Permit Fact Sheet

General Information

Permit Number:	WI-0022870-10-0	
Permittee Name:	City of Oconto Falls	
Address:	500 N Chestnut St., PO Box 70	
City/State/Zip:	Oconto Falls WI 54154-0070	
Discharge Location:	Latitude 44° 52' 08" Longitude 88° 08' 34"	
Receiving Water:	Oconto River, Lower Oconto River Watershed, Upper Green Bay Basin, Oconto County	
StreamFlow ($Q_{7,10}$):	7-Q10 = 187 cfs cubic feet per second (cfs)	
Stream Classification:	Warm Water Sport Fish (WWSF) community, non-public water supply	
Discharge Type:	Existing, continuous	
Design Flow(s)	Annual Average	0.62 MGD
Industrial Contributors	Badger Paper Mill and Flexographic Printing	
Plant Classification	The plant is classified as basic and has the following subclasses: A2, B, C, P, D, L, and SS.	
Approved Pretreatment Program?	N/A	

Facility Description

The City of Oconto Falls operates a trickling filter/solids contact wastewater treatment facility that was designed for an average daily flow of 0.62 MGD. Flow incoming to the wastewater treatment plant (WWTP) arrives by either gravity or from the 5 lift stations spread throughout the collection system. Upon entering the plant the water goes through a fine screening system followed by a pista grit removal chamber. From there the water flows through a 6-inch parshall flume flow meter and into the clarigester, which is a primary clarifier on top of a digester. The primary effluent is then diverted into the two trickling filters and spread evenly across a plastic media. After exiting the trickling filters, the trickling filter effluent flows into a small coarse air aerated contact stabilization tank. The mixed liquor then flows to the center of the final clarifier in the flocculation center well and ferric chloride is mixed in to help with the phosphorus removal. The mixed liquor suspended solids settles out and the effluent flows over the weirs and into the disinfection zone, which is achieved via Ultraviolet (UV) system on a seasonal basis.

Waste sludge is pumped back up to the clarigester where it settles out into the digester portion, and is gradually pumped out of the digester and into a sludge storage tank until sludge is either land applied or hauled to another facility for treatment.

Substantial Compliance Determination

Enforcement During Last Permit: During the past permit term, the facility received Notices of Noncompliance for SSOs on September 4, 2022 and March 21, 2021. The facility has completed all previously required actions as part of the enforcement process.

After a desk top review of all discharge monitoring reports, CMARs, land app reports, compliance schedule items, and a site visit on May 8, 2024, this facility has been found to be in substantial compliance with their current permit.

Compliance determination entered by Laura Gerold, Wastewater Engineer on May 17, 2024.

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
701	0.38 MGD January 2019-December 2023	Influent: Representative influent samples shall be collected at the Parshall Flume in the headworks facility after screening and grit removal.
001	Flow is not monitored at this point.	Effluent: 24-hour flow proportional composite samples are collected at the final effluent channel before UV disinfection. Grab samples are collected after UV disinfection.
002	75 dry U.S. tons/year estimated in permit application.	Liquid Sludge: Representative samples of the anaerobically digested liquid sludge shall be collected from the draw-off line of the sludge mixing pumps.

1 Influent – Monitoring Requirements

1.1 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	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	

1.1.1 Changes from Previous Permit:

No changes made from previous permit.

1.1.2 Explanation of Limits and Monitoring Requirements

Influent monitoring is needed to assess loading to the facility and treatment performance. Requirements for flow, BOD, and TSS are established in accordance with ch. NR 210.04(2), Wis. Adm. Code.

2 Surface Water - Monitoring and Limitations

2.1 Sample Point Number: 001- Effluent

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
BOD5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Comp	
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit effective May through September annually.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit effective May through September annually. See the E. coli Percent Limit section in the permit. Enter the result in the DMR on the last day of the month.
Phosphorus, Total	Monthly Avg	1.0 mg/L	3/Week	24-Hr Comp	
Phosphorus, Total	Monthly Avg	5.2 lbs/day	3/Week	Calculated	
Nitrogen, Ammonia (NH3-N) Total		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring only in 2027.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring only in 2027.
PFOS		ng/L	1/ 2 Months	Grab	See PFOS/PFOA Sampling and Reporting Requirements permit section.
PFOA		ng/L	1/ 2 Months	Grab	See PFOS/PFOA Sampling and Reporting Requirements permit section.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section in the permit.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section in the permit.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. See Nitrogen Series Monitoring section below. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See permit Section 2.2.1.6 for WET testing requirements and schedule.

2.1.1 Changes from Previous Permit

Sample types for Total Suspended Solids (TSS) and phosphorus have been changed from 24-hr comp to 24-hr flow proportional composite to reflect sampling practices taking place at the facility. Additional changes are listed below:

Phosphorus- Monthly average mass-based limit of 5.2 lbs/day has been added.

Nitrogen, Ammonia- Monitoring is no longer required for the entire permit term. Monthly monitoring is required in 2027.

Chloride- Monthly monitoring has been added for the year of 2027. Monitoring is to occur on four consecutive days each month.

E. coli- Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits. See additional explanation of limits under "Explanation of Limits and Monitoring Requirements" below.

Total Nitrogen Monitoring (TKN, N02+N03 and Total N)- Annual monitoring in rotating quarters throughout the permit term was added to the proposed permit.

PFOS and PFOA – Monitoring once every two months is included in the permit in accordance with s. NR 106.98(2)(c), Wis. Adm. Code.

Acute WET- Required 2 times during the permit term.

2.1.2 Explanation of Limits and Monitoring Requirements

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated April 11, 2024, used for this reissuance.

Monitoring Frequencies- The **Monitoring Frequencies for Individual Wastewater Permits** guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term.

Previously permitted monitoring frequencies for BOD, TSS and phosphorus technology based effluent limits fall below the standard monitoring frequency outlined in guidance for facilities with a design flow between 2 and 0.25 MGD. Since data submitted during the previous permit term shows consistent compliance with permit limitations, and the set monitoring frequency is consistent with requirements of state code, the reduced monitoring frequency is continued in the proposed permit. If performance levels begin to vary during the permitted term, the department may re-evaluate sampling frequencies and implement more frequent monitoring via permit modification or at permit reissuance.

Expression of Limits- In accordance with the federal regulation 40 CFR 122.45(d) and s. NR 205.065, Wis. Adm. Code. limits in this permit are to be expressed as weekly average and monthly average limits whenever practicable.

BOD_5, TSS, and pH- Categorical limits are included in the permit as outlined in s. NR 210.04, Wis. Adm. ode. The effluent limitations for BOD_5, TSS and pH are carried over into this permit and are not subject to change at this time because the receiving water characteristics have not changed.

E. Coli- Revisions to bacteria surface water quality criteria to protect recreational uses and accompanying E. coli WPDES permit implementation procedures became effective May 1, 2020. The new rule requires that WPDES permits for facilities with required disinfection include monitoring for E. coli while facilities are disinfecting during the recreation period, and establish effluent limitations for E. coli established in s. NR 210.06 (2), Wis. Adm Code. The administrative code rule changes included the following actions: revised the bacteria water quality criteria from fecal coliform to E. coli to protect recreation in ch. NR 102, Wis. Adm. Code.; removed fecal coliform criteria for certain individual waters from ch. NR 104, Wis. Adm. Code.; revised permit requirements for publicly and privately owned sewage treatment works in ch. NR 210, Wis. Adm. Code.; and, updated approved analytical methods for bacteria in ch. NR 219, Wis. Adm. Code.

E. coli monitoring is required at the permit effective date. An interim fecal coliform limit of 400 #/100 ml as a monthly geometric mean will apply from the permit effective date through the end of a compliance schedule. At the end of the compliance schedule, E. coli limits of 126 #/100 ml as a monthly geometric mean that may not be exceeded and 410 #/100 ml as a daily maximum that may not be exceeded more than 10 percent of the time in any calendar month will apply.

Phosphorus- Phosphorus requirements are based on the Phosphorus Rules as detailed in NR 102 (water quality standards) and NR 217, Wis. Adm. Code (effluent standards and limitations for phosphorus). Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters.

A Technology-Based Effluent Limit (TBEL) of 1.0 mg/L is needed if a facility discharges more than the threshold of 150 pounds per month (s. NR 217.04(1)(a)1 Wis. Adm. Code). This limit was included in previous issuances and will remain in this permit to prevent backsliding. An mass limit is also required pursuant to s. NR 217.14(1)(a), Wis. Adm. Code, in situations where downstream waters qualify as a lake or reservoir. Since Lake Michigan is an existing lake, mass limit equal to 1.0 mg/L × 8.34 × 0.62 MGD, or 5.2 lbs/day, has been added as a monthly average.

For the reasons explained in the April 30, 2012 paper entitled 'Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin', WDNR has determined that it is impracticable to express the phosphorus WQBEL for the permittee as a maximum daily or weekly value. The final effluent limit for phosphorus is expressed as a monthly average. This final effluent limit was derived from and complies with the applicable water quality criterion.

Ammonia- Current 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 IV of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for ammonia.

Chloride-Acute and chronic chloride toxicity criteria for the protection of aquatic life are included in Tables 1 and 5 of ch. NR 105, Wis. Adm. Code. Subchapter VII of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for chloride. If the permittee's effluent data shows that a calculated WQBEL for chloride cannot be met, then the permit will include a chloride effluent limitation. s. NR 106.83 of subchapter VII also provides for some permittees to obtain temporary relief from a chloride WQBEL through the use of a "chloride variance". (See chloride guidance dated March 2010 at this link: Implementation plan for the chloride rule)

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 the POTW has an indirect discharger(s) that may be a potential source of PFOS/PFOA.

Therefore, monitoring once every two months is included. A sample frequency of 1/2 months means one sample is taken during any two-month period. Examples of 1/2 month sample would be every other month (Jan, March, May, etc.) or back-to-back months with a break in between (February & March, May & June, Aug & Sept, etc.). DMR Short Forms will be generated for the following time periods: January-February, March-April, May-June, July-August, September-October, and November-December. At a minimum one sample result will be present on each form.

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.

Total Nitrogen Monitoring (NO2+NO3, 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. Annual tests are scheduled in the following rotating quarters: October- December, 2024; July- September, 2025; January- March, 2026; April- June, 2027; and October- December, 2028

Whole Effluent Toxicity- Whole effluent toxicity (WET) testing requirements and limits (if applicable) 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.wi.gov/topic/wastewater/wet.html)

Acute monitoring is required in the following quarters: July- September, 2025; and October- December, 2028

3 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)**
002	B	Liquid	Fecal Coliform	Injection	Land Applied or Hauled to	75 dry US Tons/Year estimated

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)**
					another facility	
Does sludge management demonstrate compliance? Yes.						
Is additional sludge storage required? No.						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? Yes If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in land applying sludge from this facility						
Is a priority pollutant scan required? No. 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.						

3.1 Sample Point Number: 002- 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	
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	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
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	
Radium 226 Dry Wt		pCi/g	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2025.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2025.
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS permit sections for more information.

3.1.1 Changes from Previous Permit:

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

3.1.2 Explanation of Limits and Monitoring Requirements

Requirements for land application of 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 s. NR 204.07(5). Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7) for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k). Radium requirements are addressed in s. NR 204.07(3)(n).)

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.

4 Schedules

4.1 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
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. 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.	07/31/2025
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. 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. The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan. 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. 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.	07/31/2026

4.1.1 Explanation of Schedule

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.

4.2 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
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);	07/31/2025

2) identify land application sites; 3) describe site limitations; 4) address vegetative cover management 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.	

4.2.1 Explanation of Schedules

This schedule requires the submittal of a Land Application Management Plan that documents how the permittee will manage the land application of sludge, consistent with ch. NR 204, Wis. Adm. Code.

5 Special Reporting Requirements

None

6 Attachments:

Water Quality-Based Effluent Limitations for the City of Oconto Falls WPDES Permit No. WI-0022870-10-0, April 11, 2024, Michael Polkinghorn, Water Resources Engineer.

7 Expiration Date:

June 30, 2029

8 Justification Of Any Waivers From Permit Application Requirements

No waivers have been made from permit application requirements.

Prepared By: Amanda Perdzock, Wastewater Specialist **Date: June 3, 2024**

Notice of reissuance was published in the Oconto County Times-Herald, PO Box 87, Oconto Falls, WI 54154-0087.

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: April 11, 2024

TO: Amanda Perdzock – WY/3

FROM: Michael Polkinghorn – NOR/Rhinelander Service Center

SUBJECT: Water Quality-Based Effluent Limitations for the City of Oconto Falls
WPDES Permit No. WI-0022870-10-0

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 the City of Oconto Falls in Oconto County. This municipal wastewater treatment facility (WWTF) discharges to the Oconto River, located in the Lower Oconto River Watershed in the Upper Green Bay 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
BOD_5			45 mg/L	30 mg/L	1, 2
TSS			45 mg/L	30 mg/L	1, 2
pH	9.0 s.u.	6.0 s.u.			1, 2
E. coli May – September				126 #/100 mL geometric mean	3
Phosphorus				1.0 mg/L 5.2 lbs/day	4
Ammonia Nitrogen					5
Chloride					5
PFOS and PFOA					6
TKN, Nitrate+Nitrite, and Total Nitrogen					7
Acute WET					8

Footnotes:

1. No changes from the current permit.
2. These limits are based on the Warm Water Sport Fish (WWSF) community of the immediate receiving water as described in s. NR 210.05(1), Wis. Adm. Code.
3. 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. The concertation limit is a technology-based limit as described in subch. 2 of ch. NR 217, Wis. Adm. Code. The mass limit is required as described in s. NR 217.14, Wis. Adm. Code.
5. Monthly monitoring for 1 year is recommended during the reissued permit term.
6. Once every two months monitoring is required in accordance with s. NR 106.98(2), Wis. Adm. Code.

7. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total Kjeldahl nitrogen (TKN) (all expressed as N).
8. Three acute whole effluent toxicity (WET) tests are recommended during the reissued permit term. 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. 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). <u>If a satisfactory phosphorus chemical SOP is established and implemented at the facility prior to permit reissuance, then WET testing can be reduced to 2x acute tests in the reissued permit.</u>

The recommended limits meet the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, and additional limits are not required.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Michael Polkinghorn at (715) 360-3379 or Michael.Polkinghorn@wisconsin.gov and Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (3) – Narrative, discharge area map, & weekly/monthly average ammonia nitrogen WQBELs calculation.

PREPARED BY: Michael A. Polkinghorn – Water Resources Engineer

E-cc: Laura Gerold, Wastewater Engineer – NER/Green Bay Service Center
Heidi Schmitt-Marquez, Regional Wastewater Supervisor – NER/Green Bay Service Center
Diane Figiel, Water Resources Engineer – WY/3
Nathaniel Willis, Wastewater Engineer – WY/3

Attachment #1

Water Quality-Based Effluent Limitations for
City of Oconto Falls

WPDES Permit No. WI-0022870-10-0

Prepared by: Michael A. Polkinghorn

PART 1 – BACKGROUND INFORMATION

Facility Description

The City of Oconto Falls owns and operates a trickling filter and solids contact wastewater treatment facility. Treatment consists of preliminary screening, grit removal, primary clarification (clarigester), trickling filtration, aerated solids contact tank, final clarification, and seasonal disinfection (May – October) via an ultraviolet light system. Chemical phosphorus removal via ferric chloride in the aerated solids contact chamber treatment step. Effluent is discharged on a continuous basis via Outfall 001 to the west bank of the Oconto River, approx. 3,600 ft downstream of the Maple Ave. Bridge.

Attachment #2 is a discharge area map of Outfall 001.

Existing Permit Limitations

The current permit, expired on 12/31/2022, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD_5			45 mg/L	30 mg/L	1, 2
TSS			45 mg/L	30 mg/L	1, 2
pH	9.0 s.u.	6.0 s.u.			1, 2
Fecal Coliform May – September			**656#/100 mL geometric mean**	400#/100 mL geometric mean	3
Phosphorus				1.0 mg/L	4
Ammonia Nitrogen					5

Footnotes:

1. 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.
2. These limits are based on the Warm Water Sport Fish (WWSF) community of the immediate receiving water as described in s. NR 210.05(1), Wis. Adm. Code.
3. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
4. This is a technology-based limit as described in subch. 2 of ch. NR 217, Wis. Adm. Code.
5. Monitoring only.

Receiving Water Information

- Name: Oconto River
- Waterbody Identification Code (WBIC): 440200
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply. Coldwater 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_{10} and 7-Q_2 values are from USGS for the Oconto River at Oconto Falls, WI, where Outfall 001 is located.
  7-Q_{10} = 187 cfs cubic feet per second (cfs)
  7-Q_2 = 252 cfs
  Harmonic Mean Flow = 373 cfs using a drainage area of 739 mi^2
  The Harmonic Mean has been estimated based on average flow and the 7-Q_{10} 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 = 150 mg/L as $CaCO_3$. This value represents the geometric mean of data (n = 93) from sampling done in the Oconto River (January 1988 – June 2015), from the mouth upstream to Gillett, WI.
- % 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 Wolf River in Langlade, WI, is used for this evaluation because there is no data available for the Oconto River. The Wolf River is within the same ecological landscape so ambient water quality characteristics are expected to be similar. Chloride data from the Oconto River at Gillett, WI, is used in this evaluation. The numerical values are shown in the tables in Part 2 of this evaluation, in the columns titled "MEAN BACK-GRD.". 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 and phosphorus are described later in this evaluation.
- Multiple dischargers: There are several other dischargers to the Oconto 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 Oconto River does not have any known impairments at the location of Outfall 001. The Oconto River (stream miles 0 – 9.94 and 9.94 – 14.16), approx. 5.5 mi downstream, is on the Clean Water Act (CWA) Section 303(d) list for mercury contaminated fish tissue. Approx. 19.7 mi downstream, Green Bay/Lake Michigan is on the CWA Section 303(d) list for polychlorinated biphenyls contaminated fish tissue. These impairments do not impact this evaluation due to them being subject to the fish tissue only.

Effluent Information

- Design flow rate(s):
  Annual average = 0.62 million gallons per day (MGD)
  For reference, the actual average flow from January 2018 – February 2024 was 0.390 MGD.
- Hardness = 277 mg/L as $CaCO_3$. This value represents the geometric mean of data (n = 4, January 2022 – February 2022) from the permit application.
- 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 1 industrial contributor (Badger Paper Mill). Water supply from Oconto Falls Municipal Utilities.
- Additives: Ferric chloride for chemical phosphorus treatment.
- Effluent characterization: This facility is categorized as a minor municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus chloride and hardness. The current permit also required monitoring for ammonia nitrogen.
- 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.

Chloride & Copper Effluent Data

Sample Date	Chloride (mg/L)	Copper (µg/L)
01/19/2022	250	9.3
01/25/2022	260	13
01/28/2022	250	15
02/01/2022	250	11
02/08/2022		10
02/11/2022		11
02/14/2022		13
02/17/2022		13
02/22/2022		11
03/09/2022		8.6
03/15/2022		9.3
Mean*	253	
1-day P_{99}		17
4-day P_{99}		14

*"<" means that the pollutant was not detected at the indicated level of detection. The mean concentration was calculated using zero in place of the non-detected results.

The following table presents the average concentrations and loadings at Outfall 001 from January 2018 – February 2024 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter Averages with Limits

	Average Measurement*
BOD_5	5.0 mg/L
TSS	2.9 mg/L
pH field	6.8 s.u.
Fecal Coliform	8.5 #/100 mL
Phosphorus	0.12 mg/L

*Any 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 99th percentile (or P_{99}) 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)

Acute Limits based on 1-Q_{10}

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Code, (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q_{10} receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

$$\text{Limitation} = \frac{(WQC)\,(Qs + (1-f)\,Qe) - (Qs - f\,Qe)\,(Cs)}{Qe}$$

Where:

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

Qs = average minimum 1-day flow which occurs once in 10 years (1-day Q_{10}) if the 1-day Q_{10} flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q_{10}).

Qe = 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

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q_{10} method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for City of Oconto Falls and the limits are set based on two times the ATC.

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)
RECEIVING WATER FLOW = 150 cfs, (1-Q_{10} (estimated as 80% of 7-Q_{10})), 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_{99}	1-day MAX. CONC.
Arsenic		340	679.6	135.9	<0.85		<0.85
Cadmium	277	33.2	66.5	13.3	<0.19		<0.19
Chromium	277	4159	8,318	1,664	1.5		1.5
Copper	277	40.6	81.3			17	15
Lead	277	287	573.2	114.6	<4.3		<4.3
Nickel	268	1,080	2,161	432	8.5		8.5
Zinc	277	294	587.7	117.5	23		23
Chloride (mg/L)		757	1,514	303	253		260

* 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_{10} 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 = 47 cfs (¼ of the 7-Q_{10}), 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_{99}
Arsenic		152.2		7,569	1,514	<0.85	
Cadmium	150	3.38	0.083	164.05	32.8	<0.19	
Chromium	150	184.14	0.125	9,152	1,830	1.5	
Copper	150	14.64	0.26	715.4	143.08		14
Lead	150	41.44	0.182	2,052	410.4	<4.3	
Nickel	150	73.55		3,658	731.6	8.5	
Zinc	150	171.61	0.631	8,504	1,701	23	
Chloride (mg/L)		395	4.1	19,445	3,889	253	

Monthly Average Limits based on Wildlife Criteria (WC)
The effluent characterization did not include any effluent sampling results for substances for which WC exist.

Monthly Average Limits based on Human Threshold Criteria (HTC)
RECEIVING WATER FLOW = 93 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.
Cadmium	370	0.083	36,350	7,270	<0.19
Chromium	3,818,000	0.125	375,175,050	75,035,010	1.5
Lead	140	0.182	13,739	2,749	<4.3

Nickel	43,000		4,225,387	845,077	8.5

Monthly Average Limits based on Human Cancer Criteria (HCC)
RECEIVING WATER FLOW = 93 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.
Arsenic	13.3		1,307	261.38	<0.85

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 not recommended for any toxic substances.** Monitoring recommendations are made in the paragraph(s) below:

Chloride **–** Considering available effluent data from the current permit term (January 2022 – February 2022), the mean effluent concentration is 253 mg/L. This effluent concentration is below the calculated chloride WQBELs; **therefore, no effluent limits are needed. Chloride monitoring is recommended to ensure that 11 sample results are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code.**

Mercury – The permit application did not require monitoring for mercury because the City of Oconto Falls is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code. In accordance with s. NR 106.145(3)(a)3, Wis. Adm. Code, a minor municipal discharger shall monitor, and report results of influent and effluent mercury monitoring once every three months if, "there are two or more exceedances in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5), Wis. Adm. Code." A review of the past 6 years of sludge characteristics data reveals that all the sample results are within expected analytical ranges and well below the 17 mg/kg level. The average concentration was 0.25 mg/kg (n = 6, March 2018 – March 2023), with a maximum reported concentration of 2.4 mg/kg. **Therefore, mercury monitoring is not recommended at Outfall 001.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the type of discharge and the types of indirect dischargers contributing to the collection system, **PFOS and PFOA monitoring is recommended at a once every two months frequency during the reissued permit term.**

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 the City of Oconto Falls does not currently have ammonia nitrogen limits, the need for limits is evaluated at this time.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)
Daily maximum limitations are based on acute toxicity criteria in ch. NR 105, Wis. Adm. Code, which are a function of the effluent pH and the receiving water classification. The acute toxicity criterion (ATC) for ammonia is calculated using the following equation:

$$\text{ATC in mg/L} = [A \div (1 + 10^{(7.204 - pH)})] + [B \div (1 + 10^{(pH - 7.204)})]$$

Where:

A = 0.411 and B = 58.4 for a WWSF community, and
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 2,250 sample results were reported from January 2018 – February 2024. The maximum reported value was 7.5 s.u. (Standard pH Units). The effluent pH was 7.3 s.u. or less 99% of the time. The 1-day P_{99}, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.2 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 7.2 s.u. Therefore, a value of 7.2 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 7.2 s.u. into the equation above yields an ATC = 28.5 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 will be based on the mass balance approach with the 1-Q_{10} low-flow if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits shall apply.

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-Q_{10} (estimated as 80 % of 7-Q_{10}) and the 2×ATC approach are shown below.

Daily Maximum Ammonia Nitrogen Determination

Method	Ammonia Nitrogen Limit (mg/L)
2×ATC	57
1-Q_{10}	4,473

The 2×ATC method yields the most stringent limits for the City of Oconto Falls.

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)
The weekly and monthly average ammonia nitrogen limits calculation from the July 2009 limit evaluation would become less stringent because of the decrease of the annual average design flow of the facility. The most stringent limit is the monthly average limit of 136 mg/L during November – April, which is significantly greater than effluent ammonia nitrogen concentrations most municipal WWTFs can reasonably discharge. Therefore, these limits will not be recalculated at this time. The calculations from the July 2009 limit evaluation are included as attachment #3.

Effluent Data
The following table evaluates the statistics based upon ammonia data reported from January 2018 – February 2024, with those results being compared to the calculated limits to determine the need to include

ammonia limits in the City of Oconto Falls permit for the respective month ranges. That need is determined by calculating 99th upper percentile (or P_{99}) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

Ammonia Nitrogen Effluent Data

Statistics	Conc. (mg/L)
1-day P_{99}	8.7
4-day P_{99}	4.7
30-day P_{99}	2.3
Mean*	1.3
Std	1.9
Sample size	74
Range	<0.025 - 7

*Values lower than the level of detection were substituted with a zero

Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits. **Therefore, ammonia nitrogen limits are not recommended during the reissued permit term.**

The current permit has ammonia nitrogen monitoring required at a monthly frequency. A review of this effluent data shows there are not significant changes in the effluent variability on an annual basis such that one year of monitoring is representative of the effluent variability of multiple years. **Therefore, ammonia nitrogen monitoring is recommended to continue during the reissued permit term at a reduced frequency of monthly for 1 year.**

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 the current 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 – September. No changes are recommended to the current recreational period and the required disinfection season.

Effluent Data
The City of Oconto Falls has monitored effluent *E. coli* from September 2021 – July 2022 and a total of 16 results are available. A geometric mean of 126 counts/100 mL was never exceeded, with a maximum monthly geometric mean of 6.3 counts/100 mL. Effluent data has never exceeded 410 counts/100 mL, with maximum reported value of 12 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** although sampling was missed during August of the recreation season.

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 the City of Oconto Falls 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 0.100 mg/L applies for Oconto River as described in s. NR 102.06(3)(a)29, Wis. Adm. Code.

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 = 0.100 mg/L for Oconto River.
Qs = 100% of the 7-Q_2 of 252 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 = 0.62 MGD = 0.96 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 be calculated as a median using the procedures specified in s. NR

102.07(1)(b) to (c), Wis. Code. All representative data from the most recent 5 years shall be used, but data from the most recent 10 years may be used if representative of current conditions.

The previous limit evaluation (January 2017) resulted in a WQBEL of 16 mg/L using a background concentration of 0.033 mg/L and an effluent flow of 0.68 MGD. Section NR 217.13(2)(d), Wis. Adm. Code, states that the determination of upstream concentrations shall be evaluated at each permit reissuance. Additional data were considered in estimating the background phosphorus concentration.

A review of all available in stream total phosphorus data from the Oconto River shows the background phosphorus concentration is 0.0376 mg/L. This value is based on 9 sample results collected from August 2016 – September 2018 at the Oconto Falls Pond – Deep Hole (SWIMS ID: 10044716). This sample location is approx. 1.0 mi upstream of Outfall 001.

Substituting a median value of 0.0376 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 January 2018 – February 2024. Effluent mass phosphorus data is calculated using the paired concentration and flow data for a given day.

Total Phosphorus Effluent Data

Statistics	Conc. (mg/L)	Mass (lbs/day)
1-day P_{99}	0.493	1.7
4-day P_{99}	0.283	1.0
30-day P_{99}	0.173	0.56
Mean	0.125	0.40
Std	0.0984	0.34
Sample size	957	957
Range	0.029 - 1.837	0 - 6.2

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_{99} of reported effluent total phosphorus data is less than the calculated WQBEL. **Therefore, a phosphorus WQBEL is not recommended during the reissued permit term.**

Mass Limits
A mass limit is also required, pursuant to s. NR 217.14(1)(a), Wis. Adm. Code, in situations where downstream waters qualify as a lake or reservoir. In this case, Lake Michigan is an existing lake, approx. 19.7 mi downstream from Outfall 001. **This final mass limit shall be 1.0 mg/L × 8.34 × 0.62 MGD = 5.2 lbs/day as a monthly average.** The calculated maximum monthly average mass phosphorus loading during January 2018 – February 2024 is 1.1 lbs/day (March 2018 and June 2019). Based on this information and the mass phosphorus statistics, **the City of Oconto Falls can currently meet the mass limit and a compliance schedule is not needed.**

PART 6 – 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 as a daily maximum as described in 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 and there is no reasonable potential for the discharge to exceed this limit. **Therefore, temperature limits or monitoring are not recommended during the reissued permit term.**

PART 7 – 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 (2022).*

- 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_{50} (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_{10} to the effluent flow exceeds 100:1. For the City of Oconto Falls, that ratio is approximately 195:1. With this amount of dilution, there is believed to be little potential for chronic toxicity effects in the Oconto River associated with the discharge from the City of Oconto Falls. **Therefore, chronic WET testing is not recommended during the reissued permit term.**

- 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. Therefore, WET tests performed from June 2005 to present are shown in the table below:

WET Data History

Date Test Initiated	Acute Results LC_{50} %				Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	
03/19/2008	>100	>100	Pass		
05/22/2008	>100	>100	Pass		
09/17/2008	85.22	>100	Fail	No	1
11/13/2008	>100	56.41	Fail	No	1
03/12/2009	>100	>100	Pass	No	1
05/13/2009	>100	>100	Pass	No	1
05/13/2009	>100	>100	Pass		
07/08/2009	>100	>100	Pass	No	1
10/21/2009	>100	>100	Pass		
03/17/2010	>100	>100	Pass		
04/28/2010	>100	>100	Pass		
08/11/2010	>100	>100	Pass		
12/15/2010	>100	>100	Pass		
03/16/2011	>100	>100	Pass		
06/15/2011	>100	>100	Pass		
08/17/2011	>100	>100	Pass		
11/02/2011	>100	>100	Pass		
03/21/2012	>100	>100	Pass		
02/05/2014	>100	>100	Pass		
05/06/2015	>100	>100	Pass		

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.

- 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.

  Acute Reasonable Potential = [(TUa 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_{50}, IC_{25} or $IC_{50} \geq 100\%$).

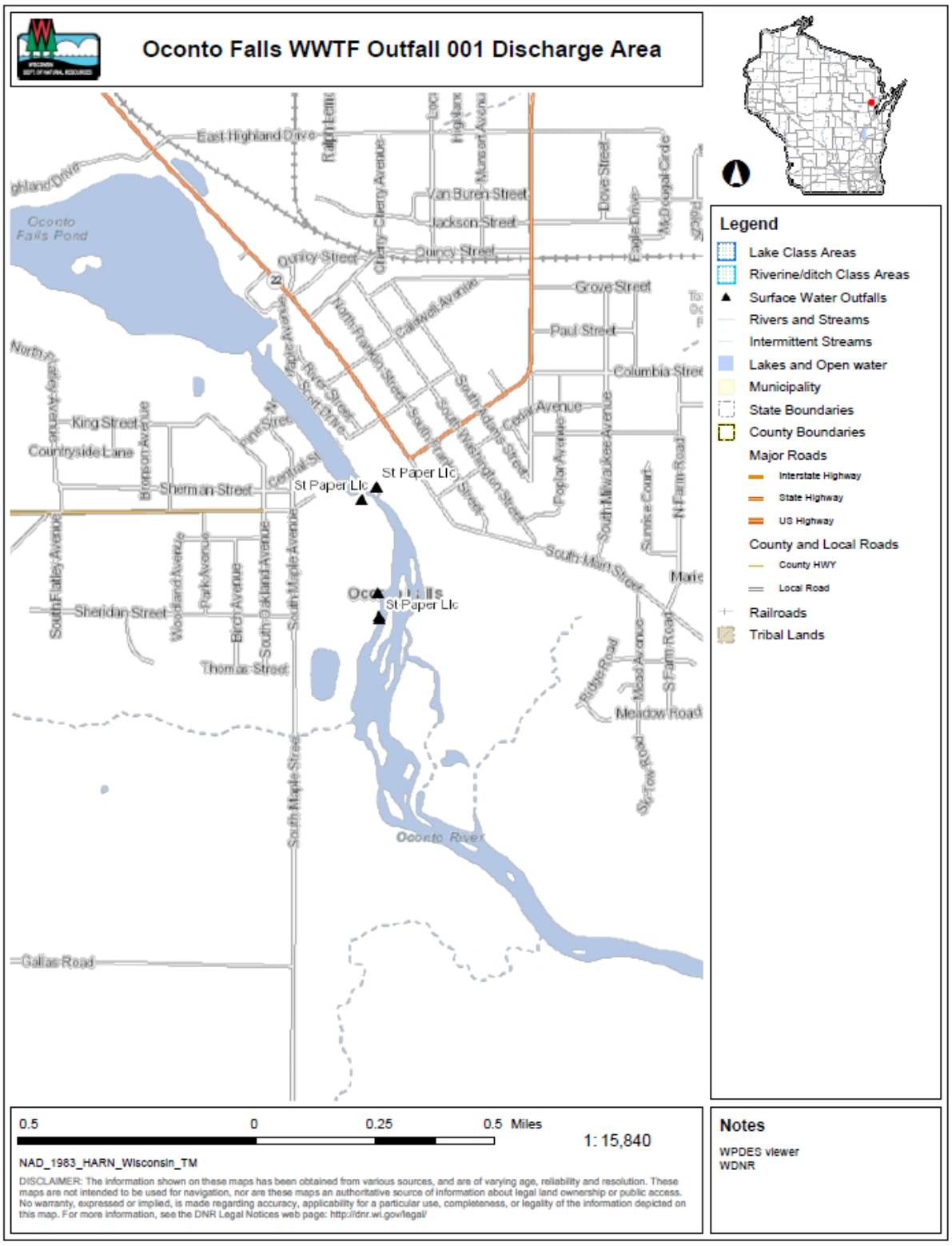
Acute Reasonable Potential = 0 < 1.0, **reasonable potential is not shown, and a limit is not required.**

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

	Acute
AMZ/IWC	Not applicable. **0 Points**
Historical Data	No acute tests available within past 5 years. **5 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. **0 Points**
Receiving Water Classification	WWSF community. **5 Points**
Chemical-Specific Data	No reasonable potential for limits based on ATC; Ammonia nitrogen, chloride, copper, chromium, nickel, and zinc detected. No additional compounds of concern. **3 Points**
Additives	No biocides and one water quality conditioners added. Permittee has proper P chemical SOPs in place: No. **16 Points**
Discharge Category	One industrial contributor. **5 Points**
Wastewater Treatment	Secondary or better. **0 Points**
Downstream Impacts	No impacts known. **0 Points**
Total Checklist Points:	**34 Points**
Recommended Monitoring Frequency (from Checklist):	Three acute tests during permit term.
Limit Required?	No.
TRE Recommended? (from Checklist)	No.

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, **3x acute WET tests are recommended 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). **If a satisfactory phosphorus chemical SOP is established and implemented at the facility prior to permit reissuance, then WET testing can be reduced to 2x acute tests in the reissued permit.**


Oconto Falls WWTF Outfall 001 Discharge Area
East Highland Drive
Van Buren Street
Jackson Street
Quincy Street
Grove Street
Paul Street
Columbia Street
Oconto Falls Pond
King Street
Countryside Lane
Sherman Street
Sheridan Street
Thomas Street
Meadow Road
Gallas Road
Oconto River
St Paper Llc
Legend
Lake Class Areas
Riverine/ditch Class Areas
Surface Water Outfalls
Rivers and Streams
Intermittent Streams
Lakes and Open water
Municipality
State Boundaries
County Boundaries
Major Roads
Interstate Highway
State Highway
US Highway
County and Local Roads
County HWY
Local Road
Railroads
Tribal Lands
0.5 0 0.25 0.5 Miles
1: 15,840
NAD_1983_HARN_Wisconsin_TM
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Notes
WPDES viewer
WDNR

Weekly/Monthly Average Ammonia Nitrogen WQBELs Calculation – July 2009 Limit Evaluation		
Classification: EFFLUENT FLOW (MGD): MAX. EFFLUENT pH (s.u.): (Max. Eff. pH since 2002 = 7.7)	WWSF 0.680 7.7	Oconto River – GL Basin Design Qe for upgraded WWTP 1-day p99, n = 3,709 (1999-2008)
BACKGROUND INFO**:** Ammonia (mg/L, default) Temp. (deg C, default) Eff. pH (s.u., default) % of river flow used: Reference weekly flow (cfs): 7Q10 = 187 cfs Reference monthly flow (cfs): 30Q5 = 227cfs	Summer 0.04 25 8.21 100 187 227	Winter 0.08 3 7.97 25 46.25 56.75
CRITERIA (in mg/L): Acute 4-day Chronic (ELS present) 30-day Chronic (ELS present)	Summer 14.44 2.24 0.90	Winter 14.44 6.35 2.54
EFFLUENT LIMITATIONS: Daily Maximum Limit – No limit recommended Eff. NH3-N 1day - p99 (winter data) = 27.7 mg/L Weekly Ave. Limits – No limit recommended Monthly Ave. Limits – No limit recommended	**Summer** 29 mg/L 396 mg/L 188 mg/L	**Winter** 29 mg/L 285 mg/L 136 mg/L
The summer period is from May to October and winter is from November to April. Limits are not required when calculated values exceed 20 mg/L in summer or 40 mg/L in winter.		