State of Wisconsin
Department of Natural Resources
PO Box 7921, Madison WI 53707-7921
dnr.wi.gov

Technical Assistance, Environmental Liability Clarification or Post-Closure Modification Request

Form 4400-237 (R 10/21)

Notice: Use this form to request **a written response (on agency letterhead)** from the Department of Natural Resources (DNR) regarding technical assistance, a post-closure change to a site, a specialized agreement or liability clarification for Property with known or suspected environmental contamination. A fee will be required as is authorized by s. 292.55, Wis. Stats., and NR 749, Wis. Adm. Code., unless noted in the instructions below. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Public Records law [ss. 19.31 - 19.39, Wis. Stats.].

Definitions

"Property" refers to the subject Property that is perceived to have been or has been impacted by the discharge of hazardous substances.

"Liability Clarification" refers to a written determination by the Department provided in response to a request made on this form. The response clarifies whether a person is or may become liable for the environmental contamination of a Property, as provided in s. 292.55, Wis. Stats.

"Technical Assistance" refers to the Department's assistance or comments on the planning and implementation of an environmental investigation or environmental cleanup on a Property in response to a request made on this form as provided in s. 292.55, Wis. Stats.

"Post-closure modification" refers to changes to Property boundaries and/or continuing obligations for Properties or sites that received closure letters for which continuing obligations have been applied or where contamination remains. Many, but not all, of these sites are included on the GIS Registry layer of RR Sites Map to provide public notice of residual contamination and continuing obligations.

Select the Correct Form

This from should be used to request the following from the DNR:

- Technical Assistance
- Liability Clarification
- Post-Closure Modifications
- Specialized Agreements (tax cancellation, negotiated agreements, etc.)

Do not use this form if one of the following applies:

- Request for an **off-site liability exemption or clarification** for Property that has been or is perceived to be contaminated by one or more hazardous substances that originated on another Property containing the source of the contamination. Use DNR's Off-Site Liability Exemption and Liability Clarification Application Form 4400-201.
- Submittal of an Environmental Assessment for the **Lender Liability Exemption**, s 292.21, Wis. Stats., **if no response or review by DNR is requested**. Use the Lender Liability Exemption Environmental Assessment Tracking Form 4400-196.
- Request for an **exemption to develop on a historic fill site** or licensed landfill. Use DNR's Form 4400-226 or 4400-226A.
- **Request for closure** for Property where the investigation and cleanup actions are completed. Use DNR's Case Closure - GIS Registry Form 4400-202.

All forms, publications and additional information are available on the internet at: dnr.wi.gov/topic/Brownfields/Pubs.html.

Instructions

1. Complete sections 1, 2, 6 and 7 for all requests. Be sure to provide adequate and complete information.
2. Select the type of assistance requested: Section 3 for technical assistance or post-closure modifications, Section 4 for a written determination or clarification of environmental liabilities; or Section 5 for a specialized agreement.
3. Include the fee payment that is listed in Section 3, 4, or 5, unless you are a "Voluntary Party" enrolled in the Voluntary Party Liability Exemption Program **and** the questions in Section 2 direct otherwise. Information on to whom and where to send the fee is found in Section 8 of this form.
4. Send the completed request, supporting materials and the fee to the appropriate DNR regional office where the Property is located. See the map on the last page of this form. A paper copy of the signed form and all reports and supporting materials shall be sent with an electronic copy of the form and supporting materials on a compact disk. For electronic document submittal requirements see: http://dnr.wi.gov/files/PDF/pubs/rr/RR690.pdf"

The time required for DNR's determination varies depending on the complexity of the site, and the clarity and completeness of the request and supporting documentation.

Section 1. Contact and Recipient Information

Requester Information

This is the person requesting technical assistance or a post-closure modification review, that his or her liability be clarified or a specialized agreement and is identified as the requester in Section 7. DNR will address its response letter to this person.

Last Name	First	MI	Organization/ Business Name		
Chambers	Britta		3M		
Mailing Address			City	State	ZIP Code
3M Center, 225-IN-22			St. Paul	MN	55144-1000
Phone # (include area code)	Fax # (include area code)		Email		
(952) 378-0198			bchambers2@mmm.com		

The requester listed above: (select all that apply)

- ☐ Is currently the owner
- ☐ Is considering selling the Property
- ☐ Is renting or leasing the Property
- ☐ Is considering acquiring the Property
- ☐ Is a lender with a mortgagee interest in the Property
- ☒ Other. Explain the status of the Property with respect to the applicant:

  Property Owner Representative

Contact Information (to be contacted with questions about this request) ☐ Select if same as requester

Contact Last Name	First	MI	Organization/ Business Name		
Chambers	Britta		3M		
Mailing Address			City	State	ZIP Code
3M Center, 225-IN-22			St. Paul	MN	55144-1000
Phone # (include area code)	Fax # (include area code)		Email		
(952) 378-0198			bchambers2@mmm.com		

Environmental Consultant (if applicable)

Contact Last Name	First	MI	Organization/ Business Name		
Bonniwell	CHris		Tetra Tech		
Mailing Address			City	State	ZIP Code
13555 Bishops Court, SUite 201			Brookfield	WI	53005
Phone # (include area code)	Fax # (include area code)		Email		
(262) 792-1282			chris.bonniwell@tetratech.com		

Section 2. Property Information

Property Name			FID No. (if known)
BRRTS No. (if known)		Parcel Identification Number	
02-17-590808		1725122812183100003 + 13 other parcels	
Street Address		City	State / ZIP Code
1425 Stokke Parkway			
County	Municipality where the Property is located	Property is composed of:	Property Size Acres
Dunn	◉ City ○ Town ○ Village of	○ Single tax parcel ◉ Multiple tax parcels	490

1. Is a response needed by a specific date? (e.g., Property closing date) Note: Most requests are completed within 60 days. Please plan accordingly.

◉ No ○ Yes

Date requested by: _____

Reason:

_____

2. Is the "Requester" enrolled as a Voluntary Party in the Voluntary Party Liability Exemption (VPLE) program?

◉ No. **Include the fee that is required for your request in Section 3, 4 or 5.**

○ Yes. **Do not include a separate fee.** This request will be billed separately through the VPLE Program.

Fill out the information in Section 3, 4 or 5 which corresponds with the type of request:
Section 3. Technical Assistance or Post-Closure Modifications;
Section 4. Liability Clarification; or Section 5. Specialized Agreement.

Section 3. Request for Technical Assistance or Post-Closure Modification

Select the type of technical assistance requested: **[Numbers in brackets are for WI DNR Use]**

☐ No Further Action Letter (NFA) (Immediate Actions) - NR 708.09, [183] - Include a fee of $350. Use for a written response to an immediate action after a discharge of a hazardous substance occurs. Generally, these are for a one-time spill event.

☒ Review of Site Investigation Work Plan - NR 716.09, [135] - **Include a fee of $700.**

☐ Review of Site Investigation Report - NR 716.15, [137] - **Include a fee of $1050.**

☐ Approval of a Site-Specific Soil Cleanup Standard - NR 720.10 or 12, [67] - **Include a fee of $1050.**

☐ Review of a Remedial Action Options Report - NR 722.13, [143] - **Include a fee of $1050.**

☐ Review of a Remedial Action Design Report - NR 724.09, [148] - **Include a fee of $1050.**

☐ Review of a Remedial Action Documentation Report - NR 724.15, [152] - **Include a fee of $350**

☐ Review of a Long-term Monitoring Plan - NR 724.17, [25] - **Include a fee of $425.**

☐ Review of an Operation and Maintenance Plan - NR 724.13, [192] - **Include a fee of $425.**

Other Technical Assistance - s. 292.55, Wis. Stats. [97] (For request to build on an abandoned landfill use Form 4400-226)

☐ Schedule a Technical Assistance Meeting - **Include a fee of $700.**

☐ Hazardous Waste Determination - **Include a fee of $700.**

☐ Other Technical Assistance - **Include a fee of $700.** Explain your request in an attachment.

Post-Closure Modifications - NR 727, [181]

☐ Post-Closure Modifications: Modification to Property boundaries and/or continuing obligations of a closed site or Property; sites may be on the GIS Registry. This also includes removal of a site or Property from the GIS Registry. **Include a fee of $1050, and:**

- ☐ Include a fee of $300 for sites with residual soil contamination; and
- ☐ Include a fee of $350 for sites with residual groundwater contamination, monitoring wells or for vapor intrusion continuing obligations.

Attach a description of the changes you are proposing, and documentation as to why the changes are needed (if the change to a Property, site or continuing obligation will result in revised maps, maintenance plans or photographs, those documents may be submitted later in the approval process, on a case-by-case basis).

Section 4. Request for Liability Clarification

Select the type of liability clarification requested. Use the available space given or attach information, explanations, or specific questions that you need answered in DNR's reply. Complete Sections 6 and 7 of this form. **[Numbers in brackets are for DNR Use]**

☐ "Lender" liability exemption clarification - s. 292.21, Wis. Stats. [686]

❖ **Include a fee of $700.**

Provide the following documentation:

(1) ownership status of the real Property, and/or the personal Property and fixtures;

(2) an environmental assessment, in accordance with s. 292.21, Wis. Stats.;

(3) the date the environmental assessment was conducted by the lender;

(4) the date of the Property acquisition; for foreclosure actions, include a copy of the signed and dated court order confirming the sheriff's sale.

(5) documentation showing how the Property was acquired and the steps followed under the appropriate state statutes.

(6) a copy of the Property deed with the correct legal description; and,

(7) the Lender Liability Exemption Environmental Assessment Tracking Form (Form 4400-196).

(8) If no sampling was done, please provide reasoning as to why it was **not** conducted. Include this either in the accompanying environmental assessment or as an attachment to this form, and cite language in s. 292. 21(1)(c)2.,h.-i., Wis. Stats.:

h. The collection and analysis of representative samples of soil or other materials in the ground that are suspected of being contaminated based on observations made during a visual inspection of the real Property or based on aerial photographs, or other information available to the lender, including stained or discolored soil or other materials in the ground and including soil or materials in the ground in areas with dead or distressed vegetation. The collection and analysis shall identify contaminants in the soil or other materials in the ground and shall quantify concentrations.

i. The collection and analysis of representative samples of unknown wastes or potentially hazardous substances found on the real Property and the determination of concentrations of hazardous waste and hazardous substances found in tanks, drums or other containers or in piles or lagoons on the real Property.

☐ "Representative" liability exemption clarification (e.g. trustees, receivers, etc.) - s. 292.21, Wis. Stats. [686]

❖ **Include a fee of $700.**

Provide the following documentation:

(1) ownership status of the Property;

(2) the date of Property acquisition by the representative;

(3) the means by which the Property was acquired;

(4) documentation that the representative has no beneficial interest in any entity that owns, possesses, or controls the Property;

(5) documentation that the representative has not caused any discharge of a hazardous substance on the Property; and

(6) a copy of the Property deed with the correct legal description.

☐ Clarification of local governmental unit (LGU) liability exemption at sites with: (select all that apply)

☐ hazardous substances spills - s. 292.11(9)(e), Wis. Stats. [649];

☐ Perceived environmental contamination - [649];

☐ hazardous waste - s. 292.24 (2), Wis. Stats. [649]; and/or

☐ solid waste - s. 292.23 (2), Wis. Stats. [649].

❖ **Include a fee of $700, a summary of the environmental liability clarification being requested, and the following:**

(1) clear supporting documentation showing the acquisition method used, and the steps followed under the appropriate state statute(s).

(2) current and proposed ownership status of the Property;

(3) date and means by which the Property was acquired by the LGU, where applicable;

(4) a map and the ¼, ¼ section location of the Property;

(5) summary of current uses of the Property;

(6) intended or potential use(s) of the Property;

(7) descriptions of other investigations that have taken place on the Property; and

(8) (for solid waste clarifications) a summary of the license history of the facility.

Section 4. Request for Liability Clarification (cont.)

☐ Lease liability clarification - s. 292.55, Wis. Stats. [646]

- ❖ **Include a fee of $700 for a single Property, or $1400 for multiple Properties and the information listed below:**

(1) a copy of the proposed lease;

(2) the name of the current owner of the Property and the person who will lease the Property;

(3) a description of the lease holder's association with any persons who have possession, control, or caused a discharge of a hazardous substance on the Property;

(4) map(s) showing the Property location and any suspected or known sources of contamination detected on the Property;

(5) a description of the intended use of the Property by the lease holder, with reference to the maps to indicate which areas will be used. Explain how the use will not interfere with any future investigation or cleanup at the Property; and

(6) all reports or investigations (e.g. Phase I and Phase II Environmental Assessments and/or Site Investigation Reports conducted under s. NR 716, Wis. Adm. Code) that identify areas of the Property where a discharge has occurred.

General or other environmental liability clarification - s. 292.55, Wis. Stats. [682] - Explain your request below.

- ❖ **Include a fee of $700 and an adequate summary of relevant environmental work to date.**

☐ No Action Required (NAR) - NR 716.05, [682]

- ❖ **Include a fee of $700.**

Use where an environmental discharge has or has not occurred, and applicant wants a DNR determination that no further assessment or clean-up work is required. Usually this is requested after a Phase I and Phase II environmental assessment has been conducted; the assessment reports should be submitted with this form. This is not a closure letter.

☐ Clarify the liability associated with a "closed" Property - s. 292.55, Wis. Stats. [682]

- ❖ **Include a fee of $700.**

- Include a copy of any closure documents if a state agency other than DNR approved the closure.

Use this space or attach additional sheets to provide necessary information, explanations or specific questions to be answered by the DNR.

Section 5. Request for a Specialized Agreement

Select the type of agreement needed. Include the appropriate draft agreements and supporting materials. Complete Sections 6 and 7 of this form. More information and model draft agreements are available at: dnr.wi.gov/topic/Brownfields/lgu.html#tabx4.

☐ Tax cancellation agreement - s. 75.105(2)(d), Wis. Stats. [654]

- ❖ **Include a fee of $700, and the information listed below:**

(1) Phase I and II Environmental Site Assessment Reports,

(2) a copy of the Property deed with the correct legal description.

☐ Agreement for assignment of tax foreclosure judgement - s.75.106, Wis. Stats. [666]

- ❖ **Include a fee of $700, and the information listed below:**

(1) Phase I and II Environmental Site Assessment Reports,

(2) a copy of the Property deed with the correct legal description.

☐ Negotiated agreement - Enforceable contract for non-emergency remediation - s. 292.11(7)(d) and (e), Wis. Stats. [630]

- ❖ **Include a fee of $1400, and the information listed below:**

(1) a draft schedule for remediation; and,

(2) the name, mailing address, phone and email for each party to the agreement.

Section 6. Other Information Submitted

Identify all materials that are included with this request.

Send both a paper copy of the signed form and all reports and supporting materials, and an electronic copy of the form and all reports, including Environmental Site Assessment Reports, and supporting materials on a compact disk.

Include one copy of any document from any state agency files that you want the Department to review as part of this request. The person submitting this request is responsible for contacting other state agencies to obtain appropriate reports or information.

- ☐ Phase I Environmental Site Assessment Report - Date: _____
- ☐ Phase II Environmental Site Assessment Report - Date: _____
- ☐ Legal Description of Property (required for all liability requests and specialized agreements)
- ☒ Map of the Property (required for all liability requests and specialized agreements)

Analytical results of the following sampled media: Select all that apply and include date of collection.

☒ Groundwater ☐ Soil ☐ Sediment ☒ Other medium - Describe: Surface water

Date of Collection: 12/11/2023

- ☐ A copy of the closure letter and submittal materials
- ☐ Draft tax cancellation agreement
- ☐ Draft agreement for assignment of tax foreclosure judgment
- ☒ Other report(s) or information - Describe: Groundwater Investigation Work Plan

For Property with newly identified discharges of hazardous substances only: Has a notification of a discharge of a hazardous substance been sent to the DNR as required by s. NR 706.05(1)(b), Wis. Adm. Code?

- ○ Yes - Date (if known): _____
- ○ No

Note: The Notification for Hazardous Substance Discharge Form - Non-Emergency Only (Form 4400-225) is accessible through the RR Program Submittal Portal application. Directions for using the form and the Submittal Portal application are available on the Submittal Portal web page.

Section 7. Certification by the Person who completed this form

- ☐ I am the person submitting this request (requester)
- ☒ I prepared this request for: Britta Chambers
  Requester Name

I certify that I am familiar with the information submitted on this request, and that the information on and included with this request is true, accurate and complete to the best of my knowledge. I also certify I have the legal authority and the applicant's permission to make this request.

Signature

4/1/24
Date Signed

Midwest Principal Account Manager
Title

(262) 792-1282
Telephone Number (include area code)

Section 8. DNR Contacts and Addresses for Request Submittals

Send or deliver one paper copy and one electronic copy on a compact disk of the completed request, supporting materials, and fee to the region where the property is located to the address below. Contact a DNR regional brownfields specialist with any questions about this form or a specific situation involving a contaminated property. For electronic document submittal requirements see: http://dnr.wi.gov/files/PDF/pubs/rr/RR690.pdf.

DNR NORTHERN REGION
Attn: RR Program Assistant
Department of Natural Resources
223 E Steinfest Rd Antigo, WI 54409

DNR NORTHEAST REGION
Attn: RR Program Assistant
Department of Natural Resources
2984 Shawano Avenue
Green Bay WI 54313

DNR SOUTH CENTRAL REGION
Attn: RR Program Assistant
Department of Natural Resources
3911 Fish Hatchery Road
Fitchburg WI 53711

DNR SOUTHEAST REGION
Attn: RR Program Assistant
Milwaukee DNR Office
1027 West St. Paul Ave
Milwaukee WI 53233

DNR WEST CENTRAL REGION
Attn: RR Program Assistant
Department of Natural Resources
1300 Clairemont Ave.
Eau Claire WI 54702

Note: These are the Remediation and Redevelopment Program's designated regions. Other DNR program regional boundaries may be different.

DNR Use Only			
Date Received	Date Assigned	BRRTS Activity Code	BRRTS No. (if used)
DNR Reviewer		Comments	
Fee Enclosed? ◯ Yes ◯ No	Fee Amount $	Date Additional Information Requested	Date Requested for DNR Response Letter
Date Approved	Final Determination		

3M Environment, Health
Safety and Product Stewardship

3M Center 225-1N-22
St. Paul, MN 55144-1000

April 1, 2024

Mr. Tim Zeichert
Hydrogeologist, Remediation & Redevelopment
Wisconsin Department of Natural Resources
101 Webster Street, PO Box 7921
Madison, Wisconsin 53707

RE: Submittal of Recent Sampling Results and Groundwater Investigation Work Plan
3M Company, Menomonie, Wisconsin
DNR BRRTS Activity # 02-17-590808 and DNR FID #617056660

Mr. Zeichert:

On September 29, 2023, 3M Company (3M) submitted a Site Investigation Report (SIR) summarizing the findings of the Field Investigation performed in May 2023 at 3M Menomonie, 1425 Stokke Parkway, Menomonie, Wisconsin. As noted in the Recommendations section of the SIR, 3M proposed additional environmental investigation including, but not limited to, supplemental groundwater and surface water sampling. A formal response from the Wisconsin Department of Natural Resources (DNR) regarding the SIR has yet to be received. At the direction of 3M, the following activities have been performed by 3M's environmental consultant, Tetra Tech, Inc. (Tetra Tech), since submittal of the SIR:

- Preparation of a Groundwater Investigation Work Plan prepared in accordance with Sections NR716.07 and NR716.09 Wisconsin Administrative Code (Wisc. Admin. Code, Modified February 1997) and in accordance with recommended additional investigation activities summarized in the SIR dated September 28, 2023. The Work Plan was submitted to the DNR via the online Remediation and Redevelopment (RR) Program Submittal Portal on April 1, 2024 by Tetra Tech.
- Site reconnaissance and a drone survey was performed between Stokke Parkway and 3M's western property line in December 2023. Nine distinct groundwater seeps between the monitoring well network and the tributary were identified, and high-resolution topographic data was collected.
- Comprehensive groundwater sampling at the new groundwater monitoring well network was performed in December 2023 to confirm the May 2023 analytical results. December 2023 groundwater analytical results for per- and polyfluoroalkyl substances (PFAS) were similar to May 2023 results. Hexavalent chromium was not detected in six of the seven groundwater samples collected in December 2023.
- Surface water samples were collected in January 2024 to assess potential presence of PFAS in the unnamed tributary and seeps. PFAS was detected in both seep and creek samples. Surface water concentrations generally reflect concentration trends observed in upgradient monitoring wells MW-4, MW-5, and MW-6.
- Within 10 days of 3M's receipt of the final validated laboratory reports, the December 2023 groundwater and January 2024 surface water analytical results were submitted

to the DNR via the online RR Program Submittal Portal on April 1, 2024. The data are compiled in the Table, Figure, and laboratory analytical reports which are enclosed with this transmittal letter for your convenience.

3M respectfully requests the WDNR's formal review and written response to the Groundwater Investigation Work Plan. The required review fee of $700 in accordance with NR 729, Wisc. Admin. Code is being sent to Ms. Hayley Schnae, the assigned Environmental Program Associate in Eau Claire, Wisconsin.

Please contact me via email at bchambers2@mmm.com should you have any questions or concerns regarding the SIR, the 2024 Groundwater Investigation Work Plan and/or the enclosed supplemental sampling data.

Sincerely,

Britta Chambers
Advanced Environmental Scientist
3M Global Remediation

Enclosure

CC: Kristen Colberg, 3M Global Remediation
LiJane Brunner, 3M Menomonie
Chris Bonniwell, Tetra Tech

Groundwater Investigation Work Plan
3M Company
Menomonie, Wisconsin

PREPARED FOR

3M Global Environment, Health & Safety
3M Center, 225-1N-22
St. Paul, MN 55144

PRESENTED BY

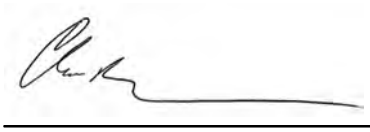
Tetra Tech, Inc.
13555 Bishops Court, Suite 201
Brookfield, WI 53005

March 26, 2024

CERTIFICATION

Hydrogeologist:

I hereby certify that I am a hydrogeologist as that term is defined in s. NR712.03(1), Wis. Adm. Code, and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR700 to 726, Wis. Adm. Code.



Chris Bonniwell, Ph.D, P.G.
Midwest Principal Account Manager

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LIST OF ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
3M	3M Company
bgs	below ground surface
BRRTS	Bureau for Remediation and Redevelopment Tracking System
ft	feet
IDW	investigation derived wastes
NAVD88	North American Vertical Datum of 1988
ng/L	Nanograms per liter
Pace	PACE Analytical Services, LLC
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonic acid
QA/QC	quality assurance/quality control
SIR	Site Investigation Report
Site	3M Menomonie, 1425 Stokke Parkway, Menomonie, Wisconsin
Tetra Tech	Tetra Tech, Inc.
VOCs	volatile organic compounds
WDNR	Wisconsin Department of Natural Resources

1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) has prepared this Groundwater Investigation Work Plan (Work Plan) on behalf of 3M Company (3M) to conduct additional groundwater investigation (Investigation) at the 3M Menomonie facility located at 1425 Stokke Parkway in Menomonie, Wisconsin (Site). The location of the Site is presented in **Figure 1.** The Site is identified in the Wisconsin Department of Natural Resources (WDNR) Bureau of Remediation and Redevelopment Tracking System (BRRTS) as site #02-17-590808

This Work Plan has been prepared in accordance with Sections NR716.07 and NR716.09 Wisconsin Administrative Code (Wisc. Admin. Code, Modified February 1997) and in accordance with Tetra Tech recommended additional investigation activities summarized in the Phase II CESA – Site Investigation Report (SIR) dated September 28, 2023. Background information on the basis of previous investigative activities, the investigative designs, and analytical results can be found within the SIR.

The SIR recommended additional Site investigative activities to evaluate soil, groundwater, and surface water conditions present at the site. The objective of the groundwater and surface-water investigative activities described in this Work Plan are to further refine delineation and characterization of per- and polyfluoroalkyl substances (PFAS) previously identified in groundwater and surface water. Groundwater and surface-water investigation has been prioritized; soil investigative activities will be conducted under a separate Soil Investigation Work Plan yet to be designed. A portion of the additional groundwater sampling and surface water sampling described in the September 2023 SIR were proactively performed in December 2023 and January 2024. The supplemental data are detailed in this report and contribute to the Site conceptual site model and the objectives described within this Work Plan.

1.1 SITE DESCRIPTION

The Site is located in Dunn County, in the southeast quarter (SE 1/4), Section 18 (S18) of Township 28 north (T28N) Range 12 west (12W). The 490-acre Site is located south of I-94 and includes the primary 3M manufacturing facility as well as surrounding undeveloped fields which are also owned by 3M. The main manufacturing facility consists of thirteen interconnected buildings that have a total approximate footprint of 750,000 square feet. A small stormwater pond is located on the west side of the Site and a larger stormwater retention pond is located on the northwest side of the Site. Stormwater is conveyed to these ponds through a series of underground pipes and aboveground swales. Both retention ponds serve as infiltration basins and currently there are no stormwater discharges from the Site. The remainder of the Site consists of asphalt paved parking lots, gravel driving lanes, and landscaped areas. 3M Menomonie is supplied by municipal water. The location of the Site is presented in **Figure 1**. The Site details are presented in **Figure 2**.

The Site has served as a research and product development facility for 3M since it was originally constructed in 1974. The Site houses 19 different 3M divisions related to manufacturing of film, tape, coatings, optical, and personal care products. Prior to 1974, the Site and surrounding property were used for agricultural purposes.

1.2 TOPOGRAPHY AND DRAINAGE

The developed portion of the Site is generally flat at an elevation of approximately 890 feet (ft) above North American Vertical Datum of 1988 (NAVD88) according to the United States Geological Survey 2018 topographic map. Topography on the west side of the Site, slopes steeply downward to the west, toward an unnamed tributary to Lake Menomin that is at an elevation of approximately 820 ft NAVD88. On December 11, 2023, Tetra Tech staff performed aerial drone reconnaissance of the Site to provide updated base imagery of building structures and to perform photogrammetric analysis for improved characterization of elevations on the western slopes.

Surface water flow across the Site is westward. The nearest surface water body is Lake Menomin which is a reservoir on the Red Cedar River. A previous stormwater management system was replaced between 1992 and 2005 with the current man-made stormwater retention ponds in the west and northwest portions of the Site.

1.3 GEOLOGY & HYDROGEOLOGY

Lithology at the Site consists primarily of sand and silty sand observed from ground surface to approximately 70 ft below ground surface (bgs), the maximum depth of the previous investigation. The sands are fine to coarse grained and generally vary in color between different shades of brown and gray. Trace amounts of gravel can also be present in the sand depending on depth and location. A clay layer, approximately 3 to 8 inches thick, was observed at a depth of 5 to 7 ft bgs in borings on the southern end of the investigation area. The clay is generally soft with low plasticity and contains varying amounts of silt. The depth to bedrock in the vicinity of the Site is reportedly approximately 100 to 200 ft bgs and is classified as a fine-grained sandstone of the Cambrian-age Eau Claire formation (Brown, 1988). Site-specific depth to bedrock has not yet been determined.

A potentiometric surface map was constructed from groundwater water level measurements collected on May 8, 2023. A west-northwest flow direction was determined with groundwater observed at depths ranging from approximately 62 to 68 ft bgs across the site. Water levels collected from the existing monitoring well network in December 2023 identified a similar potentiometric surface (**Figure 3**), with groundwater elevations on average approximately 3 ft higher than during the initial sampling event (**Table 1**). Groundwater flow is observed to be generally east to west, mirroring the site topography, which slopes gently downward towards the west and then steeply drops approximately 70 ft towards an adjacent unnamed tributary of Lake Menomin. Based on groundwater and surface elevations it is assumed that the local water table intersects the water surface at the unnamed tributary.

1.4 GROUNDWATER CHARACTERIZATION

Seven groundwater monitoring wells were installed in May 2023 to depths ranging from 68.49 ft bgs to 76.53 ft bgs. Groundwater samples were collected for analysis of PFAS, volatile organic compounds, polycyclic aromatic hydrocarbons, metals, and hexavalent chromium. An additional round of groundwater monitoring from the established monitoring wells was performed in December 2023 to corroborate the May 2023 sampling results for PFAS and hexavalent chromium. Samples were collected in a manner consistent with methodologies detailed in the SIR. Samples were submitted to the PACE Analytical Services, LLC (Pace) laboratory in Minneapolis, Minnesota for PFAS analysis using EPA Method 537.1 by isotope dilution for the 33 PFAS analytes required by the State of Wisconsin. Hexavalent chromium samples were sent to the Pace laboratory in Duluth, Minnesota for analysis using method SM 3500-CrB-2011. The PFAS and hexavalent chromium analytical results from the May and December 2023 sampling events are compiled in **Table 2.** PFAS results are also presented in **Figure 4.** December 2023 field forms are compiled in **Appendix A** and December 2023 laboratory reports are compiled in **Appendix B**[1].

The May 2023 sampling event identified the presence of hexavalent chromium in five groundwater monitoring wells. The subsequent sampling in December 2023 did not identify detectable concentrations of hexavalent chrome in six of seven of the monitoring wells, with an estimated concentration (j flagged) of 0.0018 mg/L detected in MW-2. A review of the sampling methods for the two events identified that the laboratory methods for the initial event did not include a sample filtration step, while the subsequent laboratory analysis did include filtration. The hexavalent chrome detections in the May 2023 sampling event are considered erroneous and the compound is no longer considered a contaminant of concern for the Site.

[1] *The original chain of custody for Pace PFAS analytical report # 10678774 erroneously identified the sample from MW-7 as MW-6 and from MW-6 as MW-5. Sample names and results were corrected during data validation/review.*

The PFAS analytical results from the December 2023 sampling event were generally consistent with those of the initial sampling event in the magnitude and assemblage of detected compounds at each location. In considering Perfluorooctanoic acid (PFOA) and Perfluorooctane sulfonic acid (PFOS) as the primary compounds of interest, the maximum combined PFOA and PFOS concentrations were observed in MW-3 (2,440 ng/L; 1,910 ng/L duplicate) and downgradient well MW-4 (1,590 ng/L), which is consistent with the previous sampling event. Fluctuating PFOA concentrations were noted between the May 2023 and December 2023 groundwater sampling events at MW-4 (75 ng/L to 190 ng/L) and MW-6 (56 ng/L to below detection). Fluctuating PFOS were noted at MW-2 (200 ng/L to 62 ng/L) and MW-5 (350 ng/L to 94 ng/L). The observed fluctuations may be related to the observed rise in groundwater elevation between sampling events.

1.5 SURFACE WATER PFAS CHARACTERIZATION

Based upon site groundwater elevations being similar to surface water elevations in the western adjacent unnamed tributary, the SIR recommended surface waters of the tributary be sampled. Reconnaissance of the tributary area in December 2023 identified several groundwater seeps visibly contributing to the tributary flow (**Figure 4**). On January 11, 2024 Tetra Tech staff mobilized to the creek area to collect surface water samples from four seep locations (Seep01, Seep03, Seep05, and Seep08). Samples were also collected from three locations within the creek representing the downgradient edge of 3M property (Creek01), the midpoint of the flowing creek (Creek02), and immediately below the beaver dam (Creek03). Samples were collected utilizing disposable PFAS-free dipper cups into laboratory provided containers. Samples were submitted to the PACE Analytical Services, LLC (Pace) laboratory in Minneapolis, Minnesota for PFAS analysis using EPA Method 537.1 by isotope dilution for the 33 PFAS analytes required by the State of Wisconsin. Analytical results are compiled in **Table 3**, depicted in **Figure 4**, and laboratory analytical reports are compiled in **Appendix C**.

PFAS analysis identified detectable concentrations of one or more PFAS analytes in each collected creek and seep samples. Analytical results were compared to established Wisconsin Department of Natural Resources (WDNR) surface water standards for PFOA (95 ng/L for non-public use water ways) and PFOS (8 ng/L). No samples exceeded the PFOA surface water criteria. Creek samples exceeded the PFOS criteria at the downgradient most location (Creek01) with a concentration of 33 ng/L. Similar to seep concentrations, creek concentrations of PFOS decreased to 17 ng/L in upgradient location Creek02, and further to nondetectable levels at Creek03. The PFOS surface water criteria was exceeded in three seep locations (Seep03, Seep05, and Seep08), with a maximum concentration of 250 ng/L in Seep03. Seep PFOS concentrations decreased upgradient from Seep03 to 140 ng/L at Seep05 and further to 24 ng/L at Seep08. The sample collected from downgradient Seep01 was below detection limits. Seep concentrations generally reflect concentration trends observed in upgradient monitoring wells MW-4, MW-5, and MW-6.

1.6 GROUNDWATER RECEPTOR SURVEY

To consider if impacts may have migrated off the Site in accordance with NR 716.07 and NR716.09, Wisc. Admin. Code, Tetra Tech performed a groundwater receptor survey for a one-mile radius of the Site. Details of the survey are provided below.

1.6.1 Groundwater Receptor Survey Methodology

The survey primarily utilized online information available through the Well Construction Information System maintained by the WDNR. The Well Construction Information System is a data entry program developed by the State of Wisconsin to facilitate the submittal of water well records. Primarily, the database contains information provided by well-drilling contractors. Wells that have been abandoned are not removed from the database nor does the database indicate if the well is in service or if it has been abandoned. Municipal water supply information was obtained from websites operated by local municipalities.

Tetra Tech accessed groundwater receptor information between November 1, 2023 to November 10, 2023. Well records obtained during the search are summarized in **Table 4**. The table includes well identification numbers assigned by Tetra Tech, well identification numbers assigned by WDNR, general information, well construction information, and well location information. The location of wells in relation to the Site and their identification numbers are depicted on **Figure 5**. Each well was placed on the figure according to latitude and longitude coordinates obtained from the WDNR GIS Open Data Portal and as depicted in the Well Construction Information System. In some instances, online records indicate that more than one well is installed in the same location or not within the setting described on the well construction record; these locations were not adjusted for this exercise. Well location information used to plot each well is provided in **Table 4**.

1.6.2 Receptor Survey Findings

The result of the survey identified 37 wells within a one-mile radius of the Site property (**Figure 5**). Well construction records were reviewed to determine the general use of each well. According to the use of each well they were sorted into the following categories:

- Private Potable Well (16 wells)
- Institutional Potable Well (3 wells)
- Geothermal (15 wells)
- Farm & Irrigation (2 wells)
- Unknown (1 wells)

Review of the wells identified within the search radius indicates:

- All wells identified within the search radius can be assumed to be located upgradient or cross-gradient from the Site, with respect to the groundwater flow direction established across the Site.
- Based upon the establish groundwater flow direction at the Site (**Figure 3**), four wells are depicted downgradient of the site. However, the coordinates specified in the DNR database identifies these four wells as being located within Lake Menomin or Lake Menomin Park in unlikely locations. Location inaccuracy is likely attributable to the age of the installation records and geospatial errors.
- No residential or private properties are located immediately downgradient of the Site.

Dunn County municipalities within the search radius include the City of Menomonie. Potable water for Menomonie is provided by the Menomonie Waterworks, PWS ID: 61702865. According to the Menomonie Waterworks' 2022 Consumer Confidence report, water is obtained from three bedrock groundwater wells at installed depths of 394, 400, and 417 ft bgs. The Menomonie Waterworks' 2022 Consumer Confidence report identified no detections of PFAS. Information retrieved online from the United States Geological Survey indicates that Menomonie does not have an established wellhead protection plan. Lake Menomin is not identified as a public water supply.

Surface waters identified as potential groundwater receptors within the search radius include the western adjacent Lake Menomin and the unnamed intermittent stream between the site and Lake Menomin. The intermittent creek and Lake Menomin are approximately 675 ft and 1,500 feet west of the facility, respectively.

2.0 CONCEPTUAL SITE MODEL

The site investigation activities to date and the groundwater receptor survey results combine to form the Conceptual Site Model (CSM) depicted in **Figure 7** that represents a generalized cross-section approximating the longitudinal direction of groundwater flow. The figure illustrates the vadose zone soil impacts in the suspected release area,

underlying groundwater impacts, westward migration of groundwater impacts, communication of groundwater with the intermittent stream, and observed surface water impacts. Key observations from this conceptual site model include:

- On site groundwater elevation measurements and recent surface water sampling events indicate groundwater, and any associated dissolved constituents, beneath the site is in communication with surface waters of the intermittent stream.
- The vertical extent of detectable PFAS in groundwater has not been established.
- The depth of bedrock beneath the site has not been identified.
- Potential private potable wells are substantially down/cross gradient to the established groundwater flow direction at the site, and do not appear to be an immediate receptor concern.

3.0 SCOPE OF WORK

The objective of the activities described in this scope of work are to further characterize the horizontal and vertical extent of PFAS groundwater impacts and to perform confirmation sampling of the adjacent surface waters of the creek.

This scope of work includes:

- Clearing utilities prior to conducting field activities.
- Installing shallow and deep groundwater monitoring wells.
- Installing shallow groundwater sampling points near seeps
- Collecting groundwater samples for laboratory analysis.
- Collecting creek surface water samples.
- Collecting quality control samples.
- Handling investigation derived waste (IDW).

Details regarding the field investigation, rationale, field, and laboratory methods are presented in the following sections.

3.1 SAMPLING METHODOLOGY AND RATIONALE

The proposed investigative activities were selected to further refine horizontal and vertical delineation of PFAS concentrations in groundwater and perform confirmation sampling of surface waters.

The previously established monitoring wells, surface sampling locations, and the proposed monitoring well and surface water sampling locations are presented in **Figure 7**. Sample analysis will consist of PFAS analysis via EPA Method 537.1 by isotope dilution for the 33 PFAS analytes required by the State of Wisconsin. The specific activities are described in the following sections. Tetra Tech standard operating procedures (SOPs) for sample collection (including PFAS) and other field methods are presented in **Appendix E**.

3.2 UTILITY CLEARANCE

Prior to mobilization of equipment to the Site, the Wisconsin one-call (Diggers Hotline) number will be called to locate subsurface utilities at the site. Tetra Tech personnel will coordinate with Diggers Hotline and 3M will locate privately held utilities in the areas of the proposed monitoring wells.

Drilling and sampling locations may be adjusted in the field depending on the results of the utility clearance and/or environmental limitations.

3.3 MONITORING WELL INSTALLATION AND GROUNDWATER SAMPLING

3.3.1 Monitoring Well Installation

An anticipated nine monitoring wells will be installed to further delineate horizontal and vertical extent of PFAS in groundwater. Five wells (MW-8 through MW-12) are proposed to provide further horizontal delineation of shallow groundwater PFAS concentrations in the uppermost saturated zone that is typically encountered at 60 – 65 ft bgs. The proposed locations of the shallow wells are depicted on **Figure 7**. Four monitoring wells are proposed for the vertical delineation of groundwater PFAS concentrations, identification of the groundwater flow direction within the deeper aquifer, and characterization of the depth to bedrock at the site. The deep well locations are depicted on **Figure 7** as MW-4D, MW-5D, MW-8D, and MW-12D. Actual locations of monitoring wells may be adjusted based on the location of subsurface utilities or other access constraints.

The monitoring wells will be installed in accordance with the requirements specified in Chapter NR 141, Wisc. Admin. Code. Each monitoring well will be constructed of 2-inch diameter polyvinyl chloride well screen and casing. The length of the screened interval will be 10 ft. Rotosonic drilling methods and equipment will be utilized for both shallow and deep monitoring well locations. The shallow monitoring well screens will be installed to intersect the top of the water table, with a targeted interval of 3 ft above the water table to 7 ft below the water table. The water table is anticipated to be encountered at a depth of between 50 and 80 ft bgs. The five shallow wells will be installed to approximately 70 ft bgs. Bedrock is anticipated at approximately 150 ft bgs.

At the four deeper well locations borings will be advanced until bedrock is encountered. The recovered soils will be characterized and logged by a qualified geologist. The lower portion of the boring will then be abandoned and the monitoring well will be established at a depth of approximately 100 ft bgs. The dual intent of the deep boring/monitoring well is to establish the depth to bedrock and to provide vertical delineation of groundwater impacts at a depth proximally underlying the depth of shallow wells. The borings for wells MW 9, MW-10, and MW-11 will be logged by a qualified geologist. Wells MW-8 and MW-12 will not require geologic logs because they are to be located adjacent to deeper wells MW-8D and MW-12D.

The monitoring wells will be developed in accordance with the monitoring well development procedures described in Chapter NR 141.21, Wisc. Admin. Code. The monitoring wells will be constructed with an above-ground, steel well vault and protected by the installation of three protective bollards. Forms documenting the monitoring well construction and development (WDNR Forms 4400-113A and 44000113B) will be completed for each well; copies of the forms are included in **Appendix F**. The installed monitoring wells will be surveyed by a Wisconsin licensed professional surveyor to establish the location, ground elevation, and top of casing elevation.

3.3.2 Installation of Shallow Groundwater Sampling Points near Seeps

Previous sampling at seep locations was performed utilizing disposable, PFAS-free dipper cups. It is anticipated that vegetative growth during the spring and summer months will inhibit locating and/or sampling of groundwater seeps. As indicated by the presence of the groundwater seeps, the depth to groundwater is nearly coincident with the ground surface in the vicinity of the seeps. Durable sampling locations will be established via the installation of seven hand-driven sand point well-screen sampling points immediately upslope from observed seeps (PZ-1 through PZ-7), and two points located on the western bank of the tributary (PZ-8 and PZ-9). The proposed locations of these sampling points are depicted in **Figure 7**, while actual locations may vary based upon physical field conditions. Each sampling point will consist of an Eco-Flo brand 11/4” X 3-ft galvanized pipe well point equipped with 80 GZ stainless steel mesh screen (or equivalent). The sand points will be driven to approximately 5 ft bgs to intersect the underlying water table and a galvanized pipe extension will be used to

extend the pipe to approximately 3 ft above ground surface; and removable plug will be installed at the top of the pipe. The near-seep sampling points will be designated PZ-01 through PZ-09.

3.3.3 Groundwater Sampling

Groundwater sampling will be initiated by with a synoptic groundwater level measurement event conducted prior to pre-sample purging activities for monitoring wells. Water levels at all existing and new monitoring wells will be measured for this event. Following a minimum 24-hour equilibration period, the new monitoring wells will be purged and sampled using low-flow techniques in accordance with the low-flow sampling procedures included in **Appendix E**. A portable pneumatic bladder pump and dedicated tubing will be used to purge and sample the monitoring wells. New bladders will be used to purge and sample each monitoring well. Throughout the purging process field parameters, including temperature, pH, specific conductivity, dissolved oxygen, oxidation-reduction (redox) potential, and turbidity will be measured. Readings will be recorded at set intervals (every 2 to 10 minutes). The groundwater samples submitted for laboratory analyses will be collected in laboratory-provided containers once the field parameters meet the appropriate stabilization criteria (three consecutive readings differing by less than 10 percent and +/-0.3 units for pH). Samples will be submitted to the PACE Analytical Services, LLC (Pace) laboratory in Minneapolis, Minnesota for PFAS analysis using EPA Method 537.1 by isotope dilution for the 33 PFAS analytes required by the State of Wisconsin. Tetra Tech standard groundwater sampling logs will be completed for each monitoring well sampled; a copy of the log is presented in **Appendix F**. In addition to the new monitoring wells, existing monitoring wells MW-3 and MW-5 will be sampled to further assess the fluctuation in PFAS concentrations observed between the May and December 2023 sampling events. The nine new seep-area groundwater sampling points will also be sampled. **Table 5** below identifies the wells to be sampled and anticipated sample names:

Table 5 – Groundwater Sample Collection

Well ID	Depth	Status	Sample Name
MW-3*	Shallow (78.70 ft bgs)	Existing	MEWI-GW-MW3-0-YYMMDD MEWI-GW-MW3-DB-YYMMDD
MW-5	Shallow (77.72 ft bgs)	Existing	MEWI-GW-MW5-0-YYMMDD
MW-8	Shallow (~70 ft bgs)	New	MEWI-GW-MW8-0-YYMMDD
MW-9	Shallow (~70 ft bgs)	New	MEWI-GW-MW9-0-YYMMDD
MW-10	Shallow (~70 ft bgs)	New	MEWI-GW-MW10-0-YYMMDD
MW-11	Shallow (~70 ft bgs)	New	MEWI-GW-MW11-0-YYMMDD
MW-12	Shallow (~70 ft bgs)	New	MEWI-GW-MW12-0-YYMMDD
MW-4D	Deep (~100 ft bgs)	New	MEWI-GW-MW4D-0-YYMMDD
MW-5D	Deep (~100 ft bgs)	New	MEWI-GW-MW5D-0-YYMMDD
MW-8D	Deep (~100 ft bgs)	New	MEWI-GW-MW8D-0-YYMMDD
MW-12D	Deep (~100 ft bgs)	New	MEWI-GW-MW12D-0-YYMMDD
PZ-1	270 - east bank	New	MEWI-GW-PZ1-0-YYMMDD

PZ-2	465- east bank	New	MEWI-GW-PZ2-0-YYMMDD
PZ-3	600- east bank	New	MEWI-GW-PZ3-0-YYMMDD MEWI-GW-PZ3-DB-YYMMDD
PZ-4	810- east bank	New	MEWI-GW-PZ4-0-YYMMDD
PZ-5	1,005- east bank	New	MEWI-GW-PZ5-0-YYMMDD
PZ-6	1,215- east bank	New	MEWI-GW-PZ6-0-YYMMDD
PZ-7	1,425- east bank	New	MEWI-GW-PZ7-0-YYMMDD
PZ-8	465- west bank	New	MEWI-GW-PZ8-0-YYMMDD
PZ-9	600- west bank	New	MEWI-GW-PZ9-0-YYMMDD

** Duplicate sample location*

Note: YYMMDD will be replaced with the year, month, and day of sampling (e.g., 240516 for May 16, 2024)

The portable pneumatic bladder pump will be decontaminated after the groundwater samples are collected from each monitoring well by rinsing the inside and outside of the pump with a solution of Liquinox (or equivalent) and distilled water followed by a double-rinse of distilled water. The pump will be dried with paper towels and allowed to air dry between samples. The fluid used to decontaminate the portable pneumatic bladder pump will be collected along with purge water from sampling. As noted above, dedicated tubing and new bladders will be used to purge and sample each monitoring well so these items will not require decontamination.

Groundwater samples and associated QA/QC samples will be shipped to the selected laboratories under chain-of-custody, as described above.

3.4 SURFACE WATER SAMPLING

Surface water sampling will consist of the collection of samples from the creek channel.

Previous creek sampling consisted of three sampling locations (Creek01 through Creek03) as depicted in **Figure 7**. These locations will again be sampled during the forthcoming sampling event, with an additional sample (Creek04) near the Seep08 location, equidistant between Creek02 and Creek01. Marker posts will be installed at each previously identified location . A stream stage gauge will be installed at the Creek01 location to establish the relative elevation at the time of sampling and future sampling events (if needed). Quantitative methods of establishing a discharge rating curve for the creek may be explored for future evaluations. Samples will be collected utilizing disposable, PFAS-free dipper cups, and transferred into laboratory supplied containers. Samples will be submitted to the PACE Analytical Services, LLC (Pace) laboratory in Minneapolis, Minnesota for PFAS analysis using EPA Method 537.1 by isotope dilution for the 33 PFAS analytes required by the State of Wisconsin.

Table 6 – Surface Water Sample Collection

Sample Location	Location* Distance Upstream (ft)	Status	Sample Name
Creek01*	0	Existing	MEWI-GW-CREEK01-0-YYMMDD MEWI-GW-CREEK01-DB-YYMMDD
Creek02	600	Existing	MEWI-GW-CREEK02-0-YYMMDD
Creek04	1,000	New	MEWI-GW-CREEK04-0-YYMMDD
Creek03	1,425	Existing	MEWI-GW-CREEK03-0-YYMMDD

**Location is approximate distance upstream from Creek01 location*

Note: YYMMDD will be replaced with the year, month, and day of sampling (e.g., 240516 for May 16, 2024)

3.5 QUALITY CONTROL SAMPLES

QA/QC samples for the groundwater samples will be collected at a frequency of one duplicate sample, one field blank, and one equipment blank per 10 samples for PFAS. In addition, one trip blank will be analyzed for PFAS per cooler of groundwater samples.

QA/QC samples for the surface water samples will be collected at a frequency of one duplicate sample and one field blank per 10 samples for PFAS. In addition, one trip blank will be analyzed for PFAS per cooler of surface water samples.

Field blanks will be collected by pouring laboratory-supplied PFAS-free water or distilled water directly into the laboratory supplied sample containers and equipment blanks will be collected by pouring laboratory-supplied PFAS-free water or distilled over the non-disposable field equipment (such as flow cell or portable pneumatic bladder pump) directly into the laboratory supplied sample container. Field and equipment blanks will be collected at the rate of one per twenty samples. Trip blanks will use laboratory supplied containers and liquids.

3.6 INVESTIGATION DERIVED WASTES

IDW will be generated during the field investigation. These wastes will consist primarily of drilling/soil cuttings from monitoring well installation, groundwater (from monitoring well development and pre-sample purging), used bladders, used decontamination supplies (distilled water containers, paper towels, plastic sheeting), used personal protective equipment, and decontamination fluids. IDW will be segregated, containerized, and characterized by Tetra Tech. Contained wastes will be staged in the identified drum staging area (**Figure 8**) pending a waste disposal determination. Fluids generated during the investigation will be treated by 3M at the permitted on-site wastewater treatment facility. Soil characterization will be performed in accordance with the selected disposal facility's requirements. 3M will arrange for the proper disposal of soil and other non-liquid IDW.

4.0 DATA ASSESSMENT AND REPORTING

A supplemental groundwater and surface-water SIR will be prepared in accordance with NR 716.15, Wisc. Admin. Code following receipt of all validated analytical results. . The SIR will include, but will not be limited to the following:

- Description of project objectives;
- Narrative describing field activities and methods;
- Field documentation;
- WDNR Soil boring logs;
- WDNR Monitoring well construction and development forms;
- Tetra Tech groundwater sampling forms;
- Laboratory testing reports and tabular summary of lab data;
- Figures identifying sample locations, analytical data summary (as appropriate), and the potentiometric surface;
- Summary of investigation results; and
- Conclusions and recommendations for a path forward.

5.0 SCHEDULE

The above proposed investigative activities are anticipated as three mobilizations: surface water sampling, monitoring well installation, and groundwater sampling. This Work Plan is being submitted with a technical review request and associated fee. Per WDNR guidelines, a minimum period of 60 days is to be allowed for WDNR review and comment on the work plan, within any activities performed in advance of this timeframe being performed at risk of request for WDNR for scope modifications. Investigative activities have been accelerated in accordance with the anticipated schedule below in order to avoid conflicts with facility operations scheduled for late May and June 2024. The anticipated schedule is as follows:

- 30 days after Work Plan submittal –
  - Installation of creek sampling location markers and piezometers in order to precede period of vegetative growth
  - Installation of proposed monitoring wells (~15 days to perform)
  - Surface water sampling
- 45 days after Work Plan submittal
  - Monitoring well survey
  - Groundwater sampling (~2-3 days)
- 135 days after Work Plan submittal – anticipated receipt of fully validated PFAS analytical results for surface water and groundwater samples
- 145 days after Work Plan submittal – Data submittal to WDNR within 10 days of receipt of fully validated analytical report in accordance with NR 716.14.
- 175 days after Work Plan submittal – Submittal of SIR to WDNR

The above proposed timeline is dependent upon staffing and contractor availability, and the timeline for analytical result processing and validation is based upon previous analyses associated with the Site. Significant alterations to the schedule will be communicated to the WDNR project manager.

6.0 REFERENCES

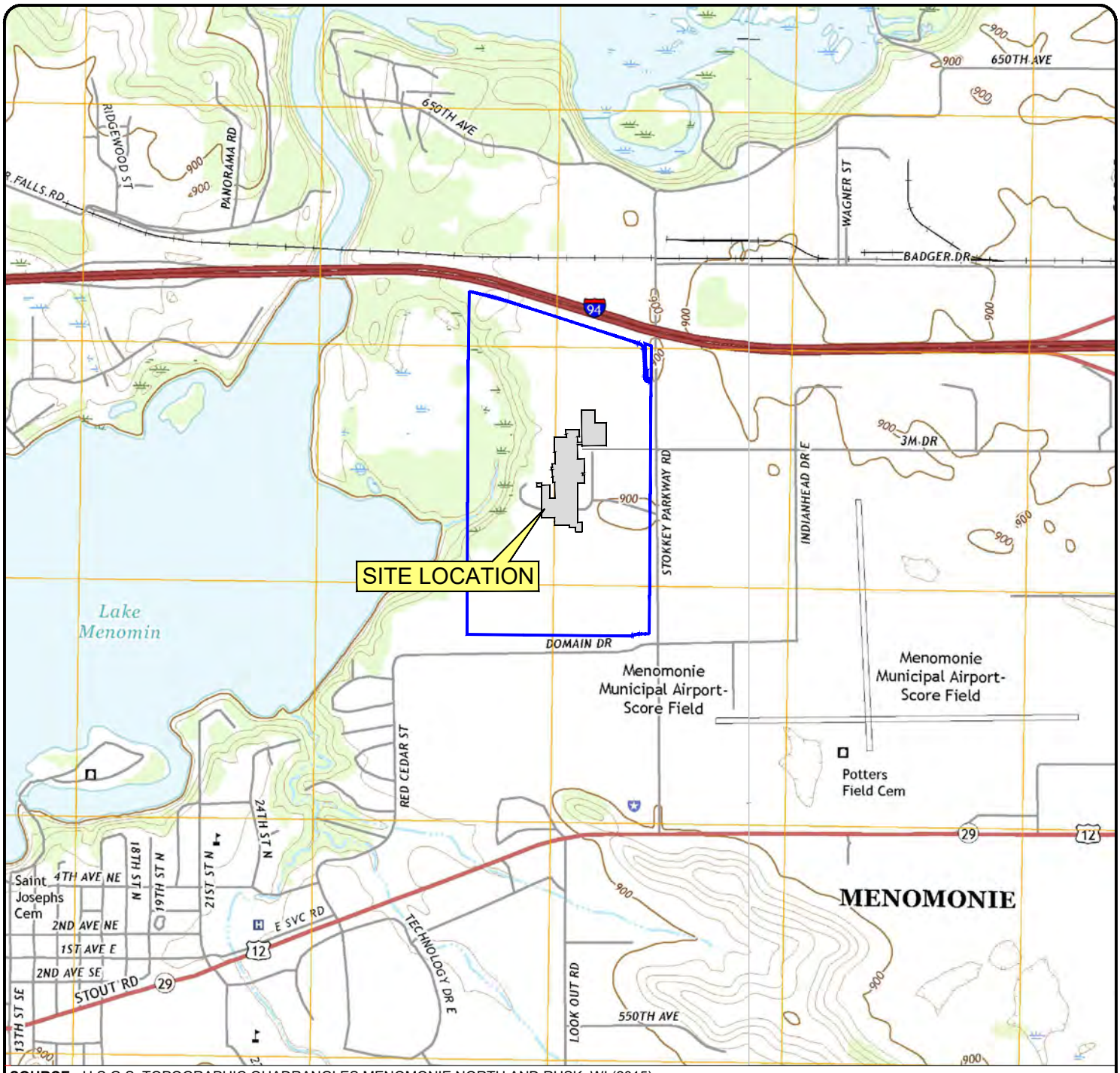
Brown, B.A. 1988, Bedrock Geology of Wisconsin, West-Central Sheet, Wisconsin Geological and Natural History Survey.

Dunn County, WI, General Map, Accessed December 2022, https://dunncowi.wgxtreme,com

Wisconsin Administrative Code, NR716.07 and NR716.09 , Modified February 1997, No. 494. Wisconsin codes established to provide uniform standards related to identification and investigation of sites and facilities that are subject to regulation under Wisconsin Statutes 289 and 292,

Wisconsin Department of Natural Resources (2022a), Accessed December 2022, https://apps.dnr.wi.gov/wellconstructionpub/#!/PublicSearch/Index

Figures



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLES MENOMONIE NORTH AND RUSK, WI (2015)

0 1000 2000 4000

Feet

N

DUNN COUNTY
WISCONSIN

P:\ACAD\03063-24001-MENO\03063-24001-009A.DWG

TETRA TECH
www.tetratech.com
13555 BISHOPS COURT, SUITE 201
BROOKFIELD, WI 53005
PHONE: 262.792.1282

3M MENOMONIE SOIL AND GROUNDWATER INVESTIGATION

1425 STOKKE PARKWAY
MENOMONIE, WISCONSIN 54751

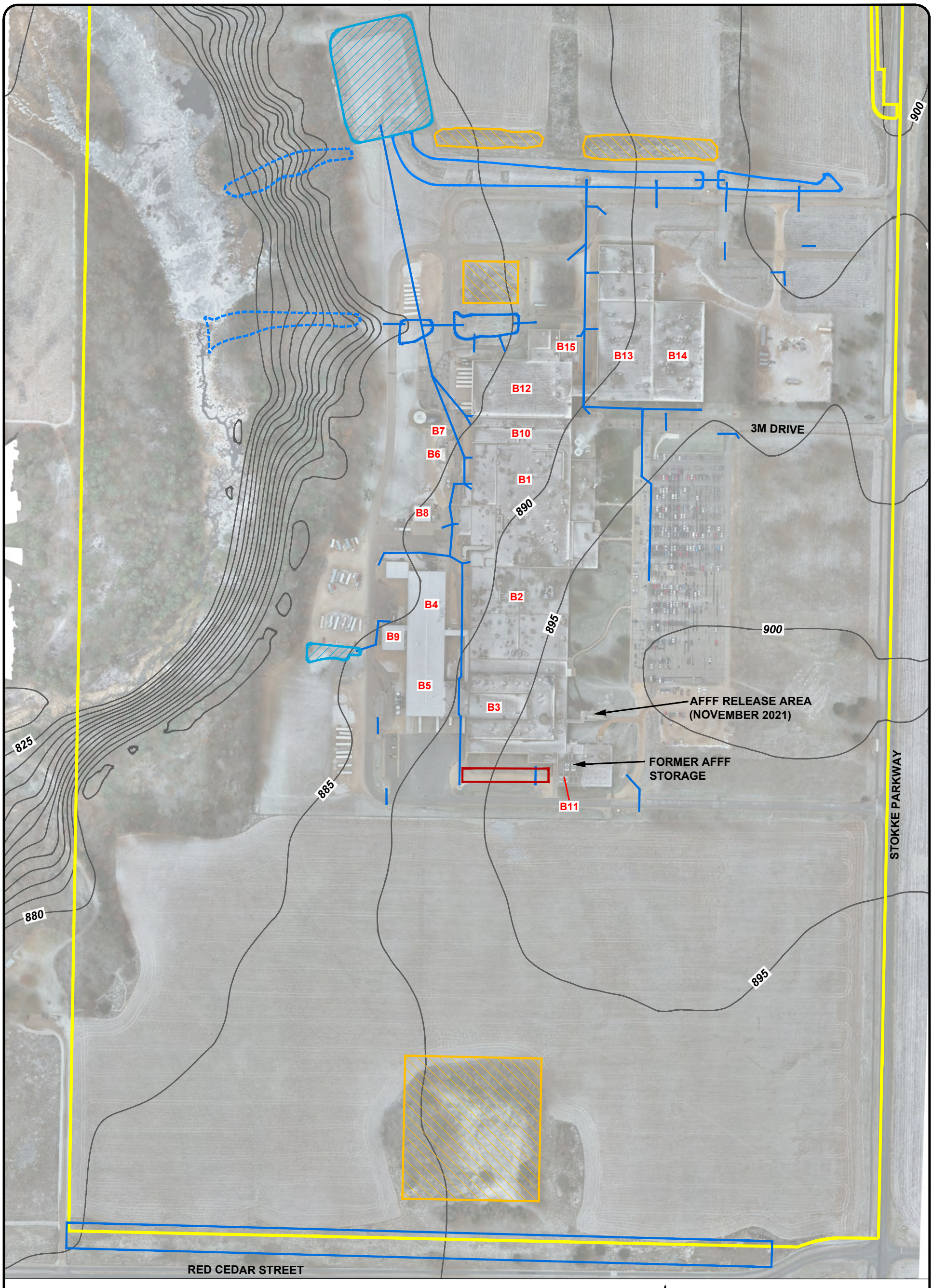
SITE LOCATION MAP

Project No:	117-03063-24001
Designed by:	CP
Checked by:	CB

FIGURE
1

Bar Measures 1 inch

3/27/2024 10:58:56 AM - P:\ACAD\03063-24001-MENO\03063-24001-003A.DWG - PAUGH, CHRISTINA



LEGEND

- Site Boundary
- B7 Building Number
- Berm / Fill Area
- Historical Fire Training Area
- Stormwater Infiltration Pond
- Stormwater Drainage Feature
- Former Stormwater Drainage Ditch
- Stormwater Conveyance
- 900 5-Foot Contour (USGS, 2018)

N

0 150 300 600

Feet

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3M MENOMONIE SOIL AND GROUNDWATER INVESTIGATION

1425 STOKKE PARKWAY
MENOMONIE, WISCONSIN 54751

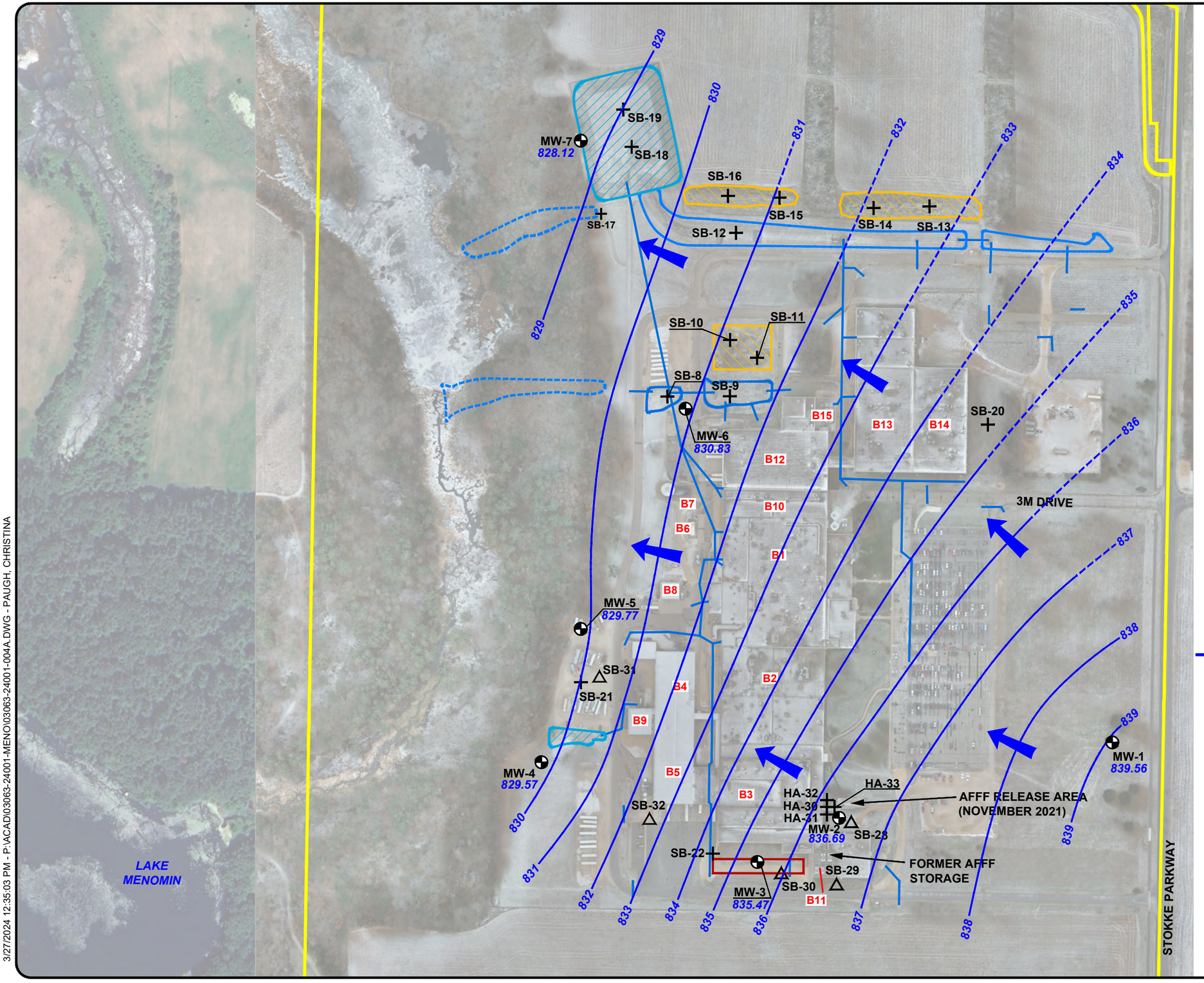
SITE DETAILS

Project No:	117-03063-24002
Designed by:	CP
Checked by:	CB

FIGURE

2

Bar Measures 1 inch



LEGEND

- Site Boundary
- B7 Building Number
- Berm / Fill Area
- Historical Fire Training Area
- Stormwater Infiltration Pond
- Stormwater Drainage Feature
- Former Stormwater Drainage Ditch
- Stormwater Conveyance
- MW-1 Monitoring Well
- SB-1 Location of Hand Auger Boring (Depth Approximately 2 Feet)
- SB-25 Location of Soil Boring Boring (Depth Approximately 10 Feet to 20 Feet
- 836 Groundwater Elevation Contour (Ft MSL) (Dashed Where Inferred)
- 835.47 Groundwater Elevation (Ft)
- Groundwater Flow Direction

Note: Water Levels Collected December 11, 2023.

0 150 300 600
Feet

Bar Measures 1 inch

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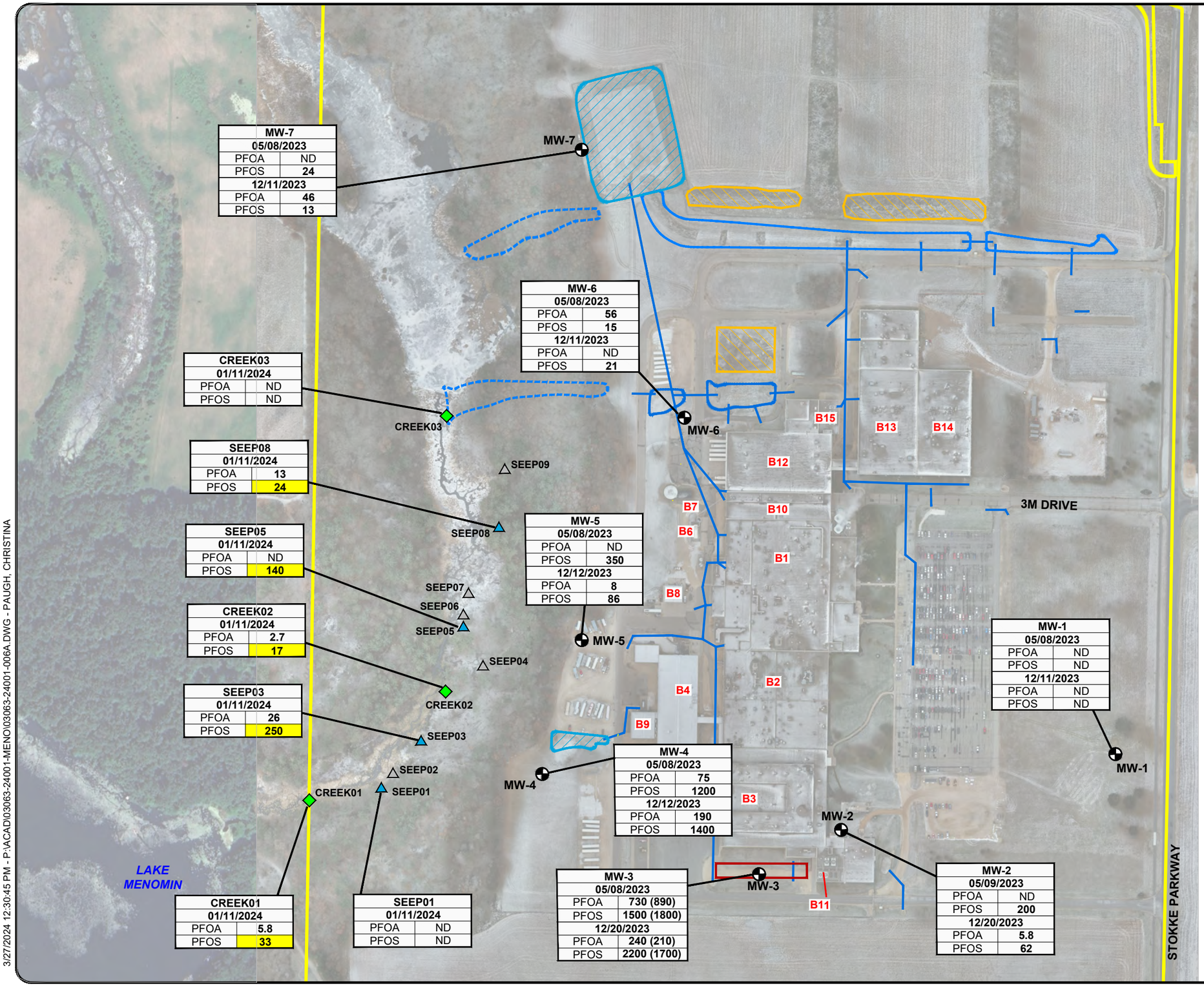
3M MENOMONIE SOIL AND GROUNDWATER INVESTIGATION

1425 STOKKE PARKWAY
MENOMONIE, WISCONSIN 54751

POTENTIOMETRIC SURFACE MAP (DECEMBER 11, 2023)

Project No.: 117-03063-24001
Drawn By: CP
Checked By: CB

FIGURE
3



LEGEND

- Site Boundary
- B7 Building Number
- Berm / Fill Area
- Historical Fire Training Area
- Stormwater Infiltration Pond
- Stormwater Drainage Feature
- Former Stormwater Drainage Ditch
- Stormwater Conveyance
- MW-1 Monitoring Well
- SEEP08 Sampled Seep Location
- SEEP04 Identified Seep Location
- CREEK01 Creek

5.8 **BOLD** Values Signify A Detection

33 **BOLD** and Highlighted Values Exceed Surface Water Standard

PFOA - Perfluorooctanoic Acid
PFOS - Perflurorooctane Sulfonic Acid

0 150 300 600
Feet

Bar Measures 1 inch

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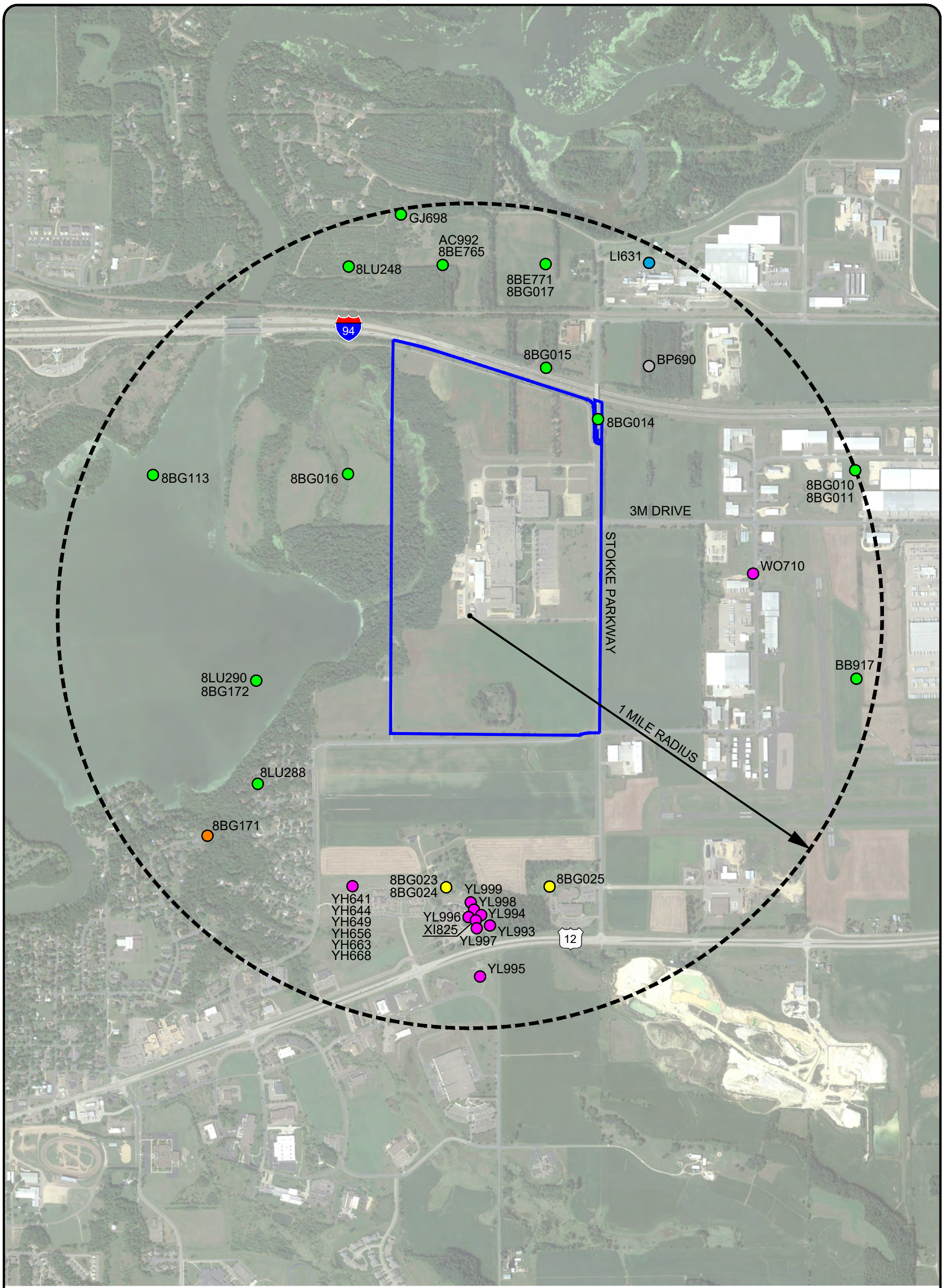
3M MENOMONIE SOIL AND GROUNDWATER INVESTIGATION
1425 STOKKE PARKWAY
MENOMONIE, WISCONSIN 54751

GROUNDWATER & SURFACE WATER ANALYTICAL RESULTS

Project No.: 117-7383011
Drawn By: CP
Checked By: CB

FIGURE
4



SOURCE: AERIAL PHOTOGRAPH FROM GOOGLE EARTH PRO
DATED AUGUST 2021

N

0 600 1200 2400
Feet

LEGEND

- Site Boundary
- Private Well
- Institution Well
- Geothermal Well
- Farm Well
- Irrigation Well
- Unknown Well

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3M MENOMONIE SOIL AND GROUNDWATER INVESTIGATION

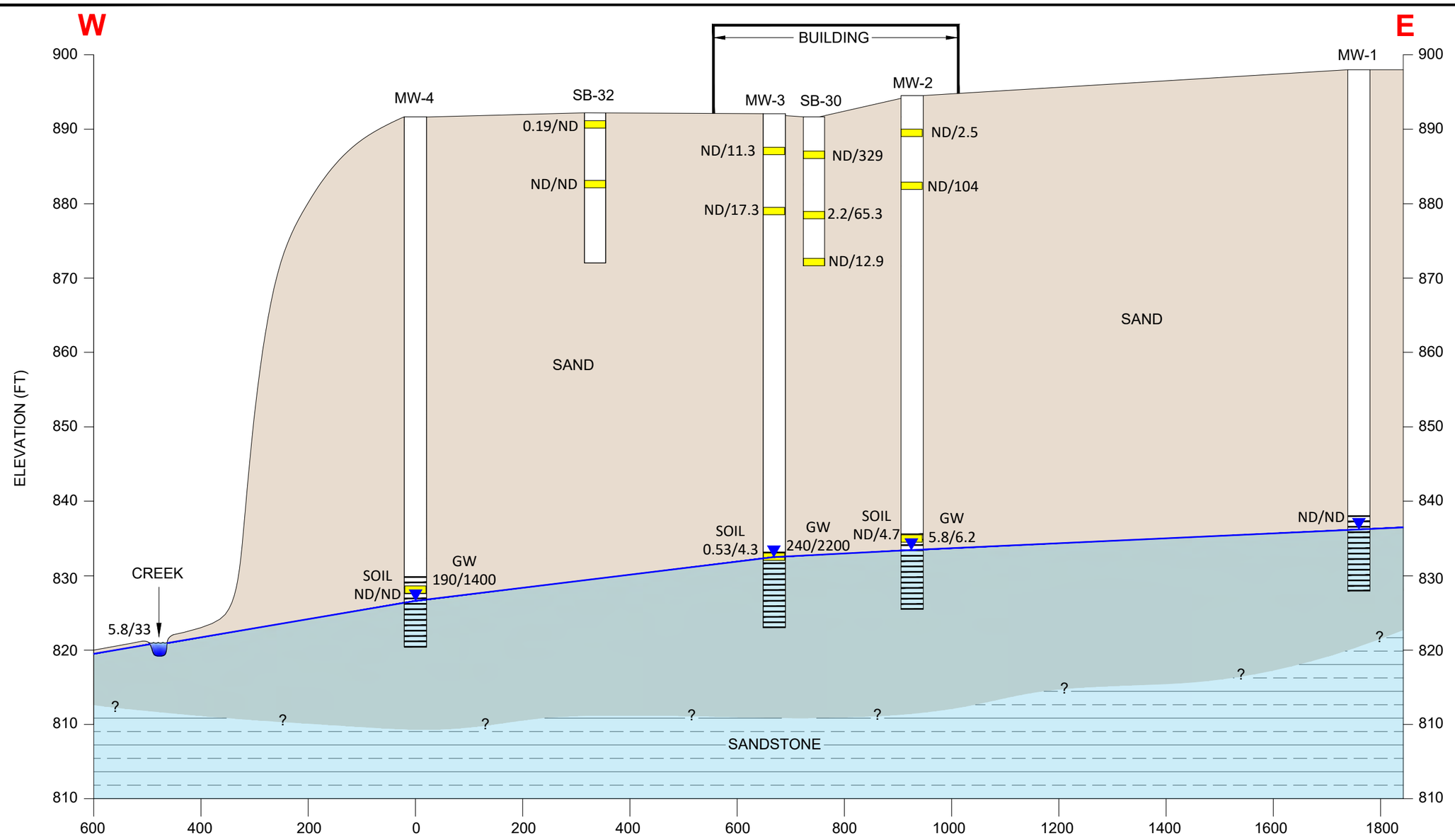
1425 STOKKE PARKWAY
MENOMONIE, WISCONSIN 54751

WELL SEARCH MAP

Project No: 117-03063-24001
Designed by: CP
Checked by: CB

FIGURE
5

Bar Measures 1 inch



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3M MENOMONIE SOIL AND GROUNDWATER INVESTIGATION

1425 STOKKE PARKWAY
MENOMONIE, WISCONSIN 54751

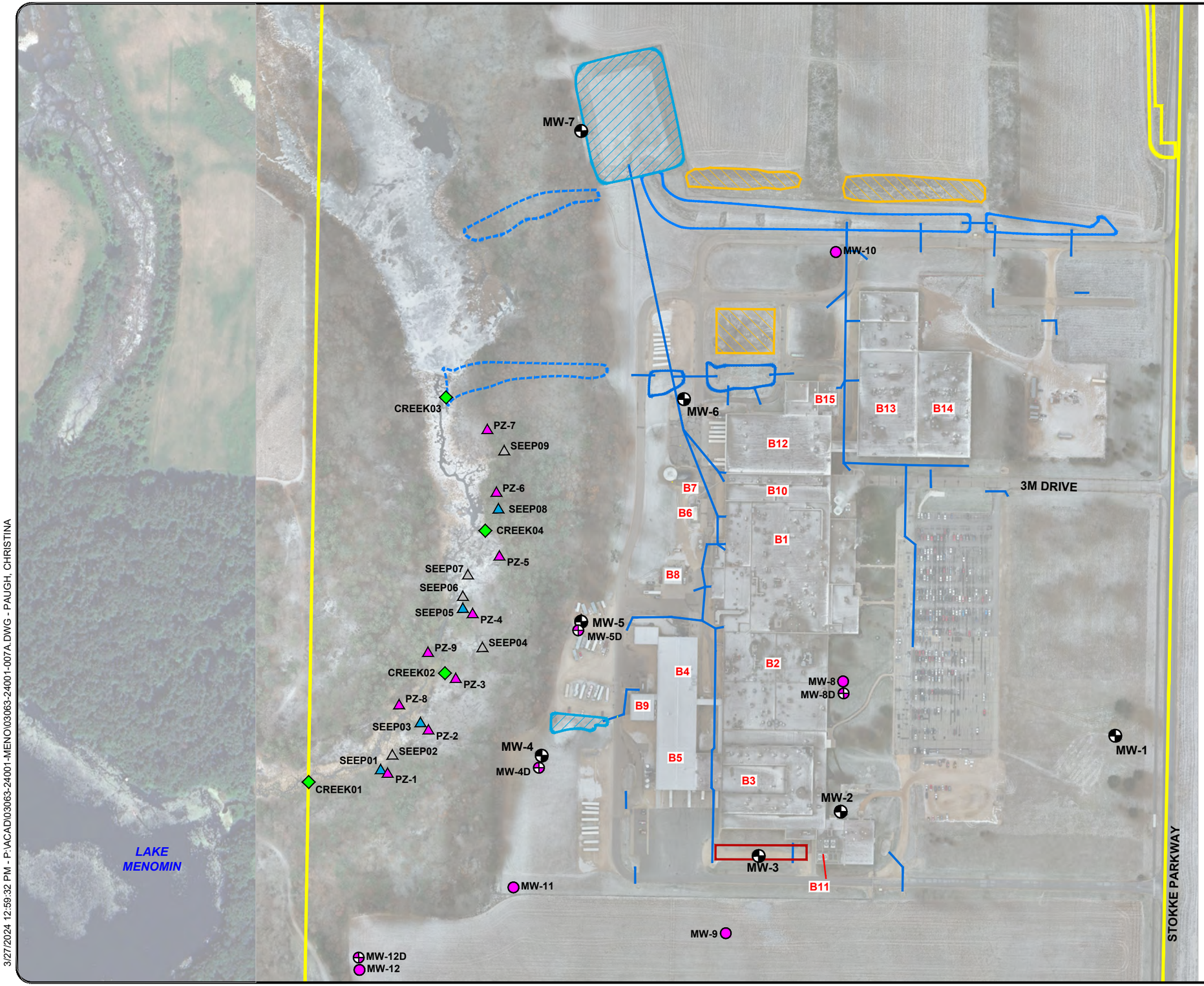
CONCEPTUAL EAST-WEST CROSS SECTION

Project No.:	117-03063-24001
Drawn By:	CP
Checked By:	CB

FIGURE
6

Bar Measures 1 inch

3/27/2024 12:46:07 PM - P:\ACAD\03063-24001-MENO\03063-24001-008A.DWG - PAUGH, CHRISTINA



LEGEND

- Site Boundary
- B7 Building Number
- Berm / Fill Area
- Historical Fire Training Area
- Stormwater Infiltration Pond
- Stormwater Drainage Feature
- Former Stormwater Drainage Ditch
- Stormwater Conveyance
- MW-1 Monitoring Well
- SEEP08 Sampled Seep Location
- SEEP04 Identified Seep Location
- CREEK01 Creek
- Proposed Piezometer
- Proposed Shallow Well
- Proposed Deep Well

0 150 300 600
Feet

Bar Measures 1 inch

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3M MENOMONIE SOIL AND GROUNDWATER INVESTIGATION

1425 STOKKE PARKWAY
MENOMONIE, WISCONSIN 54751

PROPOSED WELL & SURFACE LOCATIONS

Project No.: 117-03063-24001
Drawn By: CP
Checked By: CB

FIGURE
7

3/27/2024 12:59:32 PM - P:\ACAD\03063-24001-MENO\03063-24001-007A.DWG - PAUGH, CHRISTINA

Tables

Table 1 - Groundwater Elevations and Sampling Parameters

3M Menomonie Groundwater Investigation Work Plan

Menomonie, Wisconsin

Sample ID	Sampling Date	Temp (°C)	Specific Conductance	DO (mg/L)	pH (S.U.)	ORP (mV)	Turb (NTU)	Approx Pump Rate (mL/min)	Depth to Water (ft. below TOC) 5/9/2023	Depth to Water (ft. BGS) 5/9/2023	Total Well Depth (ft. below TOC) 5/9/2023	Total Well Depth (ft. BGS) 5/9/2023	Top of Casing Elevation (ft. AMSL)	Groundwater Elevation (ft. AMSL)	Sampling Method
		Low-Flow Parameter Stabilization Criteria													
		3%	3%	10%	0.1	10 mV	10%								
MW-1	5/8/2023	11.52	310.00	6.60	5.97	179	NM	100	64.56	61.93	72.90	70.27	900.63	836.07	Low-Flow
	12/11/2023	10.8	261.3	9.18	6.45	28.5	6.51	100	63.70	61.07	72.90	70.27	900.63	839.56	Low-Flow
MW-2	5/9/2023	11.58	330.0	4.11	7.04	192	NM	100	63.43	61.01	72.65	70.23	896.90	833.47	Low-Flow
	12/20/2023	11.2	310.0	3.57	6.15	190.9	5.60	100	62.63	60.21	72.65	70.23	896.90	836.69	Low-Flow
MW-3	5/8/2023	11.92	402.0	4.45	6.40	242	NM	100	61.68	59.51	78.70	76.53	894.20	832.52	Low-Flow
	12/20/2023	10.8	561.0	3.17	5.78	222.9	1.80	100	60.90	58.73	78.70	76.53	894.20	835.47	Low-Flow
MW-4	5/8/2023	12.56	362.0	5.48	6.42	220	NM	100	67.50	64.96	78.74	76.20	894.13	826.63	Low-Flow
	12/12/2023	11.3	599.2	11.76	6.20	144.5	4.18	100	67.10	64.56	78.74	76.20	894.13	829.57	Low-Flow
MW-5	5/8/2023	11.98	972.0	7.06	6.71	194	NM	100	68.06	65.40	77.72	75.06	894.87	826.81	Low-Flow
	12/12/2023	11.6	922.0	12.08	6.23	122.4	0.62	100	67.76	65.10	77.72	75.06	894.87	829.77	Low-Flow
MW-6	5/8/2023	11.78	799.0	7.26	6.50	205	NM	100	64.36	61.77	71.08	68.49	892.28	827.92	Low-Flow
	12/11/2023	11.4	753.0	11.97	6.26	109.4	6.12	100	64.04	61.45	71.08	68.49	892.28	830.83	Low-Flow
MW-7	5/8/2023	15.48	415.0	7.17	6.04	234	NM	100	62.03	59.60	71.50	69.07	887.84	825.81	Low-Flow
	12/11/2023	14.9	75.8	9.77	6.55	92.0	8.93	100	62.15	59.72	71.50	69.07	887.84	828.12	Low-Flow

Notes:

1. Temp (°C) = Temperature in degrees Celsius
2. pH (S.U.) = pH represented in pH units
3. Specific Conductance (mS/cm) = Conductivity represented in microsiemens per centimeter
4. ORP (mV) = Oxidation reduction potential represented in millivolts
5. DO (mg/L) = Dissolved oxygen represented in milligrams per liter
6. Turb (NTU) = Turbidity represented in nepholometeric turbidity units
7. mL/min = milliliters per minute
8. NA = not applicable
9. NM = not measured
10. ft. AMSL = feet above mean sea level
11. ft. below TOC = feet below the top of well casing
12. ft. BGS = feet below ground surface

Table 2 - Groundwater Analytical Results

3M Menomonie Groundwater Investigation Work Plan

Menomonie, Wisconsin

Parameter	Units	CAS Number	MW-1		MW-2		MW-3				MW-4		MW-5		MW-6		MW-7	
			5/8/2023	12/11/2023	5/9/2023	12/20/2023	5/8/2023	5/8/2023*	12/20/2023	12/20/2023*	5/8/2023	12/12/2023	5/8/2023	12/12/2023	5/8/2023	12/11/2023	5/8/2023	12/11/2023
Perfluoroalkyl Carboxylates/Carboxylic Acids (PFCA)																		
Perfluorobutanoic acid (PFBA)	ng/L	375-22-4	**5.2**	**4.1**	ND	**13**	ND	ND	**8.4**	**11**	ND	ND	**22**	**18**	**16**	ND	**7.6**	**5.2**
Perfluoropentanoic acid (PFPeA)	ng/L	2706-90-3	ND	ND	ND	**3.1**	ND	ND	**5.3**	**5.4**	ND	ND	ND	**2.6**	**2.4**	ND	**2.3**	ND
Perfluorohexanoic acid (PFHxA)	ng/L	307-24-4	ND	ND	ND	**5.0**	**69**	**83**	**25**	**25**	**94**	**120**	ND	**4.8**	**5.7**	ND	**4.3**	**3.7**
Perfluoroheptanoic acid (PFHpA)	ng/L	375-85-9	ND	ND	ND	ND	ND	**21**	**4.9**	**5**	ND	**24**	ND	ND	**3.6**	ND	ND	**2.5**
Perfluorooctanoic acid (PFOA)	ng/L	335-67-1	ND	ND	ND	**5.8**	**730**	**890**	**240**	**210**	**75**	**190**	ND	**8.0**	**56**	ND	ND	**46**
Perfluorononanoic acid (PFNA)	ng/L	375-95-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorodecanoic acid (PFDA)	ng/L	335-76-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoroundecanoic acid (PFUnDA/PFUdA)	ng/L	2058-94-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorododecanoic acid (PFDoA)	ng/L	307-55-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorotridecanoic acid (PFTrDA)	ng/L	72629-94-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorotetradecanoic acid (PFTeDA)	ng/L	376-06-7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoroalkyl Sulfonates/Sulfonic Acids (PFSA)																		
Perfluorobutane sulfonic acid (PFBS)	ng/L	375-73-5	ND	ND	ND	**3.0**	**17**	**21**	**8.9**	**9.8**	ND	**27**	ND	**6.5**	**8.2**	**1.9**	**4.7**	**4.9**
Perfluoropentane sulfonic acid (PFPeS)	ng/L	2706-91-4	ND	ND	ND	**4.0**	**42**	**52**	**18**	**18**	**52**	**110**	ND	**5.6**	**8.4**	**3.9**	ND	**4.5**
Perfluorohexane sulfonic acid (PFHxS)	ng/L	355-46-4	ND	ND	**230**	**110**	**1800**	**2500**	**670**	**680**	**760**	**2000**	**80**	**93**	**260**	**51**	**23**	**230**
Perfluoroheptane sulfonic acid (PFHpS)	ng/L	375-92-8	ND	ND	**22**	**11**	**120**	**140**	**44**	**42**	ND	**26**	ND	ND	ND	ND	ND	ND
Perfluorooctane sulfonic acid (PFOS)	ng/L	1763-23-1	ND	ND	**200**	**62**	**1500**	**1800**	**2200**	**1700**	**1200**	**1400**	**350**	**86**	**15**	**21**	**24**	**13**
Perfluorononе sulfonic acid (PFNS)	ng/L	68259-12-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorodecane sulfonic acid (PFDS)	ng/L	335-77-3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorododecanesulfonic acid (PFDoS)	ng/L	79780-39-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoroalkane Sulfonamides/Sufonamidoacetic Acids, Sulfonamidoethanols (FASA)																		
Perfluorooctane sulfonamide (PFOSA)	ng/L	754-91-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-methyl perfluorooctane sulfonamide (NMeFOSA)	ng/L	31506-32-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-ethyl perfluorooctane sulfonamide (NEtFOSA)	ng/L	4151-50-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ng/L	2355-31-9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ng/L	2991-50-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-methyl perfluorooctane sulfonamidoethanol (NMeFOSE)	ng/L	24448-09-7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-ethyl perfluorooctane sulfonamidoethanol (NEtFOSE)	ng/L	1691-99-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorotelomer Substances (FTS)																		
4:2 Fluorotelomer sulfonic acid (4:2FTS)	ng/L	757124-72-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6:2 Fluorotelomer sulfonic acid (6:2FTS)	ng/L	27619-97-2	ND	9.5	ND	ND	ND	ND	ND	**8.6**	ND	ND	ND	ND	ND	ND	ND	ND
8:2 Fluorotelomer sulfonic acid (8:2FTS)	ng/L	39108-34-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Replacement Chemicals																		
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ng/L	13252-13-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,8-Dioxa-3H-perfluorononanioc acid (ADONA)	ng/L	919005-14-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	ng/L	756426-58-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	ng/L	763051-92-9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Combined PFOA and PFOS	**ng/L**		ND	ND	**200**	**67.8**	**2230**	**2690**	**2440**	**1910**	**1275**	**1590**	**350**	**94**	**71**	**21**	**24**	**59**
Hexavalent Chromium	mg/L		**0.011**	<0.0016	**0.07**	0.0018 J	**0.039**	**0.066**	<0.0016	-	**0.012**	<0.0016	<0.0049	<0.0016	<0.0049	<0.0016	**0.026**	<0.0016

Notes:

1. PFAS laboratory analysis was completed utilizing EPA Method 537.1 Modified
2. ng/L = nanogram per liter
3. -- = Criteria Not Established
4. **Bold** values signify a detection

Table 3 - Surface Water PFAS Analytical Results
3M Menomonie Groundwater Investigation Work Plan
Menomonie, Wisconsin

Parameter	Units	CAS Number	Surface Water Standard	Seep01	Seep03	Seep05	Seep08	Creek01	Creek02	Creek03
				1/11/2024	1/11/2024	1/11/2024	1/11/2024	1/11/2024	1/11/2024	1/11/2024
Perfluoroalkyl Carboxylates/Carboxylic Acids (PFCA)										
Perfluorobutanoic acid (PFBA)	ng/L	375-22-4	--	**9.8**	**32**	**10**	**17**	**9.5**	**10**	**9.3**
Perfluoropentanoic acid (PFPeA)	ng/L	2706-90-3	--	ND	**11**	ND	ND	ND	ND	**2.2**
Perfluorohexanoic acid (PFHxA)	ng/L	307-24-4	--	ND	**21**	**7.3**	**2.4**	**5.0**	**4.5**	**2.1**
Perfluoroheptanoic acid (PFHpA)	ng/L	375-85-9	--	ND	ND	ND	ND	ND	ND	ND
Perfluorooctanoic acid (PFOA)	ng/L	335-67-1	95	ND	**26**	ND	**13**	**5.8**	**2.7**	ND
Perfluorononanoic acid (PFNA)	ng/L	375-95-1	--	ND	ND	ND	ND	ND	ND	ND
Perfluorodecanoic acid (PFDA)	ng/L	335-76-2	--	ND	ND	ND	ND	ND	ND	ND
Perfluoroundecanoic acid (PFUnDA/PFUdA)	ng/L	2058-94-8	--	ND	ND	ND	ND	ND	ND	ND
Perfluorododecanoic acid (PFDoA)	ng/L	307-55-1	--	ND	ND	ND	ND	ND	ND	ND
Perfluorotridecanoic acid (PFTrDA)	ng/L	72629-94-8	--	ND	ND	ND	ND	ND	ND	ND
Perfluorotetradecanoic acid (PFTeDA)	ng/L	376-06-7	--	ND	ND	ND	ND	ND	ND	ND
Perfluoroalkyl Sulfonates/Sulfonic Acids (PFSA)										
Perfluorobutane sulfonic acid (PFBS)	ng/L	375-73-5	--	**10**	**14**	**9.8**	**7.1**	**4.8**	**5.2**	**9.4**
Perfluoropentane sulfonic acid (PFPeS)	ng/L	2706-91-4	--	ND	**24**	**5.9**	**6.1**	**6.0**	**5.5**	**2.6**
Perfluorohexane sulfonic acid (PFHxS)	ng/L	355-46-4	--	**9.8**	**660**	**58**	**120**	**74**	**45**	**87**
Perfluoroheptane sulfonic acid (PFHpS)	ng/L	375-92-8	--	ND	**18**	ND	ND	ND	ND	ND
Perfluorooctane sulfonic acid (PFOS)	ng/L	1763-23-1	8	ND	**250**	**140**	**24**	**33**	**17**	ND
Perfluorononе sulfonic acid (PFNS)	ng/L	68259-12-1	--	ND	ND	ND	ND	ND	ND	ND
Perfluorodecane sulfonic acid (PFDS)	ng/L	335-77-3	--	ND	ND	ND	ND	ND	ND	ND
Perfluorododecanesulfonic acid (PFDoS)	ng/L	79780-39-5	--	ND	ND	ND	ND	ND	ND	ND
Perfluoroalkane Sulfonamides/Sufonamidoacetic Acids, Sulfonamidoethanols (FASA)										
Perfluorooctane sulfonamide (PFOSA)	ng/L	754-91-6	--	ND	ND	ND	ND	ND	ND	ND
N-methyl perfluorooctane sulfonamide (NMeFOSA)	ng/L	31506-32-8	--	ND	ND	ND	ND	ND	ND	ND
N-ethyl perfluorooctane sulfonamide (NEtFOSA)	ng/L	4151-50-2	--	ND	ND	ND	ND	ND	ND	ND
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ng/L	2355-31-9	--	ND	ND	ND	ND	ND	ND	ND
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ng/L	2991-50-6	--	ND	ND	ND	ND	ND	ND	ND
N-methyl perfluorooctane sulfonamidoethanol (NMeFOSE)	ng/L	24448-09-7	--	ND	ND	ND	ND	ND	ND	ND
N-ethyl perfluorooctane sulfonamidoethanol (NEtFOSE)	ng/L	1691-99-2	--	ND	ND	ND	ND	ND	ND	ND
Fluorotelomer Substances (FTS)										
4:2 Fluorotelomer sulfonic acid (4:2FTS)	ng/L	757124-72-4	--	ND	ND	ND	ND	ND	ND	ND
6:2 Fluorotelomer sulfonic acid (6:2FTS)	ng/L	27619-97-2	--	ND	ND	ND	ND	ND	ND	ND
8:2 Fluorotelomer sulfonic acid (8:2FTS)	ng/L	39108-34-4	--	ND	ND	ND	ND	ND	ND	ND
Replacement Chemicals										
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ng/L	13252-13-6	--	ND	ND	ND	ND	ND	ND	ND
4,8-Dioxa-3H-perfluorononanioc acid (ADONA)	ng/L	919005-14-4	--	ND	ND	ND	ND	ND	ND	ND
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	ng/L	756426-58-1	--	ND	ND	ND	ND	ND	ND	ND
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	ng/L	763051-92-9	--	ND	ND	ND	ND	ND	ND	ND

Notes:
1. PFAS laboratory analysis was completed utilizing EPA Method 537.1 Modified
2. ng/L = nanogram per liter
3. -- = Criteria Not Established
4. Surface Water Standard established by WDNR for surface water bodies, effective 8/1/2022
5. **Bold** values signify a detection
6. **Bold** and highlighted values exceed surface water standard

Table 4 - Surrounding Wells - 1 Mile Radius
3M Menomonie Groundwater Investigation Work Plan
Menomonie, WI

Well Information			Well Construction						Well Location	
Well ID	Well Use	Wisconsin Well ID	Construction Date	Well Diamter (inches)	Well Casing Depth (feet bgs)	Well Depth (feet bgs)	Static Water Level (feet bgs)	Depth to Bedrock (ft bgs)	Latitude	Longitude
1	Private - Potable	8BG016	3/19/1945	5	31	98	50	5	44°54'9.91"N	91°53'32.51"W
2	Private - Potable	8LU290	9/28/1937	4		61	25	20	44°53'44.00"N	91°53'48.95"W
3	Private - Potable	8BG172	7/14/1978	6	32	53	34	32	44°53'44.00"N	91°53'48.95"W
4	Private - Potable	8BG014	3/28/1966	4	90	90	79	NA	44°54'16.97"N	91°52'47.93"W
5	Private - Potable	8BG015	2/26/1973	6	115	128	72	NA	44°54'23.39"N	91°52'57.26"W
6	Private - Potable	8LU288	1937	4	42	75	25	42	44°53'30.99"N	91°53'48.63"W
7	Institution - Potable	8BG024	5/8/1967	6		385	59	NA	44°53'17.96"N	91°53'15.01"W
8	Institution - Potable	8BG023	3/20/1961	8	62.3	170	50	8	44°53'17.96"N	91°53'15.01"W
9	Institution - Potable	8BG025	1934	8	304	415	122	NA	44°53'18.08"N	91°52'56.62"W
10	Geothermal	WO710	7/30/2009	6	200	205	1	NA	44°53'57.46"N	91°52'20.20"W
11	Geothermal	YL999	9/26/2014	1	310	310	1	27	44°53'15.79"N	91°53'10.61"W
12	Geothermal	YL998	9/26/2014	1	310	310	1	27	44°53'14.97"N	91°53'10.07"W
13	Geothermal	YH649	9/5/2012	6	302	302	40	30	44°53'17.99"N	91°53'31.72"W
14	Geothermal	YH641	8/6/2012	6	303	303	40	30	44°53'17.99"N	91°53'31.72"W
15	Geothermal	YH663	9/21/2012	6	303	303	40	30	44°53'17.99"N	91°53'31.72"W
16	Geothermal	YH656	9/12/2012	6	302	302	40	30	44°53'17.99"N	91°53'31.72"W
17	Geothermal	YH644	8/15/2012	6	302	302	40	30	44°53'17.99"N	91°53'31.72"W
18	Geothermal	YH668	10/4/2012	6	304	304	40	30	44°53'17.99"N	91°53'31.72"W
19	Geothermal	YL994	9/26/2014	1	310	310	1	27	44°53'14.46"N	91°53'9.06"W
20	Geothermal	YL996	9/26/2014	1	310	310	1	27	44°54'23.57"N	91°52'38.81"W
21	Unknown	BP690			*No Records Available*				44°53'14.22"N	91°53'10.79"W
22	Geothermal	XI825	9/26/2014	1	308	308	1	25	44°53'13.92"N	91°53'9.78"W
23	Geothermal	YL993	9/26/2014	1	310	310	1	27	44°53'13.13"N	91°53'7.33"W
24	Geothermal	YL997	9/26/2014	1	310	310	1	27	44°53'12.84"N	91°53'9.67"W
25	Farm	8BG171	8/25/1979	6	38	80	16	10	44°53'24.41"N	91°53'57.64"W
26	Private - Potable	8BG113	10/7/1971	5	36	108	76	6	44°54'9.92"N	91°54'7.35"W
27	Private - Potable	8BE765	8/17/1982	6	120	140	56	101	44°54'36.41"N	91°53'15.67"W
28	Private - Potable	AC992	4/18/1988	6	70	75	56	NA	44°54'36.41"N	91°53'15.67"W
29	Private - Potable	8BG017	3/29/1978	6	39	120	61	25	44°54'36.52"N	91°52'57.21"W
30	Private - Potable	8BE771	4/5/1983	5	93	95.5	73	NA	44°54'36.52"N	91°52'57.21"W
31	Geothermal	YL995	9/26/2014	1	310	310	1	27	44°53'6.72"N	91°53'9.00"W
32	Private - Potable	8LU248	3/7/1944	6	32.5	91	56	27	44°54'36.20"N	91°53'32.36"W
33	Irrigation	LI631	9/12/1996	10.75	142	162	79		44°54'36.63"N	91°52'38.78"W
34	Private - Potable	BB917	5/20/1966			*Data Not Aailable*			44°53'44.20"N	91°52'1.77"W
35	Private - Potable	GJ698	7/22/1993	6	40	130	80	40	44°54'42.80"N	91°53'23.09"W
36	Private - Potable	8BG010	8/3/1977	6	40	95	45	0	44°54'10.46"N	91°52'1.94"W
37	Private - Potable	8BG011	8/3/1977	6	40	95	45	0	44°54'10.46"N	91°52'1.94"W

Appendix A
2023 Groundwater Sampling Forms

Tetra Tech — **WATER QUALITY DATA SHEET**

SAMPLE LOCATION: 3M Menomonie **SAMPLE ID NUMBER:** MW-1

Client: 3M **Project Name:** 3M Menomonie CESA **Project No.:**

Personnel: Craig W., Laura D. **Date:** 12-11-23

Weather: 24° cloudy

Purge Method: Low-Flow Techniques Other

Field Instruments: Solinist, Monsoon pro (Brand / Serial #) **Flow Cell:** YSI (Brand / Serial #)

Well Condition Inspection (Circle One)

Cover:	(Locked)	Not Locked	Zip Tie	Well Broken:	Yes	(No)
Number:	(Legible)	Not Legible		Well Frozen:	Yes	(No)
Outer Casing:	(Good)	Fair	Poor	Well Dry:	Yes	(No)
Inner Casing:	(Good)	Fair	Poor	Well Obstructed:	Yes	(No)

Screen / Pump Interval: **Initial Depth to Water:** 63.70

General Comments: **Total Depth:** 72.9

Time	Depth to H_2O (feet)	Pump Rate (mL/min)	Temp (C°)	Specific Conductance Value	Specific Conductance Units	O_2 (mg/l)	pH (S.U.)	Redox (mV)	Turb (NTU)	Visual and Olfactory Observations / Notes
			Parameter Stabilization Ranges							
			3%	3%	ms/cm	10%	0.1	10mv	10%	
10:47	63.70	1 L	10.8	267.1		91.5	6.42	30.9	10.5	
10:50	63.66		10.8	265.6		87.5	6.45	28.5	10.5	
10:53	63.69		10.8	262.5		87.5	6.41	31.1	6.8	
10:56	63.66		10.9	261.8		92.3	6.45	28.6	6.8	
10.59	63.67		10.8	261.3		91.8	6.45	28.5	6.51	

Sample Taken at: 12 : 10 **Filter Used?** (N)/Y CAPACITY

Amount Purged: 20 L gallon(s) **Water Clear?** Clear **Dissolved Metals Field Filtered** ☐

Odor: None **Color:** Clear

All measurements to Nearest Hundredth of a Foot (0.01 feet)

Well diameter gallon per ft: Vol=pi(r)2*h

1/8 inch	3/16 inch	1/4 inch	3/8 inch	1/2 inch	5/8 inch	3/4 inch	1 inch	2 inch	4 inch
0.0006	0.0014	0.0025	0.0057	0.0102	0.0159	0.0229	0.0408	0.1632	0.6528

1 liter = .264 gallons
1 liter = 61.02 inches
1 gallon = 231 inches
1 inch = 2.54 cm

Tetra Tech — **WATER QUALITY DATA SHEET**

SAMPLE LOCATION: 3M Menomonie **SAMPLE ID NUMBER:** MW-2

Client: 3M **Project Name:** 3M Menomonie CESA **Project No.:**

Personnel: Craig Wiseman **Date:** 12-20-23

Weather: Clear, Sunny 34-36° Calm

Purge Method: Low-Flow Techniques Other

Field Instruments: Submersible Pump (Brand), Solinst (Brand) water level meter (Serial #), **Flow Cell:** YSI DSS Pro 3530-1398 (Serial #)

Well Condition Inspection (Circle One)

Cover:	Locked	Not Locked	Zip Tie	Well Broken:	Yes	No
Number:	Legible	Not Legible		Well Frozen:	Yes	No
Outer Casing:	Good	Fair	Poor	Well Dry:	Yes	No
Inner Casing:	Good	Fair	Poor	Well Obstructed:	Yes	No

Screen / Pump Interval: **Initial Depth to Water:** 62.63

General Comments: Purge Water Containerized **Total Depth:** 72.65

Time	Depth to H_20 (feet)	Pump Rate (mL/min)	Temp (C°)	Specific Conductance Value	Specific Conductance Units	O_2 (mg/l)	pH (S.U.)	Redox (mV)	Turb (NTU)	Visual and Olfactory Observations / Notes
			Parameter Stabilization Ranges							
			3%	3%	ms/cm	10%	0.1	10mv	10%	
1255	62.64	~1L	10.9		317.5	6.01	6.21	176.5	52.8	
1258	62.65		11.0		320.6	5.75	6.19	178.2	47.1	
1301			11.2		319.9	4.32	6.16	180.9	31.5	
1304	62.65		11.1		311.7	3.92	6.15	185.9	17.7	
1307			11.2		307.8	3.75	6.15	187.9	12.5	
1310	62.65		11.2		303.6	3.67	6.15	189.1	7.6	
1313			11.2		309.0	3.59	6.15	190.2	7.5	
1316	62.65		11.2		310.7	3.57	6.15	191.4	6.9	
1318			11.2		310.9	3.55	6.15	190.9	5.7	
1321			11.2		310.7	3.55	6.15	191.2	5.6	
1324	62.65		11.2		310.9	3.57	6.15	190.9	5.6	
				Sampled @ 1325						

Sample Taken at: 13 : 25

Amount Purged: 4 1/2 gallon(s)

Filter Used? N/Y CAPACITY

Water Clear? Yes **Dissolved Metals Field Filtered** ☐

Odor: None **Color:** None

All measurements to Nearest Hundredth of a Foot (0.01 feet). Vol=pi(r)2*h

1 liter = .264 gallons 1 gallon = 231 inches

1 liter = 61.02 inches 1 inch = 2.54 cm

Well diameter/gallon per ft:

1/8 inch	3/16 inch	1/4 inch	3/8 inch	1/2 inch	5/8 inch	3/4 inch	1 inch	2 inch	4 inch
0.0006	0.0014	0.0025	0.0057	0.0102	0.0159	0.0229	0.0408	0.1632	0.6528

Tetra Tech — **WATER QUALITY DATA SHEET**

SAMPLE LOCATION: 3M Menomonie **SAMPLE ID NUMBER:** MW-3

Client: 3M **Project Name:** 3M Menomonie CESA **Project No.:**

Personnel: Craig Wiseman **Date:** 12-20-23

Weather: Clear Sunny 32-34°, Calm

Purge Method: Low-Flow Techniques Other

Field Instruments: Brand / Serial # Submersible Pump, Solinist Water Level Meter; Brand / Serial # Flow Cell: YSI Pro DSS 3530-1398

Well Condition Inspection (Circle One)

Cover:	(Locked)	Not Locked	Zip Tie	Well Broken:	Yes	(No)
Number:	(Legible)	Not Legible		Well Frozen:	Yes	(No)
Outer Casing:	(Good)	Fair	Poor	Well Dry:	Yes	(No)
Inner Casing:	(Good)	Fair	Poor	Well Obstructed:	Yes	(No)

Screen / Pump Interval: **Initial Depth to Water:** 60.90

General Comments: Purge water containerized **Total Depth:** 78.70

Time	Depth to H_2O (feet)	Pump Rate (mL/min)	Temp (C°)	Specific Conductance Value	Specific Conductance Units	O_2 (mg/l)	pH (S.U.)	Redox (mV)	Turb (NTU)	Visual and Olfactory Observations / Notes
			Parameter Stabilization Ranges							
			3%	3%	ms/cm	10%	0.1	10mv	10%	
1135	60.91	~1L/m	10.7		658	9.2	5.78	199.5	39.8	Opaque
1139	60.91		10.7		609	6.71	5.79	209.9	27.2	
1143			10.6		582	5.27	5.78	214.5	12.09	
1147	60.91		10.7		575	3.17	5.77	220.9	3.61	
1151			10.7		564	3.16	5.78	221.7	2.97	
1155	60.91		10.8		562	3.15	5.77	222.4	1.87	
1159			10.8		562	3.16	5.77	222.8	1.91	
1203	60.91		10.8		561	3.17	5.78	222.9	1.90	
		SAMPLED @ 1140								Pumped 2 Equal
										prior to Start of
										readings

Sample Taken at: 11 : 40 **Filter Used? N/Y** CAPACITY

Amount Purged: 4 1/2 gallon(s) **Water Clear?** Yes **Dissolved Metals Field Filtered** ☐

Odor: None **Color:** None

All measurements to Nearest Hundredth of a Foot (0.01 feet). Vol=pi(r)2*h 1 liter = .264 gallons 1 liter = 61.02 inches 1 gallon = 231 inches 1 inch = 2.54 cm

Well diameter/gallon per ft:

1/8 inch	3/16 inch	1/4 inch	3/8 inch	1/2 inch	5/8 inch	3/4 inch	1 inch	2 inch	4 inch
0.0006	0.0014	0.0025	0.0057	0.0102	0.0159	0.0229	0.0408	0.1632	0.6528

Y M P 231220 Trip Blank

Tetra Tech — **WATER QUALITY DATA SHEET**

SAMPLE LOCATION: 3M Menomonie — **SAMPLE ID NUMBER:** MW-4

Client: 3M — **Project Name:** 3M Menomonie CESA — **Project No.:**

Personnel: Craig W. Laurad. — **Date:** 12/12/23

Weather: 25° Sunny

Purge Method: Low-Flow Techniques — Other

Field Instruments: (Brand / Serial #) Solinist, Monsoon pro — (Brand) **Flow Cell:** YSI — Serial #

Well Condition Inspection (Circle One)

Cover:	(Locked)	Not Locked	Zip Tie	Well Broken:	Yes	(No)
Number:	(Legible)	Not Legible		Well Frozen:	Yes	(No)
Outer Casing:	(Good)	Fair	Poor	Well Dry:	Yes	(No)
Inner Casing:	(Good)	Fair	Poor	Well Obstructed:	Yes	(No)

Screen / Pump Interval: — **Initial Depth to Water:** 67.10

General Comments: — **Total Depth:** 78.75

Time	Depth to H_2O (feet)	Pump Rate (mL/min)	Temp (C°)	Specific Conductance Value	Specific Conductance Units	O_2 (mg/l)	pH (S.U.)	Redox (mV)	Turb (NTU)	Visual and Olfactory Observations / Notes
			Parameter Stabilization Ranges							
			3%	3%	ms/cm	10%	0.1	10mv	10%	
11:18	67.13	1200	11.8	633.0		12.65	6.31	119.5	18.5	
11:21	67.15		11.3	630.2		12.20	6.27	129.2	7.3	
11:24	67.15		11.1	608.9		12.20	6.22	137.4	5.28	
11:27	67.15		11.3	606.2		11.94	6.20	142.0	4.66	
11:30	67.15		11.3	599.2		11.76	6.20	144.5	4.18	

Sample Taken at: 11 : 35 — **Filter Used?** (N)/Y — CAPACITY

Amount Purged: 9 gallon(s) — **Water Clear?** Clear — **Dissolved Metals Field Filtered** ☐

Odor: None — **Color:** Clear

All measurements to Nearest Hundredth of a Foot (0.01 feet). — Vol=pi(r)2*h — 1 liter = .264 gallons; 1 liter = 61.02 inches — 1 gallon = 231 inches; 1 inch = 2.54 cm

Well diameter/gallon per ft:

1/8 inch	3/16 inch	1/4 inch	3/8 inch	1/2 inch	5/8 inch	3/4 inch	1 inch	2 inch	4 inch
0.0006	0.0014	0.0025	0.0057	0.0102	0.0159	0.0229	0.0408	0.1632	0.6528

Tetra Tech — **WATER QUALITY DATA SHEET**

SAMPLE LOCATION: 3M Menomonie **SAMPLE ID NUMBER:** MW-5

Client: 3M **Project Name:** 3M Menomonie CESA **Project No.:**

Personnel: Craig W., Laurad. **Date:** 12/12/23

Weather: 22° sunny

Purge Method: Low-Flow Techniques Other

Field Instruments: Solinist, Monsoon Pro (Brand / Serial #) **Flow Cell:** YSI (Brand / Serial #)

Well Condition Inspection (Circle One)

Cover:	(Locked)	Not Locked	Zip Tie	Well Broken:	Yes	(No)
Number:	(Legible)	Not Legible		Well Frozen:	Yes	(No)
Outer Casing:	(Good)	Fair	Poor	Well Dry:	Yes	(No)
Inner Casing:	(Good)	Fair	Poor	Well Obstructed:	Yes	(No)

Screen / Pump Interval: **Initial Depth to Water:** 67.76

General Comments: **Total Depth:** 77.72

Time	Depth to H_2O (feet)	Pump Rate (mL/min)	Temp (C°)	Specific Conductance Value	Specific Conductance Units	O_2 (mg/l)	pH (S.U.)	Redox (mV)	Turb (NTU)	Visual and Olfactory Observations / Notes
			Parameter Stabilization Ranges							
			3%	3%	ms/cm	10%	0.1	10mv	10%	
12:41	67.78	1200	12.0	943		12.92	6.27	76.1	—	
										Flow Stopped
12:52	67.82		12.4	976		11.85	631	89.4	—	
12:55	67.84		11.6	977		11.89	6.25	112.9	54.1	
12:58	67.80		11.7	958		11.94	6.22	128.2	28.2	
13:01	67.80		11.7	890		12.30	6.24	141.1	9.66	
13:04	67.81		11.7	912		12.16	6.23	138.1	7.20	
13:07	67.81		11.4	920		12.03	6.23	130.9	0.61	
13:10	67.81		11.6	922		12.08	6.23	122.4	0.62	

Sample Taken at: 13 :10 **Filter Used?** Y/N CAPACITY

Amount Purged: 13 gallon(s) **Water Clear?** Clear **Dissolved Metals Field Filtered** ☐

Odor: None **Color:** Clear

All measurements to Nearest Hundredth of a Foot (0.01 feet). Vol=pi(r)2*h 1 liter = .264 gallons 1 liter = 61.02 inches 1 gallon = 231 inches 1 inch = 2.54 cm

Well diameter gallon per ft:

1/8 inch	3/16 inch	1/4 inch	3/8 inch	1/2 inch	5/8 inch	3/4 inch	1 inch	2 inch	4 inch
0.0006	0.0014	0.0025	0.0057	0.0102	0.0159	0.0229	0.0408	0.1632	0.6528

Tetra Tech — **WATER QUALITY DATA SHEET**

SAMPLE LOCATION: 3M Menomonie **SAMPLE ID NUMBER:** MW – 6

Client: 3M **Project Name:** 3M Menomonie CESA **Project No.:**

Personnel: Craig W. Laura D. **Date:** 12/11/23

Weather: 28° cloudy

Purge Method: Low-Flow Techniques Other

Field Instruments: Solinst, Monsoon pro (Brand / Serial #) **Flow Cell:** YSI (Brand / Serial #)

Well Condition Inspection (Circle One)

Cover:	(Locked)	Not Locked	Zip Tie	Well Broken:	Yes	(No)
Number:	(Legible)	Not Legible		Well Frozen:	Yes	(No)
Outer Casing:	(Good)	Fair	Poor	Well Dry:	Yes	(No)
Inner Casing:	(Good)	Fair	Poor	Well Obstructed:	Yes	(No)

Screen / Pump Interval: **Initial Depth to Water:** 64.04

General Comments: **Total Depth:**

Time	Depth to H_20 (feet)	Pump Rate (mL/min)	Temp (C°)	Specific Conductance Value	Specific Conductance Units	O_2 (mg/l)	pH (S.U.)	Redox (mV)	Turb (NTU)	Visual and Olfactory Observations / Notes
			Parameter Stabilization Ranges							
			3%	3%	ms/cm	10%	0.1	10mv	10%	
15:25	64.08	500	11.3	730	us/cm	12.46	6.30	180.3	—	
15:28	64.10		11.3	743		12.06	6.29	158.3	—	
15:31	64.10		11.4	745		12.00	6.28	109.3	19.0	
15:34	64.10		11.4	740		11.90	6.28	109.0	6.18	
15:37	64.10		11.4	753		11.92	6.28	109.0	6.12	
15:40	64.10		11.4	753		11.97	6.26	109.4		

Sample Taken at: 15 : 45

Amount Purged: 9 gallon(s)

Filter Used? (N)/Y CAPACITY

Water Clear? clear

Dissolved Metals Field Filtered ☐

Odor: None

Color: clear

All measurements to Nearest Hundredth of a Foot (0.01 feet). Vol=pi(r)2*h

1 liter = .264 gallons 1 liter = 61.02 inches 1 gallon = 231 inches 1 inch = 2.54 cm

Well diameter/gallon per ft:

1/8 inch	3/16 inch	1/4 inch	3/8 inch	1/2 inch	5/8 inch	3/4 inch	1 inch	2 inch	4 inch
0.0006	0.0014	0.0025	0.0057	0.0102	0.0159	0.0229	0.0408	0.1632	0.6528

Tetra Tech — **WATER QUALITY DATA SHEET**

SAMPLE LOCATION: 3M Menomonie **SAMPLE ID NUMBER:** MW-7

Client: 3M **Project Name:** 3M Menomonie CESA **Project No.:**

Personnel: Craig W. Laura D **Date:** 12/11/23

Weather: 25° cloudy

Purge Method: Low-Flow Techniques Other

Field Instruments: Brand: Monsoon pro, Solonist Serial #: **Flow Cell:** Brand: YSI Serial #:

Well Condition Inspection (Circle One)

Cover:	(Locked)	Not Locked	Zip Tie	Well Broken:	Yes	(No)
Number:	(Legible)	Not Legible		Well Frozen:	Yes	(No)
Outer Casing:	(Good)	Fair	Poor	Well Dry:	Yes	(No)
Inner Casing:	(Good)	Fair	Poor	Well Obstructed:	Yes	(No)

Screen / Pump Interval: **Initial Depth to Water:** 62.15

General Comments: **Total Depth:** 71.50

Time	Depth to H_2O (feet)	Pump Rate (mL/min)	Temp (C°)	Specific Conductance Value	Specific Conductance Units	O_2 (mg/l)	pH (S.U.)	Redox (mV)	Turb (NTU)	Visual and Olfactory Observations / Notes
			Parameter Stabilization Ranges							
			3%	3%	ms/cm	10%	0.1	10mv	10%	
13:54	62.20	500	14.8	77.3		9.80	6.57	66.8	—	
13:57	62.19		14.8	76.3		9.78	6.57	75.0	68.0	
14:00	62.19		14.9	76.1		9.82	6.55	82.7	19.4	
14:03	62.19		14.9	75.9		9.81	6.58	85.9	13.5	
14:06	62.19		15.0	75.9		9.80	6.55	88.8	10.6	
14:09	62.19		14.9	76.1		9.86	6.54	92.0	9.58	
14:12	62.19		14.9	75.8		9.77	6.55	92.0	8.93	

Sample Taken at: 14 : 15

Amount Purged: 9 gallon(s)

Filter Used? (Y)/N CAPACITY

Water Clear? Clear

Dissolved Metals Field Filtered ☐

Odor: None

Color: Clear

All measurements to Nearest Hundredth of a Foot (0.01 feet). Vol=pi(r)2*h 1 liter = .264 gallons 1 liter = 61.02 inches 1 gallon = 231 inches 1 inch = 2.54 cm

Well diameter/gallon per ft:

1/8 inch	3/16 inch	1/4 inch	3/8 inch	1/2 inch	5/8 inch	3/4 inch	1 inch	2 inch	4 inch
0.0006	0.0014	0.0025	0.0057	0.0102	0.0159	0.0229	0.0408	0.1632	0.6528

Appendix B
December 2023 Groundwater Analytical Results

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

January 08, 2024

Amanda Albrecht
3M Environmental
3M Center, 260-05-N-17
Saint Paul, MN 551441000

RE: Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Dear Amanda Albrecht:

Enclosed are the analytical results for sample(s) received by the laboratory on December 13, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Minneapolis

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

Carolynne Trout
carolynne.trout@pacelabs.com
1(612)607-6351
Project Manager

Enclosures

cc: 3M Environmental Laboratory, 3M Environmental

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Pace Analytical Services, LLC - Minneapolis MN
1700 Elm Street SE, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8 Tribal Water Systems+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
GMP+ Certification #: GMP050884
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: AI-03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Approval: via MN 027-053-137
Minnesota Petrofund Registration #: 1240
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification (A2LA) #: R-036
North Dakota Certification (MN) #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification (1700) #: CL101
Oklahoma Certification #: 9507
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Vermont Certification #: VT-027053137
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01
USDA Permit #: P330-19-00208

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10678774001	**MEWI-GW-MW1-0-231211**	Water	12/11/23 12:10	12/13/23 11:00
10678774002	**MEWI-GW-MW5-0-231211**	Water	12/11/23 15:45	12/13/23 11:00
10678774003	**MEWI-GW-MW6-0-231211**	Water	12/11/23 14:15	12/13/23 11:00
10678774004	**MEWI-W-TB1-TB-231211**	Water	12/11/23 16:30	12/13/23 11:00

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
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SAMPLE ANALYTE COUNT

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10678774001	**MEWI-GW-MW1-0-231211**	ENV-SOP-MIN4-0178	NBH	57	PASI-M
10678774002	**MEWI-GW-MW5-0-231211**	ENV-SOP-MIN4-0178	NBH	57	PASI-M
10678774003	**MEWI-GW-MW6-0-231211**	ENV-SOP-MIN4-0178	MM4, NBH	57	PASI-M
10678774004	**MEWI-W-TB1-TB-231211**	ENV-SOP-MIN4-0178	MM4	57	PASI-M

PASI-M = Pace Analytical Services - Minneapolis

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SUMMARY OF DETECTION

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10678774001	**MEWI-GW-MW1-0-231211**					
ENV-SOP-MIN4-0178	6:2 FTS	0.0095	ug/L	0.0019	01/04/24 12:16	
ENV-SOP-MIN4-0178	PFBA	0.0041	ug/L	0.0020	01/04/24 12:16	
10678774002	**MEWI-GW-MW5-0-231211**					
ENV-SOP-MIN4-0178	Perfluorobutanesulfonic acid	0.0019	ug/L	0.0017	01/04/24 12:23	
ENV-SOP-MIN4-0178	PFPeS	0.0039	ug/L	0.0018	01/04/24 12:23	
ENV-SOP-MIN4-0178	Perfluorohexanesulfonic acid	0.051	ug/L	0.0017	01/04/24 12:23	
ENV-SOP-MIN4-0178	Perfluorooctanesulfonic acid	0.021	ug/L	0.0018	01/04/24 12:23	
10678774003	**MEWI-GW-MW6-0-231211**					
ENV-SOP-MIN4-0178	Perfluorobutanesulfonic acid	0.0049	ug/L	0.0017	01/04/24 12:30	
ENV-SOP-MIN4-0178	Perfluorohexanoic acid	0.0037	ug/L	0.0020	01/04/24 12:30	
ENV-SOP-MIN4-0178	PFBA	0.0052	ug/L	0.0020	01/04/24 12:30	
ENV-SOP-MIN4-0178	PFPeS	0.0045	ug/L	0.0019	01/04/24 12:30	
ENV-SOP-MIN4-0178	Perfluoroheptanoic acid	0.0025	ug/L	0.0020	01/04/24 12:30	
ENV-SOP-MIN4-0178	Perfluorohexanesulfonic acid	0.23	ug/L	0.018	01/03/24 17:01	
ENV-SOP-MIN4-0178	Perfluorooctanesulfonic acid	0.013	ug/L	0.0018	01/04/24 12:30	
ENV-SOP-MIN4-0178	Perfluorooctanoic acid	0.046	ug/L	0.0020	01/04/24 12:30	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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PROJECT NARRATIVE

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Date: January 08, 2024

The quality system for Pace Analytical Services, LLC in Minneapolis, MN (Pace-MN) has been audited and was found to be in conformance with ISO/IEC 17025:2017 by an independent assessment (A2LA Certificate # 2926). The PFAS test results in non-drinking water for this project are not covered by this accreditation. Pace-MN maintains accreditation with the state of Wisconsin for their isotope dilution analysis as defined in ENV-SOP-MIN4-0178 under certificate number999407970. All of the test results for this project are covered by the Wisconsin accreditation.

Pace Analytical Services, LLC
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PROJECT NARRATIVE

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Method: **ENV-SOP-MIN4-0178**
Description: WI ID NPW
Client: 3M Environmental
Date: January 08, 2024

General Information:
4 samples were analyzed for ENV-SOP-MIN4-0178 by Pace Analytical Services Minneapolis. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with ENV-SOP-MIN4-0178 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Sample: MEWI-GW-MW1-0-231211 **Lab ID: 10678774001** Collected: 12/11/23 12:10 Received: 12/13/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 250.921 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.0019	0.00055	1	12/29/23 11:12	01/04/24 12:16	763051-92-9	
4:2 FTS	ND	ug/L	0.0019	0.00046	1	12/29/23 11:12	01/04/24 12:16	757124-72-4	
6:2 FTS	**0.0095**	ug/L	0.0019	0.00067	1	12/29/23 11:12	01/04/24 12:16	27619-97-2	
8:2 FTS	ND	ug/L	0.0019	0.00050	1	12/29/23 11:12	01/04/24 12:16	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0019	0.00047	1	12/29/23 11:12	01/04/24 12:16	756426-58-1	
ADONA	ND	ug/L	0.0019	0.00091	1	12/29/23 11:12	01/04/24 12:16	919005-14-4	
HFPO-DA	ND	ug/L	0.0020	0.00049	1	12/29/23 11:12	01/04/24 12:16	13252-13-6	
NEtFOSAA	ND	ug/L	0.0020	0.00081	1	12/29/23 11:12	01/04/24 12:16	2991-50-6	
NEtFOSA	ND	ug/L	0.0020	0.00057	1	12/29/23 11:12	01/04/24 12:16	4151-50-2	
NEtFOSE	ND	ug/L	0.0020	0.00089	1	12/29/23 11:12	01/04/24 12:16	1691-99-2	
NMeFOSAA	ND	ug/L	0.0020	0.00069	1	12/29/23 11:12	01/04/24 12:16	2355-31-9	
NMeFOSA	ND	ug/L	0.0020	0.00055	1	12/29/23 11:12	01/04/24 12:16	31506-32-8	
NMeFOSE	ND	ug/L	0.0020	0.00052	1	12/29/23 11:12	01/04/24 12:16	24448-09-7	
Perfluorobutanesulfonic acid	ND	ug/L	0.0018	0.00048	1	12/29/23 11:12	01/04/24 12:16	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.0020	0.00061	1	12/29/23 11:12	01/04/24 12:16	335-76-2	
Perfluorohexanoic acid	ND	ug/L	0.0020	0.00091	1	12/29/23 11:12	01/04/24 12:16	307-24-4	
PFBA	**0.0041**	ug/L	0.0020	0.00050	1	12/29/23 11:12	01/04/24 12:16	375-22-4	
PFDS	ND	ug/L	0.0019	0.00064	1	12/29/23 11:12	01/04/24 12:16	335-77-3	
PFDoS	ND	ug/L	0.0019	0.00059	1	12/29/23 11:12	01/04/24 12:16	79780-39-5	
PFHpS	ND	ug/L	0.0019	0.00067	1	12/29/23 11:12	01/04/24 12:16	375-92-8	
PFNS	ND	ug/L	0.0019	0.00058	1	12/29/23 11:12	01/04/24 12:16	68259-12-1	
PFOSA	ND	ug/L	0.0020	0.00071	1	12/29/23 11:12	01/04/24 12:16	754-91-6	
PFPeA	ND	ug/L	0.0020	0.00082	1	12/29/23 11:12	01/04/24 12:16	2706-90-3	
PFPeS	ND	ug/L	0.0019	0.00060	1	12/29/23 11:12	01/04/24 12:16	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.0020	0.00048	1	12/29/23 11:12	01/04/24 12:16	307-55-1	
Perfluoroheptanoic acid	ND	ug/L	0.0020	0.00069	1	12/29/23 11:12	01/04/24 12:16	375-85-9	
Perfluorohexanesulfonic acid	ND	ug/L	0.0018	0.00053	1	12/29/23 11:12	01/04/24 12:16	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.0020	0.00079	1	12/29/23 11:12	01/04/24 12:16	375-95-1	
Perfluorooctanesulfonic acid	ND	ug/L	0.0018	0.00066	1	12/29/23 11:12	01/04/24 12:16	1763-23-1	
Perfluorooctanoic acid	ND	ug/L	0.0020	0.00086	1	12/29/23 11:12	01/04/24 12:16	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.0020	0.00060	1	12/29/23 11:12	01/04/24 12:16	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.0020	0.00062	1	12/29/23 11:12	01/04/24 12:16	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.0020	0.00048	1	12/29/23 11:12	01/04/24 12:16	2058-94-8	
Surrogates									
13C4-PFBA (S)	68	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	375-22-4	
13C5-PFPeA (S)	65	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	2706-90-3	
13C3-PFBS (S)	67	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	375-73-5	
13C24:2FTS (S)	47	%.	25-150		1	12/29/23 11:12	01/04/24 12:16		
13C3HFPO-DA (S)	67	%.	25-150		1	12/29/23 11:12	01/04/24 12:16		
13C4-PFHpA (S)	66	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	375-85-9	
13C3-PFHxS (S)	75	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	355-46-4	
13C26:2FTS (S)	60	%.	25-150		1	12/29/23 11:12	01/04/24 12:16		
13C8-PFOA (S)	69	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	335-67-1	
13C8-PFOS (S)	79	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Sample: MEWI-GW-MW1-0-231211 **Lab ID: 10678774001** Collected: 12/11/23 12:10 Received: 12/13/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 250.921 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	73	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	375-95-1	
13C6-PFDA (S)	73	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	335-76-2	
13C28:2FTS (S)	39	%.	25-150		1	12/29/23 11:12	01/04/24 12:16		
d3-MeFOSAA (S)	49	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	2355-31-9	
13C7-PFUdA (S)	66	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	2058-94-8	
13C8-PFOSA (S)	57	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	754-91-6	
d5-EtFOSAA (S)	47	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	2991-50-6	
13C2-PFDoA (S)	61	%.	25-150		1	12/29/23 11:12	01/04/24 12:16		
d3-NMeFOSA (S)	37	%.	10-150		1	12/29/23 11:12	01/04/24 12:16	31506-32-8	
d7-NMeFOSE (S)	45	%.	10-150		1	12/29/23 11:12	01/04/24 12:16	24448-09-7	
13C2-PFTA (S)	59	%.	25-150		1	12/29/23 11:12	01/04/24 12:16		
d9-NEtFOSE (S)	45	%.	10-150		1	12/29/23 11:12	01/04/24 12:16	1691-99-2	
d5-NEtFOSA (S)	32	%.	10-150		1	12/29/23 11:12	01/04/24 12:16	4151-50-2	
13C5-PFHxA (S)	69	%.	25-150		1	12/29/23 11:12	01/04/24 12:16	307-24-4	

REPORT OF LABORATORY ANALYSIS

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Minneapolis, MN 55414
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ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Sample: MEWI-GW-MW5-0-231211 **Lab ID: 10678774002** Collected: 12/11/23 15:45 Received: 12/13/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 263.404 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.0018	0.00053	1	12/29/23 11:12	01/04/24 12:23	763051-92-9	
4:2 FTS	ND	ug/L	0.0018	0.00044	1	12/29/23 11:12	01/04/24 12:23	757124-72-4	
6:2 FTS	ND	ug/L	0.0018	0.00064	1	12/29/23 11:12	01/04/24 12:23	27619-97-2	
8:2 FTS	ND	ug/L	0.0018	0.00048	1	12/29/23 11:12	01/04/24 12:23	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0018	0.00045	1	12/29/23 11:12	01/04/24 12:23	756426-58-1	
ADONA	ND	ug/L	0.0018	0.00087	1	12/29/23 11:12	01/04/24 12:23	919005-14-4	
HFPO-DA	ND	ug/L	0.0019	0.00047	1	12/29/23 11:12	01/04/24 12:23	13252-13-6	
NEtFOSAA	ND	ug/L	0.0019	0.00077	1	12/29/23 11:12	01/04/24 12:23	2991-50-6	
NEtFOSA	ND	ug/L	0.0019	0.00054	1	12/29/23 11:12	01/04/24 12:23	4151-50-2	
NEtFOSE	ND	ug/L	0.0019	0.00084	1	12/29/23 11:12	01/04/24 12:23	1691-99-2	
NMeFOSAA	ND	ug/L	0.0019	0.00066	1	12/29/23 11:12	01/04/24 12:23	2355-31-9	
NMeFOSA	ND	ug/L	0.0019	0.00052	1	12/29/23 11:12	01/04/24 12:23	31506-32-8	
NMeFOSE	ND	ug/L	0.0019	0.00049	1	12/29/23 11:12	01/04/24 12:23	24448-09-7	
Perfluorobutanesulfonic acid	**0.0019**	ug/L	0.0017	0.00046	1	12/29/23 11:12	01/04/24 12:23	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.0019	0.00058	1	12/29/23 11:12	01/04/24 12:23	335-76-2	
Perfluorohexanoic acid	ND	ug/L	0.0019	0.00086	1	12/29/23 11:12	01/04/24 12:23	307-24-4	
PFBA	ND	ug/L	0.0019	0.00047	1	12/29/23 11:12	01/04/24 12:23	375-22-4	
PFDS	ND	ug/L	0.0018	0.00061	1	12/29/23 11:12	01/04/24 12:23	335-77-3	
PFDoS	ND	ug/L	0.0018	0.00056	1	12/29/23 11:12	01/04/24 12:23	79780-39-5	
PFHpS	ND	ug/L	0.0018	0.00063	1	12/29/23 11:12	01/04/24 12:23	375-92-8	
PFNS	ND	ug/L	0.0018	0.00056	1	12/29/23 11:12	01/04/24 12:23	68259-12-1	
PFOSA	ND	ug/L	0.0019	0.00068	1	12/29/23 11:12	01/04/24 12:23	754-91-6	
PFPeA	ND	ug/L	0.0019	0.00078	1	12/29/23 11:12	01/04/24 12:23	2706-90-3	
PFPeS	**0.0039**	ug/L	0.0018	0.00057	1	12/29/23 11:12	01/04/24 12:23	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.0019	0.00046	1	12/29/23 11:12	01/04/24 12:23	307-55-1	
Perfluoroheptanoic acid	ND	ug/L	0.0019	0.00065	1	12/29/23 11:12	01/04/24 12:23	375-85-9	
Perfluorohexanesulfonic acid	**0.051**	ug/L	0.0017	0.00050	1	12/29/23 11:12	01/04/24 12:23	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.0019	0.00075	1	12/29/23 11:12	01/04/24 12:23	375-95-1	
Perfluorooctanesulfonic acid	**0.021**	ug/L	0.0018	0.00063	1	12/29/23 11:12	01/04/24 12:23	1763-23-1	
Perfluorooctanoic acid	ND	ug/L	0.0019	0.00082	1	12/29/23 11:12	01/04/24 12:23	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.0019	0.00057	1	12/29/23 11:12	01/04/24 12:23	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.0019	0.00059	1	12/29/23 11:12	01/04/24 12:23	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.0019	0.00046	1	12/29/23 11:12	01/04/24 12:23	2058-94-8	
Surrogates									
13C4-PFBA (S)	74	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	375-22-4	
13C5-PFPeA (S)	71	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	2706-90-3	
13C3-PFBS (S)	73	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	375-73-5	
13C24:2FTS (S)	44	%.	25-150		1	12/29/23 11:12	01/04/24 12:23		
13C3HFPO-DA (S)	78	%.	25-150		1	12/29/23 11:12	01/04/24 12:23		
13C4-PFHpA (S)	70	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	375-85-9	
13C3-PFHxS (S)	78	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	355-46-4	
13C26:2FTS (S)	69	%.	25-150		1	12/29/23 11:12	01/04/24 12:23		
13C8-PFOA (S)	77	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	335-67-1	
13C8-PFOS (S)	79	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Sample: MEWI-GW-MW5-0-231211 **Lab ID: 10678774002** Collected: 12/11/23 15:45 Received: 12/13/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 263.404 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	77	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	375-95-1	
13C6-PFDA (S)	72	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	335-76-2	
13C28:2FTS (S)	44	%.	25-150		1	12/29/23 11:12	01/04/24 12:23		
d3-MeFOSAA (S)	49	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	2355-31-9	
13C7-PFUdA (S)	69	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	2058-94-8	
13C8-PFOSA (S)	62	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	754-91-6	
d5-EtFOSAA (S)	46	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	2991-50-6	
13C2-PFDoA (S)	60	%.	25-150		1	12/29/23 11:12	01/04/24 12:23		
d3-NMeFOSA (S)	39	%.	10-150		1	12/29/23 11:12	01/04/24 12:23	31506-32-8	
d7-NMeFOSE (S)	46	%.	10-150		1	12/29/23 11:12	01/04/24 12:23	24448-09-7	
13C2-PFTA (S)	58	%.	25-150		1	12/29/23 11:12	01/04/24 12:23		
d9-NEtFOSE (S)	45	%.	10-150		1	12/29/23 11:12	01/04/24 12:23	1691-99-2	
d5-NEtFOSA (S)	39	%.	10-150		1	12/29/23 11:12	01/04/24 12:23	4151-50-2	
13C5-PFHxA (S)	74	%.	25-150		1	12/29/23 11:12	01/04/24 12:23	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Sample: MEWI-GW-MW6-0-231211 **Lab ID: 10678774003** Collected: 12/11/23 14:15 Received: 12/13/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 253.477 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.0019	0.00055	1	12/29/23 11:12	01/04/24 12:30	763051-92-9	
4:2 FTS	ND	ug/L	0.0018	0.00046	1	12/29/23 11:12	01/04/24 12:30	757124-72-4	
6:2 FTS	ND	ug/L	0.0019	0.00067	1	12/29/23 11:12	01/04/24 12:30	27619-97-2	
8:2 FTS	ND	ug/L	0.0019	0.00050	1	12/29/23 11:12	01/04/24 12:30	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0018	0.00046	1	12/29/23 11:12	01/04/24 12:30	756426-58-1	
ADONA	ND	ug/L	0.0019	0.00091	1	12/29/23 11:12	01/04/24 12:30	919005-14-4	
HFPO-DA	ND	ug/L	0.0020	0.00049	1	12/29/23 11:12	01/04/24 12:30	13252-13-6	
NEtFOSAA	ND	ug/L	0.0020	0.00080	1	12/29/23 11:12	01/04/24 12:30	2991-50-6	
NEtFOSA	ND	ug/L	0.0020	0.00057	1	12/29/23 11:12	01/04/24 12:30	4151-50-2	
NEtFOSE	ND	ug/L	0.0020	0.00088	1	12/29/23 11:12	01/04/24 12:30	1691-99-2	
NMeFOSAA	ND	ug/L	0.0020	0.00068	1	12/29/23 11:12	01/04/24 12:30	2355-31-9	
NMeFOSA	ND	ug/L	0.0020	0.00054	1	12/29/23 11:12	01/04/24 12:30	31506-32-8	
NMeFOSE	ND	ug/L	0.0020	0.00051	1	12/29/23 11:12	01/04/24 12:30	24448-09-7	
Perfluorobutanesulfonic acid	**0.0049**	ug/L	0.0017	0.00048	1	12/29/23 11:12	01/04/24 12:30	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.0020	0.00060	1	12/29/23 11:12	01/04/24 12:30	335-76-2	
Perfluorohexanoic acid	**0.0037**	ug/L	0.0020	0.00090	1	12/29/23 11:12	01/04/24 12:30	307-24-4	
PFBA	**0.0052**	ug/L	0.0020	0.00049	1	12/29/23 11:12	01/04/24 12:30	375-22-4	
PFDS	ND	ug/L	0.0019	0.00063	1	12/29/23 11:12	01/04/24 12:30	335-77-3	
PFDoS	ND	ug/L	0.0019	0.00058	1	12/29/23 11:12	01/04/24 12:30	79780-39-5	
PFHpS	ND	ug/L	0.0019	0.00066	1	12/29/23 11:12	01/04/24 12:30	375-92-8	
PFNS	ND	ug/L	0.0019	0.00058	1	12/29/23 11:12	01/04/24 12:30	68259-12-1	
PFOSA	ND	ug/L	0.0020	0.00071	1	12/29/23 11:12	01/04/24 12:30	754-91-6	
PFPeA	ND	ug/L	0.0020	0.00081	1	12/29/23 11:12	01/04/24 12:30	2706-90-3	
PFPeS	**0.0045**	ug/L	0.0019	0.00059	1	12/29/23 11:12	01/04/24 12:30	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.0020	0.00047	1	12/29/23 11:12	01/04/24 12:30	307-55-1	
Perfluoroheptanoic acid	**0.0025**	ug/L	0.0020	0.00068	1	12/29/23 11:12	01/04/24 12:30	375-85-9	
Perfluorohexanesulfonic acid	**0.23**	ug/L	0.018	0.0052	10	12/29/23 11:12	01/03/24 17:01	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.0020	0.00078	1	12/29/23 11:12	01/04/24 12:30	375-95-1	
Perfluorooctanesulfonic acid	**0.013**	ug/L	0.0018	0.00066	1	12/29/23 11:12	01/04/24 12:30	1763-23-1	
Perfluorooctanoic acid	**0.046**	ug/L	0.0020	0.00085	1	12/29/23 11:12	01/04/24 12:30	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.0020	0.00059	1	12/29/23 11:12	01/04/24 12:30	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.0020	0.00061	1	12/29/23 11:12	01/04/24 12:30	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.0020	0.00048	1	12/29/23 11:12	01/04/24 12:30	2058-94-8	
Surrogates									
13C4-PFBA (S)	75	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	375-22-4	
13C5-PFPeA (S)	73	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	2706-90-3	
13C3-PFBS (S)	74	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	375-73-5	
13C24:2FTS (S)	42	%.	25-150		1	12/29/23 11:12	01/04/24 12:30		
13C3HFPO-DA (S)	77	%.	25-150		1	12/29/23 11:12	01/04/24 12:30		
13C4-PFHpA (S)	72	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	375-85-9	
13C3-PFHxS (S)	78	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	355-46-4	
13C26:2FTS (S)	76	%.	25-150		1	12/29/23 11:12	01/04/24 12:30		
13C8-PFOA (S)	79	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	335-67-1	
13C8-PFOS (S)	83	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Sample: MEWI-GW-MW6-0-231211 **Lab ID: 10678774003** Collected: 12/11/23 14:15 Received: 12/13/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 253.477 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	80	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	375-95-1	
13C6-PFDA (S)	78	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	335-76-2	
13C28:2FTS (S)	50	%.	25-150		1	12/29/23 11:12	01/04/24 12:30		
d3-MeFOSAA (S)	54	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	2355-31-9	
13C7-PFUdA (S)	73	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	2058-94-8	
13C8-PFOSA (S)	64	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	754-91-6	
d5-EtFOSAA (S)	52	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	2991-50-6	
13C2-PFDoA (S)	66	%.	25-150		1	12/29/23 11:12	01/04/24 12:30		
d3-NMeFOSA (S)	31	%.	10-150		1	12/29/23 11:12	01/04/24 12:30	31506-32-8	
d7-NMeFOSE (S)	49	%.	10-150		1	12/29/23 11:12	01/04/24 12:30	24448-09-7	
13C2-PFTA (S)	64	%.	25-150		1	12/29/23 11:12	01/04/24 12:30		
d9-NEtFOSE (S)	44	%.	10-150		1	12/29/23 11:12	01/04/24 12:30	1691-99-2	
d5-NEtFOSA (S)	27	%.	10-150		1	12/29/23 11:12	01/04/24 12:30	4151-50-2	
13C5-PFHxA (S)	75	%.	25-150		1	12/29/23 11:12	01/04/24 12:30	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Sample: MEWI-W-TB1-TB-231211 **Lab ID: 10678774004** Collected: 12/11/23 16:30 Received: 12/13/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 248.402 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.0019	0.00056	1	12/29/23 11:12	01/03/24 15:05	763051-92-9	
4:2 FTS	ND	ug/L	0.0019	0.00047	1	12/29/23 11:12	01/03/24 15:05	757124-72-4	
6:2 FTS	ND	ug/L	0.0019	0.00068	1	12/29/23 11:12	01/03/24 15:05	27619-97-2	
8:2 FTS	ND	ug/L	0.0019	0.00051	1	12/29/23 11:12	01/03/24 15:05	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0019	0.00047	1	12/29/23 11:12	01/03/24 15:05	756426-58-1	
ADONA	ND	ug/L	0.0019	0.00092	1	12/29/23 11:12	01/03/24 15:05	919005-14-4	
HFPO-DA	ND	ug/L	0.0020	0.00050	1	12/29/23 11:12	01/03/24 15:05	13252-13-6	
NEtFOSAA	ND	ug/L	0.0020	0.00082	1	12/29/23 11:12	01/03/24 15:05	2991-50-6	
NEtFOSA	ND	ug/L	0.0020	0.00058	1	12/29/23 11:12	01/03/24 15:05	4151-50-2	
NEtFOSE	ND	ug/L	0.0020	0.00089	1	12/29/23 11:12	01/03/24 15:05	1691-99-2	
NMeFOSAA	ND	ug/L	0.0020	0.00070	1	12/29/23 11:12	01/03/24 15:05	2355-31-9	
NMeFOSA	ND	ug/L	0.0020	0.00056	1	12/29/23 11:12	01/03/24 15:05	31506-32-8	
NMeFOSE	ND	ug/L	0.0020	0.00052	1	12/29/23 11:12	01/03/24 15:05	24448-09-7	
Perfluorobutanesulfonic acid	ND	ug/L	0.0018	0.00049	1	12/29/23 11:12	01/03/24 15:05	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.0020	0.00061	1	12/29/23 11:12	01/03/24 15:05	335-76-2	
Perfluorohexanoic acid	ND	ug/L	0.0020	0.00092	1	12/29/23 11:12	01/03/24 15:05	307-24-4	
PFBA	ND	ug/L	0.0020	0.00050	1	12/29/23 11:12	01/03/24 15:05	375-22-4	
PFDS	ND	ug/L	0.0019	0.00065	1	12/29/23 11:12	01/03/24 15:05	335-77-3	
PFDoS	ND	ug/L	0.0020	0.00059	1	12/29/23 11:12	01/03/24 15:05	79780-39-5	
PFHpS	ND	ug/L	0.0019	0.00067	1	12/29/23 11:12	01/03/24 15:05	375-92-8	
PFNS	ND	ug/L	0.0019	0.00059	1	12/29/23 11:12	01/03/24 15:05	68259-12-1	
PFOSA	ND	ug/L	0.0020	0.00072	1	12/29/23 11:12	01/03/24 15:05	754-91-6	
PFPeA	ND	ug/L	0.0020	0.00083	1	12/29/23 11:12	01/03/24 15:05	2706-90-3	
PFPeS	ND	ug/L	0.0019	0.00060	1	12/29/23 11:12	01/03/24 15:05	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.0020	0.00048	1	12/29/23 11:12	01/03/24 15:05	307-55-1	
Perfluoroheptanoic acid	ND	ug/L	0.0020	0.00069	1	12/29/23 11:12	01/03/24 15:05	375-85-9	
Perfluorohexanesulfonic acid	ND	ug/L	0.0018	0.00053	1	12/29/23 11:12	01/03/24 15:05	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.0020	0.00080	1	12/29/23 11:12	01/03/24 15:05	375-95-1	
Perfluorooctanesulfonic acid	ND	ug/L	0.0019	0.00067	1	12/29/23 11:12	01/03/24 15:05	1763-23-1	
Perfluorooctanoic acid	ND	ug/L	0.0020	0.00087	1	12/29/23 11:12	01/03/24 15:05	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.0020	0.00060	1	12/29/23 11:12	01/03/24 15:05	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.0020	0.00063	1	12/29/23 11:12	01/03/24 15:05	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.0020	0.00049	1	12/29/23 11:12	01/03/24 15:05	2058-94-8	
Surrogates									
13C4-PFBA (S)	84	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	375-22-4	
13C5-PFPeA (S)	84	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	2706-90-3	
13C3-PFBS (S)	84	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	375-73-5	
13C24:2FTS (S)	77	%.	25-150		1	12/29/23 11:12	01/03/24 15:05		
13C3HFPO-DA (S)	91	%.	25-150		1	12/29/23 11:12	01/03/24 15:05		
13C4-PFHpA (S)	83	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	375-85-9	
13C3-PFHxS (S)	85	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	355-46-4	
13C26:2FTS (S)	92	%.	25-150		1	12/29/23 11:12	01/03/24 15:05		
13C8-PFOA (S)	81	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	335-67-1	
13C8-PFOS (S)	54	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Sample: MEWI-W-TB1-TB-231211 **Lab ID: 10678774004** Collected: 12/11/23 16:30 Received: 12/13/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 248.402 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	61	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	375-95-1	
13C6-PFDA (S)	51	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	335-76-2	
13C28:2FTS (S)	41	%.	25-150		1	12/29/23 11:12	01/03/24 15:05		
d3-MeFOSAA (S)	46	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	2355-31-9	
13C7-PFUdA (S)	49	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	2058-94-8	
13C8-PFOSA (S)	63	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	754-91-6	
d5-EtFOSAA (S)	44	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	2991-50-6	
13C2-PFDoA (S)	46	%.	25-150		1	12/29/23 11:12	01/03/24 15:05		
d3-NMeFOSA (S)	34	%.	10-150		1	12/29/23 11:12	01/03/24 15:05	31506-32-8	
d7-NMeFOSE (S)	51	%.	10-150		1	12/29/23 11:12	01/03/24 15:05	24448-09-7	
13C2-PFTA (S)	49	%.	25-150		1	12/29/23 11:12	01/03/24 15:05		
d9-NEtFOSE (S)	47	%.	10-150		1	12/29/23 11:12	01/03/24 15:05	1691-99-2	
d5-NEtFOSA (S)	32	%.	10-150		1	12/29/23 11:12	01/03/24 15:05	4151-50-2	
13C5-PFHxA (S)	85	%.	25-150		1	12/29/23 11:12	01/03/24 15:05	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

QC Batch: 925082
QC Batch Method: ENV-SOP-MIN4-0178
Analysis Method: ENV-SOP-MIN4-0178
Analysis Description: WI ID NPW
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10678774001, 10678774002, 10678774003, 10678774004

METHOD BLANK: 4859021 Matrix: Water
Associated Lab Samples: 10678774001, 10678774002, 10678774003, 10678774004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
11Cl-PF3OUdS	ug/L	ND	0.0018	01/03/24 14:43	
4:2 FTS	ug/L	ND	0.0018	01/03/24 14:43	
6:2 FTS	ug/L	ND	0.0019	01/03/24 14:43	
8:2 FTS	ug/L	ND	0.0019	01/03/24 14:43	
9Cl-PF3ONS	ug/L	ND	0.0018	01/03/24 14:43	
ADONA	ug/L	ND	0.0019	01/03/24 14:43	
HFPO-DA	ug/L	ND	0.0020	01/03/24 14:43	
NEtFOSA	ug/L	ND	0.0020	01/03/24 14:43	
NEtFOSAA	ug/L	ND	0.0020	01/03/24 14:43	
NEtFOSE	ug/L	ND	0.0020	01/03/24 14:43	
NMeFOSA	ug/L	ND	0.0020	01/03/24 14:43	
NMeFOSAA	ug/L	ND	0.0020	01/03/24 14:43	
NMeFOSE	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorobutanesulfonic acid	ug/L	ND	0.0017	01/03/24 14:43	
Perfluorodecanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorododecanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluoroheptanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorohexanesulfonic acid	ug/L	ND	0.0018	01/03/24 14:43	
Perfluorohexanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorononanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorooctanesulfonic acid	ug/L	ND	0.0018	01/03/24 14:43	
Perfluorooctanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorotetradecanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorotridecanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluoroundecanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
PFBA	ug/L	ND	0.0020	01/03/24 14:43	
PFDoS	ug/L	ND	0.0019	01/03/24 14:43	
PFDS	ug/L	ND	0.0019	01/03/24 14:43	
PFHpS	ug/L	ND	0.0019	01/03/24 14:43	
PFNS	ug/L	ND	0.0019	01/03/24 14:43	
PFOSA	ug/L	ND	0.0020	01/03/24 14:43	
PFPeA	ug/L	ND	0.0020	01/03/24 14:43	
PFPeS	ug/L	ND	0.0018	01/03/24 14:43	
13C2-PFDoA (S)	%.	72	25-150	01/03/24 14:43	
13C2-PFTA (S)	%.	74	25-150	01/03/24 14:43	
13C24:2FTS (S)	%.	73	25-150	01/03/24 14:43	
13C26:2FTS (S)	%.	64	25-150	01/03/24 14:43	
13C28:2FTS (S)	%.	50	25-150	01/03/24 14:43	
13C2PFHxDA (S)	%.	59	25-150	01/03/24 14:43	
13C3-PFBS (S)	%.	84	25-150	01/03/24 14:43	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

METHOD BLANK: 4859021 Matrix: Water
Associated Lab Samples: 10678774001, 10678774002, 10678774003, 10678774004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
13C3-PFHxS (S)	%.	84	25-150	01/03/24 14:43	
13C3HFPO-DA (S)	%.	90	25-150	01/03/24 14:43	
13C4-PFBA (S)	%.	84	25-150	01/03/24 14:43	
13C4-PFHpA (S)	%.	82	25-150	01/03/24 14:43	
13C5-PFHxA (S)	%.	84	25-150	01/03/24 14:43	
13C5-PFPeA (S)	%.	83	25-150	01/03/24 14:43	
13C6-PFDA (S)	%.	73	25-150	01/03/24 14:43	
13C7-PFUdA (S)	%.	74	25-150	01/03/24 14:43	
13C8-PFOA (S)	%.	82	25-150	01/03/24 14:43	
13C8-PFOS (S)	%.	82	25-150	01/03/24 14:43	
13C8-PFOSA (S)	%.	72	25-150	01/03/24 14:43	
13C9-PFNA (S)	%.	80	25-150	01/03/24 14:43	
d3-MeFOSAA (S)	%.	63	25-150	01/03/24 14:43	
d3-NMeFOSA (S)	%.	37	20-150	01/03/24 14:43	
d5-EtFOSAA (S)	%.	67	25-150	01/03/24 14:43	
d5-NEtFOSA (S)	%.	35	20-150	01/03/24 14:43	
d7-NMeFOSE (S)	%.	64	20-150	01/03/24 14:43	
d9-NEtFOSE (S)	%.	64	20-150	01/03/24 14:43	

LABORATORY CONTROL SAMPLE & LCSD: 4859022 4859023

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
11Cl-PF3OUdS	ug/L	0.0035	0.0032	0.0033	91	90	50-150	1	30	
4:2 FTS	ug/L	0.0035	0.0033	0.0034	95	93	50-150	1	30	
6:2 FTS	ug/L	0.0036	0.0033	0.0034	94	92	50-150	1	30	
8:2 FTS	ug/L	0.0036	0.0034	0.0031	96	84	50-150	10	30	
9Cl-PF3ONS	ug/L	0.0035	0.0033	0.0032	95	90	50-150	4	30	
ADONA	ug/L	0.0035	0.0033	0.0031	94	86	50-150	7	30	
HFPO-DA	ug/L	0.0037	0.0032	0.0034	86	89	50-150	6	30	
NEtFOSA	ug/L	0.0037	0.0035	0.0035	95	90	50-150	2	30	
NEtFOSAA	ug/L	0.0037	0.0038	0.0030	100	77	50-150	23	30	
NEtFOSE	ug/L	0.0037	0.0035	0.0036	94	94	50-150	3	30	
NMeFOSA	ug/L	0.0037	0.0040	0.0033	106	86	50-150	18	30	
NMeFOSAA	ug/L	0.0037	0.0039	0.0036	103	93	50-150	8	30	
NMeFOSE	ug/L	0.0037	0.0036	0.0034	97	88	50-150	7	30	
Perfluorobutanesulfonic acid	ug/L	0.0033	0.0032	0.0031	95	90	50-150	3	30	
Perfluorodecanoic acid	ug/L	0.0037	0.0036	0.0034	97	87	50-150	8	30	
Perfluorododecanoic acid	ug/L	0.0037	0.0037	0.0032	98	83	50-150	14	30	
Perfluoroheptanoic acid	ug/L	0.0037	0.0036	0.0034	97	89	50-150	6	30	
Perfluorohexanesulfonic acid	ug/L	0.0034	0.0032	0.0031	92	88	50-150	2	30	
Perfluorohexanoic acid	ug/L	0.0037	0.0036	0.0034	96	87	50-150	7	30	
Perfluorononanoic acid	ug/L	0.0037	0.0035	0.0033	94	85	50-150	8	30	
Perfluorooctanesulfonic acid	ug/L	0.0035	0.0034	0.0031	98	87	50-150	9	30	
Perfluorooctanoic acid	ug/L	0.0037	0.0037	0.0035	99	90	50-150	7	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

LABORATORY CONTROL SAMPLE & LCSD: 4859022 4859023

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Perfluorotetradecanoic acid	ug/L	0.0037	0.0036	0.0034	95	89	50-150	4	30	
Perfluorotridecanoic acid	ug/L	0.0037	0.0036	0.0034	96	87	50-150	6	30	
Perfluoroundecanoic acid	ug/L	0.0037	0.0037	0.0033	99	85	50-150	13	30	
PFBA	ug/L	0.0037	0.0037	0.0036	98	94	50-150	2	30	
PFDoS	ug/L	0.0036	0.0031	0.0031	84	82	50-150	0	30	
PFDS	ug/L	0.0036	0.0027	0.0032	75	87	50-150	18	30	
PFHpS	ug/L	0.0036	0.0038	0.0036	105	98	50-150	4	30	
PFNS	ug/L	0.0036	0.0033	0.0026	91	69	50-150	24	30	
PFOSA	ug/L	0.0037	0.0034	0.0036	90	92	50-150	5	30	
PFPeA	ug/L	0.0037	0.0037	0.0035	98	92	50-150	3	30	
PFPeS	ug/L	0.0035	0.0033	0.0032	94	88	50-150	4	30	
13C2-PFDoA (S)	%.				66	81	25-150			
13C2-PFTA (S)	%.				66	75	25-150			
13C24:2FTS (S)	%.				70	77	25-150			
13C26:2FTS (S)	%.				83	150	25-150			
13C28:2FTS (S)	%.				49	60	25-150			
13C2PFHxDA (S)	%.				59	69	25-150			
13C3-PFBS (S)	%.				76	85	25-150			
13C3-PFHxS (S)	%.				77	85	25-150			
13C3HFPO-DA (S)	%.				83	89	25-150			
13C4-PFBA (S)	%.				77	84	25-150			
13C4-PFHpA (S)	%.				76	83	25-150			
13C5-PFHxA (S)	%.				77	86	25-150			
13C5-PFPeA (S)	%.				77	85	25-150			
13C6-PFDA (S)	%.				69	81	25-150			
13C7-PFUdA (S)	%.				66	81	25-150			
13C8-PFOA (S)	%.				77	87	25-150			
13C8-PFOS (S)	%.				72	83	25-150			
13C8-PFOSA (S)	%.				70	75	25-150			
13C9-PFNA (S)	%.				72	81	25-150			
d3-MeFOSAA (S)	%.				55	69	25-150			
d3-NMeFOSA (S)	%.				34	47	20-150			
d5-EtFOSAA (S)	%.				55	75	25-150			
d5-NEtFOSA (S)	%.				34	44	20-150			
d7-NMeFOSE (S)	%.				55	68	20-150			
d9-NEtFOSE (S)	%.				54	65	20-150			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above LOD.

J - The reported result is an estimated value.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

DL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Analyte was not detected and is reported as less than the LOD or as defined by the customer.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

WORKORDER QUALIFIERS

WO: 10678774

[1] The quality system for Pace Analytical Services, LLC in Minneapolis, MN (Pace-MN) has been audited and was found to be in conformance with ISO/IEC 17025:2017 by an independent assessment (A2LA Certificate # 2926). The PFAS test results in non-drinking water for this project are not covered by this accreditation. Pace-MN maintains accreditation with the state of Wisconsin for their isotope dilution analysis as defined in ENV-SOP-MIN4-0178 under certificate number999407970. All of the test results for this project are covered by the Wisconsin accreditation.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: E23-0716 3M Menomonie GW Dec.
Pace Project No.: 10678774

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10678774001	**MEWI-GW-MW1-0-231211**	ENV-SOP-MIN4-0178	925082	ENV-SOP-MIN4-0178	926154
10678774002	**MEWI-GW-MW5-0-231211**	ENV-SOP-MIN4-0178	925082	ENV-SOP-MIN4-0178	926154
10678774003	**MEWI-GW-MW6-0-231211**	ENV-SOP-MIN4-0178	925082	ENV-SOP-MIN4-0178	926154
10678774004	**MEWI-W-TB1-TB-231211**	ENV-SOP-MIN4-0178	925082	ENV-SOP-MIN4-0178	926154

PFAS

3M Global EHS Laboratory

Chain of Custody / Request for Analytical

Project: E23-0716

Sample Shipping Address
Pace Analytical Services, LLC - Minneapolis

1700 Elm St SE
Minneapolis, MN 55414
Attn: Martha Hansen

Project Description: 3M Menomonie GW Monitoring - December 2023

Project Requester
Chambers, Britta (MAPLEWOOD-3MUS-MN 3M CENTER)
Department: 530711 Site Source: 01J9C020
Project Created: 12/1/2023

3M Project Lead
Amanda Albrecht
Email Address: aalbrecht2@mmm.com
Phone Number: 651-736-9414

Item	3M Sample Number	Sample Description	Date/Time Sampled	Matrix	Type of Sample	Sample Comment	Number of Containers: Record each container type/ preservative collected: V				
1	E23-0716-001	MEWI-GW-MW1-0- 231211	12/11/23 12:10	WG	☒Grab ☐Comp		2				01
2	E23-0716-002	MEWI-GW-MW2-0-		WG	☐Grab ☐Comp						
3	E23-0716-003	MEWI-GW-MW3-0-		WG	☐Grab ☐Comp						
4	E23-0716-004	MEWI-GW-MW3-DB-		WG	☐Grab ☐Comp						
5	E23-0716-005	MEWI-GW-MW4-0-		WG	☐Grab ☐Comp						
6	E23-0716-006	MEWI-GW-MW5-0- 231211	12/11/23 15:45	WG	☒Grab ☐Comp	~~HRS~~	2				02
7	E23-0716-007	MEWI-GW-MW6-0- 231211	12/11/23 14:15	WG	☒Grab ☐Comp		2				03
8	E23-0716-008	MEWI-GW-MW7-0-		WG	☐Grab ☐Comp						
9	E23-0716-009	MEWI-W-TB1-TB- 231211	12/11/23 16:30	WQ	☐Grab ☐Comp		1				04
10	E23-0716-010	MEWI-W-FB1-FB-		WQ	☐Grab ☐Comp						
11	E23-0716-011	MEWI-W-EB1-EB-		WQ	☐Grab ☐Comp						
12	E23-0716-012	MEWI-		WG	☐Grab ☐Comp						
13	E23-0716-013	MEWI-		WG	☐Grab ☐Comp						

WO#: 10678774

10678774

Collected by (print): Laura Dykstra Collector's signature: Laura Dykstra

Item	Relinquished by:	Date	Time	Shipped Via	Received by:	Date	Time	
1	Laura Dykstra	12/11/23	1730	fedex	Stelacia/Pace	12/12/23	09:55	4.8c
	Stelacia/Pace	12/13/23	07:49			12/13/23	0800	
		12/13/23	1100	PaceCour	Pace	12-13-23	1100	

Contact EHS Lab project lead for requested tests and target analytes, if not specified.

Sample Condition Upon Receipt

Client Name: 3M Global EHS Labs

Project #: **WO#: 10678774**

PM: CT1 **Due Date: 01/26/24**

CLIENT: 3M ENV

Courier: ☐ FedEx ☐ UPS ☐ USPS ☑ Client ☐ Pace ☐ SpeeDee ☐ Commercial

Tracking Number: _____ ☐ See Exceptions ENV-FRM-MIN4-0142

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No **Seals Intact?** ☐ Yes ☑ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Packing Material: ☑ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other **Temp Blank?** ☑ Yes ☐ No

Thermometer: ☐ T1 (0461) ☐ T2 (0436) ☐ T3 (0459) ☐ T4 (0402) ☐ T5 (0178) ☐ T6 (0235) ☑ T7 (0042) ☐ T8 (0775) ☐ T9(0727) ☐ 01339252/1710

Type of Ice: ☑ Wet ☐ Blue ☐ Dry ☐ None ☐ Melted

Did Samples Originate in West Virginia? ☐ Yes ☑ No **Were All Container Temps Taken?** ☐ Yes ☐ No ☑ N/A

Temp should be above freezing to 6 °C **Cooler temp Read w/Temp Blank:** 5.3 °C

Correction Factor: -0.4 **Cooler Temp Corrected w/temp blank:** 4.8 °C

Average Corrected Temp (no temp blank only): _____ °C ☐ See Exceptions ENV-FRM-MIN4-0142 ☐ 1 Container

USDA Regulated Soil: (☑ N/A, water sample/other: _____) **Date/Initials of Person Examining Contents:** 12-13-23 AGC

Did samples originate in a quarantine zone within the United States: AL, AR, AZ CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX, or VA (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

If Yes to either question, fill out a Regulated Soil Checklist (ENV-FRM-MIN4-0154) and include with SCUR/COC paperwork.

Location (Check one): ☐ Duluth ☐ Minneapolis ☐ Virginia				**COMMENTS**
Chain of Custody Present and Filled Out?	☑ Yes	☐ No		1.
Chain of Custody Relinquished?	☑ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	3.
Samples Arrived within Hold Time?	☑ Yes	☐ No		4. If fecal: ☐ <8 hrs ☐ >8 hr, <24 ☐ No
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E.coli ☐ BOD/cBOD ☐ Hex Chrom ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other _____
Rush Turn Around Time Requested?	☐ Yes	☑ No		6.
Sufficient Sample Volume?	☑ Yes	☐ No		7.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	8.
-Pace Containers Used?	☑ Yes	☐ No		
Containers Intact?	☑ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC? Matrix: ☑ Water ☐ Soil ☐ Oil ☐ Other	☑ Yes	☐ No		11. **If no, write ID/Date/Time of container below:** ☐ See Exceptions ENV-FRM-MIN4-0142
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO3, H2SO4, <2pH, NaOH >9 Sulfide, NaOH>10 Cyanide)	☐ Yes	☐ No	☑ N/A	☐ NaOH ☐ HNO3 ☐ H2SO4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxins/PFAS (*If adding preservative to a container, it must be added to associated field and equipment blanks--verify with PM first.)	☐ Yes	☐ No	☑ N/A	Positive for Residual Chlorine? ☐ Yes ☐ No ☐ See Exceptions ENV-FRM-MIN4-0142 **pH Paper Lot #** Residual Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in Methyl Mercury Container?	☐ Yes	☐ No	☑ N/A	13.
Extra labels present on soil VOA or WIDRO containers?	☐ Yes	☐ No	☑ N/A	14. ☐ See Exceptions ENV-FRM-MIN4-0142
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☐ No	☑ N/A	
3 Trip Blanks Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	Pace Trip Blank Lot # (if purchased): _____

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: _____ Date/Time: _____

Comments/Resolution: _____

Project Manager Review: Carolynne Trout **Date:** 12/13/23

NOTE: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e., out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled By: AGG **Line:** 4

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

January 08, 2024

Amanda Albrecht
3M Environmental
3M Center, 260-05-N-17
Saint Paul, MN 551441000

RE: Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Dear Amanda Albrecht:

Enclosed are the analytical results for sample(s) received by the laboratory on December 14, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Minneapolis

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

Carolynne Trout
carolynne.trout@pacelabs.com
1(612)607-6351
Project Manager

Enclosures

cc: 3M Environmental Laboratory, 3M Environmental

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Pace Analytical Services, LLC - Minneapolis MN
1700 Elm Street SE, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8 Tribal Water Systems+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
GMP+ Certification #: GMP050884
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: AI-03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Approval: via MN 027-053-137
Minnesota Petrofund Registration #: 1240
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification (A2LA) #: R-036
North Dakota Certification (MN) #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification (1700) #: CL101
Oklahoma Certification #: 9507
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Vermont Certification #: VT-027053137
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01
USDA Permit #: P330-19-00208

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10678924001	**MEWI-GW-MW4-0-231212**	Water	12/12/23 11:35	12/14/23 11:00
10678924002	**MEWI-GW-MW5-0-231212**	Water	12/12/23 13:10	12/14/23 11:00
10678924003	**MEWI-W-TB1-TB-231212**	Water	12/12/23 15:50	12/14/23 11:00
10678924004	**MEWI-W-FB1-FB-231212**	Water	12/12/23 15:55	12/14/23 11:00
10678924005	**MEWI-W-EB1-EB-231212**	Water	12/12/23 16:00	12/14/23 11:00

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10678924001	**MEWI-GW-MW4-0-231212**	ENV-SOP-MIN4-0178	MM4, NBH	57	PASI-M
10678924002	**MEWI-GW-MW5-0-231212**	ENV-SOP-MIN4-0178	NBH	57	PASI-M
10678924003	**MEWI-W-TB1-TB-231212**	ENV-SOP-MIN4-0178	MM4	57	PASI-M
10678924004	**MEWI-W-FB1-FB-231212**	ENV-SOP-MIN4-0178	MM4	57	PASI-M
10678924005	**MEWI-W-EB1-EB-231212**	ENV-SOP-MIN4-0178	MM4	57	PASI-M

PASI-M = Pace Analytical Services - Minneapolis

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SUMMARY OF DETECTION

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10678924001	**MEWI-GW-MW4-0-231212**					
ENV-SOP-MIN4-0178	Perfluorobutanesulfonic acid	0.027	ug/L	0.017	01/03/24 17:08	
ENV-SOP-MIN4-0178	Perfluorohexanoic acid	0.12	ug/L	0.020	01/03/24 17:08	
ENV-SOP-MIN4-0178	PFHpS	0.026	ug/L	0.019	01/03/24 17:08	
ENV-SOP-MIN4-0178	PFPeS	0.11	ug/L	0.018	01/03/24 17:08	
ENV-SOP-MIN4-0178	Perfluoroheptanoic acid	0.024	ug/L	0.020	01/03/24 17:08	
ENV-SOP-MIN4-0178	Perfluorohexanesulfonic acid	2.0	ug/L	0.036	01/04/24 12:45	
ENV-SOP-MIN4-0178	Perfluorooctanesulfonic acid	1.4	ug/L	0.018	01/03/24 17:08	
ENV-SOP-MIN4-0178	Perfluorooctanoic acid	0.19	ug/L	0.020	01/03/24 17:08	
10678924002	**MEWI-GW-MW5-0-231212**					
ENV-SOP-MIN4-0178	Perfluorobutanesulfonic acid	0.0065	ug/L	0.0018	01/04/24 12:37	
ENV-SOP-MIN4-0178	Perfluorohexanoic acid	0.0048	ug/L	0.0020	01/04/24 12:37	
ENV-SOP-MIN4-0178	PFBA	0.018	ug/L	0.0020	01/04/24 12:37	
ENV-SOP-MIN4-0178	PFPeA	0.0026	ug/L	0.0020	01/04/24 12:37	
ENV-SOP-MIN4-0178	PFPeS	0.0056	ug/L	0.0019	01/04/24 12:37	
ENV-SOP-MIN4-0178	Perfluorohexanesulfonic acid	0.093	ug/L	0.0018	01/04/24 12:37	
ENV-SOP-MIN4-0178	Perfluorooctanesulfonic acid	0.086	ug/L	0.0019	01/04/24 12:37	
ENV-SOP-MIN4-0178	Perfluorooctanoic acid	0.0080	ug/L	0.0020	01/04/24 12:37	
10678924005	**MEWI-W-EB1-EB-231212**					
ENV-SOP-MIN4-0178	6:2 FTS	0.0025	ug/L	0.0019	01/03/24 16:32	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Date: January 08, 2024

The quality system for Pace Analytical Services, LLC in Minneapolis, MN (Pace-MN) has been audited and was found to be in conformance with ISO/IEC 17025:2017 by an independent assessment (A2LA Certificate # 2926). The PFAS test results in non-drinking water for this project are not covered by this accreditation. Pace-MN maintains accreditation with the state of Wisconsin for their isotope dilution analysis as defined in ENV-SOP-MIN4-0178 under certificate number999407970. All of the test results for this project are covered by the Wisconsin accreditation.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
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PROJECT NARRATIVE

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Method: **ENV-SOP-MIN4-0178**
Description: WI ID NPW
Client: 3M Environmental
Date: January 08, 2024

General Information:
5 samples were analyzed for ENV-SOP-MIN4-0178 by Pace Analytical Services Minneapolis. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with ENV-SOP-MIN4-0178 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Sample: MEWI-GW-MW4-0-231212 **Lab ID: 10678924001** Collected: 12/12/23 11:35 Received: 12/14/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 254.367 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.018	0.0055	10	12/29/23 11:12	01/03/24 17:08	763051-92-9	
4:2 FTS	ND	ug/L	0.018	0.0046	10	12/29/23 11:12	01/03/24 17:08	757124-72-4	
6:2 FTS	ND	ug/L	0.019	0.0066	10	12/29/23 11:12	01/03/24 17:08	27619-97-2	
8:2 FTS	ND	ug/L	0.019	0.0050	10	12/29/23 11:12	01/03/24 17:08	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.018	0.0046	10	12/29/23 11:12	01/03/24 17:08	756426-58-1	
ADONA	ND	ug/L	0.019	0.0090	10	12/29/23 11:12	01/03/24 17:08	919005-14-4	
HFPO-DA	ND	ug/L	0.020	0.0048	10	12/29/23 11:12	01/03/24 17:08	13252-13-6	
NEtFOSAA	ND	ug/L	0.020	0.0080	10	12/29/23 11:12	01/03/24 17:08	2991-50-6	
NEtFOSA	ND	ug/L	0.020	0.0056	10	12/29/23 11:12	01/03/24 17:08	4151-50-2	
NEtFOSE	ND	ug/L	0.020	0.0087	10	12/29/23 11:12	01/03/24 17:08	1691-99-2	
NMeFOSAA	ND	ug/L	0.020	0.0068	10	12/29/23 11:12	01/03/24 17:08	2355-31-9	
NMeFOSA	ND	ug/L	0.020	0.0054	10	12/29/23 11:12	01/03/24 17:08	31506-32-8	
NMeFOSE	ND	ug/L	0.020	0.0051	10	12/29/23 11:12	01/03/24 17:08	24448-09-7	
Perfluorobutanesulfonic acid	**0.027**	ug/L	0.017	0.0048	10	12/29/23 11:12	01/03/24 17:08	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.020	0.0060	10	12/29/23 11:12	01/03/24 17:08	335-76-2	
Perfluorohexanoic acid	**0.12**	ug/L	0.020	0.0089	10	12/29/23 11:12	01/03/24 17:08	307-24-4	
PFBA	ND	ug/L	0.020	0.0049	10	12/29/23 11:12	01/03/24 17:08	375-22-4	
PFDS	ND	ug/L	0.019	0.0063	10	12/29/23 11:12	01/03/24 17:08	335-77-3	
PFDoS	ND	ug/L	0.019	0.0058	10	12/29/23 11:12	01/03/24 17:08	79780-39-5	
PFHpS	**0.026**	ug/L	0.019	0.0066	10	12/29/23 11:12	01/03/24 17:08	375-92-8	
PFNS	ND	ug/L	0.019	0.0058	10	12/29/23 11:12	01/03/24 17:08	68259-12-1	
PFOSA	ND	ug/L	0.020	0.0070	10	12/29/23 11:12	01/03/24 17:08	754-91-6	
PFPeA	ND	ug/L	0.020	0.0081	10	12/29/23 11:12	01/03/24 17:08	2706-90-3	
PFPeS	**0.11**	ug/L	0.018	0.0059	10	12/29/23 11:12	01/03/24 17:08	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.020	0.0047	10	12/29/23 11:12	01/03/24 17:08	307-55-1	
Perfluoroheptanoic acid	**0.024**	ug/L	0.020	0.0068	10	12/29/23 11:12	01/03/24 17:08	375-85-9	
Perfluorohexanesulfonic acid	**2.0**	ug/L	0.036	0.010	20	12/29/23 11:12	01/04/24 12:45	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.020	0.0078	10	12/29/23 11:12	01/03/24 17:08	375-95-1	
Perfluorooctanesulfonic acid	**1.4**	ug/L	0.018	0.0065	10	12/29/23 11:12	01/03/24 17:08	1763-23-1	
Perfluorooctanoic acid	**0.19**	ug/L	0.020	0.0085	10	12/29/23 11:12	01/03/24 17:08	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.020	0.0059	10	12/29/23 11:12	01/03/24 17:08	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.020	0.0061	10	12/29/23 11:12	01/03/24 17:08	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.020	0.0048	10	12/29/23 11:12	01/03/24 17:08	2058-94-8	
Surrogates									
13C4-PFBA (S)	94	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	375-22-4	
13C5-PFPeA (S)	93	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	2706-90-3	
13C3-PFBS (S)	94	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	375-73-5	
13C24:2FTS (S)	64	%.	25-150		10	12/29/23 11:12	01/03/24 17:08		
13C3HFPO-DA (S)	97	%.	25-150		10	12/29/23 11:12	01/03/24 17:08		
13C4-PFHpA (S)	96	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	375-85-9	
13C3-PFHxS (S)	91	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	355-46-4	
13C26:2FTS (S)	51	%.	25-150		10	12/29/23 11:12	01/03/24 17:08		
13C8-PFOA (S)	100	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	335-67-1	
13C8-PFOS (S)	99	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
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ANALYTICAL RESULTS

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Sample: MEWI-GW-MW4-0-231212 **Lab ID: 10678924001** Collected: 12/12/23 11:35 Received: 12/14/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 254.367 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	98	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	375-95-1	
13C6-PFDA (S)	94	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	335-76-2	
13C28:2FTS (S)	70	%.	25-150		10	12/29/23 11:12	01/03/24 17:08		
d3-MeFOSAA (S)	74	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	2355-31-9	
13C7-PFUdA (S)	96	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	2058-94-8	
13C8-PFOSA (S)	84	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	754-91-6	
d5-EtFOSAA (S)	78	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	2991-50-6	
13C2-PFDoA (S)	95	%.	25-150		10	12/29/23 11:12	01/03/24 17:08		
d3-NMeFOSA (S)	68	%.	10-150		10	12/29/23 11:12	01/03/24 17:08	31506-32-8	
d7-NMeFOSE (S)	72	%.	10-150		10	12/29/23 11:12	01/03/24 17:08	24448-09-7	
13C2-PFTA (S)	93	%.	25-150		10	12/29/23 11:12	01/03/24 17:08		
d9-NEtFOSE (S)	69	%.	10-150		10	12/29/23 11:12	01/03/24 17:08	1691-99-2	
d5-NEtFOSA (S)	62	%.	10-150		10	12/29/23 11:12	01/03/24 17:08	4151-50-2	
13C5-PFHxA (S)	97	%.	25-150		10	12/29/23 11:12	01/03/24 17:08	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
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ANALYTICAL RESULTS

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Sample: MEWI-GW-MW5-0-231212 **Lab ID: 10678924002** Collected: 12/12/23 13:10 Received: 12/14/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 247.957 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.0019	0.00056	1	12/29/23 11:12	01/04/24 12:37	763051-92-9	
4:2 FTS	ND	ug/L	0.0019	0.00047	1	12/29/23 11:12	01/04/24 12:37	757124-72-4	
6:2 FTS	ND	ug/L	0.0019	0.00068	1	12/29/23 11:12	01/04/24 12:37	27619-97-2	
8:2 FTS	ND	ug/L	0.0019	0.00051	1	12/29/23 11:12	01/04/24 12:37	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0019	0.00047	1	12/29/23 11:12	01/04/24 12:37	756426-58-1	
ADONA	ND	ug/L	0.0019	0.00093	1	12/29/23 11:12	01/04/24 12:37	919005-14-4	
HFPO-DA	ND	ug/L	0.0020	0.00050	1	12/29/23 11:12	01/04/24 12:37	13252-13-6	
NEtFOSAA	ND	ug/L	0.0020	0.00082	1	12/29/23 11:12	01/04/24 12:37	2991-50-6	
NEtFOSA	ND	ug/L	0.0020	0.00058	1	12/29/23 11:12	01/04/24 12:37	4151-50-2	
NEtFOSE	ND	ug/L	0.0020	0.00090	1	12/29/23 11:12	01/04/24 12:37	1691-99-2	
NMeFOSAA	ND	ug/L	0.0020	0.00070	1	12/29/23 11:12	01/04/24 12:37	2355-31-9	
NMeFOSA	ND	ug/L	0.0020	0.00056	1	12/29/23 11:12	01/04/24 12:37	31506-32-8	
NMeFOSE	ND	ug/L	0.0020	0.00053	1	12/29/23 11:12	01/04/24 12:37	24448-09-7	
Perfluorobutanesulfonic acid	**0.0065**	ug/L	0.0018	0.00049	1	12/29/23 11:12	01/04/24 12:37	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.0020	0.00061	1	12/29/23 11:12	01/04/24 12:37	335-76-2	
Perfluorohexanoic acid	**0.0048**	ug/L	0.0020	0.00092	1	12/29/23 11:12	01/04/24 12:37	307-24-4	
PFBA	**0.018**	ug/L	0.0020	0.00050	1	12/29/23 11:12	01/04/24 12:37	375-22-4	
PFDS	ND	ug/L	0.0019	0.00065	1	12/29/23 11:12	01/04/24 12:37	335-77-3	
PFDoS	ND	ug/L	0.0020	0.00060	1	12/29/23 11:12	01/04/24 12:37	79780-39-5	
PFHpS	ND	ug/L	0.0019	0.00067	1	12/29/23 11:12	01/04/24 12:37	375-92-8	
PFNS	ND	ug/L	0.0019	0.00059	1	12/29/23 11:12	01/04/24 12:37	68259-12-1	
PFOSA	ND	ug/L	0.0020	0.00072	1	12/29/23 11:12	01/04/24 12:37	754-91-6	
PFPeA	**0.0026**	ug/L	0.0020	0.00083	1	12/29/23 11:12	01/04/24 12:37	2706-90-3	
PFPeS	**0.0056**	ug/L	0.0019	0.00061	1	12/29/23 11:12	01/04/24 12:37	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.0020	0.00048	1	12/29/23 11:12	01/04/24 12:37	307-55-1	
Perfluoroheptanoic acid	ND	ug/L	0.0020	0.00069	1	12/29/23 11:12	01/04/24 12:37	375-85-9	
Perfluorohexanesulfonic acid	**0.093**	ug/L	0.0018	0.00054	1	12/29/23 11:12	01/04/24 12:37	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.0020	0.00080	1	12/29/23 11:12	01/04/24 12:37	375-95-1	
Perfluorooctanesulfonic acid	**0.086**	ug/L	0.0019	0.00067	1	12/29/23 11:12	01/04/24 12:37	1763-23-1	
Perfluorooctanoic acid	**0.0080**	ug/L	0.0020	0.00087	1	12/29/23 11:12	01/04/24 12:37	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.0020	0.00060	1	12/29/23 11:12	01/04/24 12:37	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.0020	0.00063	1	12/29/23 11:12	01/04/24 12:37	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.0020	0.00049	1	12/29/23 11:12	01/04/24 12:37	2058-94-8	
Surrogates									
13C4-PFBA (S)	76	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	375-22-4	
13C5-PFPeA (S)	74	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	2706-90-3	
13C3-PFBS (S)	76	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	375-73-5	
13C24:2FTS (S)	41	%.	25-150		1	12/29/23 11:12	01/04/24 12:37		
13C3HFPO-DA (S)	79	%.	25-150		1	12/29/23 11:12	01/04/24 12:37		
13C4-PFHpA (S)	73	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	375-85-9	
13C3-PFHxS (S)	79	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	355-46-4	
13C26:2FTS (S)	77	%.	25-150		1	12/29/23 11:12	01/04/24 12:37		
13C8-PFOA (S)	80	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	335-67-1	
13C8-PFOS (S)	85	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Sample: MEWI-GW-MW5-0-231212 **Lab ID: 10678924002** Collected: 12/12/23 13:10 Received: 12/14/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 247.957 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	77	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	375-95-1	
13C6-PFDA (S)	76	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	335-76-2	
13C28:2FTS (S)	51	%.	25-150		1	12/29/23 11:12	01/04/24 12:37		
d3-MeFOSAA (S)	55	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	2355-31-9	
13C7-PFUdA (S)	75	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	2058-94-8	
13C8-PFOSA (S)	64	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	754-91-6	
d5-EtFOSAA (S)	56	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	2991-50-6	
13C2-PFDoA (S)	75	%.	25-150		1	12/29/23 11:12	01/04/24 12:37		
d3-NMeFOSA (S)	43	%.	10-150		1	12/29/23 11:12	01/04/24 12:37	31506-32-8	
d7-NMeFOSE (S)	51	%.	10-150		1	12/29/23 11:12	01/04/24 12:37	24448-09-7	
13C2-PFTA (S)	76	%.	25-150		1	12/29/23 11:12	01/04/24 12:37		
d9-NEtFOSE (S)	50	%.	10-150		1	12/29/23 11:12	01/04/24 12:37	1691-99-2	
d5-NEtFOSA (S)	41	%.	10-150		1	12/29/23 11:12	01/04/24 12:37	4151-50-2	
13C5-PFHxA (S)	76	%.	25-150		1	12/29/23 11:12	01/04/24 12:37	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Sample: MEWI-W-TB1-TB-231212 **Lab ID: 10678924003** Collected: 12/12/23 15:50 Received: 12/14/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 256.764 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.0018	0.00054	1	12/29/23 11:12	01/03/24 16:17	763051-92-9	
4:2 FTS	ND	ug/L	0.0018	0.00045	1	12/29/23 11:12	01/03/24 16:17	757124-72-4	
6:2 FTS	ND	ug/L	0.0018	0.00066	1	12/29/23 11:12	01/03/24 16:17	27619-97-2	
8:2 FTS	ND	ug/L	0.0019	0.00049	1	12/29/23 11:12	01/03/24 16:17	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0018	0.00046	1	12/29/23 11:12	01/03/24 16:17	756426-58-1	
ADONA	ND	ug/L	0.0018	0.00089	1	12/29/23 11:12	01/03/24 16:17	919005-14-4	
HFPO-DA	ND	ug/L	0.0019	0.00048	1	12/29/23 11:12	01/03/24 16:17	13252-13-6	
NEtFOSAA	ND	ug/L	0.0019	0.00079	1	12/29/23 11:12	01/03/24 16:17	2991-50-6	
NEtFOSA	ND	ug/L	0.0019	0.00056	1	12/29/23 11:12	01/03/24 16:17	4151-50-2	
NEtFOSE	ND	ug/L	0.0019	0.00087	1	12/29/23 11:12	01/03/24 16:17	1691-99-2	
NMeFOSAA	ND	ug/L	0.0019	0.00068	1	12/29/23 11:12	01/03/24 16:17	2355-31-9	
NMeFOSA	ND	ug/L	0.0019	0.00054	1	12/29/23 11:12	01/03/24 16:17	31506-32-8	
NMeFOSE	ND	ug/L	0.0019	0.00051	1	12/29/23 11:12	01/03/24 16:17	24448-09-7	
Perfluorobutanesulfonic acid	ND	ug/L	0.0017	0.00047	1	12/29/23 11:12	01/03/24 16:17	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.0019	0.00059	1	12/29/23 11:12	01/03/24 16:17	335-76-2	
Perfluorohexanoic acid	ND	ug/L	0.0019	0.00089	1	12/29/23 11:12	01/03/24 16:17	307-24-4	
PFBA	ND	ug/L	0.0019	0.00048	1	12/29/23 11:12	01/03/24 16:17	375-22-4	
PFDS	ND	ug/L	0.0019	0.00062	1	12/29/23 11:12	01/03/24 16:17	335-77-3	
PFDoS	ND	ug/L	0.0019	0.00058	1	12/29/23 11:12	01/03/24 16:17	79780-39-5	
PFHpS	ND	ug/L	0.0018	0.00065	1	12/29/23 11:12	01/03/24 16:17	375-92-8	
PFNS	ND	ug/L	0.0019	0.00057	1	12/29/23 11:12	01/03/24 16:17	68259-12-1	
PFOSA	ND	ug/L	0.0019	0.00070	1	12/29/23 11:12	01/03/24 16:17	754-91-6	
PFPeA	ND	ug/L	0.0019	0.00080	1	12/29/23 11:12	01/03/24 16:17	2706-90-3	
PFPeS	ND	ug/L	0.0018	0.00059	1	12/29/23 11:12	01/03/24 16:17	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.0019	0.00047	1	12/29/23 11:12	01/03/24 16:17	307-55-1	
Perfluoroheptanoic acid	ND	ug/L	0.0019	0.00067	1	12/29/23 11:12	01/03/24 16:17	375-85-9	
Perfluorohexanesulfonic acid	ND	ug/L	0.0018	0.00052	1	12/29/23 11:12	01/03/24 16:17	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.0019	0.00077	1	12/29/23 11:12	01/03/24 16:17	375-95-1	
Perfluorooctanesulfonic acid	ND	ug/L	0.0018	0.00065	1	12/29/23 11:12	01/03/24 16:17	1763-23-1	
Perfluorooctanoic acid	ND	ug/L	0.0019	0.00084	1	12/29/23 11:12	01/03/24 16:17	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.0019	0.00058	1	12/29/23 11:12	01/03/24 16:17	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.0019	0.00061	1	12/29/23 11:12	01/03/24 16:17	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.0019	0.00047	1	12/29/23 11:12	01/03/24 16:17	2058-94-8	
Surrogates									
13C4-PFBA (S)	88	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	375-22-4	
13C5-PFPeA (S)	87	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	2706-90-3	
13C3-PFBS (S)	88	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	375-73-5	
13C24:2FTS (S)	43	%.	25-150		1	12/29/23 11:12	01/03/24 16:17		
13C3HFPO-DA (S)	94	%.	25-150		1	12/29/23 11:12	01/03/24 16:17		
13C4-PFHpA (S)	85	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	375-85-9	
13C3-PFHxS (S)	89	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	355-46-4	
13C26:2FTS (S)	112	%.	25-150		1	12/29/23 11:12	01/03/24 16:17		
13C8-PFOA (S)	83	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	335-67-1	
13C8-PFOS (S)	71	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Sample: MEWI-W-TB1-TB-231212 **Lab ID: 10678924003** Collected: 12/12/23 15:50 Received: 12/14/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 256.764 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	71	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	375-95-1	
13C6-PFDA (S)	62	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	335-76-2	
13C28:2FTS (S)	78	%.	25-150		1	12/29/23 11:12	01/03/24 16:17		
d3-MeFOSAA (S)	52	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	2355-31-9	
13C7-PFUdA (S)	62	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	2058-94-8	
13C8-PFOSA (S)	58	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	754-91-6	
d5-EtFOSAA (S)	54	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	2991-50-6	
13C2-PFDoA (S)	59	%.	25-150		1	12/29/23 11:12	01/03/24 16:17		
d3-NMeFOSA (S)	37	%.	10-150		1	12/29/23 11:12	01/03/24 16:17	31506-32-8	
d7-NMeFOSE (S)	46	%.	10-150		1	12/29/23 11:12	01/03/24 16:17	24448-09-7	
13C2-PFTA (S)	62	%.	25-150		1	12/29/23 11:12	01/03/24 16:17		
d9-NEtFOSE (S)	45	%.	10-150		1	12/29/23 11:12	01/03/24 16:17	1691-99-2	
d5-NEtFOSA (S)	36	%.	10-150		1	12/29/23 11:12	01/03/24 16:17	4151-50-2	
13C5-PFHxA (S)	86	%.	25-150		1	12/29/23 11:12	01/03/24 16:17	307-24-4	

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Sample: MEWI-W-FB1-FB-231212 **Lab ID: 10678924004** Collected: 12/12/23 15:55 Received: 12/14/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 250.392 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.0019	0.00056	1	12/29/23 11:12	01/03/24 16:24	763051-92-9	
4:2 FTS	ND	ug/L	0.0019	0.00047	1	12/29/23 11:12	01/03/24 16:24	757124-72-4	
6:2 FTS	ND	ug/L	0.0019	0.00067	1	12/29/23 11:12	01/03/24 16:24	27619-97-2	
8:2 FTS	ND	ug/L	0.0019	0.00050	1	12/29/23 11:12	01/03/24 16:24	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0019	0.00047	1	12/29/23 11:12	01/03/24 16:24	756426-58-1	
ADONA	ND	ug/L	0.0019	0.00092	1	12/29/23 11:12	01/03/24 16:24	919005-14-4	
HFPO-DA	ND	ug/L	0.0020	0.00049	1	12/29/23 11:12	01/03/24 16:24	13252-13-6	
NEtFOSAA	ND	ug/L	0.0020	0.00081	1	12/29/23 11:12	01/03/24 16:24	2991-50-6	
NEtFOSA	ND	ug/L	0.0020	0.00057	1	12/29/23 11:12	01/03/24 16:24	4151-50-2	
NEtFOSE	ND	ug/L	0.0020	0.00089	1	12/29/23 11:12	01/03/24 16:24	1691-99-2	
NMeFOSAA	ND	ug/L	0.0020	0.00069	1	12/29/23 11:12	01/03/24 16:24	2355-31-9	
NMeFOSA	ND	ug/L	0.0020	0.00055	1	12/29/23 11:12	01/03/24 16:24	31506-32-8	
NMeFOSE	ND	ug/L	0.0020	0.00052	1	12/29/23 11:12	01/03/24 16:24	24448-09-7	
Perfluorobutanesulfonic acid	ND	ug/L	0.0018	0.00048	1	12/29/23 11:12	01/03/24 16:24	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.0020	0.00061	1	12/29/23 11:12	01/03/24 16:24	335-76-2	
Perfluorohexanoic acid	ND	ug/L	0.0020	0.00091	1	12/29/23 11:12	01/03/24 16:24	307-24-4	
PFBA	ND	ug/L	0.0020	0.00050	1	12/29/23 11:12	01/03/24 16:24	375-22-4	
PFDS	ND	ug/L	0.0019	0.00064	1	12/29/23 11:12	01/03/24 16:24	335-77-3	
PFDoS	ND	ug/L	0.0019	0.00059	1	12/29/23 11:12	01/03/24 16:24	79780-39-5	
PFHpS	ND	ug/L	0.0019	0.00067	1	12/29/23 11:12	01/03/24 16:24	375-92-8	
PFNS	ND	ug/L	0.0019	0.00059	1	12/29/23 11:12	01/03/24 16:24	68259-12-1	
PFOSA	ND	ug/L	0.0020	0.00072	1	12/29/23 11:12	01/03/24 16:24	754-91-6	
PFPeA	ND	ug/L	0.0020	0.00082	1	12/29/23 11:12	01/03/24 16:24	2706-90-3	
PFPeS	ND	ug/L	0.0019	0.00060	1	12/29/23 11:12	01/03/24 16:24	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.0020	0.00048	1	12/29/23 11:12	01/03/24 16:24	307-55-1	
Perfluoroheptanoic acid	ND	ug/L	0.0020	0.00069	1	12/29/23 11:12	01/03/24 16:24	375-85-9	
Perfluorohexanesulfonic acid	ND	ug/L	0.0018	0.00053	1	12/29/23 11:12	01/03/24 16:24	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.0020	0.00079	1	12/29/23 11:12	01/03/24 16:24	375-95-1	
Perfluorooctanesulfonic acid	ND	ug/L	0.0018	0.00066	1	12/29/23 11:12	01/03/24 16:24	1763-23-1	
Perfluorooctanoic acid	ND	ug/L	0.0020	0.00086	1	12/29/23 11:12	01/03/24 16:24	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.0020	0.00060	1	12/29/23 11:12	01/03/24 16:24	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.0020	0.00062	1	12/29/23 11:12	01/03/24 16:24	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.0020	0.00049	1	12/29/23 11:12	01/03/24 16:24	2058-94-8	
Surrogates									
13C4-PFBA (S)	80	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	375-22-4	
13C5-PFPeA (S)	80	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	2706-90-3	
13C3-PFBS (S)	80	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	375-73-5	
13C24:2FTS (S)	43	%.	25-150		1	12/29/23 11:12	01/03/24 16:24		
13C3HFPO-DA (S)	83	%.	25-150		1	12/29/23 11:12	01/03/24 16:24		
13C4-PFHpA (S)	79	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	375-85-9	
13C3-PFHxS (S)	83	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	355-46-4	
13C26:2FTS (S)	104	%.	25-150		1	12/29/23 11:12	01/03/24 16:24		
13C8-PFOA (S)	82	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	335-67-1	
13C8-PFOS (S)	79	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Sample: MEWI-W-FB1-FB-231212 **Lab ID: 10678924004** Collected: 12/12/23 15:55 Received: 12/14/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 250.392 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	75	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	375-95-1	
13C6-PFDA (S)	74	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	335-76-2	
13C28:2FTS (S)	49	%.	25-150		1	12/29/23 11:12	01/03/24 16:24		
d3-MeFOSAA (S)	60	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	2355-31-9	
13C7-PFUdA (S)	73	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	2058-94-8	
13C8-PFOSA (S)	63	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	754-91-6	
d5-EtFOSAA (S)	62	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	2991-50-6	
13C2-PFDoA (S)	69	%.	25-150		1	12/29/23 11:12	01/03/24 16:24		
d3-NMeFOSA (S)	48	%.	10-150		1	12/29/23 11:12	01/03/24 16:24	31506-32-8	
d7-NMeFOSE (S)	55	%.	10-150		1	12/29/23 11:12	01/03/24 16:24	24448-09-7	
13C2-PFTA (S)	69	%.	25-150		1	12/29/23 11:12	01/03/24 16:24		
d9-NEtFOSE (S)	53	%.	10-150		1	12/29/23 11:12	01/03/24 16:24	1691-99-2	
d5-NEtFOSA (S)	42	%.	10-150		1	12/29/23 11:12	01/03/24 16:24	4151-50-2	
13C5-PFHxA (S)	80	%.	25-150		1	12/29/23 11:12	01/03/24 16:24	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Sample: MEWI-W-EB1-EB-231212 **Lab ID: 10678924005** Collected: 12/12/23 16:00 Received: 12/14/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 254.106 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.0018	0.00055	1	12/29/23 11:12	01/03/24 16:32	763051-92-9	
4:2 FTS	ND	ug/L	0.0018	0.00046	1	12/29/23 11:12	01/03/24 16:32	757124-72-4	
6:2 FTS	**0.0025**	ug/L	0.0019	0.00066	1	12/29/23 11:12	01/03/24 16:32	27619-97-2	
8:2 FTS	ND	ug/L	0.0019	0.00050	1	12/29/23 11:12	01/03/24 16:32	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0018	0.00046	1	12/29/23 11:12	01/03/24 16:32	756426-58-1	
ADONA	ND	ug/L	0.0019	0.00090	1	12/29/23 11:12	01/03/24 16:32	919005-14-4	
HFPO-DA	ND	ug/L	0.0020	0.00049	1	12/29/23 11:12	01/03/24 16:32	13252-13-6	
NEtFOSAA	ND	ug/L	0.0020	0.00080	1	12/29/23 11:12	01/03/24 16:32	2991-50-6	
NEtFOSA	ND	ug/L	0.0020	0.00056	1	12/29/23 11:12	01/03/24 16:32	4151-50-2	
NEtFOSE	ND	ug/L	0.0020	0.00087	1	12/29/23 11:12	01/03/24 16:32	1691-99-2	
NMeFOSAA	ND	ug/L	0.0020	0.00068	1	12/29/23 11:12	01/03/24 16:32	2355-31-9	
NMeFOSA	ND	ug/L	0.0020	0.00054	1	12/29/23 11:12	01/03/24 16:32	31506-32-8	
NMeFOSE	ND	ug/L	0.0020	0.00051	1	12/29/23 11:12	01/03/24 16:32	24448-09-7	
Perfluorobutanesulfonic acid	ND	ug/L	0.0017	0.00048	1	12/29/23 11:12	01/03/24 16:32	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.0020	0.00060	1	12/29/23 11:12	01/03/24 16:32	335-76-2	
Perfluorohexanoic acid	ND	ug/L	0.0020	0.00090	1	12/29/23 11:12	01/03/24 16:32	307-24-4	
PFBA	ND	ug/L	0.0020	0.00049	1	12/29/23 11:12	01/03/24 16:32	375-22-4	
PFDS	ND	ug/L	0.0019	0.00063	1	12/29/23 11:12	01/03/24 16:32	335-77-3	
PFDoS	ND	ug/L	0.0019	0.00058	1	12/29/23 11:12	01/03/24 16:32	79780-39-5	
PFHpS	ND	ug/L	0.0019	0.00066	1	12/29/23 11:12	01/03/24 16:32	375-92-8	
PFNS	ND	ug/L	0.0019	0.00058	1	12/29/23 11:12	01/03/24 16:32	68259-12-1	
PFOSA	ND	ug/L	0.0020	0.00071	1	12/29/23 11:12	01/03/24 16:32	754-91-6	
PFPeA	ND	ug/L	0.0020	0.00081	1	12/29/23 11:12	01/03/24 16:32	2706-90-3	
PFPeS	ND	ug/L	0.0018	0.00059	1	12/29/23 11:12	01/03/24 16:32	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.0020	0.00047	1	12/29/23 11:12	01/03/24 16:32	307-55-1	
Perfluoroheptanoic acid	ND	ug/L	0.0020	0.00068	1	12/29/23 11:12	01/03/24 16:32	375-85-9	
Perfluorohexanesulfonic acid	ND	ug/L	0.0018	0.00052	1	12/29/23 11:12	01/03/24 16:32	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.0020	0.00078	1	12/29/23 11:12	01/03/24 16:32	375-95-1	
Perfluorooctanesulfonic acid	ND	ug/L	0.0018	0.00066	1	12/29/23 11:12	01/03/24 16:32	1763-23-1	
Perfluorooctanoic acid	ND	ug/L	0.0020	0.00085	1	12/29/23 11:12	01/03/24 16:32	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.0020	0.00059	1	12/29/23 11:12	01/03/24 16:32	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.0020	0.00061	1	12/29/23 11:12	01/03/24 16:32	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.0020	0.00048	1	12/29/23 11:12	01/03/24 16:32	2058-94-8	
Surrogates									
13C4-PFBA (S)	83	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	375-22-4	
13C5-PFPeA (S)	81	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	2706-90-3	
13C3-PFBS (S)	82	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	375-73-5	
13C24:2FTS (S)	46	%.	25-150		1	12/29/23 11:12	01/03/24 16:32		
13C3HFPO-DA (S)	84	%.	25-150		1	12/29/23 11:12	01/03/24 16:32		
13C4-PFHpA (S)	81	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	375-85-9	
13C3-PFHxS (S)	83	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	355-46-4	
13C26:2FTS (S)	66	%.	25-150		1	12/29/23 11:12	01/03/24 16:32		
13C8-PFOA (S)	83	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	335-67-1	
13C8-PFOS (S)	76	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Sample: MEWI-W-EB1-EB-231212 **Lab ID: 10678924005** Collected: 12/12/23 16:00 Received: 12/14/23 11:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 254.106 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	77	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	375-95-1	
13C6-PFDA (S)	76	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	335-76-2	
13C28:2FTS (S)	47	%.	25-150		1	12/29/23 11:12	01/03/24 16:32		
d3-MeFOSAA (S)	60	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	2355-31-9	
13C7-PFUdA (S)	76	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	2058-94-8	
13C8-PFOSA (S)	70	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	754-91-6	
d5-EtFOSAA (S)	59	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	2991-50-6	
13C2-PFDoA (S)	72	%.	25-150		1	12/29/23 11:12	01/03/24 16:32		
d3-NMeFOSA (S)	21	%.	10-150		1	12/29/23 11:12	01/03/24 16:32	31506-32-8	
d7-NMeFOSE (S)	57	%.	10-150		1	12/29/23 11:12	01/03/24 16:32	24448-09-7	
13C2-PFTA (S)	71	%.	25-150		1	12/29/23 11:12	01/03/24 16:32		
d9-NEtFOSE (S)	53	%.	10-150		1	12/29/23 11:12	01/03/24 16:32	1691-99-2	
d5-NEtFOSA (S)	15	%.	10-150		1	12/29/23 11:12	01/03/24 16:32	4151-50-2	
13C5-PFHxA (S)	81	%.	25-150		1	12/29/23 11:12	01/03/24 16:32	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

QC Batch: 925082
QC Batch Method: ENV-SOP-MIN4-0178
Analysis Method: ENV-SOP-MIN4-0178
Analysis Description: WI ID NPW
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10678924001, 10678924002, 10678924003, 10678924004, 10678924005

METHOD BLANK: 4859021 Matrix: Water
Associated Lab Samples: 10678924001, 10678924002, 10678924003, 10678924004, 10678924005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
11Cl-PF3OUdS	ug/L	ND	0.0018	01/03/24 14:43	
4:2 FTS	ug/L	ND	0.0018	01/03/24 14:43	
6:2 FTS	ug/L	ND	0.0019	01/03/24 14:43	
8:2 FTS	ug/L	ND	0.0019	01/03/24 14:43	
9Cl-PF3ONS	ug/L	ND	0.0018	01/03/24 14:43	
ADONA	ug/L	ND	0.0019	01/03/24 14:43	
HFPO-DA	ug/L	ND	0.0020	01/03/24 14:43	
NEtFOSA	ug/L	ND	0.0020	01/03/24 14:43	
NEtFOSAA	ug/L	ND	0.0020	01/03/24 14:43	
NEtFOSE	ug/L	ND	0.0020	01/03/24 14:43	
NMeFOSA	ug/L	ND	0.0020	01/03/24 14:43	
NMeFOSAA	ug/L	ND	0.0020	01/03/24 14:43	
NMeFOSE	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorobutanesulfonic acid	ug/L	ND	0.0017	01/03/24 14:43	
Perfluorodecanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorododecanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluoroheptanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorohexanesulfonic acid	ug/L	ND	0.0018	01/03/24 14:43	
Perfluorohexanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorononanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorooctanesulfonic acid	ug/L	ND	0.0018	01/03/24 14:43	
Perfluorooctanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorotetradecanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluorotridecanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
Perfluoroundecanoic acid	ug/L	ND	0.0020	01/03/24 14:43	
PFBA	ug/L	ND	0.0020	01/03/24 14:43	
PFDoS	ug/L	ND	0.0019	01/03/24 14:43	
PFDS	ug/L	ND	0.0019	01/03/24 14:43	
PFHpS	ug/L	ND	0.0019	01/03/24 14:43	
PFNS	ug/L	ND	0.0019	01/03/24 14:43	
PFOSA	ug/L	ND	0.0020	01/03/24 14:43	
PFPeA	ug/L	ND	0.0020	01/03/24 14:43	
PFPeS	ug/L	ND	0.0018	01/03/24 14:43	
13C2-PFDoA (S)	%.	72	25-150	01/03/24 14:43	
13C2-PFTA (S)	%.	74	25-150	01/03/24 14:43	
13C24:2FTS (S)	%.	73	25-150	01/03/24 14:43	
13C26:2FTS (S)	%.	64	25-150	01/03/24 14:43	
13C28:2FTS (S)	%.	50	25-150	01/03/24 14:43	
13C2PFHxDA (S)	%.	59	25-150	01/03/24 14:43	
13C3-PFBS (S)	%.	84	25-150	01/03/24 14:43	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

METHOD BLANK: 4859021 Matrix: Water
Associated Lab Samples: 10678924001, 10678924002, 10678924003, 10678924004, 10678924005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
13C3-PFHxS (S)	%.	84	25-150	01/03/24 14:43	
13C3HFPO-DA (S)	%.	90	25-150	01/03/24 14:43	
13C4-PFBA (S)	%.	84	25-150	01/03/24 14:43	
13C4-PFHpA (S)	%.	82	25-150	01/03/24 14:43	
13C5-PFHxA (S)	%.	84	25-150	01/03/24 14:43	
13C5-PFPeA (S)	%.	83	25-150	01/03/24 14:43	
13C6-PFDA (S)	%.	73	25-150	01/03/24 14:43	
13C7-PFUdA (S)	%.	74	25-150	01/03/24 14:43	
13C8-PFOA (S)	%.	82	25-150	01/03/24 14:43	
13C8-PFOS (S)	%.	82	25-150	01/03/24 14:43	
13C8-PFOSA (S)	%.	72	25-150	01/03/24 14:43	
13C9-PFNA (S)	%.	80	25-150	01/03/24 14:43	
d3-MeFOSAA (S)	%.	63	25-150	01/03/24 14:43	
d3-NMeFOSA (S)	%.	37	20-150	01/03/24 14:43	
d5-EtFOSAA (S)	%.	67	25-150	01/03/24 14:43	
d5-NEtFOSA (S)	%.	35	20-150	01/03/24 14:43	
d7-NMeFOSE (S)	%.	64	20-150	01/03/24 14:43	
d9-NEtFOSE (S)	%.	64	20-150	01/03/24 14:43	

LABORATORY CONTROL SAMPLE & LCSD: 4859022 4859023

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
11Cl-PF3OUdS	ug/L	0.0035	0.0032	0.0033	91	90	50-150	1	30	
4:2 FTS	ug/L	0.0035	0.0033	0.0034	95	93	50-150	1	30	
6:2 FTS	ug/L	0.0036	0.0033	0.0034	94	92	50-150	1	30	
8:2 FTS	ug/L	0.0036	0.0034	0.0031	96	84	50-150	10	30	
9Cl-PF3ONS	ug/L	0.0035	0.0033	0.0032	95	90	50-150	4	30	
ADONA	ug/L	0.0035	0.0033	0.0031	94	86	50-150	7	30	
HFPO-DA	ug/L	0.0037	0.0032	0.0034	86	89	50-150	6	30	
NEtFOSA	ug/L	0.0037	0.0035	0.0035	95	90	50-150	2	30	
NEtFOSAA	ug/L	0.0037	0.0038	0.0030	100	77	50-150	23	30	
NEtFOSE	ug/L	0.0037	0.0035	0.0036	94	94	50-150	3	30	
NMeFOSA	ug/L	0.0037	0.0040	0.0033	106	86	50-150	18	30	
NMeFOSAA	ug/L	0.0037	0.0039	0.0036	103	93	50-150	8	30	
NMeFOSE	ug/L	0.0037	0.0036	0.0034	97	88	50-150	7	30	
Perfluorobutanesulfonic acid	ug/L	0.0033	0.0032	0.0031	95	90	50-150	3	30	
Perfluorodecanoic acid	ug/L	0.0037	0.0036	0.0034	97	87	50-150	8	30	
Perfluorododecanoic acid	ug/L	0.0037	0.0037	0.0032	98	83	50-150	14	30	
Perfluoroheptanoic acid	ug/L	0.0037	0.0036	0.0034	97	89	50-150	6	30	
Perfluorohexanesulfonic acid	ug/L	0.0034	0.0032	0.0031	92	88	50-150	2	30	
Perfluorohexanoic acid	ug/L	0.0037	0.0036	0.0034	96	87	50-150	7	30	
Perfluorononanoic acid	ug/L	0.0037	0.0035	0.0033	94	85	50-150	8	30	
Perfluorooctanesulfonic acid	ug/L	0.0035	0.0034	0.0031	98	87	50-150	9	30	
Perfluorooctanoic acid	ug/L	0.0037	0.0037	0.0035	99	90	50-150	7	30	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

LABORATORY CONTROL SAMPLE & LCSD: 4859022 4859023

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Perfluorotetradecanoic acid	ug/L	0.0037	0.0036	0.0034	95	89	50-150	4	30	
Perfluorotridecanoic acid	ug/L	0.0037	0.0036	0.0034	96	87	50-150	6	30	
Perfluoroundecanoic acid	ug/L	0.0037	0.0037	0.0033	99	85	50-150	13	30	
PFBA	ug/L	0.0037	0.0037	0.0036	98	94	50-150	2	30	
PFDoS	ug/L	0.0036	0.0031	0.0031	84	82	50-150	0	30	
PFDS	ug/L	0.0036	0.0027	0.0032	75	87	50-150	18	30	
PFHpS	ug/L	0.0036	0.0038	0.0036	105	98	50-150	4	30	
PFNS	ug/L	0.0036	0.0033	0.0026	91	69	50-150	24	30	
PFOSA	ug/L	0.0037	0.0034	0.0036	90	92	50-150	5	30	
PFPeA	ug/L	0.0037	0.0037	0.0035	98	92	50-150	3	30	
PFPeS	ug/L	0.0035	0.0033	0.0032	94	88	50-150	4	30	
13C2-PFDoA (S)	%.				66	81	25-150			
13C2-PFTA (S)	%.				66	75	25-150			
13C24:2FTS (S)	%.				70	77	25-150			
13C26:2FTS (S)	%.				83	150	25-150			
13C28:2FTS (S)	%.				49	60	25-150			
13C2PFHxDA (S)	%.				59	69	25-150			
13C3-PFBS (S)	%.				76	85	25-150			
13C3-PFHxS (S)	%.				77	85	25-150			
13C3HFPO-DA (S)	%.				83	89	25-150			
13C4-PFBA (S)	%.				77	84	25-150			
13C4-PFHpA (S)	%.				76	83	25-150			
13C5-PFHxA (S)	%.				77	86	25-150			
13C5-PFPeA (S)	%.				77	85	25-150			
13C6-PFDA (S)	%.				69	81	25-150			
13C7-PFUdA (S)	%.				66	81	25-150			
13C8-PFOA (S)	%.				77	87	25-150			
13C8-PFOS (S)	%.				72	83	25-150			
13C8-PFOSA (S)	%.				70	75	25-150			
13C9-PFNA (S)	%.				72	81	25-150			
d3-MeFOSAA (S)	%.				55	69	25-150			
d3-NMeFOSA (S)	%.				34	47	20-150			
d5-EtFOSAA (S)	%.				55	75	25-150			
d5-NEtFOSA (S)	%.				34	44	20-150			
d7-NMeFOSE (S)	%.				55	68	20-150			
d9-NEtFOSE (S)	%.				54	65	20-150			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above LOD.

J - The reported result is an estimated value.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

DL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Analyte was not detected and is reported as less than the LOD or as defined by the customer.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

WORKORDER QUALIFIERS

WO: 10678924

[1] The quality system for Pace Analytical Services, LLC in Minneapolis, MN (Pace-MN) has been audited and was found to be in conformance with ISO/IEC 17025:2017 by an independent assessment (A2LA Certificate # 2926). The PFAS test results in non-drinking water for this project are not covered by this accreditation. Pace-MN maintains accreditation with the state of Wisconsin for their isotope dilution analysis as defined in ENV-SOP-MIN4-0178 under certificate number999407970. All of the test results for this project are covered by the Wisconsin accreditation.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: E23-0716 Menomonee GW Dec.2023
Pace Project No.: 10678924

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10678924001	**MEWI-GW-MW4-0-231212**	ENV-SOP-MIN4-0178	925082	ENV-SOP-MIN4-0178	926154
10678924002	**MEWI-GW-MW5-0-231212**	ENV-SOP-MIN4-0178	925082	ENV-SOP-MIN4-0178	926154
10678924003	**MEWI-W-TB1-TB-231212**	ENV-SOP-MIN4-0178	925082	ENV-SOP-MIN4-0178	926154
10678924004	**MEWI-W-FB1-FB-231212**	ENV-SOP-MIN4-0178	925082	ENV-SOP-MIN4-0178	926154
10678924005	**MEWI-W-EB1-EB-231212**	ENV-SOP-MIN4-0178	925082	ENV-SOP-MIN4-0178	926154

PFAS

3M Global EHS Laboratory

Chain of Custody / Request for Analytical

Project: E23-0716

Sample Shipping Address
Pace Analytical Services, LLC - Minneapolis

1700 Elm St SE
Minneapolis, MN 55414
Attn: Martha Hansen

Project Description: 3M Menomonie GW Monitoring - December 2023

Project Requester
Chambers, Britta (MAPLEWOOD-3MUS-MN 3M CENTER)
Department: 530711 Site Source: 01J9C020
Project Created: 12/1/2023

3M Project Lead
Amanda Albrecht
Email Address: aalbrecht2@mmm.com
Phone Number: 651-736-9414

Item	3M Sample Number	Sample Description	Date/Time Sampled	Matrix	Type of Sample	Sample Comment	Number of Containers (Record each container type/ preservative collected)			
1	E23-0716-001	MEWI-GW-MW1-0-		WG	☐Grab ☐Comp					
2	E23-0716-002	MEWI-GW-MW2-0-		WG	☐Grab ☐Comp					
3	E23-0716-003	MEWI-GW-MW3-0-		WG	☐Grab ☐Comp					
4	E23-0716-004	MEWI-GW-MW3-DB-231212	12/12/23 11:35	WG	☒Grab ☐Comp	2	2			
5	E23-0716-005	MEWI-GW-MW4-0-231212	12/12/23 [illegible]	WG	☒Grab ☐Comp	Time: 13:10	2			
6	E23-0716-006	MEWI-GW-MW5-0-		WG	☐Grab ☐Comp					
7	E23-0716-007	MEWI-GW-MW6-0-		WG	☐Grab ☐Comp					
8	E23-0716-008	MEWI-GW-MW7-0-		WG	☐Grab ☐Comp					
9	E23-0716-009	MEWI-W-TB1-TB-231212	12/12/23 15:50	WQ	☐Grab ☐Comp		1			
10	E23-0716-010	MEWI-W-FB1-FB-231212	12/12/23 15:55	WQ	☒Grab ☐Comp		2			
11	E23-0716-011	MEWI-W-EB1-EB-231212	12/12/23 16:00	WQ	☒Grab ☐Comp		2			
12	E23-0716-012	MEWI-		WG	☐Grab ☐Comp					
13	E23-0716-013	MEWI-		WG	☐Grab ☐Comp					

WO#: 10678924

10678924

Collected by (print): Laura Dykstra Collector's signature: Laura Dykstra

Item	Relinquished by:	Date	Time	Shipped Via	Received by:	Date	Time
1	Laura Dykstra	12/12/23	1700	fedex	Pace	12/13/23	10:00
	Pace	12/13/23	10:00			12/14/23	0800
		12/14/23	1100	Pace courier	Pace	12/14/23	1100

Comments

Contact EHS Lab project lead for requested tests and target analytes, if not specified.

Sample Condition Upon Receipt

Client Name: 3M EHS

Project #: **WO#: 10678924**

PM: CT1 **Due Date: 01/29/24**

CLIENT: 3M ENV

Courier: ☐ FedEx ☐ UPS ☐ USPS ☐ Client ☑ Pace ☐ SpeeDee ☐ Commercial

Tracking Number: _____ ☐ See Exceptions ENV-FRM-MIN4-0142

Custody Seal on Cooler/Box Present? ☑ Yes ☐ No Seals Intact? ☑ Yes ☐ No Biological Tissue Frozen? ☐ Yes ☐ No ☑ N/A

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other Temp Blank? ☑ Yes ☐ No

Thermometer: ☐ T1 (0461) ☑ T2 (0436) ☐ T3 (0459) ☐ T4 (0402) ☐ T5 (0178) ☐ T6 (0235) ☐ T7 (0042) ☐ T8 (0775) ☐ T9(0727) ☐ 01339252/1710 Type of Ice: ☑ Wet ☐ Blue ☐ Dry ☐ None ☐ Melted

Did Samples Originate in West Virginia? ☐ Yes ☑ No Were All Container Temps Taken? ☐ Yes ☐ No ☑ N/A

Temp should be above freezing to 6 °C Cooler temp Read w/Temp Blank: 4.1 °C

Correction Factor: +.3 Cooler Temp Corrected w/temp blank: 5.0 °C

Average Corrected Temp (no temp blank only): _____ °C ☐ See Exceptions ENV-FRM-MIN4-0142 ☐ 1 Container

USDA Regulated Soil: (☑ N/A, water sample/other: _____) Date/Initials of Person Examining Contents: 12/14/23 MS

Did samples originate in a quarantine zone within the United States: AL, AR, AZ CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX, or VA (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

If Yes to either question, fill out a Regulated Soil Checklist (ENV-FRM-MIN4-0154) and include with SCUR/COC paperwork.

Location (Check one): ☐ Duluth ☑ Minneapolis ☐ Virginia

				COMMENTS
Chain of Custody Present and Filled Out?	☑ Yes	☐ No		1.
Chain of Custody Relinquished?	☑ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	3.
Samples Arrived within Hold Time?	☑ Yes	☐ No		4. If fecal: ☐ <8 hrs ☐ >8 hr, <24 ☐ No
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E.coli ☐ BOD/cBOD ☐ Hex Chrom ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other _____
Rush Turn Around Time Requested?	☐ Yes	☑ No		6.
Sufficient Sample Volume?	☑ Yes	☐ No		7.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	8.
-Pace Containers Used?	☑ Yes	☐ No		
Containers Intact?	☑ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC?	☑ Yes	☐ No		11. If no, write ID/Date/Time of container below: Sent E23-0716-006 not E23-0716-004 ☐ See Exceptions ENV-FRM-MIN4-0142
Matrix: ☑ Water ☐ Soil ☐ Oil ☐ Other				
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO3, H2SO4, <2pH, NaOH >9 Sulfide, NaOH>10 Cyanide)	☐ Yes	☐ No	☑ N/A	☐ NaOH ☐ HNO3 ☐ H2SO4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxins/PFAS (*If adding preservative to a container, it must be added to associated field and equipment blanks--verify with PM first.)	☐ Yes	☐ No	☑ N/A	Positive for Residual Chlorine? ☐ Yes ☐ No ☐ See Exceptions ENV-FRM-MIN4-0142
				pH Paper Lot #
				Residual Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in Methyl Mercury Container?	☐ Yes	☐ No	☑ N/A	13.
Extra labels present on soil VOA or WIDRO containers?	☐ Yes	☐ No	☑ N/A	14. ☐ See Exceptions ENV-FRM-MIN4-0142
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☐ No	☑ N/A	
3 Trip Blanks Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	Pace Trip Blank Lot # (if purchased): _____

CLIENT NOTIFICATION/RESOLUTION Field Data Required? ☐ Yes ☐ No

Person Contacted: Mandy Albrecht Date/Time: _____

Comments/Resolution: Appear to have received E23-0716-005 and 006, not 004 and 005 as filled out on COC

Project Manager Review: Carolynne Trout **Date:** 12/26/23

NOTE: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e., out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled By: MS **Line:** 3

Pace Analytical®	Document Name: **Sample Condition Upon Receipt (SCUR) Exception Form**	Document Revised: 04Jun2020 **Page 1 of 1**
	Document No.: **ENV-FRM-MIN4-0142 Rev.01**	Pace Analytical Services - **Minneapolis**

SCUR Exceptions:

Workorder #:

Out of Temp Sample IDs	Container Type	# of Containers

PM Notified? ☐Yes ☐No

If yes, indicate who was contacted/date/time.
If no, indicate reason why.

Multiple Cooler Project? ☐Yes ☐No
If you answered yes, fill out information to the left.

No Temp Blank

Read Temp	Corrected Temp	Average Temp
1.4	2.0	2.3
1.3	1.7	
4.0	4.4	
0.5	0.9	

Tracking Number/Temperature	

Issue Type: Sample ID	Container Type	# of Containers

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preserv.	pH Upon Receipt	Date Adjusted	Time Adjusted	Amount Added (mL)	Lot # Added	pH After	In Compliance after addition?	Initials
								☐Yes ☐No	
								☐Yes ☐No	
								☐Yes ☐No	
								☐Yes ☐No	

Comments:

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

January 16, 2024

Amanda Albrecht
3M Environmental
3M Center, 260-05-N-17
Saint Paul, MN 551441000

RE: Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Dear Amanda Albrecht:

Enclosed are the analytical results for sample(s) received by the laboratory on December 22, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Minneapolis

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

Carolynne Trout
carolynne.trout@pacelabs.com
1(612)607-6351
Project Manager

Enclosures

cc: 3M Environmental Laboratory, 3M Environmental

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Pace Analytical Services, LLC - Minneapolis MN
1700 Elm Street SE, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8 Tribal Water Systems+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
GMP+ Certification #: GMP050884
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: AI-03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Approval: via MN 027-053-137
Minnesota Petrofund Registration #: 1240
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification (A2LA) #: R-036
North Dakota Certification (MN) #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification (1700) #: CL101
Oklahoma Certification #: 9507
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Vermont Certification #: VT-027053137
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01
USDA Permit #: P330-19-00208

Pace Analytical Services, LLC
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Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10679901001	**MEWI-GW-MW2-0-231220**	Water	12/20/23 13:25	12/22/23 18:30
10679901002	**MEWI-GW-MW3-0-231220**	Water	12/20/23 11:40	12/22/23 18:30
10679901003	**MEWI-GW-MW3-DB-231220**	Water	12/20/23 11:40	12/22/23 18:30
10679901004	**MEWI-W-TB1-TB-231220**	Water	12/20/23 00:00	12/22/23 18:30

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SAMPLE ANALYTE COUNT

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10679901001	**MEWI-GW-MW2-0-231220**	ENV-SOP-MIN4-0178	NBH	57	PASI-M
10679901002	**MEWI-GW-MW3-0-231220**	ENV-SOP-MIN4-0178	NBH	57	PASI-M
10679901003	**MEWI-GW-MW3-DB-231220**	ENV-SOP-MIN4-0178	NBH	57	PASI-M
10679901004	**MEWI-W-TB1-TB-231220**	ENV-SOP-MIN4-0178	NBH	57	PASI-M

PASI-M = Pace Analytical Services - Minneapolis

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SUMMARY OF DETECTION

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10679901001	**MEWI-GW-MW2-0-231220**					
ENV-SOP-MIN4-0178	Perfluorobutanesulfonic acid	0.0030	ug/L	0.0018	01/10/24 14:31	
ENV-SOP-MIN4-0178	Perfluorohexanoic acid	0.0050	ug/L	0.0020	01/10/24 14:31	
ENV-SOP-MIN4-0178	PFBA	0.013	ug/L	0.0020	01/10/24 14:31	
ENV-SOP-MIN4-0178	PFHpS	0.011	ug/L	0.0019	01/10/24 14:31	
ENV-SOP-MIN4-0178	PFPeA	0.0031	ug/L	0.0020	01/10/24 14:31	
ENV-SOP-MIN4-0178	PFPeS	0.0040	ug/L	0.0019	01/10/24 14:31	
ENV-SOP-MIN4-0178	Perfluorohexanesulfonic acid	0.11	ug/L	0.0018	01/10/24 14:31	
ENV-SOP-MIN4-0178	Perfluorooctanesulfonic acid	0.062	ug/L	0.0018	01/10/24 14:31	
ENV-SOP-MIN4-0178	Perfluorooctanoic acid	0.0058	ug/L	0.0020	01/10/24 14:31	
10679901002	**MEWI-GW-MW3-0-231220**					
ENV-SOP-MIN4-0178	Perfluorobutanesulfonic acid	0.0089	ug/L	0.0038	01/10/24 14:38	
ENV-SOP-MIN4-0178	Perfluorohexanoic acid	0.025	ug/L	0.0043	01/10/24 14:38	
ENV-SOP-MIN4-0178	PFBA	0.0084	ug/L	0.0043	01/10/24 14:38	
ENV-SOP-MIN4-0178	PFHpS	0.044	ug/L	0.0040	01/10/24 14:38	
ENV-SOP-MIN4-0178	PFPeA	0.0053	ug/L	0.0043	01/10/24 14:38	
ENV-SOP-MIN4-0178	PFPeS	0.018	ug/L	0.0040	01/10/24 14:38	
ENV-SOP-MIN4-0178	Perfluoroheptanoic acid	0.0049	ug/L	0.0043	01/10/24 14:38	
ENV-SOP-MIN4-0178	Perfluorohexanesulfonic acid	0.67	ug/L	0.039	01/11/24 13:06	
ENV-SOP-MIN4-0178	Perfluorooctanesulfonic acid	2.2	ug/L	0.039	01/11/24 13:06	
ENV-SOP-MIN4-0178	Perfluorooctanoic acid	0.24	ug/L	0.0043	01/10/24 14:38	
10679901003	**MEWI-GW-MW3-DB-231220**					
ENV-SOP-MIN4-0178	6:2 FTS	0.0086	ug/L	0.0046	01/10/24 14:46	
ENV-SOP-MIN4-0178	Perfluorobutanesulfonic acid	0.0098	ug/L	0.0043	01/10/24 14:46	
ENV-SOP-MIN4-0178	Perfluorohexanoic acid	0.025	ug/L	0.0048	01/10/24 14:46	
ENV-SOP-MIN4-0178	PFBA	0.011	ug/L	0.0048	01/10/24 14:46	
ENV-SOP-MIN4-0178	PFHpS	0.042	ug/L	0.0046	01/10/24 14:46	
ENV-SOP-MIN4-0178	PFPeA	0.0054	ug/L	0.0048	01/10/24 14:46	
ENV-SOP-MIN4-0178	PFPeS	0.018	ug/L	0.0045	01/10/24 14:46	
ENV-SOP-MIN4-0178	Perfluoroheptanoic acid	0.0050	ug/L	0.0048	01/10/24 14:46	
ENV-SOP-MIN4-0178	Perfluorohexanesulfonic acid	0.68	ug/L	0.044	01/11/24 13:13	
ENV-SOP-MIN4-0178	Perfluorooctanesulfonic acid	1.7	ug/L	0.045	01/11/24 13:13	
ENV-SOP-MIN4-0178	Perfluorooctanoic acid	0.21	ug/L	0.0048	01/10/24 14:46	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Date: January 16, 2024

The quality system for Pace Analytical Services, LLC in Minneapolis, MN (Pace-MN) has been audited and was found to be in conformance with ISO/IEC 17025:2017 by an independent assessment (A2LA Certificate # 2926). The PFAS test results in non-drinking water for this project are not covered by this accreditation. Pace-MN maintains accreditation with the state of Wisconsin for their isotope dilution analysis as defined in ENV-SOP-MIN4-0178 under certificate number999407970. All of the test results for this project are covered by the Wisconsin accreditation.

Pace Analytical Services, LLC
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PROJECT NARRATIVE

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Method: **ENV-SOP-MIN4-0178**
Description: WI ID NPW
Client: 3M Environmental
Date: January 16, 2024

General Information:
4 samples were analyzed for ENV-SOP-MIN4-0178 by Pace Analytical Services Minneapolis. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with ENV-SOP-MIN4-0178 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

QC Batch: 925726

S0: Surrogate recovery outside laboratory control limits.

- BLANK (Lab ID: 4861248)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
  - d7-NMeFOSE (S)
  - d9-NEtFOSE (S)
- LCS (Lab ID: 4861249)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
- LCSD (Lab ID: 4861250)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
  - d7-NMeFOSE (S)
  - d9-NEtFOSE (S)
- MEWI-W-TB1-TB-231220 (Lab ID: 10679901004)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
  - d7-NMeFOSE (S)
  - d9-NEtFOSE (S)

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PROJECT NARRATIVE

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Method: **ENV-SOP-MIN4-0178**
Description: WI ID NPW
Client: 3M Environmental
Date: January 16, 2024

QC Batch: 926301

S0: Surrogate recovery outside laboratory control limits.

- BLANK (Lab ID: 4863419)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
  - d7-NMeFOSE (S)
  - d9-NEtFOSE (S)
- LCS (Lab ID: 4863420)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
  - d7-NMeFOSE (S)
  - d9-NEtFOSE (S)
- LCSD (Lab ID: 4863421)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
  - d7-NMeFOSE (S)
  - d9-NEtFOSE (S)
- MEWI-GW-MW2-0-231220 (Lab ID: 10679901001)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
- MEWI-GW-MW3-0-231220 (Lab ID: 10679901002)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
- MEWI-GW-MW3-DB-231220 (Lab ID: 10679901003)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

QC Batch: 925726

R1: RPD value was outside control limits.

- LCSD (Lab ID: 4861250)
  - NMeFOSA

QC Batch: 926301

L1: Analyte recovery in the laboratory control sample (LCS) was above QC limits. Results for this analyte in associated samples may be biased high.

- LCS (Lab ID: 4863420)
  - NEtFOSA

L2: Analyte recovery in the laboratory control sample (LCS) was below QC limits. Results for this analyte in associated samples may be biased low.

- LCSD (Lab ID: 4863421)

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Method: **ENV-SOP-MIN4-0178**
Description: WI ID NPW
Client: 3M Environmental
Date: January 16, 2024

QC Batch: 926301

L2: Analyte recovery in the laboratory control sample (LCS) was below QC limits. Results for this analyte in associated samples may be biased low.

- NEtFOSA

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Sample: MEWI-GW-MW2-0-231220 **Lab ID: 10679901001** Collected: 12/20/23 13:25 Received: 12/22/23 18:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 250.8646 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.0019	0.00055	1	01/08/24 08:08	01/10/24 14:31	763051-92-9	
4:2 FTS	ND	ug/L	0.0019	0.00046	1	01/08/24 08:08	01/10/24 14:31	757124-72-4	
6:2 FTS	ND	ug/L	0.0019	0.00067	1	01/08/24 08:08	01/10/24 14:31	27619-97-2	
8:2 FTS	ND	ug/L	0.0019	0.00050	1	01/08/24 08:08	01/10/24 14:31	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0019	0.00047	1	01/08/24 08:08	01/10/24 14:31	756426-58-1	
ADONA	ND	ug/L	0.0019	0.00091	1	01/08/24 08:08	01/10/24 14:31	919005-14-4	
HFPO-DA	ND	ug/L	0.0020	0.00049	1	01/08/24 08:08	01/10/24 14:31	13252-13-6	
NEtFOSAA	ND	ug/L	0.0020	0.00081	1	01/08/24 08:08	01/10/24 14:31	2991-50-6	
NEtFOSA	ND	ug/L	0.0020	0.00057	1	01/08/24 08:08	01/10/24 14:31	4151-50-2	L1,L2
NEtFOSE	ND	ug/L	0.0020	0.00089	1	01/08/24 08:08	01/10/24 14:31	1691-99-2	
NMeFOSAA	ND	ug/L	0.0020	0.00069	1	01/08/24 08:08	01/10/24 14:31	2355-31-9	
NMeFOSA	ND	ug/L	0.0020	0.00055	1	01/08/24 08:08	01/10/24 14:31	31506-32-8	
NMeFOSE	ND	ug/L	0.0020	0.00052	1	01/08/24 08:08	01/10/24 14:31	24448-09-7	
Perfluorobutanesulfonic acid	**0.0030**	ug/L	0.0018	0.00048	1	01/08/24 08:08	01/10/24 14:31	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.0020	0.00061	1	01/08/24 08:08	01/10/24 14:31	335-76-2	
Perfluorohexanoic acid	**0.0050**	ug/L	0.0020	0.00091	1	01/08/24 08:08	01/10/24 14:31	307-24-4	
PFBA	**0.013**	ug/L	0.0020	0.00050	1	01/08/24 08:08	01/10/24 14:31	375-22-4	
PFDS	ND	ug/L	0.0019	0.00064	1	01/08/24 08:08	01/10/24 14:31	335-77-3	
PFDoS	ND	ug/L	0.0019	0.00059	1	01/08/24 08:08	01/10/24 14:31	79780-39-5	
PFHpS	**0.011**	ug/L	0.0019	0.00067	1	01/08/24 08:08	01/10/24 14:31	375-92-8	
PFNS	ND	ug/L	0.0019	0.00058	1	01/08/24 08:08	01/10/24 14:31	68259-12-1	
PFOSA	ND	ug/L	0.0020	0.00071	1	01/08/24 08:08	01/10/24 14:31	754-91-6	
PFPeA	**0.0031**	ug/L	0.0020	0.00082	1	01/08/24 08:08	01/10/24 14:31	2706-90-3	
PFPeS	**0.0040**	ug/L	0.0019	0.00060	1	01/08/24 08:08	01/10/24 14:31	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.0020	0.00048	1	01/08/24 08:08	01/10/24 14:31	307-55-1	
Perfluoroheptanoic acid	ND	ug/L	0.0020	0.00069	1	01/08/24 08:08	01/10/24 14:31	375-85-9	
Perfluorohexanesulfonic acid	**0.11**	ug/L	0.0018	0.00053	1	01/08/24 08:08	01/10/24 14:31	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.0020	0.00079	1	01/08/24 08:08	01/10/24 14:31	375-95-1	
Perfluorooctanesulfonic acid	**0.062**	ug/L	0.0018	0.00066	1	01/08/24 08:08	01/10/24 14:31	1763-23-1	
Perfluorooctanoic acid	**0.0058**	ug/L	0.0020	0.00086	1	01/08/24 08:08	01/10/24 14:31	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.0020	0.00060	1	01/08/24 08:08	01/10/24 14:31	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.0020	0.00062	1	01/08/24 08:08	01/10/24 14:31	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.0020	0.00048	1	01/08/24 08:08	01/10/24 14:31	2058-94-8	
Surrogates									
13C4-PFBA (S)	82	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	375-22-4	
13C5-PFPeA (S)	84	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	2706-90-3	
13C3-PFBS (S)	80	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	375-73-5	
13C24:2FTS (S)	42	%.	25-150		1	01/08/24 08:08	01/10/24 14:31		
13C3HFPO-DA (S)	88	%.	25-150		1	01/08/24 08:08	01/10/24 14:31		
13C4-PFHpA (S)	84	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	375-85-9	
13C3-PFHxS (S)	81	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	355-46-4	
13C26:2FTS (S)	58	%.	25-150		1	01/08/24 08:08	01/10/24 14:31		
13C8-PFOA (S)	86	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	335-67-1	
13C8-PFOS (S)	80	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Sample: MEWI-GW-MW2-0-231220 **Lab ID: 10679901001** Collected: 12/20/23 13:25 Received: 12/22/23 18:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 250.8646 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	84	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	375-95-1	
13C6-PFDA (S)	80	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	335-76-2	
13C28:2FTS (S)	44	%.	25-150		1	01/08/24 08:08	01/10/24 14:31		
d3-MeFOSAA (S)	63	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	2355-31-9	
13C7-PFUdA (S)	76	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	2058-94-8	
13C8-PFOSA (S)	61	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	754-91-6	
d5-EtFOSAA (S)	66	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	2991-50-6	
13C2-PFDoA (S)	75	%.	25-150		1	01/08/24 08:08	01/10/24 14:31		
d3-NMeFOSA (S)	0	%.	10-150		1	01/08/24 08:08	01/10/24 14:31	31506-32-8	S0
d7-NMeFOSE (S)	19	%.	10-150		1	01/08/24 08:08	01/10/24 14:31	24448-09-7	
13C2-PFTA (S)	64	%.	25-150		1	01/08/24 08:08	01/10/24 14:31		
d9-NEtFOSE (S)	16	%.	10-150		1	01/08/24 08:08	01/10/24 14:31	1691-99-2	
d5-NEtFOSA (S)	0	%.	10-150		1	01/08/24 08:08	01/10/24 14:31	4151-50-2	S0
13C5-PFHxA (S)	86	%.	25-150		1	01/08/24 08:08	01/10/24 14:31	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Sample: MEWI-GW-MW3-0-231220 **Lab ID: 10679901002** Collected: 12/20/23 11:40 Received: 12/22/23 18:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 117.5736 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.0040	0.0012	1	01/08/24 08:08	01/10/24 14:38	763051-92-9	
4:2 FTS	ND	ug/L	0.0040	0.00099	1	01/08/24 08:08	01/10/24 14:38	757124-72-4	
6:2 FTS	ND	ug/L	0.0040	0.0014	1	01/08/24 08:08	01/10/24 14:38	27619-97-2	
8:2 FTS	ND	ug/L	0.0041	0.0011	1	01/08/24 08:08	01/10/24 14:38	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0040	0.0010	1	01/08/24 08:08	01/10/24 14:38	756426-58-1	
ADONA	ND	ug/L	0.0040	0.0020	1	01/08/24 08:08	01/10/24 14:38	919005-14-4	
HFPO-DA	ND	ug/L	0.0043	0.0010	1	01/08/24 08:08	01/10/24 14:38	13252-13-6	
NEtFOSAA	ND	ug/L	0.0043	0.0017	1	01/08/24 08:08	01/10/24 14:38	2991-50-6	
NEtFOSA	ND	ug/L	0.0043	0.0012	1	01/08/24 08:08	01/10/24 14:38	4151-50-2	L1,L2
NEtFOSE	ND	ug/L	0.0043	0.0019	1	01/08/24 08:08	01/10/24 14:38	1691-99-2	
NMeFOSAA	ND	ug/L	0.0043	0.0015	1	01/08/24 08:08	01/10/24 14:38	2355-31-9	
NMeFOSA	ND	ug/L	0.0043	0.0012	1	01/08/24 08:08	01/10/24 14:38	31506-32-8	
NMeFOSE	ND	ug/L	0.0043	0.0011	1	01/08/24 08:08	01/10/24 14:38	24448-09-7	
Perfluorobutanesulfonic acid	**0.0089**	ug/L	0.0038	0.0010	1	01/08/24 08:08	01/10/24 14:38	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.0043	0.0013	1	01/08/24 08:08	01/10/24 14:38	335-76-2	
Perfluorohexanoic acid	**0.025**	ug/L	0.0043	0.0019	1	01/08/24 08:08	01/10/24 14:38	307-24-4	
PFBA	**0.0084**	ug/L	0.0043	0.0011	1	01/08/24 08:08	01/10/24 14:38	375-22-4	
PFDS	ND	ug/L	0.0041	0.0014	1	01/08/24 08:08	01/10/24 14:38	335-77-3	
PFDoS	ND	ug/L	0.0041	0.0013	1	01/08/24 08:08	01/10/24 14:38	79780-39-5	
PFHpS	**0.044**	ug/L	0.0040	0.0014	1	01/08/24 08:08	01/10/24 14:38	375-92-8	
PFNS	ND	ug/L	0.0041	0.0012	1	01/08/24 08:08	01/10/24 14:38	68259-12-1	
PFOSA	ND	ug/L	0.0043	0.0015	1	01/08/24 08:08	01/10/24 14:38	754-91-6	
PFPeA	**0.0053**	ug/L	0.0043	0.0017	1	01/08/24 08:08	01/10/24 14:38	2706-90-3	
PFPeS	**0.018**	ug/L	0.0040	0.0013	1	01/08/24 08:08	01/10/24 14:38	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.0043	0.0010	1	01/08/24 08:08	01/10/24 14:38	307-55-1	
Perfluoroheptanoic acid	**0.0049**	ug/L	0.0043	0.0015	1	01/08/24 08:08	01/10/24 14:38	375-85-9	
Perfluorohexanesulfonic acid	**0.67**	ug/L	0.039	0.011	10	01/08/24 08:08	01/11/24 13:06	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.0043	0.0017	1	01/08/24 08:08	01/10/24 14:38	375-95-1	
Perfluorooctanesulfonic acid	**2.2**	ug/L	0.039	0.014	10	01/08/24 08:08	01/11/24 13:06	1763-23-1	
Perfluorooctanoic acid	**0.24**	ug/L	0.0043	0.0018	1	01/08/24 08:08	01/10/24 14:38	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.0043	0.0013	1	01/08/24 08:08	01/10/24 14:38	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.0043	0.0013	1	01/08/24 08:08	01/10/24 14:38	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.0043	0.0010	1	01/08/24 08:08	01/10/24 14:38	2058-94-8	
Surrogates									
13C4-PFBA (S)	82	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	375-22-4	
13C5-PFPeA (S)	83	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	2706-90-3	
13C3-PFBS (S)	78	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	375-73-5	
13C24:2FTS (S)	28	%.	25-150		1	01/08/24 08:08	01/10/24 14:38		
13C3HFPO-DA (S)	89	%.	25-150		1	01/08/24 08:08	01/10/24 14:38		
13C4-PFHpA (S)	79	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	375-85-9	
13C3-PFHxS (S)	74	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	355-46-4	
13C26:2FTS (S)	47	%.	25-150		1	01/08/24 08:08	01/10/24 14:38		
13C8-PFOA (S)	81	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	335-67-1	
13C8-PFOS (S)	68	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Sample: MEWI-GW-MW3-0-231220 **Lab ID: 10679901002** Collected: 12/20/23 11:40 Received: 12/22/23 18:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 117.5736 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	69	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	375-95-1	
13C6-PFDA (S)	77	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	335-76-2	
13C28:2FTS (S)	36	%.	25-150		1	01/08/24 08:08	01/10/24 14:38		
d3-MeFOSAA (S)	51	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	2355-31-9	
13C7-PFUdA (S)	68	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	2058-94-8	
13C8-PFOSA (S)	55	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	754-91-6	
d5-EtFOSAA (S)	51	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	2991-50-6	
13C2-PFDoA (S)	62	%.	25-150		1	01/08/24 08:08	01/10/24 14:38		
d3-NMeFOSA (S)	1	%.	10-150		1	01/08/24 08:08	01/10/24 14:38	31506-32-8	S0
d7-NMeFOSE (S)	28	%.	10-150		1	01/08/24 08:08	01/10/24 14:38	24448-09-7	
13C2-PFTA (S)	61	%.	25-150		1	01/08/24 08:08	01/10/24 14:38		
d9-NEtFOSE (S)	24	%.	10-150		1	01/08/24 08:08	01/10/24 14:38	1691-99-2	
d5-NEtFOSA (S)	1	%.	10-150		1	01/08/24 08:08	01/10/24 14:38	4151-50-2	S0
13C5-PFHxA (S)	81	%.	25-150		1	01/08/24 08:08	01/10/24 14:38	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Sample: MEWI-GW-MW3-DB-231220 **Lab ID: 10679901003** Collected: 12/20/23 11:40 Received: 12/22/23 18:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 103.6804 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.0045	0.0013	1	01/08/24 08:08	01/10/24 14:46	763051-92-9	
4:2 FTS	ND	ug/L	0.0045	0.0011	1	01/08/24 08:08	01/10/24 14:46	757124-72-4	
6:2 FTS	**0.0086**	ug/L	0.0046	0.0016	1	01/08/24 08:08	01/10/24 14:46	27619-97-2	
8:2 FTS	ND	ug/L	0.0047	0.0012	1	01/08/24 08:08	01/10/24 14:46	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0045	0.0011	1	01/08/24 08:08	01/10/24 14:46	756426-58-1	
ADONA	ND	ug/L	0.0046	0.0022	1	01/08/24 08:08	01/10/24 14:46	919005-14-4	
HFPO-DA	ND	ug/L	0.0048	0.0012	1	01/08/24 08:08	01/10/24 14:46	13252-13-6	
NEtFOSAA	ND	ug/L	0.0048	0.0020	1	01/08/24 08:08	01/10/24 14:46	2991-50-6	
NEtFOSA	ND	ug/L	0.0048	0.0014	1	01/08/24 08:08	01/10/24 14:46	4151-50-2	L1,L2
NEtFOSE	ND	ug/L	0.0048	0.0021	1	01/08/24 08:08	01/10/24 14:46	1691-99-2	
NMeFOSAA	ND	ug/L	0.0048	0.0017	1	01/08/24 08:08	01/10/24 14:46	2355-31-9	
NMeFOSA	ND	ug/L	0.0048	0.0013	1	01/08/24 08:08	01/10/24 14:46	31506-32-8	
NMeFOSE	ND	ug/L	0.0048	0.0013	1	01/08/24 08:08	01/10/24 14:46	24448-09-7	
Perfluorobutanesulfonic acid	**0.0098**	ug/L	0.0043	0.0012	1	01/08/24 08:08	01/10/24 14:46	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.0048	0.0015	1	01/08/24 08:08	01/10/24 14:46	335-76-2	
Perfluorohexanoic acid	**0.025**	ug/L	0.0048	0.0022	1	01/08/24 08:08	01/10/24 14:46	307-24-4	
PFBA	**0.011**	ug/L	0.0048	0.0012	1	01/08/24 08:08	01/10/24 14:46	375-22-4	
PFDS	ND	ug/L	0.0047	0.0015	1	01/08/24 08:08	01/10/24 14:46	335-77-3	
PFDoS	ND	ug/L	0.0047	0.0014	1	01/08/24 08:08	01/10/24 14:46	79780-39-5	
PFHpS	**0.042**	ug/L	0.0046	0.0016	1	01/08/24 08:08	01/10/24 14:46	375-92-8	
PFNS	ND	ug/L	0.0046	0.0014	1	01/08/24 08:08	01/10/24 14:46	68259-12-1	
PFOSA	ND	ug/L	0.0048	0.0017	1	01/08/24 08:08	01/10/24 14:46	754-91-6	
PFPeA	**0.0054**	ug/L	0.0048	0.0020	1	01/08/24 08:08	01/10/24 14:46	2706-90-3	
PFPeS	**0.018**	ug/L	0.0045	0.0014	1	01/08/24 08:08	01/10/24 14:46	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.0048	0.0012	1	01/08/24 08:08	01/10/24 14:46	307-55-1	
Perfluoroheptanoic acid	**0.0050**	ug/L	0.0048	0.0017	1	01/08/24 08:08	01/10/24 14:46	375-85-9	
Perfluorohexanesulfonic acid	**0.68**	ug/L	0.044	0.013	10	01/08/24 08:08	01/11/24 13:13	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.0048	0.0019	1	01/08/24 08:08	01/10/24 14:46	375-95-1	
Perfluorooctanesulfonic acid	**1.7**	ug/L	0.045	0.016	10	01/08/24 08:08	01/11/24 13:13	1763-23-1	
Perfluorooctanoic acid	**0.21**	ug/L	0.0048	0.0021	1	01/08/24 08:08	01/10/24 14:46	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.0048	0.0014	1	01/08/24 08:08	01/10/24 14:46	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.0048	0.0015	1	01/08/24 08:08	01/10/24 14:46	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.0048	0.0012	1	01/08/24 08:08	01/10/24 14:46	2058-94-8	
Surrogates									
13C4-PFBA (S)	84	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	375-22-4	
13C5-PFPeA (S)	84	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	2706-90-3	
13C3-PFBS (S)	81	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	375-73-5	
13C24:2FTS (S)	30	%.	25-150		1	01/08/24 08:08	01/10/24 14:46		
13C3HFPO-DA (S)	91	%.	25-150		1	01/08/24 08:08	01/10/24 14:46		
13C4-PFHpA (S)	81	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	375-85-9	
13C3-PFHxS (S)	79	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	355-46-4	
13C26:2FTS (S)	55	%.	25-150		1	01/08/24 08:08	01/10/24 14:46		
13C8-PFOA (S)	83	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	335-67-1	
13C8-PFOS (S)	72	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Sample: MEWI-GW-MW3-DB-231220 **Lab ID: 10679901003** Collected: 12/20/23 11:40 Received: 12/22/23 18:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 103.6804 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	72	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	375-95-1	
13C6-PFDA (S)	78	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	335-76-2	
13C28:2FTS (S)	36	%.	25-150		1	01/08/24 08:08	01/10/24 14:46		
d3-MeFOSAA (S)	51	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	2355-31-9	
13C7-PFUdA (S)	69	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	2058-94-8	
13C8-PFOSA (S)	48	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	754-91-6	
d5-EtFOSAA (S)	49	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	2991-50-6	
13C2-PFDoA (S)	65	%.	25-150		1	01/08/24 08:08	01/10/24 14:46		
d3-NMeFOSA (S)	0	%.	10-150		1	01/08/24 08:08	01/10/24 14:46	31506-32-8	S0
d7-NMeFOSE (S)	16	%.	10-150		1	01/08/24 08:08	01/10/24 14:46	24448-09-7	
13C2-PFTA (S)	64	%.	25-150		1	01/08/24 08:08	01/10/24 14:46		
d9-NEtFOSE (S)	12	%.	10-150		1	01/08/24 08:08	01/10/24 14:46	1691-99-2	
d5-NEtFOSA (S)	0	%.	10-150		1	01/08/24 08:08	01/10/24 14:46	4151-50-2	S0
13C5-PFHxA (S)	83	%.	25-150		1	01/08/24 08:08	01/10/24 14:46	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Sample: MEWI-W-TB1-TB-231220 **Lab ID: 10679901004** Collected: 12/20/23 00:00 Received: 12/22/23 18:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 248.996 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
11Cl-PF3OUdS	ND	ug/L	0.0019	0.00056	1	01/02/24 10:14	01/04/24 13:21	763051-92-9	
4:2 FTS	ND	ug/L	0.0019	0.00047	1	01/02/24 10:14	01/04/24 13:21	757124-72-4	
6:2 FTS	ND	ug/L	0.0019	0.00068	1	01/02/24 10:14	01/04/24 13:21	27619-97-2	
8:2 FTS	ND	ug/L	0.0019	0.00051	1	01/02/24 10:14	01/04/24 13:21	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0019	0.00047	1	01/02/24 10:14	01/04/24 13:21	756426-58-1	
ADONA	ND	ug/L	0.0019	0.00092	1	01/02/24 10:14	01/04/24 13:21	919005-14-4	
HFPO-DA	ND	ug/L	0.0020	0.00049	1	01/02/24 10:14	01/04/24 13:21	13252-13-6	
NEtFOSAA	ND	ug/L	0.0020	0.00082	1	01/02/24 10:14	01/04/24 13:21	2991-50-6	
NEtFOSA	ND	ug/L	0.0020	0.00058	1	01/02/24 10:14	01/04/24 13:21	4151-50-2	
NEtFOSE	ND	ug/L	0.0020	0.00089	1	01/02/24 10:14	01/04/24 13:21	1691-99-2	
NMeFOSAA	ND	ug/L	0.0020	0.00070	1	01/02/24 10:14	01/04/24 13:21	2355-31-9	
NMeFOSA	ND	ug/L	0.0020	0.00055	1	01/02/24 10:14	01/04/24 13:21	31506-32-8	
NMeFOSE	ND	ug/L	0.0020	0.00052	1	01/02/24 10:14	01/04/24 13:21	24448-09-7	
Perfluorobutanesulfonic acid	ND	ug/L	0.0018	0.00049	1	01/02/24 10:14	01/04/24 13:21	375-73-5	
Perfluorodecanoic acid	ND	ug/L	0.0020	0.00061	1	01/02/24 10:14	01/04/24 13:21	335-76-2	
Perfluorohexanoic acid	ND	ug/L	0.0020	0.00091	1	01/02/24 10:14	01/04/24 13:21	307-24-4	
PFBA	ND	ug/L	0.0020	0.00050	1	01/02/24 10:14	01/04/24 13:21	375-22-4	
PFDS	ND	ug/L	0.0019	0.00064	1	01/02/24 10:14	01/04/24 13:21	335-77-3	
PFDoS	ND	ug/L	0.0019	0.00059	1	01/02/24 10:14	01/04/24 13:21	79780-39-5	
PFHpS	ND	ug/L	0.0019	0.00067	1	01/02/24 10:14	01/04/24 13:21	375-92-8	
PFNS	ND	ug/L	0.0019	0.00059	1	01/02/24 10:14	01/04/24 13:21	68259-12-1	
PFOSA	ND	ug/L	0.0020	0.00072	1	01/02/24 10:14	01/04/24 13:21	754-91-6	
PFPeA	ND	ug/L	0.0020	0.00082	1	01/02/24 10:14	01/04/24 13:21	2706-90-3	
PFPeS	ND	ug/L	0.0019	0.00060	1	01/02/24 10:14	01/04/24 13:21	2706-91-4	
Perfluorododecanoic acid	ND	ug/L	0.0020	0.00048	1	01/02/24 10:14	01/04/24 13:21	307-55-1	
Perfluoroheptanoic acid	ND	ug/L	0.0020	0.00069	1	01/02/24 10:14	01/04/24 13:21	375-85-9	
Perfluorohexanesulfonic acid	ND	ug/L	0.0018	0.00053	1	01/02/24 10:14	01/04/24 13:21	355-46-4	
Perfluorononanoic acid	ND	ug/L	0.0020	0.00080	1	01/02/24 10:14	01/04/24 13:21	375-95-1	
Perfluorooctanesulfonic acid	ND	ug/L	0.0019	0.00067	1	01/02/24 10:14	01/04/24 13:21	1763-23-1	
Perfluorooctanoic acid	ND	ug/L	0.0020	0.00086	1	01/02/24 10:14	01/04/24 13:21	335-67-1	
Perfluorotetradecanoic acid	ND	ug/L	0.0020	0.00060	1	01/02/24 10:14	01/04/24 13:21	376-06-7	
Perfluorotridecanoic acid	ND	ug/L	0.0020	0.00062	1	01/02/24 10:14	01/04/24 13:21	72629-94-8	
Perfluoroundecanoic acid	ND	ug/L	0.0020	0.00049	1	01/02/24 10:14	01/04/24 13:21	2058-94-8	
Surrogates									
13C4-PFBA (S)	97	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	375-22-4	
13C5-PFPeA (S)	96	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	2706-90-3	
13C3-PFBS (S)	96	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	375-73-5	
13C24:2FTS (S)	54	%.	25-150		1	01/02/24 10:14	01/04/24 13:21		
13C3HFPO-DA (S)	99	%.	25-150		1	01/02/24 10:14	01/04/24 13:21		
13C4-PFHpA (S)	91	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	375-85-9	
13C3-PFHxS (S)	99	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	355-46-4	
13C26:2FTS (S)	112	%.	25-150		1	01/02/24 10:14	01/04/24 13:21		
13C8-PFOA (S)	96	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	335-67-1	
13C8-PFOS (S)	78	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Sample: MEWI-W-TB1-TB-231220 **Lab ID: 10679901004** Collected: 12/20/23 00:00 Received: 12/22/23 18:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 248.996 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis								
Surrogates									
13C9-PFNA (S)	85	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	375-95-1	
13C6-PFDA (S)	73	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	335-76-2	
13C28:2FTS (S)	42	%.	25-150		1	01/02/24 10:14	01/04/24 13:21		
d3-MeFOSAA (S)	56	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	2355-31-9	
13C7-PFUdA (S)	63	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	2058-94-8	
13C8-PFOSA (S)	53	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	754-91-6	
d5-EtFOSAA (S)	54	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	2991-50-6	
13C2-PFDoA (S)	46	%.	25-150		1	01/02/24 10:14	01/04/24 13:21		
d3-NMeFOSA (S)	0	%.	10-150		1	01/02/24 10:14	01/04/24 13:21	31506-32-8	S0
d7-NMeFOSE (S)	7	%.	10-150		1	01/02/24 10:14	01/04/24 13:21	24448-09-7	S0
13C2-PFTA (S)	37	%.	25-150		1	01/02/24 10:14	01/04/24 13:21		
d9-NEtFOSE (S)	5	%.	10-150		1	01/02/24 10:14	01/04/24 13:21	1691-99-2	S0
d5-NEtFOSA (S)	0	%.	10-150		1	01/02/24 10:14	01/04/24 13:21	4151-50-2	S0
13C5-PFHxA (S)	96	%.	25-150		1	01/02/24 10:14	01/04/24 13:21	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

QC Batch: 925726
QC Batch Method: ENV-SOP-MIN4-0178
Analysis Method: ENV-SOP-MIN4-0178
Analysis Description: WI ID NPW
Laboratory: Pace Analytical Services - Minneapolis

Associated Lab Samples: 10679901004

METHOD BLANK: 4861248 Matrix: Water
Associated Lab Samples: 10679901004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
11Cl-PF3OUdS	ug/L	ND	0.0018	01/04/24 13:06	
4:2 FTS	ug/L	ND	0.0018	01/04/24 13:06	
6:2 FTS	ug/L	ND	0.0019	01/04/24 13:06	
8:2 FTS	ug/L	ND	0.0019	01/04/24 13:06	
9Cl-PF3ONS	ug/L	ND	0.0018	01/04/24 13:06	
ADONA	ug/L	ND	0.0018	01/04/24 13:06	
HFPO-DA	ug/L	ND	0.0020	01/04/24 13:06	
NEtFOSA	ug/L	ND	0.0020	01/04/24 13:06	
NEtFOSAA	ug/L	ND	0.0020	01/04/24 13:06	
NEtFOSE	ug/L	ND	0.0020	01/04/24 13:06	
NMeFOSA	ug/L	ND	0.0020	01/04/24 13:06	
NMeFOSAA	ug/L	ND	0.0020	01/04/24 13:06	
NMeFOSE	ug/L	ND	0.0020	01/04/24 13:06	
Perfluorobutanesulfonic acid	ug/L	ND	0.0017	01/04/24 13:06	
Perfluorodecanoic acid	ug/L	ND	0.0020	01/04/24 13:06	
Perfluorododecanoic acid	ug/L	ND	0.0020	01/04/24 13:06	
Perfluoroheptanoic acid	ug/L	ND	0.0020	01/04/24 13:06	
Perfluorohexanesulfonic acid	ug/L	ND	0.0018	01/04/24 13:06	
Perfluorohexanoic acid	ug/L	ND	0.0020	01/04/24 13:06	
Perfluorononanoic acid	ug/L	ND	0.0020	01/04/24 13:06	
Perfluorooctanesulfonic acid	ug/L	ND	0.0018	01/04/24 13:06	
Perfluorooctanoic acid	ug/L	ND	0.0020	01/04/24 13:06	
Perfluorotetradecanoic acid	ug/L	ND	0.0020	01/04/24 13:06	
Perfluorotridecanoic acid	ug/L	ND	0.0020	01/04/24 13:06	
Perfluoroundecanoic acid	ug/L	ND	0.0020	01/04/24 13:06	
PFBA	ug/L	ND	0.0020	01/04/24 13:06	
PFDoS	ug/L	ND	0.0019	01/04/24 13:06	
PFDS	ug/L	ND	0.0019	01/04/24 13:06	
PFHpS	ug/L	ND	0.0019	01/04/24 13:06	
PFNS	ug/L	ND	0.0019	01/04/24 13:06	
PFOSA	ug/L	ND	0.0020	01/04/24 13:06	
PFPeA	ug/L	ND	0.0020	01/04/24 13:06	
PFPeS	ug/L	ND	0.0018	01/04/24 13:06	
13C2-PFDoA (S)	%.	79	25-150	01/04/24 13:06	
13C2-PFTA (S)	%.	71	25-150	01/04/24 13:06	
13C24:2FTS (S)	%.	55	25-150	01/04/24 13:06	
13C26:2FTS (S)	%.	65	25-150	01/04/24 13:06	
13C28:2FTS (S)	%.	46	25-150	01/04/24 13:06	
13C3-PFBS (S)	%.	93	25-150	01/04/24 13:06	
13C3-PFHxS (S)	%.	95	25-150	01/04/24 13:06	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

METHOD BLANK: 4861248 Matrix: Water
Associated Lab Samples: 10679901004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
13C3HFPO-DA (S)	%.	99	25-150	01/04/24 13:06	
13C4-PFBA (S)	%.	94	25-150	01/04/24 13:06	
13C4-PFHpA (S)	%.	90	25-150	01/04/24 13:06	
13C5-PFHxA (S)	%.	92	25-150	01/04/24 13:06	
13C5-PFPeA (S)	%.	93	25-150	01/04/24 13:06	
13C6-PFDA (S)	%.	87	25-150	01/04/24 13:06	
13C7-PFUdA (S)	%.	83	25-150	01/04/24 13:06	
13C8-PFOA (S)	%.	95	25-150	01/04/24 13:06	
13C8-PFOS (S)	%.	90	25-150	01/04/24 13:06	
13C8-PFOSA (S)	%.	60	25-150	01/04/24 13:06	
13C9-PFNA (S)	%.	89	25-150	01/04/24 13:06	
d3-MeFOSAA (S)	%.	65	25-150	01/04/24 13:06	
d3-NMeFOSA (S)	%.	0	20-150	01/04/24 13:06	S0
d5-EtFOSAA (S)	%.	65	25-150	01/04/24 13:06	
d5-NEtFOSA (S)	%.	0	20-150	01/04/24 13:06	S0
d7-NMeFOSE (S)	%.	10	20-150	01/04/24 13:06	S0
d9-NEtFOSE (S)	%.	7	20-150	01/04/24 13:06	S0

LABORATORY CONTROL SAMPLE & LCSD: 4861249 4861250

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
11Cl-PF3OUdS	ug/L	0.0037	0.0032	0.0030	86	84	50-150	5	30	
4:2 FTS	ug/L	0.0037	0.0035	0.0033	96	91	50-150	8	30	
6:2 FTS	ug/L	0.0038	0.0041	0.0034	109	92	50-150	20	30	
8:2 FTS	ug/L	0.0038	0.0039	0.0041	103	110	50-150	4	30	
9Cl-PF3ONS	ug/L	0.0037	0.0034	0.0034	93	96	50-150	0	30	
ADONA	ug/L	0.0037	0.0034	0.0033	90	91	50-150	2	30	
HFPO-DA	ug/L	0.004	0.0036	0.0036	92	94	50-150	1	30	
NEtFOSA	ug/L	0.004	0.0042	0.0057	107	149	50-150	30	30	
NEtFOSAA	ug/L	0.004	0.0037	0.0035	94	91	50-150	6	30	
NEtFOSE	ug/L	0.004	0.0035	0.0035	88	92	50-150	1	30	
NMeFOSA	ug/L	0.004	0.0036	0.0053	91	138	50-150	39	30	R1
NMeFOSAA	ug/L	0.004	0.0041	0.0037	104	95	50-150	12	30	
NMeFOSE	ug/L	0.004	0.0039	0.0039	98	102	50-150	2	30	
Perfluorobutanesulfonic acid	ug/L	0.0035	0.0033	0.0032	95	94	50-150	4	30	
Perfluorodecanoic acid	ug/L	0.004	0.0039	0.0036	98	94	50-150	7	30	
Perfluorododecanoic acid	ug/L	0.004	0.0036	0.0035	91	92	50-150	2	30	
Perfluoroheptanoic acid	ug/L	0.004	0.0037	0.0035	94	92	50-150	4	30	
Perfluorohexanesulfonic acid	ug/L	0.0036	0.0033	0.0033	91	94	50-150	1	30	
Perfluorohexanoic acid	ug/L	0.004	0.0038	0.0036	95	94	50-150	4	30	
Perfluorononanoic acid	ug/L	0.004	0.0036	0.0035	91	91	50-150	3	30	
Perfluorooctanesulfonic acid	ug/L	0.0037	0.0034	0.0037	94	104	50-150	7	30	
Perfluorooctanoic acid	ug/L	0.004	0.0036	0.0037	92	96	50-150	0	30	
Perfluorotetradecanoic acid	ug/L	0.004	0.0038	0.0037	95	96	50-150	1	30	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

LABORATORY CONTROL SAMPLE & LCSD: 4861249 4861250

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Perfluorotridecanoic acid	ug/L	0.004	0.0036	0.0035	91	90	50-150	3	30	
Perfluoroundecanoic acid	ug/L	0.004	0.0037	0.0035	93	91	50-150	6	30	
PFBA	ug/L	0.004	0.0038	0.0036	96	94	50-150	5	30	
PFDoS	ug/L	0.0038	0.0026	0.0030	68	82	50-150	15	30	
PFDS	ug/L	0.0038	0.0028	0.0030	74	81	50-150	6	30	
PFHpS	ug/L	0.0038	0.0034	0.0035	90	95	50-150	2	30	
PFNS	ug/L	0.0038	0.0037	0.0036	97	96	50-150	4	30	
PFOSA	ug/L	0.004	0.0038	0.0040	96	104	50-150	5	30	
PFPeA	ug/L	0.004	0.0038	0.0037	96	97	50-150	3	30	
PFPeS	ug/L	0.0037	0.0035	0.0034	94	95	50-150	2	30	
13C2-PFDoA (S)	%.				79	78	25-150			
13C2-PFTA (S)	%.				67	65	25-150			
13C24:2FTS (S)	%.				84	47	25-150			
13C26:2FTS (S)	%.				90	77	25-150			
13C28:2FTS (S)	%.				57	39	25-150			
13C3-PFBS (S)	%.				99	91	25-150			
13C3-PFHxS (S)	%.				102	91	25-150			
13C3HFPO-DA (S)	%.				106	94	25-150			
13C4-PFBA (S)	%.				100	92	25-150			
13C4-PFHpA (S)	%.				97	88	25-150			
13C5-PFHxA (S)	%.				100	90	25-150			
13C5-PFPeA (S)	%.				100	89	25-150			
13C6-PFDA (S)	%.				90	84	25-150			
13C7-PFUdA (S)	%.				85	82	25-150			
13C8-PFOA (S)	%.				103	94	25-150			
13C8-PFOS (S)	%.				95	90	25-150			
13C8-PFOSA (S)	%.				75	59	25-150			
13C9-PFNA (S)	%.				95	89	25-150			
d3-MeFOSAA (S)	%.				66	60	25-150			
d3-NMeFOSA (S)	%.				6	1	20-150			S0
d5-EtFOSAA (S)	%.				65	66	25-150			
d5-NEtFOSA (S)	%.				4	1	20-150			S0
d7-NMeFOSE (S)	%.				36	17	20-150			S0
d9-NEtFOSE (S)	%.				34	13	20-150			S0

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

QC Batch: 926301
QC Batch Method: ENV-SOP-MIN4-0178
Analysis Method: ENV-SOP-MIN4-0178
Analysis Description: WI ID NPW
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10679901001, 10679901002, 10679901003

METHOD BLANK: 4863419 Matrix: Water
Associated Lab Samples: 10679901001, 10679901002, 10679901003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
11Cl-PF3OUdS	ug/L	ND	0.0019	01/10/24 13:55	
4:2 FTS	ug/L	ND	0.0019	01/10/24 13:55	
6:2 FTS	ug/L	ND	0.0019	01/10/24 13:55	
8:2 FTS	ug/L	ND	0.0020	01/10/24 13:55	
9Cl-PF3ONS	ug/L	ND	0.0019	01/10/24 13:55	
ADONA	ug/L	ND	0.0019	01/10/24 13:55	
HFPO-DA	ug/L	ND	0.0020	01/10/24 13:55	
NEtFOSA	ug/L	ND	0.0020	01/10/24 13:55	
NEtFOSAA	ug/L	ND	0.0020	01/10/24 13:55	
NEtFOSE	ug/L	ND	0.0020	01/10/24 13:55	
NMeFOSA	ug/L	ND	0.0020	01/10/24 13:55	
NMeFOSAA	ug/L	ND	0.0020	01/10/24 13:55	
NMeFOSE	ug/L	ND	0.0020	01/10/24 13:55	
Perfluorobutanesulfonic acid	ug/L	ND	0.0018	01/10/24 13:55	
Perfluorodecanoic acid	ug/L	ND	0.0020	01/10/24 13:55	
Perfluorododecanoic acid	ug/L	ND	0.0020	01/10/24 13:55	
Perfluoroheptanoic acid	ug/L	ND	0.0020	01/10/24 13:55	
Perfluorohexanesulfonic acid	ug/L	ND	0.0019	01/10/24 13:55	
Perfluorohexanoic acid	ug/L	ND	0.0020	01/10/24 13:55	
Perfluorononanoic acid	ug/L	ND	0.0020	01/10/24 13:55	
Perfluorooctanesulfonic acid	ug/L	ND	0.0019	01/10/24 13:55	
Perfluorooctanoic acid	ug/L	ND	0.0020	01/10/24 13:55	
Perfluorotetradecanoic acid	ug/L	ND	0.0020	01/10/24 13:55	
Perfluorotridecanoic acid	ug/L	ND	0.0020	01/10/24 13:55	
Perfluoroundecanoic acid	ug/L	ND	0.0020	01/10/24 13:55	
PFBA	ug/L	ND	0.0020	01/10/24 13:55	
PFDoS	ug/L	ND	0.0020	01/10/24 13:55	
PFDS	ug/L	ND	0.0020	01/10/24 13:55	
PFHpS	ug/L	ND	0.0019	01/10/24 13:55	
PFNS	ug/L	ND	0.0020	01/10/24 13:55	
PFOSA	ug/L	ND	0.0020	01/10/24 13:55	
PFPeA	ug/L	ND	0.0020	01/10/24 13:55	
PFPeS	ug/L	ND	0.0019	01/10/24 13:55	
13C2-PFDoA (S)	%.	85	25-150	01/10/24 13:55	
13C2-PFTA (S)	%.	81	25-150	01/10/24 13:55	
13C24:2FTS (S)	%.	113	25-150	01/10/24 13:55	
13C26:2FTS (S)	%.	133	25-150	01/10/24 13:55	
13C28:2FTS (S)	%.	104	25-150	01/10/24 13:55	
13C2PFHxDA (S)	%.	56	25-150	01/10/24 13:55	
13C3-PFBS (S)	%.	88	25-150	01/10/24 13:55	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

METHOD BLANK: 4863419 Matrix: Water
Associated Lab Samples: 10679901001, 10679901002, 10679901003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
13C3-PFHxS (S)	%.	88	25-150	01/10/24 13:55	
13C3HFPO-DA (S)	%.	95	25-150	01/10/24 13:55	
13C4-PFBA (S)	%.	90	25-150	01/10/24 13:55	
13C4-PFHpA (S)	%.	90	25-150	01/10/24 13:55	
13C5-PFHxA (S)	%.	90	25-150	01/10/24 13:55	
13C5-PFPeA (S)	%.	90	25-150	01/10/24 13:55	
13C6-PFDA (S)	%.	87	25-150	01/10/24 13:55	
13C7-PFUdA (S)	%.	85	25-150	01/10/24 13:55	
13C8-PFOA (S)	%.	92	25-150	01/10/24 13:55	
13C8-PFOS (S)	%.	85	25-150	01/10/24 13:55	
13C8-PFOSA (S)	%.	60	25-150	01/10/24 13:55	
13C9-PFNA (S)	%.	90	25-150	01/10/24 13:55	
d3-MeFOSAA (S)	%.	77	25-150	01/10/24 13:55	
d3-NMeFOSA (S)	%.	0	20-150	01/10/24 13:55	S0
d5-EtFOSAA (S)	%.	80	25-150	01/10/24 13:55	
d5-NEtFOSA (S)	%.	0	20-150	01/10/24 13:55	S0
d7-NMeFOSE (S)	%.	9	20-150	01/10/24 13:55	S0
d9-NEtFOSE (S)	%.	6	20-150	01/10/24 13:55	S0

LABORATORY CONTROL SAMPLE & LCSD: 4863420 4863421

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
11Cl-PF3OUdS	ug/L	0.0039	0.0033	0.0032	84	84	50-150	2	30	
4:2 FTS	ug/L	0.0038	0.0034	0.0033	89	88	50-150	3	30	
6:2 FTS	ug/L	0.0039	0.0039	0.0035	100	92	50-150	10	30	
8:2 FTS	ug/L	0.0039	0.0037	0.0033	93	86	50-150	10	30	
9Cl-PF3ONS	ug/L	0.0038	0.0036	0.0034	92	89	50-150	6	30	
ADONA	ug/L	0.0039	0.0033	0.0033	86	86	50-150	1	30	
HFPO-DA	ug/L	0.0041	0.0038	0.0036	92	90	50-150	5	30	
NEtFOSA	ug/L	0.0041	0.0076	ND	184	0	50-150		30	L1,L2
NEtFOSAA	ug/L	0.0041	0.0034	0.0036	83	89	50-150	5	30	
NEtFOSE	ug/L	0.0041	0.0041	0.0042	100	104	50-150	2	30	
NMeFOSA	ug/L	0.0041	0.0042	0.0049	101	122	50-150	17	30	
NMeFOSAA	ug/L	0.0041	0.0035	0.0039	86	97	50-150	10	30	
NMeFOSE	ug/L	0.0041	0.0038	0.0035	93	87	50-150	8	30	
Perfluorobutanesulfonic acid	ug/L	0.0036	0.0032	0.0031	88	88	50-150	2	30	
Perfluorodecanoic acid	ug/L	0.0041	0.0038	0.0037	92	92	50-150	2	30	
Perfluorododecanoic acid	ug/L	0.0041	0.0037	0.0037	91	93	50-150	1	30	
Perfluoroheptanoic acid	ug/L	0.0041	0.0036	0.0036	87	90	50-150	2	30	
Perfluorohexanesulfonic acid	ug/L	0.0038	0.0034	0.0034	91	91	50-150	2	30	
Perfluorohexanoic acid	ug/L	0.0041	0.0037	0.0037	91	92	50-150	1	30	
Perfluorononanoic acid	ug/L	0.0041	0.0037	0.0036	89	90	50-150	0	30	
Perfluorooctanesulfonic acid	ug/L	0.0038	0.0035	0.0035	91	93	50-150	0	30	
Perfluorooctanoic acid	ug/L	0.0041	0.0037	0.0038	90	95	50-150	3	30	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

LABORATORY CONTROL SAMPLE & LCSD: 4863420 4863421

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Perfluorotetradecanoic acid	ug/L	0.0041	0.0036	0.0038	87	95	50-150	7	30	
Perfluorotridecanoic acid	ug/L	0.0041	0.0038	0.0034	94	84	50-150	13	30	
Perfluoroundecanoic acid	ug/L	0.0041	0.0036	0.0036	89	89	50-150	2	30	
PFBA	ug/L	0.0041	0.0038	0.0036	92	90	50-150	4	30	
PFDoS	ug/L	0.004	0.0032	0.0030	81	78	50-150	6	30	
PFDS	ug/L	0.004	0.0028	0.0033	72	86	50-150	16	30	
PFHpS	ug/L	0.0039	0.0039	0.0035	100	90	50-150	12	30	
PFNS	ug/L	0.0039	0.0035	0.0028	88	71	50-150	23	30	
PFOSA	ug/L	0.0041	0.0039	0.0036	94	89	50-150	7	30	
PFPeA	ug/L	0.0041	0.0038	0.0037	93	92	50-150	3	30	
PFPeS	ug/L	0.0039	0.0035	0.0034	91	90	50-150	3	30	
13C2-PFDoA (S)	%.				72	79	25-150			
13C2-PFTA (S)	%.				65	68	25-150			
13C24:2FTS (S)	%.				37	112	25-150			
13C26:2FTS (S)	%.				57	149	25-150			
13C28:2FTS (S)	%.				41	116	25-150			
13C2PFHxDA (S)	%.				43	50	25-150			
13C3-PFBS (S)	%.				84	85	25-150			
13C3-PFHxS (S)	%.				85	85	25-150			
13C3HFPO-DA (S)	%.				95	92	25-150			
13C4-PFBA (S)	%.				89	86	25-150			
13C4-PFHpA (S)	%.				86	87	25-150			
13C5-PFHxA (S)	%.				87	86	25-150			
13C5-PFPeA (S)	%.				88	87	25-150			
13C6-PFDA (S)	%.				80	84	25-150			
13C7-PFUdA (S)	%.				75	82	25-150			
13C8-PFOA (S)	%.				89	89	25-150			
13C8-PFOS (S)	%.				80	82	25-150			
13C8-PFOSA (S)	%.				57	57	25-150			
13C9-PFNA (S)	%.				85	87	25-150			
d3-MeFOSAA (S)	%.				62	75	25-150			
d3-NMeFOSA (S)	%.				0	0	20-150			S0
d5-EtFOSAA (S)	%.				63	76	25-150			
d5-NEtFOSA (S)	%.				0	0	20-150			S0
d7-NMeFOSE (S)	%.				15	15	20-150			S0
d9-NEtFOSE (S)	%.				11	9	20-150			S0

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above LOD.

J - The reported result is an estimated value.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

DL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Analyte was not detected and is reported as less than the LOD or as defined by the customer.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

WORKORDER QUALIFIERS

WO: 10679901

[1] The quality system for Pace Analytical Services, LLC in Minneapolis, MN (Pace-MN) has been audited and was found to be in conformance with ISO/IEC 17025:2017 by an independent assessment (A2LA Certificate # 2926). The PFAS test results in non-drinking water for this project are not covered by this accreditation. Pace-MN maintains accreditation with the state of Wisconsin for their isotope dilution analysis as defined in ENV-SOP-MIN4-0178 under certificate number999407970. All of the test results for this project are covered by the Wisconsin accreditation.

ANALYTE QUALIFIERS

L1	Analyte recovery in the laboratory control sample (LCS) was above QC limits. Results for this analyte in associated samples may be biased high.
L2	Analyte recovery in the laboratory control sample (LCS) was below QC limits. Results for this analyte in associated samples may be biased low.
R1	RPD value was outside control limits.
S0	Surrogate recovery outside laboratory control limits.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: E23-0716 3M Menomonie GW Dec23
Pace Project No.: 10679901

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10679901001	**MEWI-GW-MW2-0-231220**	ENV-SOP-MIN4-0178	926301	ENV-SOP-MIN4-0178	927131
10679901002	**MEWI-GW-MW3-0-231220**	ENV-SOP-MIN4-0178	926301	ENV-SOP-MIN4-0178	927131
10679901003	**MEWI-GW-MW3-DB-231220**	ENV-SOP-MIN4-0178	926301	ENV-SOP-MIN4-0178	927131
10679901004	**MEWI-W-TB1-TB-231220**	ENV-SOP-MIN4-0178	925726	ENV-SOP-MIN4-0178	926179

3M Global EHS Laboratory

Chain of Custody / Request for Analytical

Project: E23-0716

Sample Shipping Address
Pace Analytical Services, LLC - Minneapolis

1700 Elm St SE
Minneapolis, MN 55414
Attn: Martha Hansen

Project Description: 3M Menomonie GW Monitoring - December 2023

Project Requester
Chambers, Britta (MAPLEWOOD-3MUS-MN 3M CENTER)
Department: 530711 Site Source: 01J9C020
Project Created: 12/1/2023

3M Project Lead
Amanda Albrecht
Email Address: aalbrecht2@mmm.com
Phone Number: 651-736-9414

Item	3M Sample Number	Sample Description	Date/Time Sampled	Matrix	Type of Sample	Sample Comment	Number of Containers (Record each container type/ preservative collected)				
							4				
1	E23-0716-001	MEWI-GW-MW1-0-		WG	☐Grab ☐Comp						
2	E23-0716-002	MEWI-GW-MW2-0- 231220	12/20/23 1325	WG	☑Grab ☐Comp		2				001
3	E23-0716-003	MEWI-GW-MW3-0- 231220	12/20/23 1140	WG	☑Grab ☐Comp		2				002
4	E23-0716-004	MEWI-GW-MW3-DB- 231220	12/20/23 1140	WG	☑Grab ☐Comp		2				003
5	E23-0716-005	MEWI-GW-MW4-0-		WG	☐Grab ☐Comp						
6	E23-0716-006	MEWI-GW-MW5-0-		WG	☐Grab ☐Comp						
7	E23-0716-007	MEWI-GW-MW6-0-		WG	☐Grab ☐Comp						
8	E23-0716-008	MEWI-GW-MW7-0-		WG	☐Grab ☐Comp						
9	E23-0716-009	MEWI-W-TB1-TB- 231220	12/20/23	WQ	☑Grab ☐Comp		1				004
10	E23-0716-010	MEWI-W-FB1-FB-		WQ	☐Grab ☐Comp						
11	E23-0716-011	MEWI-W-EB1-EB-		WQ	☐Grab ☐Comp						
12	E23-0716-012	MEWI-		WG	☐Grab ☐Comp						
13	E23-0716-013	MEWI-		WG	☐Grab ☐Comp						

WO# : 10679901

10679901

Collected by (print): **Collector's signature:**

Item	Relinquished by:	Date	Time	Shipped Via	Received by:	Date	Time
1		12-20-23	1620	FedEx	Stelacek/Pace	12/21/23	10:50
	Stelacek/Pace	12/21/23	10:50		Nick V/Pace	12/22/23	1430

Comments
3SC
1.4 T7

Contact EHS Lab project lead for requested tests and target analytes, if not specified.

Sample Condition Upon Receipt | **Client Name:** 3M | **Project #:** WO#: 10679901

PM: CT1 Due Date: 02/07/24
CLIENT: 3M ENV

Courier: ☐ FedEx ☐ UPS ☐ USPS ☐ Client ☒ Pace ☐ SpeeDee ☐ Commercial

Tracking Number: _____ ☐ See Exceptions ENV-FRM-MIN4-0142

Custody Seal on Cooler/Box Present? ☐ Yes ☒ No **Seals Intact?** ☐ Yes ☒ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☒ N/A

Packing Material: ☒ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other **Temp Blank?** ☒ Yes ☐ No

Thermometer: ☐ T1 (0461) ☐ T2 (0436) ☐ T3 (0459) ☐ T4 (0402) ☐ T5 (0178) ☐ T6 (0235) ☒ T7 (0042) ☐ T8 (0775) ☐ T9(0727) ☐ 01339252/1710 **Type of Ice:** ☒ Wet ☐ Blue ☐ Dry ☐ None ☐ Melted

Did Samples Originate in West Virginia? ☐ Yes ☒ No **Were All Container Temps Taken?** ☐ Yes ☐ No ☒ N/A

Temp should be abave freezing to 6 °C **Cooler temp Read w/Temp Blank:** 1.6 °C **Average Corrected Temp (no temp blank only):** _____ °C

Correction Factor: -0.2 **Cooler Temp Corrected w/temp blank:** 1.4 °C ☐ See Exceptions ENV-FRM-MIN4-0142 ☐ 1 Container

USDA Regulated Soil: (☒ N/A, water sample/other: _____) **Date/Initials of Person Examining Contents:** HB 12/26/23

Did samples originate in a quarantine zone within the United States: AL, AR, AZ CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX, or VA (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

If Yes to either question, fill out a Regulated Soil Checklist (ENV-FRM-MIN4-0154) and include with SCUR/COC paperwork.

Location (Check one): ☐ Duluth ☒ Minneapolis ☐ Virginia				**COMMENTS**
Chain of Custody Present and Filled Out?	☒ Yes	☐ No		1.
Chain of Custody Relinquished?	☒ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☐ Yes	☒ No	☐ N/A	3.
Samples Arrived within Hold Time?	☒ Yes	☐ No		4. If fecal: ☐ <8 hrs ☐ >8 hr, <24 ☐ No
Short Hold Time Analysis (<72 hr)?	☐ Yes	☒ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E.coli ☐ BOD/cBOD ☐ Hex Chrom ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other _____
Rush Turn Around Time Requested?	☐ Yes	☒ No		6.
Sufficient Sample Volume?	☒ Yes	☐ No		7.
Correct Containers Used?	☒ Yes	☐ No	☐ N/A	8.
-Pace Containers Used?	☒ Yes	☐ No		
Containers Intact?	☒ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☒ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC?	☒ Yes	☐ No		11. **If no, write ID/Date/Time of container below:** Received E23-0716- 002,003,004,009. Item 9: Sample number doesn't match. ☐ See Exceptions ENV-FRM-MIN4-0142
Matrix: ☒ Water ☐ Soil ☐ Oil ☐ Other				
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☒ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO3, H2SO4, <2pH, NaOH >9 Sulfide, NaOH>10 Cyanide)	☐ Yes	☐ No	☒ N/A	☐ NaOH ☐ HNO3 ☐ H2SO4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxins/PFAS (*If adding preservative to a container, it must be added to associated field and equipment blanks--verify with PM first.)	☐ Yes	☐ No	☒ N/A	Positive for Residual Chlorine? ☐ Yes ☐ No ☐ See Exceptions ENV-FRM-MIN4-0142
				pH Paper Lot #
				Residual Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in Methyl Mercury Container?	☐ Yes	☐ No	☒ N/A	13.
Extra labels present on soil VOA or WIDRO containers?	☐ Yes	☐ No	☒ N/A	14. ☐ See Exceptions ENV-FRM-MIN4-0142
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☐ No	☒ N/A	
3 Trip Blanks Present?	☐ Yes	☐ No	☒ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☒ N/A	Pace Trip Blank Lot # (if purchased): _____

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Mandy Albrecht Date/Time: 12/26/23

Comments/Resolution: Bottle label for TB is E23-0716-012 instead of 019 but sample description on bottle label matches COC

Project Manager Review: Carolynne Trout **Date:** 12/26/23

NOTE: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e., out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled By: HB **Line:** 3

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

December 28, 2023

Chris Bonniwell
Tetra Tech
13555 Bishops Ct. Ste. 201
Brookfield, WI 53005

RE: Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678575

Dear Chris Bonniwell:

Enclosed are the analytical results for sample(s) received by the laboratory on December 12, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Duluth, MN

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Fiona Parcher
fiona.parcher@pacelabs.com
(612)607-6435
Project Manager

Enclosures

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678575

Pace Analytical Services, LLC - Duluth MN
4730 Oneota Street, Duluth, MN 55807
Minnesota Certification #: 027-137-152
Minnesota Dept of Ag Approval: via Minnesota 027-137-152
Minnesota Petrofund Registration #: 1240
Montana Certification #: CERT0102
Nevada Certification #: MN00037
North Dakota Certification #: R-105
Wisconsin Certification #: 999446800
Wisconsin Dept of Ag Certification: 480341

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678575

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10678575001	**MEWI-GW-MW1-0-231211**	Water	12/11/23 12:10	12/12/23 09:55
10678575002	**MEWI-GW-MW6-0-231211**	Water	12/11/23 15:45	12/12/23 09:55
10678575003	**MEWI-GW-MW7-0-231211**	Water	12/11/23 14:15	12/12/23 09:55

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678575

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10678575001	**MEWI-GW-MW1-0-231211**	SM 3500-CrB-2011	DS3	1	PASI-DU
10678575002	**MEWI-GW-MW6-0-231211**	SM 3500-CrB-2011	DS3	1	PASI-DU
10678575003	**MEWI-GW-MW7-0-231211**	SM 3500-CrB-2011	DS3	1	PASI-DU

PASI-DU = Pace Analytical Services - Duluth, MN

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678575

Sample: MEWI-GW-MW1-0-231211 **Lab ID: 10678575001** Collected: 12/11/23 12:10 Received: 12/12/23 09:55 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
3500CrB Chromium, Hex Diss DU	Analytical Method: SM 3500-CrB-2011 Pace Analytical Services - Duluth, MN								
Chromium, Hexavalent, Dissolved	**<1.6**	ug/L	4.0	1.6	1		12/12/23 11:19		F6

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678575

Sample: MEWI-GW-MW6-0-231211 **Lab ID: 10678575002** Collected: 12/11/23 15:45 Received: 12/12/23 09:55 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
3500CrB Chromium, Hex Diss DU	Analytical Method: SM 3500-CrB-2011 Pace Analytical Services - Duluth, MN								
Chromium, Hexavalent, Dissolved	**<1.6**	ug/L	4.0	1.6	1		12/12/23 11:20		F6

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678575

Sample: MEWI-GW-MW7-0-231211 **Lab ID: 10678575003** Collected: 12/11/23 14:15 Received: 12/12/23 09:55 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
3500CrB Chromium, Hex Diss DU	Analytical Method: SM 3500-CrB-2011 Pace Analytical Services - Duluth, MN								
Chromium, Hexavalent, Dissolved	**<1.6**	ug/L	4.0	1.6	1		12/12/23 11:20		F6

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678575

QC Batch: 922986
QC Batch Method: SM 3500-CrB-2011
Analysis Method: SM 3500-CrB-2011
Analysis Description: Chromium, Hex Dissolved by 3500 DU
Laboratory: Pace Analytical Services - Duluth, MN
Associated Lab Samples: 10678575001, 10678575002, 10678575003

METHOD BLANK: 4849234 Matrix: Water
Associated Lab Samples: 10678575001, 10678575002, 10678575003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chromium, Hexavalent, Dissolved	ug/L	<1.6	4.0	12/12/23 11:18	

LABORATORY CONTROL SAMPLE: 4849235

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chromium, Hexavalent, Dissolved	ug/L	40	42.2	105	92-111	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4849236 4849237

Parameter	Units	10678575001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chromium, Hexavalent, Dissolved	ug/L	<1.6	40	40	40.0	40.3	99	99	81-115	1	10	F6

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678575

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above LOD.

J - The reported result is an estimated value.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

DL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Analyte was not detected and is reported as less than the LOD or as defined by the customer.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

F6 Sample was not filtered within 15 minutes of collection and does not meet sampling and/or regulatory requirements.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678575

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10678575001	**MEWI-GW-MW1-0-231211**	SM 3500-CrB-2011	922986		
10678575002	**MEWI-GW-MW6-0-231211**	SM 3500-CrB-2011	922986		
10678575003	**MEWI-GW-MW7-0-231211**	SM 3500-CrB-2011	922986		

3M Global EHS Laboratory

Chain of Custody / Request for Analytical

Project: E23-0716

WO#: 10678575

Sample Shipping Address
Pace Analytical Services, LLC - Minneapolis

1700 Elm St SE
Minneapolis, MN 55414
Attn: Martha Hansen

Project Description: 3M Menomonie GW Monitoring - December 2023

Project Requester
Chambers, Britta (MAPLEWOOD-3MUS-MN 3M CENTER)
Department: 530711 Site Source: 01J9C020
Project Created: 12/1/2023

3M Project Lead
Amanda Albrecht
Email Address: aalbrec
Phone Number: 651-7

PM: FEP Due Date: 12/27/23
CLIENT: TETRATECH-MN

Item	3M Sample Number	Sample Description	Date/Time Sampled	Matrix	Type of Sample	Sample Comment	Record each container type/ preservative collected: U			
1	E23-0716-001	MEWI-GW-MW1-0- 231211	12/11/23 12:10	WG	☒Grab ☐Comp	Hex Chrome	1			
2	E23-0716-002	MEWI-GW-MW2-0-		WG	☐Grab ☐Comp					
3	E23-0716-003	MEWI-GW-MW3-0-		WG	☐Grab ☐Comp					
4	E23-0716-004	MEWI-GW-MW3-DB-		WG	☐Grab ☐Comp					
5	E23-0716-005	MEWI-GW-MW4-0-		WG	☐Grab ☐Comp					
6	E23-0716-006	MEWI-GW-MW5-0-		WG	☐Grab ☐Comp					
7	E23-0716-007	MEWI-GW-MW6-0- 231211	12/11/23 15:45	WG	☐Grab ☐Comp	Hex Chrome	1			
8	E23-0716-008	MEWI-GW-MW7-0- 231211	12/11/23 14:15	WG	☒Grab ☐Comp	Hex Chrome	1			
9	E23-0716-009	MEWI-W-TB1-TB-		WQ	☐Grab ☐Comp					
10	E23-0716-010	MEWI-W-FB1-FB-		WQ	☐Grab ☐Comp					
11	E23-0716-011	MEWI-W-EB1-EB-		WQ	☐Grab ☐Comp					
12	E23-0716-012	MEWI-		WG	☐Grab ☐Comp					
13	E23-0716-013	MEWI-		WG	☐Grab ☐Comp					

Collected by (print): LAURA DYKSTRA Collector's signature: LAURA DYKSTRA

Item	Relinquished by:	Date	Time	Shipped Via	Received by:	Date	Time
	LAURA DYKSTRA	12/11/23	1730	fedex	Stelacid Pace	12/12/23	0955

Comments
4.8°C

Contact EHS Lab project lead for requested tests and target analytes, if not specified

Page 1 of 1

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

December 28, 2023

Chris Bonniwell
Tetra Tech
13555 Bishops Ct. Ste. 201
Brookfield, WI 53005

RE: Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678715

Dear Chris Bonniwell:

Enclosed are the analytical results for sample(s) received by the laboratory on December 13, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Duluth, MN

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Fiona Parcher
fiona.parcher@pacelabs.com
(612)607-6435
Project Manager

Enclosures

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678715

Pace Analytical Services, LLC - Duluth MN
4730 Oneota Street, Duluth, MN 55807
Minnesota Certification #: 027-137-152
Minnesota Dept of Ag Approval: via Minnesota 027-137-152
Minnesota Petrofund Registration #: 1240
Montana Certification #: CERT0102
Nevada Certification #: MN00037
North Dakota Certification #: R-105
Wisconsin Certification #: 999446800
Wisconsin Dept of Ag Certification: 480341

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678715

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10678715001	**MEWI-GW-MW4-0-231212**	Water	12/12/23 11:35	12/13/23 10:00
10678715002	**MEWI-GW-MW5-0-231212**	Water	12/12/23 13:10	12/13/23 10:00

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678715

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10678715001	**MEWI-GW-MW4-0-231212**	SM 3500-CrB-2011	DW3	1	PASI-DU
10678715002	**MEWI-GW-MW5-0-231212**	SM 3500-CrB-2011	DW3	1	PASI-DU

PASI-DU = Pace Analytical Services - Duluth, MN

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678715

Sample: MEWI-GW-MW4-0-231212 **Lab ID: 10678715001** Collected: 12/12/23 11:35 Received: 12/13/23 10:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
3500CrB Chromium, Hex Diss DU	Analytical Method: SM 3500-CrB-2011 Pace Analytical Services - Duluth, MN								
Chromium, Hexavalent, Dissolved	**<1.6**	ug/L	4.0	1.6	1		12/13/23 11:18		F6

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678715

Sample: MEWI-GW-MW5-0-231212 **Lab ID: 10678715002** Collected: 12/12/23 13:10 Received: 12/13/23 10:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
3500CrB Chromium, Hex Diss DU	Analytical Method: SM 3500-CrB-2011 Pace Analytical Services - Duluth, MN								
Chromium, Hexavalent, Dissolved	**<1.6**	ug/L	4.0	1.6	1		12/13/23 11:19		F6

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678715

QC Batch: 923235
QC Batch Method: SM 3500-CrB-2011
Analysis Method: SM 3500-CrB-2011
Analysis Description: Chromium, Hex Dissolved by 3500 DU
Laboratory: Pace Analytical Services - Duluth, MN
Associated Lab Samples: 10678715001, 10678715002

METHOD BLANK: 4850228 Matrix: Water
Associated Lab Samples: 10678715001, 10678715002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chromium, Hexavalent, Dissolved	ug/L	<1.6	4.0	12/13/23 11:17	

LABORATORY CONTROL SAMPLE: 4850229

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chromium, Hexavalent, Dissolved	ug/L	40	40.9	102	92-111	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4850230 4850231

Parameter	Units	10678715002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chromium, Hexavalent, Dissolved	ug/L	<1.6	40	40	42.1	42.8	104	106	81-115	2	10	F6

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678715

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above LOD.

J - The reported result is an estimated value.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

DL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Analyte was not detected and is reported as less than the LOD or as defined by the customer.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

F6 Sample was not filtered within 15 minutes of collection and does not meet sampling and/or regulatory requirements.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 3M Menomonie GW Monitoring
Pace Project No.: 10678715

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10678715001	**MEWI-GW-MW4-0-231212**	SM 3500-CrB-2011	923235		
10678715002	**MEWI-GW-MW5-0-231212**	SM 3500-CrB-2011	923235		

CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/
MT

WO#: 10678715

PM: FEP Due Date: 12/28/23

CLIENT: TETRATECH-MN

ALL SHADED A

Company: TetraTech	Billing Information: 13555 Bishops Ct. Ste. 201 Brookfield, WI
Address:	
Report To: Chris Bonniwell	Email To: Chris.bonniwell@tetratech.com
Copy To:	Site Collection Info/Address:
Customer Project Name/Number: 3M	State: / County/City: Time Zone Collected: [ ] PT [ ] MT [ ] CT [ ] ET
Phone: (262) 792-1282 Email:	Site/Facility ID #: Compliance Monitoring? [ ] Yes [ ] No
Collected By (print): LauraDykstra	Purchase Order #: Quote #: DW PWS ID #: DW Location Code:
Collected By (signature): LauraDykstra	Turnaround Date Required: 24-HOURS Immediately Packed on Ice: [X] Yes [ ] No
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive: [ ] Hold:	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply) Field Filtered (if applicable): [ ] Yes [ ] No Analysis:

Container Preservative Type **

U

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

Analyses

Hex Chrome

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y N NA
Custody Signatures Present	Y N NA
Collector Signature Present	Y N NA
Bottles Intact	Y N NA
Correct Bottles	Y N NA
Sufficient Volume	Y N NA
Samples Received on Ice	Y N NA
VOA - Headspace Acceptable	Y N NA
USDA Regulated Soils	Y N NA
Samples in Holding Time	Y N NA
Residual Chlorine Present	Y N NA
Cl Strips:	
Sample pH Acceptable	Y N NA
pH Strips:	
Sulfide Present	Y N NA
Lead Acetate Strips:	

LAB USE ONLY:
Lab Sample # / Comments:

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Hex Chrome
MEW-GW-MW4-0-23122	GW	G	12/12	11:35					1
MEW-GW-MW5-0-23122	GW	G	12/12	13:10					1

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 2896991

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#:
Cooler 1 Temp Upon Receipt: ____oC
Cooler 1 Therm Corr. Factor: ____oC
Cooler 1 Corrected Temp: 5.2 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
LauraDykstra / TT	12/12/23 1700	Soledad Pace	12/13/23 10:00
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: 1 of: 1

Sample Condition Upon Receipt

Client Name: Tetra Tech

Project #: WO# : 10678715

10678715

Courier: ☑ FedEx ☐ UPS ☐ USPS ☐ Client ☐ Pace ☐ SpeeDee ☐ Commercial

☐ See Exceptions ENV-FRM-MIN4-0142

Tracking Number: _____

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No **Seals Intact?** ☐ Yes ☐ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Packing Material: ☑ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other **Temp Blank?** ☐ Yes ☑ No

Thermometer: ☐ T1 (0461) ☐ T2 (1336) ☐ T3 (0459) ☐ T4 (0254) ☐ T5 (0178) ☐ T6 (0235) ☐ T7 (0042) ☐ T8 (0775) ☑ 01339252/1710

Type of Ice: ☑ Wet ☐ Blue ☐ Dry ☐ None ☐ Melted

Did Samples Originate in West Virginia? ☐ Yes ☑ No **Were All Container Temps Taken?** ☑ Yes ☐ No ☐ N/A

Temp should be above freezing to 6 °C **Cooler temp Read w/Temp Blank:** _____ °C

Correction Factor: +0.4 **Cooler Temp Corrected w/temp blank:** _____ °C

Average Corrected Temp (no temp blank only): 5.2 °C

☑ See Exceptions ENV-FRM-MIN4-0142 ☐ 1 Container

USDA Regulated Soil: (☑ N/A, water sample/other: _____)

Date/Initials of Person Examining Contents: 12/13/23 SV

Did samples originate in a quarantine zone within the United States: AL, AR, AZ CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX, or VA (check maps)? ☐ Yes ☑ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☑ No

If Yes to either question, fill out a Regulated Soil Checklist (ENV-FRM-MIN4-0154) and include with SCUR/COC paperwork.

Location (Check one): ☑ Duluth ☐ Minneapolis ☐ Virginia				**COMMENTS**
Chain of Custody Present and Filled Out?	☑ Yes	☐ No		1.
Chain of Custody Relinquished?	☑ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	3.
Samples Arrived within Hold Time?	☑ Yes	☐ No		4. If fecal: ☐ <8 hrs ☐ >8 hr, <24 ☐ No
Short Hold Time Analysis (<72 hr)?	☑ Yes	☐ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E.coli ☐ BOD/cBOD ☑ Hex Chrom ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other
Rush Turn Around Time Requested?	☐ Yes	☑ No		6.
Sufficient Sample Volume?	☑ Yes	☐ No		7.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	8.
-Pace Containers Used?	☑ Yes	☐ No		
Containers Intact?	☑ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC?	☑ Yes	☐ No		11. **If no, write ID/Date/Time of container below:** ☐ See Exceptions ENV-FRM-MIN4-0142
Matrix: ☑ Water ☐ Soil ☐ Oil ☐ Other				
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO3, H2SO4, <2pH, NaOH >9 Sulfide, NaOH>10 Cyanide)	☐ Yes	☐ No	☑ N/A	☐ NaOH ☐ HNO3 ☐ H2SO4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxins/PFAS (*If adding preservative to a container, it must be added to associated field and equipment blanks--verify with PM first.)	☐ Yes	☐ No	☑ N/A	Positive for Residual Chlorine? ☐ Yes ☐ No ☐ See Exceptions ENV-FRM-MIN4-0142 **pH Paper Lot #** Residual Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in Methyl Mercury Container?	☐ Yes	☐ No	☑ N/A	13.
Extra labels present on soil VOA or WIDRO containers?	☐ Yes	☐ No	☑ N/A	14. ☐ See Exceptions ENV-FRM-MIN4-0142
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☐ No	☑ N/A	
3 Trip Blanks Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	Pace Trip Blank Lot # (if purchased): _____

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☒ No

Person Contacted: _____ Date/Time: _____

Comments/Resolution: _____

Project Manager Review: Fiona Pardue **Date:** 12/13/2023

NOTE: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e., out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled By: _____ **Line:** _____

Pace Analytical®	Document Name: **Sample Condition Upon Receipt (SCUR) Exception Form**	Document Revised: 04Jun2020 **Page 1 of 1**
	Document No.: **ENV-FRM-MIN4-0142 Rev.01**	Pace Analytical Services - **Minneapolis**

SCUR Exceptions:

Workorder #:

Out of Temp Sample IDs	Container Type	# of Containers

PM Notified? ☐Yes ☐No

If yes, indicate who was contacted/date/time.
If no, indicate reason why.

Multiple Cooler Project? ☐Yes ☐No
If you answered yes, fill out information to the left.

No Temp Blank		
Read Temp	Corrected Temp	Average Temp
4.6	5.0	5.2
5.0	5.4	

Tracking Number/Temperature	

Issue Type: Sample ID	Container Type	# of Containers

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preserv.	pH Upon Receipt	Date Adjusted	Time Adjusted	Amount Added (mL)	Lot # Added	pH After	In Compliance after addition?	Initials
								☐Yes ☐No	
								☐Yes ☐No	
								☐Yes ☐No	
								☐Yes ☐No	

Comments:

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

January 02, 2024

Chris Bonniwell
Tetra Tech
13555 Bishops Ct. Ste. 201
Brookfield, WI 53005

RE: Project: E23-0716-Revised Report
Pace Project No.: 10679586

Dear Chris Bonniwell:

Enclosed are the analytical results for sample(s) received by the laboratory on December 21, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Duluth, MN

This report was revised January 2, 2024, to report the results of Pace samples 10679586-001 and -002 to the limit of detection and the limit of quantitation.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Fiona Parcher
fiona.parcher@pacelabs.com
(612)607-6435
Project Manager

Enclosures

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: E23-0716-Revised Report
Pace Project No.: 10679586

Pace Analytical Services, LLC - Duluth MN
4730 Oneota Street, Duluth, MN 55807
Minnesota Certification #: 027-137-152
Minnesota Dept of Ag Approval: via Minnesota 027-137-152
Minnesota Petrofund Registration #: 1240
Montana Certification #: CERT0102
Nevada Certification #: MN00037
North Dakota Certification #: R-105
Wisconsin Certification #: 999446800
Wisconsin Dept of Ag Certification: 480341

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: E23-0716-Revised Report
Pace Project No.: 10679586

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10679586001	**MW-2**	Water	12/20/23 13:25	12/21/23 10:50
10679586002	**MW-3**	Water	12/20/23 11:40	12/21/23 10:50

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: E23-0716-Revised Report
Pace Project No.: 10679586

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10679586001	**MW-2**	SM 3500-CrB-2011	DS3	1	PASI-DU
10679586002	**MW-3**	SM 3500-CrB-2011	DS3	1	PASI-DU

PASI-DU = Pace Analytical Services - Duluth, MN

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716-Revised Report
Pace Project No.: 10679586

Sample: MW-2 **Lab ID: 10679586001** Collected: 12/20/23 13:25 Received: 12/21/23 10:50 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
3500CrB Chromium, Hex Diss DU	Analytical Method: SM 3500-CrB-2011 Pace Analytical Services - Duluth, MN								
Chromium, Hexavalent, Dissolved	**1.8J**	ug/L	4.0	1.6	1		12/21/23 11:35		F6

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E23-0716-Revised Report
Pace Project No.: 10679586

Sample: MW-3 **Lab ID: 10679586002** Collected: 12/20/23 11:40 Received: 12/21/23 10:50 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
3500CrB Chromium, Hex Diss DU	Analytical Method: SM 3500-CrB-2011 Pace Analytical Services - Duluth, MN								
Chromium, Hexavalent, Dissolved	**<1.6**	ug/L	4.0	1.6	1		12/21/23 11:35		F6

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E23-0716-Revised Report
Pace Project No.: 10679586

QC Batch: 924634
QC Batch Method: SM 3500-CrB-2011
Analysis Method: SM 3500-CrB-2011
Analysis Description: Chromium, Hex Dissolved by 3500 DU
Laboratory: Pace Analytical Services - Duluth, MN
Associated Lab Samples: 10679586001, 10679586002

METHOD BLANK: 4856747 Matrix: Water
Associated Lab Samples: 10679586001, 10679586002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chromium, Hexavalent, Dissolved	ug/L	<1.6	4.0	12/21/23 11:33	

LABORATORY CONTROL SAMPLE: 4856748

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chromium, Hexavalent, Dissolved	ug/L	40	40.3	101	92-111	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4856841 4856842

Parameter	Units	10679586001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chromium, Hexavalent, Dissolved	ug/L	1.8J	40	40	39.8	40.1	95	96	81-115	1	10	F6

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: E23-0716-Revised Report
Pace Project No.: 10679586

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above LOD.

J - The reported result is an estimated value.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

DL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Analyte was not detected and is reported as less than the LOD or as defined by the customer.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

F6 Sample was not filtered within 15 minutes of collection and does not meet sampling and/or regulatory requirements.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: E23-0716-Revised Report
Pace Project No.: 10679586

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10679586001	**MW-2**	SM 3500-CrB-2011	924634		
10679586002	**MW-3**	SM 3500-CrB-2011	924634		

CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workord

WO# : 10679586

PM: FEP Due Date: 01/08/24

CLIENT: TETRATECH-MN

ALL SHADED

Company: TETRA Tech	Billing Information: 13555 Bishops Ct Ste 201 Brookfield WI
Address:	
Report To: C Bonnlwell PH:(262) 202-7393	Email To:
Copy To:	Site Collection Info/Address: 7425 Stoke Parkway Menomonee WI
Customer Project Name/Number: E23-0716	State: WI County/City: Time Zone Collected: [ ] PT [ ] MT [X] CT [ ] ET
Phone: 715/432-5870 Email:	Site/Facility ID #: 01J9C6Z0 Compliance Monitoring? [ ] Yes [ ] No
Collected By (print): Greg Wiseman	Purchase Order #: Quote #: DW PWS ID #: DW Location Code:
Collected By (signature):	Turnaround Date Required: STANDARD Immediately Packed on Ice: [X] Yes [ ] No
Sample Disposal: [X] Dispose as appropriate [ ] Return [ ] Archive: [ ] Hold:	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply) Field Filtered (if applicable): [ ] Yes [ ] No Analysis: N/A

Container Preservative Type *: U

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Analyses: Hex. Chrome	Lab Profile/Line
MW-2	GW	G	12-20-23	1323				1	X	
MW-3	GW	G	12-20-23	1145				1	X	

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y N NA
Custody Signatures Present	Y N NA
Collector Signature Present	Y N NA
Bottles Intact	Y N NA
Correct Bottles	Y N NA
Sufficient Volume	Y N NA
Samples Received on Ice	Y N NA
VOA - Headspace Acceptable	Y N NA
USDA Regulated Soils	Y N NA
Samples in Holding Time	Y N NA
Residual Chlorine Present	Y N NA
Cl Strips: _____	
Sample pH Acceptable	Y N NA
pH Strips: _____	
Sulfide Present	Y N NA
Lead Acetate Strips: _____	

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 2781364

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: _____
Cooler 1 Temp Upon Receipt: _____oC
Cooler 1 Therm Corr. Factor: _____oC
Cooler 1 Corrected Temp: 3.5 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
	12/20/23 1625	Shelaich Pace	12/21/23 10:50
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: _____ of: _____

DC#_Title: Excel Form Template
Effective Date:

Sample Condition Upon Receipt

Client Name: TetraTech

Project #: WO# : 10679586

10679586

Courier: ☑ FedEx ☐ UPS ☐ USPS ☐ Client ☐ Pace ☐ SpeeDee ☐ Commercial

☐ See Exceptions ENV-FRM-MIN4-0142

Tracking Number: _____

Custody Seal on Cooler/Box Present? ☑ Yes ☐ No **Seals Intact?** ☑ Yes ☐ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Packing Material: ☑ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other **Temp Blank?** ☐ Yes ☑ No

Thermometer: ☐ T1 (0461) ☐ T2 (0436) ☐ T3 (0459) ☐ T4 (0402) ☐ T5 (0178) ☐ T6 (0235) ☐ T7 (0042) ☐ T8 (0775) ☐ T9(0727) ☑ 01339252/1710 **Type of Ice:** ☑ Wet ☐ Blue ☐ Dry ☐ None ☐ Melted

Did Samples Originate in West Virginia? ☐ Yes ☐ No **Were All Container Temps Taken?** ☑ Yes ☐ No ☐ N/A

Temp should be above freezing to 6 °C

Cooler temp Read w/Temp Blank: _____ °C

Correction Factor: -0.3

Cooler Temp Corrected w/temp blank: _____ °C

Average Corrected Temp (no temp blank only): 3.5 °C

☑ See Exceptions ENV-FRM-MIN4-0142 ☐ 1 Container

USDA Regulated Soil: (☑ N/A, water sample/other: _____)

Date/Initials of Person Examining Contents: 12/21/23 SV

Did samples originate in a quarantine zone within the United States: AL, AR, AZ CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX, or VA (check maps)? ☐ Yes ☑ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☑ No

If Yes to either question, fill out a Regulated Soil Checklist (ENV-FRM-MIN4-0154) and include with SCUR/COC paperwork.

Location (Check one): ☑ Duluth ☐ Minneapolis ☐ Virginia

				COMMENTS
Chain of Custody Present and Filled Out?	☑ Yes	☐ No		1.
Chain of Custody Relinquished?	☑ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	3.
Samples Arrived within Hold Time?	☑ Yes	☐ No		4. If fecal: ☐ <8 hrs ☐ >8 hr, <24 ☐ No
Short Hold Time Analysis (<72 hr)?	☑ Yes	☐ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E.coli ☐ BOD/cBOD ☑ Hex Chrom ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other
Rush Turn Around Time Requested?	☐ Yes	☑ No		6.
Sufficient Sample Volume?	☑ Yes	☐ No		7.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	8.
-Pace Containers Used?	☑ Yes	☐ No		
Containers Intact?	☑ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC?	☐ Yes	☐ No		11. **If no, write ID/Date/Time of container below:** ☐ See Exceptions ENV-FRM-MIN4-0142
Matrix: ☑ Water ☐ Soil ☐ Oil ☐ Other				
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO3, H2SO4, <2pH, NaOH >9 Sulfide, NaOH>10 Cyanide)	☐ Yes	☐ No	☑ N/A	☐ NaOH ☐ HNO3 ☐ H2SO4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxins/PFAS (*If adding preservative to a container, it must be added to associated field and equipment blanks--verify with PM first.)	☐ Yes	☐ No	☑ N/A	Positive for Residual Chlorine? ☐ Yes ☐ No ☐ See Exceptions ENV-FRM-MIN4-0142 **pH Paper Lot #** Residual Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in Methyl Mercury Container?	☐ Yes	☐ No	☑ N/A	13.
Extra labels present on soil VOA or WIDRO containers?	☐ Yes	☐ No	☑ N/A	14. ☐ See Exceptions ENV-FRM-MIN4-0142
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☐ No	☑ N/A	
3 Trip Blanks Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	Pace Trip Blank Lot # (if purchased): _____

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☒ No

Person Contacted: _____ Date/Time: _____

Comments/Resolution: _____

Project Manager Review: Kevin Pardue **Date:** 12/21/2023

NOTE: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e., out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled By: _____ **Line:** _____

Pace Analytical®	Document Name: **Sample Condition Upon Receipt (SCUR) Exception Form**	Document Revised: 04Jun2020 **Page 1 of 1**
	Document No.: **ENV-FRM-MIN4-0142 Rev.01**	Pace Analytical Services - **Minneapolis**

SCUR Exceptions:

Workorder #:

Out of Temp Sample IDs	Container Type	# of Containers

PM Notified? ☐Yes ☐No

If yes, indicate who was contacted/date/time.
If no, indicate reason why.

Multiple Cooler Project? ☐Yes ☐No
If you answered yes, fill out information to the left.

No Temp Blank		
Read Temp	Corrected Temp	Average Temp
4.7	4.4	3.5
2.8	2.5	

Tracking Number/Temperature	

Issue Type: Sample ID	Container Type	# of Containers

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preserv.	pH Upon Receipt	Date Adjusted	Time Adjusted	Amount Added (mL)	Lot # Added	pH After	In Compliance after addition?	Initials
								☐Yes ☐No	
								☐Yes ☐No	
								☐Yes ☐No	
								☐Yes ☐No	

Comments:

Appendix C
December 2023 Surface Water Analytical Results

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

March 22, 2024

Amanda Albrecht
3M Environmental
3M Center, 260-05-N-17
Saint Paul, MN 551441000

RE: Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Dear Amanda Albrecht:

Enclosed are the analytical results for sample(s) received by the laboratory on January 12, 2024. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:
- Pace Analytical Services - Minneapolis

This report was revised on March 22, 2024, to add QC qualifiers for low surrogate recoveries.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

Carolynne Trout
carolynne.trout@pacelabs.com
1(612)607-6351
Project Manager

Enclosures

cc: 3M Environmental Laboratory, 3M Environmental

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Pace Analytical Services, LLC - Minneapolis MN
1700 Elm Street SE, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8 Tribal Water Systems+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
GMP+ Certification #: GMP050884
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: AI-03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Approval: via MN 027-053-137
Minnesota Petrofund Registration #: 1240
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification (A2LA) #: R-036
North Dakota Certification (MN) #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification (1700) #: CL101
Oklahoma Certification #: 9507
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Vermont Certification #: VT-027053137
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01
USDA Permit #: P330-19-00208

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10681218001	**MEWI-SW-SEEP01-0-20240111**	Water	01/11/24 10:00	01/12/24 08:50
10681218002	**MEWI-SW-SEEP03-0-20240111**	Water	01/11/24 10:10	01/12/24 08:50
10681218003	**MEWI-SW-SEEP05-0-20240111**	Water	01/11/24 10:25	01/12/24 08:50
10681218004	**MEWI-SW-SEEP08-0-20240111**	Water	01/11/24 10:40	01/12/24 08:50
10681218005	**MEWI-SW-CREEK01-0-20240111**	Water	01/11/24 09:50	01/12/24 08:50
10681218006	**MEWI-SW-CREEK02-0-20240111**	Water	01/11/24 10:20	01/12/24 08:50
10681218007	**MEWI-SW-CREEK03-0-20240111**	Water	01/11/24 10:50	01/12/24 08:50

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10681218001	**MEWI-SW-SEEP01-0-20240111**	ENV-SOP-MIN4-0178	NBH	57	PASI-M
10681218002	**MEWI-SW-SEEP03-0-20240111**	ENV-SOP-MIN4-0178	NBH	57	PASI-M
10681218003	**MEWI-SW-SEEP05-0-20240111**	ENV-SOP-MIN4-0178	NBH	57	PASI-M
10681218004	**MEWI-SW-SEEP08-0-20240111**	ENV-SOP-MIN4-0178	NBH	57	PASI-M
10681218005	**MEWI-SW-CREEK01-0-20240111**	ENV-SOP-MIN4-0178	NBH	57	PASI-M
10681218006	**MEWI-SW-CREEK02-0-20240111**	ENV-SOP-MIN4-0178	NBH	57	PASI-M
10681218007	**MEWI-SW-CREEK03-0-20240111**	ENV-SOP-MIN4-0178	NBH	57	PASI-M

PASI-M = Pace Analytical Services - Minneapolis

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SUMMARY OF DETECTION

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10681218001	**MEWI-SW-SEEP01-0-20240111**					
ENV-SOP-MIN4-0178	PFBS	0.010	ug/L	0.0038	01/31/24 15:30	
ENV-SOP-MIN4-0178	PFBA	0.0098	ug/L	0.0043	01/31/24 15:30	
ENV-SOP-MIN4-0178	PFHxS	0.098	ug/L	0.0039	01/31/24 15:30	
10681218002	**MEWI-SW-SEEP03-0-20240111**					
ENV-SOP-MIN4-0178	PFBS	0.014	ug/L	0.0039	01/31/24 15:37	
ENV-SOP-MIN4-0178	PFHxA	0.021	ug/L	0.0044	01/31/24 15:37	
ENV-SOP-MIN4-0178	PFBA	0.032	ug/L	0.0044	01/31/24 15:37	
ENV-SOP-MIN4-0178	PFHpS	0.018	ug/L	0.0042	01/31/24 15:37	
ENV-SOP-MIN4-0178	PFPeA	0.011	ug/L	0.0044	01/31/24 15:37	
ENV-SOP-MIN4-0178	PFPeS	0.024	ug/L	0.0041	01/31/24 15:37	
ENV-SOP-MIN4-0178	PFHxS	0.66	ug/L	0.040	01/31/24 12:41	
ENV-SOP-MIN4-0178	PFOS	0.25	ug/L	0.0041	01/31/24 15:37	
ENV-SOP-MIN4-0178	PFOA	0.026	ug/L	0.0044	01/31/24 15:37	
10681218003	**MEWI-SW-SEEP05-0-20240111**					
ENV-SOP-MIN4-0178	PFBS	0.0098	ug/L	0.0038	01/31/24 15:44	
ENV-SOP-MIN4-0178	PFHxA	0.0073	ug/L	0.0043	01/31/24 15:44	
ENV-SOP-MIN4-0178	PFBA	0.010	ug/L	0.0043	01/31/24 15:44	
ENV-SOP-MIN4-0178	PFPeS	0.0059	ug/L	0.0040	01/31/24 15:44	
ENV-SOP-MIN4-0178	PFHxS	0.058	ug/L	0.0039	01/31/24 15:44	
ENV-SOP-MIN4-0178	PFOS	0.14	ug/L	0.0040	01/31/24 15:44	
10681218004	**MEWI-SW-SEEP08-0-20240111**					
ENV-SOP-MIN4-0178	PFBS	0.0071	ug/L	0.0018	01/31/24 15:52	
ENV-SOP-MIN4-0178	PFHxA	0.0024	ug/L	0.0020	01/31/24 15:52	
ENV-SOP-MIN4-0178	PFBA	0.017	ug/L	0.0020	01/31/24 15:52	
ENV-SOP-MIN4-0178	PFPeS	0.0061	ug/L	0.0019	01/31/24 15:52	
ENV-SOP-MIN4-0178	PFHxS	0.12	ug/L	0.0018	01/31/24 15:52	
ENV-SOP-MIN4-0178	PFOS	0.024	ug/L	0.0019	01/31/24 15:52	
ENV-SOP-MIN4-0178	PFOA	0.013	ug/L	0.0020	01/31/24 15:52	
10681218005	**MEWI-SW-CREEK01-0-20240111**					
ENV-SOP-MIN4-0178	PFBS	0.0048	ug/L	0.0018	01/31/24 15:59	
ENV-SOP-MIN4-0178	PFHxA	0.0050	ug/L	0.0020	01/31/24 15:59	
ENV-SOP-MIN4-0178	PFBA	0.0095	ug/L	0.0020	01/31/24 15:59	
ENV-SOP-MIN4-0178	PFPeS	0.0060	ug/L	0.0019	01/31/24 15:59	
ENV-SOP-MIN4-0178	PFHxS	0.074	ug/L	0.0018	01/31/24 15:59	
ENV-SOP-MIN4-0178	PFOS	0.033	ug/L	0.0018	01/31/24 15:59	
ENV-SOP-MIN4-0178	PFOA	0.0058	ug/L	0.0020	01/31/24 15:59	
10681218006	**MEWI-SW-CREEK02-0-20240111**					
ENV-SOP-MIN4-0178	PFBS	0.0052	ug/L	0.0018	01/31/24 16:06	
ENV-SOP-MIN4-0178	PFHxA	0.0045	ug/L	0.0020	01/31/24 16:06	
ENV-SOP-MIN4-0178	PFBA	0.010	ug/L	0.0020	01/31/24 16:06	
ENV-SOP-MIN4-0178	PFPeS	0.0055	ug/L	0.0019	01/31/24 16:06	
ENV-SOP-MIN4-0178	PFHxS	0.045	ug/L	0.0018	01/31/24 16:06	
ENV-SOP-MIN4-0178	PFOS	0.017	ug/L	0.0018	01/31/24 16:06	
ENV-SOP-MIN4-0178	PFOA	0.0027	ug/L	0.0020	01/31/24 16:06	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SUMMARY OF DETECTION

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10681218007	**MEWI-SW-CREEK03-0-20240111**					
ENV-SOP-MIN4-0178	PFBS	0.0094	ug/L	0.0018	01/31/24 16:13	
ENV-SOP-MIN4-0178	PFHxA	0.0021	ug/L	0.0020	01/31/24 16:13	
ENV-SOP-MIN4-0178	PFBA	0.0093	ug/L	0.0020	01/31/24 16:13	
ENV-SOP-MIN4-0178	PFPeA	0.0022	ug/L	0.0020	01/31/24 16:13	
ENV-SOP-MIN4-0178	PFPeS	0.0026	ug/L	0.0019	01/31/24 16:13	
ENV-SOP-MIN4-0178	PFHxS	0.087	ug/L	0.0018	01/31/24 16:13	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
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PROJECT NARRATIVE

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Date: March 22, 2024

The quality system for Pace Analytical Services, LLC in Minneapolis, MN (Pace-MN) has been audited and was found to be in conformance with ISO/IEC 17025:2017 by an independent assessment (A2LA Certificate # 2926). The PFAS test results in non-drinking water for this project are not covered by this accreditation.

Pace-MN maintains accreditation with the state of Wisconsin for their isotope dilution analysis as defined in ENV-SOP-MIN4-0178 under certificate number999407970. All of the test results for this project are covered by the Wisconsin accreditation.

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PROJECT NARRATIVE

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Method: **ENV-SOP-MIN4-0178**
Description: WI ID NPW
Client: 3M Environmental
Date: March 22, 2024

General Information:
7 samples were analyzed for ENV-SOP-MIN4-0178 by Pace Analytical Services Minneapolis. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with ENV-SOP-MIN4-0178 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

QC Batch: 928777

S0: Surrogate recovery outside laboratory control limits.

- BLANK (Lab ID: 4874459)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
- MEWI-SW-CREEK03-0-20240111 (Lab ID: 10681218007)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
- MEWI-SW-SEEP03-0-20240111 (Lab ID: 10681218002)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
- MEWI-SW-SEEP05-0-20240111 (Lab ID: 10681218003)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

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PROJECT NARRATIVE

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Method: **ENV-SOP-MIN4-0178**
Description: WI ID NPW
Client: 3M Environmental
Date: March 22, 2024

QC Batch: 928777

R1: RPD value was outside control limits.
- LCSD (Lab ID: 4874461)
  - PFOS

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: 928777

C0: Result confirmed by second analysis.
- BLANK (Lab ID: 4874459)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)
- MEWI-SW-CREEK03-0-20240111 (Lab ID: 10681218007)
  - d3-NMeFOSA (S)
  - d5-NEtFOSA (S)

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-SEEP01-0-20240111 **Lab ID: 10681218001** Collected: 01/11/24 10:00 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 115.217 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
11Cl-PF3OUdS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:30	763051-92-9	
4:2 FTS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:30	757124-72-4	
6:2 FTS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:30	27619-97-2	
8:2 FTS	ND	ug/L	0.0042	1	01/29/24 10:26	01/31/24 15:30	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0040	1	01/29/24 10:26	01/31/24 15:30	756426-58-1	
ADONA	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:30	919005-14-4	
HFPO-DA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	13252-13-6	
NEtFOSAA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	2991-50-6	
NEtFOSA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	4151-50-2	
NEtFOSE	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	1691-99-2	
NMeFOSAA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	2355-31-9	
NMeFOSA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	31506-32-8	
NMeFOSE	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	24448-09-7	
PFBS	**0.010**	ug/L	0.0038	1	01/29/24 10:26	01/31/24 15:30	375-73-5	
PFDA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	335-76-2	
PFHxA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	307-24-4	
PFBA	**0.0098**	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	375-22-4	
PFDS	ND	ug/L	0.0042	1	01/29/24 10:26	01/31/24 15:30	335-77-3	
PFDoS	ND	ug/L	0.0042	1	01/29/24 10:26	01/31/24 15:30	79780-39-5	
PFHpS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:30	375-92-8	
PFNS	ND	ug/L	0.0042	1	01/29/24 10:26	01/31/24 15:30	68259-12-1	
PFOSA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	754-91-6	
PFPeA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	2706-90-3	
PFPeS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:30	2706-91-4	
PFDoA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	307-55-1	
PFHpA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	375-85-9	
PFHxS	**0.098**	ug/L	0.0039	1	01/29/24 10:26	01/31/24 15:30	355-46-4	
PFNA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	375-95-1	
PFOS	ND	ug/L	0.0040	1	01/29/24 10:26	01/31/24 15:30	1763-23-1	
PFOA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	335-67-1	
PFTeDA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	376-06-7	
PFTrDA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	72629-94-8	
PFUnA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:30	2058-94-8	
Surrogates								
13C4-PFBA (S)	93	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	375-22-4	
13C5-PFPeA (S)	94	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	2706-90-3	
13C3-PFBS (S)	90	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	375-73-5	
13C24:2FTS (S)	41	%.	25-150	1	01/29/24 10:26	01/31/24 15:30		
13C3HFPO-DA (S)	81	%.	25-150	1	01/29/24 10:26	01/31/24 15:30		
13C4-PFHpA (S)	85	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	375-85-9	
13C3-PFHxS (S)	86	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	355-46-4	
13C26:2FTS (S)	92	%.	25-150	1	01/29/24 10:26	01/31/24 15:30		
13C8-PFOA (S)	94	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	335-67-1	
13C8-PFOS (S)	90	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
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ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-SEEP01-0-20240111 **Lab ID: 10681218001** Collected: 01/11/24 10:00 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 115.217 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
Surrogates								
13C9-PFNA (S)	90	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	375-95-1	
13C6-PFDA (S)	85	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	335-76-2	
13C28:2FTS (S)	46	%.	25-150	1	01/29/24 10:26	01/31/24 15:30		
d3-MeFOSAA (S)	61	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	2355-31-9	
13C7-PFUdA (S)	76	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	2058-94-8	
13C8-PFOSA (S)	72	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	754-91-6	
d5-EtFOSAA (S)	55	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	2991-50-6	
13C2-PFDoA (S)	78	%.	25-150	1	01/29/24 10:26	01/31/24 15:30		
d3-NMeFOSA (S)	46	%.	10-150	1	01/29/24 10:26	01/31/24 15:30	31506-32-8	
d7-NMeFOSE (S)	67	%.	10-150	1	01/29/24 10:26	01/31/24 15:30	24448-09-7	
13C2-PFTA (S)	72	%.	25-150	1	01/29/24 10:26	01/31/24 15:30		
d9-NEtFOSE (S)	64	%.	10-150	1	01/29/24 10:26	01/31/24 15:30	1691-99-2	
d5-NEtFOSA (S)	46	%.	10-150	1	01/29/24 10:26	01/31/24 15:30	4151-50-2	
13C5-PFHxA (S)	94	%.	25-150	1	01/29/24 10:26	01/31/24 15:30	307-24-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-SEEP03-0-20240111 **Lab ID: 10681218002** Collected: 01/11/24 10:10 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 114.051 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
11Cl-PF3OUdS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:37	763051-92-9	
4:2 FTS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:37	757124-72-4	
6:2 FTS	ND	ug/L	0.0042	1	01/29/24 10:26	01/31/24 15:37	27619-97-2	
8:2 FTS	ND	ug/L	0.0042	1	01/29/24 10:26	01/31/24 15:37	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:37	756426-58-1	
ADONA	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:37	919005-14-4	
HFPO-DA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	13252-13-6	
NEtFOSAA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	2991-50-6	
NEtFOSA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	4151-50-2	
NEtFOSE	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	1691-99-2	
NMeFOSAA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	2355-31-9	
NMeFOSA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	31506-32-8	
NMeFOSE	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	24448-09-7	
PFBS	**0.014**	ug/L	0.0039	1	01/29/24 10:26	01/31/24 15:37	375-73-5	
PFDA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	335-76-2	
PFHxA	**0.021**	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	307-24-4	
PFBA	**0.032**	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	375-22-4	
PFDS	ND	ug/L	0.0042	1	01/29/24 10:26	01/31/24 15:37	335-77-3	
PFDoS	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:37	79780-39-5	
PFHpS	**0.018**	ug/L	0.0042	1	01/29/24 10:26	01/31/24 15:37	375-92-8	
PFNS	ND	ug/L	0.0042	1	01/29/24 10:26	01/31/24 15:37	68259-12-1	
PFOSA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	754-91-6	
PFPeA	**0.011**	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	2706-90-3	
PFPeS	**0.024**	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:37	2706-91-4	
PFDoA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	307-55-1	
PFHpA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	375-85-9	
PFHxS	**0.66**	ug/L	0.040	10	01/29/24 10:26	01/31/24 12:41	355-46-4	
PFNA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	375-95-1	
PFOS	**0.25**	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:37	1763-23-1	
PFOA	**0.026**	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	335-67-1	
PFTeDA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	376-06-7	
PFTrDA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	72629-94-8	
PFUnA	ND	ug/L	0.0044	1	01/29/24 10:26	01/31/24 15:37	2058-94-8	
Surrogates								
13C4-PFBA (S)	93	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	375-22-4	
13C5-PFPeA (S)	93	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	2706-90-3	
13C3-PFBS (S)	92	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	375-73-5	
13C24:2FTS (S)	45	%.	25-150	1	01/29/24 10:26	01/31/24 15:37		
13C3HFPO-DA (S)	83	%.	25-150	1	01/29/24 10:26	01/31/24 15:37		
13C4-PFHpA (S)	87	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	375-85-9	
13C3-PFHxS (S)	85	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	355-46-4	
13C26:2FTS (S)	80	%.	25-150	1	01/29/24 10:26	01/31/24 15:37		
13C8-PFOA (S)	98	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	335-67-1	
13C8-PFOS (S)	95	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-SEEP03-0-20240111 **Lab ID: 10681218002** Collected: 01/11/24 10:10 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 114.051 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
Surrogates								
13C9-PFNA (S)	89	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	375-95-1	
13C6-PFDA (S)	93	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	335-76-2	
13C28:2FTS (S)	53	%.	25-150	1	01/29/24 10:26	01/31/24 15:37		
d3-MeFOSAA (S)	60	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	2355-31-9	
13C7-PFUdA (S)	84	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	2058-94-8	
13C8-PFOSA (S)	66	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	754-91-6	
d5-EtFOSAA (S)	59	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	2991-50-6	
13C2-PFDoA (S)	88	%.	25-150	1	01/29/24 10:26	01/31/24 15:37		
d3-NMeFOSA (S)	0	%.	10-150	1	01/29/24 10:26	01/31/24 15:37	31506-32-8	S0
d7-NMeFOSE (S)	26	%.	10-150	1	01/29/24 10:26	01/31/24 15:37	24448-09-7	
13C2-PFTA (S)	78	%.	25-150	1	01/29/24 10:26	01/31/24 15:37		
d9-NEtFOSE (S)	23	%.	10-150	1	01/29/24 10:26	01/31/24 15:37	1691-99-2	
d5-NEtFOSA (S)	0	%.	10-150	1	01/29/24 10:26	01/31/24 15:37	4151-50-2	S0
13C5-PFHxA (S)	93	%.	25-150	1	01/29/24 10:26	01/31/24 15:37	307-24-4	

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ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-SEEP05-0-20240111 **Lab ID: 10681218003** Collected: 01/11/24 10:25 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 116.629 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
11Cl-PF3OUdS	ND	ug/L	0.0040	1	01/29/24 10:26	01/31/24 15:44	763051-92-9	
4:2 FTS	ND	ug/L	0.0040	1	01/29/24 10:26	01/31/24 15:44	757124-72-4	
6:2 FTS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:44	27619-97-2	
8:2 FTS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:44	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0040	1	01/29/24 10:26	01/31/24 15:44	756426-58-1	
ADONA	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:44	919005-14-4	
HFPO-DA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	13252-13-6	
NEtFOSAA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	2991-50-6	
NEtFOSA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	4151-50-2	
NEtFOSE	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	1691-99-2	
NMeFOSAA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	2355-31-9	
NMeFOSA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	31506-32-8	
NMeFOSE	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	24448-09-7	
PFBS	**0.0098**	ug/L	0.0038	1	01/29/24 10:26	01/31/24 15:44	375-73-5	
PFDA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	335-76-2	
PFHxA	**0.0073**	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	307-24-4	
PFBA	**0.010**	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	375-22-4	
PFDS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:44	335-77-3	
PFDoS	ND	ug/L	0.0042	1	01/29/24 10:26	01/31/24 15:44	79780-39-5	
PFHpS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:44	375-92-8	
PFNS	ND	ug/L	0.0041	1	01/29/24 10:26	01/31/24 15:44	68259-12-1	
PFOSA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	754-91-6	
PFPeA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	2706-90-3	
PFPeS	**0.0059**	ug/L	0.0040	1	01/29/24 10:26	01/31/24 15:44	2706-91-4	
PFDoA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	307-55-1	
PFHpA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	375-85-9	
PFHxS	**0.058**	ug/L	0.0039	1	01/29/24 10:26	01/31/24 15:44	355-46-4	
PFNA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	375-95-1	
PFOS	**0.14**	ug/L	0.0040	1	01/29/24 10:26	01/31/24 15:44	1763-23-1	
PFOA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	335-67-1	
PFTeDA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	376-06-7	
PFTrDA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	72629-94-8	
PFUnA	ND	ug/L	0.0043	1	01/29/24 10:26	01/31/24 15:44	2058-94-8	
Surrogates								
13C4-PFBA (S)	97	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	375-22-4	
13C5-PFPeA (S)	98	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	2706-90-3	
13C3-PFBS (S)	97	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	375-73-5	
13C24:2FTS (S)	43	%.	25-150	1	01/29/24 10:26	01/31/24 15:44		
13C3HFPO-DA (S)	87	%.	25-150	1	01/29/24 10:26	01/31/24 15:44		
13C4-PFHpA (S)	93	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	375-85-9	
13C3-PFHxS (S)	96	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	355-46-4	
13C26:2FTS (S)	97	%.	25-150	1	01/29/24 10:26	01/31/24 15:44		
13C8-PFOA (S)	102	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	335-67-1	
13C8-PFOS (S)	100	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-SEEP05-0-20240111 **Lab ID: 10681218003** Collected: 01/11/24 10:25 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 116.629 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
Surrogates								
13C9-PFNA (S)	95	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	375-95-1	
13C6-PFDA (S)	96	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	335-76-2	
13C28:2FTS (S)	59	%.	25-150	1	01/29/24 10:26	01/31/24 15:44		
d3-MeFOSAA (S)	67	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	2355-31-9	
13C7-PFUdA (S)	91	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	2058-94-8	
13C8-PFOSA (S)	67	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	754-91-6	
d5-EtFOSAA (S)	63	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	2991-50-6	
13C2-PFDoA (S)	91	%.	25-150	1	01/29/24 10:26	01/31/24 15:44		
d3-NMeFOSA (S)	1	%.	10-150	1	01/29/24 10:26	01/31/24 15:44	31506-32-8	S0
d7-NMeFOSE (S)	35	%.	10-150	1	01/29/24 10:26	01/31/24 15:44	24448-09-7	
13C2-PFTA (S)	90	%.	25-150	1	01/29/24 10:26	01/31/24 15:44		
d9-NEtFOSE (S)	31	%.	10-150	1	01/29/24 10:26	01/31/24 15:44	1691-99-2	
d5-NEtFOSA (S)	1	%.	10-150	1	01/29/24 10:26	01/31/24 15:44	4151-50-2	S0
13C5-PFHxA (S)	97	%.	25-150	1	01/29/24 10:26	01/31/24 15:44	307-24-4	

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ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-SEEP08-0-20240111 **Lab ID: 10681218004** Collected: 01/11/24 10:40 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 249.213 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
11Cl-PF3OUdS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:52	763051-92-9	
4:2 FTS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:52	757124-72-4	
6:2 FTS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:52	27619-97-2	
8:2 FTS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:52	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:52	756426-58-1	
ADONA	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:52	919005-14-4	
HFPO-DA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	13252-13-6	
NEtFOSAA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	2991-50-6	
NEtFOSA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	4151-50-2	
NEtFOSE	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	1691-99-2	
NMeFOSAA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	2355-31-9	
NMeFOSA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	31506-32-8	
NMeFOSE	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	24448-09-7	
PFBS	**0.0071**	ug/L	0.0018	1	01/29/24 10:26	01/31/24 15:52	375-73-5	
PFDA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	335-76-2	
PFHxA	**0.0024**	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	307-24-4	
PFBA	**0.017**	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	375-22-4	
PFDS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:52	335-77-3	
PFDoS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:52	79780-39-5	
PFHpS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:52	375-92-8	
PFNS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:52	68259-12-1	
PFOSA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	754-91-6	
PFPeA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	2706-90-3	
PFPeS	**0.0061**	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:52	2706-91-4	
PFDoA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	307-55-1	
PFHpA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	375-85-9	
PFHxS	**0.12**	ug/L	0.0018	1	01/29/24 10:26	01/31/24 15:52	355-46-4	
PFNA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	375-95-1	
PFOS	**0.024**	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:52	1763-23-1	
PFOA	**0.013**	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	335-67-1	
PFTeDA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	376-06-7	
PFTrDA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	72629-94-8	
PFUnA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:52	2058-94-8	
Surrogates								
13C4-PFBA (S)	77	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	375-22-4	
13C5-PFPeA (S)	89	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	2706-90-3	
13C3-PFBS (S)	89	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	375-73-5	
13C24:2FTS (S)	50	%.	25-150	1	01/29/24 10:26	01/31/24 15:52		
13C3HFPO-DA (S)	76	%.	25-150	1	01/29/24 10:26	01/31/24 15:52		
13C4-PFHpA (S)	85	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	375-85-9	
13C3-PFHxS (S)	87	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	355-46-4	
13C26:2FTS (S)	83	%.	25-150	1	01/29/24 10:26	01/31/24 15:52		
13C8-PFOA (S)	93	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	335-67-1	
13C8-PFOS (S)	95	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-SEEP08-0-20240111 **Lab ID: 10681218004** Collected: 01/11/24 10:40 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 249.213 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
Surrogates								
13C9-PFNA (S)	94	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	375-95-1	
13C6-PFDA (S)	92	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	335-76-2	
13C28:2FTS (S)	57	%.	25-150	1	01/29/24 10:26	01/31/24 15:52		
d3-MeFOSAA (S)	68	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	2355-31-9	
13C7-PFUdA (S)	84	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	2058-94-8	
13C8-PFOSA (S)	72	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	754-91-6	
d5-EtFOSAA (S)	61	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	2991-50-6	
13C2-PFDoA (S)	87	%.	25-150	1	01/29/24 10:26	01/31/24 15:52		
d3-NMeFOSA (S)	45	%.	10-150	1	01/29/24 10:26	01/31/24 15:52	31506-32-8	
d7-NMeFOSE (S)	66	%.	10-150	1	01/29/24 10:26	01/31/24 15:52	24448-09-7	
13C2-PFTA (S)	72	%.	25-150	1	01/29/24 10:26	01/31/24 15:52		
d9-NEtFOSE (S)	65	%.	10-150	1	01/29/24 10:26	01/31/24 15:52	1691-99-2	
d5-NEtFOSA (S)	45	%.	10-150	1	01/29/24 10:26	01/31/24 15:52	4151-50-2	
13C5-PFHxA (S)	90	%.	25-150	1	01/29/24 10:26	01/31/24 15:52	307-24-4	

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ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-CREEK01-0-20240111 **Lab ID: 10681218005** Collected: 01/11/24 09:50 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 251.51 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
11Cl-PF3OUdS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:59	763051-92-9	
4:2 FTS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:59	757124-72-4	
6:2 FTS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:59	27619-97-2	
8:2 FTS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:59	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0018	1	01/29/24 10:26	01/31/24 15:59	756426-58-1	
ADONA	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:59	919005-14-4	
HFPO-DA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	13252-13-6	
NEtFOSAA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	2991-50-6	
NEtFOSA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	4151-50-2	
NEtFOSE	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	1691-99-2	
NMeFOSAA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	2355-31-9	
NMeFOSA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	31506-32-8	
NMeFOSE	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	24448-09-7	
PFBS	**0.0048**	ug/L	0.0018	1	01/29/24 10:26	01/31/24 15:59	375-73-5	
PFDA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	335-76-2	
PFHxA	**0.0050**	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	307-24-4	
PFBA	**0.0095**	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	375-22-4	
PFDS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:59	335-77-3	
PFDoS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:59	79780-39-5	
PFHpS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:59	375-92-8	
PFNS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:59	68259-12-1	
PFOSA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	754-91-6	
PFPeA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	2706-90-3	
PFPeS	**0.0060**	ug/L	0.0019	1	01/29/24 10:26	01/31/24 15:59	2706-91-4	
PFDoA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	307-55-1	
PFHpA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	375-85-9	
PFHxS	**0.074**	ug/L	0.0018	1	01/29/24 10:26	01/31/24 15:59	355-46-4	
PFNA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	375-95-1	
PFOS	**0.033**	ug/L	0.0018	1	01/29/24 10:26	01/31/24 15:59	1763-23-1	
PFOA	**0.0058**	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	335-67-1	
PFTeDA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	376-06-7	
PFTrDA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	72629-94-8	
PFUnA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 15:59	2058-94-8	
Surrogates								
13C4-PFBA (S)	86	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	375-22-4	
13C5-PFPeA (S)	90	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	2706-90-3	
13C3-PFBS (S)	90	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	375-73-5	
13C24:2FTS (S)	55	%.	25-150	1	01/29/24 10:26	01/31/24 15:59		
13C3HFPO-DA (S)	78	%.	25-150	1	01/29/24 10:26	01/31/24 15:59		
13C4-PFHpA (S)	88	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	375-85-9	
13C3-PFHxS (S)	90	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	355-46-4	
13C26:2FTS (S)	83	%.	25-150	1	01/29/24 10:26	01/31/24 15:59		
13C8-PFOA (S)	95	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	335-67-1	
13C8-PFOS (S)	98	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-CREEK01-0-20240111 **Lab ID: 10681218005** Collected: 01/11/24 09:50 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 251.51 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
Surrogates								
13C9-PFNA (S)	99	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	375-95-1	
13C6-PFDA (S)	102	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	335-76-2	
13C28:2FTS (S)	65	%.	25-150	1	01/29/24 10:26	01/31/24 15:59		
d3-MeFOSAA (S)	69	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	2355-31-9	
13C7-PFUdA (S)	90	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	2058-94-8	
13C8-PFOSA (S)	77	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	754-91-6	
d5-EtFOSAA (S)	66	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	2991-50-6	
13C2-PFDoA (S)	90	%.	25-150	1	01/29/24 10:26	01/31/24 15:59		
d3-NMeFOSA (S)	52	%.	10-150	1	01/29/24 10:26	01/31/24 15:59	31506-32-8	
d7-NMeFOSE (S)	75	%.	10-150	1	01/29/24 10:26	01/31/24 15:59	24448-09-7	
13C2-PFTA (S)	83	%.	25-150	1	01/29/24 10:26	01/31/24 15:59		
d9-NEtFOSE (S)	66	%.	10-150	1	01/29/24 10:26	01/31/24 15:59	1691-99-2	
d5-NEtFOSA (S)	48	%.	10-150	1	01/29/24 10:26	01/31/24 15:59	4151-50-2	
13C5-PFHxA (S)	93	%.	25-150	1	01/29/24 10:26	01/31/24 15:59	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-CREEK02-0-20240111 **Lab ID: 10681218006** Collected: 01/11/24 10:20 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 251.081 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
11Cl-PF3OUdS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:06	763051-92-9	
4:2 FTS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:06	757124-72-4	
6:2 FTS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:06	27619-97-2	
8:2 FTS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:06	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:06	756426-58-1	
ADONA	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:06	919005-14-4	
HFPO-DA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	13252-13-6	
NEtFOSAA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	2991-50-6	
NEtFOSA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	4151-50-2	
NEtFOSE	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	1691-99-2	
NMeFOSAA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	2355-31-9	
NMeFOSA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	31506-32-8	
NMeFOSE	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	24448-09-7	
PFBS	**0.0052**	ug/L	0.0018	1	01/29/24 10:26	01/31/24 16:06	375-73-5	
PFDA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	335-76-2	
PFHxA	**0.0045**	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	307-24-4	
PFBA	**0.010**	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	375-22-4	
PFDS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:06	335-77-3	
PFDoS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:06	79780-39-5	
PFHpS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:06	375-92-8	
PFNS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:06	68259-12-1	
PFOSA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	754-91-6	
PFPeA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	2706-90-3	
PFPeS	**0.0055**	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:06	2706-91-4	
PFDoA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	307-55-1	
PFHpA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	375-85-9	
PFHxS	**0.045**	ug/L	0.0018	1	01/29/24 10:26	01/31/24 16:06	355-46-4	
PFNA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	375-95-1	
PFOS	**0.017**	ug/L	0.0018	1	01/29/24 10:26	01/31/24 16:06	1763-23-1	
PFOA	**0.0027**	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	335-67-1	
PFTeDA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	376-06-7	
PFTrDA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	72629-94-8	
PFUnA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:06	2058-94-8	
Surrogates								
13C4-PFBA (S)	87	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	375-22-4	
13C5-PFPeA (S)	93	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	2706-90-3	
13C3-PFBS (S)	92	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	375-73-5	
13C24:2FTS (S)	58	%.	25-150	1	01/29/24 10:26	01/31/24 16:06		
13C3HFPO-DA (S)	78	%.	25-150	1	01/29/24 10:26	01/31/24 16:06		
13C4-PFHpA (S)	92	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	375-85-9	
13C3-PFHxS (S)	93	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	355-46-4	
13C26:2FTS (S)	117	%.	25-150	1	01/29/24 10:26	01/31/24 16:06		
13C8-PFOA (S)	100	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	335-67-1	
13C8-PFOS (S)	102	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-CREEK02-0-20240111 **Lab ID: 10681218006** Collected: 01/11/24 10:20 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 251.081 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
Surrogates								
13C9-PFNA (S)	102	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	375-95-1	
13C6-PFDA (S)	97	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	335-76-2	
13C28:2FTS (S)	74	%.	25-150	1	01/29/24 10:26	01/31/24 16:06		
d3-MeFOSAA (S)	66	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	2355-31-9	
13C7-PFUdA (S)	91	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	2058-94-8	
13C8-PFOSA (S)	77	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	754-91-6	
d5-EtFOSAA (S)	65	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	2991-50-6	
13C2-PFDoA (S)	86	%.	25-150	1	01/29/24 10:26	01/31/24 16:06		
d3-NMeFOSA (S)	54	%.	10-150	1	01/29/24 10:26	01/31/24 16:06	31506-32-8	
d7-NMeFOSE (S)	68	%.	10-150	1	01/29/24 10:26	01/31/24 16:06	24448-09-7	
13C2-PFTA (S)	84	%.	25-150	1	01/29/24 10:26	01/31/24 16:06		
d9-NEtFOSE (S)	65	%.	10-150	1	01/29/24 10:26	01/31/24 16:06	1691-99-2	
d5-NEtFOSA (S)	53	%.	10-150	1	01/29/24 10:26	01/31/24 16:06	4151-50-2	
13C5-PFHxA (S)	96	%.	25-150	1	01/29/24 10:26	01/31/24 16:06	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-CREEK03-0-20240111 **Lab ID: 10681218007** Collected: 01/11/24 10:50 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 246.847 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
11Cl-PF3OUdS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:13	763051-92-9	
4:2 FTS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:13	757124-72-4	
6:2 FTS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:13	27619-97-2	
8:2 FTS	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	39108-34-4	
9Cl-PF3ONS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:13	756426-58-1	
ADONA	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:13	919005-14-4	
HFPO-DA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	13252-13-6	
NEtFOSAA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	2991-50-6	
NEtFOSA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	4151-50-2	
NEtFOSE	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	1691-99-2	
NMeFOSAA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	2355-31-9	
NMeFOSA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	31506-32-8	
NMeFOSE	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	24448-09-7	
PFBS	**0.0094**	ug/L	0.0018	1	01/29/24 10:26	01/31/24 16:13	375-73-5	
PFDA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	335-76-2	
PFHxA	**0.0021**	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	307-24-4	
PFBA	**0.0093**	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	375-22-4	
PFDS	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	335-77-3	
PFDoS	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	79780-39-5	
PFHpS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:13	375-92-8	
PFNS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:13	68259-12-1	
PFOSA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	754-91-6	
PFPeA	**0.0022**	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	2706-90-3	
PFPeS	**0.0026**	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:13	2706-91-4	
PFDoA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	307-55-1	
PFHpA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	375-85-9	
PFHxS	**0.087**	ug/L	0.0018	1	01/29/24 10:26	01/31/24 16:13	355-46-4	
PFNA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	375-95-1	
PFOS	ND	ug/L	0.0019	1	01/29/24 10:26	01/31/24 16:13	1763-23-1	
PFOA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	335-67-1	
PFTeDA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	376-06-7	
PFTrDA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	72629-94-8	
PFUnA	ND	ug/L	0.0020	1	01/29/24 10:26	01/31/24 16:13	2058-94-8	
Surrogates								
13C4-PFBA (S)	89	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	375-22-4	
13C5-PFPeA (S)	95	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	2706-90-3	
13C3-PFBS (S)	94	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	375-73-5	
13C24:2FTS (S)	50	%.	25-150	1	01/29/24 10:26	01/31/24 16:13		
13C3HFPO-DA (S)	82	%.	25-150	1	01/29/24 10:26	01/31/24 16:13		
13C4-PFHpA (S)	92	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	375-85-9	
13C3-PFHxS (S)	97	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	355-46-4	
13C26:2FTS (S)	94	%.	25-150	1	01/29/24 10:26	01/31/24 16:13		
13C8-PFOA (S)	99	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	335-67-1	
13C8-PFOS (S)	99	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	1763-23-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
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ANALYTICAL RESULTS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Sample: MEWI-SW-CREEK03-0-20240111 **Lab ID: 10681218007** Collected: 01/11/24 10:50 Received: 01/12/24 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WI ID NPW	Analytical Method: ENV-SOP-MIN4-0178 Preparation Method: ENV-SOP-MIN4-0178 Initial Volume/Weight: 246.847 mL Final Volume/Weight: 1 mL Pace Analytical Services - Minneapolis							
Surrogates								
13C9-PFNA (S)	103	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	375-95-1	
13C6-PFDA (S)	100	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	335-76-2	
13C28:2FTS (S)	79	%.	25-150	1	01/29/24 10:26	01/31/24 16:13		
d3-MeFOSAA (S)	72	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	2355-31-9	
13C7-PFUdA (S)	93	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	2058-94-8	
13C8-PFOSA (S)	72	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	754-91-6	
d5-EtFOSAA (S)	66	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	2991-50-6	
13C2-PFDoA (S)	87	%.	25-150	1	01/29/24 10:26	01/31/24 16:13		
d3-NMeFOSA (S)	6	%.	10-150	1	01/29/24 10:26	01/31/24 16:13	31506-32-8	C0,S0
d7-NMeFOSE (S)	34	%.	10-150	1	01/29/24 10:26	01/31/24 16:13	24448-09-7	
13C2-PFTA (S)	60	%.	25-150	1	01/29/24 10:26	01/31/24 16:13		
d9-NEtFOSE (S)	35	%.	10-150	1	01/29/24 10:26	01/31/24 16:13	1691-99-2	
d5-NEtFOSA (S)	6	%.	10-150	1	01/29/24 10:26	01/31/24 16:13	4151-50-2	C0,S0
13C5-PFHxA (S)	97	%.	25-150	1	01/29/24 10:26	01/31/24 16:13	307-24-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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QUALITY CONTROL DATA

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

QC Batch: 928777
QC Batch Method: ENV-SOP-MIN4-0178
Analysis Method: ENV-SOP-MIN4-0178
Analysis Description: WI ID NPW
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10681218001, 10681218002, 10681218003, 10681218004, 10681218005, 10681218006, 10681218007

METHOD BLANK: 4874459
Matrix: Water
Associated Lab Samples: 10681218001, 10681218002, 10681218003, 10681218004, 10681218005, 10681218006, 10681218007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
11Cl-PF3OUdS	ug/L	ND	0.0019	01/31/24 10:39	
4:2 FTS	ug/L	ND	0.0018	01/31/24 10:39	
6:2 FTS	ug/L	ND	0.0019	01/31/24 10:39	
8:2 FTS	ug/L	ND	0.0019	01/31/24 10:39	
9Cl-PF3ONS	ug/L	ND	0.0018	01/31/24 10:39	
ADONA	ug/L	ND	0.0019	01/31/24 10:39	
HFPO-DA	ug/L	ND	0.0020	01/31/24 10:39	
NEtFOSA	ug/L	ND	0.0020	01/31/24 10:39	
NEtFOSAA	ug/L	ND	0.0020	01/31/24 10:39	
NEtFOSE	ug/L	ND	0.0020	01/31/24 10:39	
NMeFOSA	ug/L	ND	0.0020	01/31/24 10:39	
NMeFOSAA	ug/L	ND	0.0020	01/31/24 10:39	
NMeFOSE	ug/L	ND	0.0020	01/31/24 10:39	
PFBA	ug/L	ND	0.0020	01/31/24 10:39	
PFBS	ug/L	ND	0.0017	01/31/24 10:39	
PFDA	ug/L	ND	0.0020	01/31/24 10:39	
PFDoA	ug/L	ND	0.0020	01/31/24 10:39	
PFDoS	ug/L	ND	0.0019	01/31/24 10:39	
PFDS	ug/L	ND	0.0019	01/31/24 10:39	
PFHpA	ug/L	ND	0.0020	01/31/24 10:39	
PFHpS	ug/L	ND	0.0019	01/31/24 10:39	
PFHxA	ug/L	ND	0.0020	01/31/24 10:39	
PFHxS	ug/L	ND	0.0018	01/31/24 10:39	
PFNA	ug/L	ND	0.0020	01/31/24 10:39	
PFNS	ug/L	ND	0.0019	01/31/24 10:39	
PFOA	ug/L	ND	0.0020	01/31/24 10:39	
PFOS	ug/L	ND	0.0018	01/31/24 10:39	
PFOSA	ug/L	ND	0.0020	01/31/24 10:39	
PFPeA	ug/L	ND	0.0020	01/31/24 10:39	
PFPeS	ug/L	ND	0.0019	01/31/24 10:39	
PFTeDA	ug/L	ND	0.0020	01/31/24 10:39	
PFTrDA	ug/L	ND	0.0020	01/31/24 10:39	
PFUnA	ug/L	ND	0.0020	01/31/24 10:39	
13C2-PFDoA (S)	%.	94	25-150	01/31/24 10:39	
13C2-PFTA (S)	%.	82	25-150	01/31/24 10:39	
13C24:2FTS (S)	%.	97	25-150	01/31/24 10:39	
13C26:2FTS (S)	%.	121	25-150	01/31/24 10:39	
13C28:2FTS (S)	%.	88	25-150	01/31/24 10:39	
13C2PFHxDA (S)	%.	64	25-150	01/31/24 10:39	
13C3-PFBS (S)	%.	98	25-150	01/31/24 10:39	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

METHOD BLANK: 4874459 Matrix: Water
Associated Lab Samples: 10681218001, 10681218002, 10681218003, 10681218004, 10681218005, 10681218006, 10681218007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
13C3-PFHxS (S)	%.	88	25-150	01/31/24 10:39	
13C3HFPO-DA (S)	%.	90	25-150	01/31/24 10:39	
13C4-PFBA (S)	%.	103	25-150	01/31/24 10:39	
13C4-PFHpA (S)	%.	94	25-150	01/31/24 10:39	
13C5-PFHxA (S)	%.	102	25-150	01/31/24 10:39	
13C5-PFPeA (S)	%.	102	25-150	01/31/24 10:39	
13C6-PFDA (S)	%.	92	25-150	01/31/24 10:39	
13C7-PFUdA (S)	%.	92	25-150	01/31/24 10:39	
13C8-PFOA (S)	%.	96	25-150	01/31/24 10:39	
13C8-PFOS (S)	%.	92	25-150	01/31/24 10:39	
13C8-PFOSA (S)	%.	72	25-150	01/31/24 10:39	
13C9-PFNA (S)	%.	93	25-150	01/31/24 10:39	
d3-MeFOSAA (S)	%.	86	25-150	01/31/24 10:39	
d3-NMeFOSA (S)	%.	1	20-150	01/31/24 10:39	C0,S0
d5-EtFOSAA (S)	%.	82	25-150	01/31/24 10:39	
d5-NEtFOSA (S)	%.	1	20-150	01/31/24 10:39	C0,S0
d7-NMeFOSE (S)	%.	37	20-150	01/31/24 10:39	
d9-NEtFOSE (S)	%.	30	20-150	01/31/24 10:39	

LABORATORY CONTROL SAMPLE & LCSD: 4874460 4874461

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
11Cl-PF3OUdS	ug/L	0.0036	0.0032	0.0029	88	81	50-150	8	30	
4:2 FTS	ug/L	0.0036	0.0034	0.0029	93	81	50-150	14	30	
6:2 FTS	ug/L	0.0037	0.0038	0.0031	105	84	50-150	22	30	
8:2 FTS	ug/L	0.0037	0.0036	0.0035	98	93	50-150	5	30	
9Cl-PF3ONS	ug/L	0.0036	0.0032	0.0030	88	83	50-150	5	30	
ADONA	ug/L	0.0036	0.0032	0.0030	88	82	50-150	6	30	
HFPO-DA	ug/L	0.0039	0.0037	0.0032	97	84	50-150	14	30	
NEtFOSA	ug/L	0.0039	0.0031	0.0029	81	76	50-150	6	30	
NEtFOSAA	ug/L	0.0039	0.0034	0.0029	87	75	50-150	14	30	
NEtFOSE	ug/L	0.0039	0.0038	0.0031	99	80	50-150	21	30	
NMeFOSA	ug/L	0.0039	0.0032	0.0033	84	86	50-150	4	30	
NMeFOSAA	ug/L	0.0039	0.0033	0.0032	87	83	50-150	5	30	
NMeFOSE	ug/L	0.0039	0.0035	0.0034	90	87	50-150	3	30	
PFBA	ug/L	0.0039	0.0038	0.0034	98	87	50-150	11	30	
PFBS	ug/L	0.0034	0.0032	0.0030	93	87	50-150	6	30	
PFDA	ug/L	0.0039	0.0036	0.0035	94	89	50-150	5	30	
PFDoA	ug/L	0.0039	0.0037	0.0033	95	85	50-150	11	30	
PFDoS	ug/L	0.0037	0.0030	0.0026	79	70	50-150	12	30	
PFDS	ug/L	0.0037	0.0030	0.0027	81	73	50-150	10	30	
PFHpA	ug/L	0.0039	0.0037	0.0034	96	89	50-150	7	30	
PFHpS	ug/L	0.0037	0.0034	0.0030	91	82	50-150	10	30	
PFHxA	ug/L	0.0039	0.0036	0.0033	94	85	50-150	9	30	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

LABORATORY CONTROL SAMPLE & LCSD: 4874460 4874461

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
PFHxS	ug/L	0.0035	0.0034	0.0030	98	84	50-150	15	30	
PFNA	ug/L	0.0039	0.0036	0.0036	94	93	50-150	0	30	
PFNS	ug/L	0.0037	0.0033	0.0033	89	90	50-150	1	30	
PFOA	ug/L	0.0039	0.0037	0.0034	96	87	50-150	9	30	
PFOS	ug/L	0.0036	0.0046	0.0031	130	86	50-150	40	30	R1
PFOSA	ug/L	0.0039	0.0040	0.0035	103	91	50-150	12	30	
PFPeA	ug/L	0.0039	0.0037	0.0034	96	87	50-150	9	30	
PFPeS	ug/L	0.0036	0.0037	0.0032	103	89	50-150	14	30	
PFTeDA	ug/L	0.0039	0.0036	0.0034	95	87	50-150	8	30	
PFTrDA	ug/L	0.0039	0.0038	0.0035	98	91	50-150	8	30	
PFUnA	ug/L	0.0039	0.0034	0.0032	89	82	50-150	7	30	
13C2-PFDoA (S)	%.				98	105	25-150			
13C2-PFTA (S)	%.				89	95	25-150			
13C24:2FTS (S)	%.				102	109	25-150			
13C26:2FTS (S)	%.				134	143	25-150			
13C28:2FTS (S)	%.				83	90	25-150			
13C2PFHxDA (S)	%.				78	86	25-150			
13C3-PFBS (S)	%.				108	108	25-150			
13C3-PFHxS (S)	%.				98	103	25-150			
13C3HFPO-DA (S)	%.				94	96	25-150			
13C4-PFBA (S)	%.				111	111	25-150			
13C4-PFHpA (S)	%.				103	105	25-150			
13C5-PFHxA (S)	%.				110	110	25-150			
13C5-PFPeA (S)	%.				110	111	25-150			
13C6-PFDA (S)	%.				99	102	25-150			
13C7-PFUdA (S)	%.				96	100	25-150			
13C8-PFOA (S)	%.				107	110	25-150			
13C8-PFOS (S)	%.				101	104	25-150			
13C8-PFOSA (S)	%.				94	97	25-150			
13C9-PFNA (S)	%.				101	104	25-150			
d3-MeFOSAA (S)	%.				90	93	25-150			
d3-NMeFOSA (S)	%.				54	47	20-150			
d5-EtFOSAA (S)	%.				87	89	25-150			
d5-NEtFOSA (S)	%.				54	45	20-150			
d7-NMeFOSE (S)	%.				104	97	20-150			
d9-NEtFOSE (S)	%.				97	101	20-150			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

WORKORDER QUALIFIERS

WO: 10681218

[1] The quality system for Pace Analytical Services, LLC in Minneapolis, MN (Pace-MN) has been audited and was found to be in conformance with ISO/IEC 17025:2017 by an independent assessment (A2LA Certificate # 2926). The PFAS test results in non-drinking water for this project are not covered by this accreditation.

Pace-MN maintains accreditation with the state of Wisconsin for their isotope dilution analysis as defined in ENV-SOP-MIN4-0178 under certificate number999407970. All of the test results for this project are covered by the Wisconsin accreditation.

ANALYTE QUALIFIERS

C0	Result confirmed by second analysis.
R1	RPD value was outside control limits.
S0	Surrogate recovery outside laboratory control limits.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: E24-0023 Menomonie SW Jan 2024-Revised Report
Pace Project No.: 10681218

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10681218001	**MEWI-SW-SEEP01-0-20240111**	ENV-SOP-MIN4-0178	928777	ENV-SOP-MIN4-0178	930041
10681218002	**MEWI-SW-SEEP03-0-20240111**	ENV-SOP-MIN4-0178	928777	ENV-SOP-MIN4-0178	930041
10681218003	**MEWI-SW-SEEP05-0-20240111**	ENV-SOP-MIN4-0178	928777	ENV-SOP-MIN4-0178	930041
10681218004	**MEWI-SW-SEEP08-0-20240111**	ENV-SOP-MIN4-0178	928777	ENV-SOP-MIN4-0178	930041
10681218005	**MEWI-SW-CREEK01-0-20240111**	ENV-SOP-MIN4-0178	928777	ENV-SOP-MIN4-0178	930041
10681218006	**MEWI-SW-CREEK02-0-20240111**	ENV-SOP-MIN4-0178	928777	ENV-SOP-MIN4-0178	930041
10681218007	**MEWI-SW-CREEK03-0-20240111**	ENV-SOP-MIN4-0178	928777	ENV-SOP-MIN4-0178	930041

3M Global EHS Laboratory

Chain of Custody / Request for Analytical

Project: E24-0023

Sample Shipping Address
Pace Analytical Services, LLC - Minneapolis

1700 Elm St SE
Minneapolis, MN 55414
Attn: Martha Hansen

Project Description: 3M Menomonie Surface Water PFAS Monitoring - January 2024

Project Requester
Chambers, Britta (MAPLEWOOD-3MUS-MN 3M CENTER)
Department: 530711 Site Source: 01J9C020
Project Created: 1/4/2024

3M Project Lead
Amanda Albrecht
Email Address: aalbrecht2@mmm.com
Phone Number: 651-736-9414

Item	3M Sample Number	Sample Description	Date/Time Sampled	Matrix	Type of Sample	Sample Comment	Number of Containers: Record each container type/preservative collected: P/NA				
1	E24-0023-001	MEWI-SW-SEEP01-0- 20240111	1/11/24 / 10:00	WS	☒ Grab ☐ Comp	PFAS	2				001
~~2~~	~~E24-0023-002~~	~~MEWI-SW-SEEP02-0-~~		WS	☐ Grab ☐ Comp						
3	E24-0023-003	MEWI-SW-SEEP03-0- 20240111	1/11/24 / 10:10	WS	☒ Grab ☐ Comp	PFAS	2				002
~~4~~	~~E24-0023-004~~	~~MEWI-SW-SEEP04-0~~		WS	☐ Grab ☐ Comp						
5	E24-0023-005	MEWI-SW-SEEP05-0- 20240111	1/11/24 / 10:25	WS	☒ Grab ☐ Comp	PFAS	2				003
~~6~~	~~E24-0023-006~~	~~MEWI-SW-SEEP06-0-~~		WS	☐ Grab ☐ Comp						
~~7~~	~~E24-0023-007~~	~~MEWI-SW-SEEP07-0-~~		WS	☐ Grab ☐ Comp						
8	E24-0023-008	MEWI-SW-SEEP08-0- 20240111	1/11/24 / 10:40	WS	☒ Grab ☐ Comp	PFAS	2				004
~~9~~	~~E24-0023-009~~	~~MEWI-SW-SEEP09-0-~~		WS	☐ Grab ☐ Comp						
10	E24-0023-010	MEWI-SW-CREEK01-0- 20240111	1/11/24 / 9:50	WS	☒ Grab ☐ Comp	PFAS	2				005
11	E24-0023-011	MEWI-SW-CREEK02-0- 20240111	1/11/24 / 10:20	WS	☒ Grab ☐ Comp	PFAS	2				006
12	E24-0023-012	MEWI-SW-CREEK03-0- 20240111	1/11/24 / 10:50	WS	☒ Grab ☐ Comp	PFAS	2				007

WO# : 10681218

10681218

Collected by (print): Connor Lawson Collector's signature: Connor Lawson

Item	Relinquished by:	Date	Time	Shipped Via	Received by:	Date	Time
	CSL	1/11	1300	FedEx			
						1-12-24	8:50

Comments

Contact EHS Lab project lead for requested tests and target analytes, if not specified.

Sample Condition Upon Receipt

Client Name: 3M Global EHS Labs

Project #: WO#: 10681218
PM: CT1 Due Date: 02/23/24
CLIENT: 3M ENV

Courier: ☑ FedEx ☐ UPS ☐ USPS ☐ Client ☐ Pace ☐ SpeeDee ☐ Commercial

Tracking Number: 784116043 4012 ☐ See Exceptions ENV-FRM-MIN4-0142

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No **Seals Intact?** ☐ Yes ☑ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other **Temp Blank?** ☐ Yes ☐ No

Thermometer: ☐ T1 (0461) ☐ T2 (0436) ☐ T3 (0459) ☑ T4 (0402) ☐ T5 (0178) ☐ T6 (0235) ☐ T7 (0042) ☐ T8 (0775) ☐ T9(0727) ☐ 01339252/1710 **Type of Ice:** ☑ Wet ☐ Blue ☐ Dry ☐ None ☐ Melted

Did Samples Originate in West Virginia? ☐ Yes ☑ No **Were All Container Temps Taken?** ☐ Yes ☐ No ☑ N/A

Temp should be above freezing to 6 °C **Cooler temp Read w/Temp Blank:** _____ °C

Correction Factor: +0.2 **Cooler Temp Corrected w/temp blank:** _____ °C

Average Corrected Temp (no temp blank only): _____ °C ☐ See Exceptions ENV-FRM-MIN4-0142 ☐ 1 Container

USDA Regulated Soil: (☑ N/A, water sample/other: _____) **Date/Initials of Person Examining Contents:** JMW 1-12-24

Did samples originate in a quarantine zone within the United States: AL, AR, AZ CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX, or VA (check maps)? ☐ Yes ☑ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☑ No

If Yes to either question, fill out a Regulated Soil Checklist (ENV-FRM-MIN4-0154) and include with SCUR/COC paperwork.

Location (Check one): ☐ Duluth ☑ Minneapolis ☐ Virginia				**COMMENTS**
Chain of Custody Present and Filled Out?	☑ Yes	☐ No		1.
Chain of Custody Relinquished?	☑ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	3.
Samples Arrived within Hold Time?	☑ Yes	☐ No		4. If fecal: ☐ <8 hrs ☐ >8 hr, <24 ☐ No
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E.coli ☐ BOD/cBOD ☐ Hex Chrom ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other _____
Rush Turn Around Time Requested?	☐ Yes	☑ No		6.
Sufficient Sample Volume?	☑ Yes	☐ No		7.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	8.
-Pace Containers Used?	☐ Yes	☑ No		
Containers Intact?	☑ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC?	☑ Yes	☐ No		11. **If no, write ID/Date/Time of container below:** ☐ See Exceptions ENV-FRM-MIN4-0142
Matrix: ☑ Water ☐ Soil ☐ Oil ☐ Other				
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO3, H2SO4, <2pH, NaOH >9 Sulfide, NaOH>10 Cyanide)	☐ Yes	☐ No	☑ N/A	☐ NaOH ☐ HNO3 ☐ H2SO4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxins/PFAS (*If adding preservative to a container, it must be added to associated field and equipment blanks--verify with PM first.)	☐ Yes	☐ No	☑ N/A	Positive for Residual Chlorine? ☐ Yes ☐ No ☐ See Exceptions ENV-FRM-MIN4-0142 **pH Paper Lot #** Residual Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in Methyl Mercury Container?	☐ Yes	☐ No	☑ N/A	13.
Extra labels present on soil VOA or WIDRO containers?	☐ Yes	☐ No	☑ N/A	14. ☐ See Exceptions ENV-FRM-MIN4-0142
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☐ No	☑ N/A	
3 Trip Blanks Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	Pace Trip Blank Lot # (if purchased): _____

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: _____ Date/Time: _____

Comments/Resolution: _____

Project Manager Review: Carolynne Trout **Date:** 1/15/24

NOTE: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e., out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled By: JMW **Line:** 3

Pace ANALYTICAL SERVICES	DC#_Title: ENV-FRM-MIN4-0142 v02_Sample Condition Upon Receipt (SCUR) Exception Form
	Effective Date: 09/22/2022

Workorder #: _____

No Temp Blank		
Read Temp	Corrected Temp	Average temp
3.4	3.6	
3.2	3.4	1.7
1.2	1.4	
1.3	1.5	

PM Notified of Out of Temp Cooler? ☐ Yes ☐ No

If yes, indicate who was contacted, date and time.
If no, indicate reason why.

_____

Multiple Cooler Project? ☐ Yes ☐ No

If anything is OVER 6.0° C, you MUST document containers in this section HERE

Tracking Number	Temperature

Out of Temp Sample ID	Container Type	# of Containers

pH Adjustment Log for Preserved Samples

Sample ID	Type Of Preserve	pH Upon Receipt	Date Adjusted	Time Adjusted	Amount Added (mL)	Lot # Added	pH After	In Compliance After Addition?		Initials
								☐ Yes	☐ No	
								☐ Yes	☐ No	
								☐ Yes	☐ No	
								☐ Yes	☐ No	
								☐ Yes	☐ No	
								☐ Yes	☐ No	
								☐ Yes	☐ No	
								☐ Yes	☐ No	

Comments:

_____

_____

_____

Appendix D
Field Standard Operating Procedures for PFAS Sampling and Other Field Activities

SOP 1

Sample Acquisition for Per- and Polyfluoroalkyl Substances (PFAS)

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes the methods and protocols to be used for collecting and handling samples to be analyzed for Per- and Polyfluoroalkyl substances (PFAS). PFAS are present in many consumer products including some typical sampling equipment and are ubiquitous in the environment. Because regulatory screening criteria are very low, measurements of very low PFAS concentrations are required. These two conditions make the collection of samples for accurate quantitation of PFAS concentrations difficult unless special precautions are taken to avoid introducing contaminants into the samples. Instructions are provided herein for collection of environmental samples without contaminating them. This SOP is designed to supplement but not replace existing sampling SOPs. In addition, some clients and/or projects may have specific PFAS-related sampling requirements that extend beyond the procedures described in this SOP.

2.0 SCOPE AND APPLICABILITY

This document provides information on proper sampling equipment and techniques for groundwater, surface water, sediment, and soil sampling for PFAS analysis. Sampling of air or biota is not addressed in this SOP, but the same principles would apply for those media.

3.0 BACKGROUND

PFAS have been used since the 1940s as manufacturer-applied oil and water repellants on products such as clothing, upholstery, paper, and carpets; and in making fluoropolymers for non- stick cookware. They are found in textiles and leather products, mist suppressants for metal plating, the photography industry, photolithography, semi-conductors, paper and packaging coatings, cleaning products, pesticides, and cosmetics. They have been used in well-known consumer products including Teflon®, StainMaster®, Scotchgard®, and GoreTex®. In the 1960s, aqueous film-forming foam (AFFF) containing PFAS was developed for fighting flammable liquid fires, particularly petroleum-fueled (Class B) fires (ATSDR, 2009). The two most researched and most prevalent PFAS in the environment are perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) (ATSDR, 2009).

PFAS are persistent in the environment, tend to bioaccumulate, and demonstrate toxicity in laboratory animals, enough to raise concerns about their presence in the environment. Some areas where PFAS may have been released to the environment include the following:

- Firefighting training areas
- Areas where firefighting products/materials are stored
- Aircraft crash sites

- Metal coating and plating facilities
- Water treatment systems and receiving water bodies
- Airport hangars and other facilities storing fire-fighting foams
- Fluorochemical manufacturing, use, and disposal facilities

PFAS are ubiquitous in consumer products and some materials used in environmental sampling (Teflon® tubing, waterproof logbooks, or GoreTex® field clothing). There are many potential sources of PFAS that are independent of media being sampled; therefore, it is essential to take special precautions to minimize the potential for contaminating environmental samples with PFAS during collection and handling. Laboratory detection limits are low for these compounds and contact of sample material or sampling equipment with any one of the multitude of PFAS sources could result in detectable contamination. In addition, PFAS tend to adsorb to glass so glass sample collection containers are inappropriate. Adsorption to glass sample containers may result in a low bias for measured PFAS concentrations.

Collection and analysis of Quality Control blanks is an important aspect of verifying that samples have not been contaminated during sample collection and handling. Use of additional blanks or blanks of a different type than usual may be required. Consult Section 7.7 of this SOP for instructions regarding collection of field reagent blanks (FRBs).

4.0 DEFINITIONS AND ABBREVIATIONS

AFFF – Aqueous film-forming foam.

FRB – Field Reagent Blank. A blank sample prepared in the field by transferring laboratory- supplied, chemically-preserved deionized water to an empty, laboratory-supplied collection bottle. FRBs are typically analyzed only for PFAS and are treated as a site sample in all respects, including shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all PFAS analytical procedures. The purpose of FRBs is to indicate whether PFAS measured in corresponding site samples may have been introduced during sample collection and handling.

PFAS – Per- and polyfluoroalkyl Substances. A reference term currently in use, replacing “PFCs” in recent scientific and other technical literature. The term is inclusive of both perfluorinated chemicals like PFOA and PFOS and polyfluoroalkyl substances like fluorinated telomers.

PFOA – Perfluorooctanoic Acid. PFOA is used as an aqueous dispersion agent and in the manufacture of fluoropolymers (including Teflon®) that are used in industrial components such as electrical wire casings, fire- and chemical-resistant tubing, and plumbing seal tape. PFOA is used in surface treatment products to impart oil, stain, grease, and water resistance. PFOA can also be produced by the breakdown

of some fluorinated telomers.

PFOS – Perfluorooctane Sulfonate. PFOS was a key ingredient in Scotchgard® and used in the manufacture of Class B AFFF used per DoD military specifications.

5.0 SAFETY PRECAUTIONS

Sample acquisition activities shall be conducted in accordance health and safety requirements identified in the project-specific Health and Safety Plan (HASP), corporate health and safety policies, and individual sampling SOPs, as applicable.

6.0 PERSONNEL RESPONSIBILITIES, QUALIFICATIONS, AND TRAINING

Project Manager (PM) – The PM is responsible for determining sampling objectives, initial sampling locations, and field procedures used in the collection of samples of environmental media. Additionally, in consultation with other project personnel (geologist, hydrogeologist, etc.), the PM is responsible for selecting and detailing the specific sampling techniques, equipment to be used, and providing detailed input in this regard to the project planning documents. The PM has the overall responsibility for ensuring that sampling activities are properly conducted by appropriately trained staff.

Site Safety Officer (SSO) – The SSO (or a qualified designee) is responsible for providing the technical support necessary to implement the project HASP, AP or equivalent. The SSO or SSO designee may also be required to advise the Field Operations Leader (FOL) on safety-related matters regarding sampling, such as measures to mitigate potential hazards from hazardous objects or conditions. The SSO may be referred to as the Site Safety and Health Officer (SSHO).

Project Geologist/Sampler – The project geologist/sampler is responsible for the proper acquisition of samples in accordance with this SOP or other project-specific documents. In addition, this individual is responsible for the completion of all required paperwork (e.g., sample log sheets, field notebook, boring logs, container labels, custody seals, and chain-of-custody forms) associated with the collection of those samples.

Field Operations Leader (FOL) – This individual is primarily responsible for the execution of the field sampling program in accordance with the project planning documents. This is accomplished through management of a field sampling team for the proper acquisition of samples.

General personnel qualifications for environmental media sample collection include the following:

- Occupational Safety and Health Administration (OSHA) 40-hour HAZWOPER and applicable refresher training.

- Ability to perform field work under the expected physical and environmental (i.e., weather) conditions
- Familiarity with appropriate procedures for sample documentation, handling, packaging, and shipping
- Familiarity with chemical-specific requirements for collection and handling of samples for PFAS analysis as described in this procedure.
- Personnel implementing this SOP must read and understand this SOP prior to collection of samples designated for PFAS analysis.

7.0 PROCEDURES

All personnel involved in sample acquisition must strive to prevent contact of sample media with potential sources of PFAS contamination. Given the widespread use of PFAS in products including those typically preferred for environmental sampling, all samples for PFAS analysis are to be collected using precautions to avoid inadvertent contamination of the sample media. These precautions are identified below for selection of sampling equipment and general field equipment, field personnel clothing and protective gear, sample containers and sample handling activities.

7.1 Selection Of Equipment

It is important to research available equipment and materials at the planning stage to avoid last minute problems in the field; for example, ensuring compatibility of high-density polyethylene (HDPE) tubing with fittings for use in a peristaltic or other pump; or ensuring that equipment does not contain Teflon®.

Sampling Equipment:

- Avoid using any sampling equipment constructed of or containing polytetrafluoroethylene (PTFE) or Teflon® (DuPont brand name) or fluorinated ethylene propylene (FEP) during sample handling or mobilization/demobilization.
- Avoid using low-density polyethylene products (LDPE) if contamination from those products can be transferred to environmental samples or QC samples.
- Use sampling equipment made of stainless steel, acetate, silicone, high-density polyethylene (HDPE), or polypropylene. This applies to tubing, pumps and pump components, tape for plumbing fittings, trowels, mixing bowls or other equipment that could contact the sample media. Gasket and O-ring components of sampling equipment may contain fluoropolymers.

Non-Sampling Field Equipment:

- Avoid using waterproof field books or paper during sampling activities. Non-waterproof loose-leaf paper or notebooks are acceptable. Do not use plastic clipboards, binders, or spiral hard cover notebooks that may be coated; use Masonite or aluminum clipboards instead.
- Avoid using Post-it® notes or similar removable notes during sample handling or mobilization/demobilization activities.
- Avoid using Sharpies® or similar indelible markers; do use ball-point pens or pencils for note taking and sample bottle labeling.

Field Personnel Clothing and Protective Gear:

- Avoid wearing new clothing due to the possible treating of fabric with PFAS for stain resistance. Wear clothing made from natural fibers (e.g., cotton) to the extent possible. Clothing should have been washed at least several times between time of purchase and time of first use during sampling activities. Avoid using fabric softener when laundering clothing to be worn during sample collection.
- During wet weather, use rain gear made from polyurethane or wax-coated materials.
- Avoid wearing water-resistant (e.g., Gore-Tex® or similar material) clothing or footwear (i.e., boots) immediately prior to or during sample collection and management.
- Avoid wearing cosmetics, shampoos, moisturizers, or other similar personal hygiene products on the day of sampling.
- Use sunscreens and insect repellants with 100% natural ingredients. The following items are acceptable for use, but the suitability of these items has not been independently verified:
    - Sunscreens - Alba Organics Natural Sunscreen, Yes To Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss my face, Baby sunscreens that are “free” or “natural.”
    - Insect Repellents - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, BabyGanics
    - Sunscreen and insect repellant - Avon Skin So Soft Bug Guard Plus – SPF 30 Lotion
- Avoid wearing Tyvek® suits.
- Wear un-powdered nitrile gloves at all times while collecting and handling samples and change gloves often.

- Avoid unnecessary contact with automobile upholstery that may have been treated with PFAS. If practical, cover clothing and skin that has been in contact with such upholstery within non-fluorinated clothing.

Sample Containers and Shipping Materials

- Avoid the use of glass sample containers, which are believed to result in loss of PFAS from samples through adsorption to the container.
- Collect samples in laboratory-supplied plastic bottles only, typically polypropylene or HDPE.
- Confirm that Teflon®-lined caps are not used in sample containers; unlined polypropylene screw caps must be used.
- Avoid using Blue Ice® or similar items to cool samples and avoid placing such items in sample coolers for shipping. Use commercially available (e.g., from convenience stores or supermarkets) double-bagged ice instead.

7.2 Other Precautions for Sample Handling

- Avoid handling or bringing pre-wrapped food or snacks (e.g., fast food, candy bars, microwave popcorn, etc.) into the sampling area before or during sampling, because many food and snack products are packaged in wrappers treated with PFAS. Only water or hydrating drinks (e.g., Gatorade) should be brought onsite or allowed in vehicles used for PFAS sampling activities.
- Wash hands thoroughly after handling fast food, carryout food, or snacks, or other items that may contain PFAS.
- Assume that shipping tape used for securing coolers could contain PFAS; therefore, take care not to transfer PFAS from tape to samples.

These precautions should be observed during sampling activities, especially during water sample collection (groundwater and surface water), given the high solubility of PFAS in water. Examples of how these precautions may be applied to sampling of specific media are provided in the following sections.

7.3 Groundwater Sample Acquisition

The precautions and requirements identified in the previous sections must be observed for groundwater sampling. Do not proceed any further without reviewing each of those precautions and requirements.

- Collect groundwater samples for PFAS analyses in accordance with this SOP, and/or project- or client-specific requirements.

- If non-dedicated, non-disposable equipment is used between sampling locations, it should be decontaminated with Alconox® or Liquinox®, unless 1,4-dioxane (a potential component of these detergents) is also a contaminant of concern. In that case Liquinox® should not be used. Products such as Decon 90 should not be used.
- If samples are to be collected for analysis of PFAS and other analytes, determine whether the same equipment can be used for all sample analyses. If Teflon® or LDPE materials are required for the non-PFAS analytes, then use multiple sets of equipment and determine a suitable sample collection sequence and protocol for collecting the groundwater samples for the analyte groups of interest. For example, purge and sample a monitoring well for PFAS first using a peristaltic pump with HDPE and silicone tubing. Then use a bladder pump with Teflon® tape on air-line fittings to purge the well and sample for VOCs with Teflon tubing, if the VOC protocol requires it. Or use silicone tubing for all parameters, if appropriate. Protocols and order of sampling should be clearly identified in the SAPs. If the sampling sequence is unclear, consult the FOL or Project Manager and record the actual sequence in the field notes.
- If tasked to sample monitoring wells that have or had dedicated Teflon® or FEP tubing that potentially contained PFAS, after removing the tubing, evacuate at least one well volume prior to sampling using silicone or HDPE tubing. This will ensure that standing water that was in contact with the tubing is removed from the water column prior to sampling.

7.4 Soil Sample Acquisition

The precautions and requirements identified in Sections 7.1 and 7.2 must be observed for soil sampling. Do not proceed any further without reviewing each of those precautions and requirements.

- Collect soil samples for PFAS analyses in accordance with this SOP, and/or project- or client-specific requirements.
- Soil sampling equipment should not be constructed of or contain Teflon® materials. Acceptable materials for sampling include stainless steel, acetate, or polypropylene. If non-dedicated, non-disposable equipment is used between sample locations, it should be decontaminated with Alconox® or Liquinox®.
- Collect samples in laboratory-provided containers specifically designated for PFAS analysis. Do not use glass jars typically used for soil sample collection.

7.5 Surface Water and Sediment Sample Acquisition

The precautions and requirements identified in Sections 7.1 and 7.2 must be observed for surface water

and sediment sampling. Do not proceed any further without reviewing each of those precautions and requirements.

- Collect surface water and sediment samples for PFAS analysis in accordance with this SOP, and/or project- or client-specific requirements.
- Surface water and sediment samples should be collected in laboratory-supplied bottleware specifically designated for PFAS analysis (not glass). If transfer bottles are required for collection of surface water samples, the transfer bottles used should be the same material as the containers designated for submission to the laboratory.
- Surface water and sediment sampling equipment should not be constructed of or contain Teflon® or LDPE materials. Acceptable materials for sampling include HDPE, silicone, stainless steel, acetate, or polypropylene. If non-dedicated, non-disposable equipment is used between sample locations, it should be decontaminated with Alconox® or Liquinox®.

7.6 Water Supply Sampling

This section applies to sampling from taps, spigots, faucets, or similar devices. The precautions and requirements identified in Sections 7.1 and 7.2 must be observed for water supply sampling. Do not proceed any further without reviewing each of those precautions and requirements.

- Collect water supply samples for PFAS analysis in accordance with applicable portions of this SOP, and/or project- or client-specific requirements.
- Water supply samples should be collected in laboratory-supplied bottles specifically designated for PFAS analysis (not glass).
- Ensure that sample bottles used to collect chlorinated water samples contain the proper preservative; non-chlorinated water does not require chemical preservatives designed to remove chlorine.
- Water supply sampling equipment (if needed) should not be constructed of or contain Teflon® or LDPE materials. Acceptable materials for sampling include HDPE, silicone, stainless steel, acetate, or polypropylene. If non-dedicated, non-disposable equipment is used between sample locations, it should be decontaminated with Alconox® or Liquinox®.
- Locate the sampling point. If a specific sampling point has already been designated (e.g., a kitchen tap), plan to collect the sample from that point; otherwise, identify a location in the water supply line that is as close as possible to the water's point of origination (e.g., a well or other

water source) and upstream of any local water treatment unit(s) that could affect PFAS levels (e.g., water softeners, activated carbon, or reverse osmosis treatment units). If a treatment unit is in use, a post-treatment sample may also be required in some cases, per project requirements.

Note: If treatment that could affect PFAS levels (e.g., carbon filtration or reverse osmosis) is part of the water distribution system, often a spigot will be present in the plumbing line between the water source and the treatment unit and this spigot should be used

- Remove any aerator/diffuser from the faucet, if possible. If removal is not possible, record this observation in the field notes.
- Allow the water to run freely from the tap until parameter stabilization per project-specific requirements is achieved, or as otherwise required by project-specific requirements. This will often require purging for 3 to 5 minutes.
- Reduce the water flow rate to minimize aeration of the sample. The water stream should be no wider than the diameter of a pencil.
- Fill the sample bottle (typically 250 mL) directly from the tap to the bottom of the neck of the bottle and cap the bottle immediately.
- After collecting the sample, cap the bottle and, if preservative is included, agitate by hand until the preservative is dissolved.

7.7 Field Reagent Blank Collection

Note: EPA Method 537 and modifications thereof for PFAS analysis require an FRB to be handled along with each sample set. A sample set is described as samples collected from the same sample site and at the same time, but “sample site” and “same time” are not precisely defined. Therefore, it is important to verify that the correct number of FRBs will be collected. *Collection of an FRB at every sampling point may be required.*

- Verify the number of FRBs to be collected for the project and where those samples must be collected. This should be described in the project planning documents such as work plans or sampling and analysis plans. If it is not, consult the PM.
- At the sampling site, when ready to collect an FRB, open the bottle of chemically preserved FRB reagent water provided by the laboratory and a corresponding empty bottle, also provided by the laboratory.

- Pour the preserved FRB reagent water into the empty sample bottle, close the cap, and label this filled bottle as the FRB.
- Pack and ship the FRB along with site samples and the required documentation (e.g., chain of custody form) to the laboratory.

Note: Although chain of custody forms will indicate that FRBs must be analyzed for PFAS, analysis of an FRB will be required only if site samples contain PFAS above a certain concentration. *If an FRB is analyzed and any PFAS concentration in the FRB exceeds 1/3 the laboratory MRL, then all samples collected with that FRB may be considered invalid and may require recollection and analysis* of the recollected samples*. Consult the project planning documents governing sample collection for specifics as to whether resampling is necessary. Care in collection and handling of site samples and FRBs in a way that avoids contamination cannot be overemphasized.*

SOP 2

Chain of Custody Procedures

1.0 PURPOSE

Chain-of-custody procedures are established to provide sample integrity. Sample custody protocols will be based on procedures as described in "NEIC Policies and Procedures", EPA-330/9-78-DD1-R, Revised June, 1985. This custody is in two parts: sample collection and laboratory analysis. A sample is under a person's custody if it meets the following requirements:

- It is in the person's possession;
- It is in the person's view, after being in the person's possession;
- It was in the person's possession and it was placed in a secured location; or
- It is in a designated secure area.

2.0 FIELD SPECIFIC CUSTODY PROCEDURES

The sample packaging and shipment procedures summarized below will assure that the samples will arrive at the laboratory with the chain-of-custody intact.

Field procedures are as follows:

(a) The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples.

(b) All bottles should be labeled with sample numbers and locations.

(c) Sample labels should be filled out using waterproof ink for each sample.

(d) The Project Manager should review all field activities to determine whether proper custody procedures were followed during the field work and decide if additional samples are required.

Transfer of Custody and Shipment Procedures are as follows:

(a) Samples should be accompanied by a properly completed chain-of-custody form. The sample numbers will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage area.

(b) Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and secured with strapping tape in at least two locations for shipment to the laboratory. Custody seals will be used for samples shipped to laboratories. When custody seals are used, two printed, numbered custody seals will be placed on each cooler and the numbers will also appear on the chain-of-custody forms, or two signed and dated seals will be placed on the cooler. Clear tape will be placed over the seals.

(c) Whenever samples are split with a source or government agency, a separate Sample Receipt is prepared for those samples and marked to indicate with whom the samples are being split. The person relinquishing the samples to the facility or agency should request the representative's signature acknowledging sample receipt. If the representative is unavailable or refuses, this is noted in the "Received By" space.

(d) If the samples are sent by common carrier, a bill of lading should be used. Receipts of bills of lading will be retained as part of the permanent documentation. If sent by mail, the package will be registered with return receipt requested. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler. Air bill information will be recorded on chain-of-custody forms.

SOP 3

Field Equipment Use and Calibration

1.0 PURPOSE

The purpose of this procedure is to set criteria for field equipment use and calibration.

2.0 PROCEDURE

A significant number of field activities involve usage of electronic instruments to monitor for environmental screening and heath and safety purposes. It is imperative the instruments are used and maintained properly to optimize their performance and minimize the potential for inaccuracies in the data obtained, and to ensure worker's health and safety is not compromised.

This SOP provides guidance on the usage, maintenance and calibration of electronic field equipment, whether for equipment owned by the Consultant or Contractor, or equipment obtained from a rental agency.

2.1 FIELD PREPARATION

2.1.1 Forms

- Field Calibration Forms

2.1.2 Equipment

- Monitoring equipment specific to work plan tasks.
- Associated calibration gases, aqueous standards, etc.
- Appropriate shipping containers to facilitate transport without damage to equipment.

2.1.3 Documents

- Manufacturer's instructions, operation and maintenance information.

2.2 FIELD PROCEDURES

All monitoring equipment will be in proper working order, and operated for the purpose for which it was intended, in accordance manufacturer's recommendations.

Field personnel will be responsible for insuring the equipment is maintained and calibrated in the field to extent practical, or returned for office or manufacturer maintenance or calibration if warranted. Calibration is discussed in greater detail below.

A copy of the Operating Instructions, Maintenance and Service manual for each instrument used on a project will be kept on site at all times.

Instruments will be operated only by personnel trained in the proper usage and calibration. In the event certification of training is required, personnel will have documentation of such certification with them on site at all times.

Personnel must be aware that certain instruments are rated for operation within a limited range of conditions such as temperature and humidity. Usage of such instruments in conditions outside these ranges will only proceed with proper approval by a project manager and/or Health and Safety supervisor as appropriate.

Instruments that contain radioactive source material, such as x-ray fluorescence analyzers or moisture-density gauges require specific transportation, handling and usage procedures that are generally associated with a license from the Nuclear Regulatory Commission (NRC) or an NRC- Agreement State. Under no circumstance will operation of such instruments be allowed on site unless by properly authorized and trained personnel, using the proper personal dosimeter badges or monitoring instruments.

Calibration

Calibration of an electronic instrument is critical to insure it is operating properly for its intended use. Such instruments are often sensitive to changes in temperature or humidity, or chemical vapors in the working atmosphere, and as a result their response and ability to monitor conditions and provide data can change significantly.

Parameters

Calibration of instruments shall be performed in accordance with the manufacturer's recommendations. This includes the following parameters:

- Frequency
- Use of proper calibration Gases or Chemical Standards
- Requirements for Factory Calibration

Calibration Gas Safety

Several instruments such as photoionization detectors (PIDs), flame ionization detectors @!IDS), oxygen meters, explosimeters, combustible gas indicators and many others require use of calibration gasses contained in compressed gas cylinders. Many of these gases are combustible or explosive. Care shall be taken to minimize the potential for injury from the use of such compressed gases. Transport, handling and storage of cylinders, where necessary, shall be performed in accordance with applicable DOT regulations and site requirements.

Calibration will only be performed in areas free of sources of spark, flame or excessive heat. Smoking will not be allowed in the vicinity of calibration gas usage areas.

Documentation of Calibration

Instrument Calibration activities will be documented on the field calibration form.

Intrinsically Safe Requirements

Certain work locations may be such that dangerous, ignitable or explosive conditions exist. In such cases, it may be necessary to utilize only equipment that is rated as "Intrinsically Safe." Intrinsically safe instrumentation is designed with limited electrical and thermal energy levels to eliminate the potential for ignition of hazardous mixtures.

For site work requiring operation of monitoring instruments in Class I, Division I locations (as defined by the National Fire Protection Agency (NFPA)) only instrumentation rated as Intrinsically Safe will be used. Such equipment (including all accessories and ancillary equipment) must be rated to conform to Underwriter's Laboratories (UL) Standard 91 3, for use in a Class I, Division 1 Groups A, B, C, and D locations. It is also recommended the equipment conform to CSA Standard 22.2, No. 157-92.

Upon completion of the field activities, equipment shall be returned to the possession of the Consultant, Contractor or Rental Agency accompanied by a written summary of any problems encountered with its use or calibration.

Equipment shall be properly prepared for shipping, including insuring that residual gases (if applicable) are removed from the instrument, and accompanying containers of compressed gases or fluids are properly labeled and sealed.

Equipment Decontamination

Equipment that comes in contact with Site media (water level meters, water quality meters) must be cleaned before removal from the site to ensure that chemicals are not transferred to other sites. It is the responsibility of the person who requisitioned the equipment to ensure appropriate cleaning before returning the equipment. Equipment decontamination procedures are typically site-specific for unique site compounds.

SOP 4

Soil Boring and Monitoring Well Installation

1.0 PURPOSE

The purpose of this procedure is to install a soil boring or groundwater monitoring well to obtain soil and groundwater data. Monitoring wells are constructed to ensure that groundwater accessed is representative of in-situ conditions.

2.0 PROCEDURE

2.1 FIELD PREPARATION

Call Digger's Hotline or equivalent more than 72 hours in advance of field activity commencement to identify buried utilities in the area of subsurface activity.

2.1.1 Forms

- Soil Boring and Monitoring Well Logs
- Tailgate Health and Safety
- *Daily Report* Sheets

2.1.2 Equipment

- Well caps - expanding, locking
- Locks (keyed alike)
- Latex or nitrile gloves
- *Typically provided by the drillers:*
- Well screen and casing
- Sand, bentonite chips/grout
- Concrete

2.1.3 Documents

- Site Access Agreements (if necessary)
- Site maps
- Workplan
- Health and Safety Plan

2.1.4 Other

- Cellular telephone
- First aid kit
- Personal comfort items
- Stakes and flagging to mark location

2.2 FIELD PROCEDURES

Build a berm or dike, if necessary, around the drilling area to divert surface water and run-off from the borehole and avoid entry of surface water and run-off into the hole during drilling and well installation. Boreholes should not be left open (unsupported by casing, auger, or drilling fluid) if advanced through contaminated material to prevent contaminated soils from caving to the area of the well screen.

Segregate all well materials and drilling tools from potential sources of contamination. The drilling contractor should use new well casing and screen that has been sealed at the factory, or decontaminated and wrapped before arrival at the site. Handle casing and screen only while wearing clean gloves (this is most important if the wells are not expected to be in an affected area). Be sure to decontaminate all drilling tools and equipment before each well installation using a high-pressure steam cleaner.

Soil boring and monitoring well depth should be determined before field activity commencement, if appropriate. Reference the Field Service Request Form for the method to be used for field depth determination.

If nested wells (two or more closely spaced wells, screened at different depths) are installed, the deepest well in the grouping should be installed first. This allows for complete vertical characterization of the geology and verification of the proper depths for any shallower well. It also reduces the possibility of grout intrusion into the shallower wells.

For installing groundwater monitoring wells in unconsolidated geologic materials, hollow stem auger drilling is the method of choice, as vertical cross-contamination between depth intervals and extraneous handling of contaminated materials is avoided.

- Determine position and depth of well to be installed.
- As soils are retrieved from the split spoon sampling tool (or Shelby tube), the borings must be characterized based on their color, moisture content, odor, cohesive properties, grain size, and lithology.

- Well materials may be schedule 40, 2” or 4” diameter with # 10 (or 0.010-inch) slot well screen with a schedule 40, 2” or 4” diameter PVC casing or a stainless-steel screen with galvanized steel casing.
- If the well hole is advanced too far, backfill the bottom with sand before positioning the screen (unless a confining unit has been breached - then seal the breach with bentonite and grout the boring). Deposit appropriate sand filter pack around the well screen until measured at one foot above the screen. Then seal the top of the sand pack with a bentonite slurry (approx. 1-1.5 feet), bentonite chips or a grout mixture to the surface.
- A well cap with a watertight seal and lock must be affixed to the well top. For flush-mounted wells, have the drillers use a neat cement grout to form the annular seal surrounding the well casing. They should bring the grout to within 3 inches of the top of the monitoring well casing, tapering the grout away from the monitoring well to the edge of the bore hole. Place and center the metal manhole cover (minimum diameter 8”) over the monitoring well casing. Cement the cover in place inside a square 2 x 2 foot (or 12” diameter round pad) 6-inch deep pad. Slope the concrete surface away from the well to promote surface drainage away from the monitoring well.
- Develop the well before conducting sampling or performing hydraulic conductivity tests by surging, pumping, or bailing, depending on the well depth, yield, diameter, contaminants present, and depth to water.

SOP 5

Safe Drilling Practices

This document establishes safe work practices (SWP) to follow during drilling operations. These SWPs are based on suggested safety procedures provided in the National Drilling Association's "Drilling Safety Guide." Procedures to follow before, during, and after drilling are listed below.

Before beginning any drill operation, each employee must conform to the following requirements:

- Wear a hard hat, safety glasses or goggles, steel-toed work boots, a shirt and full-length pants when working with or near the drill rig. Shirts must be tucked in at the belt.
- Do not wear loose or frayed clothing, loose long hair, or loose jewelry while working with rotating equipment.
- Do not eat, drink, or smoke near the drill rig.
- Identify all underground utility and buried structure locations before drilling.
- Ensure that drill masts or other projecting devices will be farther than 25 feet in any direction from overhead power lines.
- Ensure that the drill rig and any other machinery used is inspected daily by competent, qualified individuals. The site safety coordinator (SSC) will ensure compliance with this precaution.
- Drill rig operators will be instructed to report any abnormalities, such as equipment failure, oozing liquids, and unusual odors, to their supervisors or the SSC.
- Establish hand-signal communications for use when verbal communication is difficult. One person per work team will be designated to give hand signals to equipment operators.

While the drill rig is operating, employees must:

- Wear appropriate respiratory and personal protective equipment (PPE) when conditions warrant their use.
- Avoid direct contact with known or suspected contaminated surfaces.
- Move tools, materials, cords, hoses, and debris to prevent tripping hazards and contact with moving drill rig parts.
- Adequately secure tools, materials, and equipment subject to displacement or falling.
- Store flammable materials away from ignition sources and in approved containers.

- Maintain adequate clearance of the drill rig and mast from overhead transmission lines. The minimum clearance is 25 feet unless special permission is granted by the utility company. Call the local utility company for proper clearance.
- Only qualified and licensed personnel should operate drill rigs.
- Workers should not assume that the drill rig operator is keeping track of the rig's exact location. Workers should never walk directly behind or beside heavy equipment without the operator's knowledge.
- Workers should maintain visual contact with drill rig operators at all times.
- When an operator must maneuver equipment in tight quarters, the presence of a second person is required to ensure adequate clearance. If much backing is required, two ground guides will be used: one in the direction the equipment is moving, and the other in the operator's normal field of vision to relay signals.
- Auger sections and other equipment are extremely heavy. All lifting precautions should be taken before moving heavy equipment. Appropriate equipment, such as chains, hoists, straps, and other equipment, should be used to safely transport heavy equipment too heavy to safely lift.
- Proper personal lifting techniques will be used. Workers should lift using their legs, not their backs.
- Workers will not use equipment they are not familiar with. This precaution applies to heavy as well as light equipment.
- All personnel not essential to work activities will be kept out of the work area.
- Workers will be aware of their footing at all times.
- Workers will remain alert at all times.

After drilling operations are completed, employees should do the following:

- Shut down machinery before repairing or lubricating parts (except parts that must be in motion for lubrication).
- Shut down mechanical equipment prior to and during fueling operations. When refueling or transferring fuel, containers and equipment must be bonded to prevent the buildup of static electricity.

- Keep drill rigs in the exclusion zone until work has been completed. Such equipment should then be decontaminated within the designated decontamination area.
- Engage parking brakes when equipment is not in use.
- Implement an ongoing maintenance program for all tools and equipment. All tools and moving equipment should be inspected regularly to ensure that parts are secured, are intact, and have no cracks or areas of weakness. The equipment must turn smoothly without wobbling and must operate in accordance with manufacturer specifications. Defective items should be promptly repaired or replaced. Maintenance and repair logs will be kept.
- Store tools in clean, secure areas to prevent damage, loss, or theft.

SOP 5

Well Development

1.0 PURPOSE

The purpose of this procedure is to set criteria for well development after installation of new monitoring or production wells or wells than have not been sampled or used for an extended period of time.

2.0 PROCEDURE

This procedure is for the development of groundwater monitoring wells. Before a newly constructed well can be used for water-quality sampling, measuring water levels, or aquifer testing, it must be developed. Well development refers to the procedure used to clear the well and formation around the screen of fine-grained materials (sands, silts, and clays) produced during drilling or naturally occurring in the formation.

Well development is completed to remove fine grained materials from the well casing, well screen and gravel pack. The time allotted and techniques used for well development will vary by well and depend on drilling method, well construction, geological formation and intended use for the well. In general, well development should continue until the well responds to water level changes in the formation (i.e., a good hydraulic connection is established between the well and formation) and the well produces clear, sediment-free water to the extent practical. In general, the method (disturbance) used to develop the well should be more rigorous than the amount of disturbance the well will experience during its regular or intended use. For example, if a well develops clear, sediment free water using a bailer, it is very well developed for low-flow sampling using a peristaltic pump. Please note that well development is especially important when contaminants of concern are sensitive to suspended solids (e.g., metals, PCBs, SVOCs).

2.1 FIELD PREPARATION

2.1.1 Forms

- Daily Log
- Well Development Form

2.1.2 Equipment

- Required Health and Safety Equipment and PPE
- Well Keys
- General Tools: knife, socket set, vise grips, screwdriver, etc.
- Power Source: generator, extension cord
- Well Development Device: water truck with hoist, surge block, bailer, submersible pump
- Discharge Line: tubing or hose (suitable for expected flow rates and chemicals of concern)

- Purge Water Container: Clear glass jars (e.g., drillers' jars), graduated pail, 55- gallon drum, poly tank or frac tank
- Cleaning Supplies: non-phosphate soap, buckets, brushes, laboratory-supplied distilled/deionized water, tap water, cleaning solvent, aluminum foil, plastic sheeting, etc.
- Meters: water level, flow
- Water Quality Meter: pH, temperature, conductivity, turbidity, etc.

2.1.3 Documents

- Detailed Scope Work Summary
- Proposal
- Work Plan

2.2 FIELD PROCEDURES

All wells must be developed and well development generally occurs with a few days of installation (please remember that some grouts require time to cure). Well development methods and procedures will vary as described above. In most cases, a monitoring well can be developed in less than one hour using a bailer, submersible pump, surge block and/or check valve and tubing (waterra tubing). Production or extraction wells may need to be developed by more rigorous methods and may require a specialized subcontractor. The following presents the minimum steps required to complete well development for a monitoring well and is generally acceptable for all well development activities. More rigorous methods may be required and will be detailed in project specific SOP.

1. Review HASP and don appropriate safety equipment and set up appropriate air monitoring equipment as needed.
2. Prior to introduction to a well, all non-dedicated equipment used for development purposes must be cleaned using a soapy wash (laboratory grade), tap water rinse, isopropyl alcohol rinse and distilled/deionized water rinse as appropriate.
3. Uncap and gauge well, record initial water level.
4. Place well development device (pump, bailer, surge block) into the well.
5. Collect a baseline groundwater sample in a glass jar, or purge bucket to determine relative turbidity. Your project manager may also request that you measure and record the temperature, pH, turbidity, specific electrical conductance, and other water quality parameters.

6. Surge the well.
7. Purge the well. If the well runs dry, stop purging and allow the well to recover. Sometimes purge water or distilled water must be added to the well initially to help clear the screen. Additional surging of the screen with the recycled purge water (or distilled water) will allow formation water to flow into the screen. Please make sure that three times the amount of water added is removed during the purging of the well.
8. Repeat steps 5 through 7 until groundwater is relatively clear (less than 4 NTUs) and if required, the water quality parameters are stable within 10%.
9. After development, the well should be allowed to rest and should not be sampled immediately. The period of rest will vary depending on the hydraulic properties of the aquifer or targeted water bearing unit and the intended use of the sample results obtained from the well. In general, a minimum of 2 to 3 days of rest should be adequate.

Waste Disposal

- All waste generated will be disposed in accordance with the methods and procedures contained in the work plan or other SOP.
- All water generated during cleaning and development procedures will be collected and contained in accordance with the site specific disposal requirements.
- All PPE, such as gloves, disposable clothing, and other disposable equipment used or generated during the development process, will be placed in plastic bags. These bags will be transferred into appropriately labeled 55-gallon drums or a covered roll-off box for appropriate disposal.

SOP 7

Water Sampling

1.0 PURPOSE

The purpose of this procedure is to obtain representative groundwater samples from groundwater monitoring wells or piezometers with a bailer, peristaltic, submersible, or KeckTM pump. Site-specific groundwater sampling requirements, if necessary, will be described in work plans or field sampling plans.

2.0 PROCEDURE

2.1 FIELD PREPARATION

Notify client, property owner, and agency as necessary.

2.1.1 Forms

- Water Level Data *Sheet*
- *Daily Report* Sheets
- *Chain of Custodies*
- *Water Quality Data* Sheet
- Field Service Request
- Tailgate Health and Safety

2.1.2 Equipment

- Laboratory provided containers and labels
- Laboratory-cleaned cooler
- Well keys
- Electronic water level indicator
- Interface probe (if free-product is expected at the site)
- Calculator
- Latex or nitrile gloves
- Tools to access wells
- metal detector, turkey baster or plastic cup
- Decontamination equipment including deionized or distilled water, Alconox, graduated cylinders, and paper towel

- Knife or scissors
- Garbage bags
- Two graduated 5-gallon pails to collect purge water
- pH, temperature, and specific conductivity meter

One of:

- Disposable high-density polyethylene sampling bailers and bailer rope
- Peristaltic pump and sufficient disposable Silicon (approximately 10 inches per sample) and Tygon tubing (length measured from pump head to sampling depth)
- Submersible pump and Tygon tubing
- Keck™ pump

If needed:

- DOT-approved sealed drums for storage of purged well water, or a suitable location to disperse of liquid (i.e., on-site treatment system)
- Quantab ™ and Hach™ Titration kits

2.1.3 Documents

- Well Construction Log
- Well location map/site map
- Work Plan
- Health and Safety Plan
- Signed site access agreement

2.1.4 Other

- Cellular phone
- Replacement locks
- Writing implements and an indelible marker
- Crushed ice
- Bubble wrap if required to protect samples during shipment to the laboratory

- First aid kit
- Personal comfort items
- Machete or other vegetation-clearing tools

2.2 FIELD PROCEDURES

2.2.1 Well Purge

Don a new pair of latex or nitrile gloves

First sample those wells with the lowest historical or suspected concentrations, and then advance to the wells more likely to be contaminated. Set plastic sheeting or a garbage bag near the well to set sample bottles on and to rest sampling equipment.

Obtain the water level measurement, noting any occurrence of LNAPL or DNAPL.

Calculate three or five times the volume of groundwater present in the well casing, as indicated on the *Field Service Request Form.*

Purge the well using a dedicated HDPE disposable bailer and a new length of clean rope, a peristaltic pump with new Teflon and Tygon tubing, a submersible pump with new Tygon tubing, or a Keck™ pump. Purge the groundwater monitoring well of a minimum of 3 to 5 well casing volumes prior to collecting the samples. Measure the volume of purged water using a graduated pail, or other container of known volume. Purging and sampling should be conducted using slow and steady motions to avoid excessive agitation, increased sample turbidity, and sample volatilization. Empty purge water onto the ground, away from the well, or in the event containerizing is required, transfer purged water from the pail into the appropriate storage container for storage until disposal is arranged.

NOTE: If well goes dry before 3 well volumes can be purged from the well, allow groundwater to recharge, then collect sample.

2.2.2 Field Measured Parameters

After at least 3 well volumes have been purged from the well, measure temperature, pH, conductivity, and any other field parameters as specified in the Field Service Request Form. Once three measurements are obtained within 10-percent of each other, the groundwater quality may be considered representative of the groundwater as it exists in the formation.

If well goes dry before 3 well volumes can be purged from the well, a single round of field parameter measurements will be obtained following recharge of a sufficient amount of groundwater to complete the sampling activities.

2.2.3 Bottle Preparation

Prior to sample collection, label all appropriate fields on the sample container labels with an indelible marker. Apply labels to appropriate containers.

2.2.4 Sample Collection

2.2.4.1 Bailers

Samples will be collected using the same HDPE disposable bailer used for purging. Transfer groundwater samples from the bailer to their appropriate sample bottle, minimizing turbulent flow between the bailer and the sample bottles. Place samples in the appropriate containers in decreasing order of volatility (e.g., purgeables and aromatics first, then PNAs and phenols, then cyanides, and lastly, nitrate, sulfate and metals). Samples for dissolved metals analysis may be field filtered. If there is insufficient sample volume to provide all sampling needs, retrieve additional bailer volumes until all samples are collected.

2.2.4.2 Peristaltic, Submersible, or Keck™ Pump

Samples for laboratory analysis of parameters, other than VOCs, will be collected directly from the pump tubing following purging of 3 to 5 well volumes, and stabilization of field parameter measurements. A 0.45 μm filter will be used to field filter samples for dissolved metals into a preserved laboratory container.

2.2.5 Sample Preservation

Tighten lids of sample containers and place in coolers

Wrap all glass containers in bubble wrap or foam; then place into large 1-2 gallon zip-lock bags; label the outside of the bag, and place into the coolers.

Completely fill out the Chain-of-Custody. When shipping samples, seal Chain-of-Custody in a watertight zip-lock bag, and attach to the underside of the cooler lid with packaging tape. Ship coolers or arrange delivery to the laboratory as soon as possible and before the sample “hold- time” expires.

2.2.6 Decontamination

Decontaminate electronic water level indicator, pH, temperature, and specific conductivity meter between sampling points.

If peristaltic pump is used, dispose used flow-through tubing and filters.

If submersible or Keck™ pump is used, place pump in a graduated cylinder filled with a solution of Alconox and deionized or distilled water. Allowing the soap and water solution to re-circulate through the pump and tubing for a maximum of five minutes. Rinse cylinder and outside of pump and tubing with deionized or distilled water. Fill cylinder with deionized or distilled water and allow at least 4 liters to run though the

pump and tubing and onto the ground away from the well.

NOTE: During pump use and decontamination, take care to assure tubing and pump does not come in contact with the ground or other surfaces. Following sampling of the last well, remove and throw away submersible pump tubing prior to decontamination of the pump.

Dispose of all gloves, bailers, rope/string, tubing, and filters used to collect the sample prior to accessing the next well.

3.0 QUALITY ASSURANCE

Avoid cross-contamination of wells with the water level indicator, and sampling equipment by conducting proper decontamination procedures described above.

Take care in labeling the samples, and the corresponding Chain-of-Custody with the correct sample date, time and well identification. All labeling must be consistent between samples and the Chain of Custody.

Keep samples on ice following collection, and be conscience of “hold-times” for the samples. It is imperative that samples are submitted to the laboratory prior to the exceedance of hold times.

SOP 8

EPA Low Flow (Minimum Drawdown) Groundwater Sampling Procedures

United States Environmental Protection Agency | Office of Research and Development | Office of Solid Waste and Emergency Response | EPA/540/S-95/504 April 1996

Ground Water Issue

LOW-FLOW (MINIMAL DRAWDOWN) GROUND-WATER SAMPLING PROCEDURES

by Robert W. Puls[1] and Michael J. Barcelona[2]

Background

The Regional Superfund Ground Water Forum is a group of ground-water scientists, representing EPA's Regional Superfund Offices, organized to exchange information related to ground-water remediation at Superfund sites. One of the major concerns of the Forum is the sampling of ground water to support site assessment and remedial performance monitoring objectives. This paper is intended to provide background information on the development of low-flow sampling procedures and its application under a variety of hydrogeologic settings. It is hoped that the paper will support the production of standard operating procedures for use by EPA Regional personnel and other environmental professionals engaged in ground-water sampling.

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I. Introduction

The methods and objectives of ground-water sampling to assess water quality have evolved over time. Initially the emphasis was on the assessment of water quality of aquifers as sources of drinking water. Large water-bearing units were identified and sampled in keeping with that objective. These were highly productive aquifers that supplied drinking water via private wells or through public water supply systems. Gradually, with the increasing awareness of subsurface pollution of these water resources, the understanding of complex hydrogeochemical processes which govern the fate and transport of contaminants in the subsurface increased. This increase in understanding was also due to advances in a number of scientific disciplines and improvements in tools used for site characterization and ground-water sampling. Ground-water quality investigations where pollution was detected initially borrowed ideas, methods, and materials for site characterization from the water supply field and water analysis from public health practices. This included the materials and manner in which monitoring wells were installed and the way in which water was brought to the surface, treated, preserved and analyzed. The prevailing conceptual ideas included convenient generalizations of ground-water resources in terms of large and relatively homogeneous hydrologic *units*. With time it became apparent that conventional water supply generalizations of *homogeneity* did not adequately represent field data regarding pollution of these subsurface resources. The important role of *heterogeneity* became increasingly clear not only in geologic terms, but also in terms of complex physical,

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chemical and biological subsurface processes. With greater appreciation of the role of heterogeneity, it became evident that subsurface pollution was ubiquitous and encompassed the unsaturated zone to the deep subsurface and included unconsolidated sediments, fractured rock, and *aquitards* or low-yielding or impermeable formations. Small-scale processes and heterogeneities were shown to be important in identifying contaminant distributions and in controlling water and contaminant flow paths.

It is beyond the scope of this paper to summarize all the advances in the field of ground-water quality investigations and remediation, but two particular issues have bearing on ground-water sampling today: aquifer heterogeneity and colloidal transport. Aquifer heterogeneities affect contaminant flow paths and include variations in geology, geochemistry, hydrology and microbiology. As methods and the tools available for subsurface investigations have become increasingly sophisticated and understanding of the subsurface environment has advanced, there is an awareness that in most cases a primary concern for site investigations is characterization of contaminant flow paths rather than entire aquifers. In fact, in many cases, plume thickness can be less than well screen lengths (e.g., 3-6 m) typically installed at hazardous waste sites to detect and monitor plume movement over time. Small-scale differences have increasingly been shown to be important and there is a general trend toward smaller diameter wells and shorter screens.

The hydrogeochemical significance of colloidal-size particles in subsurface systems has been realized during the past several years (Gschwend and Reynolds, 1987; McCarthy and Zachara, 1989; Puls, 1990; Ryan and Gschwend, 1990). This realization resulted from both field and laboratory studies that showed faster contaminant migration over greater distances and at higher concentrations than flow and transport model predictions would suggest (Buddemeier and Hunt, 1988; Enfield and Bengtsson, 1988; Penrose et al., 1990). Such models typically account for interaction between the mobile aqueous and immobile solid phases, but do not allow for a mobile, reactive solid phase. It is recognition of this third *phase* as a possible means of contaminant transport that has brought increasing attention to the manner in which samples are collected and processed for analysis (Puls et al., 1990; McCarthy and Degueldre, 1993; Backhus et al., 1993; U. S. EPA, 1995). If such a phase is present in sufficient mass, possesses high sorption reactivity, large surface area, and remains stable in suspension, it can serve as an important mechanism to facilitate contaminant transport in many types of subsurface systems.

Colloids are particles that are sufficiently small so that the surface free energy of the particle dominates the bulk free energy. Typically, in ground water, this includes particles with diameters between 1 and 1000 nm. The most commonly observed mobile particles include: secondary clay minerals; hydrous iron, aluminum, and manganese oxides; dissolved and particulate organic materials, and viruses and bacteria. These reactive particles have been shown to be mobile under a variety of conditions in both field studies and laboratory column experiments, and as such need to be included in monitoring programs where identification of the *total* mobile contaminant loading (dissolved + naturally suspended particles) at a site is an objective. To that end, sampling methodologies must be used which do not artificially bias *naturally* suspended particle concentrations.

Currently the most common ground-water purging and sampling methodology is to purge a well using bailers or high speed pumps to remove 3 to 5 casing volumes followed by sample collection. This method can cause adverse impacts on sample quality through collection of samples with high levels of turbidity. This results in the inclusion of otherwise immobile artifactual particles which produce an overestimation of certain analytes of interest (e.g., metals or hydrophobic organic compounds). Numerous documented problems associated with filtration (Danielsson, 1982; Laxen and Chandler, 1982; Horowitz et al., 1992) make this an undesirable method of rectifying the turbidity problem, and include the removal of potentially mobile (contaminant-associated) particles during filtration, thus artificially biasing contaminant concentrations low. Sampling-induced turbidity problems can often be mitigated by using low-flow purging and sampling techniques.

Current subsurface conceptual models have undergone considerable refinement due to the recent development and increased use of field screening tools. So-called hydraulic *push* technologies (e.g., cone penetrometer, Geoprobe®, QED HydroPunch®) enable relatively fast screening site characterization which can then be used to design and install a monitoring well network. Indeed, alternatives to conventional monitoring wells are now being considered for some hydrogeologic settings. The ultimate design of any monitoring system should however be based upon adequate site characterization and be consistent with established monitoring objectives.

If the sampling program objectives include accurate assessment of the magnitude and extent of subsurface contamination over time and/or accurate assessment of subsequent remedial performance, then some information regarding plume delineation in three-dimensional space is necessary prior to monitoring well network design and installation. This can be accomplished with a variety of different tools and equipment ranging from hand-operated augers to screening tools mentioned above and large drilling rigs. Detailed information on ground-water flow velocity, direction, and horizontal and vertical variability are essential baseline data requirements. Detailed soil and geologic data are required prior to and during the installation of sampling points. This includes historical as well as detailed soil and geologic logs which accumulate during the site investigation. The use of borehole geophysical techniques is also recommended. With this information (together with other site characterization data) and a clear understanding of sampling

objectives, then appropriate location, screen length, well diameter, slot size, etc. for the monitoring well network can be decided. This is especially critical for new in situ remedial approaches or natural attenuation assessments at hazardous waste sites.

In general, the overall goal of any ground-water sampling program is to collect water samples with no alteration in water chemistry; analytical data thus obtained may be used for a variety of specific monitoring programs depending on the regulatory requirements. The sampling methodology described in this paper assumes that the monitoring goal is to sample monitoring wells for the presence of contaminants and it is applicable whether mobile colloids are a concern or not and whether the analytes of concern are metals (and metalloids) or organic compounds.

II. Monitoring Objectives and Design Considerations

The following issues are important to consider prior to the design and implementation of any ground-water monitoring program, including those which anticipate using low-flow purging and sampling procedures.

A. Data Quality Objectives (DQOs)

Monitoring objectives include four main types: detection, assessment, corrective-action evaluation and resource evaluation, along with *hybrid* variations such as site-assessments for property transfers and water availability investigations. Monitoring objectives may change as contamination or water quality problems are discovered. However, there are a number of common components of monitoring programs which should be recognized as important regardless of initial objectives. These components include:

1) Development of a conceptual model that incorporates elements of the regional geology to the local geologic framework. The conceptual model development also includes initial site characterization efforts to identify hydrostratigraphic units and likely flow-paths using a minimum number of borings and well completions;

2) Cost-effective and well documented collection of high quality data utilizing simple, accurate, and reproducible techniques; and

3) Refinement of the conceptual model based on supplementary data collection and analysis.

These fundamental components serve many types of monitoring programs and provide a basis for future efforts that evolve in complexity and level of spatial detail as purposes and objectives expand. High quality, reproducible data collection is a common goal regardless of program objectives.

High quality data collection implies data of sufficient accuracy, precision, and completeness (i.e., ratio of valid analytical results to the minimum sample number called for by the program design) to meet the program objectives. Accuracy depends on the correct choice of monitoring tools and procedures to minimize sample and subsurface disturbance from collection to analysis. Precision depends on the repeatability of sampling and analytical protocols. It can be assured or improved by replication of sample analyses including blanks, field/lab standards and reference standards.

B. Sample Representativeness

An important goal of any monitoring program is collection of data that is truly representative of conditions at the site. The term *representativeness* applies to chemical and hydrogeologic data collected via wells, borings, piezometers, geophysical and soil gas measurements, lysimeters, and temporary sampling points. It involves a recognition of the statistical variability of individual subsurface physical properties, and contaminant or major ion concentration levels, while explaining extreme values. Subsurface temporal and spatial variability are facts. Good professional practice seeks to maximize representativeness by using proven accurate and reproducible techniques to define limits on the distribution of measurements collected at a site. However, measures of representativeness are dynamic and are controlled by evolving site characterization and monitoring objectives. An evolutionary site characterization model, as shown in Figure 1, provides a systematic approach to the goal of consistent data collection.

Figure 1. Evolutionary Site Characterization Model

The model emphasizes a recognition of the causes of the variability (e.g., use of inappropriate technology such as using bailers to purge wells; imprecise or operator-dependent methods) and the need to control avoidable errors.

1) Questions of Scale

A sampling plan designed to collect representative samples must take into account the potential scale of changes in site conditions through space and time as well as the chemical associations and behavior of the parameters that are targeted for investigation. In subsurface systems, physical (i.e., aquifer) and chemical properties over time or space are not statistically independent. In fact, samples taken in close proximity (i.e., within distances of a few meters) or within short time periods (i.e., more frequently than monthly) are highly auto-correlated. This means that designs employing high-sampling frequency (e.g., monthly) or dense spatial monitoring designs run the risk of redundant data collection and misleading inferences regarding trends in values that aren't statistically valid. In practice, contaminant detection and assessment monitoring programs rarely suffer these *over-sampling* concerns. In corrective-action evaluation programs, it is also possible that too little data may be collected over space or time. In these cases, false interpretation of the spatial extent of contamination or underestimation of temporal concentration variability may result.

2) Target Parameters

Parameter selection in monitoring program design is most often dictated by the regulatory status of the site. However, background water quality constituents, purging indicator parameters, and contaminants, all represent targets for data collection programs. The tools and procedures used in these programs should be equally rigorous and applicable to all categories of data, since all may be needed to determine or support regulatory action.

C. Sampling Point Design and Construction

Detailed site characterization is central to all decision-making purposes and the basis for this characterization resides in identification of the geologic framework and major hydro-stratigraphic units. Fundamental data for sample point location include: subsurface lithology, head-differences and background geochemical conditions. Each sampling point has a proper use or uses which should be documented at a level which is appropriate for the program's data quality objectives. Individual sampling points may not always be able to fulfill multiple monitoring objectives (e.g., detection, assessment, corrective action).

1) Compatibility with Monitoring Program and Data Quality Objectives

Specifics of sampling point location and design will be dictated by the complexity of subsurface lithology and variability in contaminant and/or geochemical conditions. It should be noted that, regardless of the ground-water sampling approach, few sampling points (e.g., wells, drive-points, screened augers) have zones of influence in excess of a few feet. Therefore, the spatial frequency of sampling points should be carefully selected and designed.

2) Flexibility of Sampling Point Design

In most cases *well-point* diameters in excess of 1 7/8 inches will permit the use of most types of submersible pumping devices for low-flow (minimal drawdown) sampling. It is suggested that *short* (e.g., less than 1.6 m) screens be incorporated into the monitoring design where possible so that comparable results from one device to another might be expected. *Short*, of course, is relative to the degree of vertical water quality variability expected at a site.

3) Equilibration of Sampling Point

Time should be allowed for equilibration of the well or sampling point with the formation after installation. Placement of well or sampling points in the subsurface produces some disturbance of ambient conditions. Drilling techniques (e.g., auger, rotary, etc.) are generally considered to cause more disturbance than *direct-push* technologies. In either case, there may be a period (i.e., days to months) during which water quality near the point may be distinctly different from that in the formation. Proper development of the sampling point and adjacent formation to remove fines created during emplacement will shorten this water quality *recovery* period.

III. Definition of Low-Flow Purging and Sampling

It is generally accepted that water in the well casing is non-representative of the formation water and needs to be purged prior to collection of ground-water samples. However, the water in the screened interval may indeed be representative of the formation, depending upon well construction and site hydrogeology. Wells are purged to some extent for the following reasons: the presence of the air interface at the top of the water column resulting in an oxygen concentration gradient with depth, loss of volatiles up the water column, leaching from or sorption to the casing or filter pack, chemical changes due to clay seals or backfill, and surface infiltration.

Low-flow purging, whether using portable or dedicated systems, should be done using pump-intake located in the middle or slightly above the middle of the screened interval. Placement of the pump too close to the bottom of the well will cause increased entrainment of solids which have collected in the well over time. These particles are present as a result of well development, prior purging and sampling events, and natural colloidal transport and deposition. Therefore, placement of the pump in the middle or toward the top of the screened interval is suggested. Placement of the pump at the top of the water column for sampling is only recommended in unconfined aquifers, screened across the water table, where this is the desired sampling point. Low-

flow purging has the advantage of minimizing mixing between the overlying stagnant casing water and water within the screened interval.

A. Low-Flow Purging and Sampling

Low-flow refers to the velocity with which water enters the pump intake and that is imparted to the formation pore water in the immediate vicinity of the well screen. It does not necessarily refer to the flow rate of water discharged at the surface which can be affected by flow regulators or restrictions. Water level drawdown provides the best indication of the stress imparted by a given flow-rate for a given hydrological situation. The objective is to pump in a manner that minimizes stress (drawdown) to the system to the extent practical taking into account established site sampling objectives. Typically, flow rates on the order of 0.1 - 0.5 L/min are used, however this is dependent on site-specific hydrogeology. Some extremely coarse-textured formations have been successfully sampled in this manner at flow rates to 1 L/min. The effectiveness of using low-flow purging is intimately linked with proper screen location, screen length, and well construction and development techniques. The reestablishment of natural flow paths in both the vertical and horizontal directions is important for correct interpretation of the data. For high resolution sampling needs, screens less than 1 m should be used. Most of the need for purging has been found to be due to passing the sampling device through the overlying casing water which causes mixing of these stagnant waters and the dynamic waters within the screened interval. Additionally, there is disturbance to suspended sediment collected in the bottom of the casing and the displacement of water out into the formation immediately adjacent to the well screen. These disturbances and impacts can be avoided using dedicated sampling equipment, which precludes the need to insert the sampling device prior to purging and sampling.

Isolation of the screened interval water from the overlying stagnant casing water may be accomplished using low-flow minimal drawdown techniques. If the pump intake is located within the screened interval, most of the water pumped will be drawn in directly from the formation with little mixing of casing water or disturbance to the sampling zone. However, if the wells are not constructed and developed properly, zones other than those intended may be sampled. At some sites where geologic heterogeneities are sufficiently different within the screened interval, higher conductivity zones may be preferentially sampled. This is another reason to use shorter screened intervals, especially where high spatial resolution is a sampling objective.

B. Water Quality Indicator Parameters

It is recommended that water quality indicator parameters be used to determine purging needs prior to sample collection in each well. Stabilization of parameters such as pH, specific conductance, dissolved oxygen, oxidation-reduction potential, temperature and turbidity should be used to determine when formation water is accessed during purging. In general, the order of stabilization is pH, temperature, and specific conductance, followed by oxidation-reduction potential, dissolved oxygen and turbidity. Temperature and pH, while commonly used as purging indicators, are actually quite insensitive in distinguishing between formation water and stagnant casing water; nevertheless, these are important parameters for data interpretation purposes and should also be measured. Performance criteria for determination of stabilization should be based on water-level drawdown, pumping rate and equipment specifications for measuring indicator parameters. Instruments are available which utilize in-line flow cells to continuously measure the above parameters.

It is important to establish specific well stabilization criteria and then consistently follow the same methods thereafter, particularly with respect to drawdown, flow rate and sampling device. Generally, the time or purge volume required for parameter stabilization is independent of well depth or well volumes. Dependent variables are well diameter, sampling device, hydrogeochemistry, pump flow rate, and whether the devices are used in a portable or dedicated manner. If the sampling device is already in place (i.e., dedicated sampling systems), then the time and purge volume needed for stabilization is much shorter. Other advantages of dedicated equipment include less purge water for waste disposal, much less decontamination of equipment, less time spent in preparation of sampling as well as time in the field, and more consistency in the sampling approach which probably will translate into less variability in sampling results. The use of dedicated equipment is strongly recommended at wells which will undergo routine sampling over time.

If parameter stabilization criteria are too stringent, then minor oscillations in indicator parameters may cause purging operations to become unnecessarily protracted. It should also be noted that turbidity is a very conservative parameter in terms of stabilization. Turbidity is always the last parameter to stabilize. Excessive purge times are invariably related to the establishment of too stringent turbidity stabilization criteria. It should be noted that natural turbidity levels in ground water may exceed 10 nephelometric turbidity units (NTU).

C. Advantages and Disadvantages of Low-Flow (Minimum Drawdown) Purging

In general, the advantages of low-flow purging include:

- samples which are representative of the *mobile* load of contaminants present (dissolved and colloid-associated);
- minimal disturbance of the sampling point thereby minimizing sampling artifacts;
- less operator variability, greater operator control;

- reduced stress on the formation (minimal drawdown);
- less mixing of stagnant casing water with formation water;
- reduced need for filtration and, therefore, less time required for sampling;
- smaller purging volume which decreases waste disposal costs and sampling time;
- better sample consistency; reduced artificial sample variability.

Some disadvantages of low-flow purging are:

- higher initial capital costs,
- greater set-up time in the field,
- need to transport additional equipment to and from the site,
- increased training needs,
- resistance to change on the part of sampling practitioners,
- concern that new data will indicate a *change in conditions* and trigger an *action*.

IV. Low-Flow (Minimal Drawdown) Sampling Protocols

The following ground-water sampling procedure has evolved over many years of experience in ground-water sampling for organic and inorganic compound determinations and as such summarizes the authors' (and others) experiences to date (Barcelona et al., 1984, 1994; Barcelona and Helfrich, 1986; Puls and Barcelona, 1989; Puls et. al. 1990, 1992; Puls and Powell, 1992; Puls and Paul, 1995). High-quality chemical data collection is essential in ground-water monitoring and site characterization. The primary limitations to the collection of *representative* ground-water samples include: mixing of the stagnant casing and *fresh* screen waters during insertion of the sampling device or ground-water level measurement device; disturbance and resuspension of settled solids at the bottom of the well when using high pumping rates or raising and lowering a pump or bailer; introduction of atmospheric gases or degassing from the water during sample handling and transfer, or inappropriate use of vacuum sampling device, etc.

A. Sampling Recommendations

Water samples should not be taken immediately following well development. Sufficient time should be allowed for the ground-water flow regime in the vicinity of the monitoring well to stabilize and to approach chemical equilibrium with the well construction materials. This lag time will depend on site conditions and methods of installation but often exceeds one week.

Well purging is nearly always necessary to obtain samples of water flowing through the geologic formations in the screened interval. Rather than using a general but arbitrary guideline of purging three casing volumes prior to sampling, it is recommended that an in-line water quality measurement device (e.g., flow-through cell) be used to establish the stabilization time for several parameters (e.g. , pH, specific conductance, redox, dissolved oxygen, turbidity) on a well-specific basis. Data on pumping rate, drawdown, and volume required for parameter stabilization can be used as a guide for conducting subsequent sampling activities.

The following are recommendations to be considered before, during and after sampling:

- use low-flow rates (<0.5 L/min), during both purging and sampling to maintain minimal drawdown in the well;
- maximize tubing wall thickness, minimize tubing length;
- place the sampling device intake at the desired sampling point;
- minimize disturbances of the stagnant water column above the screened interval during water level measurement and sampling device insertion;
- make proper adjustments to stabilize the flow rate as soon as possible;
- monitor water quality indicators during purging;
- collect unfiltered samples to estimate contaminant loading and transport potential in the subsurface system.

B. Equipment Calibration

Prior to sampling, all sampling device and monitoring equipment should be calibrated according to manufacturer's recommendations and the site Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP). Calibration of pH should be performed with at least two buffers which bracket the expected range. Dissolved oxygen calibration must be corrected for local barometric pressure readings and elevation.

C. Water Level Measurement and Monitoring

It is recommended that a device be used which will least disturb the water surface in the casing. Well depth should be obtained from the well logs. Measuring to the bottom of the well casing will only cause resuspension of settled solids from the formation and require longer purging times for turbidity equilibration. Measure well depth after sampling is completed. The water level measurement should be taken from a permanent reference point which is surveyed relative to ground elevation.

D. Pump Type

The use of low-flow (e.g., 0.1-0.5 L/min) pumps is suggested for purging and sampling all types of analytes. All pumps have some limitation and these should be investigated with respect to application at a particular site. Bailers are inappropriate devices for low-flow sampling.

1) General Considerations

There are no unusual requirements for ground-water sampling devices when using low-flow, minimal drawdown techniques. The major concern is that the device give consistent results and minimal disturbance of the sample across a range of *low* flow rates (i.e., < 0.5 L/min). Clearly, pumping rates that cause minimal to no drawdown in one well could easily cause *significant* drawdown in another well finished in a less transmissive formation. In this sense, the pump should not cause undue pressure or temperature changes or physical disturbance on the water sample over a reasonable sampling range. Consistency in operation is critical to meet accuracy and precision goals.

2) Advantages and Disadvantages of Sampling Devices

A variety of sampling devices are available for low-flow (minimal drawdown) purging and sampling and include peristaltic pumps, bladder pumps, electrical submersible pumps, and gas-driven pumps. Devices which lend themselves to both dedication and consistent operation at definable low-flow rates are preferred. It is desirable that the pump be easily adjustable and operate reliably at these lower flow rates. The peristaltic pump is limited to shallow applications and can cause degassing resulting in alteration of pH, alkalinity, and some volatiles loss. Gas-driven pumps should be of a type that does not allow the gas to be in direct contact with the sampled fluid.

Clearly, bailers and other *grab* type samplers are ill-suited for low-flow sampling since they will cause repeated disturbance and mixing of *stagnant* water in the casing and the *dynamic* water in the screened interval. Similarly, the use of inertial lift foot-valve type samplers may cause too much disturbance at the point of sampling. Use of these devices also tends to introduce uncontrolled and unacceptable operator variability.

Summaries of advantages and disadvantages of various sampling devices are listed in Herzog et al. (1991), U. S. EPA (1992), Parker (1994) and Thurnblad (1994).

E. Pump Installation

Dedicated sampling devices (left in the well) capable of pumping and sampling are preferred over <u>any</u> other type of device. Any portable sampling device should be slowly and carefully lowered to the middle of the screened interval or slightly above the middle (e.g., 1-1.5 m below the top of a 3 m screen). This is to minimize excessive mixing of the stagnant water in the casing above the screen with the screened interval zone water, and to minimize resuspension of solids which will have collected at the bottom of the well. These two disturbance effects have been shown to directly affect the time required for purging. There also appears to be a direct correlation between size of portable sampling devices relative to the well bore and resulting purge volumes and times. The key is to minimize disturbance of water and solids in the well casing.

F. Filtration

Decisions to filter samples should be dictated by sampling objectives rather than as a *fix* for poor sampling practices, and field-filtering of certain constituents should not be the default. Consideration should be given as to what the application of field-filtration is trying to accomplish. For assessment of truly dissolved (as opposed to operationally *dissolved* [i.e., samples filtered with 0.45 µm filters]) concentrations of major ions and trace metals, 0.1 µm filters are recommended although 0.45 µm filters are normally used for most regulatory programs. Alkalinity samples must also be filtered if significant particulate calcium carbonate is suspected, since this material is likely to impact alkalinity titration results (although filtration itself may alter the CO_2 composition of the sample and, therefore, affect the results).

Although filtration may be appropriate, filtration of a sample may cause a number of unintended changes to occur (e.g. oxidation, aeration) possibly leading to filtration-induced artifacts during sample analysis and uncertainty in the results. Some of these unintended changes may be unavoidable but the factors leading to them must be recognized. Deleterious effects can be minimized by consistent application of certain filtration guidelines. Guidelines should address selection of filter type, media, pore size, etc. in order to identify and minimize potential sources of uncertainty when filtering samples.

In-line filtration is recommended because it provides better consistency through less sample handling, and minimizes sample exposure to the atmosphere. In-line filters are available in both disposable (barrel filters) and non-disposable (in-line filter holder, flat membrane filters) formats and various filter pore sizes (0.1-5.0 µm). Disposable filter cartridges have the advantage of greater sediment handling capacity when compared to traditional membrane filters. Filters must be pre-rinsed following manufacturer's recommendations. If there are no recommendations for rinsing, pass through a minimum of 1 L of ground water following purging and prior to sampling. Once filtration has begun, a filter cake may develop as particles larger than the pore size accumulate on the filter membrane. The result is that the effective pore diameter of the membrane is reduced and particles smaller than the stated pore size are excluded from the filtrate. Possible corrective measures include prefiltering (with larger pore size filters), minimizing particle loads to begin with, and reducing sample volume.

G. Monitoring of Water Level and Water Quality Indicator Parameters

Check water level periodically to monitor drawdown in the well as a guide to flow rate adjustment. The goal is minimal drawdown (<0.1 m) during purging. This goal may be difficult to achieve under some circumstances due to geologic heterogeneities within the screened interval, and may require adjustment based on site-specific conditions and personal experience. In-line water quality indicator parameters should be continuously monitored during purging. The water quality

indicator parameters monitored can include pH, redox potential, conductivity, dissolved oxygen (DO) and turbidity. The last three parameters are often most sensitive. Pumping rate, drawdown, and the time or volume required to obtain stabilization of parameter readings can be used as a future guide to purge the well. Measurements should be taken every three to five minutes if the above suggested rates are used. Stabilization is achieved after all parameters have stabilized for three successive readings. In lieu of measuring all five parameters, a minimum subset would include pH, conductivity, and turbidity or DO. Three successive readings should be within ± 0.1 for pH, ± 3% for conductivity, ± 10 mv for redox potential, and ± 10% for turbidity and DO. Stabilized purge indicator parameter trends are generally obvious and follow either an exponential or asymptotic change to stable values during purging. Dissolved oxygen and turbidity usually require the longest time for stabilization. The above stabilization guidelines are provided for rough estimates based on experience.

H. Sampling, Sample Containers, Preservation and Decontamination

Upon parameter stabilization, sampling can be initiated. If an in-line device is used to monitor water quality parameters, it should be disconnected or bypassed during sample collection. Sampling flow rate may remain at established purge rate or may be adjusted slightly to minimize aeration, bubble formation, turbulent filling of sample bottles, or loss of volatiles due to extended residence time in tubing. Typically, flow rates less than 0.5 L/min are appropriate. The same device should be used for sampling as was used for purging. Sampling should occur in a progression from least to most contaminated well, if this is known. Generally, volatile (e.g., solvents and fuel constituents) and gas sensitive (e.g., Fe^{2+}, CH_4, H_2S/HS^-, alkalinity) parameters should be sampled first. The sequence in which samples for most inorganic parameters are collected is immaterial unless filtered (dissolved) samples are desired. Filtering should be done last and in-line filters should be used as discussed above. During both well purging and sampling, proper protective clothing and equipment must be used based upon the type and level of contaminants present.

The appropriate sample container will be prepared in advance of actual sample collection for the analytes of interest and include sample preservative where necessary. Water samples should be collected directly into this container from the pump tubing.

Immediately after a sample bottle has been filled, it must be preserved as specified in the site (QAPP). Sample preservation requirements are based on the analyses being performed (use site QAPP, FSP, RCRA guidance document [U. S. EPA, 1992] or EPA SW-846 [U. S. EPA, 1982]). It may be advisable to add preservatives to sample bottles in a controlled setting prior to entering the field in order to reduce the chances of improperly preserving sample bottles or introducing field contaminants into a sample bottle while adding the preservatives.

The preservatives should be transferred from the chemical bottle to the sample container using a disposable polyethylene pipet and the disposable pipet should be used only once and then discarded.

After a sample container has been filled with ground water, a Teflon™ (or tin)-lined cap is screwed on tightly to prevent the container from leaking. A sample label is filled out as specified in the FSP. The samples should be stored inverted at 4°C.

Specific decontamination protocols for sampling devices are dependent to some extent on the type of device used and the type of contaminants encountered. Refer to the site QAPP and FSP for specific requirements.

I. Blanks

The following blanks should be collected:

(1) field blank: one field blank should be collected from each source water (distilled/deionized water) used for sampling equipment decontamination or for assisting well development procedures.

(2) equipment blank: one equipment blank should be taken prior to the commencement of field work, from each set of sampling equipment to be used for that day. Refer to site QAPP or FSP for specific requirements.

(3) trip blank: a trip blank is required to accompany each volatile sample shipment. These blanks are prepared in the laboratory by filling a 40-mL volatile organic analysis (VOA) bottle with distilled/deionized water.

V. Low-Permeability Formations and Fractured Rock

The overall sampling program goals or sampling objectives will drive how the sampling points are located, installed, and choice of sampling device. Likewise, site-specific hydrogeologic factors will affect these decisions. Sites with very low permeability formations or fractures causing discrete flow channels may require a unique monitoring approach. Unlike water supply wells, wells installed for ground-water quality assessment and restoration programs are often installed in low water-yielding settings (e.g., clays, silts). Alternative types of sampling points and sampling methods are often needed in these types of environments, because low-permeability settings may require extremely low-flow purging (<0.1 L/min) and may be technology-limited. Where devices are not readily available to pump at such low flow rates, the primary consideration is to avoid dewatering of

the well screen. This may require repeated recovery of the water during purging while leaving the pump in place within the well screen.

Use of low-flow techniques may be impractical in these settings, depending upon the water recharge rates. The sampler and the end-user of data collected from such wells need to understand the limitations of the data collected; i.e., a strong potential for underestimation of actual contaminant concentrations for volatile organics, potential false negatives for filtered metals and potential false positives for unfiltered metals. It is suggested that comparisons be made between samples recovered using low-flow purging techniques and samples recovered using passive sampling techniques (i.e., two sets of samples). Passive sample collection would essentially entail acquisition of the sample with no or very little purging using a dedicated sampling system installed within the screened interval or a passive sample collection device.

A. Low-Permeability Formations (<0.1 L/min recharge)

1. Low-Flow Purging and Sampling with Pumps

a. "portable or non-dedicated mode" - Lower the pump (one capable of pumping at <0.1 L/min) to mid-screen or slightly above and set in place for minimum of 48 hours (to lessen purge volume requirements). After 48 hours, use procedures listed in Part IV above regarding monitoring water quality parameters for stabilization, etc., but do not dewater the screen. If excessive drawdown and slow recovery is a problem, then alternate approaches such as those listed below may be better.

b. "dedicated mode" - Set the pump as above at least a week prior to sampling; that is, operate in a dedicated pump mode. With this approach significant reductions in purge volume should be realized. Water quality parameters should stabilize quite rapidly due to less disturbance of the sampling zone.

2. Passive Sample Collection

Passive sampling collection requires insertion of the device into the screened interval for a sufficient time period to allow flow and sample equilibration before extraction for analysis. Conceptually, the extraction of water from low yielding formations seems more akin to the collection of water from the unsaturated zone and passive sampling techniques may be more appropriate in terms of obtaining "representative" samples. Satisfying usual sample volume requirements is typically a problem with this approach and some latitude will be needed on the part of regulatory entities to achieve sampling objectives.

B. Fractured Rock

In fractured rock formations, a low-flow to zero purging approach using pumps in conjunction with packers to isolate the sampling zone in the borehole is suggested. Passive multi-layer sampling devices may also provide the most "representative" samples. It is imperative in these settings to identify flow paths or water-producing fractures prior to sampling using tools such as borehole flowmeters and/or other geophysical tools.

After identification of water-bearing fractures, install packer(s) and pump assembly for sample collection using low-flow sampling in "dedicated mode" or use a passive sampling device which can isolate the identified water-bearing fractures.

VI. Documentation

The usual practices for documenting the sampling event should be used for low-flow purging and sampling techniques. This should include, at a minimum: information on the conduct of purging operations (flow-rate, drawdown, water-quality parameter values, volumes extracted and times for measurements), field instrument calibration data, water sampling forms and chain of custody forms. See Figures 2 and 3 and "Ground Water Sampling Workshop -- A Workshop Summary" (U. S. EPA, 1995) for example forms and other documentation suggestions and information. This information coupled with laboratory analytical data and validation data are needed to judge the "useability" of the sampling data.

VII. Notice

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Appendix E
Field Sampling Forms and Logs

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other ☐ _____

Page _____ of _____

Facility/Project Name	License/Permit/Monitoring Number	Boring Number

Boring Drilled By: Name of crew chief (first, last) and Firm First Name: Last Name: Firm:	Date Drilling Started m m / d d / y y y y	Date Drilling Completed m m / d d / y y y y	Drilling Method

WI Unique Well No.	DNR Well ID No.	Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
_ _ _ _ _ _	_ _ _ _		_____ Feet MSL	_____ Feet MSL	_____ inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane _____ N, _____ E
_____ 1/4 of _____ 1/4 of Section _____, T _____ N, R _____

Lat ___ ° ___ ' ___ "
Long ___ ° ___ ' ___ "

Local Grid Location
☐ N ☐ E
_____ Feet ☐ S _____ Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
		____ ____	

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment 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 other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	

State of Wisconsin
Department of Natural Resources

Instructions
Soil Boring Log Information Forms
Form 4400-122, Form 4400-l22A

General Instructions:

Fill out a Soil Boring Log Information Form for every boring drilled. Be sure to indicate the page number and boring number in the blanks at the top of each page. All applicable portions of the Soil Boring Log Information Form must be properly completed. The form must be signed. Form 4400-122A must only be used as an attachment to form 4400-122.

Routing:

Return this form to the project manager or plan reviewer for the Department program that required the boring. If the project manager/plan reviewer is in a Regional Office, send the original to the Regional Office and a copy to the Central Office in Madison. If the project manager/plan reviewer is in the Central Office, send the original form there and a copy to the Regional Office. If your project does not have a project manager or plan reviewer or you do not know who it is, send the form to the appropriate program in the Central Office. Check the appropriate box at the top of the form to assure proper routing once the form reaches the Department.

Facility/Project Name: List the name of the landfill, wastewater treatment facility, surface impoundment, spill or project.

License/Permit/Monitoring Number: The number assigned by the Department to the facility where the boring was drilled. If unknown, leave blank.

Boring Number: The site boring number or name (e.g., B-1).

Boring Drilled By: The name (first and last) of the drilling crew chief and the drilling firm name.

Date Drilling Started: The date the boring was started in month/day/year (mm/dd/yyyy) format.

Date Drilling Completed: The date the boring was completed in month/day/year (mm/dd/yyyy) format.

Drilling Method: List drilling method used: solid stem auger, hollow stem auger, rotary (air or mud), reverse rotary, cable tool, wash boring, vibratory, etc.

Wisconsin Unique Well Number: If a well is to be set in the boring, fill in the 2 alphabetic 3 numeric Wisconsin Unique Well Number (WUWN) on this form. In addition, attach a WUWN tag to the inside of the protective cover pipe and record that number on the Monitoring Well Construction Form 4400-113A and Monitoring Well Development Form 4400-113B. WUWN tags are available from the DNR Central or Regional Offices.

DNR Well ID Number: The 3 digit number assigned to the well by the Department.

Well Name: If a well is constructed, fill in common well name, such as B-ll, OW-13A, or MW-5R. (Use the suffix "R" for a replacement well.)

Final Static Water Level: The static water level in the borehole in tenths (0.1) of feet above mean sea level prior to abandonment or well construction.

Surface Elevation: The surface elevation of the ground surface at the borehole in tenths (0.1) of feet above mean sea level referenced to the closest USGS benchmark.

Borehole Diameter: The diameter of the borehole in tenths (0.1) of inches.

Local Grid Origin or Boring Location: Check the appropriate box behind the Local Grid Origin or the Boring Location text. Locate the grid origin at a permanent feature near the waste or source of contamination. Give the location in State Plane Coordinates or Latitude and Longitude in degrees, minutes and seconds (using 1927 North American Datum). If State Plane Coordinates are used, circle the appropriate letter for south, central, or north zone. Alternately, an acceptable method for providing this information

without surveying is to locate the Grid Origin on a USGS 7.5 minute quadrangle map. The Location of the Grid Origin can then be interpolated (estimated) using standard cartographic techniques. If the Grid Origin location is estimated, check the estimated box.

The boring location can be determined by surveying or by Global Positioning System (GPS) (with processing to be accurate within 1 foot and reported with precision to hundredths of a second). If the exact location or the boring is given in State Plane Coordinates, then leave the Local Grid Location fields blank.

Section Location of Waste/Source: Enter the quarter quarter section, quarter section, section, township, range and range direction.

Local Grid Location: The location of the boring to the nearest foot, in relation to the grid origin established for the site. If the exact location or the boring is given in State Plane Coordinates, then leave these fields blank.

Facility ID: Fill in the Facility ID (FID) assigned to the site.

County: The county in which the boring is located.

County Code: The two-digit Department county code. (The code is based alphabetically with Adams County 01 and Wood County 72 and can be found on the map included with the Monitoring Well Construction form instructions.)

Civil Town/City/or Village: The municipality in which the boring is located.

Sample Number: The number used to identify the sample. Indicate the type of sampling apparatus used (i.e. split spoon/ss, Shelby tube/st, grab/gs, piston sampler/ps, core/cs, cuttings/cu). Note the diameter of the sampler in Comments column.

Sample Length Attempted and Recovered: The length of sample attempted and the length of sample recovered reported in inches.

Blow Counts: The number of blow counts per specified length.

Depth: Indicate the depth (below ground surface) of sample collection and depth of any changes in the soil or rock type encountered.

Soil/Rock Description and Geologic Origin: List visual characteristics of soil/rock noted during boring along with any pertinent descriptive remarks. Each major soil unit and bedrock formation shall be described using both subsurface investigations and regional information. Indicate likely geologic origin and Munsell color of the material.
USCS: Indicate the Unified Soil Classification System classification of any unconsolidated units or rock type encountered during boring.

Graphic Log: Graphically illustrate soil/rock types encountered through the depth of boring and provide a key for the symbols used. Indicate the total depth of the boring on the log.

Well Diagram: Graphically show the well casing, well screen length(s), and the location of the top of the filter pack(s) if the boring is converted into a well.

PID/FID: Measurements performed on samples using a Photo-Ionization Detector or a Flame Ionization Detector. Indicate in the Comments column the type of detector and the method used.

Soil Properties:

Compressive Strength - Standard measurements in tons/ft. Indicate in the Comments column the type of test used.
Moisture Content - Laboratory measurements of percent moisture content.
Liquid Limit - Measurement in percent.
Plasticity Index - Measurement in percent.
P 200 - Measurement of percentage of soils smaller than the #200 sieve.

RQD/Comments: Where boring penetrates bedrock, indicate the Rock Quality Designation of the sample. Otherwise, place all comments or remarks in this column and the adjacent margin.

State of Wisconsin
Department of Natural Resources

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION

Form 4400-113A Rev. 7-98

Facility/Project Name	Local Grid Location of Well ____ ft. ☐ N. ☐ S. ____ ft. ☐ E. ☐ W.	Well Name
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ___° ___' ___" Long. ___° ___' ___" or	Wis. Unique Well No. _ _ _ _ _ _ / DNR Well ID No. _ _ _ _
Facility ID _ _ _ _ _ _ _ _ _	St. Plane ____ ft. N, ____ ft. E. S/C/N	Date Well Installed _ _ / _ _ / _ _ _ _ (m m d d y y y y)
Type of Well Well Code ____ / ____	Section Location of Waste/Source ____ 1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E. ☐ W.	Well Installed By: Name (first, last) and Firm
Distance from Waste/Source ____ ft. / Enf. Stds. Apply ☐	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known / Gov. Lot Number ____	

A. Protective pipe, top elevation _ _ _ _ _ _ ft. MSL

B. Well casing, top elevation _ _ _ _ _ _ ft. MSL

C. Land surface elevation _ _ _ _ _ _ ft. MSL

D. Surface seal, bottom _ _ _ _ _ _ ft. MSL or _ _ _ _ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis performed? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 50 / Hollow Stem Auger ☐ 41 / Other ☐ _____

15. Drilling fluid used: Water ☐ 02 / Air ☐ 01 / Drilling Mud ☐ 03 / None ☐ 99

16. Drilling additives used? ☐ Yes ☐ No
Describe _____

17. Source of water (attach analysis, if required):
_____

E. Bentonite seal, top _ _ _ _ _ _ ft. MSL or _ _ _ _ _ ft.

F. Fine sand, top _ _ _ _ _ _ ft. MSL or _ _ _ _ _ ft.

G. Filter pack, top _ _ _ _ _ _ ft. MSL or _ _ _ _ _ ft.

H. Screen joint, top _ _ _ _ _ _ ft. MSL or _ _ _ _ _ ft.

I. Well bottom _ _ _ _ _ _ ft. MSL or _ _ _ _ _ ft.

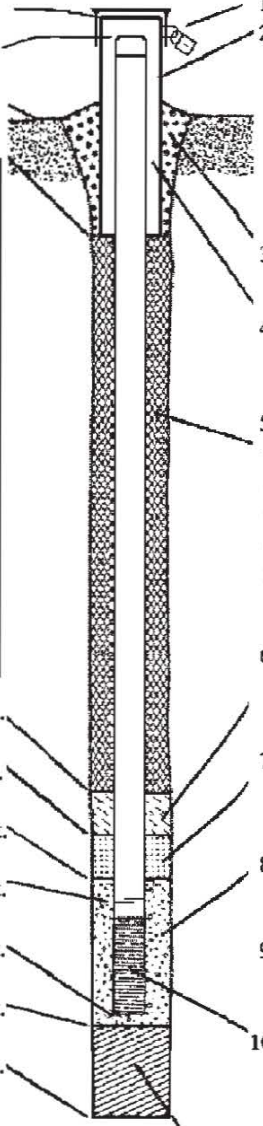
J. Filter pack, bottom _ _ _ _ _ _ ft. MSL or _ _ _ _ _ ft.

K. Borehole, bottom _ _ _ _ _ _ ft. MSL or _ _ _ _ _ ft.

L. Borehole, diameter _ _ _ _ in.

M. O.D. well casing _ _ _ _ in.

N. I.D. well casing _ _ _ _ in.



1. Cap and lock? ☐ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: _ _ _ in.
b. Length: _ _ _ ft.
c. Material: Steel ☐ 04 / Other ☐ _____
d. Additional protection? ☐ Yes ☐ No
If yes, describe: _____

3. Surface seal: Bentonite ☐ 30 / Concrete ☐ 01 / Other ☐ _____

4. Material between well casing and protective pipe: Bentonite ☐ 30 / Other ☐ _____

5. Annular space seal: a. Granular/Chipped Bentonite ☐ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 31
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. _____ Ft^3 volume added for any of the above
f. How installed: Tremie ☐ 01 / Tremie pumped ☐ 02 / Gravity ☐ 08

6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐1/4 in. ☐3/8 in. ☐1/2 in. Bentonite chips ☐ 32
c. _____ Other ☐ _____

7. Fine sand material: Manufacturer, product name & mesh size
a. _____
b. Volume added _____ ft^3

8. Filter pack material: Manufacturer, product name & mesh size
a. _____
b. Volume added _____ ft^3

9. Well casing: Flush threaded PVC schedule 40 ☐ 23 / Flush threaded PVC schedule 80 ☐ 24 / Other ☐ _____

10. Screen material: _____
a. Screen type: Factory cut ☐ 11 / Continuous slot ☐ 01 / Other ☐ _____
b. Manufacturer _____
c. Slot size: 0. _ _ _ in.
d. Slotted length: _ _ _ _ ft.

11. Backfill material (below filter pack): None ☐ 14 / Other ☐ _____

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm

Please complete both Forms 4400-113A and 4400-113B and return them to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number
	__	_ _ _ _ _ _	_ _ _

1. Can this well be purged dry? ☐ Yes ☐ No

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐ __

3. Time spent developing well _ _ _ _ min.

4. Depth of well (from top of well casisng) _ _ _ . _ ft.

5. Inside diameter of well _ _ . _ _ in.

6. Volume of water in filter pack and well casing _ _ _ . _ gal.

7. Volume of water removed from well _ _ _ . _ gal.

8. Volume of water added (if any) _ _ _ . _ gal.

9. Source of water added _____

10. Analysis performed on water added? (If yes, attach results) ☐ Yes ☐ No

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. _ _ _ . _ _ ft.	_ _ _ . _ _ ft.
Date	b. _ _/_ _/_ _ _ _ (m m d d y y y y)	_ _/_ _/_ _ _ _ (m m d d y y y y)
Time	c. _ _ : _ _ ☐ a.m. ☐ p.m.	_ _ : _ _ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	_ _ . _ inches	_ _ . _ inches
13. Water clarity	Clear ☐ 10 Turbid ☐ 15 (Describe)	Clear ☐ 20 Turbid ☐ 25 (Describe)
14. Total suspended solids	_ _ _ _ . _ mg/l	_ _ _ _ . _ mg/l
15. COD	_ _ _ _ . _ mg/l	_ _ _ _ . _ mg/l

Fill in if drilling fluids were used and well is at solid waste facility:

16. Well developed by: Name (first, last) and Firm
First Name: Last Name:
Firm:

17. Additional comments on development:

Name and Address of Facility Contact /Owner/Responsible Party
First Name: _____ Last Name: _____
Facility/Firm: _____
Street: _____
City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: _____
Print Name: _____
Firm: _____

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

INSTRUCTIONS
Monitoring Well Construction Form 4400-113A

General Instructions: Fill out both a monitoring well construction form (4400-113A) and a monitoring well development form (4400-113B) for each well installed. Sign each form. Please note that these forms are subject to change. (Personally identifiable information on these forms is not intended to be used for any other purpose.)

Routing: Return these forms to the project manager or plan reviewer for the DNR program who required the well installation. If the project manager/plan reviewer is in the Regional Office, send the original forms to the Regional Office and a copy to the Central Office in Madison. If the project manager/plan reviewer is in the Central Office, send the original forms there and a copy to the Regional Office. If your project does not have a project manager or plan reviewer or you don't know who it is, send the forms to the appropriate program in the Central Office. The addresses of the DNR offices are provided on the attached map.

Check the appropriate routing box at the top of the forms to assure proper routing once the forms reach DNR.

Time-saving tip: When filling out many forms at once, you can save time by using a photocopier. Fill out one form (the "original") with any information that is the same for all wells, such as facility name, section location, grid origin location, drilling method and well casing type. Photocopy both sides of the "original", making as many copies as there are wells. On the separate copies, fill in the details that are unique for each well.

TOP LEFT

Facility/Project Name: Fill in the name of landfill, wastewater treatment facility, surface impoundment, spill or project.

Facility License, Permit, or Monitoring Number: Fill in number assigned to facility by the Department. If unknown, leave blank.

Facility ID: Fill in the nine digit Facility ID (FID) assigned to the site.

Type of Well: Record the type of well code (number/initials) from the following list:

11/mw	Water table observation well (monitoring well screen intersecting the water table) (non Subtitle D well)
12/pz	Piezometer (monitoring well with screen sealed below the water table) (non Subtitle D well)
17/gc	Gradient control
18/at	Aquifer test
24/lh	Leachate head well
26/ew	Groundwater extraction well
27/he	Horizontal groundwater extraction well
28/hw	Horizontal monitoring well
29/ha	Horizontal vapor extraction well
51/gp	Gas probe
53/ge	Gas extraction well
57/sv	Soil venting wells (includes both soil vapor extraction and bioventing, includes both extraction and unsaturated zone gas phase injection wells installed in soil or fill, but not refuse
61/ij	Injection well (injection of liquids not gases)
62/as	In situ air sparging well (injection well to inject gases into the aquifer
63/uv	Unterdruck Verdampfer Brunnen (UVB) wells (sparging wells where the gases remain in the well and are not injected into the aquifer)
64/le	Groundwater and light non-aqueous phase liquid (LNAPL) extraction wells
65/de	Groundwater and dense non-aqueous phase liquid (DNAPL) extraction wells
66/ve	Vacuum enhanced groundwater extraction wells
67/vi	Vacuum enhanced groundwater and LNAPL extraction wells
68/vd	Vacuum enhanced groundwater and DNAPL extraction wells
71/dw	Subtitle D water table observation well (see 11/mw above)
72/dp	Subtitle D piezometer (see 12/pz above)
99/Ot	Other

Distance From Waste/Source: Enter distance in feet from the monitoring well to the edge of a facility waste storage or discharge structure, e.g., from the edge of a wastewater lagoon or the approved waste fill boundary for a landfill. For a contaminant source which is not a facility, e.g., a spill, enter the distance the well is from the contaminant source.

Enf. Stds. Apply: Check this box only if enforcement standards apply at this well. Enforcement standards apply at any well beyond the Design Management Zone or the property boundary of the facility or at a water supply well. For spills, enforcement standards apply at every point at which groundwater is monitored. (For more information, see s. NR 140.22, Wis. Adm. Code.)

TOP CENTER

Local Grid Location: The location of the well to the nearest foot, in relation to the grid origin established for the site. If the exact location of the well is given in State Plane Coordinates, then leave these fields blank.

Local Grid Origin or Well Location: Check the appropriate box behind the Local Grid Origin or the Well Location text. Locate the grid origin at a permanent feature near the waste or source of contamination. Give the location in State Plane Coordinates or Latitude and Longitude in degrees, minutes and seconds (using 1927 North American Datum). If State Plane Coordinates are used, circle the appropriate letter for south, central or north zone. Alternately, an acceptable method for providing this information without surveying is to locate the Grid Origin on a USGS 7.5 minute quadrangle map. The Location of the Grid Origin can then be interpolated (estimated) using standard cartographic techniques. If the Grid Origin location is estimated, check the estimated box.

The Well Location can be determined directly by surveying or by Global Positioning System (GPS) (with processing to be accurate within 1 foot and reported with precision to hundredths of a second). If the exact location of the well is given in State Plane Coordinates, then leave the Local Grid Location fields blank.

Section Location of Waste/Source: Fill in the quarter quarter and quarter section, section, township, range and range direction of the waste or source.

Location of Well Relative to Waste/Source: Check the box which describes the location of the well in the groundwater flow system relative to the disposal site, spill, etc. If groundwater flow directions are unknown, check "not known."

Gov. Lot Number: Provide the government lot number for the property if applicable. (Government lot numbers are the legal description of a tract of land adjacent to a lake or stream where a proper quarter or quarter quarter section corner could not be established.)

TOP RIGHT

Well Name: Fill in common well name, such as B-ll, OW-13A, or MW-5R. (Use the suffix "R" for a replacement well.)

Wis. Unique Well Number: Fill in the 2 alphabetic and 3 numeric Wisconsin Unique Well Number (WUWN) on this form. In addition, attach the WUWN tag to the inside of the protective cover pipe and record that number on the Soil Boring Log Information form 4400-122 and Monitoring Well Development form 4400-113B. WUWN tags are available from the DNR Central or Regional Offices.

DNR Well ID Number: The 3 digit number assigned to the well by the Department.

Date Well Installed: List Month/Day/Year (mm/dd/yyyy) the well was installed.

Well Installed By: Fill in name (first and last) and firm of the person who supervised the drilling. The person must be a hydrogeologist, a drilling crew chief or experienced engineering technician.

LEFT SIDE

Numerical Specifications: Fill in data for letters A through N which refer to design elements on the figure on the form. Letters A, B and C must be reported as elevations in feet above mean sea level (MSL), surveyed to the nearest 0.01 foot. Letters D through K may be either elevation above MSL or depth below land surface, accurate to the nearest 0.1 foot.

A. **Protective pipe, top elevation**. With cap off. Referenced to Mean Sea Level (MSL).

B. **Well casing, top elevation**. With cap off. Referenced to MSL.

C. **Land surface elevation**. Referenced to MSL.

D. **Surface seal, bottom**. Fill in elevation, MSL or depth below land surface.

E. **Bentonite seal, top**. MSL or depth below land surface. (See NR 141.13(1) to determine if this seal is required)

F. **Fine sand, top**. MSL or depth below land surface. Cross out if not installed.

G. **Filter pack, top**. MSL or depth below land surface.

H. **Screen joint, top**. MSL or depth below land surface. (Top of the entire screen section, NOT the top slot)

L. **Well bottom**. MSL or depth below land surface.

J. **Filter pack, bottom**. MSL or depth below land surface.

K. **Borehole, bottom**. MSL or depth below land surface.

L. **Borehole, diameter**: Diameter to nearest 0.1 inch.

M. **O.D. well casing**: Outside diameter to nearest 0.01 inch.

N. **I.D. well casing**: Inside diameter to nearest 0.01 inch.

LEFT CENTER INSERT (BOX)

12. **USCS classification of soil near screen**: Check boxes for all soil types (or bedrock) found at the depths spanned by the well screen, using the Unified Soil Classification System symbols. Refer to the native soil near the screen, not to the filter pack material.

13. **Sieve analysis performed?**: Check box. A sieve analysis for soil near the screen is required for all wells.

14. **Drilling method used**: Choose from among the choices on the form or check "Other" and write in one of the choices below:

Reverse rotary	Solid stem auger	Cable tool	Driven point
Vibratory	Casing hammer	Wash boring	

15. **Drilling fluid used**: Check appropriate box or boxes.

16. **Drilling additives used**: Check box. If yes, describe.

17. **Source of water**: Cite source(s) of any water used to drill the well OR to hydrate dry bentonite OR to mix annular space sealant. Cite exact source so that a sample of the water can be obtained later, if necessary. If the well is at a solid waste facility, attach an analysis of the water according to s. NR 507.06(1), Wis. Adm. Code.

RIGHT SIDE

1. **Cap and Lock**: Check box.

2. **Protective pipe**: Provide the information below.

   a. **Inside diameter**: Give to nearest 0.1 inch.
   b. **Length**: Give to nearest 0.1 foot
   c. **Material**: Check box. If "Other", describe.
   d. **Additional protection?**: Check box. If 'Yes', describe.

3. **Surface seal**: Check box for the material used to prevent surface water from entering the borehole. If "Other," describe.

4. **Material between well casing and protective pipe**: Check box. If "Other", describe.

5. **Annular space seal**: Check boxes for both materials used and how installed, and fill in volume used.

   Material: If dry bentonite, list source of water used for hydration on line #17. For wells installed at a solid waste site, attach an analysis of water (see s. NR 507.06(1), Wis. Adm. Code.) For other choices, fill in pounds per gallon mud weight or percent bentonite as appropriate.

   e. **Volume**: Fill in volume used in cubic feet.
   f. **How installed**: Check box for how the annular space seal was installed. If dropped from the land surface, check "Gravity."

6. **Bentonite seal**: If bentonite pellets were used, also check the pellet diameter. If material installed was the same as the annular space seal, or if no filter pack seal was installed, write "none."

7. **Fine sand material**: Fine sand is used to prevent migration of annular space seal material into the filter pack.
   a. Indicate manufacturer, product name, and mesh size.
   b. Indicate volume added.

8. **Filter pack material**: General description of filter pack material, e.g., "430 grit sand," and name of filter pack manufacturer, product name or number, and volume added. Attach grain size analysis of filter pack and state quantity used.

9. **Well casing**: Check box for PVC type. If "Other", describe. Examples of "Other" include stainless steel, steel, and Teflon ©.

10. **Screen material**: If same as well casing, write "same."

    a. **Screen type**: Check box. If "Other", describe the design.
    b. **Manufacturer**: List name of manufacturer.
    c. **Slot size**: Give width of slot in thousandths (0.001) of an inch.
    d. **Slotted length**: Give distance from top slot to bottom slot to nearest 0.1 foot.

11. **Backfill material**: Check "None" or, if "Other", describe any backfill installed below the filter pack.

FAR BOTTOM

"I hereby certify that the information on this form is true and correct to the best of my knowledge.": Sign the form and indicate name of firm.

MONITORING WELL DEVELOPMENT FORM 4400-113B

TOP TWO LINES

Facility/Project Name: Fill in the name of landfill, wastewater treatment facility, surface impoundment, spill or project.

Facility License Permit, or Monitoring Number: Enter number assigned to facility by the DNR. If unknown, leave blank.

County Name: Fill in the name of the county in which the well is installed.

County Code: Fill in the two digit county code number.

1 . Adams	16. Douglas	31. Kewaunee	46. Ozaukee	61. Taylor
2. Ashland	17. Dunn	32. La Crosse	47. Pepin	62. Trempealeau
3. Barron	18. Eau Claire	33. Lafayette	48. Pierce	63. Vernon
4. Bayfield	19. Florence	34. Langlade	49. Polk	64. Vilas
5. Brown	20. Fond Du Lac	35. Lincoln	50. Portage	65. Walworth
6. Buffalo	21. Forest	36. Manitowoc	51. Price	66. Washburn
7. Burnett	22. Grant	37. Marathon	52. Racine	67. Washington
8. Calumet	23. Green	38. Marinette	53. Richland	68. Waukesha
9. Chippewa	24. Green Lake	39. Marquette	54. Rock	69. Waupaca
10. Clark	25. Iowa	40. Menominee	55. Rusk	70. Waushara
11. Columbia	26. Iron	41. Mlwaukee	56. St. Croix	71. Winnebago
12. Crawford	27. Jackson	42. Monroe	57. Sauk	72. Wood
13. Dane	28 Jefferson	43. Oconto	58. Sawyer	
14. Dodge	29. Juneau	44. Oneida	59. Shawano	
15. Door	30. Kenosha	45. Outagamie	60. Sheboygan	

Well Name: Fill in common well name, such as P-11, OW-13A, or MW-5R. (Use the suffix "R" for a replacement well.)

Wis. Unique Well Number: Record the Wisconsin Unique Well Number assigned to the well.

DNR Well ID Number: The 3 digit number assigned to the well by the Department.

LEFT COLUMN

1. **Can this well be purged dry?** Check whether well can or cannot be purged dry (all water removed).

2. **Well development method**: Check appropriate box. If "Other", describe. Note that a well shall be surged and purged for a minimum of 30 minutes.

3. **Time spent developing well**: In minutes.

4. **Depth of well**: In tenths (0.1) of feet, from top of well casing.

5. **Inside diameter of well**: In hundredths (0.01) of inches.

6. **Volume of water in filter pack and well casing**: In tenths (0.1) of gallons.

7. **Volume of water removed from well**: In tenths (0.1) of gallons.

8. **Volume of water added, if any**: In tenths (0.1) of gallons.

9. **Source of water added**: Cite exact source so that a sample of the water can be obtained later, if necessary.

10. **Analysis performed on water added?** Check appropriate box. If well is installed at a solid waste facility, attach analysis of water according to s. NR 507.06(1), Wis. Adm. Code.

RIGHT COLUMN

11. **Depth to water**:

    a. Enter distance from top of well casing to water level in well, in hundredths (0.01) of a foot, both before and after development.

    b. **Date**: Enter month/day/year (mm/dd/yyyy) development began and ended.

    c. **Time**: Enter according to a twelve hour clock the time development began and ended.

12. **Sediment in well bottom**: Compute to tenths (0.1) of inches, both before and after development.

13. **Water clarity**: Check box and describe.

14. **Total suspended solids**: Total Suspended Solids, as determined by a certified or registered analytical laboratory. Required only for wells near solid waste facilities when drilling fluids were used.

15. **COD**: Chemical oxygen demand, as determined by a certified or registered analytical laboratory. Required only for wells near solid waste facilities when drilling fluids were used.

16. **Well developed by**: Enter the name (first and last) and firm of the person who supervised the development This person must be a hydrogeologist, the drilling crew chief, or an experienced engineering technician.

BOTTOM SECTION

17. **Additional comments on development**: Describe any of the above in more detail or add information such as the relative recovery rates of wells or the amount of drilling fluid lost to the formation and the amount of water removed to account for lost drilling fluid. For example, if 150 gallons of drilling water were, lost, you should remove the volume of water in the filter pack and well casing plus 150 gallons as part of development.

Name and Address of Facility/Owner/Responsible Party Contact: Enter a contact name (first and last), or a firm name or facility name, street address, city, state, and zip code of the facility or site.

Signature, Print Name, and Firm: Signature and printed name of the person filling out the form and name of firm for which the person works.

Tetra Tech, Inc. Ground Water Sampling Log

Project _____ **Site** _____ **Well No.** _____ **Date** _____

Well Depth _____ **Screen Length** _____ **Well Diameter** _____ **Casing Type** _____

Sampling Device _____ **Tubing type** _____ **Water Level** _____

Measuring Point _____ **Other Infor** _____

_____

Sampling Personnel _____

Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ]Conc	Pump Rate		Notes

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: Vol = $\pi r^2 h$, Vol = $4/3 \pi r^3$