

Tyco Fire Products LP

# Deep Aquifer Bedrock Well Design and Long-Term Monitoring Work Plan

**Tyco Fire Technology Center  
2700 Industrial Parkway South  
Marinette, WI 54143  
BRRTS# 02-38-580694**

September 27, 2022

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**Prepared By:**

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

**Prepared For:**

Tyco Fire Products LP  
2700 Industrial Parkway South  
Marinette, WI 54143

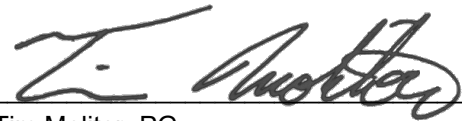
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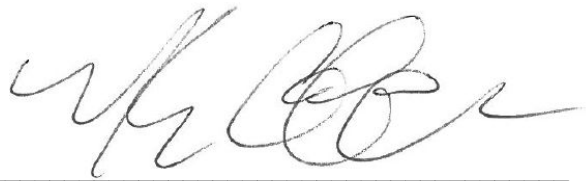
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Christopher S. Peters, PG  
Principal Geologist



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Tim Molitor, PG  
Project Geologist



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Michael Cobb  
Principal Scientist

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## Acronyms and Abbreviations

AMSL	above mean sea level
Arcadis	Arcadis U.S., Inc.
bgs	below ground surface
FTC	Fire Technology Center
FOSA	perfluorooctanesulfonamide
gpm	gallons per minute
ng/L	nanograms per liter
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
the Site	Fire Technology Center, 2700 Industrial, Parkway South in Marinette, Wisconsin
Tyco	Tyco Fire Products LP
WDNR	Wisconsin Department of Natural Resources
Wis. Adm. Code	Wisconsin Administrative Code

## Executive Summary

Tyco Fire Products LP (Tyco) continues to investigate per- and poly-fluoroalkyl substances (PFAS) potentially related to the Tyco Fire Technology Center (FTC) located at 2700 Industrial Parkway South in Marinette, Wisconsin (the Site). To date, drinking water in an area southeast of the Site has been addressed on an interim basis by point-of-entry treatment systems and bottled water. Tyco is working with affected residents within the area to implement a long-term drinking water plan that will involve new deep drinking water wells and potential extension of the City of Marinette municipal water into part of the area.

This work plan proposes the design, location and monitoring approach for three sentinel monitoring wells that will be part of a long-term groundwater monitoring network.

The proposed sentinel wells are planned to extend to approximately 450 to 500 feet below ground surface (bgs) to monitor a deep bedrock aquifer that underlies the Marinette area. This water producing zone is below the vertical extent of the PFAS plume associated with the Site (Arcadis 2020), and is protected from future contamination by an aquitard in shallow bedrock. Long-term monitoring of the sentinel wells is planned to safeguard groundwater users against potential future changes in groundwater quality. The well design is based on the construction of private residential water supply wells with the addition of an extended surface casing to prevent cross-contamination from the shallow aquifer system. Specifications will meet or exceed Wisconsin Administrative Code (Wis Adm Code) NR 812 specifications for water supply wells. Monitoring of the sentinel wells will be performed following a purge-and-sample approach that will best represent groundwater quality as it would be encountered by a groundwater user.

The proposed sentinel wells will supplement a future groundwater monitoring network supporting site investigations relating to PFAS being conducted under NR 716. That network will comprise existing and future monitoring wells and piezometers in the overburden and shallow bedrock constructed consistent with NR 141 specifications. Delineation of the site-related PFAS plume will be completed vertically and laterally using NR 141-compliant wells. NR 141-compliant wells are not, however, appropriate to meet the objectives of the proposed sentinel wells. A variance from NR 141 is proposed for the deep bedrock sentinel monitoring wells based on the specifics of the local geology and groundwater for the distinct purpose of the wells as sentinels for deep bedrock aquifer users.

# 1. Introduction

On behalf of Tyco, Arcadis U.S., Inc. (Arcadis) prepared this Deep Aquifer Bedrock Well Design and Long-Term Monitoring Work Plan (work plan) as a component of ongoing investigations of per- and poly-fluoroalkyl substances (PFAS) potentially related to the Site (**Figure 1**). To date, PFAS-impacted drinking water has been addressed on an interim basis by point-of-entry treatment systems and bottled water. Tyco is working with the affected residents to implement a long-term drinking water plan that will involve new deep drinking water wells and potential extension of the City of Marinette municipal water into a portion of the Town of Peshtigo.

This work plan proposes the design, location and monitoring approach for sentinel monitoring wells that will be part of a long-term groundwater monitoring network. Proposed sentinel well locations are shown on **Figure 2**. The sentinel monitoring wells will be used to verify that site-related PFAS have not migrated downward into the deep bedrock aquifer system and that current and potential future users of groundwater from that aquifer remain protected against PFAS exposure.

Tyco is conducting site investigations relating to PFAS within the Wisconsin Department of Natural Resources (WDNR) Environmental Repair Program, pursuant to the requirements of Chapter Natural Resources (NR) 716 of the Wisconsin Administrative Code (Wis. Adm. Code). Project records have been tracked since January 2018 under the Bureau for Remediation and Redevelopment Tracking System (BRRTS) No. 02-38-580694. Earlier phases of site investigations were completed under BRRTS No. 03-38-001345.

As described in this work plan, the proposed sentinel well design will be based on the construction of private residential water supply wells as specified under NR 812, with extended surface casings to protect against cross-contamination from the shallow aquifer system, and open boreholes that will extend across a highly transmissive zone present at approximately 450 to 500 feet below ground surface (bgs). This design, with water samples collected using a multi-volume purge approach, are proposed as the most-effective way to monitor groundwater quality as it would be encountered by a groundwater user.

The proposed sentinel wells will supplement a future site-wide PFAS groundwater monitoring network, comprised of existing and future monitoring wells and piezometers in the overburden and shallow bedrock constructed consistent with NR 141 specifications. Delineation of the site-related PFAS plume will be completed vertically and laterally using NR 141-compliant wells to the degree feasible. As described in this work plan, the variances from NR 141 for the proposed deep bedrock sentinel monitoring wells are required based on the specifics of local geology and groundwater for the distinct purpose of the wells as sentinels for deep bedrock aquifer users.

## 2. Background

The Site is a fire suppressant training, testing, research and development facility, occupying approximately 380 acres in southern Marinette. Background information relevant to this work plan is summarized below. More comprehensive background information is available in prior reports, most recently the Additional Site Investigation Work Plan (Arcadis 2022a).

### 2.1. Previous Groundwater Investigation Findings

In 2017, Tyco completed site investigations that showed that PFAS had migrated in shallow groundwater off-site to the northeast, east and southeast of the Site into parts of the City of Marinette and the Town of Peshtigo. Tyco has since performed multiple phases of site-investigation to complete delineation, refine the conceptual site model, and install a network of monitoring wells and piezometers within the overburden and shallow bedrock aquifers.

This work has shown that the primary migration pathways for PFAS in groundwater are within the overburden aquifer system, which is mostly comprised of sand. To the north of the Site, PFAS has also been found at the bedrock surface, and in a zone of limited permeability that extends about 20 feet below the bedrock surface. PFAS has not been detected in shallow bedrock southeast of the Site within the area referred to as the Potable Well Sampling Area (PWSA). Below the surficial zone of bedrock, investigations have shown the bedrock is effectively impermeable to at least 200 feet below the bedrock surface. This shallow bedrock aquitard is interpreted to separate the shallow flow system (including overburden and surficial bedrock zone) from all water bearing zones below in the deep bedrock aquifer.

Section 3 provides a review of available information supporting the current understanding of bedrock groundwater. Work underway in the summer and fall of 2022 includes additional wells and test borings to refine the current understanding of the shallow bedrock zone, and the nature of the shallow bedrock aquitard. This ongoing work is being performed in accordance with the Additional Site Investigation Work Plan (Arcadis 2022a). The Additional Site Investigation Work Plan also includes a comprehensive review of PFAS investigations completed to-date.

### 2.2. Area Water-Use

Drinking water in the vicinity of the Site is provided through a combination of municipal water supply and private wells:

- Areas immediately surrounding the Site, and to the north and east within the City of Marinette are served by the City of Marinette public water system, which obtains water entirely from an intake in Green Bay. Water is treated at a central plant, and then distributed via buried lines to all connected properties in the service area.
- Municipalities southwest of the Site, including the cities of Peshtigo and Oconto, obtain water from production wells completed in the deep bedrock aquifer (consisting of sandstone and dolomite of Ordovician and Cambrian ages).



- In the Town of Peshtigo, south and southeast of the Site, all properties obtain water from private wells. Most private wells in this area are completed in the shallow unconsolidated aquifer system, with average depths of less than 75 feet. A small percentage of wells are completed to depths of 400 to 500 feet bgs, the approximate depth required to reach the deep bedrock aquifer system.

In 2017, groundwater investigations completed by Tyco identified a portion of the PFAS plume in the shallow overburden aquifer that had migrated southeast of the Site into portions of the Town of Peshtigo. Based on these data, Tyco initiated a potable well sampling program of approximately 140 private wells and offered bottled water and bottled water services to community members. As sample analyses were completed, Tyco offered point-of-entry treatment (POET) systems to those locations with a confirmed detection of perfluorooctanoic acid (PFOA) or perfluorooctanesulfonic acid (PFOS) above the laboratory reporting limits for these compounds.

To date, POET systems have been installed in 47 locations and Tyco has tested 173 private wells. Currently 46 POET systems remain in use, and 166 potable wells are sampled as outlined in the Revised Long-Term Potable Well Sampling Plan (Arcadis 2021) that was approved by WDNR. Residents will continue to receive bottled water service or POET system maintenance as requested while Tyco works with interested parties, including several municipalities, to define and implement permanent measures (Arcadis 2020).

Since the discovery that PFAS associated with the Site was present in groundwater used by private wells southeast of the Site, Tyco has worked with the affected residents and the WDNR to develop a long-term solution that would permanently eliminate the potential drinking water exposure pathway. Initial studies found that the most protective and implementable long-term approach was to connect the affected properties to municipal water from the City of Marinette (Arcadis 2019). After multiple years of dialog, and direct feedback from the residents, the current viable long-term water supply options for the affected area include (1) Annexation of a portion of the area to the City of Marinette to enable the provision of City of Marinette Municipal Water, and (2) Deep (Bedrock) Replacement Wells in the areas that will not be annexed.

Annexation to the City of Marinette is required for residents to receive City of Marinette municipal water.<sup>1</sup> Annexation requires at least 50% of electors in an area that is adjacent and contiguous to the City of Marinette to sign a petition for annexation. Tyco's outreach efforts have demonstrated that while there may be sufficient interest to achieve annexation of part of the affected area, there is not sufficient interest to annex the entire area. As a result, Tyco anticipates that in any area that is not annexed to the City of Marinette, Tyco will install deep bedrock replacement wells as a long-term solution. As discussed above, the purpose of this work plan is to propose a deep aquifer sentinel well network to monitor deep aquifer groundwater quality as it would be encountered by a groundwater user.

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<sup>1</sup> ANNEXATION REQUIRED PRIOR TO NEW WATER CONNECTION No property outside of the corporate boundaries of the city may be connected as a new Marinette Municipal Water System customer unless that property has been annexed into the City of Marinette prior to the connection. In the event of inadvertent or mistaken connection of such a property without its annexation, upon the discovery of this fact, the Utility shall provide notice to the property owner that the owner has ninety (90) days within which to annex. If annexation does not occur within ninety (90) days of the notice, the service shall be immediately disconnected. City of Marinette Code of Ordinances 7.0129.

## 3. Summary of Related Studies and Information

### 3.1 Geology and Hydrostratigraphy

The geology in the Marinette and Peshtigo area comprises unconsolidated glacial deposits overlying at least 700 feet of sedimentary bedrock consisting of dolomite, shale and sandstone. The current understanding of the geology is based on multiple resources:

- Regional literature (e.g., Oakes and Hamilton 1973).
- Well-driller and lithologic descriptions available in State of Wisconsin databases including the WiscLith database maintained by the Wisconsin Geological and Natural History Survey.
- Drilling and geophysical logging completed by Tyco.

Based on these sources, the major components of the subsurface geology can be summarized as follows:

#### *Summary of Geologic Units*

Period	Lithology/Formation	Description and Approximate Thickness
Quaternary	Glacial Deposits	Mostly sand, with layers of silt and clay; till typically above bedrock surface. Highly permeable in sand zones. 30 to 125 feet thick.
Ordovician	Sinnipee Group (Galena, Decorah, and Platteville Formations)	Dolomite and shale. Unfractured to sparsely fractured with no significant permeability except at immediate bedrock surface. Up to 200-feet thick
	Ancell Group (Glenwood and St Peter Formations)	Sandstone with shale and dolomite. 25 to 50 feet thick
	Prairie du Chien Group	Mostly dolomite, with minor sandstone and shale. Vuggy and permeable near base of unit. 200 to 250 feet thick.
Cambrian	Trempealeau, Tunnel City and Elk Mound Groups	Mostly sandstone and dolomite, up to 500 feet thick. Portions highly permeable.
Precambrian	Crystalline rock	Igneous and metamorphic rocks. Negligible permeability.

As discussed in the sections below, site-specific and regional evidence show that the bedrock of the Sinnipee Group acts as a major aquitard that permits no significant vertical transmission of groundwater from the overburden to the deeper aquifer. Available data also show that the first zone of significant groundwater production in the deep aquifer system is a 50-foot-thick zone of pitted and vuggy dolomite, interpreted to belong either to the basal Prairie du Chien or Trempealeau Groups.

## 3.2 Bedrock Well Drilling and Logging Results

Investigations of bedrock groundwater are a component of the ongoing site-investigations associated with groundwater for both the Site and Tyco's Stanton Street Facility, located approximately 1.5 miles north of the Site. The investigations completed to-date have consistently supported two major observations relating to bedrock:

- A zone of shallow bedrock up to about 20 feet below the bedrock surface may contain fractures with limited permeability that are in communication with groundwater at and above the bedrock surface. PFAS impacts have been found in this zone at the Site and north of the Site. Data collected to date indicate that the portion of plume southeast of the Site is only present in the overburden aquifer and not in the shallow bedrock. These data are most recently reported in the Site Investigation Status Report for the Tyco Stanton Street Facility (Arcadis 2022b).
- Below the shallow zone of first encountered bedrock, the bedrock is effectively impermeable to at least 200 feet below the bedrock surface. This bedrock aquitard separates the shallow aquifer system (including overburden and surficial bedrock zone) from all deep bedrock water bearing zones below.

Three historical investigations, described below, provide data supporting the integrity of the shallow bedrock aquitard.

### 3.2.1 Bedrock Borings MW-100B, MW-101B, MW-102B

Three bedrock boreholes were completed in 2018 to evaluate the characteristics of bedrock and assess whether PFAS impacts had migrated into bedrock below the immediate rock surface (Arcadis, 2018a). The three boreholes (MW-100B, MW-101B and MW-102B) are shown on **Figure 3**. Each borehole was cased 10 feet below the bedrock surface to isolate it from potential surficial zone connections to the shallow aquifer system. Each borehole was then advanced to 205 feet bgs (between 118 and 145 feet below the bedrock surface).

While packer testing and well completion had been planned for each borehole, neither was possible due to the absence of groundwater yield, even after significant efforts surging and flushing the boreholes in an attempt to improve hydraulic communication with the formation. Geophysical logging completed at each borehole showed the rock to be a mixture of shale and dolomite with sparse evidence of fractures and no evidence of yield sufficient for sampling or well completion. Each borehole was abandoned with WDNR concurrence, after these findings were communicated in teleconferences on August 16 and 23, 2018.

### 3.2.2 Former Site Production Well Testing

In June 2018, Tyco conducted work to evaluate the condition of a former supply well located on the Site at the north end of the OTA (Arcadis, 2018a). The well (identified PW-1) is shown on **Figure 3**. Based on the 1964 construction log, the well had been drilled to 171 feet, with casing to the bedrock surface at 65 feet bgs.

Geophysical logging of the well showed that all measurable flow into the well under pumping conditions entered from either the base of the casing at 66 ft bgs or from a notable fracture just below the casing at 67 ft bgs. No measurable flow could be detected entering the well below 67 feet bgs. To verify the geophysical logging results, a single packer was deployed below the 67 feet fracture so that the yield of the zones above and below the packer could be tested separately via short pumping tests. The results showed that the zone above the packer

was the only significant water-bearing interval in the borehole (i.e., specific capacity of the shallow zone was found to be similar to that of the full well). The yield of the deeper zone was too low to measure.

These results supported the observations at MW-100B, MW-101B and MW-102B, namely that while the first encountered surficial bedrock zone may be transmissive, the rock directly below that zone has no recoverable groundwater and functions as an aquitard isolating the deep bedrock aquifer from the shallow aquifer system (including the overburden and surficial bedrock zone). The former production well was abandoned in June 2019, in accordance with WNDR guidelines.

### 3.2.3 Bedrock Investigations at the Stanton Street Site

Historical studies at the Tyco Stanton Street Site were performed to evaluate the nature of bedrock and assess the potential for downward migration of arsenic contamination from the shallow aquifer system (Dames & Moore 1976). The study involved three open-hole bedrock wells:

- The Dock Well, former supply well completed to approximately 625 feet bgs.
- The Research Well, another former supply well, completed to at least 480 feet bgs.
- A Test Well #1, completed to 115 feet bgs.

Well locations are shown on **Figure 3**. The studies included a combination of pumping tests, packer tests, borehole geophysics, and groundwater sampling. The Dock Well, was found to be impacted by site-related constituents; however, testing indicated that all or nearly all water entering the well was drawn from the surficial aquifer from leaks in the surface casing and not from bedrock. The well was subsequently abandoned in 1978. The Research Well, by comparison, was found to draw all or nearly all of its water from the deep aquifer and was not impacted by site-related constituents. Test Well #1, which was effectively cased off from the surficial zone but not drilled deep enough to reach the deep bedrock aquifer, was found to be essentially dry.

The report authors concluded that shallow bedrock to at least 114 feet had no appreciable permeability, and that the zone acts as a confining unit which effectively prevents water from migrating downward into the deep bedrock aquifer system from the surficial aquifer.

## 3.3 Irrigation Well Profiling

Starting in May 2022, Tyco completed geophysical logging and groundwater sampling at two irrigation wells located at the Marinette High School to assess the thickness of the shallow bedrock aquitard, and the depth and water quality of the deep bedrock aquifer. The locations of the wells, identified IRR-01 and IRR-02, are shown on **Figure 3**. Geophysical logs are included as **Appendix A**. The logging suite included tools to assess both the geology and hydraulic characteristics of the borehole. The major well details and logging findings are as follows:

#### *Irrigation Well Profiling Details*

	IRR-01	IRR-02
<b>Well Use</b>	Seasonal irrigation of baseball fields	Seasonal irrigation of football fields
<b>Depth of surface casing</b>	44 feet bgs	62 feet bgs

	IRR-01	IRR-02
<b>Total Depth</b>	415 feet bgs	584 feet bgs
<b>Specific Capacity</b>	5.5 gpm/foot of drawdown	8.5 gpm/foot of drawdown
<b>Zone with no measurable groundwater inflow (shallow bedrock aquitard)</b>	45 to 246 feet bgs	67 to 254 feet bgs
<b>Zone of significant groundwater production (Transmissive Zone)</b>	403 feet bgs to base of well	420 to 470 feet bgs

The hydrostratigraphy in both boreholes was nearly identical. No flowing fractures or porous zones were identified within the bedrock to a depth of approximately 250 feet bgs, a zone that comprises the Sinnipee and Ancel Groups. Minor fractures inflows were detected between about 250 and 400 feet within the Prairie du Chien. Below this, each well intersected a highly transmissive zone of pitted and vuggy dolomite, either at the base of the Prairie du Chien or within the Trempealeau Group. At IRR-01, this zone continued to the termination depth of the well (at 415 feet bgs). At IRR-02, this permeable zone continued to 470 feet bgs, below which little additional flow entered the well.

In both wells, the transmissive zone was found to produce significant quantities of water. IRR-02 is reportedly capable of sustaining 230 gpm when in use for irrigation. The high transmissivity of this zone is consistent with observations of similarly deep wells reported on well driller logs and based on performance of municipal wells completed in the zone in neighboring cities of Peshtigo and Oconto.

Samples to evaluate the potential presence of PFAS in the irrigation wells was performed in three phases:

- Dynamic vertical profiling samples were collected May 19 and 21, 2022 (**Table 1**). Samples were collected at multiple depths in each well while continuously pumping from the top of the water-column
- Total well samples were collected July 1, 2022 (**Table 2**). Samples were taken directly from the discharge of the permanent irrigation well pumps.
- Discrete-zone packer samples were collected (from IRR-02 only) on August 4 to 6, 2022 (**Table 3**)

Sample results from IRR-01 showed the PFAS is not present in the deeper aquifer. No PFAS were detected above laboratory reporting limits in any of the profiling samples, or in the total well sample except one compound, perfluorooctanesulfonamide (FOSA). FOSA was detected only in the total-well sample (using the permanent pump) at an estimated concentration of 1.5 nanograms per liter (ng/L). The compound is not associated with Tyco products, nor is it a significant constituent in shallow groundwater. The compound is present in a number of consumer and industrial products, and (as noted in Section 3.4) its frequent presence at low concentrations in residential well samples is likely the result of FOSA-containing components in the well pump or plumbing system.

Sample results from IRR-02 indicate that a minor leak in the surface casing or inflow from very shallow bedrock had allowed PFAS from the shallow aquifer system into the well. PFOA and other PFAS were detected in the first samples collected, and then at decreasing concentrations as pumping continued. These data show that concentrations of PFAS entering the well from the shallow aquifer system are rapidly diluted by PFAS-free water

entering the well from the transmissive zone in the deep bedrock aquifer. This interpretation was confirmed by the low PFOA concentrations of PFAS found in the total-well sample (**Table 2**) and by the packer test sampling (**Table 3**). The packer test results show that PFAS is present in the upper portion of the well (i.e., entering the well from the shallow aquifer system), but absent in deep bedrock groundwater. No PFAS were present above laboratory detection limits in the packer sample that isolated the borehole from 100 feet bgs to the base of the well.

Tyco is currently completing its analysis of the irrigation well testing results and will be providing a more-detailed report on these findings in a forthcoming deliverable. A temporary packer has been installed at IRR-02 to prevent flow from shallow to deep portions of the borehole until an appropriate repair to the well can be implemented.

### 3.4 Residential Well Water Quality

Groundwater monitoring data from the private wells located southeast of the Site shows that the deep bedrock aquifer is not impacted by PFAS. While most private wells southeast of the Site are completed in the overburden aquifer, 12 wells are reported to be constructed to depths between 400 and 622 feet bgs where they are likely to be drawing water from the deep bedrock aquifer. The surface casings for these existing wells were generally completed only to the bedrock surface, which provides less protection against potential leakage from the shallow aquifer than a casing installed deeper into bedrock. However, the results of sampling completed at these wells since 2017 has found no evidence to suggest that the overburden PFAS plume has either leaked into the wells or migrated downward into the deep bedrock.

Sampling of the 12 deep private wells is part of a residential well monitoring program undertaken by Tyco since 2017 under the oversight of the WDNR (Arcadis 2018b, Arcadis 2022c). As shown on **Figure 3**, the 12 wells are distributed over an area of about 1 square mile, as follows:

- One well (WS-006) is located just south of University Avenue and along County Road B.
- Three wells (WS-012, -028 and -056) are located near Oakwood Beach Road and Shore Drive.
- One well (WS-098) is on Shore Drive south of Wieggers Road.
- Four wells (WS-069A, -083, -130 and -156) are on or just south of Rader Road.
- One well (WS-103) is on Stanley Lane.
- Two wells (WS-002 and -004) are located at the former hospital at University and Shore Drives, in the City of Marinette. The wells were sampled in 2017 and 2018 but have since been abandoned.

Collectively, the 12 deep water wells have been sampled for PFAS 70 times between 2017 and 2022, an average of six times at each well. The analytical results for the PFAS analysis of the well water samples are summarized in **Table 4**. PFOA and PFOS were not detected above the laboratory reporting limits in any samples. Of the other PFAS analyzed, none were present above reporting limits except FOSA, which was detected in six of the ten wells, at levels between 1.1 and 6.1 nanograms per liter. As noted in Section 3.3., the compound is not associated with Tyco products, and its frequent presence at low concentrations in water supply well samples is likely the result of FOSA-containing components in the well pump or plumbing system.

## 4. Sentinel Well Design and Construction Approach

### 4.1 Well Siting

Three proposed sentinel well locations are shown on **Figure 2**. The locations are preliminary and subject to change based on obtaining property access or to avoid utilities. The locations were selected to fall between the Site and/or locations where PFAS is known to be present in surficial bedrock and areas to the southeast of the Site where deep residential water wells currently exist, and additional replacement wells are planned. The locations, to the extent possible, are on public or publicly accessible lands and avoid road easements so that wells may be completed with stick-up well casings. The selected locations also form a triangle and may be used to assess the hydraulic gradient in the deep aquifer system.

### 4.2 Design Objectives

Sentinel monitoring wells are proposed for the following purposes:

- Verify the current understanding of the hydrostratigraphy of deep bedrock, including thickness of the shallow bedrock aquitard and depth of the transmissive zone.
- Verify that PFAS associated with the Site is not present in deep groundwater
- Permit long-term monitoring in deep bedrock to safe-guard groundwater users against potential future changes in groundwater quality.

Note that the sentinel monitoring wells are not intended to serve as delineation points for the PFAS plume present in the shallow groundwater flow system. Tyco is in the process of demonstrating vertical delineation of the PFAS plume consistent with NR 716 requirements using conventional NR 141 compliant monitoring wells and piezometers along with related lines-of-evidence. Sentinel wells are planned as an additional layer of protection for deep groundwater users by providing monitoring locations where, in the unlikely scenario that PFAS impacts penetrate the aquitard, routine sampling would detect its presence in time to take corrective measures.

To serve this purpose most-effectively, the proposed sentinel monitoring wells require a non-standard design and sampling approach. The design objectives include the following:

- Be constructed with sufficient surface casing to eliminate potential for downward leakage from the shallow aquifer system into the well and deep aquifer.
- Encompass, to the degree feasible, minor water producing zones between the shallow bedrock aquitard and the transmissive zone where, if downward breakthrough were occurring, PFAS would be most likely detected first.
- Permit sampling of the well in a way that will mostly closely replicate how deep aquifer wells are used, and therefore provide the most representative data to assess potential drinking water exposure.

The most effective way to serve the sentinel wells' purpose and meet the design objectives is to construct them as open borehole wells, analogous to residential water wells (i.e., as specified under NR 812) with a deeper casing seated in the shallow bedrock aquitard. While this approach varies from the requirements for site-investigation related wells under NR 141, the proposed long-open borehole design and multi-volume purge sampling approach is better suited for sentinel monitoring. Alternative approaches such as short-screened

piezometer clusters or multi-level wells will unavoidably limit monitoring to fewer potential transport pathways, which are not representative of what would be encountered by a groundwater user.

### 4.3 Design and Construction

Sentinel monitoring wells will be drilled and installed by a Wisconsin-licensed driller. Design specifications are illustrated on **Figure 4**. The principal design and construction elements are as follows:

Design Element	Specifications
Upper borehole	10-inch diameter drilled by mud-rotary from the surface to approximately 75 feet below the bedrock surface.
Surface casing	6-inch diameter carbon steel from approximately 2 feet above grade to 75 feet below bedrock surface.
Surface casing seal	Neat cement grout injected from the base of the casing. Seal will be permitted a minimum of 48 hours to cure before drilling continues.
Lower borehole	6-inch diameter drilled by air rotary to approximately 500 feet bgs or at least 50 feet beyond the top of the transmissive zone, based on driller observations of water production.
Surface completion	Approximately 2-foot stick-up, vented well plug, and locking cover.

The casing depth of 75 feet below the bedrock surface was selected to extend a conservative distance into the shallow bedrock aquitard to create an effective seal between the overburden flow system and deeper bedrock. This casing depth significantly exceeds NR 812 requirements which specify a minimum casing depth of 40 feet below the ground surface for wells in limestone or dolomite aquifer. Based on the expected depth to bedrock of 70 to 80 feet at the sentinel well locations, surface casings will be completed to between 145 and 155 feet bgs.

Upon completion of drilling at each replacement well, development will occur until the water is practicably clear and free of silt and sand by any one of the following methods: mechanical surging, air-lifting, jetting, or by any combination of these methods per Wis. Adm. Code NR 141 and NR 812. Following development, a short-duration pumping test will be conducted to determine each well's stable yield and the water level drawdown.

After drilling and well development, geophysical logging will be performed to characterize the lithology and hydrostratigraphic characteristics of the bedrock at each well.

Completed wells will be surveyed by a Wisconsin-licensed surveyor. Ground surface and top of well casing elevations will be referenced to the North American Vertical Datum of 1988 (NAVD 88). Horizontal coordinates will be referenced to the State Plane North American Datum of 1983 (NAD 83) – Wisconsin Central (4802) Zone. Locations will be surveyed to the nearest 0.01 foot (horizontal and vertical).



Well completion logs will be finalized and submitted to the WDNR following well installation.

All wastes generated during well construction and development (i.e., drill cuttings, rock, and water) will be containerized and transported to the Site to be stored pending characterization and disposal. Waste will be segregated into two separate streams:

- Waste material generated during drilling and installation of the surface casing (i.e., overburden and upper bedrock zones) will be treated as potentially containing PFAS and characterized for appropriate disposal.
- Waste generated from drilling the lower borehole (i.e., below the surface casing) will be characterized and be treated as construction waste.

To the extent possible, wastewater will be containerized and treated at the Site via an appropriate on-site treatment system. Other containerized waste will be disposed either through an approved treatment facility or at an approved disposal facility.

## 5. Long-Term Monitoring

After installation, sentinel wells will be sampled for PFAS quarterly for 1 year, semiannually (twice per year) for 2 years, and annually thereafter until site closure or approval from WDNR to discontinue sampling on an annual basis.

Sampling will be completed by purging the well of approximately 5 well volumes (estimated to be about 3,600 gallons) with a submersible pump deployed in the cased portion of the well. This approach will simulate the water use of private wells completed in the deep bedrock aquifer. Samples will provide information on the quality of water entering across the length of the open borehole but be most representative of the primary water-producing zones (i.e., transmissivity-weighted). Samples collected in this way will best reflect the water quality as it is used by water-consumers.

Monitoring results will be communicated to property owners and tenants (as appropriate) within 10 days of final data being received by Arcadis from the laboratory. The results will include a letter describing the monitoring activities, a summary table of sampling results, and relevant pages from the laboratory report(s). A copy of the results package will be provided to WDNR within 10 days of final data being received by Arcadis.

## 6. References

- Arcadis. 2018b. Revised Long-Term Potable Well Sampling Plan. Tyco Fire Technology Center, 2700 Industrial Parkway, Marinette, Wisconsin 54143. BRRTS# 02-38-580694. April 20.
- Arcadis. 2018a. Site Investigation Report, Tyco Fire Technology Center Site, 2700 Industrial Parkway, Marinette, Wisconsin, BRRTS No. 02-38-580694. September 28.
- Arcadis. 2019. Remedial Action Options Report for Long-Term Drinking Water Supply, Town of Peshtigo, Wisconsin, Summary Report, Wisconsin Department of Natural Resources and Public Services Commission Submittal. September.
- Arcadis. 2020. Interim Site Investigation Report. Tyco Fire Technology Center, Marinette, Wisconsin, BRRTS No. 02-38-5806945. May 21.
- Arcadis. 2021. Revised Long-Term Potable Well Sampling Plan, Tyco Fire Technology Center Site, 2700 Industrial Parkway, Marinette, Wisconsin, BRRTS No. 02-38-580694. October 1.
- Arcadis. 2022a. Additional Site Investigation Work Plan, Tyco Stanton Street Facility, Marinette, Wisconsin, BRRTS No. 02-38-581955. February 22.
- Arcadis. 2022b. Site Investigation Status Report, Tyco Stanton Street Facility, Marinette, Wisconsin, BRRTS No. 02-38-581955. March 22.
- Arcadis. 2022c. Private Drinking Water Well Sampling Program Annual Summary Report – FTC Sampling Area, Tyco Fire Technology Center Site, 2700 Industrial Parkway, Marinette, Wisconsin 54143, BRRTS No. 02-38-580694. August.
- Dames & Moore. 1976. Investigation of Hydrology and Potential Ground-Water Contamination of Bedrock Aquifers at the Ansul Company Site, Marinette, Wisconsin. January 29.
- Oakes, E. L., & Hamilton, L. J. 1973. Water resources of Wisconsin: Menominee-Oconto-Peshtigo River basin (No. 470). US Geological Survey.

# Tables

**Table 1**  
**Irrigation Well Summary PFAS Results**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

Analyte	June 2019 DHS (Not Adopted by DNR Board) <sup>(1)</sup>	November 2020 DHS (Not Yet Proposed for Rulemaking by DNR) <sup>(2)</sup>	Location Sample ID Sample Depth (ft bgs) Sample Time Purge Volume (gal) Sample Date Sample Type	IRR-01	IRR-01	IRR-01	IRR-01	IRR-02	IRR-02	IRR-02	IRR-02	IRR-02	IRR-02
				IRR-01-42 (20220519)	IRR-01-170 (20220519)	DUP-01 (20220519)	IRR-01-374 (20220519)	IRR-02-50 (20220521)	IRR-02-180 (20220521)	DUP-02 (20220521)	IRR-02-392 (20220521)	IRR-02-444 (20220521)	IRR-02-540 (20220521)
				42	170	170	374	50	180	180	14:45	444	540
				17:30	19:40	19:40	13:15	16:30	15:15	15:15	14:45	14:00	13:00
				2,600	10,600	10,600	8,900	8,700	7,400	7,400	6,400	5,300	4,400
				05/19/2022	05/19/2022	05/19/2022	05/19/2022	05/21/2022	05/21/2022	05/21/2022	05/21/2022	05/21/2022	05/21/2022
				N	N	FD	N	N	N	FD	N	N	N
			<b>Unit</b>										
PFBA	--	10,000	ng/l	< 4.4 U	< 4.7 U	< 4.8 U	< 4.5 U	< 4.8 U	< 5 U	< 4.8 U	14	16	23
PFPeA	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	2.9	3.1	32	40	57
PFHxA	--	150,000	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	3.7	4.8	50	60	78
PFHpA	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	4.6	5.6	54	65	87
PFOA	20	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	33	41	350	440 D	600 D
PFNA	--	30	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 UB	< 1.9 UB	12	15	20
PFDA	--	300	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
PFUnA	--	3,000	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
PFDoA	--	500	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
PFTriA	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
PFTeA	--	10,000	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
PFHxDA	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
PFODA	--	400,000	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
PFBS	--	450,000	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	0.45 J	< 1.9 U	0.52 J	0.64 J	0.89 J
PFPeS	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	0.51 J	0.62 J	0.76 J
PFHxS	--	40	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	0.6 J	4	4.6	5.9
PFHpS	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
PFOS	20	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 UB	< 2 UB
PFNS	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
PFDS	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
PFDoS	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
4:2 FTS	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	0.36 J	0.55 J	4.1	4.6	6.8
6:2 FTS	--	--	ng/l	< 4.4 U	< 4.7 U	< 4.8 U	< 4.5 U	< 4.8 U	8.2	9.8	90	110	150
8:2 FTS	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	0.91 J	1 J	1.6 J
10:2 FTS	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
FOSA	--	20 <sup>(2)</sup>	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
NMeFOSA	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
NEtFOSA	--	20 <sup>(2)</sup>	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
NMeFOSAA	--	--	ng/l	< 4.4 U	< 4.7 U	< 4.8 U	< 4.5 U	< 4.8 U	< 5 U	< 4.8 U	< 5 U	< 4.9 U	< 4.9 U
NEtFOSAA	--	20 <sup>(2)</sup>	ng/l	< 4.4 U	< 4.7 U	< 4.8 U	< 4.5 U	< 4.8 U	< 5 U	< 4.8 U	< 5 U	< 4.9 U	< 4.9 U
NMeFOSE	--	--	ng/l	< 3.5 U	< 3.7 U	< 3.8 U	< 3.6 U	< 3.9 U	< 4 U	< 3.9 U	< 4 U	< 4 U	< 4 U
NEtFOSE	--	20 <sup>(2)</sup>	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
HFPO-DA	--	300	ng/l	< 3.5 U	< 3.7 U	< 3.8 U	< 3.6 U	< 3.9 U	< 4 U	< 3.9 U	< 4 U	< 4 U	< 4 U
DONA	--	3,000	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
9Cl-PF3ONS	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U
11Cl-	--	--	ng/l	< 1.8 U	< 1.9 U	< 1.9 U	< 1.8 U	< 1.9 U	< 2 U	< 1.9 U	< 2 U	< 2 U	< 2 U

Notes on Page 2.

**Table 1**  
**Irrigation Well Summary PFAS Results**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

**Notes:**

< = Compound not detected at reporting detection limit.

(1) = In June 2019 the Wisconsin Department of Health Services (DHS) recommended individual groundwater standards of 20 ng/L for PFOA and PFOS. The WDNR proposed those standards through the state rulemaking process. In February 2022, the Wisconsin Natural Resources Board did not approve the proposed rulemaking for groundwater. In August 2022, WDNR promulgated a drinking water standard of 70 ng/L for PFOA and PFOS, individually and combined, for public water systems. This standard does not apply to private drinking water wells.

(2) = In November 2020 the Wisconsin DHS recommended a combined groundwater standard of 20 ng/L for: FOSA, NEtFOSE, NEtFOSA, NEtFOSAA, PFOS and PFOA. DHS also recommended individual standards for FOSA, NEtFOSE, NEtFOSA, NEtFOSAA, PFBS, PFHxS, PFNA, PFDA, PFDoA, PFHxA, PFTeA, PFUnA, PFBA, PFODA, DONA, and GenX. In March 2021, The Wisconsin Natural Resources Board approved a Statement of Scope to initiate a rulemaking for this recommendation. The WDNR has not yet proposed rules to initiate the rulemaking process to implement this recommendation; the agency's authority to do so under the Statement of Scope will expire in September 2023.

-- = No standard

N = Normal sample

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

U = The analyte was analyzed for but the result was not detected above the method detection limit.

**Chemical Abbreviations**

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

**Table 2**  
**Total Well Sample Confirmation Results**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

Analyte	June 2019 DHS (Not Adopted by DNR Board) <sup>(1)</sup>	November 2020 DHS (Not Yet Proposed for Rulemaking by DNR) <sup>(2)</sup>	Location Sample ID Depth Sample Date Sample Type	IRR-01 IRR-01 (070122) Composite Well 07/01/2022 N	IRR-02 IRR-02 (070122) Composite Well 07/01/2022 N
			Units		
PFBA	--	10,000	ng/l	< 5.3 U	< 5.1 U
PFPeA	--	--	ng/l	< 2.1 U	0.62 J
PFHxA	--	150,000	ng/l	< 2.1 U	1 J
PFHpA	--	--	ng/l	< 2.1 U	0.4 J
PFOA	20	--	ng/l	< 2.1 U	5.8
PFNA	--	30	ng/l	< 2.1 U	< 2 U
PFDA	--	300	ng/l	< 2.1 U	< 2 U
PFUnA	--	3,000	ng/l	< 2.1 U	< 2 U
PFDoA	--	500	ng/l	< 2.1 U	< 2 U
PFTriA	--	--	ng/l	< 2.1 U	< 2 U
PFTeA	--	10,000	ng/l	< 2.1 U	< 2 U
PFHxDA	--	--	ng/l	< 2.1 U	< 2 U
PFODA	--	400,000	ng/l	< 2.1 U	< 2 U
PFBS	--	450,000	ng/l	< 2.1 U	< 2 U
PFPeS	--	--	ng/l	< 2.1 U	< 2 U
PFHxS	--	40	ng/l	< 2.1 U	< 2 U
PFHpS	--	--	ng/l	< 2.1 U	< 2 U
PFOS	20	--	ng/l	< 2.1 U	< 2 U
PFNS	--	--	ng/l	< 2.1 U	< 2 U
PFDS	--	--	ng/l	< 2.1 U	< 2 U
PFDoS	--	--	ng/l	< 2.1 U	< 2 U
4:2 FTS	--	--	ng/l	< 2.1 U	< 2 U
6:2 FTS	--	--	ng/l	< 5.3 U	< 5.1 U
8:2 FTS	--	--	ng/l	< 2.1 U	< 2 U
10:2 FTS	--	--	ng/l	< 2.1 U	< 2 U
FOSA	--	20 <sup>(2)</sup>	ng/l	1.5 J	2.7
NMeFOSA	--	--	ng/l	< 2.1 U	< 2 U
NEtFOSA	--	20 <sup>(2)</sup>	ng/l	< 2.1 U	< 2 U
NMeFOSAA	--	--	ng/l	< 5.3 U	< 5.1 U
NEtFOSAA	--	20 <sup>(2)</sup>	ng/l	< 5.3 U	< 5.1 U
NMeFOSE	--	--	ng/l	< 4.2 U	< 4.1 U
NEtFOSE	--	20 <sup>(2)</sup>	ng/l	< 2.1 U	< 2 U
HFPO-DA	--	300	ng/l	< 4.2 U	< 4.1 U
DONA	--	3,000	ng/l	< 2.1 U	< 2 U
9Cl-PF3ONS	--	--	ng/l	< 2.1 U	< 2 U
11Cl-PF3OUdS	--	--	ng/l	< 2.1 U	< 2 U

Notes on Page 2.

**Table 2**  
**Total Well Sample Confirmation Results**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

**Notes:**

< = Compound not detected at reporting detection limit.

(1) = In June 2019 the Wisconsin Department of Health Services (DHS) recommended individual groundwater standards of 20 ng/L for PFOA and PFOS. The WDNR proposed those standards through the state rulemaking process. In February 2022, the Wisconsin Natural Resources Board did not approve the proposed rulemaking for groundwater. In August 2022, WDNR promulgated a drinking water standard of 70 ng/L for PFOA and PFOS, individually and combined, for public water systems. This standard does not apply to private drinking water wells.

(2) = In November 2020 the Wisconsin DHS recommended a combined groundwater standard of 20 ng/L for: FOSA, NEtFOSE, NEtFOSA, NEtFOSAA, PFOS and PFOA. DHS also recommended individual standards for FOSA, NEtFOSE, NEtFOSA, NEtFOSAA, PFBS, PFHxS, PFNA, PFDA, PFDoA, PFHxA, PFTeA, PFUnA, PFBA, PFODA, DONA, and GenX. In March 2021, The Wisconsin Natural Resources Board approved a Statement of Scope to initiate a rulemaking for this recommendation. The WDNR has not yet proposed rules to initiate the rulemaking process to implement this recommendation; the agency's authority to do so under the Statement of Scope will expire in September 2023.

-- = No standard

N = Normal sample

ng/L = nanograms per liter

FD = Field duplicate sample

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

U = The analyte was analyzed for but the result was not detected above the method detection limit.

**Chemical Abbreviations**

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



**Table 3**  
**Discrete-zone Packer Results**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

Analyte	June 2019 DHS (Not Adopted by DNR Board) <sup>(1)</sup>	November 2020 DHS (Not Yet Proposed for Rulemaking by DNR) <sup>(2)</sup>	Test Interval	Borehole above 100 ft bgs, after purging well dry		Borehole above 100 ft bgs, after recovery	Borehole below 150 feet, after 10x well volume purge		
				Location	IRR-02	IRR-02	IRR-02	IRR-02	IRR-02
				Sample ID	IRR-02_100 (20220804)	DUP-01 (20220804)	IRR-02_65 (20220805)	IRR-02_150 (20220806)	DUP-02 (20220806)
				Sample Date	08/04/2022	08/04/2022	08/05/2022	08/06/2022	08/06/2022
				Sample Type	N	FD	N	N	FD
Unit									
PFBA	--	10,000	ng/l	4.1 J	4.1 J	< 4.5 U	< 4.6 U	< 4.4 U	
PFPeA	--	--	ng/l	7.2	7	0.67 J	< 1.8 U	< 1.8 U	
PFHxA	--	150,000	ng/l	14	13	1.5 J	< 1.8 U	< 1.8 U	
PFHpA	--	--	ng/l	7.8	8	0.85 J	< 1.8 U	< 1.8 U	
PFOA	20	--	ng/l	94	93	11	< 1.8 U	< 1.8 U	
PFNA	--	30	ng/l	2	1.8	0.37 J	< 1.8 U	< 1.8 U	
PFDA	--	300	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
PFUnA	--	3,000	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
PFDoA	--	500	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
PFTriA	--	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
PFTeA	--	10,000	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
PFHxDA	--	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
PFODA	--	400,000	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
PFBS	--	450,000	ng/l	0.26 J	0.24 J	< 1.8 U	< 1.8 U	< 1.8 U	
PFPeS	--	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
PFHxS	--	40	ng/l	1.4 J	1.2 J	< 1.8 U	< 1.8 U	< 1.8 U	
PFHpS	--	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
PFOS	20	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
PFNS	--	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
PFDS	--	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
PFDoS	--	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
4:2 FTS	--	--	ng/l	0.9 J	0.95 J	< 1.8 U	< 1.8 U	< 1.8 U	
6:2 FTS	--	--	ng/l	27	28	3.2 J	< 4.6 U	< 4.4 U	
8:2 FTS	--	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
10:2 FTS	--	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
FOSA	--	20 <sup>(2)</sup>	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
NMeFOSA	--	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
NEIFOSA	--	20 <sup>(2)</sup>	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
NMeFOSAA	--	--	ng/l	< 4.5 U	< 4.5 U	< 4.5 U	< 4.6 U	< 4.4 U	
NEIFOSAA	--	20 <sup>(2)</sup>	ng/l	< 4.5 U	< 4.5 U	< 4.5 U	< 4.6 U	< 4.4 U	
NMeFOSE	--	--	ng/l	< 3.6 U	< 3.6 U	< 3.6 U	< 3.7 U	< 3.6 U	
NEIFOSE	--	20 <sup>(2)</sup>	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
HFPO-DA	--	300	ng/l	< 3.6 U	< 3.6 U	< 3.6 U	< 3.7 U	< 3.6 U	
DONA	--	3,000	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
9CI-PF3ONS	--	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	
11CI-PF3OUdS	--	--	ng/l	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	

**Notes:**  
< = Compound not detected at reporting detection limit.  
(1) = In June 2019 the Wisconsin Department of Health Services (DHS) recommended individual groundwater standards of 20 ng/L for PFOA and PFOS. The WDNR proposed those standards through the state rulemaking process. In February 2022, the Wisconsin Natural Resources Board did not approve the proposed rulemaking for groundwater. In August 2022, WDNR promulgated a drinking water standard of 70 ng/L for PFOA and PFOS, individually and combined, for public water systems. This standard does not apply to private drinking water wells.  
(2) = In November 2020 the Wisconsin DHS recommended a combined groundwater standard of 20 ng/L for: FOSA, NEIFOSE, NEIFOSAA, NEIFOSAA, PFOS and PFOA. DHS also recommended individual standards for FOSA, NEIFOSE, NEIFOSAA, NEIFOSAA, PFBS, PFHxS, PFNA, PFDA, PFDoA, PFHxA, PFTeA, PFUnA, PFBA, PFODA, DONA, and GenX. In March 2021, J = The analyte was positively identified; however the associated numerical value is an estimated concentration only  
U = The analyte was analyzed for but the result was not detected above the method detection limit.

**Chemical Abbreviations**

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

**Table 4**  
**Potable Well PFAS Analytical Results - December 2017 to June 2022**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

	June 2019 WDHS (Not Adopted by WDNR Board) <sup>(1)</sup>	November 2020 WDHS (Not Yet Proposed for Rulemaking by WDNR) <sup>(2)</sup>	Location	WS-002			WS-004	WS-006				
			Sample ID	WS-002 (041818)	DUP-064 (041818)	WS-002 (120717)	WS-004 (120717)	WS-006 (121217)	WS-006 (041818)	WS-006 (082918)	WS-006 (051221)	WS-006 (052322)
			Sample Date	4/18/2018	4/18/2018	12/7/2017	12/7/2017	12/12/2017	4/18/2018	8/29/2018	5/12/2021	5/23/2022
			Sample Type	N	FD	N	N	N	N	N	N	N
			General Depth	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
			Well Depth	523	523	523	476	521	521	521	521	521
			Source	+,-	+,-	+,-	+	+,-	+,-	+,-	+,-	+,-
			WUWN	MT2112	MT2112	MT2112	UH526	UH515	UH515	UH515	UH515	UH515
PFAS	Unit											
PFBA	--	10,000	ng/L	NA	NA	NA	NA	NA	NA	NA	<4.7 U	NA
PFPeA	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
PFHxA	--	150,000	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	<1.9 U	NA
PFHpA	--	--	ng/L	<10 U	<10 U	<2.18 U	<2.02 U	<10 U	<9.7 U	<2.9 U	<1.9 U	NA
PFOA	20	--	ng/L	<21 U	<20 U	<2.18 U	<2.02 U	<20 U	<19 U	<5.8 U	<1.9 U	NA
PFNA	--	30	ng/L	<21 U	<20 U	<2.18 U	<2.02 U	<20 U	<19 U	<1.9 U	<1.9 U	NA
PFDA	--	300	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	<1.9 U	NA
PFUnA	--	3,000	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	<1.9 U	NA
PFDaA	--	500	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	<1.9 U	NA
PFTriA	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	<1.9 U	NA
PFTeA	--	10,000	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	<1.9 U	NA
PFHxDA	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
PFODA	--	400,000	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
PFBS	--	450,000	ng/L	<93 U	<92 U	<2.18 U	<2.02 U	<90 U	<87 U	<1.9 U	<1.9 U	NA
PFPeS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
PFHxS	--	40	ng/L	<31 U	<31 U	<2.18 U	<2.02 U	<30 U	<29 U	<1.9 U	<1.9 U	NA
PFHpS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
PFOS	20	--	ng/L	<41 U	<41 U	<2.18 U	<2.02 U	<40 U	<39 U	<1.9 U	<1.9 U	NA
PFNS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
PFDS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
PFDoS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
4:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
6:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<4.7 U	NA
8:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
10:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
FOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	NA	4.4	NA
NMeFOSA	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
NEtFOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
NMeFOSAA	--	--	ng/L	NA	NA	NA	NA	NA	NA	<2.9 U	<4.7 U	NA
NEtFOSAA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	<4.7 U	NA
NMeFOSE	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<3.8 U	NA
NEtFOSE	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
HFPO-DA	--	300	ng/L	NA	NA	NA	NA	NA	NA	NA	<3.8 U	NA
DONA	--	3,000	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
9Cl-PF3ONS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA
11Cl-PF3OUdS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	<1.9 U	NA

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**Table 4**  
**Potable Well PFAS Analytical Results - December 2017 to June 2022**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

	June 2019 WDHS (Not Adopted by WDNR Board) <sup>(1)</sup>	November 2020 WDHS (Not Yet Proposed for Rulemaking by WDNR) <sup>(2)</sup>	Location	WS-012						WS-028		
			Sample ID	WS-012 (121217)	WS-012 (041318)	WS-012 (092818)	WS-012 (112718)	WS-012 (051319)	WS-012 (102119)	WS-012 (020921)	WS-028 (121317)	WS-028 (041018)
			Sample Date	12/12/2017	4/13/2018	9/28/2018	11/27/2018	5/13/2019	10/21/2019	2/9/2021	12/13/2017	4/10/2018
			Sample Type	N	N	N	N	N	N	N	N	N
			General Depth	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
			Well Depth	510	510	510	510	510	510	510	454	454
			Source	+,-	+,-	+,-	+,-	+,-	+,-	+,-	+,-	+,-
			WUWN	WS724	WS724	WS724	WS724	WS724	WS724	IC095	IC095	
PFAS			Unit									
PFBA	--	10,000	ng/L	NA	NA	NA	NA	NA	NA	<4.5 U	NA	NA
PFPeA	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
PFHxA	--	150,000	ng/L	NA	NA	<2.0 U	<1.8 U	<1.8 U	<1.8 U	<1.8 U	NA	NA
PFHpA	--	--	ng/L	<10 U	<10 U	<3.0 U	<1.8 U	<2.7 U	<1.8 U	<1.8 U	<11 U	<9.9 U
PFOA	20	--	ng/L	<20 U	<20 U	<6.0 U	<1.8 U	<5.5 U	<1.8 U	<1.8 U	<21 U	<20 U
PFNA	--	30	ng/L	<20 U	<20 U	<2.0 U	<1.8 U	<1.8 U	<1.8 U	<1.8 U	<21 U	<20 U
PFDA	--	300	ng/L	NA	NA	<2.0 U	<1.8 U	<1.8 U	<1.8 U	<1.8 U	NA	NA
PFUnA	--	3,000	ng/L	NA	NA	<2.0 U	<1.8 U	<1.8 U	<1.8 U	<1.8 U	NA	NA
PFDoA	--	500	ng/L	NA	NA	<2.0 U	<1.8 U	<1.8 U	<1.8 U	<1.8 U	NA	NA
PFTriA	--	--	ng/L	NA	NA	<2.0 U	<1.8 U	<1.8 U	<1.8 U	<1.8 U	NA	NA
PFTeA	--	10,000	ng/L	NA	NA	<2.0 U	<1.8 U	<1.8 U	<1.8 U	<1.8 U	NA	NA
PFHxDA	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
PFODA	--	400,000	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
PFBS	--	450,000	ng/L	<90 U	<92 U	<2.0 U	<1.8 U	<1.8 U	<1.8 U	<1.8 U	<96 U	<89 U
PFPeS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
PFHxS	--	40	ng/L	<30 U	<31 U	<2.0 U	<1.8 U	<1.8 U	<1.8 U	<1.8 U	<32 U	<30 U
PFHpS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
PFOS	20	--	ng/L	<40 U	<41 U	<2.0 U	<1.8 U	<1.8 U	<1.8 U	<1.8 U	<43 U	<39 U
PFNS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
PFDS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
PFDoS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
4:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
6:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<4.5 U	NA	NA
8:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
10:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
FOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
NMeFOSA	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
NEtFOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
NMeFOSAA	--	--	ng/L	NA	NA	<3.0 U	<1.8 U	<2.7 U	<1.8 U	<4.5 U	NA	NA
NEtFOSAA	--	20 <sup>(2)</sup>	ng/L	NA	NA	<2.0 U	<1.8 U	<1.8 U	<1.8 U	<4.5 U	NA	NA
NMeFOSE	--	--	ng/L	NA	NA	NA	NA	NA	NA	<3.6 U	NA	NA
NEtFOSE	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
HFPO-DA	--	300	ng/L	NA	NA	NA	NA	NA	NA	<3.6 U	NA	NA
DONA	--	3,000	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
9Cl-PF3ONS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA
11Cl-PF3OUdS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.8 U	NA	NA

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**Potable Well PFAS Analytical Results - December 2017 to June 2022**  
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**Marinette, Wisconsin**

	June 2019 WDHS (Not Adopted by WDNR Board) <sup>(1)</sup>	November 2020 WDHS (Not Yet Proposed for Rulemaking by WDNR) <sup>(2)</sup>	Location	WS-028 (continued)					WS-056			
			Sample ID	WS-028 (090518)	WS-028 (120618)	DUP-205 (120618)	WS-028 (031622)	DUP-461 (031622)	WS-056 (122717)	DUP-08 (122717)	WS-056 (050118)	WS-056 (091818)
			Sample Date	9/5/2018	12/6/2018	12/6/2018	3/16/2022	3/16/2022	12/27/2017	12/27/2017	5/1/2018	9/18/2018
			Sample Type	N	N	FD	N	FD	N	FD	N	N
			General Depth	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
			Well Depth	454	454	454	454	454	495	495	495	495
			Source	+,-	+,-	+,-	+,-	+,-	+,-	+,-	+,-	+,-
			WUWN	IC095	IC095	IC095	IC095	IC095	WS712	WS712	WS712	WS712
PFAS			Unit									
PFBA	--	10,000	ng/L	NA	NA	NA	<4.7 U	<4.6 U	NA	NA	NA	NA
PFPeA	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
PFHxA	--	150,000	ng/L	<1.9 U	<1.8 U	<1.8 U	<1.9 U	<1.8 U	NA	NA	NA	<2.1 U
PFHpA	--	--	ng/L	<2.9 U	<1.8 U	<1.8 U	<1.9 U	<1.8 U	<10 U	<10 U	<9.6 U	<3.2 U
PFOA	20	--	ng/L	<5.7 U	<1.8 U	<1.8 U	<1.9 U	<1.8 U	<20 U	<21 U	<19 U	<6.4 U
PFNA	--	30	ng/L	<1.9 U	<1.8 U	<1.8 U	<1.9 U	<1.8 U	<20 U	<21 U	<19 U	<2.1 U
PFDA	--	300	ng/L	<1.9 U	<1.8 U	<1.8 U	<1.9 U	<1.8 U	NA	NA	NA	<2.1 U
PFUnA	--	3,000	ng/L	<1.9 U	<1.8 U	<1.8 U	<1.9 U	<1.8 U	NA	NA	NA	<2.1 U
PFDaA	--	500	ng/L	<1.9 U	<1.8 U	<1.8 U	<1.9 U	<1.8 U	NA	NA	NA	<2.1 U
PFTriA	--	--	ng/L	<1.9 U	<1.8 U	<1.8 U	<1.9 U	<1.8 U	NA	NA	NA	<2.1 U
PFTeA	--	10,000	ng/L	<1.9 U	<1.8 U	<1.8 U	<1.9 U	<1.8 U	NA	NA	NA	<2.1 U
PFHxDA	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
PFODA	--	400,000	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
PFBS	--	450,000	ng/L	<1.9 U	<1.8 UB	<1.8 UB	<1.9 U	<1.8 U	<90 U	<93 U	<87 U	<2.1 U
PFPeS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
PFHxS	--	40	ng/L	<1.9 U	<1.8 U	<1.8 U	<1.9 U	<1.8 U	<30 U	<31 U	<29 U	<2.1 U
PFHpS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
PFOS	20	--	ng/L	<1.9 U	<1.8 U	<1.8 U	<1.9 U	<1.8 U	<40 U	<41 U	<38 U	<2.1 U
PFNS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
PFDS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
PFDoS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
4:2 FTS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
6:2 FTS	--	--	ng/L	NA	NA	NA	<4.7 U	<4.6 U	NA	NA	NA	NA
8:2 FTS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
10:2 FTS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
FOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	2.4	2.3	NA	NA	NA	NA
NMeFOSA	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
NEtFOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
NMeFOSAA	--	--	ng/L	<2.9 U	<1.8 U	<1.8 U	<4.7 U	<4.6 U	NA	NA	NA	<3.2 U
NEtFOSAA	--	20 <sup>(2)</sup>	ng/L	<1.9 U	<1.8 U	<1.8 U	<4.7 U	<4.6 U	NA	NA	NA	<2.1 U
NMeFOSE	--	--	ng/L	NA	NA	NA	<3.8 U	<3.6 U	NA	NA	NA	NA
NEtFOSE	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
HFPO-DA	--	300	ng/L	NA	NA	NA	<3.8 U	<3.6 U	NA	NA	NA	NA
DONA	--	3,000	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
9Cl-PF3ONS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA
11Cl-PF3OUdS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA

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**Table 4**  
**Potable Well PFAS Analytical Results - December 2017 to June 2022**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

	June 2019 WDHS (Not Adopted by WDNR Board) <sup>(1)</sup>	November 2020 WDHS (Not Yet Proposed for Rulemaking by WDNR) <sup>(2)</sup>	Location	WS-056 (continued)				WS-069A					
			Sample ID	WS-056 (062019)	DUP-283 (062019)	WS-056 (062921)	DUP-422 (06292021)	WS-069A (010918)	WS-069A (042318)	DUP-068 (042318)	WS-069A (090418)	WS-069A (102518)	
			Sample Date	6/20/2019	6/20/2019	6/29/2021	6/29/2021	1/9/2018	4/23/2018	4/23/2018	9/4/2018	10/25/2018	
			Sample Type	N	FD	N	FD	N	N	FD	N	N	
			General Depth	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	
			Well Depth	495	495	495	495	520	520	520	520	520	
			Source	+,-	+,-	+,-	+,-	+,-	+,-	+,-	+,-	+,-	
			WUWN	WS712	WS712	WS712	WS712	LK952	LK952	LK952	LK952	LK952	
PFAS	Unit												
PFBA	--	10,000	ng/L	NA	NA	<4.7 U	<4.5 U	NA	NA	NA	NA	NA	NA
PFPeA	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
PFHxA	--	150,000	ng/L	<1.8 U	<2.0 UJ-	<1.9 U	<1.8 U	NA	NA	NA	<1.8 U	<1.7 U	<1.7 U
PFHpA	--	--	ng/L	<2.8 U	<2.9 UJ-	<1.9 U	<1.8 U	<8.8 U	<9.7 U	<10 U	<2.6 U	<2.6 U	<2.6 U
PFOA	20	--	ng/L	<5.5 U	<5.9 UJ-	<1.9 U	<1.8 U	<18 U	<19 U	<20 U	<5.3 U	<5.1 U	<5.1 U
PFNA	--	30	ng/L	<1.8 U	<2.0 UJ-	<1.9 U	<1.8 U	<18 U	<19 U	<20 U	<1.8 U	<1.7 U	<1.7 U
PFDA	--	300	ng/L	<1.8 U	<2.0 UJ-	0.29 J	0.32 J	NA	NA	NA	<1.8 U	<1.7 U	<1.7 U
PFUnA	--	3,000	ng/L	<1.8 U	<2.0 UJ-	<1.9 U	<1.8 U	NA	NA	NA	<1.8 U	<1.7 U	<1.7 U
PFDoA	--	500	ng/L	<1.8 U	<2.0 UJ-	<1.9 U	<1.8 U	NA	NA	NA	<1.8 U	<1.7 U	<1.7 U
PFTriA	--	--	ng/L	<1.8 U	<2.0 UJ-	<1.9 U	<1.8 U	NA	NA	NA	<1.8 U	<1.7 U	<1.7 U
PFTeA	--	10,000	ng/L	<1.8 U	<2.0 UJ-	<1.9 U	<1.8 U	NA	NA	NA	<1.8 U	<1.7 U	<1.7 U
PFHxDA	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
PFODA	--	400,000	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
PFBS	--	450,000	ng/L	<1.8 U	<2.0 UJ-	<1.9 U	<1.8 U	<79 U	<87 U	<90 U	<1.8 U	<1.7 U	<1.7 U
PFPeS	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
PFHxS	--	40	ng/L	<1.8 U	<2.0 UJ-	<1.9 U	<1.8 U	<26 U	<29 U	<30 U	<1.8 U	<1.7 U	<1.7 U
PFHpS	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
PFOS	20	--	ng/L	<1.8 U	<2.0 UJ-	<1.9 U	<1.8 U	<35 U	<39 U	<40 U	<1.8 U	<1.7 U	<1.7 U
PFNS	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
PFDS	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
PFDoS	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
4:2 FTS	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
6:2 FTS	--	--	ng/L	NA	NA	<4.7 U	<4.5 U	NA	NA	NA	NA	NA	NA
8:2 FTS	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
10:2 FTS	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
FOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
NMeFOSA	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
NEtFOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
NMeFOSAA	--	--	ng/L	<2.8 U	<2.9 UJ-	<4.7 U	<4.5 U	NA	NA	NA	<2.6 U	<2.6 U	<2.6 U
NEtFOSAA	--	20 <sup>(2)</sup>	ng/L	<1.8 U	<2.0 UJ-	<4.7 U	<4.5 U	NA	NA	NA	<1.8 U	<1.7 U	<1.7 U
NMeFOSE	--	--	ng/L	NA	NA	<3.7 U	<3.6 U	NA	NA	NA	NA	NA	NA
NEtFOSE	--	20 <sup>(2)</sup>	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
HFPO-DA	--	300	ng/L	NA	NA	<3.7 U	<3.6 U	NA	NA	NA	NA	NA	NA
DONA	--	3,000	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
9Cl-PF3ONS	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA
11Cl-PF3OUdS	--	--	ng/L	NA	NA	<1.9 U	<1.8 U	NA	NA	NA	NA	NA	NA

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**Table 4**  
**Potable Well PFAS Analytical Results - December 2017 to June 2022**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

	June 2019 WDHS (Not Adopted by WDNR Board) <sup>(1)</sup>	November 2020 WDHS (Not Yet Proposed for Rulemaking by WDNR) <sup>(2)</sup>	Location	WS-069A (continued)							WS-083		
			Sample ID	DUP-179 (102518)	WS-069A (051519)	WS-069A (082819)	WS-069A (100219)	DUP-325 (100219)	WS-069A (033021)	WS-069A (062922)	WS-083 (011118)	WS-083 (042418)	
			Sample Date	10/25/2018	5/15/2019	8/28/2019	10/2/2019	10/2/2019	3/30/2021	6/29/2022	1/11/2018	4/24/2018	
			Sample Type	FD	N	N	N	FD	N	N	N	N	
			General Depth	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	
			Well Depth	520	520	520	520	520	520	520	400	400	
			Source	+,-	+,-	+,-	+,-	+,-	+,-	+,-	-	-	
			WUWN	LK952	LK952	LK952	LK952	LK952	LK952	LK952	N/A	N/A	
PFAS			Unit										
PFBA	--	10,000	ng/L	NA	NA	NA	NA	NA	<4.6 U	<5.1 U	NA	NA	
PFPeA	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
PFHxA	--	150,000	ng/L	<1.7 U	<1.8 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<2.0 U	NA	NA	
PFHpA	--	--	ng/L	<2.6 U	<2.7 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<2.0 U	<10 U	<10 U	
PFOA	20	--	ng/L	<5.2 U	<5.4 U	0.59 J	<1.9 U	<1.9 U	<1.8 U	<2.0 U	<21 U	<20 U	
PFNA	--	30	ng/L	<1.7 U	<1.8 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<2.0 U	<21 U	<20 U	
PFDA	--	300	ng/L	<1.7 U	<1.8 U	<1.9 U	<1.9 U	<1.9 U	0.32 J	<2.0 U	NA	NA	
PFUnA	--	3,000	ng/L	<1.7 U	<1.8 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<2.0 U	NA	NA	
PFDaA	--	500	ng/L	<1.7 U	<1.8 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<2.0 U	NA	NA	
PFTriA	--	--	ng/L	<1.7 U	<1.8 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<2.0 U	NA	NA	
PFTeA	--	10,000	ng/L	<1.7 U	<1.8 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<2.0 U	NA	NA	
PFHxDA	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
PFODA	--	400,000	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
PFBS	--	450,000	ng/L	<1.7 U	<1.8 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<2.0 U	<93 U	<90 U	
PFPeS	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
PFHxS	--	40	ng/L	<1.7 U	<1.8 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<2.0 U	<31 U	<30 U	
PFHpS	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
PFOS	20	--	ng/L	<1.7 U	<1.8 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<2.0 U	<41 U	<40 U	
PFNS	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
PFDS	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
PFDoS	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
4:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
6:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	<4.6 U	<5.1 U	NA	NA	
8:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
10:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
FOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	6.1	<2.0 U	NA	NA	
NMeFOSA	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
NEtFOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
NMeFOSAA	--	--	ng/L	<2.6 U	<2.7 U	<1.9 U	<1.9 U	<1.9 U	<4.6 U	<5.1 U	NA	NA	
NEtFOSAA	--	20 <sup>(2)</sup>	ng/L	<1.7 U	<1.8 U	<1.9 U	<1.9 U	<1.9 U	<4.6 U	<5.1 U	NA	NA	
NMeFOSE	--	--	ng/L	NA	NA	NA	NA	NA	<3.7 U	<4.1 U	NA	NA	
NEtFOSE	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
HFPO-DA	--	300	ng/L	NA	NA	NA	NA	NA	<3.7 U	<4.1 U	NA	NA	
DONA	--	3,000	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
9Cl-PF3ONS	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	
11Cl-PF3OUdS	--	--	ng/L	NA	NA	NA	NA	NA	<1.8 U	<2.0 U	NA	NA	

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**Table 4**  
**Potable Well PFAS Analytical Results - December 2017 to June 2022**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

	June 2019 WDHS (Not Adopted by WDNR Board) <sup>(1)</sup>	November 2020 WDHS (Not Yet Proposed for Rulemaking by WDNR) <sup>(2)</sup>	Location	WS-083 (continued)						WS-098		
			Sample ID	WS-083 (112918)	WS-083 (031819)	WS-083 (051319)	DUP-262 (051319)	WS-083 (030220)	WS-083 (032321)	WS-098 (012718)	WS-098 (053018)	WS-098 (092818)
			Sample Date	11/29/2018	3/18/2019	5/13/2019	5/13/2019	3/2/2020	3/23/2021	1/27/2018	5/30/2018	9/28/2018
			Sample Type	N	N	N	FD	N	N	N	N	N
			General Depth	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
			Well Depth	400	400	400	400	400	400	488	488	488
			Source	-	-	-	-	-	-	+	+	+
WUWN	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MT272	MT272	MT272		
PFAS			Unit									
PFBA	--	10,000	ng/L	NA	NA	NA	NA	NA	<4.1 U	NA	NA	NA
PFPeA	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
PFHxA	--	150,000	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.8 U	<1.7 U	NA	NA	<2.1 U
PFHpA	--	--	ng/L	<1.8 U	<2.6 U	<2.8 U	<2.7 U	<1.8 U	<1.7 U	<10 U	<10 U	<3.1 U
PFOA	20	--	ng/L	<1.8 U	<5.2 U	<5.6 U	<5.4 U	<1.8 U	<1.7 U	<20 U	<20 U	<6.2 U
PFNA	--	30	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.8 U	<1.7 U	<20 U	<20 U	<2.1 U
PFDA	--	300	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.8 U	0.27 J	NA	NA	<2.1 U
PFUnA	--	3,000	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.8 U	<1.7 U	NA	NA	<2.1 U
PFDoA	--	500	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.8 U	<1.7 U	NA	NA	<2.1 U
PFTriA	--	--	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.8 U	<1.7 U	NA	NA	<2.1 U
PFTeA	--	10,000	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.8 U	<1.7 U	NA	NA	<2.1 U
PFHxDA	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
PFODA	--	400,000	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
PFBS	--	450,000	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.8 U	<1.7 U	<92 U	<90 U	<2.1 U
PFPeS	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
PFHxS	--	40	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.8 U	<1.7 U	<31 U	<30 U	<2.1 U
PFHpS	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
PFOS	20	--	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.8 U	<1.7 U	<41 U	<40 U	<2.1 U
PFNS	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
PFDS	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
PFDoS	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
4:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
6:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	<4.1 U	NA	NA	NA
8:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
10:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
FOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
NMeFOSA	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
NEtFOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
NMeFOSAA	--	--	ng/L	<1.8 U	<2.6 U	<2.8 U	<2.7 U	<1.8 U	<4.1 U	NA	NA	<3.1 U
NEtFOSAA	--	20 <sup>(2)</sup>	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.8 U	<4.1 U	NA	NA	<2.1 U
NMeFOSE	--	--	ng/L	NA	NA	NA	NA	NA	<3.3 U	NA	NA	NA
NEtFOSE	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
HFPO-DA	--	300	ng/L	NA	NA	NA	NA	NA	<3.3 U	NA	NA	NA
DONA	--	3,000	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
9Cl-PF3ONS	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA
11Cl-PF3OUdS	--	--	ng/L	NA	NA	NA	NA	NA	<1.7 U	NA	NA	NA

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**Table 4**  
**Potable Well PFAS Analytical Results - December 2017 to June 2022**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
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	June 2019 WDHS (Not Adopted by WDNR Board) <sup>(1)</sup>	November 2020 WDHS (Not Yet Proposed for Rulemaking by WDNR) <sup>(2)</sup>	Location	WS-098 (continued)						WS-103		
			Sample ID	DUP-158 (092818)	WS-098 (102718)	DUP-181 (102718)	WS-098 (051719)	WS-098 (041321)	DUP-409 (041321)	WS-103 (020218)	WS-103 (040518)	DUP-049 (040518)
			Sample Date	9/28/2018	10/27/2018	10/27/2018	5/17/2019	4/13/2021	4/13/2021	2/2/2018	4/5/2018	4/5/2018
			Sample Type	FD	N	FD	N	N	FD	N	N	FD
			General Depth	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
			Well Depth	488	488	488	488	488	488	622	622	622
			Source	+	+	+	+	+	+	+	+	+
	WUWN	MT272	MT272	MT272	MT272	MT272	MT272	TL121, WR076	TL121, WR076	TL121, WR076		
PFAS			Unit									
PFBA	--	10,000	ng/L	NA	NA	NA	NA	<4.7 U	<4.5 U	NA	NA	NA
PFPeA	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
PFHxA	--	150,000	ng/L	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	NA	NA	NA
PFHpA	--	--	ng/L	<3.0 U	<2.8 U	<2.8 U	<2.9 U	<1.9 U	<1.8 U	<10 U	<10 U	<9.9 U
PFOA	20	--	ng/L	<6.0 U	<5.6 U	<5.6 U	<5.8 U	<1.9 U	<1.8 U	<21 U	<20 U	<20 U
PFNA	--	30	ng/L	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<21 U	<20 U	<20 U
PFDA	--	300	ng/L	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	NA	NA	NA
PFUnA	--	3,000	ng/L	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	NA	NA	NA
PFDaA	--	500	ng/L	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	NA	NA	NA
PFTriA	--	--	ng/L	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	NA	NA	NA
PFTeA	--	10,000	ng/L	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	NA	NA	NA
PFHxDA	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
PFODA	--	400,000	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
PFBS	--	450,000	ng/L	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<93 U	<90 U	<89 U
PFPeS	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
PFHxS	--	40	ng/L	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<31 U	<30 U	<30 U
PFHpS	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
PFOS	20	--	ng/L	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<41 U	<40 U	<40 U
PFNS	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
PFDS	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
PFDoS	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
4:2 FTS	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
6:2 FTS	--	--	ng/L	NA	NA	NA	NA	<4.7 U	<4.5 U	NA	NA	NA
8:2 FTS	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
10:2 FTS	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
FOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	3.9	5.1	NA	NA	NA
NMeFOSA	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
NEtFOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
NMeFOSAA	--	--	ng/L	<3.0 U	<2.8 U	<2.8 U	<2.9 U	<4.7 U	<4.5 U	NA	NA	NA
NEtFOSAA	--	20 <sup>(2)</sup>	ng/L	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<4.7 U	<4.5 U	NA	NA	NA
NMeFOSE	--	--	ng/L	NA	NA	NA	NA	<3.8 U	<3.6 U	NA	NA	NA
NEtFOSE	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
HFPO-DA	--	300	ng/L	NA	NA	NA	NA	<3.8 U	<3.6 U	NA	NA	NA
DONA	--	3,000	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
9Cl-PF3ONS	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA
11Cl-PF3OUdS	--	--	ng/L	NA	NA	NA	NA	<1.9 U	<1.8 U	NA	NA	NA

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**Table 4**  
**Potable Well PFAS Analytical Results - December 2017 to June 2022**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

	June 2019 WDHS (Not Adopted by WDNR Board) <sup>(1)</sup>	November 2020 WDHS (Not Yet Proposed for Rulemaking by WDNR) <sup>(2)</sup>	Location	WS-103 (continued)						WS-130		
			Sample ID	WS-103 (090518)	DUP-138 (090518)	WS-103 (103018)	DUP-183 (103018)	WS-103 (041619)	DUP-249 (041619)	WS-103 (030921)	WS-130 (022718)	WS-130 (040618)
			Sample Date	9/5/2018	9/5/2018	10/30/2018	10/30/2018	4/16/2019	4/16/2019	3/9/2021	2/27/2018	4/6/2018
			Sample Type	N	FD	N	FD	N	FD	N	N	N
			General Depth	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
			Well Depth	622	622	622	622	622	622	622	506	506
			Source	+	+	+	+	+	+	+	+,-	+,-
			WUWN	TL121, WR076	TL121, WR076	TL121, WR076	TL121, WR076	TL121, WR076	TL121, WR076	TL121, WR076	TL121, WR076	XC094
PFAS	Unit											
PFBA	--	10,000	ng/L	NA	NA	NA	NA	NA	NA	<4.7 U	NA	NA
PFPeA	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
PFHxA	--	150,000	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.7 U	<1.8 U	<1.9 U	NA	NA
PFHpA	--	--	ng/L	<2.7 U	<2.6 U	<2.8 U	<2.7 U	<2.6 U	<2.6 U	<1.9 U	<9.3 U	<10 UJ
PFOA	20	--	ng/L	<5.3 U	<5.2 U	<5.6 U	<5.3 U	<5.2 U	<5.3 U	<1.9 U	<19 U	<20 UJ
PFNA	--	30	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.7 U	<1.8 U	<1.9 U	<19 U	<20 UJ
PFDA	--	300	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.7 U	<1.8 U	<1.9 U	NA	NA
PFUnA	--	3,000	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.7 U	<1.8 U	<1.9 U	NA	NA
PFDaA	--	500	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.7 U	<1.8 U	<1.9 U	NA	NA
PFTriA	--	--	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.7 U	<1.8 U	<1.9 U	NA	NA
PFTeA	--	10,000	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.7 U	<1.8 U	<1.9 U	NA	NA
PFHxDA	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
PFODA	--	400,000	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
PFBS	--	450,000	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.7 U	<1.8 U	<1.9 U	<84 U	<90 UJ
PFPeS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
PFHxS	--	40	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.7 U	<1.8 U	<1.9 U	<28 U	<30 UJ
PFHpS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
PFOS	20	--	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.7 U	<1.8 U	<1.9 U	<37 U	<40 UJ
PFNS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
PFDS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
PFDoS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
4:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
6:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<4.7 U	NA	NA
8:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	0.90 J	NA	NA
10:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
FOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	2.0	NA	NA
NMeFOSA	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
NEtFOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
NMeFOSAA	--	--	ng/L	<2.7 U	<2.6 U	<2.8 U	<2.7 U	<2.6 U	<2.6 U	<4.7 U	NA	NA
NEtFOSAA	--	20 <sup>(2)</sup>	ng/L	<1.8 U	<1.7 U	<1.9 U	<1.8 U	<1.7 U	<1.8 U	<4.7 U	NA	NA
NMeFOSE	--	--	ng/L	NA	NA	NA	NA	NA	NA	<3.8 U	NA	NA
NEtFOSE	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
HFPO-DA	--	300	ng/L	NA	NA	NA	NA	NA	NA	<3.8 U	NA	NA
DONA	--	3,000	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
9Cl-PF3ONS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA
11Cl-PF3OUdS	--	--	ng/L	NA	NA	NA	NA	NA	NA	<1.9 U	NA	NA

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**Table 4**  
**Potable Well PFAS Analytical Results - December 2017 to June 2022**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

	June 2019 WDHS (Not Adopted by WDNR Board) <sup>(1)</sup>	November 2020 WDHS (Not Yet Proposed for Rulemaking by WDNR) <sup>(2)</sup>	Location	WS-130 (continued)										
			Sample ID	WS-130 (091118)	WS-130 (112718)	DUP-199 (112718)	WS-130 (031319)	DUP-233 (031319)	WS-130 (051719)	DUP-266 (051719)	WS-130 (082719)	DUP-309 (082719)		
			Sample Date	9/11/2018	11/27/2018	11/27/2018	3/13/2019	3/13/2019	5/17/2019	5/17/2019	8/27/2019	8/27/2019		
			Sample Type	N	N	FD	N	FD	N	FD	N	FD		
			General Depth	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep		
			Well Depth	506	506	506	506	506	506	506	506	506		
			Source	+,-	+,-	+,-	+,-	+,-	+,-	+,-	+,-	+,-		
			WUWN	XC094	XC094	XC094	XC094	XC094	XC094	XC094	XC094	XC094		
PFAS			Unit											
PFBA	--	10,000	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PFPeA	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PFHxA	--	150,000	ng/L	<2.0 U	<1.8 U	<1.7 U	<1.9 U	<1.9 U	<2.0 U	<2.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
PFHpA	--	--	ng/L	<2.9 U	<1.8 U	<1.7 U	<2.8 U	<2.8 U	<3.0 U	<3.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
PFOA	20	--	ng/L	<5.9 U	<1.8 U	<1.7 U	<5.6 U	<5.7 U	<5.9 U	<6.3 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
PFNA	--	30	ng/L	<2.0 U	<1.8 U	<1.7 U	<1.9 U	<1.9 U	<2.0 U	<2.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
PFDA	--	300	ng/L	<2.0 U	<1.8 U	<1.7 U	<1.9 U	<1.9 U	<2.0 U	<2.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
PFUnA	--	3,000	ng/L	<2.0 U	<1.8 U	<1.7 U	<1.9 U	<1.9 U	<2.0 U	<2.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
PFDaA	--	500	ng/L	<2.0 U	<1.8 U	<1.7 U	<1.9 U	<1.9 U	<2.0 U	<2.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
PFTriA	--	--	ng/L	<2.0 U	<1.8 U	<1.7 U	<1.9 U	<1.9 U	<2.0 U	<2.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
PFTeA	--	10,000	ng/L	<2.0 U	<1.8 U	<1.7 U	<1.9 U	<1.9 U	<2.0 U	<2.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
PFHxDA	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PFODA	--	400,000	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PFBS	--	450,000	ng/L	<2.0 U	<1.8 U	<1.7 U	<1.9 U	<1.9 U	<2.0 U	<2.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
PFPeS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PFHxS	--	40	ng/L	<2.0 U	<1.8 U	<1.7 U	<1.9 U	<1.9 U	<2.0 U	<2.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
PFHpS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PFOS	20	--	ng/L	<2.0 U	<1.8 U	<1.7 U	<1.9 U	<1.9 U	<2.0 U	<2.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
PFNS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PFDS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PFDoS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
8:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10:2 FTS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NMeFOSA	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NEtFOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NMeFOSAA	--	--	ng/L	<2.9 U	<1.8 U	<1.7 U	<2.8 U	<2.8 U	<3.0 U	<3.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
NEtFOSAA	--	20 <sup>(2)</sup>	ng/L	<2.0 U	<1.8 U	<1.7 U	<1.9 U	0.55 J	<2.0 U	<2.1 U	<1.9 U	<1.8 U	<1.8 U	<1.8 U
NMeFOSE	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NEtFOSE	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFPO-DA	--	300	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DONA	--	3,000	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9Cl-PF3ONS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11Cl-PF3OUdS	--	--	ng/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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**Table 4**  
**Potable Well PFAS Analytical Results - December 2017 to June 2022**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

	June 2019 WDHS (Not Adopted by WDNR Board) <sup>(1)</sup>	November 2020 WDHS (Not Yet Proposed for Rulemaking by WDNR) <sup>(2)</sup>	Location	WS-130 (continued)					WS-156			
			Sample ID	WS-130 (110719)	WS-130 (030920)	DUP-368 (030920)	WS-130 (031021)	WS-130 (060722)	WS-156 (101018)	WS-156 (022619)	WS-156 (052219)	WS-156 (081419)
			Sample Date	11/7/2019	3/9/2020	3/9/2020	3/10/2021	6/7/2022	10/10/2018	2/26/2019	5/22/2019	8/14/2019
			Sample Type	N	N	FD	N	N	N	N	N	N
			General Depth	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
			Well Depth	506	506	506	506	506	550	550	550	550
			Source	+,-	+,-	+,-	+,-	+,-	+,-	+,-	+,-	+,-
			WUWN	XC094	XC094	XC094	XC094	XC094	MT2117	MT2117	MT2117	MT2117
PFAS			Unit									
PFBA	--	10,000	ng/L	NA	NA	NA	<4.7 U	<4.7 U	NA	NA	NA	NA
PFPeA	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
PFHxA	--	150,000	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<2.0 U	<1.9 U
PFHpA	--	--	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<1.9 U	<1.9 U	<2.8 U	<2.9 U	<3.0 U	<1.9 U
PFOA	20	--	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<1.9 U	<1.9 U	<5.6 U	<5.8 U	<6.0 U	<1.9 U
PFNA	--	30	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<2.0 U	<1.9 U
PFDA	--	300	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<2.0 U	<1.9 U
PFUnA	--	3,000	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<2.0 U	<1.9 U
PFDoA	--	500	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<2.0 U	<1.9 U
PFTriA	--	--	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<2.0 U	<1.9 U
PFTeA	--	10,000	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<2.0 U	<1.9 U
PFHxDA	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
PFODA	--	400,000	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
PFBS	--	450,000	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<2.0 U	<1.9 U
PFPeS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
PFHxS	--	40	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<2.0 U	<1.9 U
PFHpS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
PFOS	20	--	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<2.0 U	<1.9 U
PFNS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
PFDS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
PFDoS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
4:2 FTS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
6:2 FTS	--	--	ng/L	NA	NA	NA	<4.7 U	<4.7 U	NA	NA	NA	NA
8:2 FTS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
10:2 FTS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
FOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	1.1 J	1.7 J	NA	NA	NA	NA
NMeFOSA	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
NEtFOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
NMeFOSAA	--	--	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<4.7 U	<4.7 U	<2.8 U	<2.9 U	<3.0 U	<1.9 U
NEtFOSAA	--	20 <sup>(2)</sup>	ng/L	<2.0 UJ-	<1.9 U	<2.0 U	<4.7 U	<4.7 U	<1.9 U	<1.9 U	<2.0 U	<1.9 U
NMeFOSE	--	--	ng/L	NA	NA	NA	<3.8 U	<3.7 U	NA	NA	NA	NA
NEtFOSE	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
HFPO-DA	--	300	ng/L	NA	NA	NA	<3.8 U	<3.7 U	NA	NA	NA	NA
DONA	--	3,000	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
9Cl-PF3ONS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA
11Cl-PF3OUdS	--	--	ng/L	NA	NA	NA	<1.9 U	<1.9 U	NA	NA	NA	NA

Notes on Page 12.

**Table 4**  
**Potable Well PFAS Analytical Results - December 2017 to June 2022**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

	June 2019 WDHS (Not Adopted by WDNR Board) <sup>(1)</sup>	November 2020 WDHS (Not Yet Proposed for Rulemaking by WDNR) <sup>(2)</sup>	Location	WS-156 (continued)			
			Sample ID	WS-156 (102919)	DUP-337 (102919)	WS-156 (022420)	WS-156 (031621)
			Sample Date	10/29/2019	10/29/2019	2/24/2020	3/16/2021
			Sample Type	N	FD	N	N
			General Depth	Deep	Deep	Deep	Deep
			Well Depth	550	550	550	550
			Source	+,-	+,-	+,-	+,-
			WUWN	MT2117	MT2117	MT2117	MT2117
PFAS			Unit				
PFBA	--	10,000	ng/L	NA	NA	NA	<4.5 U
PFPeA	--	--	ng/L	NA	NA	NA	<1.8 U
PFHxA	--	150,000	ng/L	<1.9 U	<2.0 U	<1.8 U	<1.8 U
PFHpA	--	--	ng/L	<1.9 U	<2.0 U	<1.8 U	<1.8 U
PFOA	20	--	ng/L	<1.9 U	<2.0 U	<1.8 U	<1.8 U
PFNA	--	30	ng/L	<1.9 U	<2.0 U	<1.8 U	<1.8 U
PFDA	--	300	ng/L	<1.9 U	<2.0 U	<1.8 U	<1.8 U
PFUnA	--	3,000	ng/L	<1.9 U	<2.0 U	<1.8 U	<1.8 U
PFDoA	--	500	ng/L	<1.9 U	<2.0 U	<1.8 U	<1.8 U
PFTriA	--	--	ng/L	<1.9 U	<2.0 U	<1.8 U	<1.8 U
PFTeA	--	10,000	ng/L	<1.9 U	<2.0 U	<1.8 U	<1.8 U
PFHxDA	--	--	ng/L	NA	NA	NA	<1.8 U
PFODA	--	400,000	ng/L	NA	NA	NA	<1.8 U
PFBS	--	450,000	ng/L	<1.9 U	<2.0 U	<1.8 U	<1.8 U
PFPeS	--	--	ng/L	NA	NA	NA	<1.8 U
PFHxS	--	40	ng/L	<1.9 U	<2.0 U	<1.8 U	<1.8 U
PFHpS	--	--	ng/L	NA	NA	NA	<1.8 U
PFOS	20	--	ng/L	<1.9 U	<2.0 U	<1.8 U	<1.8 U
PFNS	--	--	ng/L	NA	NA	NA	<1.8 U
PFDS	--	--	ng/L	NA	NA	NA	<1.8 U
PFDoS	--	--	ng/L	NA	NA	NA	<1.8 U
4:2 FTS	--	--	ng/L	NA	NA	NA	<1.8 U
6:2 FTS	--	--	ng/L	NA	NA	NA	<4.5 U
8:2 FTS	--	--	ng/L	NA	NA	NA	<1.8 U
10:2 FTS	--	--	ng/L	NA	NA	NA	<1.8 U
FOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	<1.8 U
NMeFOSA	--	--	ng/L	NA	NA	NA	<1.8 U
NEtFOSA	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	<1.8 U
NMeFOSAA	--	--	ng/L	<1.9 U	<2.0 U	<1.8 U	<4.5 U
NEtFOSAA	--	20 <sup>(2)</sup>	ng/L	<1.9 U	<2.0 U	<1.8 U	<4.5 U
NMeFOSE	--	--	ng/L	NA	NA	NA	<3.6 U
NEtFOSE	--	20 <sup>(2)</sup>	ng/L	NA	NA	NA	<1.8 U
HFPO-DA	--	300	ng/L	NA	NA	NA	<3.6 U
DONA	--	3,000	ng/L	NA	NA	NA	<1.8 U
9Cl-PF3ONS	--	--	ng/L	NA	NA	NA	<1.8 U
11Cl-PF3OUdS	--	--	ng/L	NA	NA	NA	<1.8 U

Notes on Page 12.

**Table 4**  
**Potable Well PFAS Analytical Results - December 2017 to June 2022**  
**Deep Aquifer Bedrock Well Design and Long Term Monitoring Work Plan**  
**Tyco Fire Products LP**  
**Marinette, Wisconsin**

**Notes:**

< = Compound not detected at method detection limit

<sup>(1)</sup> = In June 2019 the Wisconsin Department of Health Services (DHS) recommended individual groundwater standards of 20 ng/L for PFOA and PFOS. The WDNR proposed those standards through the state rulemaking process. In February 2022, the Wisconsin Natural Resources Board did not approve the proposed rulemaking for groundwater. In August 2022, WDNR promulgated a drinking water standard of 70 ng/L for PFOA and PFOS, individually and combined, for public water systems. This standard does not apply to private drinking water wells.

<sup>(2)</sup> = In November 2020 the Wisconsin DHS recommended a combined groundwater standard of 20 ng/L for: FOSA, NEtFOSE, NEtFOSA, NEtFOSAA, PFOS and PFOA. DHS also recommended individual standards for FOSA, NEtFOSE, NEtFOSA, NEtFOSAA, PFBS, PFHxS, PFNA, PFDA, PFDoA, PFHxA, PFTeA, PFUnA, PFBA, PFODA, DONA, and GenX. In March 2021, The Wisconsin Natural Resources Board approved a Statement of Scope to initiate a rulemaking for this recommendation. The WDNR has not yet proposed rules to initiate the rulemaking process to implement this recommendation; the agency's authority to do so under the Statement of Scope will expire in September 2023.

- = Information gathered from sampling log according to homeowners

+ = Information gathered from well construction form

+, - = Information gathered from well construction form, but information also available from sampling log

Well depth in feet

-- = No standard

NA = Not analyzed

N = Normal sample

FD = Field Duplicate

ng/L = nanograms per liter

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

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

U = The analyte was analyzed for but the result was not detected above the method detection limit

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

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

UJ- = The compound was not detected above the reported sample method detection limit. However, the reported limit is expected to be biased low and may or may not represent the actual method detection limit.

USEPA = United States Environmental Protection Agency

WDNR = Wisconsin Department of Natural Resources

WUWN = Wisconsin Unique Well Number

**Chemical Abbreviations:**

PFOA = Perfluorooctanoic acid (C8)

PFOS = Perfluorooctanesulfonic acid (C8)

PFBS = Perfluorobutanesulfonic acid (C4)

PFHpA = Perfluoroheptanoic acid (C7)

PFHxS = Perfluorohexanesulfonic acid (C6)

PFNA = Perfluorononanoic acid (C9)

PFDA = Perfluorodecanoic acid (C10)

PFDoA = Perfluorododecanoic acid (C12)

PFHxA = Perfluorohexanoic acid (C6)

PFTeA = Perfluorotetradecanoic acid (C14)

PFTriA = Perfluorotridecanoic acid (C13)

PFUnA = Perfluoroundecanoic acid (C11)

NEtFOSAA = N-ethylperfluorooctanesulfonamidoacetic acid (C12)

NMeFOSAA = N-methylperfluorooctanesulfonamidoacetic acid (C11)

PFBA = Perfluorobutanoic acid (C4)

PFPeA = Perfluoropentanoic acid (C5)

PFHxDA = Perfluoro-n-hexadecanoic acid (C16)

PFODA = Perfluoro-n-octadecanoic acid (C18)

PFPeS = Perfluoropentanesulfonic acid (C5)

PFHpS = Perfluoroheptanesulfonic acid (C7)

PFNS = Perfluorononanesulfonic acid (C9)

PFDS = Perfluorodecanesulfonic acid (C10)

PFDoS = Perfluorododecanesulfonic acid (C12)

FOSA = Perfluorooctanesulfonamide (C8)

NEtFOSA = N-ethylperfluorooctanesulfonamide (C10)

NMeFOSA = N-methylperfluorooctanesulfonamide (C9)

NMeFOSE = N-methylperfluorooctanesulfonamidoethanol (C11)

NEtFOSE = N-ethylperfluorooctanesulfonamidoethanol (C12)

4:2 FTS = 4:2 fluorotelomer sulfonate (C6)

6:2 FTS = 6:2 fluorotelomer sulfonate (C8)

8:2 FTS = 8:2 fluorotelomer sulfonate (C10)

10:2 FTS = 10:2 fluorotelomer sulfonate (C12)

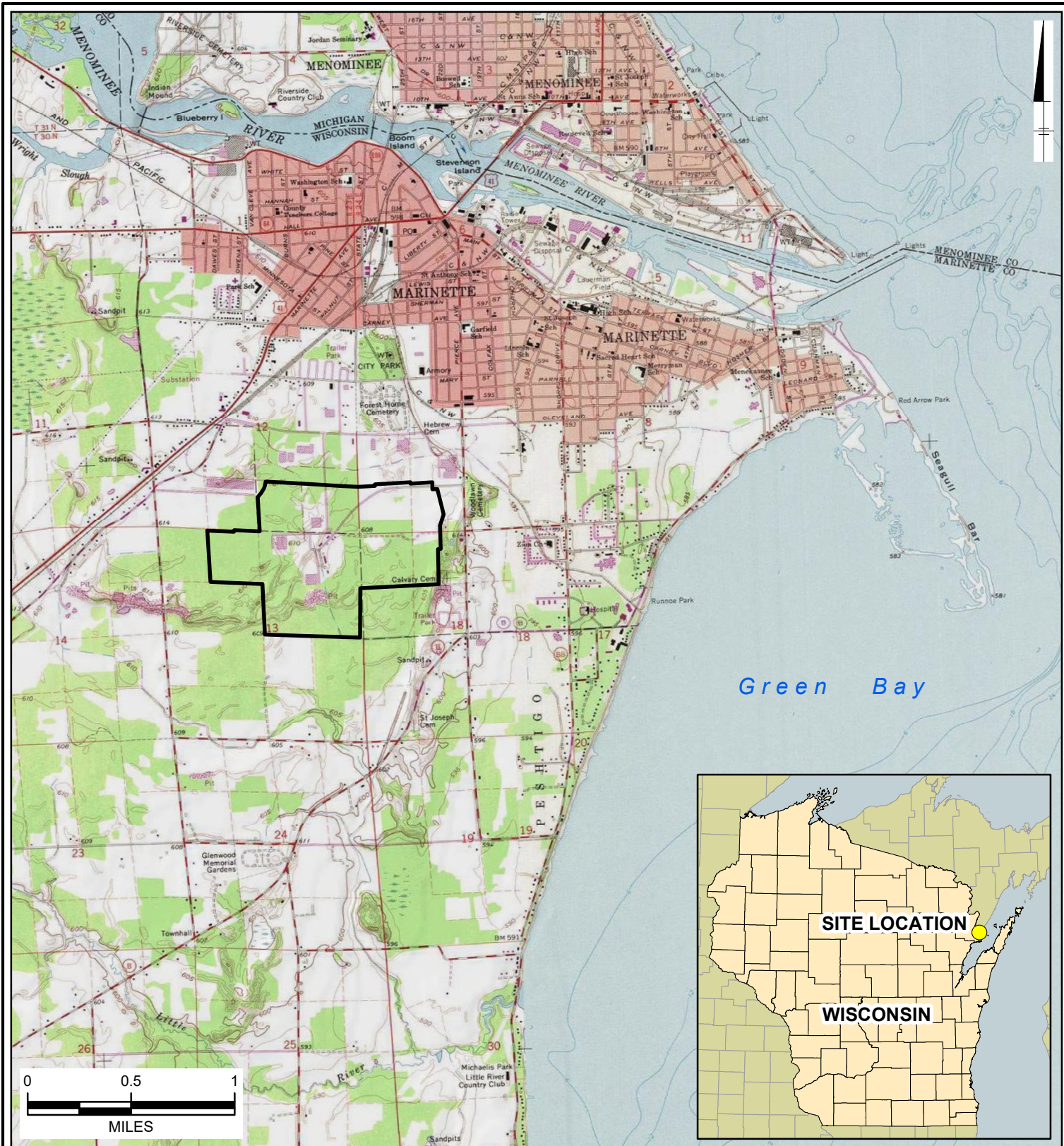
ADONA = 4,8-Dioxa-3H-perfluorononanoic acid (C7)

HFPO-DA (GenX) = Hexafluoropropylene oxide dimer acid (C6)

F-53B Major = 9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (C8)

F-53B Minor = 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (C10)

# Figures



**LEGEND:**

 APPROXIMATE SITE PROPERTY BOUNDARY

**NOTES:**

1. TOPOGRAPHIC MAP SOURCE: COPYRIGHT:© 2013 NATIONAL GEOGRAPHIC SOCIETY, I-CUBED, ACCESSED SEPTEMBER 2022.

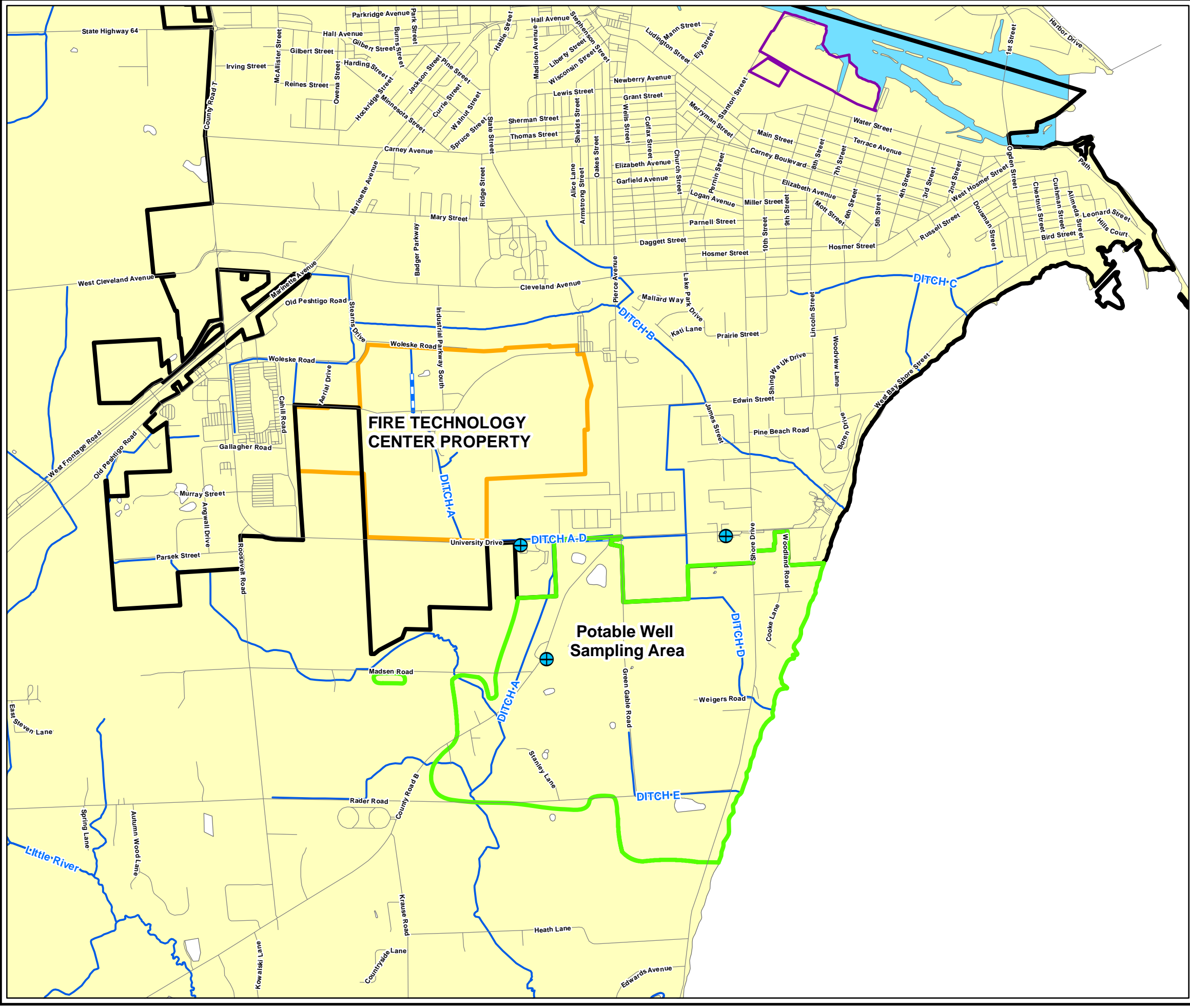
TYCO FIRE PRODUCTS LP  
MARINETTE, WISCONSIN

**SITE LOCATION**



**FIGURE  
1**

T:\\_ENV\TYCO\MXD\FTCPotable\_Well\Figure2\_Proposed\_Sentinel\_Well\_Locs.mxd 9/13/2022 1:24:06 PM



- LEGEND:**
- PROPOSED SENTINEL WELL LOCATION
  - POTABLE WELL SAMPLING AREA
  - STANTON STREET FACILITY BOUNDARY
  - APPROXIMATE SITE PROPERTY BOUNDARY
  - APPROXIMATE MARINETTE CITY BOUNDARY
  - WATERBODY
  - DITCH OR STREAM
  - ROAD

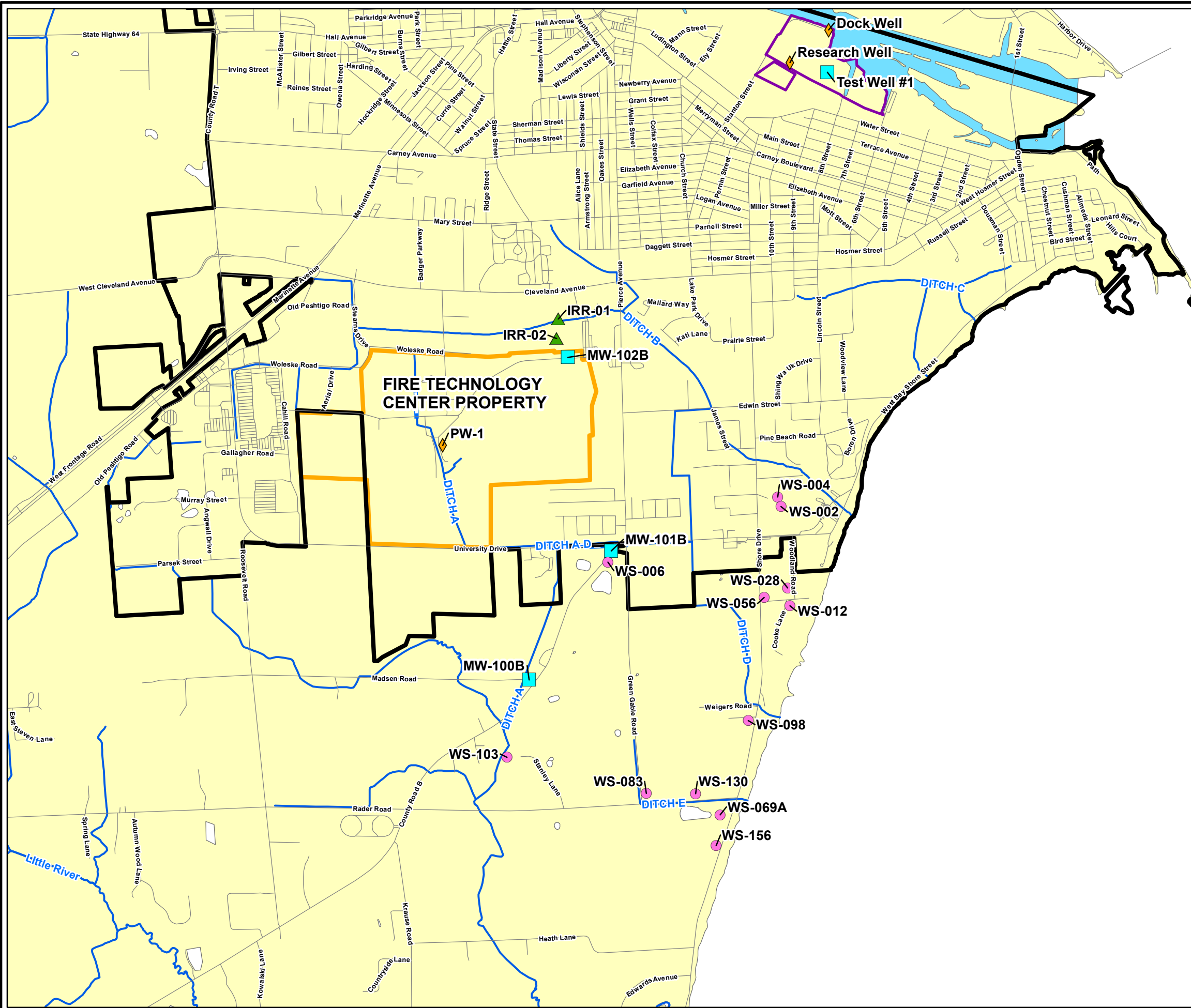
TYCO FIRE PRODUCTS LP  
MARINETTE, WISCONSIN

**PROPOSED SENTINEL WELL LOCATIONS**

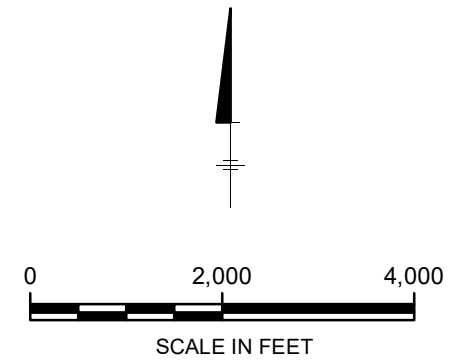
**ARCADIS** | **FIGURE 2**



TYCO\FIRE\TYCO\FTC\RemedialActionDesign\Report\Fig\_2\_Bedrock\_Logging\_Locations.mxd 9/1/2022 5:56:38 PM



- LEGEND:**
- FORMER BEDROCK BOREHOLE
  - ◆ FORMER BEDROCK PRODUCTION WELL
  - ▲ IRRIGATION WELL
  - RESIDENTIAL WELL
  - STANTON STREET FACILITY BOUNDARY
  - APPROXIMATE SITE PROPERTY BOUNDARY
  - APPROXIMATE MARINETTE CITY BOUNDARY
  - WATERBODY
  - DITCH OR STREAM
  - ROAD

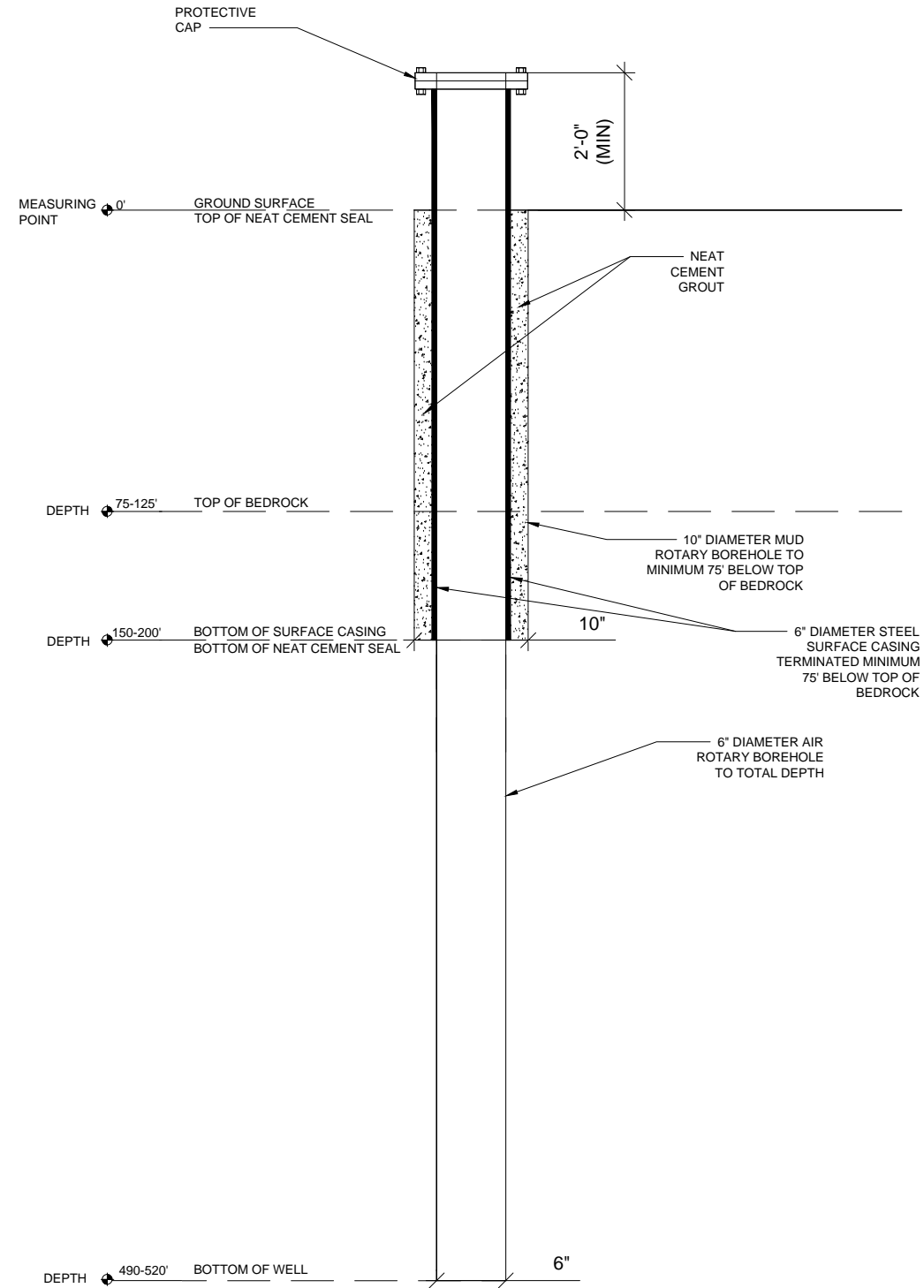


TYCO FIRE PRODUCTS LP  
MARINETTE, WISCONSIN

**EXISTING AND FORMER BEDROCK  
EXPLORATORY WELLS AND SAMPLING  
LOCATIONS**

**ARCADIS** | **FIGURE 3**

CITY: SYR-NY DIV/GROUP: IMDV DB: S.HILL, K.SARTORI PIC: B.STONE PM: J.BERRIGAN TM: B.ZELER LYN-ON--OFF--REF-  
 \arcadis-us.com\office\data\Milwaukee-WI\Aproject\1\yo\W001605\cadd\Deep Well Investigation\M-Mechanical\Mairmette Private Well.dwg LAYOUT: M-16-01  
 ACADVER: 23.05 (LMS TECH) PAGES: 1-1 PLOT: 8/30/2022 1:41 PM  
 PLOTTED: 8/30/2022 1:44 PM BY: DOYLE, BRIGID



**A** SENTINEL BEDROCK WELL DETAIL  
 NTS

No.	Date	Revisions	By	Ckd

Professional Engineer's Name		
Professional Engineer's No.		
State	Date Signed	Project Mgr.
Designed by	Drawn by	Checked by

--	--	--



TYCO FIRE PRODUCTS LP MARINETTE, WI 54143-2542

**SENTINEL BEDROCK WELL DETAIL**

ARCADIS Project No.  
 30135605.00006

Date  
 AUGUST 2022

ARCADIS NA  
 126 NORTH JEFFERSON STREET  
 SUITE 400  
 MILWAUKEE, WISCONSIN 53202  
 TEL. 414.276.7742

**FIGURE 4**

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Arcadis U.S., Inc.  
126 North Jefferson Street, Suite 400  
Milwaukee  
Wisconsin 53202  
Phone: 414 276 7742  
Fax: 414 276 7603  
[www.arcadis.com](http://www.arcadis.com)