

# Permit Fact Sheet

## General Information

Permit Number:	WI-0026182-10-0	
Permittee Name:	City of Marinette	
Address:	501 Water St.	
City/State/Zip:	Marinette WI 54143	
Discharge Location:	Menominee River South Bank, 1/8 mile downstream of Interstate bridge Hwy 41. Point of Discharge: Latitude 45° 06' 2.5" N, Longitude 87° 37' 24.8" W (GPS observation 1995)	
Receiving Water:	Menominee River	
StreamFlow (Q <sub>7,10</sub> ):	1240 cfs	
Stream Classification:	Warmwater sport fish community, non-public water supply	
Design Flow	Annual Average	5.1 MGD
Significant Industrial Loading?	Yes. The facility design flow is >5 MGD, therefore it's classified as a pretreatment-EPA Delegated Facility. The facility permits, monitors, and inspects approximately seven categorical dischargers.	
Operator at Proper Grade?	Yes, the facility is rated as an Advanced level facility in subclasses A1, Suspended Growth Processes; B, Solids Separation; C, Biological Solids/Sludge Processing; D, Disinfection; P, Phosphorus Removal; and L, Laboratory.  The Operator-In-Charge, Warren Howard, has Advanced level certification in all the above subclasses.	
Approved Pretreatment Program?	October 13, 1992.	

## Facility Description

The Wastewater Treatment Facility includes preliminary treatment with screening and girt removal, primary clarification, biological treatment with activated sludge aeration basins and final clarification, and disinfection with Ultraviolet Radiation. Phosphorus removal is accomplished by chemical precipitation using Ferric Chloride added to the primary clarified inlet. Treated effluent is discharged to the Menominee River via Outfall 001, located approximately two miles upstream from its mouth at Green Bay.

Marinette WWTP has gone through the addition of a PW Tech Volute Screw Press followed by a Shincci dehumidification system as a solids treatment train while leaving the conventional digester and liquid storage in place for emergency operation. Sludge is currently being landfilled.

# Substantial Compliance Determination

## Enforcement During Last Permit:

After a compliance inspection on July 12, 2023, the treatment plant was found in compliance with the effluent limits and all terms and conditions of the permit. The following recommendations or follow-up actions are needed:

1. Update the department on chemical storage updates to provide secondary containment in the solids building.
2. Submit a plan for ensuring that eDMRs are submitted on time (by the 21st of the month following the reporting period).
3. CMOM should be updated per the attached checklist and should be resubmitted to the Department for review by 12/31/24.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)
701		Influent: 24-hr flow proportional composite samples shall be collected at the influent bar screen.
001	Average flow from 10/01/2017 – 12/31/2022 was 2.48 MGD.	Effluent: Representative effluent samples shall be collected from the discharge channel of the ultraviolet disinfection unit. Sample point has a 24-hour flow proportional sampler.
003		Liquid Sludge: Representative samples of the stored anaerobically digested sludge are collected from a sample tap on the sludge loadout pump.
111		Field Blank - Effluent: Sample point for reporting the analysis of field blanks collected using standard sample handling procedures for grab type effluent samples for Total Recoverable Mercury at sample point/outfall 001.

## 1 Influent – Monitoring Requirements

### Sample Point Number: 701- Influent

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	5/Week	24-Hr Flow Prop Comp	
Suspended Solids,		mg/L	5/Week	24-Hr Flow	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Total				Prop Comp	
Cadmium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Chromium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Copper, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Lead, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Nickel, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Zinc, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Mercury, Total Recoverable		ng/L	Monthly	Grab	

### Changes from Previous Permit:

No changes.

### Explanation of Limits and Monitoring Requirements

**Pretreatment Program:** The Marinette WWTF discharges more than 5 MGD and is currently required to administer a pretreatment program. Monthly monitoring is required for cadmium, chromium, copper, lead, nickel, and zinc.

**Mercury Monitoring:** As a condition of reissuing this permit with an alternative mercury effluent limitation, influent monitoring for mercury monitoring is required, per ch. NR 106.145(6), Wis. Adm. Code.

## 2 Inplant - Monitoring and Limitations

### Sample Point Number: 111- Field Blank - Effluent

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Mercury, Total Recoverable		ng/L	Monthly	Blank	

## Changes from Previous Permit:

No changes.

## Explanation of Limits and Monitoring Requirements

**Mercury Monitoring:** Field blanks accompany required influent and effluent mercury monitoring per. ss. NR 1-6.145(9) and (10), Wis. Adm. Codes.

## 3 Surface Water - Monitoring and Limitations

### Sample Point Number: 001- Effluent

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	45 mg/L	5/Week	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	30 mg/L	5/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	5/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	5/Week	24-Hr Flow Prop Comp	
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
Phosphorus, Total	Monthly Avg	1.0 mg/L	5/Week	24-Hr Flow Prop Comp	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Occurs year round.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Occurs year round. See the E. coli Percent Limit section. Enter the result in the DMR on the last day of the month.
Mercury, Total Recoverable	Monthly Avg	3.6 ng/L	Monthly	Grab	See Mercury Section 5.1 for pollutant minimization program implementation requirements.
Nitrogen, Ammonia (NH3-N) Total		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring January through December 2028 only.

<b>Monitoring Requirements and Limitations</b>					
<b>Parameter</b>	<b>Limit Type</b>	<b>Limit and Units</b>	<b>Sample Frequency</b>	<b>Sample Type</b>	<b>Notes</b>
Nitrogen, Total Kjeldahl		mg/L	Quarterly	24-Hr Flow Prop Comp	See Nitrogen Series Monitoring section.
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hr Flow Prop Comp	See Nitrogen Series Monitoring section.
Nitrogen, Total		mg/L	Quarterly	24-Hr Flow Prop Comp	See Nitrogen Series Monitoring section. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
PFOS		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
PFOA		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
Cadmium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Chromium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Copper, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Lead, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Nickel, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Zinc, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See Whole Effluent Toxicity (WET) section for testing requirements and the WET testing schedule.

### **Changes from Previous Permit**

- Addition of E. Coli limits and monitoring, removal of weekly fecal coliform testing.

- Addition of PFOS and PFOA monitoring.
- Addition of Nitrogen Monitoring series.

## **Explanation of Limits and Monitoring Requirements**

### **Categorical Limits**

Categorical limits are required per ch. NR 210, Wis. Adm. Code.

### **BOD5, TSS and pH**

The effluent limitations for BOD5, TSS and pH are carried over into this permit. These limitations are not subject to change at this time because the receiving water characteristics have not changed.

### **E. Coli/Fecal Coliform & Disinfection**

On May 1, 2020, revisions to chs. NR 102 and NR 210, Wis. Adm. Code, became effective and replace fecal coliform limits with new *Escherichia coli* (*E. coli*) limits for protection of recreation uses. Since the facility is required to disinfect the following limits are included in the proposed permit in accordance with s. NR 210.06(2)(a)1, Wis. Adm. Code. The existing fecal coliform limit of 400 #/100 ml as a monthly geometric mean is replaced with *E. coli* limit of 126 #/100 ml as a monthly geometric mean and no more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 #/100 ml. Year round disinfection for *E. coli* is required for to protect recreational uses in waters having full fish and aquatic life use designation, like the Menominee River.

### **Phosphorus**

Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters. Subchapter II of that code limits municipal dischargers of more than 150 pounds of phosphorus per month to an effluent limit of 1.0 mg/L total phosphorus – unless an alternative limit is approved. The Department’s March 6, 2023, evaluation determined that the City of Marinette WWTF currently can meet this limit.

### **Water Quality-Based Limits**

The permit application required monitoring for phosphorus and metals. These and other available data were evaluated by Department staff and recommendations for water quality-based effluent limitations (WQBELs) and Whole Effluent Toxicity testing are presented in the March 6, 2023, memo, “Water Quality-Based Effluent Limitations for Marinette Wastewater Treatment Facility WPDES Permit No. WI-0026182-10.”

### **Ammonia**

Acute and chronic ammonia toxicity criteria for the protection of aquatic life are included in Tables 2C and 4B of ch. NR 105, Wis. Adm. Code. Subchapter III of ch. NR 106 establishes the procedure for calculating WQBELs for ammonia. Effluent limits are necessary in accordance with the reasonable potential analysis. The daily maximum ammonia effluent limit is applied as a variable limit that is a function of effluent pH. See the permit for the variable limit table.

### **PFOS and PFOA**

NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for municipal dischargers with an average flow rate less than 1 MGD, to be evaluated on a case-by-case basis to determine if monitoring is required pursuant to s. NR 106.98(2)(c), Wis. Adm. Code. The department evaluated the need for PFOS and PFOA monitoring taking into consideration the presence of potential PFOS or PFOA industrial wastes, remediation sites and other potential sources of PFOS or PFOA. Based on information available at the time the proposed permit was drafted, it was identified that Marinette's source water has known levels of PFOS/PFOA. Therefore, monitoring once every two months is included. The initial determination of the need for sampling shall be conducted for up to two years in order to determine if the permitted discharge has the reasonable potential to cause or contribute to an exceedance of the PFOS or PFOA standards under s. NR 102.04(8)(d)1, Wis. Adm. Code. See the Schedules section for the PFOS/PFOA Minimization Plan Determination of Need schedule.

### **Total Nitrogen Monitoring (NO<sub>2</sub>+NO<sub>3</sub>, TKN and Total N)**

The Department has included effluent monitoring for Total Nitrogen in the permit through the authority under §§ 283.55(1)(e), Wis. Stats., which allows the department to require the permittee to submit information necessary to identify the type and quantity of any pollutants discharged from the point source, and through s. NR 200.065(1)(h), Wis. Adm. Code, which allows for this monitoring to be collected during the permit term. More information on the justification to include total nitrogen monitoring in wastewater permits can be found in the “Guidance for Total Nitrogen Monitoring in Wastewater Permits” dated October 1, 2019.

### **Mercury**

Effluent limitations for mercury are necessary based on the reasonable potential analysis present in the WQBEL memo “Water Quality-Based Effluent Limitations for Marinette Wastewater Treatment Facility WPDES Permit No. WI-0026182-10”. The calculated WQBEL is 3.6 ng/L, expressed as a monthly average.

### **Whole Effluent Toxicity Testing**

Whole effluent toxicity (WET) testing requirements and limits are determined in accordance with ss. NR 106.08 and NR 106.09, Wis. Adm. Code, as revised August 2016. (See the current version of the Whole Effluent Toxicity Program Guidance Document and checklist and WET information, guidance and test methods at <http://dnr.wisconsin.gov/topic/wastewater/wet.html>).

After consideration of the guidance provided in the Department's WET Program Guidance Document (2019) and other information described above, 1x yearly acute tests are required in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).

The department has determined that due to the available acute WET testing data and requirements specified in s. NR 106.08, Wis. Adm. Code, an acute WET limit is required to be continued in the permit and shall be 1.0 TUc expressed as a daily maximum limit.

### **Pretreatment Program**

The Marinette WWTF discharges more than 5 MGD and is currently required to administer a pretreatment program. Monthly monitoring is required for cadmium, chromium, copper, lead, nickel, and zinc.

**Monitoring Frequency Evaluation** - Monitoring frequencies for parameters that have final effluent limits in effect during this permit term were evaluated taking into consideration the size and type of the facility, and whether the monitoring occurs frequently enough to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Monitoring frequency decisions are based on requirements in s. NR 205.066(1), Wis. Adm. Code, (decisions are case-by-case) and considering the factors in s. NR 210.04 (a) through (e), Wis. Adm. Code, along with recommendations provided in the Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021).

The department has determined at this time that an increase in monitoring frequency for pH Field to Daily is appropriate to be consistent with facilities of similar size and effluent quality across the state. If the permittee believes the facility should be eligible to return to the previously permitted monitoring frequency based on performance during the permitted term, they may request a reduction with their next permit application. No additional changes to sampling frequency were warranted.

## 4 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
003	B	Liquid	Fecal coliform	Incorporation or Injection	Land application-contract hauling	280
Does sludge management demonstrate compliance? <b>Yes</b>						
Is additional sludge storage required? <b>No</b>						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? <b>Yes</b>						
If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility						
Is a priority pollutant scan required? <b>Yes</b>						
Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

### Sample Point Number: 003- Liquid Sludge

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	



<b>Monitoring Requirements and Limitations</b>					
<b>Parameter</b>	<b>Limit Type</b>	<b>Limit and Units</b>	<b>Sample Frequency</b>	<b>Sample Type</b>	<b>Notes</b>
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	
Nitrogen, Ammonium (NH4-N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Monitoring in 2025.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Monitoring in 2025.
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOS and PFAS. See PFAS Permit Sections for more information.

### **Changes from Previous Permit:**

PFAS – Annual monitoring is included in the permit pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.

### **Explanation of Limits and Monitoring Requirements**

Requirements for municipal sludge are determined in accordance with ch. NR 204 Wis. Adm. Code. Ceiling and high quality limits for metals in sludge are specified in ch. NR 204.07(5) Wis. Adm. Code. Requirements for pathogens are specified in ch. NR 204.07(6) and in ch. NR 204.07 (7) Wis. Adm. Code for vector attraction requirements. Limitations for PCBs are addressed in ch. NR 204.07(3)(k) Wis. Adm. Code.

**PFAS:** The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA is currently developing a risk assessment to determine future land application rates and expects to release this risk

assessment by the end of 2024. In the interim, the department has developed the “Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS.”

Collecting sludge data on PFAS concentrations from a wide range of wastewater treatment facilities will help protect public health from exposure to elevated levels of PFAS and determine the department’s implementation of EPA’s recommendations. To quantitate this risk, PFAS sampling has been included in the proposed WPDES permit pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9., Wis. Adm. Code.

## 5 Schedules

### 5.1 Mercury Pollutant Minimization Program

As a condition of the variance to the water quality based effluent limitation(s) for mercury granted in accordance with s. NR 106.145(6), Wis. Adm. Code, the permittee shall perform the following actions.

Required Action	Due Date
<p>Annual Mercury Progress Reports: Submit an annual mercury progress report related to the pollutant minimization activities for the previous year. The annual mercury progress report shall:</p> <p>Indicate which mercury pollutant minimization activities or activities outlined in the Pollutant Minimization Program Plan have been implemented and state which, if any, activities from the Pollutant Minimization Program Plan were not pursued and why;</p> <p>Include an assessment of whether each implemented pollutant minimization activity appears to be effective or ineffective at reducing pollutant discharge concentrations and identify actions planned for the upcoming year;</p> <p>Identification of barriers that have limited program effectiveness and adjustments to the program that will be implemented during the next year to help address these barriers;</p> <p>Include an analysis of trends in total effluent mercury concentrations based on mercury sampling; and</p> <p>Include an analysis of how influent and effluent mercury varies with time and with significant loading of mercury.</p> <p>The first annual mercury progress report is to be submitted by the Due Date.</p>	03/31/2025
<p>Annual Mercury Progress Report #2: Submit a mercury progress report, related to the pollutant minimization activities for the previous year, as defined above.</p>	03/31/2026
<p>Annual Mercury Progress Report #3: Submit a mercury progress report, related to the pollutant minimization activities for the previous year, as defined above.</p>	03/31/2027
<p>Annual Mercury Progress Report #4: Submit a mercury progress report, related to the pollutant minimization activities for the previous year, as defined above.</p>	03/31/2028

### 5.2 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
<p>Land Application Management Plan Submittal: Submit a management plan to optimize the land application system performance and demonstrate compliance with ch. NR 204, Wis. Adm. Code, by the Due Date. This management plan shall 1) specify information on pretreatment processes (if any); 2) identify land application sites; 3) describe site limitations; 4) address vegetative cover management</p>	04/01/2025

and removal; 5) specify availability of storage; 6) describe the type of transporting and spreading vehicle(s); 7) specify monitoring procedures; 8) track site loading; 9) address contingency plans for adverse weather and odor/nuisance abatement; and 10) include any other pertinent information. Once approved, all landspreading activities shall be conducted in accordance with the plan. Any changes to the plan must be approved by the Department prior to implementing the changes.	
---	--

### 5.3 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
<p>Report on Effluent Discharge: Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code.</p> <p>This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.</p>	03/31/2025
<p>Report on Effluent Discharge and Evaluation of Need: Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan.</p> <p>This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.</p> <p>The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan.</p> <p>If the Department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for Department approval no later than 90 days after written notification was sent from the Department. The Department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued.</p> <p>If, however, the Department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.</p>	03/31/2026

### Explanation of Schedules

As stated above, NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. S. NR 106.98, Wis. Adm. Code, specifies steps to generate data in order to determine the need for reducing PFOS and PFOA in the discharge. Data generated per the effluent monitoring requirements will be used to determine the need for developing a PFOS/PFOA minimization plan. As part of the schedule, the permittee is required to submit two annual Reports on Effluent Discharge.

If the Department determines that a minimization plan is needed, the permit will be modified or revoked/reissued to include additional requirements.

**Attachments:**

Water Quality-Based Effluent Limitations for Marinette Wastewater Treatment Facility (WPDES Permit No. WI-0026182-10), from Nicole Krueger to Sarah Adkins on March 6, 2023.

**Proposed Expiration Date:**

March 31, 2029

**Justification Of Any Waivers From Permit Application Requirements:**

No waivers from permit application requirements granted.

**Prepared By:** Sarah Adkins. Wastewater Specialist

**Date:** February 8, 2024

# CORRESPONDENCE/MEMORANDUM

DATE: 03/06/2023

TO: Sarah Adkins – NER

FROM: Nicole Krueger – SER *Nicole Krueger*

SUBJECT: Water Quality-Based Effluent Limitations for Marinette Wastewater Treatment Facility  
WPDES Permit No. WI-0026182-10

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from Marinette in Marinette County. This municipal wastewater treatment facility (WWTF) discharges to the Menominee River, located in the Menominee River Watershed in the Lake Michigan Basin. The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations are made on a chemical-specific basis at Outfall 001:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1,2
BOD <sub>5</sub>			45 mg/L	30 mg/L	1
TSS			45 mg/L	30 mg/L	1
pH	9.0 s.u.	6.0 s.u.			1
Phosphorus				1.0 mg/L	1
Bacteria					3
Fecal Coliform				400 #/100 mL geometric mean	
<i>E. coli</i>				126 #/100 mL geometric mean	
Mercury				1.3 ng/L	4
PFOS and PFOA					5
Ammonia Nitrogen					1,2
TKN, Nitrate+Nitrite, and Total Nitrogen					6
WET					7,8

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. Bacteria limits apply year-round. The *E. Coli* limits may apply year-round at the end of the compliance schedule or *E. Coli* limits may apply May – September and the fecal coliform limits may apply November – March. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
4. A compliance schedule to meet the mercury WQBEL of 1.3 ng/L is recommended. The permit may be modified to remove the limit if reasonable potential is not shown.
5. Monitoring 1x/2 months is required in accordance with s. NR 106.98(2), Wis. Adm. Code.
6. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, quarterly total nitrogen monitoring is recommended for all municipal

major permittees. Total Nitrogen is the sum of nitrate (NO<sub>3</sub>), nitrite (NO<sub>2</sub>), and total kjeldahl nitrogen (TKN) (all expressed as N).

7. 1x yearly acute WET tests are recommended.
8. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).

**Continued monitoring for total recoverable cadmium, chromium, copper, lead, nickel, and zinc is also required because Marinette operates a local pretreatment program for the many industries that discharge to the treatment facility.**

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Nicole Krueger at [Nicole.Krueger@wisconsin.gov](mailto:Nicole.Krueger@wisconsin.gov) or Diane Figiel at [Diane.Figiel@wisconsin.gov](mailto:Diane.Figiel@wisconsin.gov).

Attachments (2) – Narrative & Map

PREPARED BY: Nicole Krueger, Water Resources Engineer – SER

E-cc: Laura Gerold, Wastewater Engineer – NER  
Heidi Schmitt Marquez, Regional Wastewater Supervisor – NER  
Diane Figiel, Water Resources Engineer – WY/3  
Laura Dietrich, Wastewater Specialist – WY/Waukesha

Attachment #1  
**Water Quality-Based Effluent Limitations for  
 Marinette Wastewater Treatment Facility**

**WPDES Permit No. WI-0026182-10**

Prepared by: Nicole Krueger

**PART 1 – BACKGROUND INFORMATION**

**Facility Description**

The Marinette Wastewater Treatment Facility includes preliminary treatment with screening and girt removal, primary clarification, biological treatment with activated sludge aeration basins and final clarification, and disinfection with Ultraviolet Radiation. Phosphorus removal is accomplished by chemical precipitation using Ferric Chloride added to the primary clarified inlet. Treated effluent is discharged to the Menominee River via Outfall 001, located approximately two miles upstream from its mouth at Green Bay.

Attachment #2 is a map of the area showing the approximate location of Outfall 001.

**Existing Permit Limitations**

The current permit, which expired on 09/30/2022, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD <sub>5</sub>			45 mg/L	30 mg/L	2,3
TSS			45 mg/L	30 mg/L	2,3
pH	9.0 s.u.	6.0 s.u.			2
Phosphorus				1.0 mg/L	
Fecal Coliform May – September			656#/100 mL geometric mean	400#/100 mL geometric mean	
Mercury	3.6 ng/L				
Ammonia Nitrogen					1
Metals					4
WET					5

Footnotes:

1. Monitoring only.
2. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
3. These limits are based on requirements in s. NR 210.05(1), Wis. Adm. Code.
4. Monitoring for total recoverable cadmium, chromium, copper, lead, nickel and zinc is also required because Marinette operates a local pretreatment program for the many industries that discharge to the treatment facility.
5. Acute WET tests are required annually in rotating quarters.

### Receiving Water Information

- Name: Menominee River
- Waterbody Identification Code (WBIC): 609000
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply. (Cold Water and Public Water Supply criteria are used for bioaccumulating compounds of concern, because the discharge is within the Great Lakes basin.)
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q<sub>10</sub> and 7-Q<sub>2</sub> values are from USGS, where Outfall 001 is located.
  - 7-Q<sub>10</sub> = 1240 cfs (cubic feet per second)
  - 7-Q<sub>2</sub> = 1740 cfs
  - 90-Q<sub>10</sub> = 1590 cfs
  - Harmonic Mean Flow = cfs using a drainage area of 2255 mi<sup>2</sup>The Harmonic Mean has been estimated based on average flow and the 7-Q<sub>10</sub> using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).
- Hardness = 135 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data from WET testing at Tyco Fire Products from 10/21/2009 – 07/17/2013.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from the Menominee River at Hwy JJ is used for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: There are several other dischargers to the Menominee River, however they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: The Menominee River is 303(d) listed as impaired for mercury, PAHs, arsenic, and PCBs.

### Effluent Information

- Design flow rate(s):
  - Annual average = 5.1 MGD (Million Gallons per Day)
  - For reference, the actual average flow from 10/01/2017 – 12/31/2022 was 2.48 MGD.
- Hardness = 215 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data from the permit reissuance application from 02/15/2022 – 02/21/2022.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water source: Domestic wastewater with water supply from Lake Michigan and 7 industrial users.
- Additives: Ferric chloride is added for phosphorus removal.
- Effluent characterization: This facility is categorized as a major municipal, so the permit application required effluent sample analyses for all the “priority pollutants” except for the Dioxins and Furans as specified in s. NR 200.065, Table 1, Wis. Adm. Code. The permit-required monitoring for ammonia, Cd, Cr, Cu, Pb, Ni, Hg and Zn used in this evaluation.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled “MEAN EFFL. CONC.”. Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.



Attachment #1  
Effluent Data

	Arsenic µg/L		Cadmium µg/L**
1-day P <sub>99</sub>	5.3	1-day P <sub>99</sub>	
4-day P <sub>99</sub>	3.9	4-day P <sub>99</sub>	
30-day P <sub>99</sub>	2.3	30-day P <sub>99</sub>	
Mean*	1.6	Mean*	0.010
Std	0.99	Std	0.012
Sample size	20	Sample size	62
Range	<0.85 – 4	Range	<0.14 – 0.22
	Chromium µg/L		Copper µg/L
1-day P <sub>99</sub>	4.3	1-day P <sub>99</sub>	76
4-day P <sub>99</sub>	2.1	4-day P <sub>99</sub>	42
30-day P <sub>99</sub>	0.91	30-day P <sub>99</sub>	25
Mean*	0.34	Mean	18
Std	1.4	Std	15
Sample size	62	Sample size	62
Range	<0.67 – 4.6	Range	5.8 – 130
	Lead µg/L**		Nickel µg/L
1-day P <sub>99</sub>		1-day P <sub>99</sub>	13
4-day P <sub>99</sub>		4-day P <sub>99</sub>	9.0
30-day P <sub>99</sub>		30-day P <sub>99</sub>	6.4
Mean*	0.0	Mean*	5.1
Std		Std	2.3
Sample size	62	Sample size	62
Range	<1.5 - <4.5	Range	<3.5 – 16
	Mercury ng/L		Zinc µg/L
1-day P <sub>99</sub>	3.18	1-day P <sub>99</sub>	91.3
4-day P <sub>99</sub>	1.91	4-day P <sub>99</sub>	50.3
30-day P <sub>99</sub>	1.27	30-day P <sub>99</sub>	28.8
Mean	0.98	Mean*	16.9
Std	0.62	Std	18.5
Sample size	21	Sample size	62
Range	0.5 – 2.4	Range	8.4 – 140

\*Results below the level of detection (LOD) were included as zeroes in calculation of average. “<” means that the pollutant was not detected at the indicated LOD.

\*\*Less than 11 detected results available, so P<sub>99</sub>'s cannot be calculated.

**Effluent Chloride Data**

Sample Date	Chloride mg/L
02/15/2022	160
02/16/2022	160
02/17/2022	140
02/21/2022	150
Average	153

The following table presents the average concentrations and loadings at Outfall 001 from 10/01/2017 – 12/31/2022 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

**Averages of Parameters with Limits**

	Average Measurement
BOD <sub>5</sub>	3.52 mg/L*
TSS	3.08 mg/L*
pH field	7.18 s.u.
Phosphorus	0.49 mg/L
Fecal coliform	110 #/100 mL
Mercury	0.98 ng/L

\*Results below the level of detection (LOD) were included as zeroes in calculation of average.

**PART 2 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR TOXIC SUBSTANCES – EXCEPT AMMONIA NITROGEN**

Permit limits for toxic substances are required whenever any of the following occur:

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99<sup>th</sup> percentile (or P<sub>99</sub>) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

**Daily Maximum Limit Calculation Method**

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. In accordance with s. NR 106.06(3)(b), limitations based on acute toxicity are either set equal to two times the acute criteria (the final acute value) or calculated using the mass balance equation below, whichever is more restrictive.

$$\text{Limitation} = \frac{(\text{WQC}) (Q_s + (1-f) Q_e) - (Q_s - f Q_e) (C_s)}{Q_e}$$

Where:

WQC = Acute toxicity criterion or secondary acute value according to ch. NR 105, Wis. Adm. Code.

Q<sub>s</sub> = average minimum 1-day flow which occurs once in 10 years (1-day Q<sub>10</sub>)  
 if the 1-day Q<sub>10</sub> flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q<sub>10</sub>).

Q<sub>e</sub> = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

f = Fraction of the effluent flow that is withdrawn from the receiving water, and

C<sub>s</sub> = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e), Wis. Adm. Code.

Attachment #1

In this case, limits set equal to two times the acute criteria are more restrictive and this method is used to calculate the daily maximum limits shown in the table below.

The following tables list the calculated WQBELs for this discharge along with the results of effluent sampling for all the detected substances. All concentrations are expressed in terms of micrograms per Liter (µg/L), except for hardness and chloride (mg/L) and mercury (ng/L).

**Daily Maximum Limits based on Acute Toxicity Criteria (ATC)**

RECEIVING WATER FLOW = 992 cfs, (1-Q<sub>10</sub> (estimated as 80% of 7-Q<sub>10</sub>)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P <sub>99</sub>	1-day MAX. CONC.
Arsenic		340	680			5.3	4
Cadmium	215	24.8	49.6	9.92	0.010		
Chromium	215	3375	6750			4.3	4.6
Copper	215	32.0	63.9			76	130
Lead	215	224	448	89.6	<1.5		
Mercury		830	1660			3.18	2.4
Nickel	215	897	1793			13	16
Zinc	215	235	470			91.3	140
Chloride (mg/L)		757	1514	303	153		

\* The indicated hardness may differ from the effluent hardness because the effluent hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the acute criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

\*\* The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q<sub>10</sub> flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

**Weekly Average Limits based on Chronic Toxicity Criteria (CTC)**

RECEIVING WATER FLOW = 310 cfs (¼ of the 7-Q<sub>10</sub>), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P <sub>99</sub>
Arsenic		152		6131			3.9
Cadmium	135	3.12	0.10	122	24.4	0.010	
Chromium	135	169		6805			2.1
Copper	135	13.4	4.95	344			42
Lead	135	37.4	3.59	1367	273	<1.5	
Mercury		440	2.99	440			1.91
Nickel	135	67.3	20	1925			9.0
Zinc	135	157	19.9	5525			50.3
Chloride (mg/L)		395	10.1	15516	3103	153	

\* The indicated hardness may differ from the receiving water hardness because the receiving water hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the chronic criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

**Monthly Average Limits based on Wildlife Criteria (WC)**

RECEIVING WATER FLOW = 370 cfs (¼ of the 90-Q<sub>10</sub>), as specified in s. NR 106.06(4), Wis. Adm. Code

SUBSTANCE	WC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P <sub>99</sub>
Mercury (ng/L)	1.3	2.99	1.30			1.27

**Monthly Average Limits based on Human Threshold Criteria (HTC)**

RECEIVING WATER FLOW = 564 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P <sub>99</sub>
Cadmium	370	0.10	26802	5360	0.010	
Chromium (+3)	3818000	0.00	276639270			0.91
Lead	140	3.59	9887	1977	<1.5	
Mercury	1.5	2.99	1.5			1.27
Nickel	43000	20.00	3114204			6.4
Antimony	373		27026	5405	0.39	

**Monthly Average Limits based on Human Cancer Criteria (HCC)**

RECEIVING WATER FLOW = 564 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P <sub>99</sub>
Arsenic	13.3		964			2.3
Chloroform	1960		142015	28403	0.60	

In addition to evaluating the need for limits for each individual substance for which HCC exist, s. NR 106.06(8), Wis. Adm. Code, requires the evaluation of the cumulative cancer risk. Because no effluent limits are needed based on HCC, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

**Conclusions and Recommendations**

Based on a comparison of the effluent data and calculated effluent limitations, **effluent limitations are required for mercury.**

Mercury – The WQBEL for total recoverable mercury is set equal to the most stringent criterion of 1.3 ng/L, according to s. NR 106.06(6), Wis. Adm. Code, because the background concentration in the receiving water and similar inland streams is known to exceed 1.3 ng/L. The current permit requires quarterly monitoring of the influent and effluent for total recoverable mercury so a total of 21 results are available from 12/27/2017 – 10/11/2022. The average concentration was 0.98 ng/L, and the maximum was 2.4 ng/L.

Marinette currently has a mercury variance and a daily maximum variance limit of 3.6 ng/L. The facility has been implementing their pollutant minimization program (PMP) and the effluent concentration has decreased since the initial commencement of the variance. Because the 30-day P<sub>99</sub> of 1.27 ng/L is less than the WQBEL of 1.3 ng/L, they are no longer eligible for a variance.

**The final WQBEL of 1.3 ng/L as a monthly average is recommended to become effective after a compliance schedule. The limit may be removed if there is not reasonable potential shown during the reissued permit.** Per s. NR 106.06(8), Wis. Adm. Code if representative discharge data is not available and water quality standards will be exceeded if the discharge is not limited, a WQBEL may be included in the reissued permit. Because Marinette has plans to identify legacy mercury in the collection system and work to reduce other sources of mercury, data that is representative of these activities is needed in the reissued permit. The continuation of a PMP is recommended as well per s. 205.10(3), Wis. Adm. Code for best management practices to control the discharge of mercury.

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Previous monitoring produced the PFOS and PFOA results below:

Sample Date	PFOS ng/L	PFOA ng/L
11/20/2017	42.8	38.2
05/14/2018	13.3	50.3

These results are greater than one fifth of the respective criteria for each substance. Based on the type of discharge, the effluent flow rate, the types of indirect dischargers contributing to the collection system, the available PFOS/PFOA monitoring data, and known levels of PFOS/PFOA in the source water, **PFOS and PFOA monitoring is recommended at a once every two months frequency.**

### **PART 3 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR AMMONIA NITROGEN**

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. Given the fact that Marinette WWTF does not currently have ammonia nitrogen limits, the need for limits is evaluated at this time.

The effluent pH data was examined as part of this evaluation. A total of 1370 sample results were reported from 10/02/2017 – 12/30/2022. The maximum reported value was 7.9 s.u. (Standard pH Units). The effluent pH was 7.7 s.u. or less 99% of the time. The 1-day P<sub>99</sub>, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.7 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 7.7 s.u. Therefore, a value of 7.7 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 7.7 s.u. into the equation above yields an ATC = 14.4 mg/L.

#### **Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method**

In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are either set equal to two times the acute criteria (the final acute value) or calculated using the mass balance equation in s. NR 106.32(2)(e), Wis. Adm. Code.

In this case, limits calculated set equal to two times the acute criteria are more restrictive. This method is used to calculate the daily maximum limit of **29 mg/L**.

**Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)**

The ammonia limit calculation also warrants evaluation of weekly and monthly average limits based on chronic toxicity criteria for ammonia, because those limits relate to the assimilative capacity of the receiving water.

Weekly average and monthly average limits for ammonia nitrogen are based on chronic toxicity criteria in ch. NR 105, Wis. Adm. Code.

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as a Warm Water Sport Fish Community is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

$$CTC = E \times \{ [0.0676 \div (1 + 10^{(7.688 - pH)})] + [2.912 \div (1 + 10^{(pH - 7.688)})] \} \times C$$

Where:

pH = the pH (s.u.) of the receiving water,

E = 0.854,

C = the minimum of 2.85 or  $1.45 \times 10^{(0.028 \times (25 - T))}$  – (Early Life Stages Present), or

C =  $1.45 \times 10^{(0.028 \times (25 - T))}$  – (Early Life Stages Absent), and

T = the temperature (°C) of the receiving water – (Early Life Stages Present), or

T = the maximum of the actual temperature (°C) and 7 – (Early Life Stages Absent)

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q<sub>10</sub> (4-Q<sub>3</sub>, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q<sub>5</sub> (estimated as 85% of the 7-Q<sub>2</sub> if the 30-Q<sub>5</sub> is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 °C, 25% of the flow is used if the Temperature < 11 °C, and 50% of the flow is used if the Temperature ≥ 11 °C but < 16 °C.

Section NR 106.32 (3), Wis. Adm. Code, provides a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 °C, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the Menomonee River, based on conversations with local fisheries biologists. So “ELS Absent” criteria apply from October through March, and “ELS Present” criteria will apply from April through September for a warmwater sport fish classification.

The “default” basin assumed values are used for Temperature, pH and background ammonia concentrations, because minimum ambient data is available. These values are shown in the table below, with the resulting criteria and effluent limitations.

**Weekly and Monthly Ammonia Nitrogen Limits – WWSF**

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. – March
<b>Effluent Flow</b>	Qe (MGD)	5.1	5.1	5.1
<b>Background Information</b>	7-Q <sub>10</sub> (cfs)	1240	1240	1240
	7-Q <sub>2</sub> (cfs)	1740	1740	1740
	Ammonia (mg/L)	0.04	0.03	0.05
	Average Temperature (°C)	12	22	3

Attachment #1

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. – March
	Maximum Temperature (°C)	16	24	11
	pH (s.u.)	8.10	8.07	8.06
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	620	1240	310
	Reference Monthly Flow (cfs)	740	1479	370
<b>Criteria mg/L</b>	4-day Chronic			
	Early Life Stages Present	4.90	2.98	
	Early Life Stages Absent			6.95
	30-day Chronic			
	Early Life Stages Present	1.96	1.19	
	Early Life Stages Absent			2.78
<b>Effluent Limitations mg/L</b>	Weekly Average			
	Early Life Stages Present	387	467	
	Early Life Stages Absent			278
	Monthly Average			
	Early Life Stages Present	182	219	
	Early Life Stages Absent			131

**Effluent Data**

The following table evaluates the statistics based upon ammonia data reported from 03/31/2021 – 10/11/2022 with those results being compared to the calculated limits to determine the need to include ammonia limits in Marinette’s permit for the respective month ranges. That need is determined by calculating 99<sup>th</sup> upper percentile (or P<sub>99</sub>) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

**Effluent Ammonia Data**

	Ammonia Nitrogen mg/L
1-day P <sub>99</sub>	0.39
4-day P <sub>99</sub>	0.24
30-day P <sub>99</sub>	0.14
Mean*	0.09
Std	0.08
Sample size	14
Range	<0.039 – 0.35

\*Values lower than the level of detection were substituted with a zero. “<” means that the pollutant was not detected at the indicated level of detection.

Based on this comparison, **there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits.**

**No limits are needed; however, monitoring is recommended to continue.**

## **PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA**

On May 1, 2020, revisions to chs. NR 102 and NR 210, Wis. Adm. Codes, became effective which replace fecal coliform limits with new *Escherichia coli* (*E. coli*) limits for protection of recreational uses. Section NR 210.06(2)(a)1, Wis. Adm. Code, includes two limits which must be included in permits for facilities which are required to disinfect:

1. The geometric mean of *E. coli* bacteria in effluent samples collected in any calendar month may not exceed 126 counts/100 mL.
2. No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 counts/100 mL.

*E. coli* monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Because Marinette's permit requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit. These limits are required during May through September.

The current permit requires Marinette to disinfect year-round for protection of the public water supply, due to the proximity to the drinking water intake for Marinette Waterworks. Because the *E. coli* limits listed in NR 210.06(2)(a)1, Wis. Adm. Code, are set for protection of recreational uses and not drinking water supply, these *E. coli* limits do not necessarily need to be applied year-round. However, either *E. coli* or fecal coliform bacteria limits are needed year-round in order to ensure that there is no reduction from the current level of disinfection needed to protect the public drinking water source.

In accordance with s. NR 210.06(2)(a)2, Wis. Adm. Code, outside of the recreational season, bacteria limits may either be set equal to the previous fecal coliform limits or the listed *E. coli* limits. Therefore, the facility can select **one** of the two possible sets of permit limits:

- *E. coli* limits as listed above during the recreation period of May through September and a fecal coliform limit of 400 counts/100 mL as a monthly geometric mean in November through April. Any fecal coliform weekly geometric mean limit which was included in the previous permit for expression of limits purposes does not need to be included in the reissued permit.
- *E. coli* limits as listed above apply year-round.

### **Effluent Data**

Marinette has monitored effluent *E. coli* from 05/03/2021 – 09/27/2021 and a total of 21 results are available. A geometric mean of 126 counts/100 mL was not exceeded, with a maximum monthly geometric mean of 63 counts/100 mL. Effluent data has not exceeded 410 counts/100 mL. The maximum reported value was 146.7 counts/100 mL. **Based on this effluent data, it appears that the facility can meet new *E. coli* limits and a compliance schedule is not needed in the reissued permit.**

## **PART 5 – PHOSPHORUS**

### **Technology-Based Effluent Limit**

Subchapter II of Chapter NR 217, Wis. Adm. Code, requires municipal wastewater treatment facilities that discharge greater than 150 pounds of Total Phosphorus per month to comply with a monthly average limit of 1.0 mg/L, or an approved alternative concentration limit.



Because Marinette currently has a limit of 1.0 mg/L, this limit should be included in the reissued permit. This limit remains applicable unless a more stringent WQBEL is given. In addition, the need for a WQBEL for phosphorus must be considered.

**Water Quality-Based Effluent Limits (WQBEL)**

Revisions to administrative rules regulating phosphorus took effect on December 1, 2010. These rule revisions include additions to s. NR 102.06, Wis. Adm. Code, which establish phosphorus standards for surface waters. Subchapter III of NR 217, Wis. Adm. Code, establishes procedures for determining WQBELs for phosphorus, based on the applicable standards in ch. NR 102, Wis. Adm. Code.

Section NR 102.06(3)(a), Wis. Adm. Code, specifically names river segments for which a phosphorus criterion of 0.100 mg/L applies. For other stream segments that are not specified in s. NR 102.06(3)(a), Wis. Adm. Code, s. NR 102.06(3)(b), Wis. Adm. Code, specifies a phosphorus criterion of 0.075 mg/L. The phosphorus criterion of 0.10 mg/L applies for the Menomonee River.

The conservation of mass equation is described in s. NR 217.13(2)(a), Wis. Adm. Code, for phosphorus WQBELs and includes variables of water quality criterion (WQC), receiving water flow rate (Qs), effluent flow rate (Qe), and upstream phosphorus concentrations (Cs) provided below.

$$\text{Limitation} = [(WQC)(Qs + (1-f) Qe) - (Qs - f Qe) (Cs)] / Qe$$

Where:

- WQC = 0.10 mg/L for the Menomonee River
- Qs = 100% of the 7-Q<sub>2</sub> of 1740 cfs
- Cs = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code
- Qe = effluent flow rate = 5.1 MGD = 7.89 cfs
- f = the fraction of effluent withdrawn from the receiving water = 0

Section NR 217.13(2)(d), Wis. Adm. Code, specifies that the background phosphorus concentration used in the limit calculation formula shall equal the median of at least four samples collected during the months of May through October, and that all samples collected during a 28-day period shall be considered as a single sample and the average of these concentrations used to determine a median. Averaging begins at date of the first sample in the range of May through October.

A review of all available in stream total phosphorus data stored in the Surface Water Integrated Monitoring System database is summarized below:

SWIMS ID	383016	383088
Station Name	Monitoring station at USH 41	Monitoring station at County Hwy JJ
Waterbody	Menominee River	Menominee River
Sample Count	6	54
First Sample	10/30/2011	05/13/2007
Last Sample	09/09/2012	10/25/2021
Mean	0.027 mg/L	0.029 mg/L
Median	0.027 mg/L	0.028 mg/L
NR 217 Median	0.027 mg/L	0.028 mg/L

Substituting a median value of 0.027 mg/L into the limit calculation equation above, the calculated limit is 16 mg/L.

**Effluent Data**

The following table summarizes effluent total phosphorus monitoring data from 10/01/2017 – 12/29/2022.

<b>Total Phosphorus Effluent Data</b>	
	<b>Phosphorus mg/L</b>
1-day P <sub>99</sub>	1.35
4-day P <sub>99</sub>	0.86
30-day P <sub>99</sub>	0.61
Mean	0.49
Std	0.25
Sample size	1370
Range	0.13 – 2.46

**Reasonable Potential Determination**

**The discharge does not have reasonable potential to cause or contribute to an exceedance of the water quality criterion** because the 30-day P<sub>99</sub> of reported effluent total phosphorus data is less than the calculated WQBEL. Therefore, a **WQBEL is not required**.

**PART 5 – WATER QUALITY-BASED EFFLUENT LIMITATIONS  
FOR THERMAL**

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in chs. NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. Daily maximum and weekly average temperature criteria are available for the 12 different months of the year depending on the receiving water classification.

Due to the amount of upstream flow available for dilution in the limit calculation (Qs:Qe >20:1), the lowest calculated limitation is 120° F (s. NR 106.55(6)(a), Wis. Adm. Code).

At temperatures above approximately 103° F, conventional biological treatment systems do not function properly and experience upsets. There is no indication that this has ever occurred in this treatment system. Therefore, there is no reasonable potential for the discharge to exceed this limit. **No monitoring or effluent limits are recommended for temperature.**

**PART 6 – WHOLE EFFLUENT TOXICITY (WET)**

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. Decisions below related to the selection of representative data and the need for WET limits were made according to ss. NR 106.08 and 106.09, Wis. Adm. Code. WET monitoring frequency and toxicity reduction evaluation (TRE) recommendations were made using the best professional

judgment of staff familiar with the discharge after consideration of the guidance in the *Whole Effluent Toxicity (WET) Program Guidance Document (October 29, 2019)*.

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC<sub>50</sub> (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic testing is usually not recommended where the ratio of the 7-Q<sub>10</sub> to the effluent flow exceeds 100:1. For Marinette, that ratio is approximately 157:1. With this amount of dilution, there is believed to be little potential for chronic toxicity effects in the Menominee River associated with the discharge from Marinette, so the need for chronic WET testing will not be considered further.
- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.
- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations. Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005. Data before July 2005 was excluded in this evaluation.

**WET Data History**

Date Test Initiated	Acute Results LC <sub>50</sub> %				Footnotes or Comments
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	
08/16/2006	>100	>100	Pass	Yes	
10/03/2007	>100	>100	Pass	Yes	
06/11/2008	>100	>100	Pass	Yes	
03/18/2009	>100	>100	Pass	No	1
12/14/2011	>100	>100	Pass	Yes	
08/15/2012	>100	>100	Pass	Yes	
05/22/2013	>100	>100	Pass	Yes	
01/22/2014	>100	>100	Pass	Yes	
10/28/2015	>100	>100	Pass	Yes	
09/28/2016	>100	>100	Pass	Yes	
09/19/2018	>100	>100	Pass	Yes	
12/11/2019	>100	>100	Pass	Yes	
07/22/2020	>100	>100	Pass	Yes	
09/08/2021	>100	>100	Pass	Yes	
06/28/2022	>100	>100	Pass	Yes	

Footnotes:

1. *Tests done by S-F Analytical, July 2008 – March 2011.* The DNR has reason to believe that WET tests completed by SF Analytical Labs from July 2008 through March 31, 2011 were not performed using proper test methods. Therefore, WET data from this lab during this period has been disqualified and was not included in the analysis.

Attachment #1

- According to s. NR 106.08, Wis. Adm. Code, WET reasonable potential is determined by multiplying the highest toxicity value that has been measured in the effluent by a safety factor, to predict the likelihood (95% probability) of toxicity occurring in the effluent above the applicable WET limit. The safety factor used in the equation changes based on the number of toxicity detects in the dataset. The fewer detects present, the higher the safety factor, because there is more uncertainty surrounding the predicted value. **WET limits must be given, according to s. NR 106.08(6), Wis. Adm. Code, whenever the applicable Reasonable Potential equation results in a value greater than 1.0.**

$$\text{Acute Reasonable Potential} = [(TUa \text{ effluent}) (B)(AMZ)]$$

According to s. NR 106.08(6)(d), Wis. Adm. Code, TUa and TUC effluent values are equal to zero whenever toxicity is not detected (i.e. when the LC<sub>50</sub>, IC<sub>25</sub> or IC<sub>50</sub> ≥ 100%).

Acute Reasonable Potential = 0 < 1.0, reasonable potential is not shown, and a limit is not required.

The WET checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other related permit conditions. The checklist indicates whether acute and chronic WET limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code. The checklist steps the user through a series of questions, assesses points based on the potential for effluent toxicity, and suggests monitoring frequencies based on points accumulated during the checklist analysis. As toxicity potential increases, more points accumulate, and more monitoring is recommended to ensure that toxicity is not occurring. A summary of the WET checklist analysis completed for this permittee is shown in the table below. Staff recommendations based on best professional judgment are provided below the summary table. For guidance related to reasonable potential and the WET checklist, see Chapter 1.3 of the WET Guidance Document: <https://dnr.wisconsin.gov/topic/Wastewater/WET.html>.

**WET Checklist Summary**

	<b>Acute</b>
<b>AMZ/IWC</b>	Not Applicable. <b>0 Points</b>
<b>Historical Data</b>	14 tests used to calculate RP. No tests failed. <b>0 Points</b>
<b>Effluent Variability</b>	Little variability, no violations or upsets, consistent WWTF operations. <b>0 Points</b>
<b>Receiving Water Classification</b>	Warmwater sport fish <b>5 Points</b>
<b>Chemical-Specific Data</b>	Reasonable potential for limits for no substances based on ATC; Ammonia, arsenic, cadmium, chromium, copper, mercury, nickel, zinc, and chloride detected. Additional Compounds of Concern: antimony and chloroform.

## Attachment #1

	<b>Acute</b>
	<b>5 Points</b>
<b>Additives</b>	0 Biocides and 1 Water Quality Conditioners added. Permittee has proper P chemical SOPs in place: Yes. <b>1 Point</b>
<b>Discharge Category</b>	7 Industrial Contributors. <b>11 Points</b>
<b>Wastewater Treatment</b>	Secondary or better. <b>0 Points</b>
<b>Downstream Impacts</b>	No impacts known. <b>0 Points</b>
<b>Total Checklist Points:</b>	<b>22 Points</b>
<b>Recommended Monitoring Frequency (from Checklist):</b>	1x yearly
<b>Limit Required?</b>	No
<b>TRE Recommended? (from Checklist)</b>	No

- After consideration of the guidance provided in the Department's *WET Program Guidance Document* (2019) and other information described above, **1x yearly acute tests are required in the reissued permit**. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).

Attachment #2

