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

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 Open 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		
Wahl	Scott		Tyco Fire Products LP		
Mailing Address			City	State	ZIP Code
2700 Industrial Parkway South			Marinette	WI	54143
Phone # (include area code)	Fax # (include area code)		Email		

The requester listed above: (select all that apply)

- [x] 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:

Contact Information (to be contacted with questions about this request)

[ ] Select if same as requester

Contact Last Name	First	MI	Organization/ Business Name		
Verburg	Ben		Arcadis		
Mailing Address			City	State	ZIP Code
126 N Jefferson Street, Suite 400			Milwaukee	WI	53202
Phone # (include area code)	Fax # (include area code)		Email		
(414) 276-7742			ben.verburg@arcadis.com		

Environmental Consultant (if applicable)

Contact Last Name	First	MI	Organization/ Business Name		
Verburg	Ben		Arcadis		
Mailing Address			City	State	ZIP Code
126 N Jefferson Street, Suite 400			Milwaukee	WI	53202
Phone # (include area code)	Fax # (include area code)		Email		
(414) 276-7742			ben.verburg@arcadis.com		

Section 2. Property Information

Property Name			FID No. (if known)		
Tyco Fire Technology Center - PFCs			438005590		
BRRTS No. (if known)			Parcel Identification Number		
0238580694					
Street Address			City	State	ZIP Code
2700 Industrial Parkway South			Marinette	WI	54143
County	Municipality where the Property is located		Property is composed of:		Property Size Acres
Marinette	◯ City ◯ Town ◯ Village of Marinette		◯ Single tax parcel ◯ Multiple tax parcels		380

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).

Skip Sections 4 and 5 if the technical assistance you are requesting is listed above and complete Sections 6 and 7 of this fo

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.

This Form 4400-237 is being submitted for review/technical assistance in reference to the DNR-requested Southern Area Groundwater Evaluation Report document.

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: _____

Date of Collection: _____

- ☐ 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: _____

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 (non-emergency) form is available at: dnr.wi.gov/files/PDF/forms/4400/4400-225.pdf.

Section 7. Certification by the Person who completed this form

- ☐ I am the person submitting this request (requester)
- ☒ I prepared this request for: Scott Wahl

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

3-3-2020
Date Signed

Principal Engineer
Title

414-276-7742
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.

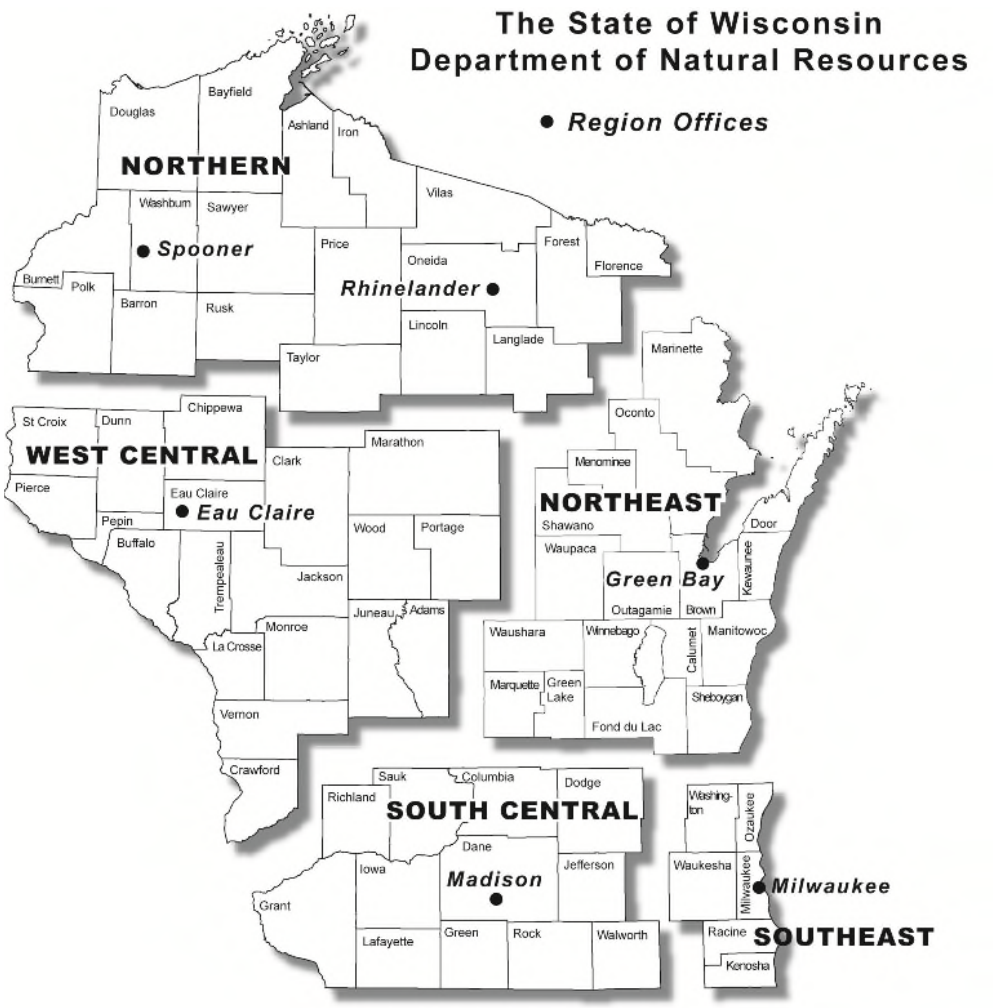
DNR NORTHERN REGION
Attn: RR Program Assistant
Department of Natural Resources
223 E Steinfest Rd Antigo, WI 54409

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
Department of Natural Resources
2300 North Martin Luther King Drive
Milwaukee WI 53212

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		

ARCADIS Design & Consultancy for natural and built assets

Mr. David Neste
Remediation and Redevelopment Program
Wisconsin Department of Natural Resources
2984 Shawano Avenue
Green Bay, Wisconsin 54313-6727

Arcadis U.S., Inc.
10 Friends Lane
Suite 100
Newtown
Pennsylvania 18940
Tel 267 685 1800
Fax 267 685 1801
www.arcadis.com

ENVIRONMENT

Subject:
Southern Area Groundwater Evaluation Report
Tyco Fire Technology Center PFAS
2700 Industrial Parkway South, Marinette, Wisconsin
BRRTS Activity#: 02-38-580694

Date:
March 20, 2020

Contact:
Michael Bedard

Email:
michael.bedard@arcadis.com

Dear Mr. Neste:

On behalf of Tyco Fire Products LP (Tyco), Arcadis US, Inc. (Arcadis) submits the attached "*Southern Area Groundwater Evaluation Report*" (Evaluation Report) for the Wisconsin Department of Natural Resources (WDNR) Bureau for Remediation and Redevelopment Tracking System site number referenced above.

Tyco conducted extensive site investigation activities to further evaluate the presence of per- and poly-fluorinated alkyl substances (PFAS) in groundwater in a portion of the Town of Peshtigo, Wisconsin, referred to as the Southern Area. The investigation activities included the collection of vertical aquifer profiling (VAP) groundwater samples and water-level elevation measurements, and installation of piezometers and stilling well/piezometer pairs to understand groundwater conditions. Surface water sample data also was used for this evaluation.

The Evaluation Report is focused on groundwater and surface water flow pathways and the mixture of PFAS in groundwater in the Southern Area. The Southern Area referenced in this Evaluation Report is an informally defined region of approximately 0.75 square miles, lying south of Rader Road, north of the Little River, between Ditch A and the Bay of Green Bay in the Town of Peshtigo, and includes the Heath Lane Area.

Groundwater quality data show that the southernmost extent of PFAS detections potentially related to the Tyco Fire Technology Center (FTC) is generally north of, and does not extend to, the Southern Area. Although PFAS also were detected in parts of the Southern Area south of the FTC plume extent, specifically in a grouping of VAP borings in the vicinity of Heath Lane and Edwards Avenue, the extensive data collected indicates the detections of PFAS in this grouping are due to an isolated local source or sources not associated with the FTC.

The multiple lines of evidence supporting these conclusions include the following:

- The absence of PFAS detections in groundwater upgradient of the Heath Lane and Edwards Avenue area indicates that the VAP detections and other isolated PFAS detections in the Southern Area are disconnected from the FTC groundwater plume.
- In the western portion of the Southern Area, groundwater flows into Ditch A (i.e., the ditch is “gaining”) and the absence of PFAS detections in shallow groundwater adjacent to Ditch A suggest that Ditch A has not been a source of PFAS to groundwater in the Southern Area.
- The shallow depth and limited vertical extent of PFAS detections in Southern Area groundwater indicate those detections are derived from a nearby local point source or other sources, and the mixture of PFAS substances detected in VAP samples collected in the Southern Area is distinct from the mixture detected in areas that were affected by releases at the FTC.

The Evaluation Report provides data indicating that the Southern Area detections are not related to the FTC. To the extent unconfirmed PFAS test results are being reported for the Southern Area or locations to the south and west of the Southern Area, the evidence indicates that these results are related to an isolated local source or sources not associated with the FTC and not yet identified by the WDNR.

Tyco and Arcadis look forward to hearing your thoughts on this report.

Sincerely,

Arcadis U.S., Inc.

Michael F. Bedard
Program Manager

Copy:
Jeffrey Danko, Scott Wahl, Rick Bethel – Johnson Controls

Attachment

Southern Area Groundwater Evaluation Report, Tyco FTC, Marinette

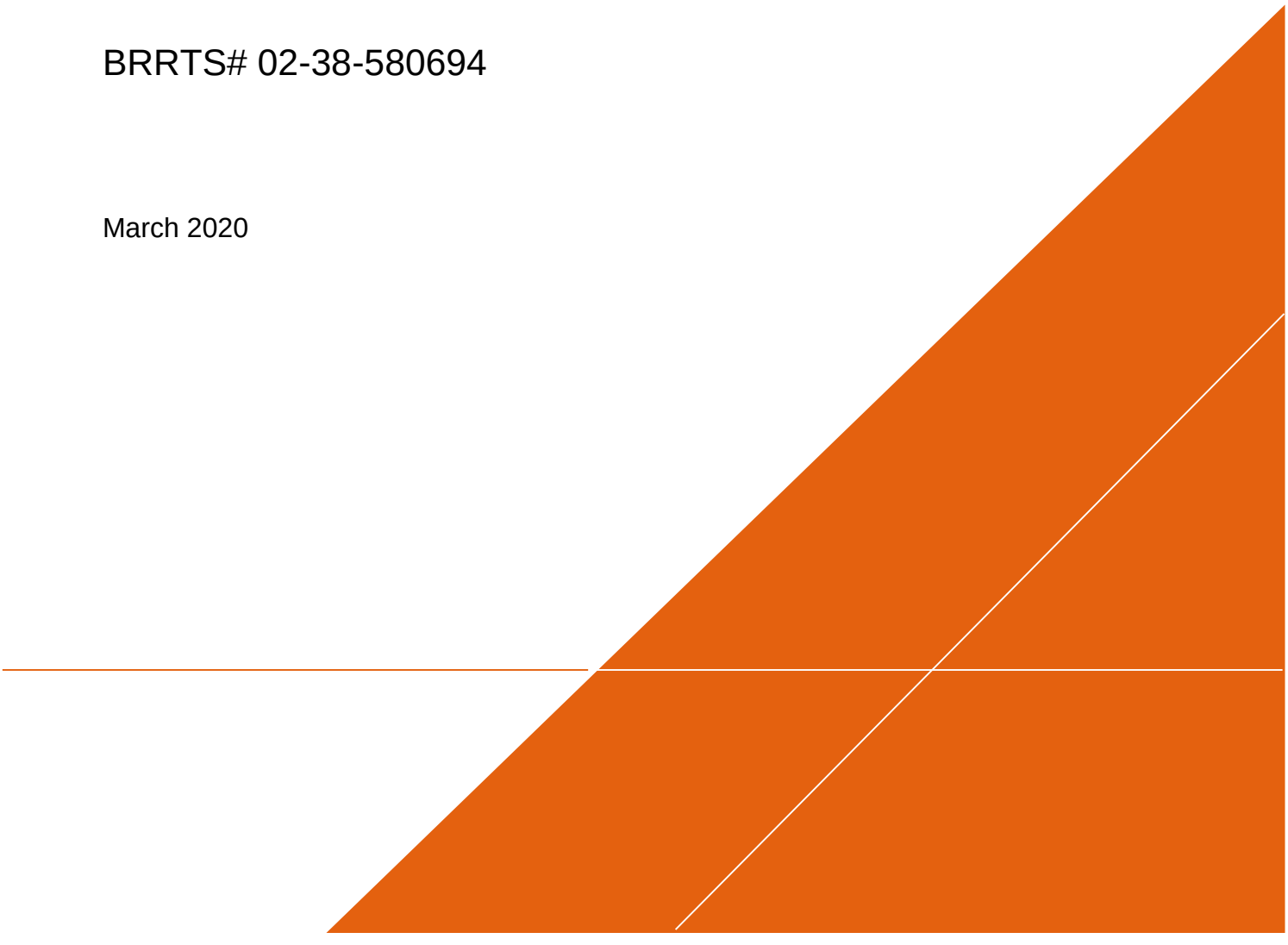
ARCADIS Design & Consultancy for natural and built assets

Tyco Fire Products LP

SOUTHERN AREA GROUNDWATER EVALUATION REPORT

BRRTS# 02-38-580694

March 2020



SOUTHERN AREA GROUNDWATER EVALUATION REPORT

Christopher S. Peters, PG
Project Geologist

Benjamin J. Verburg, PE
Principal Engineer

Michael F. Bedard
Project Lead/Associate Vice President

Prepared for:

Tyco Fire Products LP
2700 Industrial Parkway South
Marinette
Wisconsin 54143

Prepared by:

Arcadis U.S., Inc.
126 North Jefferson Street
Suite 400
Milwaukee
Wisconsin 53202
Tel 414 276 7742
Fax 414 276 7603

Our Ref:

30015290

Date:

March 20, 2020

CONTENTS

FIGURES

APPENDIX

Appendix A Historical PFAS Groundwater Sampling Data

EXECUTIVE SUMMARY

On behalf of Tyco Fire Products LP (Tyco), Arcadis U.S., Inc. (Arcadis) conducted extensive site investigation activities to further evaluate the presence of per- and poly-fluorinated alkyl substances (PFAS) in groundwater in a portion of the Town of Peshtigo, Wisconsin, referred to as the Southern Area. Tyco and Arcadis have conducted PFAS investigation work over a wider area within the City of Marinette and the Town of Peshtigo over the last few years, and this report provides an evaluation of the data collected within a smaller portion of the overall investigation area. The investigation activities included the collection of vertical aquifer profiling (VAP) samples and water-level elevation measurements, and installation of piezometers and stilling well/piezometer pairs to obtain a further understanding of groundwater conditions. This *Southern Area Groundwater Evaluation Report* (*Evaluation Report*) presents the analysis and interpretation of the data collected during the above-referenced site investigation activities.

This Evaluation Report is focused on groundwater and surface water flow pathways and the mixture of PFAS in groundwater in the Southern Area. The Southern Area referenced in this Evaluation Report is an informally defined region of approximately 0.75 square miles, lying south of Rader Road, north of the Little River, and between Ditch A and the Bay of Green Bay in the Town of Peshtigo. The Heath Lane Area is included within the Southern Area.

Groundwater quality data associated with the VAP borings and piezometers show that the southern extent of PFAS detections that are potentially related to the Tyco Fire Technology Center (FTC) is north of the Southern Area, with the exception of a narrow area south of Rader Road adjacent to Green Bay. Although PFAS were also detected in parts of the Southern Area south of the FTC plume extent, most notably in a grouping of VAP borings in the vicinity of Heath Lane and Edwards Avenue, the extensive dataset provides multiple lines of evidence that show the detections of PFAS in this grouping are due to an isolated local source or sources not associated with the FTC. This evidence also demonstrates that other PFAS detections in the vicinity of the Southern Area are not associated with the FTC.

The multiple lines of evidence supporting these conclusions include the following:

- The absence of PFAS detections upgradient of the Heath Lane and Edwards Avenue area indicates that the VAP detections and other isolated detections in that area are disconnected from the FTC groundwater plume and therefore not related to it.
- The shallow depth and limited vertical extent of PFAS detections in the Southern Area indicate they are derived from nearby local point or other sources rather than transported over a significant distance in deeper groundwater as would be necessary if they were associated with the FTC.
- The gaining condition of Ditch A and the absence of PFAS detections in shallow groundwater adjacent to Ditch A suggest that Ditch A is not and was not historically a source of PFAS to groundwater in the Southern Area.
- The mixture of PFAS substances detected in VAP samples collected in the Southern Area is distinct from the mixture detected in areas known to be affected by releases at the FTC.

In summary, this Evaluation Report provides robust, multi-faceted data demonstrating that the Southern Area detections are outside of the FTC groundwater plume. Thus, to the extent unconfirmed PFAS test results are being reported for the Southern Area or locations to the south and west of the Southern Area, the evidence and data indicate that such results are related to an isolated local source or sources not associated with the FTC and not yet identified by the Wisconsin Department of Natural Resources.

1 INTRODUCTION

This *Southern Area Groundwater Evaluation Report* (*Evaluation Report*) provides analysis and interpretation as a supplement to the January 2020 *Data Summary Report – Heath Lane Area Site Investigation* (Data Summary Report) and other investigation reports prepared by Arcadis U.S., Inc. (Arcadis) on behalf of Tyco Fire Products LP (Tyco). Those reports present the results of extensive field investigations completed to evaluate the presence of per- and poly-fluorinated alkyl substances (PFAS) in groundwater in a portion of the town of Peshtigo, Wisconsin, referred to as the Southern Area. Tyco and Arcadis have conducted PFAS investigation work over a wider area within the City of Marinette and the Town of Peshtigo over the last few years, and this Evaluation Report summarizes the Southern Area data collected within a smaller portion of the overall investigation area. The Heath Lane Area is included within the Southern Area.

This Evaluation Report is structured as a supplement to the prior reports noted above, and therefore does not include duplicate figures and data tables except as needed to support the discussion. The reader is referred to the Data Summary Report and other reports referenced herein and in Section 4 of this Evaluation Report for complete results and a detailed summary of the work completed. In addition, Appendix A includes the PFAS groundwater data summary tables from prior reports.

As described by the Wisconsin Department of Natural Resources (WDNR) at a public meeting on March 13, 2019, the site investigation process typically consists of iterative steps. This document is not intended to fulfill the requirements of the Natural Resources (NR) NR700 rule series representing a comprehensive *Site Investigation Report* for the entire study area.

The discussion presented in this Evaluation Report of geologic/hydrogeologic data, groundwater flow conditions, including the interaction of groundwater and surface water, and groundwater analytical results is based on site investigation activities that span more than 2 years. Since November 2017, the data collection efforts have included the following investigation activities:

- Advancement of borings using direct push technology and sonic drilling method for geologic and hydrogeologic logging purposes.
- Advancement of hydraulic profiling tool borings.
- Collection of soil samples from a number of vertical aquifer profiling (VAP) intervals for laboratory analysis of PFAS.
- Collection of groundwater samples from multiple depth intervals in numerous VAP locations for laboratory analysis of PFAS.
- Installation of temporary piezometers and collection of groundwater samples for laboratory analysis of PFAS and depth to water measurements from these piezometers.
- Installation of stilling wells and piezometers (pairs) on Ditch A.
- Measurement of paired surface water and groundwater elevations.
- Collection of surface water samples for laboratory analysis of PFAS and measurement of stream velocity.

The findings of the data analysis and interpretation associated with these field efforts are presented in various site investigation and data summary reports including the *Site Investigation Report* dated September 2018, the *Data Summary Report* dated March 2019, and the *Data Summary Report – Supplemental Site Investigation* dated December 2019.

2 BACKGROUND AND OBJECTIVES

The Southern Area is an informally defined region of approximately 0.75 square miles, lying south of Rader Road, north of the Little River, and between Ditch A and Green Bay (Figure 1). This area is outside of the interpreted Tyco Fire Technology Center (FTC) groundwater plume. The investigations completed within the Southern Area are an extension of work performed relating to PFAS concerns associated with the FTC, located approximately 1 mile to the northwest on Industrial Parkway South in Marinette, Wisconsin (Figure 1). Although as further discussed in this report, the data indicate that PFAS detections in groundwater in the Southern Area are not associated with PFAS detections connected to the FTC, Tyco is cooperating with WDNR to better understand the presence of PFAS in this area.

The objectives of this Evaluation Report are to:

- Provide an interpretation of the geology, hydrology, and groundwater flow patterns in the Southern Area.
- Describe the nature and extent of PFAS detections in the Southern Area.
- Provide interpretation of PFAS sources and transport pathways to the Southern Area.

This Evaluation Report is focused on groundwater and surface water flow pathways and PFAS detected (or not detected) in groundwater and drinking water wells. Other receptors and transport pathways are discussed or considered, but they are not the focus of this Evaluation Report for two primary reasons:

- Groundwater represents the most important receptor pathway for human consumption of drinking water.
- Other transport pathways and/or mechanisms (e.g., historical air transport) are not as likely to have contributed to meaningful concentrations of PFAS in drinking water that are at or near WDNR's proposed groundwater standard for PFAS. In the near future, Tyco will provide WDNR with additional evaluation of the potential for historical air transport of PFAS.

Additional data analyses and assessments are currently underway to support evaluation of PFAS concerns associated with the FTC. Tyco's FTC analysis will be comprehensive in nature and may provide further refinements and updates to the interpretations described below.

2.1 Physical Setting

The Southern Area comprises residential, undeveloped, and/or forest land (Figure 1). The area includes a wetland of approximately 30 acres lying south of Rader Road and north of a small out-of-use sanitary landfill owned by the Town of Peshtigo. The primary residential areas are along the Green Bay shore or along Heath Lane and Edwards Avenue, in the southern part of the Southern Area.

The Southern Area is nearly flat. The western side of the Southern Area is drained by a ditch that flows to Green Bay. This ditch is not formally named but is referred to in this Evaluation Report by letter (A), as identified on Figure 1. Ditch A originates in the FTC and then flows south. Two unnamed ditches flow into Ditch A between University Drive and Rader Road. South of Edwards Avenue, Ditch A flows into the Little River. The Little River flows into Green Bay.

2.2 Geology

The surficial geology in the Marinette and Peshtigo area is mapped by the United States Geological Survey as glacial lake deposits, consisting mainly of clay, silt, and sand, overlying Ordovician dolomite bedrock (Oakes and Hamilton 1973). Observations from boreholes completed in the Southern Area are consistent with this interpretation. Figure 2 shows the transect locations of two cross sections prepared to illustrate the geology of the Southern Area. The cross sections are presented on Figures 3 and 4. For these cross sections, the detailed geologic interpretations included on the subsurface logs have been generalized to better illustrate the major hydrostratigraphic zones. The cross sections support the following observations:

- The overburden in the Southern Area is approximately 100 to 115 feet thick, encompassing a layered sequence of glacial deposits.
- The glacial sediments are predominantly sands, ranging from fine to-coarse texture. The coarsest beds also include gravel-size particles.
- The sandy portions of the overburden are separated into shallow and deep units by a zone of lower permeability materials that contain a significant percentage of silt or clay.
- Within the Southern Area, the zone of lower permeability varies in thickness and soil-type but does appear to be laterally continuous based on data obtained in the investigations. Investigations related to the FTC have shown that this low-permeability zone is present in locations north of the Southern Area, but that it is not continuous throughout the entire Marinette-Peshtigo area.
- The deep sand zone is separated from the dolomite bedrock by a zone of low-permeability sediments that range from 5 to more than 20 feet in thickness. This zone typically consists of silt and clay overlying dense clay-rich till.

2.3 Hydrogeology and Groundwater Flow

The sandy surface soils found in the Southern Area are typically well-drained, allowing recharge to occur broadly across the area. The shallow and deep sand units are moderately to highly permeable and support residential drinking water supply via private wells. Potentiometric surfaces for both the shallow and deep zones (Figures 5 and 6) show a dominant southeastward gradient direction in the Southern Area. Potentiometric contours shown on Cross Section A-A' (Figure 3) also illustrate how groundwater flows in the vertical plane, including how groundwater interacts with surface water in Ditch A and Green Bay. The potentiometric surfaces and potentiometric cross-section support several interpretations regarding groundwater flow in the Southern Area, as follows:

- The water table occurs at depths averaging less than 5 ft below ground surface (ft bgs) in the shallow sand unit. The water table intersects surface water at several features: Ditch A to the west, Little River to the south and Green Bay to the east. The water table also likely intersects the wetland south of Rader Road, Ditch E adjacent to Rader Road, and a private manmade pond at the corner of Shore Drive and Rader Road.
- As the regional hydraulic base level, Green Bay is the dominant control on groundwater flow patterns. In both the shallow and deep units, the major component of flow is toward Green Bay.

- Ditch A influences the shallow sand potentiometric surface along the western edge of the Southern Area, where the ditch is gaining. During the October 2019 measurement round, upward gradients were observed at the streambed piezometers and stilling-well pairs where Ditch A crosses Rader Road (PZ/STW-1), Heath Lane (PZ/STW-40), and Edwards Avenue (PZ/STW-39). As shown on Cross-Section A-A' (Figure 3), the piezometer level at PZ/STW-40 was at least 2.5 feet higher than the ditch level, a condition that demonstrates a strong gradient into the ditch from shallow groundwater both on the west and east sides.
- The gaining condition of Ditch A creates a groundwater divide in the shallow zone between Ditch A and Green Bay. While shallow groundwater over most of the Southern Area flows southeast toward Green Bay, the western edge of the area flows toward Ditch A.
- The deep sand unit potentiometric surface is not influenced by Ditch A, and therefore does not exhibit a groundwater divide like the shallow sand unit. The flow in the deep sand is southeasterly toward Green Bay or (in the southern part of the Southern Area) potentially toward the lower reach of the Little River. The stage of the Little River downstream of the Ditch A confluence is very near the elevation of Green Bay, and likely acts as a discharge boundary for both the shallow and deep sand units.

Note that slight downward gradients are observed between the shallow and deep sand units in the center of the Southern Area, at locations farthest away from Green Bay, Ditch A, or the Little River (i.e., PZ-43 and PZ-42 piezometer clusters). This supports the observation that the region provides recharge to the shallow sand unit, via general infiltration through the sandy soils. At locations closer to Green Bay or the Little River, the vertical gradient reverses and is upward (i.e., PZ-36, PZ-37, and PZ-38 clusters). This shift in vertical gradient direction reflects discharge occurring to Green Bay and the Little River and away from the Southern Area. As illustrated on Cross-Section A-A' (Figure 3), groundwater in the shallow sand unit intersects surface water directly and therefore discharge to Green Bay likely occurs at the shoreline. Groundwater in the deep sand unit, however, is partially confined by low-permeability beds. Discharge from the deep sand up to Green Bay and the Little River likely occurs more diffusely and over a broader area (including out beyond the Green Bay shoreline).

The data collected indicate that the segment of Ditch A adjacent to the Southern Area is perennial and gaining. These observations are consistent with the expectation that a stream in this physiographic setting would receive groundwater discharge. Ditch A (including the two unnamed ditches that flow into Ditch A) is the primary drainage for an approximately 3.5-square-mile recharge area within Peshtigo and Marinette, including areas upstream and west of the FTC. The portion of Ditch A adjacent to the Southern Area is the most downstream portion of this drainage basin. As illustrated on Cross-Section A-A' (Figure 3), the ditch is topographically entrenched below the nearly flat land that surrounds it. In this setting, the segment of Ditch A adjacent to the Southern Area would be expected to act as a local base level, receiving shallow groundwater under all normal conditions.

Although the observed conditions and physical setting of Ditch A indicate that gaining conditions are predominant, short-term reversals (losing conditions) are possible under extreme weather conditions. During storm or flood events, water levels in the ditch can rise quickly and cause a short period of losing conditions until water levels recede. Though unlikely, it is also theoretically possible that historical periods of severe drought may have caused temporary losing conditions in Ditch A. In either case, a short period

in which the stream exhibits losing conditions will generally not influence groundwater quality away from the ditch. At the slow pace of groundwater flow (e.g., 10s to 100s of feet per year), most short-term losing periods will not result in water escaping the ditch's catchment. Instead, lost surface water will migrate a short distance from the ditch, but then flow back into the ditch when stream and groundwater levels revert to normal conditions (e.g., as illustrated on Cross Section A-A'). As explained below, VAP borings around Ditch A further support this conclusion.

2.4 Groundwater PFAS Analytical Results

The mixture of PFAS substances in the Southern Area has been evaluated via VAP with discrete-depth water samples collected between December 2017 and August 2019. The groundwater sampling in the Southern Area supplements a wider-ranging investigation completed for the FTC over approximately the same time period. Appendix A includes the PFAS groundwater data summary tables from prior reports. Figure 7 provides an overview of PFAS detections across the Marinette-Peshtigo area. The yellow line on the figure denotes the lateral extent of PFAS impacts that are potentially related to the FTC. The lateral extent was determined based on robust data regarding the observed mixture of PFAS in groundwater across the region (including VAP borings, piezometers, and private wells), data regarding PFAS releases from the FTC, and patterns of surface water and groundwater transport.

As shown on Figure 7, the data indicate that the southern extent of PFAS detections potentially related to the FTC is north of the Southern Area, with the exception of a narrow wedge-shaped area south of Rader Road adjacent to Green Bay. The PFAS detections found south of the FTC plume extent in the Southern Area represent either local point or minor sources unrelated to the FTC. Figures 8 and 9C present the results of VAP sampling in the Southern Area. The figure supports the following observations:

- Samples from a grouping of four VAP borings (VAP-36, VAP-40, VAP-41, and VAP-48) completed near the intersection of Heath Lane, Shore Drive, and Edwards Avenue show low-level detections (less than 20 nanograms per liter [ng/L]) of perfluorooctanoic acid (PFOA) and/or perfluorooctane sulfonate (PFOS) and a maximum combined PFOA/PFOS concentration of 24.4 ng/L (VAP-48 at 6- to 10-foot sample depth).
- In this "Heath Lane grouping", the samples with the highest detections are limited to the upper portion of the shallow sand unit near the water table, at depths of less than 20 ft bgs. All samples collected deeper than 20 ft bgs contained combined PFOS and PFOA concentrations no greater than 2.4 ng/L (VAP-48 at 33- to 37-foot sample depth), with most sample intervals having no detections above the reporting limit (RL). The shallow nature of these detections is important because they are indicative of local releases.
- The shallow detections in the Heath Lane grouping are also spatially isolated, which is not consistent with what the data would show if these detections were being driven by one common, large-scale groundwater plume.
- Perhaps most significantly, the Heath Lane grouping is surrounded to the west and northwest (i.e., upgradient direction) by additional VAP borings where no samples contained PFOS or PFOA at levels consistent with the shallow detections found in the grouping.

- In samples from VAP locations within the immediate upgradient area, within approximately 1,500 feet of the Heath Lane grouping (VAP-37, -42, -43, -49, -50, -51, -52), with one exception PFOA and PFOS were not detected above the RL or were detected at a combined concentration no greater than 5.7 ng/L (VAP-37 at 29- to 33-foot sample interval). These data help establish a boundary around the Heath Lane grouping that shows it is not connected to the FTC-impacted groundwater.
- There is only one exception to this “clean ring” encircling the Heath Lane grouping: a combined PFOS and PFOA concentration of 27.5 ng/L in the 7- to 10-foot depth sample from VAP-53. However, for several reasons, the data indicate that this isolated exception is related to an as-yet unidentified localized source and, like the Heath Lane grouping, is not connected to the FTC-impacted groundwater. First, this location is cross-gradient from the Heath Lane grouping, indicating that the particular source affecting groundwater at VAP-53 is unrelated to the localized source or sources that affect shallow groundwater in the Heath Lane grouping. Moreover, the very shallow depth of the VAP-53 detection also suggests it too is related to a separate localized surface release. All deeper samples collected at VAP-53 contained no PFOS or PFOA concentrations above RLs.
- Samples collected farther upgradient of the Heath Lane grouping provide additional evidence that the detections are not connected to the FTC plume. In samples from borings VAP-17 and 47, located on Rader Road, PFOS and PFOA concentrations were not detected above the RL for most intervals, with an estimated maximum combined detection of 3.47 ng/L (VAP-17 at 46- to 50-ft bgs sample). In addition, Figure 8 shows that PFOS and PFOA have not been detected in any of the 15 residential wells (denoted by green triangular markers) sampled routinely on Stanley Lane and the section of Rader Road between Ditch A and Green Gable Road. These data further mark a boundary between the FTC-impacted groundwater and the Southern Area.
- Though surface water sampling performed for the FTC investigation has shown that PFAS substances are present in Ditch A as it flows through the Southern Area, samples from VAP borings adjacent to Ditch A show that it is not affecting groundwater quality. For example, no PFOA or PFOS substances were detected in any of the shallow sample intervals at VAP-17 and VAP-38 (located where Rader Road and Heath Lane cross Ditch A, respectively). As discussed previously, the hydraulic measurements obtained in this reach of Ditch A have shown that it is consistently gaining, which means that any PFAS in Ditch A flow in this area would not affect the groundwater around it. These VAP results for borings near the ditch (1) further underscore this conclusion as to current prevailing conditions and (2) demonstrate that historical periods of losing conditions have not occurred or did not occur for sufficiently long periods to affect groundwater quality.
- There is no evidence that PFOS or PFOA substances are present at significant concentrations in the deep sand unit within the Southern Area. Samples collected from VAP-52 and VAP-53 from the deep sand unit (i.e., those deeper than approximately 50 feet) contained no PFOS or PFOA concentrations above the RL.

In summary, the grouping of shallow detections of PFOS and PFOA up to a combined concentration of 24.4 ng/L in the vicinity of Heath Lane and Edwards Avenue are due to an as-yet unidentified isolated local source or sources and are not connected to the FTC-impacted groundwater. This grouping is disconnected from the FTC plume area by more than 2,000 feet. Within the area upgradient of the grouping, there is no evidence of connection to PFAS detections in groundwater associated with the FTC. The very shallow depths of detections moreover suggest a local source, not a long-distance transport

pathway. The detections found in shallow groundwater can be best explained by nearby surface or near-surface releases that have not been identified to date, rather than a hydrogeologically implausible connection to the FTC-impacted groundwater.

2.5 PFAS Mixture in Groundwater Samples Collected in Investigation Area

Another line of evidence that the detections in the Southern Area are unrelated to the FTC is the fact that the mixture of PFAS detected in Southern Area VAP borings is distinctly different from detections found in northern portions of the FTC investigation area. In general, groundwater detections potentially associated with the FTC are PFOA-dominant (i.e., PFOA is more than 50 percent of the PFAS concentration detected) (Figure 9A, Figure 10A, and Figure 11A, left). Whereas at the four VAP borings where the highest PFAS detections were observed in the Heath Lane grouping (VAP-36, VAP-40, VAP-41, and VAP-48), PFOA ranges between 13 percent and 39 percent of the total PFAS detected (Figure 9C and Figure 10C) and in two of the borings (VAP-36 and VAP-41), PFOS is detected at higher concentrations than PFOA. The only locations in the Southern Area outside of the potential FTC plume where PFOA is dominant are VAP-46 and VAP-53. As discussed in Section 2.4, VAP-53 is interpreted to be impacted by an as-yet unidentified localized source, distinct from both the FTC plume and from the detections in the Heath Lane grouping. The VAP-46 detection is low level, with PFOA measured at a maximum concentration of 8.8 ng/L.

2.5.1 FTC Groundwater PFAS Mixture

The FTC groundwater plume is characterized by a predominance of PFOA (green), perfluorohexanoic acid (PFHxA) (yellow), and perfluoroheptanoic acid (PFHpA) (purple), seen in the individual sample locations (Figures 9A and 10A) and in an analysis of the aggregate data (Figure 11A). PFOS (teal) represents a small percentage of the PFAS in most sample locations. Overall, these samples are highly perfluoroalkyl carboxylate dominant (89.6 percent of the average concentration) (Figure 11A, right). PFOS and perfluorohexane sulfonate (PFHxS) (red) account for 9.2 percent of the remaining average PFAS concentration (Figure 11A, left).

Only three locations (VAP-12, VAP-28, and VAP-30) are not perfluoroalkyl carboxylate dominant within the FTC-impacted area, and all of the detections at these locations were low level and qualified as estimated (i.e., given a J flag) after data validation. Only one compound, perfluorobutane sulfonate (PFBS), was detected at VAP-12, at a J-flagged value of 19.6 ng/L. VAP-28 and VAP-30 (Figure 10A) are located on the outer edges of the FTC groundwater plume and contain less than 5 ng/L of total PFAS with all detections in these locations below the RL and J-flagged. Thus, these locations are not representative of the broader FTC plume PFAS mixture and their mixture is likely skewed by their near-detection limit results.

2.5.2 Distal FTC Groundwater PFAS Mixture

The data associated with the distal FTC groundwater plume (i.e., the southern portion of the FTC plume), beginning around University Drive and extending south (Figure 9b), were separately examined to determine if the FTC groundwater plume closer to the Southern Area exhibits different PFAS mixtures

than the FTC plume. The distal FTC plume generally resembles the FTC plume at large. PFOA (green) and PFHpA (purple) are the predominant analytes detected (Figures 9B, 10B, and 11B). Perfluoroalkyl carboxylates make up an average of 85.8 percent of the PFAS detected (Figure 11B, right). PFOS and PFHxS (red) account for 12.7 percent of the remaining average PFAS concentration (Figure 11B, left).

2.5.3 Southern Area Groundwater PFAS Mixture

In the Southern Area, the PFAS distribution is markedly different than both the FTC plume at large and the distal portion immediately upgradient. This provides strong evidence that the source of PFAS in the Southern Area is something other than the FTC-impacted groundwater. The lines of evidence supporting this conclusion are as follows:

- 13 out of 15 groundwater VAP locations are not PFOA dominant in the Southern Area (Figures 9C and 10C).
- PFBS (orange), detected at less than 0.5 percent of the average PFAS concentration in groundwater locations within the FTC plume (Figure 11C, left), is detected at 10.2 percent of the average PFAS concentration in the Southern Area (Figure 11C, left).
- The samples contain an average of 64.8 percent perfluoroalkyl carboxylates (Figure 11C, right), much lower than the FTC groundwater plume (Figure 11A, right), and have a much higher proportion of the perfluoroalkyl sulfonates, including 24.5 percent PFOS and PFHxS, on average (Figure 11C, left).
- If polyfluorinated precursor compounds are present in significant quantities within the FTC plume, they would likely form additional perfluoroalkyl carboxylates upon transformation, based on the preponderance of perfluoroalkyl carboxylates found in the FTC groundwater plume (i.e., PFOA, PFHpA, and PFHxA) and the lack of meaningful detections of two PFOS precursors measured in most samples, EtFOSAA and MeFOSAA (Figures 11A through C). Additionally, precursor compounds generally have higher soil water partitioning coefficients than their perfluoroalkyl acid analogs of equivalent perfluoroalkyl chain length (Xiao et al. 2017); therefore, they are not expected to migrate as far as their perfluoroalkyl acid analogs. The presence of a greater proportion of perfluoroalkyl sulfonates in the PFAS mixture observed in the Southern Area groundwater relative to the FTC groundwater plume cannot be explained by the potential transformation of precursors associated with the FTC.

The different PFAS mixture in the Southern Area provides further evidence reinforcing what the local geology and groundwater flow also demonstrate: that the Southern Area is being affected by a different source or sources than the FTC-impacted groundwater, which is supported by intervening non-detect VAP groundwater samples collected at multiple vertical intervals (Figure 9C) between the FTC plume and the Southern Area.

3 CONCLUSIONS

Based on the extensive work completed in the Southern Area, the low levels of PFAS detected in this area are unrelated to the FTC. This conclusion is supported by the data discussion above, which is summarized here for ease of reference:

- Groundwater quality data associated with the VAPs and piezometers show that the southern extent of PFAS detections potentially related to the FTC is north of the Southern Area, with the exception of a narrow area south of Rader Road adjacent to Green Bay.
- The grouping of detections of PFOS and PFOA up to a combined concentration of 24.4 ng/L in the vicinity of Heath Lane and Edwards Avenue are due to an as-yet unidentified isolated local source or sources and are not connected to the FTC-impacted groundwater. These detections are shallow and spatially isolated. There is no evidence from the VAP and drinking water well samples collected in the area immediately north of Heath Lane that the plume from the FTC extends to this area. The very shallow depths of detections near Heath Lane further indicate a local source and demonstrate that there is not a long-distance transport pathway, as would be necessary to associate these detections with the FTC-impacted groundwater.
- Ditch A is gaining where it traverses along the western edge of the Southern Area. Results for samples collected from VAP borings adjacent to the ditch confirm that the ditch is not affecting groundwater and is also unlikely to have done so in the past.
- The PFAS mixture in the FTC groundwater plume is distinctly different than the PFAS mixture in the Southern Area. Most notably, the FTC groundwater samples are PFOA dominant and the Southern Area contains a much higher average percentage of perfluoroalkyl sulfonates than the FTC groundwater plume, including the distal portion of the plume located closest to the Southern Area.

These multiple lines of physical and chemical evidence show that the detections of PFAS in the Southern Area are associated with as-yet unidentified local sources unrelated to the FTC.

4 REFERENCES

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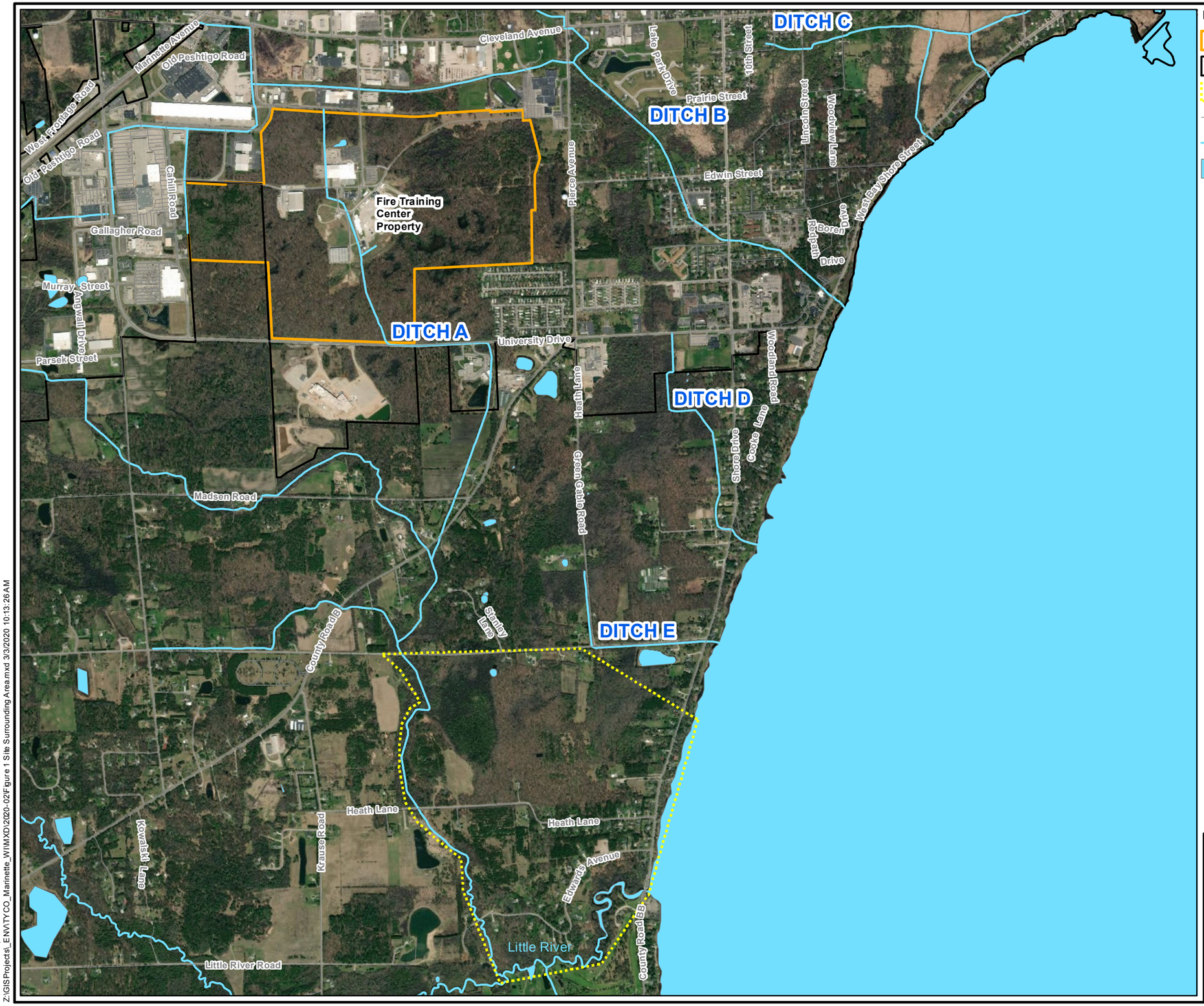
Xiao, X., Ulrich, B.A., Chen, B. and Higgins, C. P., 2017. Sorption of poly- and perfluoroalkyl substances (PFASs) relevant to aqueous film-forming foam (AFFF)-impacted groundwater by biochars and activated carbon. Environ. Sci. Technol., 51, 6342–6351.

FIGURES



LEGEND:

- APPROXIMATE SITE PROPERTY BOUNDARY
- APPROXIMATE MARINETTE CITY BOUNDARY
- APPROXIMATE EXTENT OF SOUTHERN AREA
- ROAD
- DITCH/STREAM
- WATERBODY

NOTES:

1. CITY BOUNDARY DATA SOURCE: WISCONSIN LEGISLATIVE TECHNOLOGY SERVICES BUREAU, WISCONSIN COUNTY CLERKS AND LAND INFORMATION OFFICES, ACCESSED FALL 2017.
2. DITCH/STREAM DATA SOURCE: U.S. GEOLOGICAL SURVEY NATIONAL HYDROGRAPHY DATASET, ACCESSED FALL 2017.
3. ROAD DATA SOURCE: OPEN STREET MAP, ACCESSED FALL 2017.
4. AERIAL IMAGERY: 4/27/2016 DIGITALGLOBE, VIVID-USA

0 1,100 2,200

GRAPHIC SCALE IN FEET

TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN
SOUTHERN AREA GROUNDWATER EVALUATION

SITE LOCATION

ARCADIS

FIGURE
1

City: Minneapolis/Citrix Div/Group: IMDVC Created By: Last Saved By: msmiller
TYCO Marinette, WI
Z:\GIS\Projects_ENV\TYCO_Marinette_WI\MXD\2020-02\Figure 1 Site Surrounding Area.mxd 3/3/2020 10:13:26 AM

LEGEND:

- A-A': LOCATION OF CROSS-SECTION SHOWN ON FIGURE 3
- B-B': LOCATION OF CROSS-SECTION SHOWN ON FIGURE 4
- SAND UNIT VAP BORING LOCATION
- 2019 PIEZOMETER INSTALLATION
- IN-STREAM PIEZOMETER AND STILLING WELL PAIR
- PIEZOMETER
- TEMPORARY PIEZOMETER
- ROAD
- DITCH/STREAM
- WATERBODY

NOTES:

1. DITCH/STREAM DATA SOURCE: U.S. GEOLOGICAL SURVEY NATIONAL HYDROGRAPHY DATASET, ACCESSED FALL 2017.
2. ROAD DATA SOURCE: OPEN STREET MAP, ACCESSED FALL 2017.
3. AERIAL IMAGERY: 5/14/2017 DIGITALGLOBE, VIVID-USA

0 700 1,400

GRAPHIC SCALE IN FEET

TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN
SOUTHERN AREA GROUNDWATER EVALUATION

PIEZOMETER INSTALLATION LOCATIONS 2019

ARCADIS

FIGURE 2

City: Minneapolis/Citrix Div/Group: IMDVC Created By: Last Saved By: msmiller
TYCO Marinette, WI
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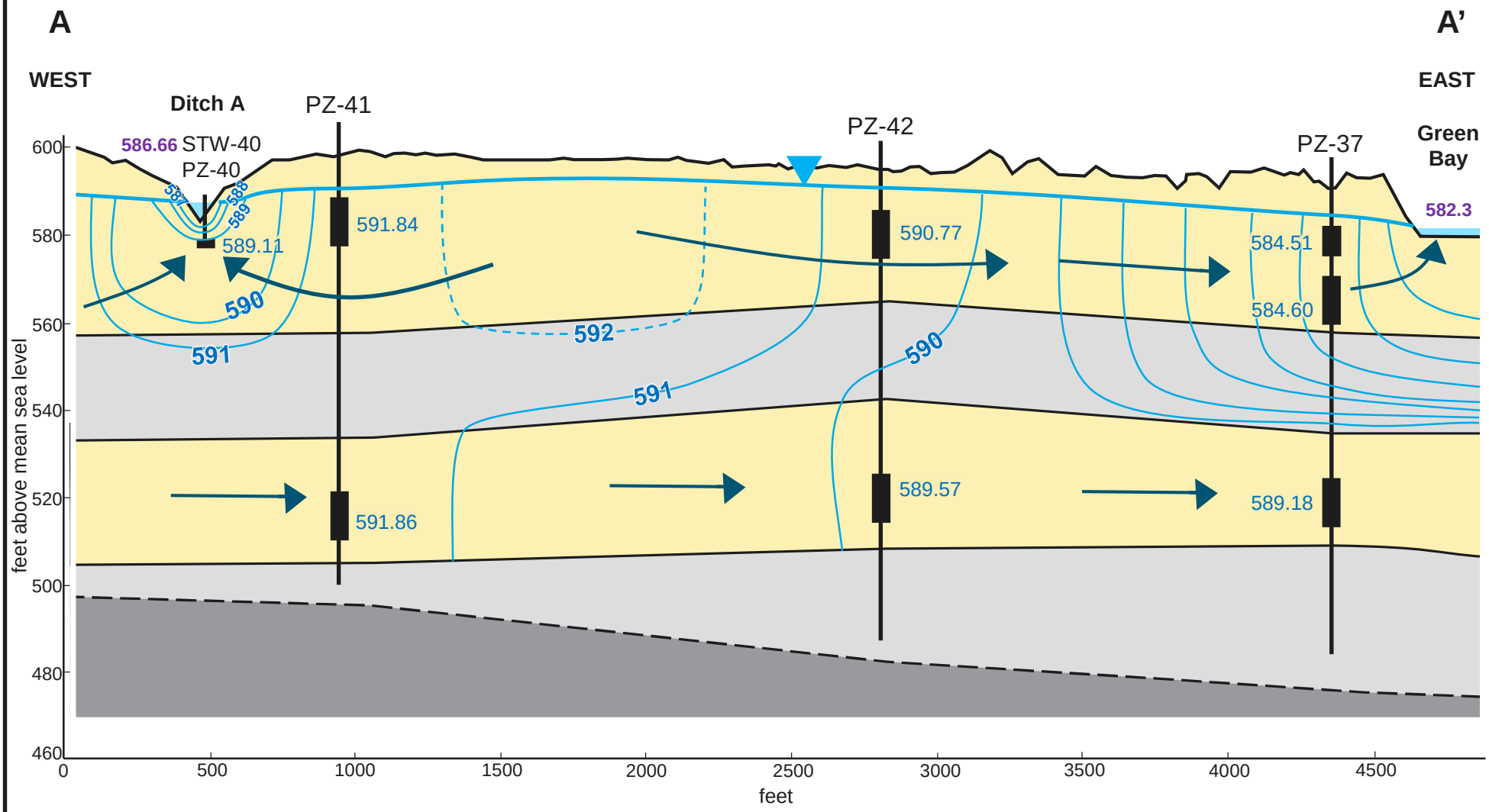


Legend

- Surface water
- Sand and gravel
- Silt, clay, and till
- Bedrock (Sinnipee Group)

PZ-41 — Well/boring ID

582.3 — Screened interval and water-level elevation (feet AMSL) October 2019

582.3 — Surface water elevation (feet AMSL) October 2019

Water Table

591 — Equipotential Contour (feet AMSL)

Direction of Groundwater Flow in Plane of Section

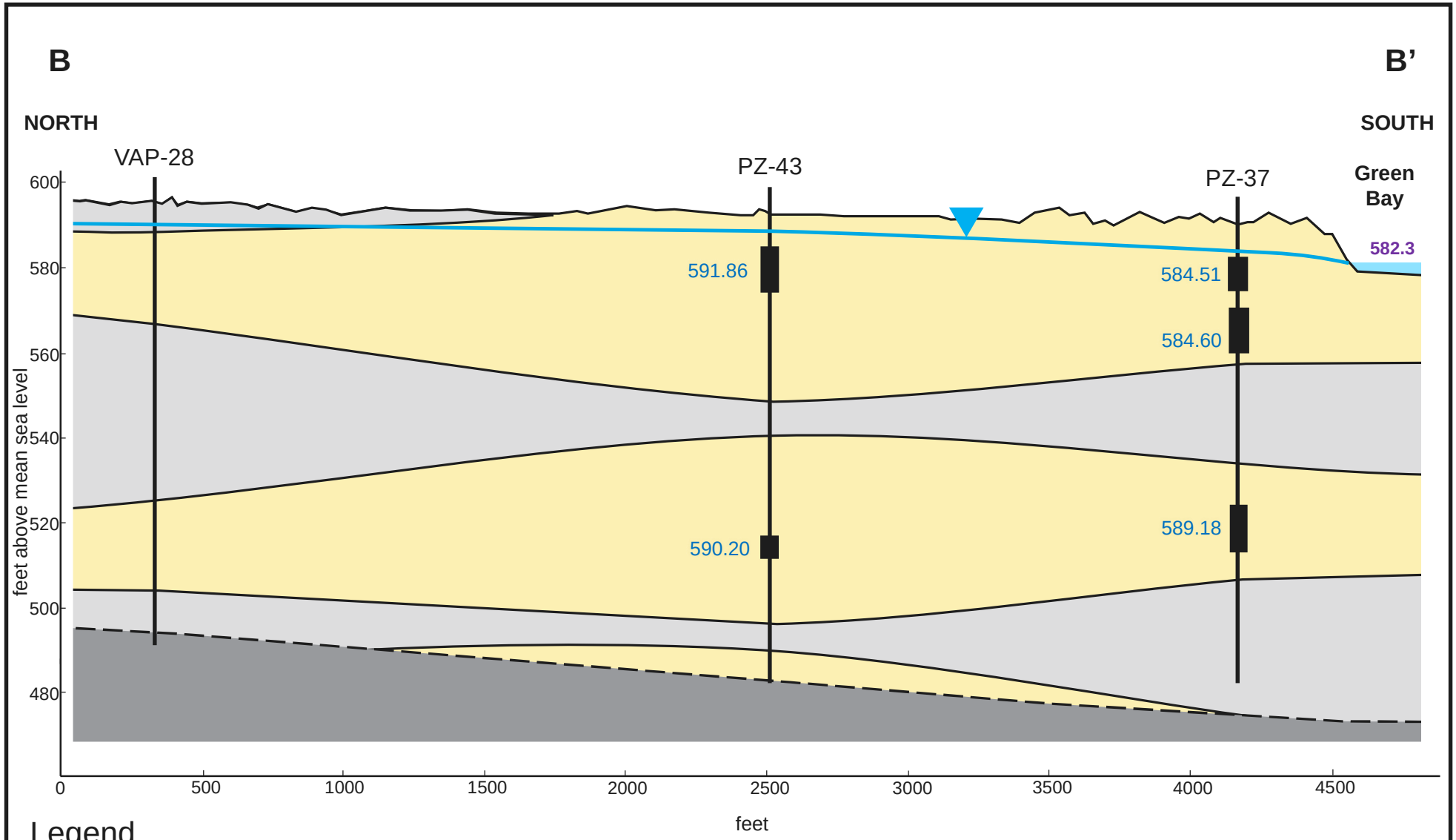
Note: Piezometer locations and ground surface elevation are approximate.

TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN
SOUTHERN AREA GROUNDWATER EVALUATION

CROSS SECTION A-A'

ARCADIS Design & Consultancy for natural and built assets

FIGURE 3



Legend

- Surface water
- Sand and gravel
- Silt, clay, and till
- Bedrock (Sinnipee Group)

PZ-41 — Well/boring ID

582.3 — Screened interval and water-level elevation (feet AMSL) October 2019

582.3 — Surface water elevation (feet AMSL) October 2019

Water Table

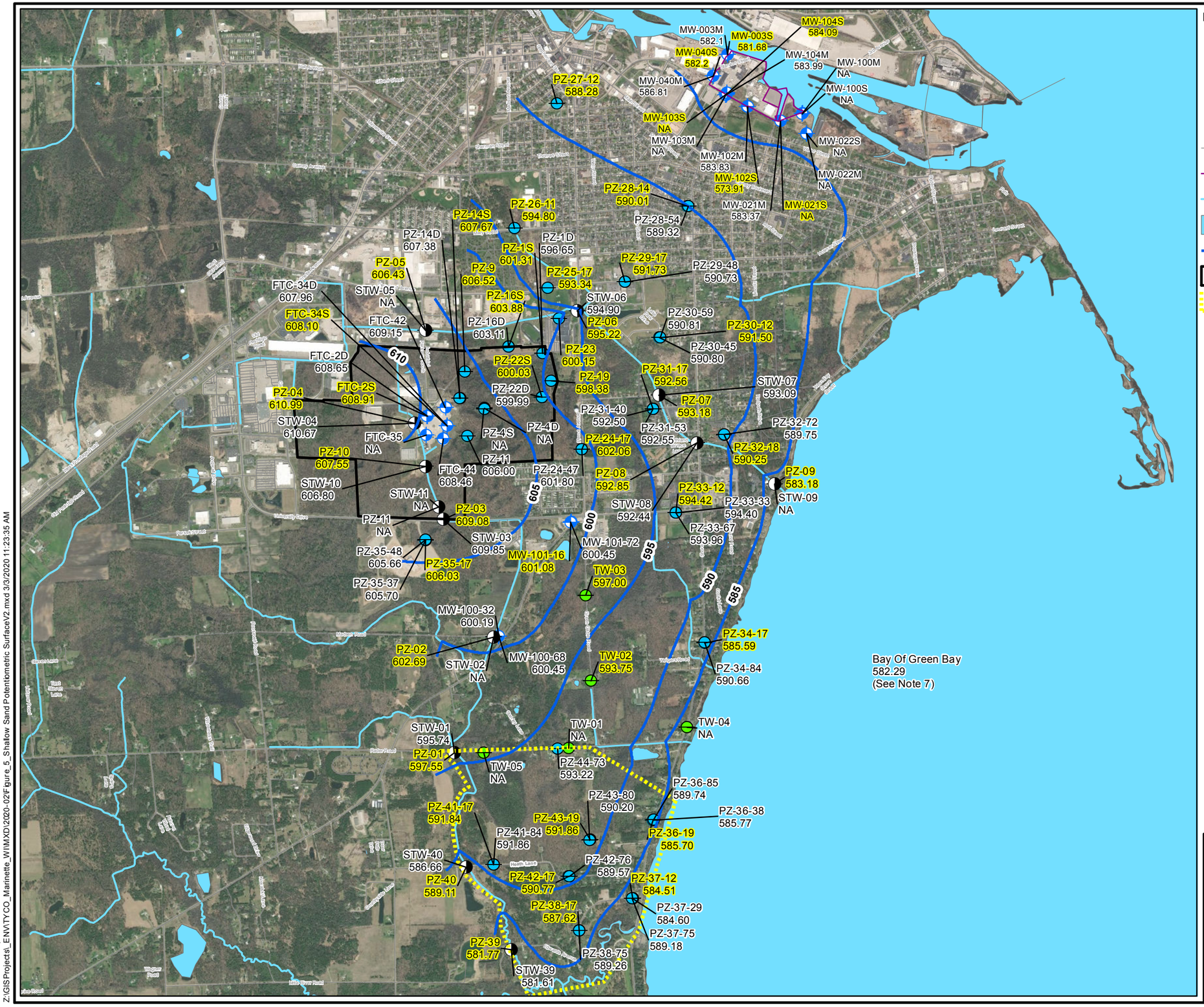
Note: Piezometer and boring locations and ground surface elevation are approximate.

TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN
SOUTHERN AREA GROUNDWATER EVALUATION

CROSS SECTION B-B'

ARCADIS Design & Consultancy for natural and built assets

FIGURE 4



LEGEND:

- MONITORING WELL
- PIEZOMETER
- IN-STREAM PIEZOMETER AND STILLING WELL PAIR
- TEMPORARY PIEZOMETER
- ROAD
- HYDRAULIC CONTAINMENT WALL
- DITCH/STREAM
- WATERBODY
- SHALLOW SAND POTENTIOMETRIC SURFACE (AMSL)
- APPROXIMATE FTC PROPERTY BOUNDARY
- APPROXIMATE EXTENT OF SOUTHERN AREA

NOTES:

1. HIGHLIGHTED WELLS WERE USED FOR CONTOURING THE SHALLOW GROUNDWATER POTENTIOMETRIC SURFACE. THE WATER ELEVATIONS MEASURED AT STILLING WELLS AND DEEPER GROUNDWATER WELLS HAVE ALSO BEEN PROVIDED FOR REFERENCE.
2. WELLS AND PIEZOMETERS WERE USED FOR CONTOURING THE GROUNDWATER POTENTIOMETRIC SURFACE.
3. WATER-LEVELS POSTED FOR PIEZOMETER/STILLING WELL PAIRS ARE FOR THE PIEZOMETERS. STILLING WELL MEASUREMENTS NOT AVAILABLE.
4. DITCH/STREAM DATA SOURCE: U.S. GEOLOGICAL SURVEY NATIONAL HYDROGRAPHY DATASET, ACCESSED FALL 2017.
5. ROAD DATA SOURCE: OPEN STREET MAP, ACCESSED FALL 2017.
6. AERIAL IMAGERY: 5/14/2017 DIGITALGLOBE, VIVID-USA
7. POSTED WATER-LEVEL ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL (AMSL), BASED ON MEASUREMENTS COMPLETED 10/16/2019- 10/17/2019.
8. BAY OF GREEN BAY SURFACE ELEVATION (582.29) AS REPORTED BY NOAA/NOS MENOMINEE, MI, STATION #9087088 FOR 10/16/2019.
9. 9. NA = NOT AVAILABLE

0 2,000 4,000

GRAPHIC SCALE IN FEET

TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN
SOUTHERN AREA GROUNDWATER EVALUATION

SHALLOW SAND POTENTIOMETRIC SURFACE, OCTOBER 2019

ARCADIS

FIGURE
5

City: Minneapolis/Citrix Div/Group: IMDVC Created By: Last Saved By: msmiller
TYCO Marinette, WI
Z:\GIS Projects_E.NV\TYCO_Marinette_WI\MXD\2020-02\Figure_5_Shallow Sand Potentiometric Surface\V2.mxd 3/3/2020 11:23:35 AM

MW-003M 582.1
MW-003S 581.68
MW-040S 582.2
MW-104S 584.09
MW-104M 583.99
MW-100M NA
MW-100S NA
MW-040M 586.81
PZ-27-12 588.28
MW-103S NA
MW-103M NA
MW-102M 583.83
MW-102S 573.91
MW-022S NA
MW-022M NA
MW-021S NA
PZ-28-14 590.01
MW-021M 583.37
PZ-28-54 589.32
PZ-26-11 594.80
PZ-14D 607.38
PZ-14S 607.67
PZ-1D 596.65
PZ-1S 601.31
PZ-9 606.52
PZ-05 606.43
STW-05 NA
FTC-34D 607.96
FTC-34S 608.10
FTC-42 609.15
PZ-16S 603.88
PZ-16D 603.11
PZ-25-17 593.34
PZ-29-17 591.73
PZ-29-48 590.73
STW-06 594.90
PZ-06 595.22
PZ-30-59 590.82
PZ-30-12 591.50
PZ-30-45 590.80
PZ-23 600.15
PZ-22S 600.03
FTC-2D 608.65
FTC-2S 608.91
PZ-04 610.99
PZ-22D 599.99
PZ-19 598.38
PZ-31-17 592.56
STW-07 593.09
PZ-07 593.18
PZ-31-40 592.50
PZ-31-53 592.56
PZ-32-72 589.75
PZ-32-18 590.25
STW-04 610.67
FTC-35 NA
PZ-4S NA
PZ-4D NA
PZ-24-17 602.06
PZ-10 607.55
PZ-11 606.00
FTC-44 608.46
PZ-24-47 601.80
PZ-08 592.85
PZ-09 583.18
STW-09 NA
STW-10 606.80
STW-11 NA
PZ-03 609.08
PZ-33-12 594.42
PZ-33-33 594.40
STW-08 592.44
PZ-33-67 593.96
PZ-11 NA
STW-03 609.85
MW-101-72 600.45
MW-101-16 601.08
PZ-35-48 605.66
PZ-35-17 606.03
PZ-35-37 605.70
TW-03 597.00
MW-100-32 600.19
PZ-02 602.69
STW-02 NA
MW-100-68 600.45
TW-02 593.75
PZ-34-17 585.59
PZ-34-84 590.66
STW-01 595.74
PZ-01 597.55
TW-05 NA
TW-01 NA
PZ-44-73 593.22
TW-04 NA
PZ-43-80 590.20
PZ-36-85 589.74
PZ-41-84 591.86
PZ-41-17 591.84
PZ-43-19 591.86
PZ-36-38 585.77
PZ-36-19 585.70
STW-40 586.66
PZ-40 589.11
PZ-42-76 589.57
PZ-42-17 590.77
PZ-37-12 584.51
PZ-38-17 587.62
PZ-37-29 584.60
PZ-37-75 589.18
PZ-39 581.77
PZ-38-75 589.26
STW-39 581.61

605
600
595
590

Bay Of Green Bay
582.29
(See Note 7)

LEGEND:

- MONITORING WELL
- PIEZOMETER
- IN-STREAM PIEZOMETER AND STILLING WELL PAIR
- TEMPORARY PIEZOMETER
- ROAD
- HYDRAULIC CONTAINMENT WALL
- DITCH/STREAM
- WATERBODY
- APPROXIMATE FTC PROPERTY BOUNDARY
- DEEP SAND POTENTIOMETRIC SURFACE
- APPROXIMATE EXTENT OF SOUTHERN AREA

NOTES:

1. HIGHLIGHTED WELLS WERE USED FOR CONTOURING THE DEEP GROUNDWATER POTENTIOMETRIC SURFACE. THE WATER ELEVATIONS MEASURED AT STILLING WELLS AND SHALLOW GROUNDWATER WELLS HAVE ALSO BEEN PROVIDED FOR REFERENCE.
2. WELLS AND PIEZOMETERS WERE USED FOR CONTOURING THE GROUNDWATER POTENTIOMETRIC SURFACE.
3. WATER-LEVELS POSTED FOR PIEZOMETER/STILLING WELL PAIRS ARE FOR THE PIEZOMETERS. STILLING WELL MEASUREMENTS NOT AVAILABLE.
4. DITCH/STREAM DATA SOURCE: U.S. GEOLOGICAL SURVEY NATIONAL HYDROGRAPHY DATASET, ACCESSED FALL 2017.
5. ROAD DATA SOURCE: OPEN STREET MAP, ACCESSED FALL 2017.
6. AERIAL IMAGERY: 5/14/2017 DIGITALGLOBE, VIVID-USA
7. POSTED WATER-LEVEL ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL (AMSL), BASED ON MEASUREMENTS COMPLETED 10/16/2019- 10/17/2019.
8. BAY OF GREEN BAY SURFACE ELEVATION (582.29) AS REPORTED BY NOAA/NOS MENOMINEE, MI, STATION #9087088 FOR 10/16/2019.
9. NA = NOT AVAILABLE

0 2,000 4,000
GRAPHIC SCALE IN FEET

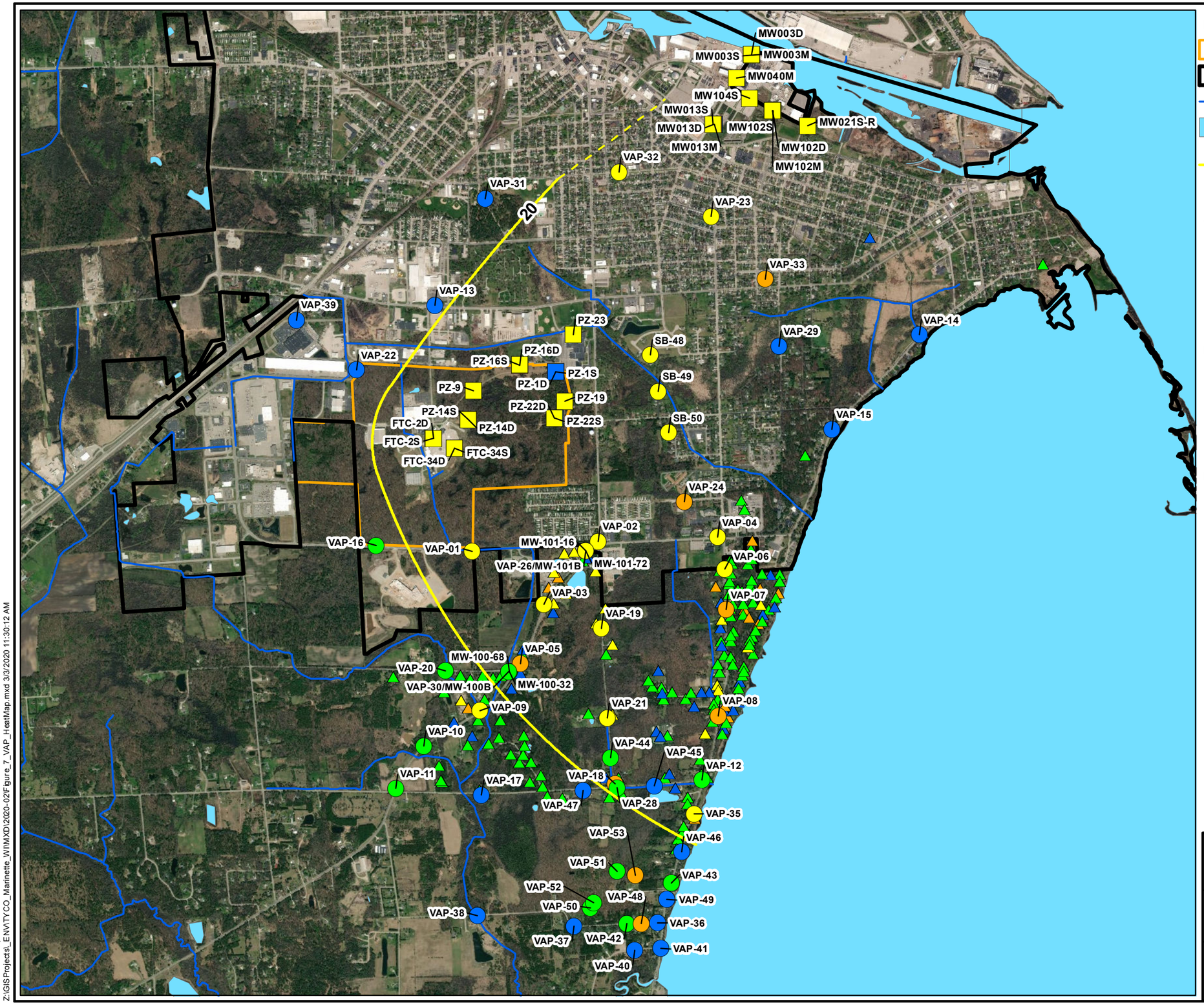
TYCO FIRE PRODUCTS LP
MARINETTE WISCONSIN
SOUTHERN AREA GROUNDWATER EVALUATION

DEEP SAND POTENTIOMETRIC SURFACE, OCTOBER 2019

ARCADIS

FIGURE 6

City: Minneapolis/Citrix Div/Group: IMDVC Created By: Last Saved By: msmiller
TYCO Marinette, WI
Z:\GIS\Projects_ENV\TYCO_Marinette_WI\MXD\2020-02\Figure_6_Deep Sand Potentiometric SurfaceV2.mxd 3/3/2020 12:15:38 PM



LEGEND:

- APPROXIMATE SITE PROPERTY BOUNDARY
- APPROXIMATE MARINETTE CITY BOUNDARY
- DITCH/STREAM
- WATERBODY
- APPROXIMATE WESTERN EXTENT OF GROUNDWATER WHERE COMBINED PFOS AND PFOA DETECTED ABOVE 20 ppt AND POTENTIALLY ASSOCIATED WITH THE FTC OR STANTON STREET SITES (DASHED WHERE INFERRED)

TOTAL PFOS AND PFOA IN GROUNDWATER

VAP BORING (MAX RESULT AT ANY SAMPLE DEPTH)

- ND - 2 ppt
- 2 - 20 ppt
- 20 - 70 ppt
- >70 ppt

MONITORING WELL SAMPLE RESULT (AUGUST 2019)

- ND - 2 ppt
- 2 - 20 ppt
- 20 - 70 ppt
- >70 ppt

RESIDENTIAL WELL SAMPLING RESULT (SPRING 2019)

- ND - 2 ppt
- 2 - 20 ppt
- 20 - 70 ppt
- >70 ppt

NOTES:

1.FIGURE PROVIDES REPRESENTATIVE ONSITE DATA AND DOES NOT REFLECT A COMPREHENSIVE DATASET FOR THE FTC SITE

2. RESIDENTIAL WELL LOCATIONS ARE APPROXIMATE

3. ppt = PARTS PER TRILLION
PFOA = PERFLUOROOCTANOIC ACID
PFOS = PERFLUOROOCTANESULFONIC ACID
VAP = VERTICAL AQUIFER PROFILE
FTC = FIRE TRAINING CENTER

4. SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

0 1,200 2,400

GRAPHIC SCALE IN FEET

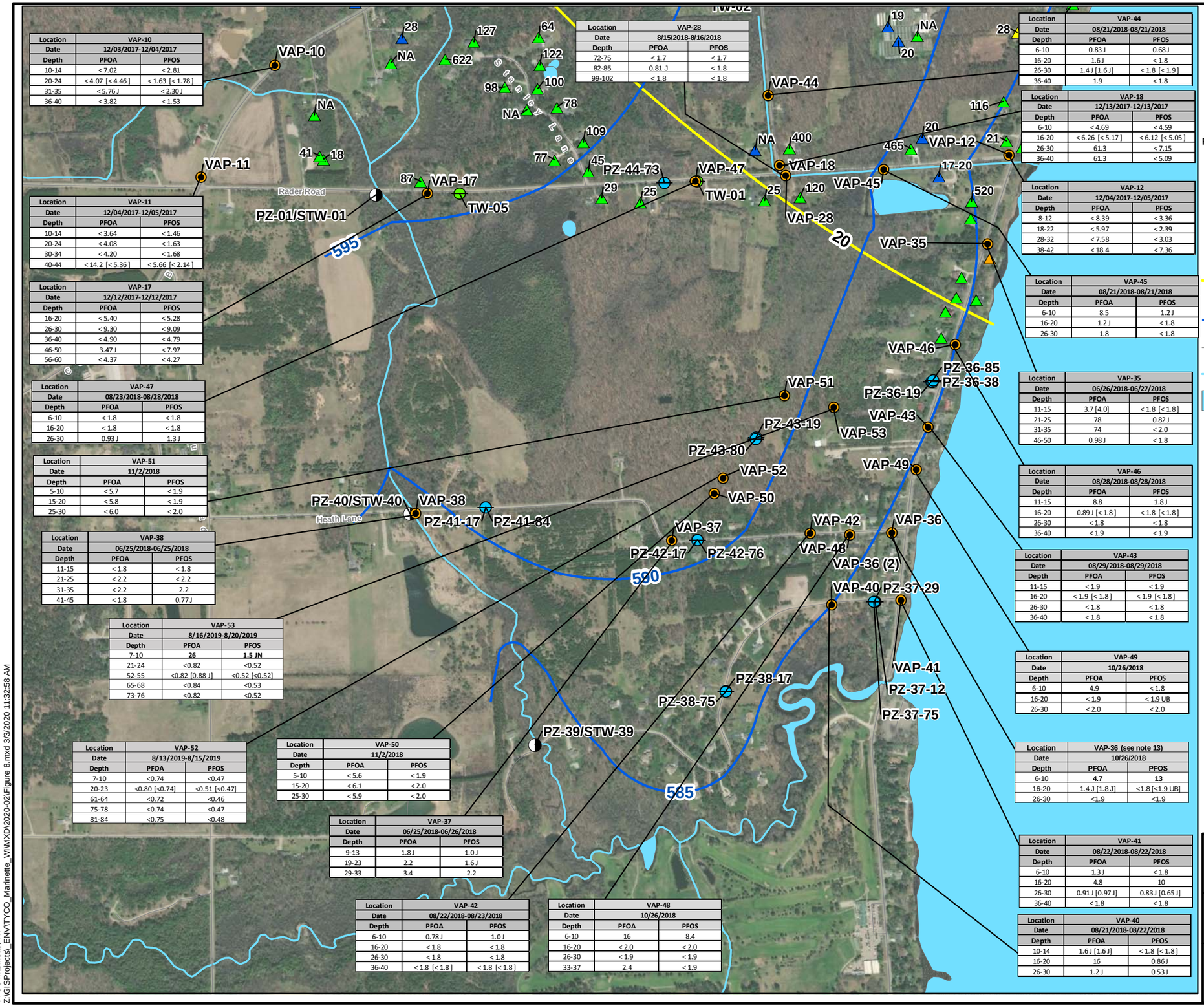
TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN
SOUTHERN AREA GROUNDWATER EVALUATION

DETECTIONS OF PFOA AND PFOS IN GROUNDWATER

ARCADIS

FIGURE 7

City: Minneapolis/Citrix Div/Group: IMDVC Created By: Last Saved By: msmiller
TYCO Marinette, WI
Z:\GIS Projects_E NV\TYCO_Marinette_WI\MXD\2020-02\Figure_7_VAP_HeatMap.mxd 3/3/2020 11:30:12 AM



Location	VAP-10	
Date	12/03/2017-12/04/2017	
Depth	PFOA	PFOS
10-14	< 7.02	< 2.81
20-24	< 4.07 [< 4.46]	< 1.63 [< 1.78]
31-35	< 5.76 J	< 2.30 J
36-40	< 3.82	< 1.53

Location	VAP-11	
Date	12/04/2017-12/05/2017	
Depth	PFOA	PFOS
10-14	< 3.64	< 1.46
20-24	< 4.08	< 1.63
30-34	< 4.20	< 1.68
40-44	< 14.2 [< 5.36]	< 5.66 [< 2.14]

Location	VAP-17	
Date	12/12/2017-12/12/2017	
Depth	PFOA	PFOS
16-20	< 5.40	< 5.28
26-30	< 9.30	< 9.09
36-40	< 4.90	< 4.79
46-50	3.47 J	< 7.97
56-60	< 4.37	< 4.27

Location	VAP-47	
Date	08/23/2018-08/28/2018	
Depth	PFOA	PFOS
6-10	< 1.8	< 1.8
16-20	< 1.8	< 1.8
26-30	0.93 J	1.3 J

Location	VAP-51	
Date	11/2/2018	
Depth	PFOA	PFOS
5-10	< 5.7	< 1.9
15-20	< 5.8	< 1.9
25-30	< 6.0	< 2.0

Location	VAP-38	
Date	06/25/2018-06/25/2018	
Depth	PFOA	PFOS
11-15	< 1.8	< 1.8
21-25	< 2.2	< 2.2
31-35	< 2.2	2.2
41-45	< 1.8	0.77 J

Location	VAP-53	
Date	8/16/2019-8/20/2019	
Depth	PFOA	PFOS
7-10	**26**	**1.5 JN**
21-24	<0.82	<0.52
52-55	<0.82 [0.88 J]	<0.52 [<0.52]
65-68	<0.84	<0.53
73-76	<0.82	<0.52

Location	VAP-52	
Date	8/13/2019-8/15/2019	
Depth	PFOA	PFOS
7-10	<0.74	<0.47
20-23	<0.80 [<0.74]	<0.51 [<0.47]
61-64	<0.72	<0.46
75-78	<0.74	<0.47
81-84	<0.75	<0.48

Location	VAP-28	
Date	8/15/2018-8/16/2018	
Depth	PFOA	PFOS
72-75	< 1.7	< 1.7
82-85	0.81 J	< 1.8
99-102	< 1.8	< 1.8

Location	VAP-50	
Date	11/2/2018	
Depth	PFOA	PFOS
5-10	< 5.6	< 1.9
15-20	< 6.1	< 2.0
25-30	< 5.9	< 2.0

Location	VAP-37	
Date	06/25/2018-06/26/2018	
Depth	PFOA	PFOS
9-13	1.8 J	1.0 J
19-23	2.2	1.6 J
29-33	3.4	2.2

Location	VAP-42	
Date	08/22/2018-08/23/2018	
Depth	PFOA	PFOS
6-10	0.78 J	1.0 J
16-20	< 1.8	< 1.8
26-30	< 1.8	< 1.8
36-40	< 1.8 [< 1.8]	< 1.8 [< 1.8]

Location	VAP-48	
Date	10/26/2018	
Depth	PFOA	PFOS
6-10	16	8.4
16-20	< 2.0	< 2.0
26-30	< 1.9	< 1.9
33-37	2.4	< 1.9

Location	VAP-44	
Date	08/21/2018-08/21/2018	
Depth	PFOA	PFOS
6-10	0.83 J	0.68 J
16-20	1.6 J	< 1.8
26-30	1.4 J [1.6 J]	< 1.8 [< 1.9]
36-40	1.9	< 1.8

Location	VAP-18	
Date	12/13/2017-12/13/2017	
Depth	PFOA	PFOS
6-10	< 4.69	< 4.59
16-20	< 6.26 [< 5.17]	< 6.12 [< 5.05]
26-30	61.3	< 7.15
36-40	61.3	< 5.09

Location	VAP-12	
Date	12/04/2017-12/05/2017	
Depth	PFOA	PFOS
8-12	< 8.39	< 3.36
18-22	< 5.97	< 2.39
28-32	< 7.58	< 3.03
38-42	< 18.4	< 7.36

Location	VAP-45	
Date	08/21/2018-08/21/2018	
Depth	PFOA	PFOS
6-10	8.5	1.2 J
16-20	1.2 J	< 1.8
26-30	1.8	< 1.8

Location	VAP-35	
Date	06/26/2018-06/27/2018	
Depth	PFOA	PFOS
11-15	3.7 [4.0]	< 1.8 [< 1.8]
21-25	78	0.82 J
31-35	74	< 2.0
46-50	0.98 J	< 1.8

Location	VAP-46	
Date	08/28/2018-08/28/2018	
Depth	PFOA	PFOS
11-15	8.8	1.8 J
16-20	0.89 J [< 1.8]	< 1.8 [< 1.8]
26-30	< 1.8	< 1.8
36-40	< 1.9	< 1.9

Location	VAP-43	
Date	08/29/2018-08/29/2018	
Depth	PFOA	PFOS
11-15	< 1.9	< 1.9
16-20	< 1.9 [< 1.8]	< 1.9 [< 1.8]
26-30	< 1.8	< 1.8
36-40	< 1.8	< 1.8

Location	VAP-49	
Date	10/26/2018	
Depth	PFOA	PFOS
6-10	4.9	< 1.8
16-20	< 1.9	< 1.9 UB
26-30	< 2.0	< 2.0

Location	VAP-36 (see note 13)	
Date	10/26/2018	
Depth	PFOA	PFOS
6-10	**4.7**	**13**
16-20	1.4 J [1.8 J]	<1.8 [<1.9 UB]
26-30	<1.9	<1.9

Location	VAP-41	
Date	08/22/2018-08/22/2018	
Depth	PFOA	PFOS
6-10	1.3 J	< 1.8
16-20	4.8	10
26-30	0.91 J [0.97 J]	0.83 J [0.65 J]
36-40	< 1.8	< 1.8

Location	VAP-40	
Date	08/21/2018-08/22/2018	
Depth	PFOA	PFOS
10-14	1.6 J [1.6 J]	< 1.8 [< 1.8]
16-20	16	0.86 J
26-30	1.2 J	0.53 J

LEGEND:

- PIEZOMETER
- IN-STREAM PIEZOMETER AND STILLING WELL PAIR
- TEMPORARY PIEZOMETER
- SAND UNIT VAP BORING LOCATION

RESIDENTIAL WELL SAMPLING RESULT (SPRING 2019)

- ND - 2 ppt
- 2 - 20 ppt
- 20 - 70 ppt
- >70 ppt
- APPROXIMATE WESTERN EXTENT OF GROUNDWATER WHERE COMBINED PFOS AND PFOA DETECTED ABOVE 20 ppt AND POTENTIALLY ASSOCIATED WITH THE FTC OR STANTON STREET SITES (DASHED WHERE INFERRED)
- OCTOBER 2019 SHALLOW SAND UNIT POTENTIOMETIC SURFACES
- ROAD
- DITCH/STREAM
- WATERBODY

NOTES:

1. PFOA = PERFLUOROOCTANOIC ACID
2. PFOS = PERFLUOROOCTANE SULFONIC ACID
3. VAP = VERTICAL AQUIFER PROFILING
4. NG/L = NANOGRAMS PER LITER NEW
5. J = THE ANALYTE WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY
6. NA = NOT AVAILABLE
7. ONLY SHALLOW SAND UNIT VAPS COMPLETED VIA GEOPROBE ARE SHOWN; DEEP SAND UNIT VAP, VAP-28, WHICH IS LOCATED NEAR VAP-18, IS NOT INCLUDED. NOTE THAT PFOS AND PFOA RESULTS FOR VAP-28 ARE LESS THAN 5 NG/L.
8. UB = ANALYTE CONSIDERED NON-DETECT AT THE LISTED VALUE DUE TO ASSOCIATED BLANK CONTAMINATION
9. CITY BOUNDARY DATA SOURCE: WISCONSIN LEGISLATIVE TECHNOLOGY SERVICES BUREAU, WISCONSIN COUNTY CLERKS AND LAND INFORMATION OFFICES, ACCESSED FALL 2017.
10. DITCH/STREAM AND WATERBODY DATA SOURCE: U.S. GEOLOGICAL SURVEY NATIONAL HYDROGRAPHY DATASET, ACCESSED FALL 2017.
11. ROAD DATA SOURCE: OPEN STREET MAP, ACCESSED FALL 2017.
12. AERIAL IMAGERY SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
13. VAP-36 WAS ORIGINALLY SAMPLED ON 6/26/2018. THE DATA WAS CONSIDERED AN ANOMALY AND THE LOCATION WAS RESAMPLED.

0 800 1,600

GRAPHIC SCALE IN FEET

TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN
SOUTHERN AREA GROUNDWATER EVALUATION

VAP INVESTIGATION AND PRIVATE WELL SAMPLING RESULTS

ARCADIS

FIGURE 8

City: Minneapolis/Citrix Div/Group: IMDVC Created By: Last Saved By: msmiller
TYCO Marinette, WI
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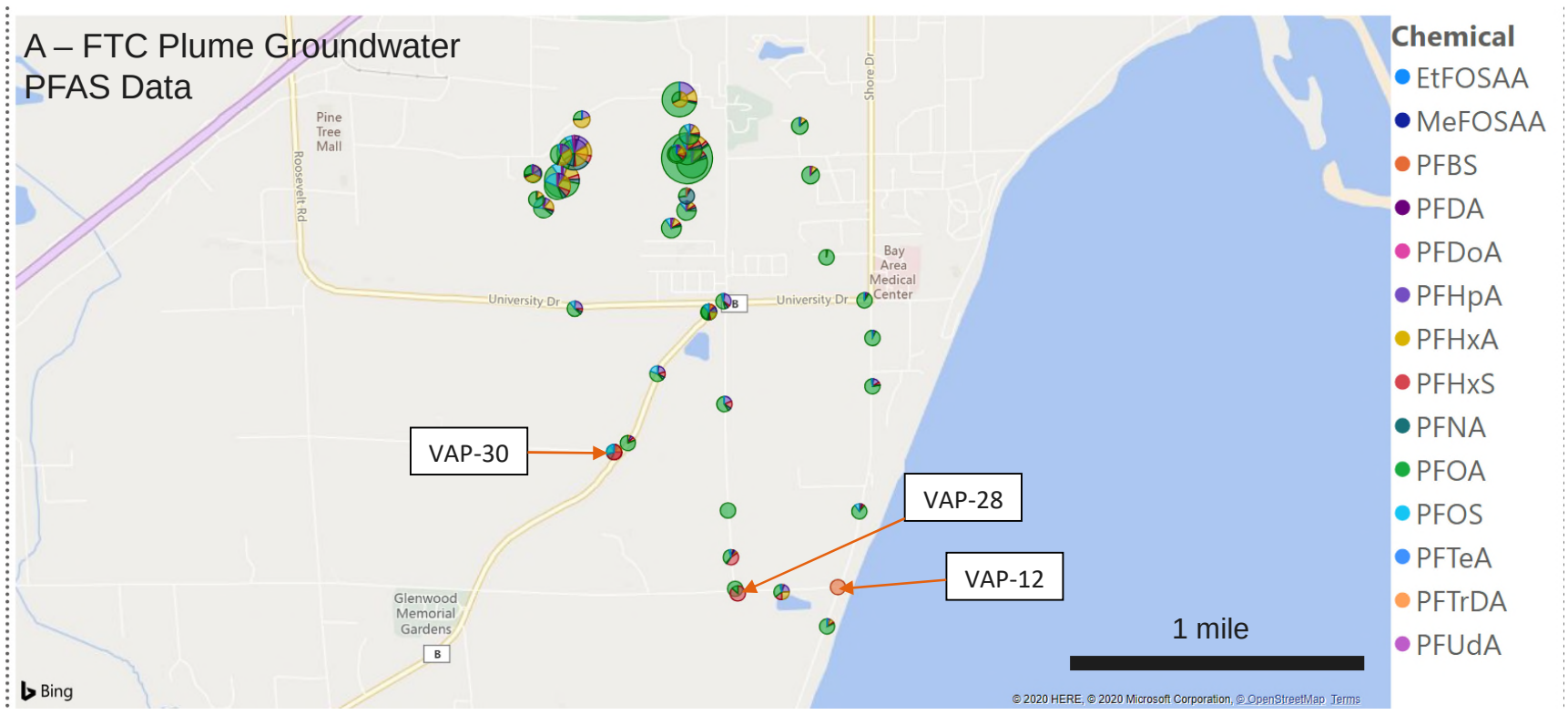

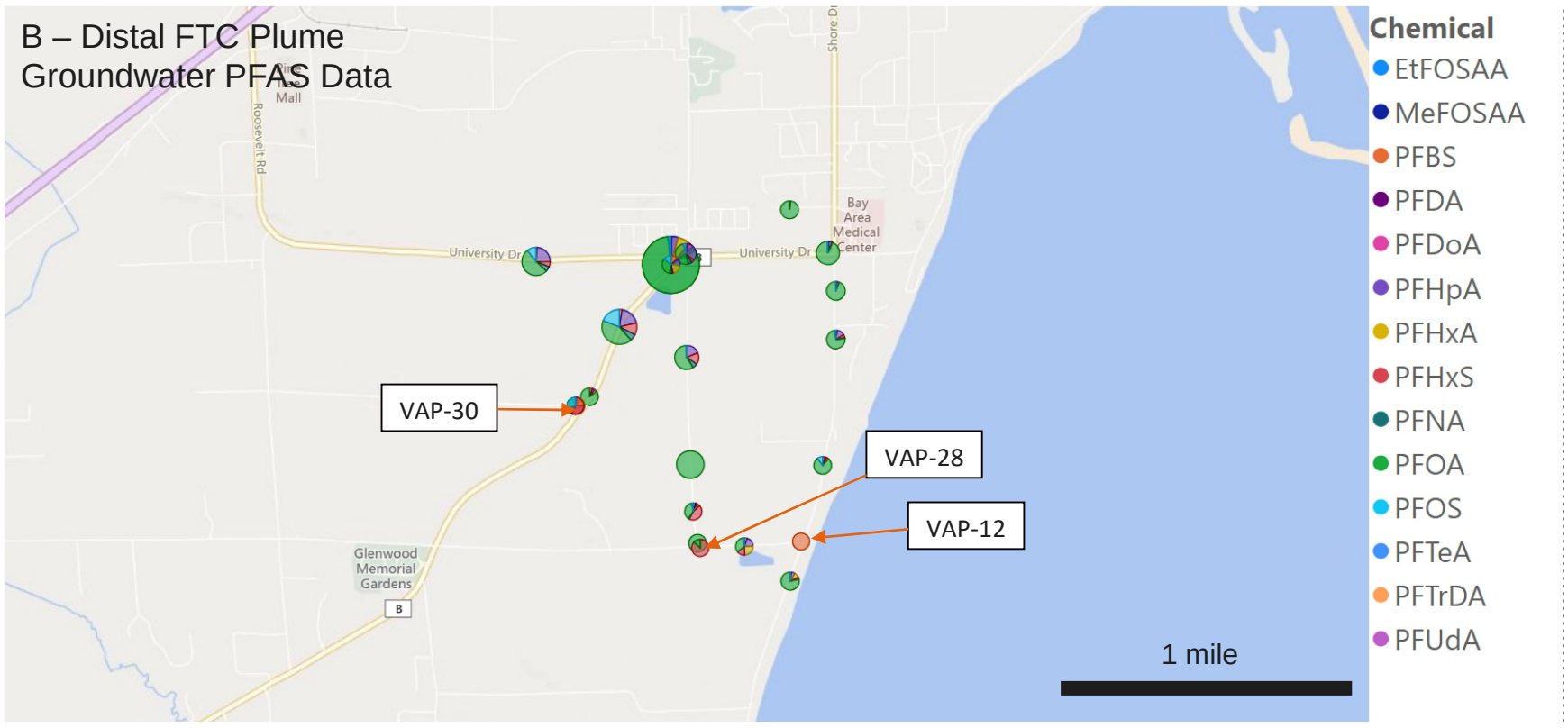

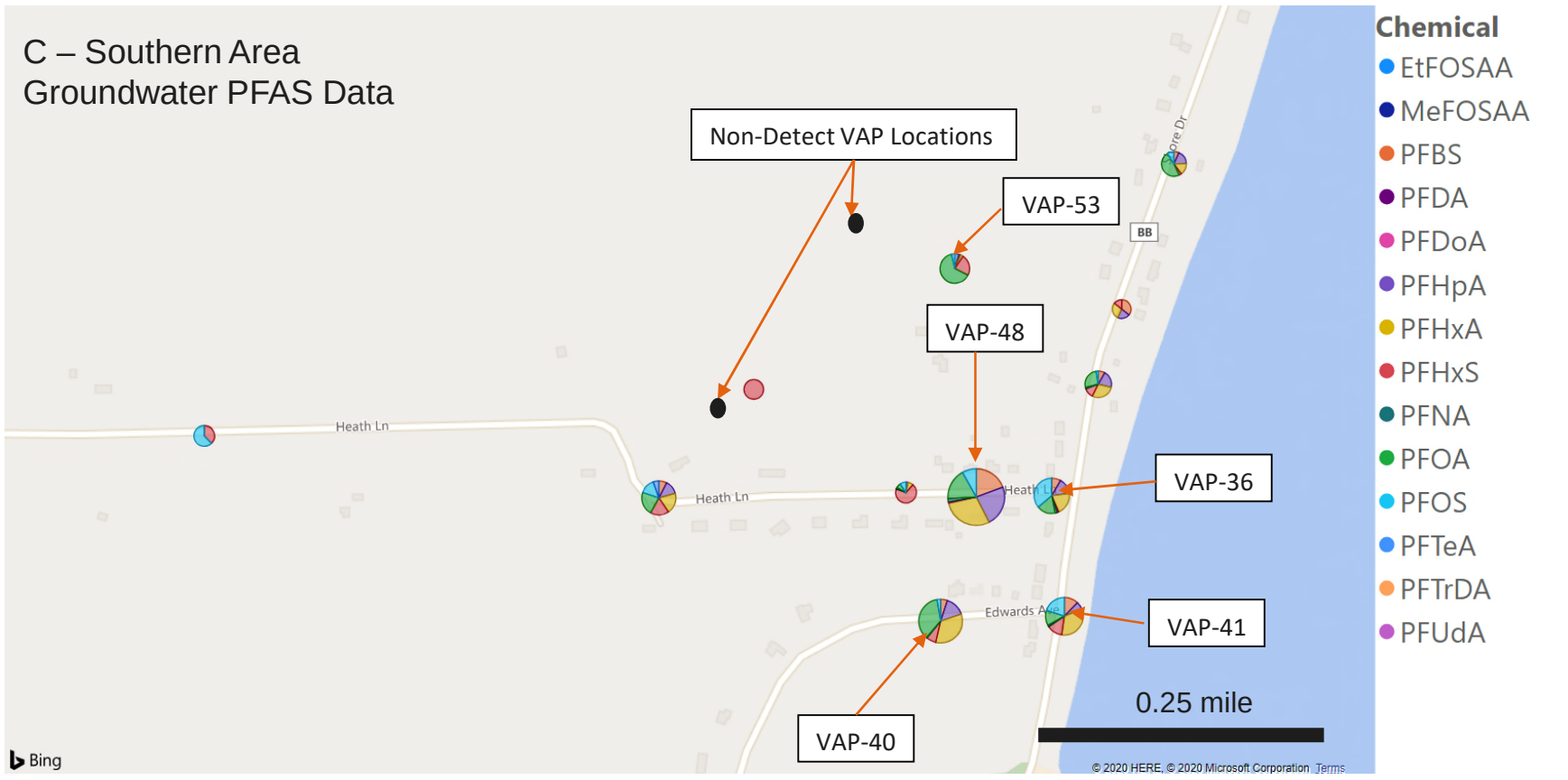

Notes:
Data in B is a subset of the data included in A.
Bubble size increases as average PFAS concentration increases but bubble size is scaled differently on maps A, B, and C for visibility.
Distribution of PFAS is based on average concentration at location across all depths and sampling time points, if relevant. Duplicates were not included in average.
Concentrations of non-detect analytes were set to zero.
All data reported above the limit of detection (e.g., J-flags) were included without modification.

TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN
SOUTHERN AREA GROUNDWATER EVALUATION

PFAS GROUNDWATER SAMPLING LOCATIONS

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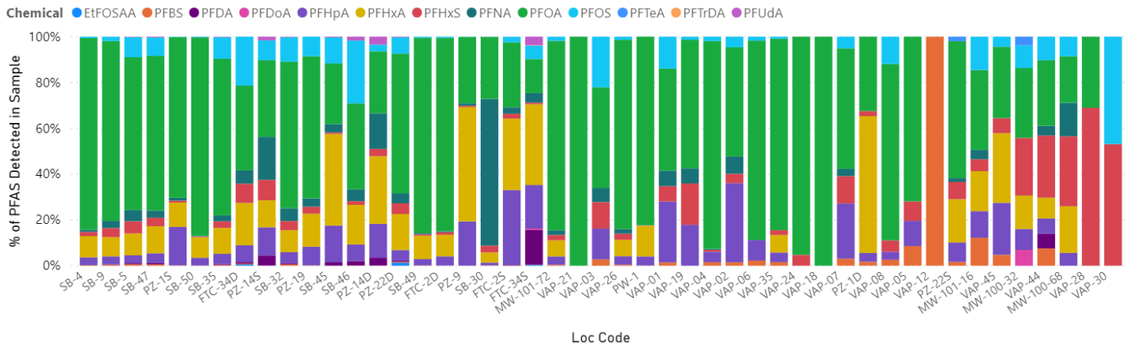
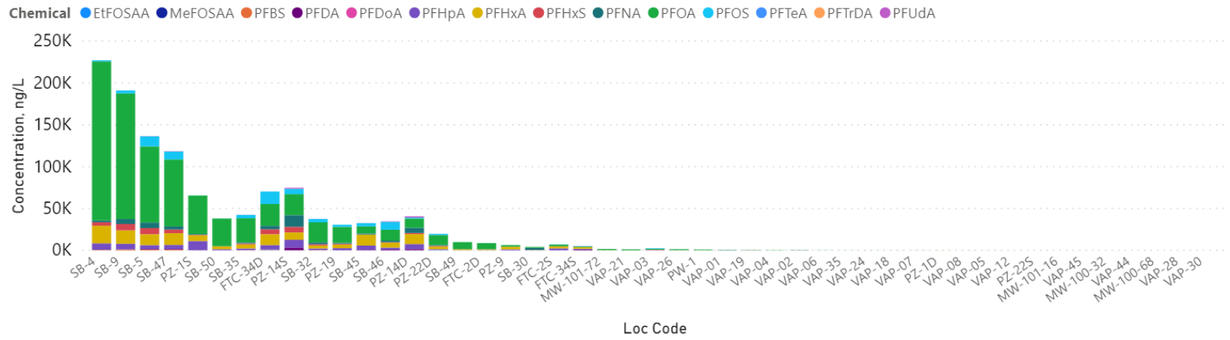
FIGURE 9

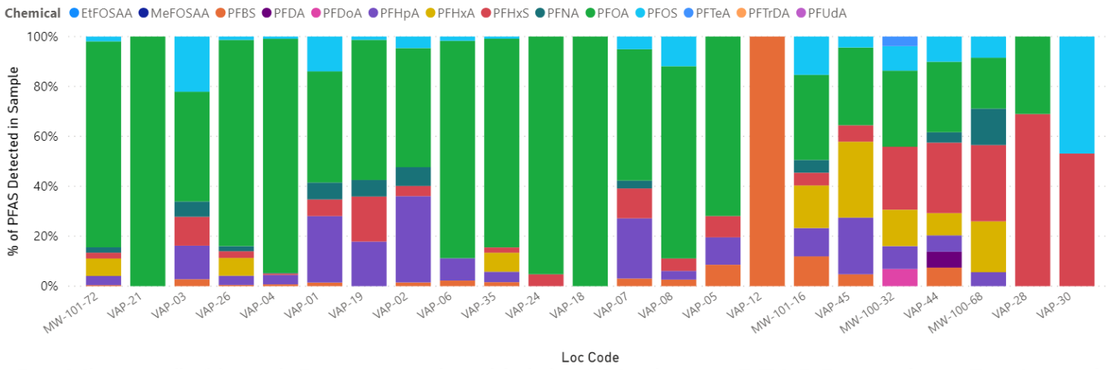
CITY: Minneapolis/Citrix Div/Group: IMDVC Created by: Last Saved By: pmilionis
TYCO Marinette_WI
Z:\GISProjects_ENV\TYCO_Marinette_\MXD\2020-02\Figure 10.mxd
3/20/2020 3:15:54 PM

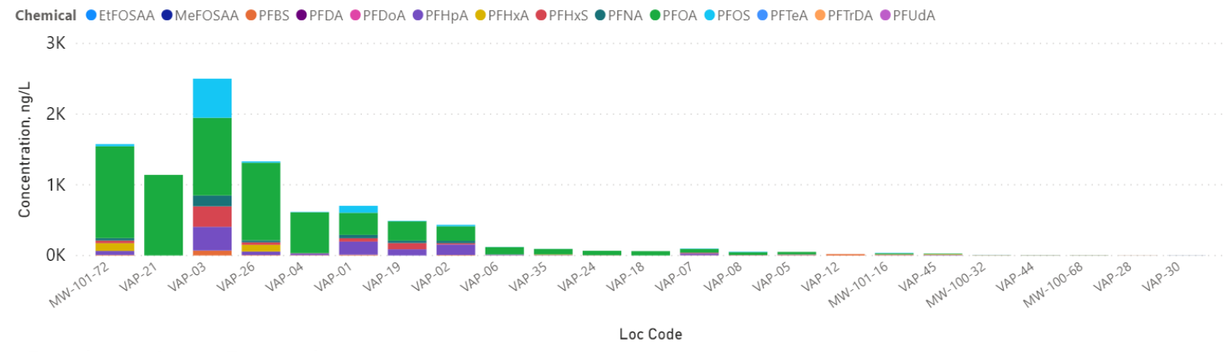
A – Mixture (left) and Concentration (right) of Maximum PFAS Detections Per Location in FTC Plume Groundwater



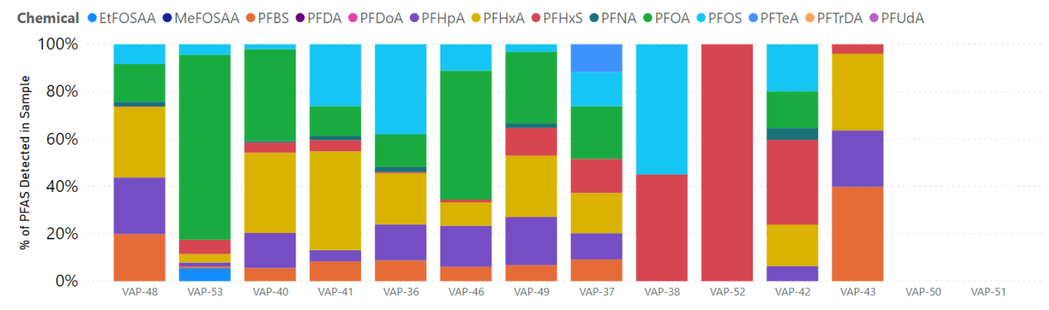


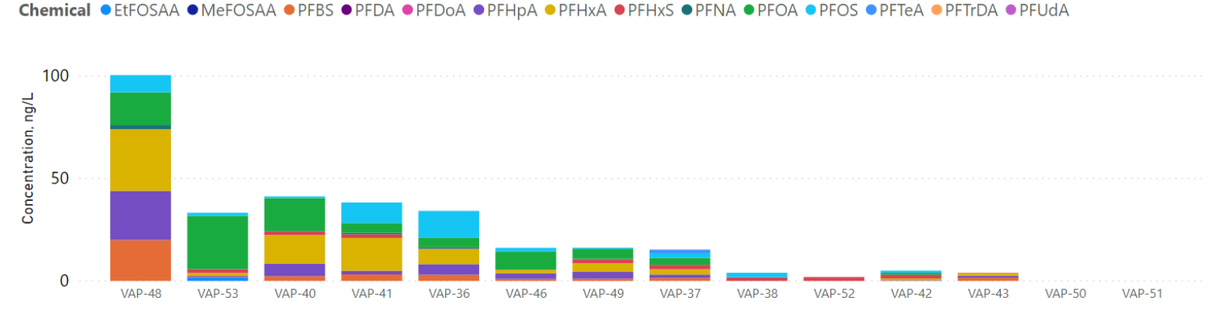
B – Mixture (left) and Concentration (right) of Maximum PFAS Detections Per Location in Distal FTC Plume Groundwater





C – Mixture (left) and Concentration (right) of Maximum PFAS Detections Per Location in Southern Area Groundwater





Notes:
Data locations included in average PFAS distribution for each area are indicated on Figure 9. Data in B is a subset of the data included in A.
Duplicates were not included in average PFAS distribution for each area.
Concentrations of non-detect analytes were set to zero.
All data reported above the limit of detection (e.g., J-flags) were included without modification.
Because most samples were not analyzed for PFPeA, PFBA, 6:2 FtS, 8:2 FtS, PFHpS, and PFOSA, and PFDS, these analytes were not included in these calculations.

TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN
SOUTHERN AREA GROUNDWATER EVALUATION

MIXTURE AND CONCENTRATIONS OF MAXIMUM PFAS DETECTIONS IN FTC PLUME, DISTAL FTC PLUME, AND SOUTHERN AREA GROUNDWATER

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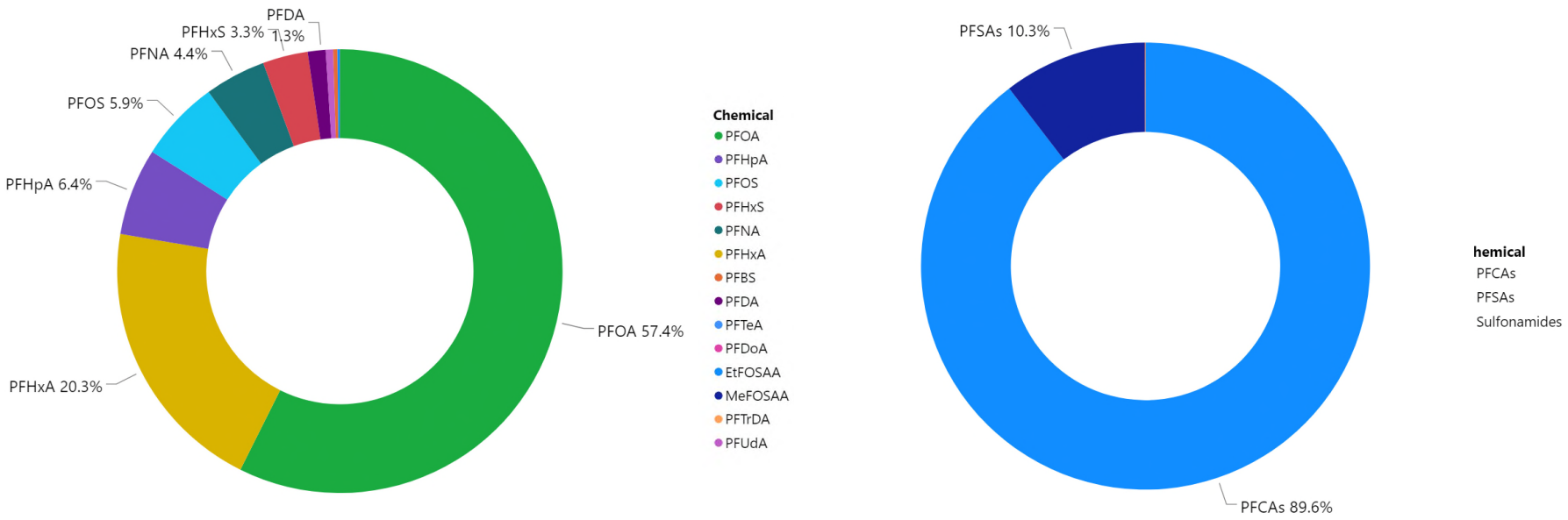
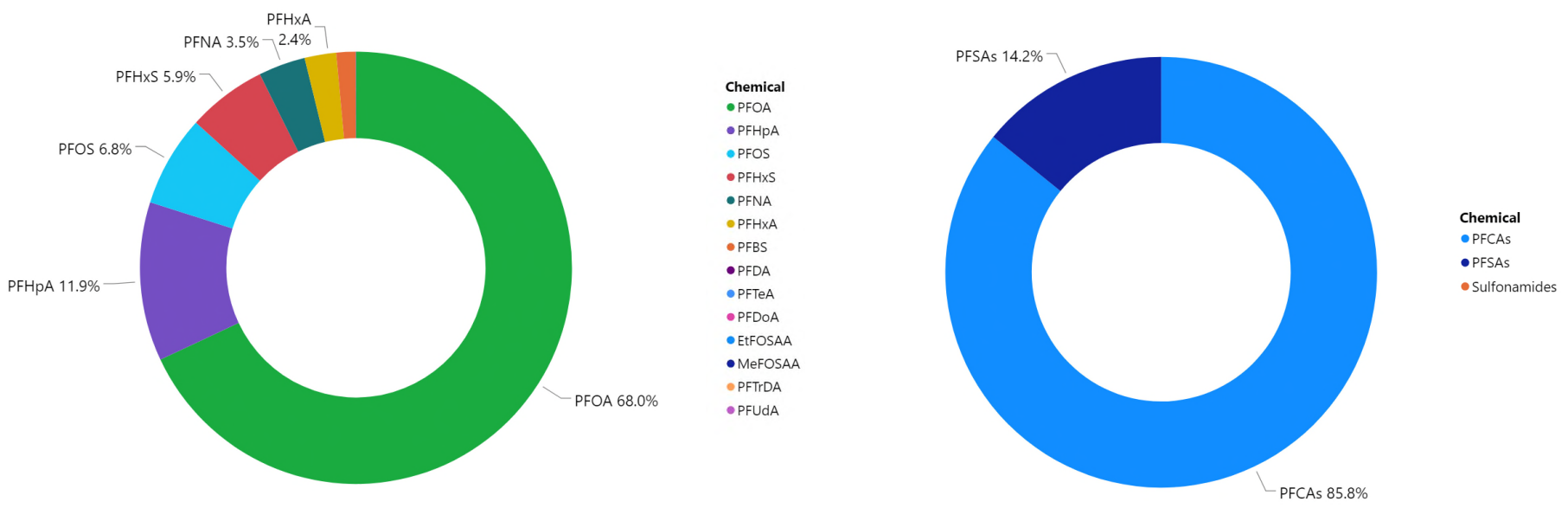
FIGURE
10

3/20/2020 1:10:14 PM

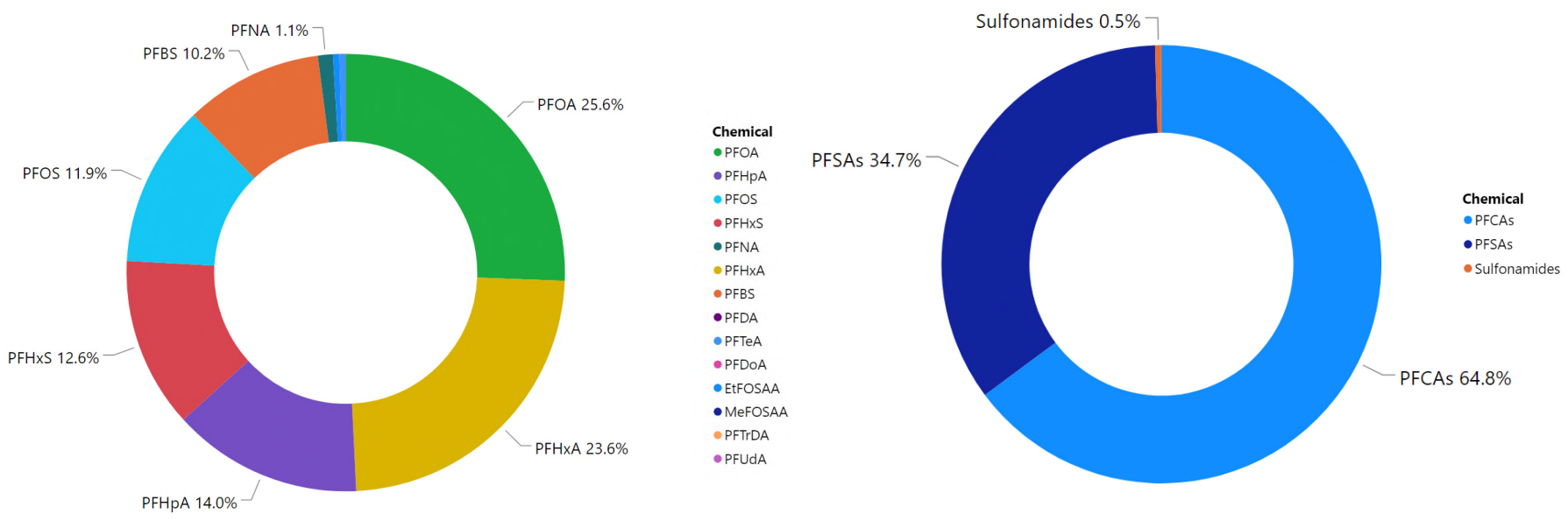
A – Average PFAS Mixture in FTC Plume Groundwater Data



B – Average PFAS Mixture in Distal FTC Plume Groundwater Data



C – Average PFAS Mixture in Southern Area Groundwater Data



Notes:
Data locations included in average PFAS distribution for each area are indicated on Figure 9. Data in B is a subset of the data included in A.
Duplicates were not included in average PFAS distribution for each area.
Concentrations of non-detect analytes were set to zero.
All data reported above the limit of detection (e.g., J-flags) were included without modification.
PFCAs = PFOA, PFHpA, PFNA, PFHxA, PFDA, PFTeA, PFDoA, PFTrDA, and PFUdA
PFSAs = PFBS, PFHxS, PFOS
Sulfonamides = MeFOSAA and ETFOSAA
Because most samples were not analyzed for PFPeA, PFBA, 6:2 FtS, 8:2 FtS, PFHpS, and PFOSA, and PFDS, these analytes were not included in these calculations.

TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN
SOUTHERN AREA GROUNDWATER EVALUATION

AVERAGE PFAS MIXTURES IN FTC PLUME, DISTAL FTC PLUME, AND SOUTHERN AREA GROUNDWATER

ARCADIS Design & Consultancy for natural and built assets

FIGURE
11

APPENDIX A

Historical PFAS Groundwater Sampling Data

Site Investigation Report (November 2016)

Table 2. Groundwater PFAS Analytical Results

Table 2
Groundwater PFAS Analytical Results
2016 Investigation Report
Marinette, Wisconsin

	Location	SB-4		SB-5			SB-9				SB-15			SB-16	SB-29
	Sample Date	6/17/2016	6/26/2016	6/17/2016	6/17/2016	6/18/2016	6/20/2016	6/20/2016	6/20/2016	6/25/2016	6/24/2016	6/24/2016	6/24/2016	6/24/2016	8/24/2016
Chemical Name	Depth (feet)	30-35	45-50	5-10	15-20	35-40	5-10	20-25	35-40	45-50	5-10	15-20	35-40	30-35	5-10
Perfluorobutanesulfonic acid (PFBS)	ng/L	**24 HB**	**510**	**0.89 JHB**	**1.6 JHB**	**900 HB**	**1.1 JHB**	**1.1 JHB**	**54 HB**	**870**	**1.7 JHB**	**1.9 HB**	**130 J**	<200	**2.3 B**
perfluorohexanesulfonic acid (PFHxS)	ng/L	**210 H**	**4,200**	<1.9 H	**2.8 H**	**7,300 H**	**1.2 JH**	<1.9 H	**540 H**	**7,600**	**2.6 H**	**5.3 H**	**990**	**350**	**5.4**
Perfluoroheptanesulfonic acid (PFHpS)	ng/L	**11 JH**	<200	<1.9 H	<1.8 H	**330 H**	<1.9 H	<1.9 H	**24 H**	**260**	<1.9 H	**0.72 JH**	<190	<200	<1.7
Perfluorooctanoicsulfonic acid (PFOS)	ng/L	**270 H**	**1,400 B**	<1.9 H	<1.8 H	**12,000 H**	<1.9 H	<1.9 H	**680 H**	**3,600**	**4.5 H**	**12 H**	**200 B**	**1,500 B**	**1.6 J**
Perfluorodecanesulfonic acid (PFDS)	ng/L	<19 H	<200	<1.9 H	<1.8 H	<180 H	<1.9 H	<1.9 H	<19 H	<170	<1.9 H	<1.8 H	<190	<200	<1.7
Perfluorobutanoic acid (PFBA)	ng/L	**220 H**	**4,100**	**1.8 JH**	**13 H**	**3,200 H**	**3.7 H**	<1.9 H	**380 H**	**4,400**	**4.5 H**	**17 H**	**1,400**	**3,900**	**4.2**
Perfluoropentanoic acid (PFPA)	ng/L	**690 H**	**11,000**	<1.9 H	**7.7 H**	**8,900 H**	**7.8 H**	<1.9 H	**1,100 H**	**11,000**	**6.7 H**	**31 H**	**4,300**	**16,000**	**4.2**
Perfluorohexanoic acid (PFHxA)	ng/L	**680 H**	**21,000**	**0.82 JH**	**12 H**	**13,000 H**	**6.8 H**	<1.9 H	**1,300 H**	**16,000**	**5.7 H**	**24 H**	**4,800**	**11,000**	**5.2**
Perfluoroheptanoic acid (PFHpA)	ng/L	**470 H**	**7,800**	<1.9 H	**3.7 H**	**4,600 H**	**1.6 JH**	<1.9 H	**650 H**	**6,700**	**3.3 H**	**16 H**	**9,100**	**3,900**	**2.8**
Perfluorooctanoic acid (PFOA)	ng/L	**2,100 H**	**190,000 B**	**3.4 H**	**30 H**	**91,000 H**	**16 H**	**1.4 JH**	**5,000 H**	**150,000**	**21 H**	**230 H**	**59,000 B**	**16,000 B**	**58**
Perfluorononanoic acid (PFNA)	ng/L	**170 H**	**2,100**	<1.9 H	<1.8 H	**6,700 H**	<1.9 H	<1.9 H	**290 H**	**5,900**	**0.61 JH**	**2.7 H**	**4,700**	**2,000**	<1.7
Perfluorodecanoic acid (PFDA)	ng/L	**42 H**	<200	<1.9 H	<1.8 H	**720 H**	<1.9 H	<1.9 H	**83 H**	**280**	<1.9 H	<1.8 H	<190	<200	<1.7
Perfluoroundecanoic acid (PFUnA)	ng/L	**11 JH**	<200	<1.9 H	<1.8 H	**260 H**	<1.9 H	<1.9 H	**30 H**	<170	<1.9 H	<1.8 H	<190	<200	<1.7
Perfluorododecanoic acid (PFDoA)	ng/L	<19 H	<200	<1.9 H	<1.8 H	<180 H	<1.9 H	<1.9 H	<19 H	<170	<1.9 H	<1.8 H	<190	<200	<1.7
Perfluorotridecanoic acid (PFTriA)	ng/L	<19 H	<200	<1.9 H	<1.8 H	<180 H	<1.9 H	<1.9 H	<19 H	<170	<1.9 H	<1.8 H	<190	<200	<1.7
Perfluorotetradecanoic acid (PFTeA)	ng/L	<19 H	<200	<1.9 H	<1.8 H	<180 H	<1.9 H	**2.5 HB**	<19 H	<170	<1.9 H	<1.8 H	<190	<200	<1.7
Perfluorooctane sulfonamide (FOSA)	ng/L	**110 H**	**100 J**	**1.3 JH**	**0.64 JH**	**5,400 H**	**2.3 H**	**0.77 JH**	**270 H**	**4,000**	<1.9 H	**1.2 JH**	<190	<200	**0.90 JH**
6:2 Fluorotelomer sulfonate (FTS)	ng/L	**1,400 H**	**2,100**	<19 H	<18 H	**1,600 JH**	<19 H	<19 H	**1,500 H**	**1,700**	<19 H	**100 H**	**2,000**	**2,000**	<17
8:2 Fluorotelomer sulfonate (FTS)	ng/L	**1,300 H**	**700 J**	**5.8 JH**	<18 H	**1,800 H**	<19 H	<19 H	**1,400 H**	**1,500 J**	<19 H	**8.0 JH**	<1,900	**1,400 J**	<17

Notes and Acronyms:
Bold = Compound detected
ng/L = nanograms per liter
H = Analysis completed after method hold time
B = Compound was detected in method blank sample
J = Estimated result, as concentration is below method level of quantification
<= Result less than detection limit.

Table 2
Groundwater PFAS Analytical Results
2016 Investigation Report
Marinette, Wisconsin

	Location	SB-29 (continued)		SB-30			SB-32			SB-35			SB-45	
	Sample Date	8/24/2016	8/24/2016	9/1/2016	9/1/2016	9/1/2016	8/23/2016	8/23/2016	8/23/2016	8/26/2016	8/26/2016	8/26/2016	8/28/2016	8/28/2016
Chemical Name	Depth (feet)	20-25	30-35	5-10	20-25	30-35	5-10	30-35	40-45	5-10	30-35	40-45	5-10	15-20
Perfluorobutanesulfonic acid (PFBS)	ng/L	<19	**2.2 B**	**1.9 B**	**1.5 JB**	**4.9 B**	**1.4 JB**	**1.6 JB**	**220 B**	**1.6 JB**	**4.1 B**	**130 B**	**4.1 B**	**2.3 B**
perfluorohexanesulfonic acid (PFHxS)	ng/L	**33**	**11**	<1.7	<2.0	**120**	**0.73 J**	**2.2**	**1,500**	**2.2**	**69**	**1,200**	**48**	**40**
Perfluoroheptanesulfonic acid (PFHpS)	ng/L	<19	<1.8	<1.7	<2.0	<2.0	<1.6	<1.8	**80**	<2.0	**1.8 J**	**32**	<1.8	**1.8 J**
Perfluorooctanoicsulfonic acid (PFOS)	ng/L	**61**	**11**	<1.7	<2.0	**1.8 J**	**3.4**	<1.8	**4,000**	<2.0	**86**	**4,000**	**7.1**	**45**
Perfluorodecanesulfonic acid (PFDS)	ng/L	<19	<1.8	<1.7	<2.0	<2.0	<1.6	<1.8	<19	<2.0	<2.0	<2.0	<1.8	<1.9
Perfluorobutanoic acid (PFBA)	ng/L	**39**	**89**	**50 B**	**0.76 JB**	**33 B**	**2.6**	**3.7**	**850**	**17 B**	**65 B**	**1,000 B**	**2,400 B**	**750 B**
Perfluoropentanoic acid (PFPA)	ng/L	**97**	**240**	**2.7**	<2.0	**160**	**2.7**	**2.4**	**2,300**	**8.8**	**170**	**2,700**	**8,900**	**3,200**
Perfluorohexanoic acid (PFHxA)	ng/L	**130**	**200**	**0.96 J**	<2.0	**180**	**2.9**	**2.7**	**3,600**	**8.4**	**170**	**4,800**	**9,000**	**5,200**
Perfluoroheptanoic acid (PFHpA)	ng/L	**88**	**110**	<1.7	<2.0	**51**	**0.93 J**	**1.8**	**1,800**	**3.3**	**100**	**1,900**	**5,200**	**1,600**
Perfluorooctanoic acid (PFOA)	ng/L	**590**	**300**	**4**	**2.8**	**1,100**	**8.6**	**24**	**24,000**	**47**	**1,400**	**29,000**	**3,300**	**8,400**
Perfluorononanoic acid (PFNA)	ng/L	**9.5 J**	**11**	<1.7	<2.0	**2,600**	**0.92 J**	<1.8	**2,100**	<2.0	**12**	**1,100**	**61**	**250**
Perfluorodecanoic acid (PFDA)	ng/L	<19	<1.8	<1.7	<2.0	<2.0	<1.6	<1.8	**200**	<2.0	**2.2**	**180**	**51**	**67**
Perfluoroundecanoic acid (PFUnA)	ng/L	<19	<1.8	<1.7	<2.0	<2.0	<1.6	<1.8	**81**	<2.0	**1.5 J**	**84**	<1.8	<1.9
Perfluorododecanoic acid (PFDoA)	ng/L	<19	<1.8	<1.7	<2.0	<2.0	<1.6	<1.8	<19	<2.0	<2.0	<2.0	<1.8	<1.9
Perfluorotridecanoic acid (PFTriA)	ng/L	<19	<1.8	**0.52 J**	<2.0	<2.0	<1.6	<1.8	<19	<2.0	<2.0	<2.0	<1.8	<1.9
Perfluorotetradecanoic acid (PFTeA)	ng/L	<19	<1.8	**0.53 J**	<2.0	<2.0	<1.6	<1.8	<19	**0.38 JB**	**0.25 JB**	**0.74 JB**	**0.39 JB**	**0.99 JB**
Perfluorooctane sulfonamide (FOSA)	ng/L	<19	**1.7 JH**	**2.3 B**	**1.8 JB**	**1.7 JB**	**2.8 H**	**0.97 JH**	**360 B**	**1.6 JB**	**0.95 JB**	**300 HB**	**2.7 B**	**1.9 B**
6:2 Fluorotelomer sulfonate (FTS)	ng/L	**38 J**	**340**	<17	<20	**570**	**43**	<18	**1,600**	<20	**270**	**1,400**	**210**	**150**
8:2 Fluorotelomer sulfonate (FTS)	ng/L	<190	**31**	<17	<20	<20	**10 J**	<18	**1,500**	<20	**180 H**	**2100 H**	**27**	**370 J**

Notes and Acronyms:
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ng/L = nanograms per liter
H = Analysis completed after method hold time
B = Compound was detected in method blank sample
J = Estimated result, as concentration is below method level of quantification
<= Result less than detection limit.

Table 2
Groundwater PFAS Analytical Results
2016 Investigation Report
Marinette, Wisconsin

	Location	SB-45 (continued)		SB-46				SB-47				
	Sample Date	8/28/2016	8/28/2016	8/30/2016	8/30/2016	8/30/2016	8/30/2016	8/29/2016	8/29/2016	8/29/2016	8/29/2016	8/29/2016
Chemical Name	Depth (feet)	25-30	35-40	5-10	15-20	25-30	35-40	5-10	15-20	25-30	35-40	45-50
Perfluorobutanesulfonic acid (PFBS)	ng/L	**9.3 B**	**4.2 B**	**5.2 B**	**18 B**	**30 B**	**9.0 B**	**2.2 HB**	**310 HB**	**460 HB**	**730 HB**	**390 HB**
perfluorohexanesulfonic acid (PFHxS)	ng/L	**220**	**59**	**48**	**560**	**540**	**250**	**3.1 H**	**2,600 H**	**3,000 H**	**4,400 H**	**3,400 H**
Perfluoroheptanesulfonic acid (PFHpS)	ng/L	**5.1**	**3.2**	**4.5**	**250**	**15**	**10**	**1.9 H**	**96 H**	**140 H**	**210 H**	**120 H**
Perfluorooctanoicsulfonic acid (PFOS)	ng/L	**3,700**	**130**	**590**	**9,500**	**2,000**	**1,600**	**8.6 H**	**9,500 H**	**5,500 H**	**6,200 H**	**8,700 H**
Perfluorodecanesulfonic acid (PFDS)	ng/L	<1.9	<1.8	**2.1**	<2.0	<2.0	<2.0	**1.7 JH**	<8.8 H	<1.9 H	<2.0 H	<2.5 H
Perfluorobutanoic acid (PFBA)	ng/L	**4,000 B**	**350 B**	**270 B**	**1,300 B**	**2,000 B**	**430 B**	**120 HB**	**2,600 HB**	**1,600 HB**	**2,300 HB**	**3,600 HB**
Perfluoropentanoic acid (PFPA)	ng/L	**12,000**	**960**	**1,100**	**2,700**	**6,800**	**1,100**	**340 H**	**6,100 H**	**3,400 H**	**5,800 H**	**9,700 H**
Perfluorohexanoic acid (PFHxA)	ng/L	**13,000**	**760**	**940**	**2,400**	**6,000**	**1,000**	**1100 H**	**8,500 H**	**7,800 H**	**12,000 H**	**14,000 H**
Perfluoroheptanoic acid (PFHpA)	ng/L	**3,800**	**430**	**530**	**1,200**	**2,500**	**710**	**340 H**	**4,900 H**	**2,400 H**	**3,100 H**	**4,800 H**
Perfluorooctanoic acid (PFOA)	ng/L	**8,600**	**6,400**	**2,500**	**4,100**	**13,000**	**4,400**	**81 H**	**65,000 H**	**29,000 H**	**24,000 H**	**80,000 H**
Perfluorononanoic acid (PFNA)	ng/L	**1,200**	**45**	**380**	**1,800**	**760**	**210**	**11 H**	**3,700 H**	**3,000 H**	**2,500 H**	**3,700 H**
Perfluorodecanoic acid (PFDA)	ng/L	**490**	**7.1**	**680**	**620**	**220**	**160**	**26 H**	**770 H**	**360 H**	**310 H**	**600 H**
Perfluoroundecanoic acid (PFUnA)	ng/L	**100**	**0.90 J**	**580**	**150**	**53**	**94**	**24 H**	**380 H**	**45 H**	**8.5 H**	**130 H**
Perfluorododecanoic acid (PFDoA)	ng/L	<1.9	<1.8	**3.1**	**2.4**	**2.4**	**1.1 J**	**45 H**	<8.8 H	**0.72 JH**	**0.69 JH**	**3.4 H**
Perfluorotridecanoic acid (PFTriA)	ng/L	<1.9	<1.8	<2.1	**1.5 J**	**1.4 J**	**0.71 J**	**7.0 H**	<8.8 H	<1.9 H	<2.0 H	**0.93 JH**
Perfluorotetradecanoic acid (PFTeA)	ng/L	**0.98 JB**	**1.0 JB**	**0.65 JB**	**0.36 JB**	**0.39 JB**	**0.96 JB**	**0.41 JHB**	<8.8 H	<1.9 H	**0.98 JHB**	<2.5 H
Perfluorooctane sulfonamide (FOSA)	ng/L	**64 B**	**6.1 B**	**240**	**290**	**110**	**53**	**10 H**	**2,000 H**	**1,800 H**	**1,100 H**	**2,200 H**
6:2 Fluorotelomer sulfonate (FTS)	ng/L	**93**	**1,300**	**1,700**	**1,500**	**1,200**	**1,600**	**1,400 H**	**1,200 H**	**1,000 H**	**900 H**	**1,200 H**
8:2 Fluorotelomer sulfonate (FTS)	ng/L	**1,900**	**210**	**1,600**	**360**	**1,500**	**1,500**	**770 H**	**710 H**	**1,500 H**	**1,600 H**	**420 H**

Notes and Acronyms:
Bold = Compound detected
ng/L = nanograms per liter
H = Analysis completed after method hold time
B = Compound was detected in method blank sample
J = Estimated result, as concentration is below method level of quantification
<= Result less than detection limit.

Site Investigation Report (September 2018)

Table 3. VAP Groundwater Analytical Results - June/July/August 2018

Table 5. Production Well Analytical Results - June 2018

Appendix B: Table 3. PFAS Groundwater Sample Results November and December 2017 VAP Investigation

Table 3. VAP Groundwater Analytical Results - June/July/August 2018

Table 3
VAP Groundwater Analytical Results - June/July/August 2018
Site Investigation Report
Marinette, Wisconsin

	Location	VAP-26	VAP-28	VAP-28	VAP-28	VAP-29	VAP-29	VAP-29	VAP-29	VAP-30
	Sample Date	6/12/2018	8/15/2018	8/16/2018	8/16/2018	6/25/2018	6/25/2018	6/26/2018	6/27/2018	8/7/2018
	Depth (ft)	66-69	72-75	82-85	99-102	5-10	5-10	25-30	79-82	59-62
	Geology	Sand	Sand	Sand	Confining/ Bedrock Interface	Sand	Sand	Sand	Confining/ Bedrock Interface	Sand
	Sample Type	N	N	N	N	N	FD	N	N	N
Chemical Name	**Units**									
Ethylperfluorooctane sulfonamido acetate (EtFOSAA)	ng/L	< 21	< 17	< 18	< 18	< 18	< 17	< 18	< 17	< 17
Methylperfluorooctane sulfonamido acetate (MeFOSAA)	ng/L	< 21	< 17	< 18	< 18	< 18	< 17	< 18	< 17	< 17
Perfluorobutane sulfonic acid (PFBS)	ng/L	**6.0**	< 1.7	< 1.8	< 1.8	**2.0**	**2.5**	< 1.8	< 1.7	< 1.7
Perfluorodecanoic acid (PFDA)	ng/L	**0.52 J**	< 1.7	< 1.8	< 1.8	< 1.8	< 1.7	< 1.8	< 1.7	< 1.7
Perfluorododecanoic acid (PFDoA)	ng/L	< 2.1	< 1.7	< 1.8	< 1.8	< 1.8	< 1.7	< 1.8	< 1.7	< 1.7
Perfluoroheptanoic acid (PFHpA)	ng/L	**49**	< 1.7	< 1.8	< 1.8	**6.9**	**8.2**	**0.34 J**	< 1.7	< 1.7
Perfluorohexane sulfonic acid (PFHxS)	ng/L	**36**	< 1.7 UB	< 1.8 UB	< 1.8 UB	< 1.8	< 1.7	< 1.8 UB	< 1.7 UB	< 1.7 UB
Perfluorohexanoic acid (PFHxA)	ng/L	**95**	< 1.7	< 1.8	< 1.8	**21**	**21**	< 1.8	< 1.7	< 1.7
Perfluorononanoic acid (PFNA)	ng/L	**27**	< 1.7	< 1.8	< 1.8	< 1.8	< 1.7	**0.28 J**	< 1.7	< 1.7
Perfluorooctanesulfonic acid (PFOS)	ng/L	**18**	< 1.7	< 1.8	< 1.8	< 1.8	< 1.7	< 1.8	< 1.7	**1.5 J**
Perfluorooctanoic acid (PFOA)	ng/L	**1100 D**	< 1.7	**0.81 J**	< 1.8	**4.5**	**4.3**	**1.0 J**	< 1.7	< 1.7
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 2.1	< 1.7	< 1.8	< 1.8	< 1.8	**0.38 J**	< 1.8	< 1.7	< 1.7
Perfluorotridecanoic acid (PFTriA)	ng/L	< 2.1	< 1.7	< 1.8	< 1.8	< 1.8	< 1.7	< 1.8	< 1.7	< 1.7
Perfluoroundecanoic acid (PFUnA)	ng/L	< 2.1	< 1.7	< 1.8	< 1.8	< 1.8	< 1.7	< 1.8	< 1.7	< 1.7

Table 3
VAP Groundwater Analytical Results - June/July/August 2018
Site Investigation Report
Marinette, Wisconsin

	Location	VAP-30	VAP-31	VAP-31	VAP-32	VAP-32	VAP-32	VAP-33	VAP-33	VAP-33
	Sample Date	8/8/2018	6/28/2018	6/28/2018	6/28/2018	6/28/2018	6/28/2018	6/27/2018	6/27/2018	6/27/2018
	Depth (ft)	72-80	6-10	16-20	6-10	16-20	24-28	6-10	16-20	16-20
	Geology	Confining/ Bedrock Interface	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*
	Sample Type	N	N	N	N	N	N	N	N	FD
Chemical Name	**Units**									
Ethylperfluorooctane sulfonamido acetate (EtFOSAA)	ng/L	< 17	< 17	< 18	< 18	< 17	< 18	< 18	< 19	< 18
Methylperfluorooctane sulfonamido acetate (MeFOSAA)	ng/L	< 17	< 17	< 18	< 18	< 17	< 18	< 18	< 19	< 18
Perfluorobutane sulfonic acid (PFBS)	ng/L	< 1.7	**2.4**	**8.0**	**8.5**	**1.2 J**	**0.93 J**	**4.6**	**1.2 J**	**1.0 J**
Perfluorodecanoic acid (PFDA)	ng/L	< 1.7	< 1.7	< 1.8	< 1.8	< 1.7	< 1.8	< 1.8	< 1.9	< 1.8
Perfluorododecanoic acid (PFDoA)	ng/L	< 1.7	< 1.7	< 1.8	< 1.8	**0.70 J**	< 1.8	< 1.8	< 1.9	< 1.8
Perfluoroheptanoic acid (PFHpA)	ng/L	< 1.7	**13**	**5.3**	**40**	**6.7**	**3.5**	**90**	**2.0**	**1.8**
Perfluorohexane sulfonic acid (PFHxS)	ng/L	< 1.7 UB	**2.3**	< 1.8 UB	**2.2**	< 1.7	< 1.8	< 1.8 UB	< 1.9 UB	< 1.8 UB
Perfluorohexanoic acid (PFHxA)	ng/L	< 1.7	**19**	**9.3**	**90**	**13**	**8.7**	**140**	**11**	**11**
Perfluorononanoic acid (PFNA)	ng/L	< 1.7	**1.9**	< 1.8	**0.65 J**	< 1.7	< 1.8	**1.8**	< 1.9	< 1.8
Perfluorooctanesulfonic acid (PFOS)	ng/L	< 1.7	**3.0**	< 1.8	**10**	< 1.7	< 1.8	**5.3**	< 1.9	< 1.8
Perfluorooctanoic acid (PFOA)	ng/L	< 1.7	**8.6**	**4.1**	**29**	**76**	**33**	**27**	**2.2**	**2.6**
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 1.7	**0.36 J**	< 1.8	< 1.8	**1.3 J**	< 1.8	< 1.8	< 1.9	< 1.8
Perfluorotridecanoic acid (PFTriA)	ng/L	< 1.7	< 1.7	< 1.8	< 1.8	< 1.7	< 1.8	< 1.8	< 1.9	< 1.8
Perfluoroundecanoic acid (PFUnA)	ng/L	< 1.7	< 1.7	< 1.8	< 1.8	< 1.7	< 1.8	< 1.8	< 1.9	< 1.8

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	Location	VAP-33	VAP-33	VAP-33	VAP-35	VAP-35	VAP-35	VAP-35	VAP-35	VAP-36
	Sample Date	6/27/2018	6/27/2018	6/27/2018	6/26/2018	6/26/2018	6/26/2018	6/26/2018	6/27/2018	6/26/2018
	Depth (ft)	31-35	41-45	51-55	11-15	11-15	21-25	31-35	46-50	6-10
	Geology	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand
	Sample Type	N	N	N	N	FD	N	N	N	N
Chemical Name	**Units**									
Ethylperfluorooctane sulfonamido acetate (EtFOSAA)	ng/L	< 18	< 18	< 18	< 18	< 18	< 19	< 20	< 18	< 18
Methylperfluorooctane sulfonamido acetate (MeFOSAA)	ng/L	< 18	< 18 J	< 18 J	< 18	< 18	< 19	< 20	< 18	< 18
Perfluorobutane sulfonic acid (PFBS)	ng/L	< 1.8	< 1.8 J	< 1.8 J	**1.5 J**	**1.4 J**	**0.67 J**	**0.78 J**	< 1.8	**8.2**
Perfluorodecanoic acid (PFDA)	ng/L	< 1.8	< 1.8 J	< 1.8	< 1.8	< 1.8	< 1.9	< 2.0	< 1.8	< 1.8
Perfluorododecanoic acid (PFDoA)	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.9	< 2.0	< 1.8	< 1.8
Perfluoroheptanoic acid (PFHpA)	ng/L	< 1.8	< 1.8 J	< 1.8	**3.0**	**2.8**	**3.9**	**3.9**	< 1.8	**3.9**
Perfluorohexane sulfonic acid (PFHxS)	ng/L	< 1.8	< 1.8	< 1.8	< 1.8 UB	< 1.8 UB	< 1.9 UB	< 2.0 UB	< 1.8 UB	< 1.8 UB
Perfluorohexanoic acid (PFHxA)	ng/L	< 1.8 J	< 1.8 J	**4.2**	**2.2**	**2.0**	**7.1**	**6.5**	< 1.8	**12**
Perfluorononanoic acid (PFNA)	ng/L	< 1.8	< 1.8 J	< 1.8 J	< 1.8	< 1.8	< 1.9	< 2.0	< 1.8	< 1.8
Perfluorooctanesulfonic acid (PFOS)	ng/L	< 1.8	< 1.8 J	< 1.8 J	< 1.8	< 1.8	**0.82 J**	< 2.0	< 1.8	**6.4**
Perfluorooctanoic acid (PFOA)	ng/L	< 1.8	< 1.8 J	**1.8**	**3.7**	**4.0**	**78**	**74**	**0.98 J**	**4.0**
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 1.8	< 1.8 J	< 1.8 J	< 1.8	< 1.8	< 1.9	< 2.0	< 1.8	< 1.8
Perfluorotridecanoic acid (PFTriA)	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.9	< 2.0	< 1.8	< 1.8
Perfluoroundecanoic acid (PFUnA)	ng/L	< 1.8	< 1.8 J	< 1.8	< 1.8	< 1.8	< 1.9	< 2.0	< 1.8	< 1.8

Table 3
VAP Groundwater Analytical Results - June/July/August 2018
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	Location	VAP-36	VAP-36 Reanalysis	VAP-36	VAP-37	VAP-37	VAP-37	VAP-38	VAP-38
	Sample Date	6/26/2018	6/26/2018	6/26/2018	6/25/2018	6/25/2018	6/26/2018	6/25/2018	6/25/2018
	Depth (ft)	16-20	16-20	26-30	9-13	19-23	29-33	11-15	21-25
	Geology	Sand	Sand	Sand/ Clay	Sand*	Sand*	Sand*	Sand*	Sand*
	Sample Type	N	N	N	N	N	N	N	N
Chemical Name	Units								
Ethylperfluorooctane sulfonamido acetate (EtFOSAA)	ng/L	< 21	R	< 18	< 22	< 18	< 19	< 18	< 22
Methylperfluorooctane sulfonamido acetate (MeFOSAA)	ng/L	< 21	R	< 18	< 22	< 18	< 19	< 18	< 22
Perfluorobutane sulfonic acid (PFBS)	ng/L	**3.7**	**6.9 J**	< 1.8	**1.1 J**	< 1.8	**1.4 J**	< 1.8	< 2.2
Perfluorodecanoic acid (PFDA)	ng/L	< 2.1	R	< 1.8	< 2.2	< 1.8	< 1.9	< 1.8	< 2.2
Perfluorododecanoic acid (PFDoA)	ng/L	< 2.1	R	< 1.8	< 2.2	< 1.8	< 1.9	< 1.8	< 2.2
Perfluoroheptanoic acid (PFHpA)	ng/L	**170**	**320 J**	< 1.8	**1.0 J**	**1.7 J**	**1.7 J**	< 1.8	< 2.2
Perfluorohexane sulfonic acid (PFHxS)	ng/L	< 2.1 UB	**2.6 J**	< 1.8 UB	< 2.2 UB	< 1.8 UB	< 1.9 UB	< 1.8	< 2.2
Perfluorohexanoic acid (PFHxA)	ng/L	**200**	**340 J**	< 1.8	**1.8 J**	**2.6**	**2.2**	< 1.8	< 2.2
Perfluorononanoic acid (PFNA)	ng/L	**5.4**	**10 J**	< 1.8	< 2.2	< 1.8	< 1.9	< 1.8	< 2.2
Perfluorooctanesulfonic acid (PFOS)	ng/L	**2.1**	**5.8 J**	< 1.8	**1.0 J**	**1.6 J**	**2.2**	< 1.8	< 2.2
Perfluorooctanoic acid (PFOA)	ng/L	**300**	**570 J**	< 1.8	**1.8 J**	**2.2**	**3.4**	< 1.8	< 2.2
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 2.1	R	< 1.8	< 2.2	< 1.8 UB	< 1.9	< 1.8	< 2.2
Perfluorotridecanoic acid (PFTriA)	ng/L	< 2.1	R	< 1.8	< 2.2	< 1.8	< 1.9	< 1.8	< 2.2 J
Perfluoroundecanoic acid (PFUnA)	ng/L	< 2.1	R	< 1.8	< 2.2	< 1.8	< 1.9	< 1.8	< 2.2

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	Location	VAP-38	VAP-38	VAP-39	VAP-39	VAP-39	VAP-40	VAP-40	VAP-40	VAP-40
	Sample Date	6/25/2018	6/25/2018	7/23/2018	7/23/2018	7/23/2018	8/21/2018	8/21/2018	8/21/2018	8/22/2018
	Depth (ft)	31-35	41-45	6-10	16-20	22-26	10-14	10-14	16-20	26-30
	Geology	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*
	Sample Type	N	N	N	N	N	N	FD	N	N
Chemical Name	**Units**									
Ethylperfluorooctane sulfonamido acetate (EtFOSAA)	ng/L	< 22	< 18	< 18	< 34	< 20	< 18	< 18	< 18	< 18
Methylperfluorooctane sulfonamido acetate (MeFOSAA)	ng/L	< 22	< 18	< 18	< 34	< 20	< 18	< 18	< 18	< 18
Perfluorobutane sulfonic acid (PFBS)	ng/L	< 2.2	< 1.8	**1.4 J**	**2.7 J**	**1.6 J**	< 1.8	**0.57 J**	**2.3**	**0.31 J**
Perfluorodecanoic acid (PFDA)	ng/L	< 2.2	< 1.8	< 1.8	< 3.4	< 2.0	< 1.8	< 1.8	< 1.8	< 1.8
Perfluorododecanoic acid (PFDoA)	ng/L	< 2.2	< 1.8	< 1.8	< 3.4	< 2.0	< 1.8	< 1.8	< 1.8	< 1.8
Perfluoroheptanoic acid (PFHpA)	ng/L	< 2.2	< 1.8	**2.0**	**6.1**	**9.5**	**1.0 J**	**1.1 J**	**6.1**	**0.63 J**
Perfluorohexane sulfonic acid (PFHxS)	ng/L	< 2.2	< 1.8 UB	**1.7 J**	< 3.4 UB	< 2.0 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB
Perfluorohexanoic acid (PFHxA)	ng/L	< 2.2	< 1.8	**2.4**	**9.1**	**14**	**2.9**	**2.9**	**14**	**0.81 J**
Perfluorononanoic acid (PFNA)	ng/L	< 2.2	< 1.8	< 1.8	**1.3 J**	**2.1**	< 1.8	< 1.8	< 1.8	**0.24 J**
Perfluorooctanesulfonic acid (PFOS)	ng/L	**2.2**	**0.77 J**	**1.7 J**	**2.8 J**	**2.6**	< 1.8	< 1.8	**0.86 J**	**0.53 J**
Perfluorooctanoic acid (PFOA)	ng/L	< 2.2	< 1.8	**7.5**	**6.9**	**8.2**	**1.6 J**	**1.6 J**	**16**	**1.2 J**
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 2.2	< 1.8	< 1.8	< 3.4	< 2.0	< 1.8	< 1.8	< 1.8	< 1.8
Perfluorotridecanoic acid (PFTriA)	ng/L	< 2.2	< 1.8	< 1.8	< 3.4	< 2.0	< 1.8	< 1.8	< 1.8	< 1.8
Perfluoroundecanoic acid (PFUnA)	ng/L	< 2.2	< 1.8	< 1.8	< 3.4	< 2.0	< 1.8	< 1.8	< 1.8	< 1.8

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	Location	VAP-41	VAP-41	VAP-41	VAP-41	VAP-41	VAP-42	VAP-42	VAP-42	VAP-42
	Sample Date	8/22/2018	8/22/2018	8/22/2018	8/22/2018	8/22/2018	8/22/2018	8/22/2018	8/23/2018	8/23/2018
	Depth (ft)	6-10	16-20	26-30	26-30	36-40	6-10	16-20	26-30	36-40
	Geology	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*
	Sample Type	N	N	N	FD	N	N	N	N	N
Chemical Name	**Units**									
Ethylperfluorooctane sulfonamido acetate (EtFOSAA)	ng/L	< 18	< 18	< 18	< 18	< 18	< 18	< 18	< 18	< 18
Methylperfluorooctane sulfonamido acetate (MeFOSAA)	ng/L	< 18	< 18	< 18	< 18	< 18	< 18	< 18	< 18	< 18
Perfluorobutane sulfonic acid (PFBS)	ng/L	**3.2**	**2.9**	**0.48 J**	**0.48 J**	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Perfluorodecanoic acid (PFDA)	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Perfluorododecanoic acid (PFDoA)	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Perfluoroheptanoic acid (PFHpA)	ng/L	**1.1 J**	**1.8**	**0.64 J**	**0.65 J**	< 1.8	**0.32 J**	< 1.8	< 1.8	< 1.8
Perfluorohexane sulfonic acid (PFHxS)	ng/L	< 1.8 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB
Perfluorohexanoic acid (PFHxA)	ng/L	**1.0 J**	**16**	**0.98 J**	**0.97 J**	< 1.8	**0.88 J**	< 1.8	< 1.8	< 1.8
Perfluorononanoic acid (PFNA)	ng/L	< 1.8	**0.72 J**	< 1.8	< 1.8	< 1.8	**0.25 J**	< 1.8	< 1.8	< 1.8
Perfluorooctanesulfonic acid (PFOS)	ng/L	< 1.8	**10**	**0.83 J**	**0.65 J**	< 1.8	**1.0 J**	< 1.8	< 1.8	< 1.8
Perfluorooctanoic acid (PFOA)	ng/L	**1.3 J**	**4.8**	**0.91 J**	**0.97 J**	< 1.8	**0.78 J**	< 1.8	< 1.8	< 1.8
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Perfluorotridecanoic acid (PFTriA)	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Perfluoroundecanoic acid (PFUnA)	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8

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	Location	VAP-42	VAP-43	VAP-43	VAP-43	VAP-43	VAP-43	VAP-44	VAP-44	VAP-44
	Sample Date	8/23/2018	8/29/2018	8/29/2018	8/29/2018	8/29/2018	8/29/2018	8/21/2018	8/21/2018	8/21/2018
	Depth (ft)	36-40	11-15	16-20	16-20	26-30	36-40	6-10	16-20	26-30
	Geology	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*
	Sample Type	FD	N	N	FD	N	N	N	N	N
Chemical Name	**Units**									
Ethylperfluorooctane sulfonamido acetate (EtFOSAA)	ng/L	< 18	< 19	< 19	< 18	< 18	< 18	< 18	< 18	< 18
Methylperfluorooctane sulfonamido acetate (MeFOSAA)	ng/L	< 18	< 19	< 19	< 18	< 18	< 18	< 18	< 18	< 18
Perfluorobutane sulfonic acid (PFBS)	ng/L	< 1.8	**1.6 J**	< 1.9	< 1.8	< 1.8	< 1.8	**0.50 J**	< 1.8	< 1.8
Perfluorodecanoic acid (PFDA)	ng/L	< 1.8	< 1.9	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Perfluorododecanoic acid (PFDoA)	ng/L	< 1.8	< 1.9	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Perfluoroheptanoic acid (PFHpA)	ng/L	< 1.8	**0.96 J**	< 1.9	< 1.8	< 1.8	< 1.8	**0.28 J**	**0.44 J**	< 1.8
Perfluorohexane sulfonic acid (PFHxS)	ng/L	< 1.8 UB	< 1.9 UB	< 1.9 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB
Perfluorohexanoic acid (PFHxA)	ng/L	< 1.8	**1.3 J**	< 1.9	< 1.8	< 1.8	< 1.8	**0.60 J**	< 1.8	< 1.8
Perfluorononanoic acid (PFNA)	ng/L	< 1.8	< 1.9	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	**0.28 J**	< 1.8
Perfluorooctanesulfonic acid (PFOS)	ng/L	< 1.8	< 1.9	< 1.9	< 1.8	< 1.8	< 1.8	**0.68 J**	< 1.8	< 1.8
Perfluorooctanoic acid (PFOA)	ng/L	< 1.8	< 1.9	< 1.9	< 1.8	< 1.8	< 1.8	**0.83 J**	**1.6 J**	**1.4 J**
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 1.8	< 1.9	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Perfluorotridecanoic acid (PFTriA)	ng/L	< 1.8	< 1.9	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Perfluoroundecanoic acid (PFUnA)	ng/L	< 1.8	< 1.9	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8

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	Location	VAP-44	VAP-44	VAP-45	VAP-45	VAP-45	VAP-46	VAP-46	VAP-46	VAP-46
	Sample Date	8/21/2018	8/21/2018	8/21/2018	8/21/2018	8/21/2018	8/28/2018	8/28/2018	8/28/2018	8/28/2018
	Depth (ft)	26-30	36-40	6-10	16-20	26-30	11-15	16-20	16-20	26-30
	Geology	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*	Sand*
	Sample Type	FD	N	N	N	N	N	N	FD	N
Chemical Name	**Units**									
Ethylperfluorooctane sulfonamido acetate (EtFOSAA)	ng/L	< 19	< 18	< 18	< 18	< 18	< 23	< 18	< 18	< 18
Methylperfluorooctane sulfonamido acetate (MeFOSAA)	ng/L	< 19	< 18	< 18	< 18	< 18	< 23	< 18	< 18	< 18
Perfluorobutane sulfonic acid (PFBS)	ng/L	< 1.9	**0.31 J**	**1.3 J**	**0.22 J**	**0.36 J**	**0.98 J**	**0.35 J**	**0.33 J**	< 1.8
Perfluorodecanoic acid (PFDA)	ng/L	< 1.9	**0.43 J**	< 1.8	< 1.8	< 1.8	< 2.3	< 1.8	< 1.8	< 1.8
Perfluorododecanoic acid (PFDoA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 2.3	< 1.8	< 1.8	< 1.8
Perfluoroheptanoic acid (PFHpA)	ng/L	< 1.9	< 1.8	**6.2**	< 1.8	**0.54 J**	**2.8**	**0.87 J**	**0.81 J**	< 1.8
Perfluorohexane sulfonic acid (PFHxS)	ng/L	< 1.9 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB	< 2.3 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB
Perfluorohexanoic acid (PFHxA)	ng/L	< 1.9	< 1.8	**8.3**	< 1.8	**0.68 J**	**1.4 J**	**1.6 J**	**1.7 J**	< 1.8
Perfluorononanoic acid (PFNA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 2.3	< 1.8	< 1.8	< 1.8
Perfluorooctanesulfonic acid (PFOS)	ng/L	< 1.9	< 1.8	**1.2 J**	< 1.8	< 1.8	**1.8 J**	< 1.8	< 1.8	< 1.8
Perfluorooctanoic acid (PFOA)	ng/L	**1.6 J**	**1.9**	**8.5**	**1.2 J**	**1.8**	**8.8**	**0.89 J**	< 1.8	< 1.8
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 2.3	< 1.8	< 1.8	< 1.8
Perfluorotridecanoic acid (PFTriA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 2.3	< 1.8	< 1.8	< 1.8
Perfluoroundecanoic acid (PFUnA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 2.3	< 1.8	< 1.8	< 1.8

Table 3
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	Location	VAP-46	VAP-47	VAP-47	VAP-47
	Sample Date	8/28/2018	8/23/2018	8/23/2018	8/28/2018
	Depth (ft)	36-40	6-10	16-20	26-30
	Geology	Sand*	Sand*	Sand*	Sand*
	Sample Type	N	N	N	N
Chemical Name	Units				
Ethylperfluorooctane sulfonamido acetate (EtFOSAA)	ng/L	< 19	< 18	< 18	< 18
Methylperfluorooctane sulfonamido acetate (MeFOSAA)	ng/L	< 19	< 18	< 18	< 18
Perfluorobutane sulfonic acid (PFBS)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8
Perfluorodecanoic acid (PFDA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8
Perfluorododecanoic acid (PFDoA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8
Perfluoroheptanoic acid (PFHpA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8
Perfluorohexane sulfonic acid (PFHxS)	ng/L	< 1.9 UB	< 1.8 UB	< 1.8 UB	< 1.8 UB
Perfluorohexanoic acid (PFHxA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8
Perfluorononanoic acid (PFNA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8
Perfluorooctanesulfonic acid (PFOS)	ng/L	< 1.9	< 1.8	< 1.8	**1.3 J**
Perfluorooctanoic acid (PFOA)	ng/L	< 1.9	< 1.8	< 1.8	**0.93 J**
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8
Perfluorotridecanoic acid (PFTriA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8
Perfluoroundecanoic acid (PFUnA)	ng/L	< 1.9	< 1.8	< 1.8	< 1.8

Table 3
VAP Groundwater Analytical Results - June/July/August 2018
2018 Investigation Report
Marinette, Wisconsin

Notes & Acronyms

1. The general geology associated with each sample has been provided. For locations where soils were not logged, an asterisk follows the description to indicate that soil logging was not completed at the location/interval, and the geology has been assumed based on the results of soil logging within the vicinity of the investigation.

2. VAP-36 (16-20) was reanalyzed for informational purposes outside of maximum holding time. Because reanalysis occurred outside of the holding time, compound detections have been flagged with a J (estimated value) qualifier. If the compound was not detected at a concentration above the reporting limit, the result was rejected.

< = Compound not detected at reporting limit

Bold = Compound detected

N = Normal

FD = Field Duplicate

D = Dilution required for sample analysis

J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.

R = The compound was not detected above the reported sample reporting limit; however, due to holding time exceedance, the result was rejected.

UB = Compound considered non-detect at the listed value due to associated blank contamination.

VAP = vertical aquifer profiling

ng/L = nanograms per liter

Table 5. Production Well Analytical Results - June 2018

Table 5
Production Well Analytical Results - June 2018
Site Investigation Report
Marinette, Wisconsin

	Location	PW-1
	Sample Date	6/4/2018
	Sample Type	N
Chemical Name	Units	
Ethylperfluorooctane sulfonamido acetate (EtFOSAA)	ng/L	< 20
Methylperfluorooctane sulfonamido acetate (MeFOSAA)	ng/L	< 20
Perfluorobutane sulfonic acid (PFBS)	ng/L	**0.75 J**
Perfluorodecanoic acid (PFDA)	ng/L	< 2.0
Perfluorododecanoic acid (PFDoA)	ng/L	< 2.0
Perfluoroheptanoic acid (PFHpA)	ng/L	**39**
Perfluorohexane sulfonic acid (PFHxS)	ng/L	**1.4 JB**
Perfluorohexanoic acid (PFHxA)	ng/L	**130**
Perfluorononanoic acid (PFNA)	ng/L	**0.59 J**
Perfluorooctanesulfonic acid (PFOS)	ng/L	< 2.0
Perfluorooctanoic acid (PFOA)	ng/L	**800 D**
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 2.0
Perfluorotridecanoic acid (PFTriA)	ng/L	< 2.0
Perfluoroundecanoic acid (PFUnA)	ng/L	< 2.0

Notes & Acronyms
< = Compound not detected at reporting limit
Bold = Compound detected
N = Normal
D = Dilution required for sample analysis
J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.
JB = The compound was positively identified; however, the associated numerical value is an estimated concentration only. The compound was also identified in the associated blank.
ng/L = nanograms per liter

Appendix B:

Table 3. PFAS Groundwater Sample Results November and December 2017 VAP Investigation

Table 3
PFAS Groundwater Sample Results
November and December 2017 VAP Investigation
Marinette, Wisconsin

Sample Location	Interval	PFOA	PFOS	PFBS	PFHpA	PFHxS	PFNA
PZ-1D	63.5-68.5	26.1	<1.51	<3.36	<3.78	<3.25	<1.89
SS-01	Surface	2220	70.4	4.41	206	21.7 J	52.9
SS-02	Surface	2760	1860	22.5	1640	467	515
SS-03	Surface	296	121	2.86 J	145	17.7	75.7
SS-04	Surface	351	228	7.33	120	46.5	39.1
VAP-01	EB	<3.62	<1.45	<3.22	<3.62	<3.11	<1.81
	EB	<3.58	<1.43	<3.19	<3.58	<3.08	<1.79
	TB	<3.60	<1.44	<3.20	<3.60	<3.10	<1.80
	TB	<4.16	<1.66	<3.70	<4.16	<3.58	<2.08
	4-8	297	61.3	8.28	164	30.9	42.9
	10-14	291	97.9	10.2	187	47	47.4
	20-24	275	79.1	5.17	181	31.1 J	39.9
	30-34	313	<1.56	1.16 J	3.42 J	30.6	<1.96
	40-44	<4.27	<1.71	<3.80	<4.27	<3.67	<2.13
	50-54	<7.47	<2.99	<6.65	<7.47	<6.42	<3.74
VAP-02	EB	10.7	<5.40	<1.63	4.56	<3.37	<1.85
	EB	<3.87	<1.55	<3.44	<3.87	<3.33	<1.94
	TB	<3.72	<1.49	<3.31	<3.72	<3.20	<1.86
	TB	<7.12	<2.85	<6.34	<7.12	<6.12	<3.56
	4-8	207	20.1	3.51	150	17.7	32.6
	14-18	24.5	<2.50	6.5	15	<5.38	<3.13
	24-28	5.5	<2.17	<4.83	<5.43	3.36	<2.72
	34-38	15.1	<3.33	3.74 J	<8.32	3.26	<4.16
VAP-03	EB	27.7	22.5	9.9	<3.67	<3.16	<1.84
	EB	<3.77	<1.51	<3.36	<3.77	<3.24	<1.88
	TB	<3.65	<1.46	<3.25	<3.65	<3.14	<1.82
	12-16	41.9	<1.60	2.54 J	114	12.1 J	<2.00
	22-24	53.4	<3.56	7.06 J	55.8	19.1 J	<4.45
	32-36	128	65.7	2.46 J	63.6	30.5	27.4
	32-36 DUP	151	62.9	4.32	80	31.6	28.9
	48-52	47.3	<2.69	4.51 J	27.3	17.1 J	5.29
	58-62	1100	553	69.6	336	290	153

Notes on Page 5.

Table 3
PFAS Groundwater Sample Results
November and December 2017 VAP Investigation
Marinette, Wisconsin

Sample Location	Interval	PFOA	PFOS	PFBS	PFHpA	PFHxS	PFNA
VAP-04	EB	<3.75	<1.50	<3.34	<3.75	<3.22	<1.88
	4-8	6.99	<1.87	3.69 J	<4.68	<4.02	<2.34
	14-18	29.7	5.58	4.48	5.72	1.93	1.15 J
	24-28	266	<1.51	1.04 J	13.4	2.48	<1.88
	24-28 DUP	588	<1.48	5.22	26.7	4.39	<1.85
	34-38	68.1	<1.80	2.75 J	<4.49	<3.86	<2.25
VAP-05	EB	<3.66	<1.46	<3.26	<3.66	<3.15	<1.83
	8-12	11.3	<2.96	4.31 J	<7.40	2.41 J	<3.70
	18-22	35.2	<1.48	2.09 J	5.51	4.29 J	<1.84
	28-32	<5.28	<2.11	<4.70	<5.28	<4.54	<2.64
	38-42	<9.61	<3.84	<8.55	<9.61	<8.26	<4.80
	48-52	36.1	<4.16	<9.26	<10.4	<8.94	<5.20
	48-52 DUP	24.1	<3.08	<6.85	<7.70	<6.62	<3.85
VAP-06	EB	<4.07	<1.63	<3.62	<4.07	<3.50	<2.04
	EB	<3.80	<1.52	<3.38	<3.80	<3.27	<1.90
	TB	8.46	<1.49	<3.32	<3.73	<3.21	<1.86
	4-8	6.51	2.05	1.83 J	1.32 J	<3.21	<1.86
	14-18	7.21	<1.53	<3.41	10.8	<3.29	<1.92
	24-28	105	<2.67	<5.95	<6.68	<5.74	<3.34
	34-38	94.2	<2.35	2.71 J	<5.87	<5.05	<2.94
	34-38 DUP	52	<1.54	<3.42	<3.84	<3.30	<1.92
VAP-07	EB	36.2	<1.45	<3.22	<3.62	<3.11	<1.81
	6-10	48.3	<1.46	1.97 J	4.04	<3.14	<1.82
	16-20	49.3	<2.38	<5.30	<5.95	<5.12	<2.98
	31-35	51.9	5.00	3.02 J	23.8	11.8	3.12
	41-45	4.61 J	<1.99	<4.43	<4.98	<4.28	<2.49
VAP-08	EB	<3.90	<1.56	<3.47	<3.90	<3.35	<1.95
	8-12	42.3	6.53	1.40 J	<4.01	2.74	<2.00
	18-22	9.03	<1.84	1.44 J	1.92 J	<3.96	<2.30
	28-32	<3.90	<1.56	<3.47	<3.90	<3.35	<1.95

Notes on Page 5.

Table 3
PFAS Groundwater Sample Results
November and December 2017 VAP Investigation
Marinette, Wisconsin

Sample Location	Interval	PFOA	PFOS	PFBS	PFHpA	PFHxS	PFNA
VAP-09	EB	<3.86	<1.54	<3.44	<3.86	<3.32	<1.93
	EB	<3.72	<1.49	1.42 J	<3.72	<3.20	<1.86
	EB	<4.00	<1.60	<3.56	<4.00	<3.44	<2.00
	EB	<4.47	<1.79	<3.98	<4.47	<3.84	<2.23
	TB	<3.60	<1.44	<3.20	<3.60	<3.10	<1.80
	TB	<3.58	<1.43	<3.19	<3.58	<3.08	<1.79
	6-10	36	<2.42	5.09 J	3.28 J	<5.20	<3.02
	16-20	194	<1.46	2.02 J	3.45 J	<3.14	<1.82
	26-30	<5.53	<2.21	<4.92	<5.53	<4.76	<2.76
	26-30 DUP	<5.32	<2.13	<4.73	<5.32	<4.58	<2.66
	36-40	<5.49	1.36 J	1.55 J	<5.49	<4.72	<2.74
VAP-10	EB	<3.92	<1.57	<3.49	<3.92	<3.37	<1.96
	10-14	<7.02	<2.81	<6.25	<7.02	<6.04	<3.51
	20-24	<4.07	<1.63	<3.62	<4.07	<3.50	<2.04
	20-24 DUP	<4.46	<1.78	1.31 J	<4.46	<3.84	<2.23
	31-35	<5.76	<2.30	<5.13	<5.76	<4.95	<2.88
	36-40	<3.82	<1.53	<3.40	<3.82	<3.29	<1.91
VAP-11	EB	<3.65	<1.46	<3.25	<3.65	<3.14	<1.82
	10-14	<3.64	<1.46	1.57 J	<3.64	<3.13	<1.82
	20-24	<4.08	<1.63	<3.63	<4.08	<3.51	<2.04
	30-34	<4.20	<1.68	<3.74	<4.20	<3.61	<2.10
	40-44	<14.2	<5.66	<12.6	<14.2	<12.2	<7.08
	40-44 DUP	<5.36	<2.14	<4.77	<5.36	<4.61	<2.68
VAP-12	EB	<3.75	<1.50	<3.34	<3.75	<3.22	<1.88
	8-12	<8.39	<3.36	<7.47	<8.39	<7.22	<4.20
	18-22	<5.97	<2.39	<5.31	<5.97	<5.13	<2.98
	28-32	<7.58	<3.03	19.6	<7.58	<6.52	<3.79
	38-42	<18.4	<7.36	<16.4	<18.4	<15.8	<9.20
VAP-13	EB	<4.19	<1.68	<3.73	<4.19	<3.60	<2.10
	4-8	10.2 J	4.38 J	4.22 J	<11.5	<9.90	<5.76
	14-18	16.3	<2.80	8.61	<6.99	<6.01	<3.50
	24-28	15.8	<3.21	<7.15	<8.03	4.91	<4.02

Notes on Page 5.

Table 3
PFAS Groundwater Sample Results
November and December 2017 VAP Investigation
Marinette, Wisconsin

Sample Location	Interval	PFOA	PFOS	PFBS	PFHpA	PFHxS	PFNA
VAP-14	EB	<3.83	<1.53	<3.41	<3.83	<3.29	<1.92
	4-8	8.07	<2.14	6.9	28.2	<4.60	<2.68
	14-18	<5.91	<2.36	<5.26	<5.91	<5.08	<2.96
VAP-15	4-8	8.28	<1.58	5.05	20.9	<3.39	<1.97
	14-18	<5.25	<2.10	2.19 J	<5.25	<4.52	<2.62
VAP-16	EB	<3.90	<1.56	2.05 J	<3.90	<3.35	<1.95
	6-10	<10.0	<4.02	<8.94	<10.0	<8.64	<5.02
	16-20	<6.22	<2.49	<5.54	<6.22	<5.35	<3.11
	26-30	<5.83	<2.33	<5.19	<5.83	<5.01	<2.92
	36-40	<3.90	<1.56	<3.47	<3.90	0.514 J	<1.95
	46-50	<4.80	<1.92	<4.27	<4.80	<4.13	<2.40
VAP-17	EB	<4.13	<4.04	<1.83	<4.13	<3.55	<2.07
	16-20	<5.40	<5.28	<2.39	<5.40	<4.64	<2.70
	26-30	<9.30	<9.09	<4.12	<9.30	<8.00	<4.65
	36-40	<4.90	<4.79	<2.17	1.98 J	<4.21	<2.45
	46-50	3.47 J	<7.97	<3.61	<8.15	<7.01	<4.08
	56-60	<4.37	<4.27	<1.93	<4.37	<3.76	<2.18
VAP-18	EB	<4.61	<4.51	<2.04	<4.61	<3.97	<2.31
	6-10	<4.69	<4.59	<2.08	<4.69	<4.04	<2.35
	16-20	<6.26	<6.12	<2.77	<6.26	<5.38	<3.13
	16-20 DUP	<5.17	<5.05	<2.29	<5.17	<4.44	<2.58
	26-30	61.3	<7.15	<3.24	<7.32	<6.29	<3.66
	36-40	61.3	<5.09	<2.30	<5.21	<4.48	<2.60
VAP-19	6-10	<7.35	<7.19	<3.25	<7.35	<6.32	<3.68
	16-20	10.3	<7.95	<3.60	<8.13	<6.99	<4.07
	26-30	262	6.53 J	<3.53	87.8	61.1	29.3
	36-40	276	<4.10	<1.85	87.3	88.8	32.5
VAP-20	6-10	<4.36	<4.27	<1.93	<4.36	<3.75	<2.18
	16-20	<5.30	<5.18	<2.35	<5.30	<4.56	<2.65
	16-20 DUP	<7.06	<6.90	<3.12	<7.06	<6.07	<3.53
	26-30	<6.99	<6.83	<3.09	<6.99	<6.01	<3.50
	36-40	<4.43	<4.33	<1.96	<4.43	<3.81	<2.22
	46-50	<4.75	<4.64	<2.10	<4.75	<4.08	<2.37

Notes on Page 5.

Table 3
PFAS Groundwater Sample Results
November and December 2017 VAP Investigation
Marinette, Wisconsin

Sample Location	Interval	PFOA	PFOS	PFBS	PFHpA	PFHxS	PFNA
VAP-21	EB	2.34 J	<4.56	<2.07	<4.67	<4.02	<2.33
	6-10	4.75	<4.60	<2.08	<4.71	<4.05	<2.35
	16-20	1140	<5.04	<2.28	<5.15	<4.43	<2.58
	26-30	48.5	<4.50	<2.04	<4.60	<3.96	<2.30
	36-40	538	<5.15	<2.33	<5.27	<4.53	<2.64
	46-50	25.9	<4.61	<2.09	<4.72	<4.06	<2.36
VAP-22	EB	<4.58	<4.48	<2.03	<4.58	<3.94	<2.29
	6-10	15.0	<3.92	<1.77	<4.01	4.96	<2.00
	16-20	<9.19	<8.99	<4.07	<9.19	<7.91	<4.60
VAP-23	EB	<4.93	<4.82	<2.18	<4.93	<4.24	<2.46
	6-10	44.3	<5.38	76.7	63.5	<4.73	<2.75
	16-20	<4.38	<4.28	<1.94	<4.38	<3.77	<2.19
	26-30	<5.71	<5.58	<2.53	<5.71	<4.91	<2.86
	36-40	34	<6.75	<3.06	28.9	<5.94	<3.45
	46-50	395	<6.52	<2.95	162	<5.74	<3.34
VAP-24	EB	<5.60	<5.47	<2.48	<5.60	<4.82	<2.80
	6-10	16.6	<4.24	<1.92	<4.33	<3.73	<2.17
	16-20	12.3	<4.05	<1.83	<4.14	<3.56	<2.07
	16-20 DUP	18.4	<7.79	<3.53	<7.97	<6.86	<3.99
	26-30	63.4	<8.72	<3.95	<8.92	<7.68	<4.46
	36-40	24.3	<5.51	<2.49	<5.64	3.18	<2.82
	46-50	18.0	<4.30	<1.94	<4.39	<3.78	<2.20

Notes:
All results above are in units of nanograms per liter (ng/L)
< = result less than detection limit (detection limit value shown)
J = Estimated Value
DUP = Field Duplicate Sample Result
EB = Drilling Rod Equipment Blank
TB = Tubing Blank
PFBS = Perfluorobutanesulfonic acid
PFHpA = Perfluoroheptanoic acid
PFHxS = Perfluorohexanesulfonic acid
PFOA = Perfluorooctanoic acid
PFNA = Perfluorononanoic acid
PFOS = Perfluorooctanesulfonic acid
VAP= Vertical Aquifer Profile

Data Summary Report (March 2019)

Table 2. Monitoring Well Groundwater Analytical Results - August 2018

Table 3. VAP Groundwater Analytical Results - October/November 2018

Table 2. Monitoring Well Groundwater Analytical Results - August 2018

Table 2
Monitoring Well Groundwater Analytical Results - August 2018
Data Summary Report
Marinette, Wisconsin

	Location	FTC-2D	FTC-2S	FTC-34D	FTC-34S	MW-100-32	MW-100-68	MW-101-16
	Sample Date	8/28/2018	8/28/2018	8/28/2018	8/28/2018	8/29/2018	8/29/2018	8/29/2018
	Sample Type	N	N	N	N	N	N	N
Chemical Name	Unit							
Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	ng/L	< 20	< 20	**390 DJ**	**8.8 J**	< 19	< 19	< 19
Methylperfluoroocatane Sulfonamidoacetic Acid (MeFOSAA)	ng/L	< 20	< 20	< 1900	< 19	< 19	< 19	< 19
Perfluorobutane sulfonic acid (PFBS)	ng/L	**4.1**	**1.2 J**	**260 J**	**1.2 J**	< 1.9	< 1.9	**4.2**
Perfluorodecanoic acid (PFDA)	ng/L	**1.8 J**	**17**	**280 D**	**780 D**	< 1.9	< 1.9	< 1.9
Perfluorododecanoic acid (PFDoA)	ng/L	< 2.0	< 2.0	< 190	**7.8**	**0.52 J**	< 1.9	< 1.9
Perfluoroheptanoic acid (PFHpA)	ng/L	**310**	**370**	**5200 D**	**810 D**	< 1.9	**0.33 J**	**4.0**
Perfluorohexane sulfonic acid (PFHxS)	ng/L	**45**	**19**	**5900 D**	**25**	< 1.9 UB	< 1.9 UB	< 1.9 UB
Perfluorohexanoic acid (PFHxA)	ng/L	**810 D**	**870 D**	**13000 D**	**1800 D**	< 1.9	**1.2 J**	**5.1**
Perfluorononanoic acid (PFNA)	ng/L	**20**	**40**	**4100 D**	**120**	< 1.9	< 1.9	**1.4 J**
Perfluorooctanesulfonic acid (PFOS)	ng/L	**29**	**41**	**15000 D**	**290**	< 1.9	< 1.9 UB	**5.0**
Perfluorooctanoic acid (PFOA)	ng/L	**7300 D**	**160**	**26000 D**	**550 D**	**1.0 J**	< 1.9	**7.8**
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 2.0	< 2.0	< 190	< 1.9	**0.29 J**	< 1.9	< 1.9
Perfluorotridecanoic acid (PFTriA)	ng/L	< 2.0	< 2.0	< 190	**2.2**	< 1.9	< 1.9	< 1.9
Perfluoroundecanoic acid (PFUnA)	ng/L	< 2.0	**2.2**	< 190	**90**	< 1.9	< 1.9	< 1.9

Table 2
Monitoring Well Groundwater Analytical Results - August 2018
Data Summary Report
Marinette, Wisconsin

	Location	MW-101-16	MW-101-72	PZ-14D	PZ-14D	PZ-14S	PZ-16D	PZ-16D
	Sample Date	8/29/2018	8/29/2018	8/28/2018	8/28/2018	8/28/2018	8/29/2018	8/29/2018
	Sample Type	FD	N	N	FD	N	N	FD
Chemical Name	Unit							
Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	ng/L	< 19	< 18	< 970	< 940	< 1900	< 2000	< 980
Methylperfluoroocatane Sulfonamidoacetic Acid (MeFOSAA)	ng/L	< 19	< 18	< 970	< 940	< 1900	< 2000	< 980
Perfluorobutane sulfonic acid (PFBS)	ng/L	**3.8**	**6.4**	**17 DJ**	**13 J**	**50 J**	**45 J**	**35 DJ**
Perfluorodecanoic acid (PFDA)	ng/L	< 1.9	**0.64 J**	**1400 D**	**1200 D**	**3300 D**	**160 J**	**190 D**
Perfluorododecanoic acid (PFDoA)	ng/L	< 1.9	< 1.8	< 97	< 94	< 190	< 200	< 98
Perfluoroheptanoic acid (PFHpA)	ng/L	**3.8**	**57**	**6000 D**	**5900 D**	**9200 D**	**4500 D**	**4000 D**
Perfluorohexane sulfonic acid (PFHxS)	ng/L	< 1.9 UB	**37**	**1300 D**	**1200 D**	**6700 D**	**850 D**	**950 D**
Perfluorohexanoic acid (PFHxA)	ng/L	**5.0**	**110**	**12000 D**	**12000 D**	**8800 D**	**13000 D**	**12000 D**
Perfluorononanoic acid (PFNA)	ng/L	**1.8 J**	**29**	**6300 D**	**6300 D**	**12000 D**	**2200 D**	**3000 D**
Perfluorooctanesulfonic acid (PFOS)	ng/L	**5.4**	**20**	**1200 D**	**1200 D**	**6500 D**	**5400 D**	**5700 D**
Perfluorooctanoic acid (PFOA)	ng/L	**7.7**	**1300 D**	**11000 D**	**11000 D**	**25000 D**	**16000 D**	**14000 D**
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 1.9	< 1.8	< 97	< 94	< 190	< 200	< 98
Perfluorotridecanoic acid (PFTriA)	ng/L	< 1.9	< 1.8	< 97	< 94	< 190	< 200	< 98
Perfluoroundecanoic acid (PFUnA)	ng/L	< 1.9	< 1.8	**1400 D**	**1200 D**	**1200 D**	< 200	< 98

Table 2
Monitoring Well Groundwater Analytical Results - August 2018
Data Summary Report
Marinette, Wisconsin

	Location	PZ-16S	PZ-19	PZ-1D	PZ-1S	PZ-22D	PZ-22S	PZ-23	PZ-9
	Sample Date	8/29/2018	8/30/2018	8/29/2018	8/29/2018	8/30/2018	8/30/2018	8/29/2018	8/29/2018
	Sample Type	N	N	N	N	N	N	N	N
Chemical Name	Unit								
Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	ng/L	< 19	< 1900	< 19	< 3900	< 19	< 19	< 950	< 19
Methylperfluoroocatane Sulfonamidoacetic Acid (MeFOSAA)	ng/L	< 19	< 1900	< 19	< 3900	< 19	< 19	< 950	< 19
Perfluorobutane sulfonic acid (PFBS)	ng/L	**1.0 J**	**45 J**	**1.4 J**	**96 DJ**	**0.86 J**	**0.53 J**	**41**	**1.4 J**
Perfluorodecanoic acid (PFDA)	ng/L	< 1.9		< 1.9	< 390	**0.84 J**	< 1.9	< 95	< 1.9
Perfluorododecanoic acid (PFDoA)	ng/L	< 1.9	< 190	< 1.9	< 390	< 1.9	< 1.9	< 95	< 1.9
Perfluoroheptanoic acid (PFHpA)	ng/L	**3.0**	**2500 D**	**3.1**	**11000 D**	**27**	**2.7**	**4300 D**	**730 D**
Perfluorohexane sulfonic acid (PFHxS)	ng/L	**3.9**	**940 D**	< 1.9 UB	**510 D**	**15**	**2.3**	**110 D**	**21**
Perfluorohexanoic acid (PFHxA)	ng/L	**10**	**4400 D**	**43**	**6300 D**	**40**	**6.0**	**3700 D**	**2100 D**
Perfluorononanoic acid (PFNA)	ng/L	**0.43 J**	**1100 D**	< 1.9	**670 D**	**5.4**	< 1.9	**45 DJ**	**14**
Perfluorooctanesulfonic acid (PFOS)	ng/L	**4.9**	**2600 D**	< 1.9	< 390 UB	**12**	< 1.9	< 95	**5.4**
Perfluorooctanoic acid (PFOA)	ng/L	**29**	**19000 D**	**20**	**46000 D**	**160**	**17**	**16000 D**	**580 D**
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 1.9	< 190	< 1.9	< 390	< 1.9	**0.62 J**	< 95	**0.44 J**
Perfluorotridecanoic acid (PFTriA)	ng/L	< 1.9	< 190	< 1.9	< 390	< 1.9	< 1.9	< 95	< 1.9
Perfluoroundecanoic acid (PFUnA)	ng/L	< 1.9	< 190	< 1.9	< 390	< 1.9	< 1.9	< 95	< 1.9

Notes & Acronyms

< = Compound not detected at reporting limit

Bold = Compound detected

N = Normal

FD = Field Duplicate

D = Dilution required for sample analysis

J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.

UB = Compound considered non-detect at the listed value due to associated blank contamination.

ng/L = nanograms per liter

Table 3. VAP Groundwater Analytical Results - October/November 2018

Table 3
VAP Groundwater Analytical Results - October/November 2018
Data Summary Report
Marinette, Wisconsin

	Location	VAP-36	VAP-36	VAP-36	VAP-36	VAP-48	VAP-48
	Sample Date	10/26/2018	10/26/2018	10/26/2018	10/26/2018	10/26/2018	10/26/2018
	Sample Depth (ft)	6-10	16-20	16-20	26-30	6-10	16-20
	Geology	Sand	Sand	Sand	Sand	Sand	Sand
	Sample Type	N	N	FD	N	N	N
Chemical Name	Units						
Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	ng/L	< 18	< 18	< 19	< 19	< 19	< 20
Methylperfluoroocatane Sulfonamidoacetic Acid (MeFOSAA)	ng/L	< 18	< 18	< 19	< 19	< 19	< 20
Perfluorobutane sulfonic acid (PFBS)	ng/L	**3.0**	< 1.8	< 1.9	< 1.9	**20**	< 2.0
Perfluorodecanoic acid (PFDA)	ng/L	< 1.8	< 1.8	< 1.9	< 1.9	< 1.9	< 2.0
Perfluorododecanoic acid (PFDoA)	ng/L	< 1.8	< 1.8	< 1.9	< 1.9	< 1.9	< 2.0
Perfluoroheptanoic acid (PFHpA)	ng/L	**5.2**	< 1.8	< 1.9	< 1.9	**24**	< 2.0
Perfluorohexane sulfonic acid (PFHxS)	ng/L	< 1.8 UB	< 1.8 UB	< 1.9 UB	< 1.9 UB	< 1.9 UB	< 2.0 UB
Perfluorohexanoic acid (PFHxA)	ng/L	**7.4**	< 1.8	< 1.9	< 1.9	**30**	< 2.0
Perfluorononanoic acid (PFNA)	ng/L	**0.75 J**	< 1.8	< 1.9	< 1.9	**2.0**	< 2.0
Perfluorooctanesulfonic acid (PFOS)	ng/L	**13**	< 1.8	< 1.9 UB	< 1.9	**8.4**	< 2.0
Perfluorooctanoic acid (PFOA)	ng/L	**4.7**	**1.4 J**	**1.8 J**	< 1.9	**16**	< 2.0
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 1.8	< 1.8	< 1.9	< 1.9	< 1.9	< 2.0
Perfluorotridecanoic acid (PFTriA)	ng/L	< 1.8	< 1.8	< 1.9	< 1.9	< 1.9	< 2.0
Perfluoroundecanoic acid (PFUnA)	ng/L	< 1.8	< 1.8	< 1.9	< 1.9	< 1.9	< 2.0

Table 3
VAP Groundwater Analytical Results - October/November 2018
Data Summary Report
Marinette, Wisconsin

	Location	VAP-48	VAP-48	VAP-49	VAP-49	VAP-49	VAP-50
	Sample Date	10/26/2018	10/26/2018	10/26/2018	10/26/2018	10/26/2018	11/2/2018
	Sample Depth (ft)	26-30	33-37	6-10	16-20	26-30	5-10
	Geology	Sand	Sand	Sand	Sand	Sand	Sand
	Sample Type	N	N	N	N	N	N
Chemical Name	Units						
Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	ng/L	< 19	< 19	< 18	< 19	< 20	< 1.9
Methylperfluoroocatane Sulfonamidoacetic Acid (MeFOSAA)	ng/L	< 19	< 19	< 18	< 19	< 20	< 2.8
Perfluorobutane sulfonic acid (PFBS)	ng/L	< 1.9	< 1.9	**1.1 J**	**0.41 J**	< 2.0	< 1.9
Perfluorodecanoic acid (PFDA)	ng/L	< 1.9	< 1.9	< 1.8	< 1.9	< 2.0	< 1.9
Perfluorododecanoic acid (PFDoA)	ng/L	< 1.9	< 1.9	< 1.8	< 1.9	< 2.0	< 1.9
Perfluoroheptanoic acid (PFHpA)	ng/L	< 1.9	< 1.9	**3.3**	**0.57 J**	< 2.0	< 2.8
Perfluorohexane sulfonic acid (PFHxS)	ng/L	< 1.9 UB	< 1.9 UB	**1.9**	< 1.9 UB	< 2.0 UB	< 1.9
Perfluorohexanoic acid (PFHxA)	ng/L	< 1.9	< 1.9	**4.2**	**1.2 J**	< 2.0	< 1.9
Perfluorononanoic acid (PFNA)	ng/L	< 1.9	< 1.9	< 1.8	**0.32 J**	< 2.0	< 1.9
Perfluorooctanesulfonic acid (PFOS)	ng/L	< 1.9	< 1.9	< 1.8	< 1.9 UB	< 2.0	< 1.9
Perfluorooctanoic acid (PFOA)	ng/L	< 1.9	**2.4**	**4.9**	< 1.9	< 2.0	< 5.6
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 1.9	< 1.9	< 1.8	< 1.9	< 2.0	< 1.9
Perfluorotridecanoic acid (PFTriA)	ng/L	< 1.9	< 1.9	< 1.8	< 1.9	< 2.0	< 1.9
Perfluoroundecanoic acid (PFUnA)	ng/L	< 1.9	< 1.9	< 1.8	< 1.9	< 2.0	< 1.9

Table 3
VAP Groundwater Analytical Results - October/November 2018
Data Summary Report
Marinette, Wisconsin

	Location	VAP-50	VAP-50	VAP-51	VAP-51	VAP-51
	Sample Date	11/2/2018	11/2/2018	11/2/2018	11/2/2018	11/2/2018
	Sample Depth (ft)	15-20	25-30	5-10	15-20	25-30
	Geology	Sand	Sand	Sand	Sand	Sand
	Sample Type	N	N	N	N	N
Chemical Name	Units					
Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	ng/L	< 2.0	< 2.0	< 1.9	< 1.9	< 2.0
Methylperfluoroocatane Sulfonamidoacetic Acid (MeFOSAA)	ng/L	< 3.0	< 3.0	< 2.9	< 2.9	< 3.0
Perfluorobutane sulfonic acid (PFBS)	ng/L	< 2.0	< 2.0	< 1.9	< 1.9	< 2.0
Perfluorodecanoic acid (PFDA)	ng/L	< 2.0	< 2.0	< 1.9	< 1.9	< 2.0
Perfluorododecanoic acid (PFDoA)	ng/L	< 2.0	< 2.0	< 1.9	< 1.9	< 2.0
Perfluoroheptanoic acid (PFHpA)	ng/L	< 3.0	< 3.0	< 2.9	< 2.9	< 3.0
Perfluorohexane sulfonic acid (PFHxS)	ng/L	< 2.0	< 2.0	< 1.9	< 1.9	< 2.0
Perfluorohexanoic acid (PFHxA)	ng/L	< 2.0	< 2.0	< 1.9	< 1.9	< 2.0
Perfluorononanoic acid (PFNA)	ng/L	< 2.0	< 2.0	< 1.9	< 1.9	< 2.0
Perfluorooctanesulfonic acid (PFOS)	ng/L	< 2.0	< 2.0	< 1.9	< 1.9	< 2.0
Perfluorooctanoic acid (PFOA)	ng/L	< 6.1	< 5.9	< 5.7	< 5.8	< 6.0
Perfluorotetradecanoic acid (PFTeA)	ng/L	< 2.0	< 2.0	< 1.9	< 1.9	< 2.0
Perfluorotridecanoic acid (PFTriA)	ng/L	< 2.0	< 2.0	< 1.9	< 1.9	< 2.0
Perfluoroundecanoic acid (PFUnA)	ng/L	< 2.0	< 2.0	< 1.9	< 1.9	< 2.0

Notes & Acronyms

1. The general geology associated with each sample has been provided. Soils were not logged at each sample location. Instead the geology has been assumed based on the results of soil logging within the vicinity of the investigation.

< = Compound not detected at reporting limit

Bold = Compound detected

N = Normal

FD = Field Duplicate

J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.

UB = Compound considered non-detect at the listed value due to associated blank contamination.

VAP = vertical aquifer profiling

ng/L = nanograms per liter

Data Summary Report - Supplemental Site Investigation (December 2019)

Table 3. Groundwater Analytical Results - August 2019

Table 3
Groundwater Analytical Results - August 2019
Data Summary Report - Supplemental Site Investigation
Tyco Fire Technology Center
Marinette, Wisconsin

	Location	FTC-2D	FTC-2S	FTC-34D	FTC-34S	MW-100-32	MW-100-68	MW-101-16	MW-101-72	MW-101-72 FD	PZ-14D	PZ-14D FD	PZ-14S	PZ-16D
	Sample Date	8/22/2019	8/22/2019	8/22/2019	8/22/2019	8/21/2019	8/21/2019	8/20/2019	8/21/2019	8/21/2019	8/23/2019	8/23/2019	8/23/2019	8/22/2019
Chemical Name	Unit													
Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	ng/L	<34 U	<1.8 U	**340**	**19 J+**	<1.7 U	<1.8 U	<1.7 U	<1.7 U	<1.7 U	<180 U	<200 U	<19 U	<180 U
Methylperfluoroocatane Sulfonamidoacetic Acid (MeFOSAA)	ng/L	<55 U	<2.9 U	<28 U	<2.7 U	<2.7 U	<2.9 U	<2.8 U	<2.8 U	<2.7 U	<300 U	<330 U	<31 U	<290 U
Perfluorobutane sulfonic acid (PFBS)	ng/L	**5.1 DJ**	**3.8**	**220**	**1.4 J**	<0.17 U	<0.18 U	**3.7**	**5.8**	**5.8**	**26 J**	**25 J**	**13 DJ**	**56 J**
Perfluorodecanoic acid (PFDA)	ng/L	<5.5 U	**28**	**420**	**640 D**	<0.27 U	<0.29 U	<0.28 U	**0.97 J**	**1.0 J**	**630**	**690**	**2,600**	**220**
Perfluorododecanoic acid (PFDoA)	ng/L	<9.8 U	<0.51 U	<5.0 U	**29**	<0.48 U	<0.51 U	<0.50 U	<0.50 U	<0.49 U	<53 U	<58 U	<5.4 U	<51 U
Perfluoroheptanoic acid (PFHpA)	ng/L	**350 D**	**2,300 D**	**3,400**	**970 D**	**0.52 J**	<0.23 U	**3.4**	**43**	**47**	**4,300**	**4,300**	**3,700**	**5,400**
Perfluorohexane sulfonic acid (PFHxS)	ng/L	**100 D**	**150**	**4,600 D**	**37 J+**	<1.7 UB	<1.8 UB	<1.8 UB	36	**37**	**510**	**530**	**2,200**	**930**
Perfluorohexanoic acid (PFHxA)	ng/L	**800 D**	**2,200 D**	**13,000 D**	**1,500 D**	**0.70 J**	<0.54 U	**6.0**	**96**	**93**	**11,000**	**12,000**	**7,100 D**	**15,000**
Perfluorononanoic acid (PFNA)	ng/L	**34 DJ**	**200**	**2,800**	**210**	<0.24 U	**0.86 J**	**0.59 J**	**32**	**34**	**3,900**	**4,000**	**14,000 D**	**3,900**
Perfluorooctanesulfonic acid (PFOS)	ng/L	**46 D**	**170**	**10,000 D**	**300**	<0.47 U	<0.50 U	**1.9**	**28**	**30**	**740**	**710**	**2,100**	**6,300**
Perfluorooctanoic acid (PFOA)	ng/L	**5,100 D**	**2,000 D**	**25,000 D**	**760 D**	**2.2**	**1.2 J**	**12**	**960 D**	**990 D**	**10,000**	**10,000**	**19,000 D**	**24,000**
Perfluorotetradecanoic acid (PFTeA)	ng/L	<5.2 U	<0.27 U	<2.6 U	**0.74 J**	<0.25 U	<0.27 U	<0.26 U	**0.30 J**	<0.26 U	<28 U	<31 U	<2.9 U	<27 U
Perfluorotridecanoic acid (PFTriA)	ng/L	<23 U	<1.2 U	<12 U	**8.1**	<1.1 U	<1.2 U	<1.2 U	<1.2 U	<1.2 U	<120 U	<140 U	<13 U	<120 U
Perfluoroundecanoic acid (PFUnA)	ng/L	<20 U	**1.0 J**	<10 U	**190**	<0.96 U	<1.0 U	<1.0 U	<1.0 U	<0.97 U	**590**	**640**	**1,200**	<100 U

Notes:
< = below the method detection limit
Bold = detection
D = concentration is based on diluted sample analysis
J = result is estimated, the associated numerical value is the approximate concentration of the analyte in the sample
J+ = result is an estimated quantity, the associated numerical value is expected to have a positive or high bias
JN = the analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification, the associated numerical value is an estimated concentration
ng/L = nanograms per liter
U = the compound was analyzed for but not detected, the associated value is the compound quantitation limit
UB = analyte considered non-detect a the listed value due to associated blank contamination
UJ = the analyte was not detected above the reporting limit, the reported limit is approximate and may or may not represent the actual limit of detection

Table 3
Groundwater Analytical Results - August 2019
Data Summary Report - Supplemental Site Investigation
Tyco Fire Technology Center
Marinette, Wisconsin

	Location	PZ-16D FD	PZ-16S	PZ-19	PZ-1D	PZ-1S	PZ-22D	PZ-22S	PZ-22S FD	PZ-23	PZ-9
	Sample Date	8/22/2019	8/22/2019	8/21/2019	8/22/2019	8/22/2019	8/21/2019	8/21/2019	8/21/2019	8/22/2019	8/22/2019
Chemical Name	Unit										
Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	ng/L	<170 U	<1.7 U	<1.8 U	<1.7 U	<17 U	**260**	<1.8 U	<1.7 U	<38 U	<35 U
Methylperfluorooctane Sulfonamidoacetic Acid (MeFOSAA)	ng/L	<280 U	<2.8 U	<3.0 U	<2.8 U	<28 U	<14 U	<2.9 U	<2.8 U	<61 U	<57 U
Perfluorobutane sulfonic acid (PFBS)	ng/L	**52 J**	**0.96 J**	**0.57 J**	<0.18 U	**40 J**	**72**	**0.53 J**	**0.51 J**	**10 DJ**	<3.7 U
Perfluorodecanoic acid (PFDA)	ng/L	**240**	<0.28 U	**1.2 J**	<0.28 U	<2.8 U	**120**	<0.29 U	<0.28 U	<6.1 U	<5.7 U
Perfluorododecanoic acid (PFDoA)	ng/L	<50 U	<0.50 U	<0.53 U	<0.50 U	<5.0 U	<2.5 U	<0.51 U	<0.50 U	<11 U	<10 U
Perfluoroheptanoic acid (PFHpA)	ng/L	**5,700**	**4.4**	**52**	**2.3**	**9,300 D**	**890**	**2.6**	**2.3**	**3,400 D**	**1,200 D**
Perfluorohexane sulfonic acid (PFHxS)	ng/L	**940**	**2.4**	**13**	<1.8 UB	**540**	**920**	**2.4**	**2.2**	**120**	**38 D**
Perfluorohexanoic acid (PFHxA)	ng/L	**15,000**	**11**	**79**	**48**	**7,000 D**	**3,100 D**	**5.6**	**5.6**	**4,000 D**	**3,100 D**
Perfluorononanoic acid (PFNA)	ng/L	**3,900**	<0.24 U	**9.3**	<0.25 U	**810**	**850**	**0.52 J**	<0.25 U	**41 D**	**64 D**
Perfluorooctanesulfonic acid (PFOS)	ng/L	**6,200**	**3.6 JN**	**19**	<0.49 U	**46**	**1,400**	<0.50 U	<0.50 U	<11 U	<10 U
Perfluorooctanoic acid (PFOA)	ng/L	**25,000**	**34**	**260**	**20**	**43,000 EJ**	**12,000 D**	**19**	**16**	**14,000 D**	**1,800 D**
Perfluorotetradecanoic acid (PFTeA)	ng/L	<26 U	<0.26 U	<0.28 U	<0.26 U	<2.6 U	<1.3 U	<0.27 U	<0.27 U	<5.7 U	<5.4 U
Perfluorotridecanoic acid (PFTriA)	ng/L	<120 U	<1.2 U	<1.2 U	<1.2 U	<12 U	<6.0 U	<1.2 U	<1.2 U	<26 U	<24 U
Perfluoroundecanoic acid (PFUnA)	ng/L	<100 U	<1.0 U	<1.1 U	<1.0 U	<9.9 U	**53**	<1.0 U	<1.0 U	<22 U	<20 U

Notes:
< = below the method detection limit
Bold = detection
D = concentration is based on diluted sample analysis
J = result is estimated, the associated numerical value is the approximate concentrati
J+ = result is an estimated quantity, the associated numerical value is expected to ha
JN = the analysis indicates the presence of a compound for which there is presumpti
ng/L = nanograms per liter
U = the compound was analyzed for but not detected, the associated value is the con
UB = analyte considered non-detect a the listed value due to associated blank contar
UJ = the analyte was not detected above the reporting limit, the reported limit is appr

Data Summary Report – Heath Lane Area Site Investigation (January 2020)

Table 1. Vertical Aquifer Profile Sample Results - August 2019

ARCADIS Design & Consultancy for natural and built assets

Table 1
Vertical Aquifer Profile Sample Results - August 2019
Data Summary Report - Heath Lane Area Site Investigation
Tyco Fire Products LP

Location	Sample Date	Sample ID	EtFOSAA	MeFOSAA	PFBS	PFDA	PFDoA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTeA	PFTriA	PFUnA
VAP-52	8/13/2019	VAP-52 (7-10)	<1.7 U	<2.7 U	<0.17 U	<0.27 U	<0.48 U	<0.22 U	<0.50 U	<1.7 UB	<0.23 U	<0.74 U	<0.47 U	<0.25 U	<1.1 U	<0.96 U
VAP-52	8/14/2019	VAP-52 (20-23)	<1.8 U	<2.9 U	<0.19 U	<0.29 U	<0.52 U	<0.23 U	<0.54 U	<1.9 UB	<0.25 U	<0.80 U	<0.51 U	<0.27 U	<1.2 U	<1.0 U
VAP-52	8/14/2019	VAP-52 (61-64)	<1.6 U	<2.6 U	<0.17 U	<0.26 U	<0.47 U	<0.21 U	<0.49 U	<1.7 UB	<0.23 U	<0.72 U	<0.46 U	<0.25 U	<1.1 U	<0.93 U
VAP-52	8/14/2019	DUP-01 / VAP-52 (20-23)	<1.7 U	<2.7 U	<0.17 U	<0.27 U	<0.48 U	<0.22 U	<0.50 U	<1.7 UB	<0.23 U	<0.74 U	<0.47 U	<0.25 U	<1.1 U	<0.96 U
VAP-52	8/15/2019	VAP-52 (75-78)	<1.6 U	<2.7 U	<0.17 U	<0.27 U	<0.48 U	<0.22 U	<0.50 U	<1.7 UB	<0.23 U	<0.74 U	<0.47 U	<0.25 U	<1.1 U	<0.95 U
VAP-52	8/15/2019	VAP-52 (81-84)	<1.7 U	<2.7 U	<0.18 U	<0.27 U	<0.49 U	<0.22 U	<0.51 U	<1.8 UB	<0.24 U	<0.75 U	<0.48 U	<0.26 U	<1.1 U	<0.97 U
VAP-53	8/16/2019	VAP-53 (21-24)	<1.8 U	<3.0 U	<0.19 U	<0.30 U	<0.53 U	<0.24 U	<0.56 U	<1.9 UB	<0.26 U	<0.82 U	<0.52 U	<0.28 U	<1.3 U	<1.1 U
VAP-53	8/16/2019	VAP-53 (7-10)	<1.7 U	<2.7 U	**0.25 J**	<0.27 U	<0.48 U	**0.57 J**	**1.2 J**	<1.7 UB	<0.24 U	**26**	**1.5 JN**	<0.25 U	<1.1 U	<0.96 U
VAP-53	8/19/2019	VAP-53 (52-55)	**1.8 J**	<3.0 U	<0.19 U	<0.30 U	<0.53 U	<0.24 U	<0.56 U	<1.9 UB	<0.26 U	<0.82 U	<0.52 U	<0.28 U	<1.3 U	<1.1 U
VAP-53	8/19/2019	VAP-53 (65-68)	<1.9 U	<3.1 U	<0.20 U	<0.31 U	<0.54 U	<0.25 U	<0.57 U	<2.0 UB	<0.27 U	<0.84 U	<0.53 U	<0.29 U	<1.3 U	<1.1 U
VAP-53	8/19/2019	DUP-02 / VAP-53 (52-55)	<1.8 U	<3.0 U	<0.19 U	<0.30 U	<0.53 U	<0.24 U	<0.56 U	<1.9 UB	<0.26 U	**0.88 J**	<0.52 U	<0.28 U	<1.2 U	<1.1 U
VAP-53	8/20/2019	VAP-53 (73-76)	<1.8 U	<3.0 U	<0.19 U	<0.30 U	<0.53 U	<0.24 U	<0.56 U	<1.9 UB	<0.26 U	<0.82 U	<0.52 U	<0.28 U	<1.3 U	<1.1 U

Notes:
Detections are boldfaced.
Sample result units are in ng/L (nanogram per liter).
< = compound not detected at method detection limit
D = dilution required for sample analysis
DUP = field duplicate
J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.
JN = The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
UB = The compound is considered non-detect at the listed value due to associated blank contamination.
EtFOSAA = ethylperfluorooctane sulfonamido acetate
MeFOSAA = methylperfluorooctane sulfonamido acetate
PFBS = perfluorobutanesulfonic acid (C4)
PFDA = perfluorodecanoic acid (C10)
PFDoA = perfluorododecanoic acid (C12)
PFHpA = perfluoroheptanoic acid (C7)
PFHxA = perfluorohexanoic acid (C6)
PFHxS = perfluorohexanesulfonic acid (C6)
PFNA = perfluorononanoic acid (C9)
PFOA = perfluorooctanoic acid (C8)
PFOS = perfluorooctanesulfonic acid (C8)
PFTeA = perflruorotetradecanoic acid (C14)
PFTriA = perflruorotridecanoic acid (C13)
PFUnA = perflruoroundecanoic acid (C11)

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