Permit Fact Sheet

General Information

Permit Number:	WI-0028100-10-0	
Permittee Name:	Village of Shiocton	
Address:	PO BOX 26	
City/State/Zip:	Shiocton WI 54170-0026	
Discharge Location:	East bank of the Wolf River, located in the Wolf River/New London and Bear Creek Watershed (WR12), Wolf River Basin	
Receiving Water:	Wolf River in Outagamie County	
StreamFlow ($Q_{7,10}$):	362 cfs	
Stream Classification:	Warmwater Sport Fish Community	
Discharge Type:	Existing, Continuous	
Design Flow(s)	Annual Average	0.151 MGD
Significant Industrial Loading?	Wolf River Tannery	
Operator at Proper Grade?	Yes, the facility is rated as a Basic level facility in subclasses A1, Suspended Growth Processes; B, Solids Separate; C, Biological Solids/Sludge Processing; D, Disinfection; L, Laboratory; and SS, Sanitary Sewage.	
Approved Pretreatment Program?	N/A	

Facility Description

The Village of Shiocton owns and operates a secondary treatment activated sludge wastewater treatment facility. The facility was constructed in 1980, with additional upgrades in 1995. The plant's annual average design flow is 0.151 million gallons per (MGD), and existing flows are approximately 0.104MGD. Treatment consists of a raw sewage wet well, three submersible pumps, comminutor/grinder, backup bar screen, circular primary clarifier, dual secondary-activated sludge aeration basins, and a final clarifier. Treated effluent is seasonally disinfected with gaseous chlorine and ultimately dechlorinated using sodium bisulfite. Waste sludge is treated aerobically and dewatered by screw press and two drying beds. Resultant cake sludge is stored on-site prior to land application on DNR approved sites.

Treated effluent is discharged on a continuous basis via Outfall 001 through 900 feet of pipe to the east bank of the Wolf River, approximately 0.5 miles south of Highway 54 near Old Highway 54.

Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, CMARs, land app reports, compliance schedule items, CMOM, and a site visit on August 31, 2023, this facility has been found to be in substantial compliance with their current WPDES permit.

Compliance determination entered by Barti Oumarou on September 26, 2023.

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)**
701	0.116 MGD (Average October 2017 – January 2024)	Influent: 24-hour flow proportional composite samples shall be collected from the wet well before the comminutor/grinder. The electromagnetic flow meter is located in the discharge pipe after the wet well.
001	0.104 MGD (Average October 2017 – June 2023)	Effluent: 24-hour flow proportional composite samples shall be collected after final clarification, prior to the chlorine contact tank. Grab type samples for pH, total residual chlorine, and fecal coliform shall be taken after the chlorine contact tank. Ultrasonic flow meter located in the chlorine contact tank.
002	15 dry U.S. tons (2022 permit application)	Aerobically digested, Cake, Class B. Representative sludge samples shall be collected from the discharge chute of the Somat Bio-Solids Press.

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	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	2/Week	24-Hr Flow Prop Comp	

Changes from Previous Permit:

No changes from previous permit.

Explanation of Limits and Monitoring Requirements

BOD_5 and Total Suspended Solids: Tracking of BOD_5, and Suspended Solids are required for percent removal requirements found in s. NR 210.05, Wis. Adm. Code and in the standard requirement section of the permit.

2 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	2/Week	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	30 mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	58 lbs/day	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	39 lbs/day	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of TSS and report on the last day of the month on the DMR. See TMDL Calculations section.
Suspended Solids, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of TSS discharged and report on the last day of the month on the DMR. See TMDL Calculations section.
pH Field	Daily Min	6.0 su	5/Week	Grab	
pH Field	Daily Max	9.0 su	5/Week	Grab	
Chlorine, Total Residual	Daily Max	38 ug/L	5/Week	Grab	Limit effective May through September each year.
Chlorine, Total Residual	Weekly Avg	38 ug/L	5/Week	Grab	Limit effective May through September each year.
Chlorine, Total	Monthly Avg	38 ug/L	5/Week	Grab	Limit effective May

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Residual					through September each year.
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit effective May through September each year.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit effective May through September each year.
Nitrogen, Ammonia (NH3-N) Total	Daily Max	24 mg/L	2/Week	Grab	Limit effective November through April each year.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	24 mg/L	2/Week	Grab	Limit effective November through April each year.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	24 mg/L	2/Week	Grab	Limit effective November through April each year.
Nitrogen, Ammonia (NH3-N) Total		mg/L	Monthly	Grab	Monitoring only May through October in 2027 and 2028.
Phosphorus, Total	Monthly Avg	4.5 mg/L	2/Week	Grab	This is an interim limit. The final effluent limits will be 0.78 lbs/day as a monthly average & 0.26 lbs/day and a six-month average per the phosphorus compliance schedule.
Phosphorus, Total		lbs/day	2/Week	Calculated	Monitoring only upon permit effective date. Final TMDL-based mass limits go into effect per the phosphorus compliance schedule. See Phosphorus TMDL section.
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of phosphorus and report on the last day of the month on the DMR. See TMDL Calculations section.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of phosphorus discharged and report on

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					the last day of the month on the DMR. See TMDL Calculations section.
Chloride		mg/L	Monthly	Grab	Monitoring only January through December in 2028.
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.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	Grab	Annual in rotating quarters. See Nitrogen Series Monitoring section.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	Grab	Annual in rotating quarters. See Nitrogen Series Monitoring section.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. 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.

Changes from Previous Permit

Total Suspended Solids TMDL Limits: Mass based TSS limits of 58 lbs/day as a weekly average and 39 lbs/day as a monthly average have been added to the permit to comply with requirements of the Upper Fox Wolf River TMDL. Effluent concentration (mg/L) shall be monitored and reported 2 times per week upon permit reissuance and will be used to calculate amounts reported for mass-based limits. An additional reporting requirement for lbs/month will be used to calculate the facility's 12-month rolling sum of total monthly discharge, which can be compared directly to the facility's designated WLA.

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.

Ammonia: The ammonia limits monitoring frequency has increased from monthly to 2/week. Monitoring monthly for 2 years during May through October has been included in the permit.

Phosphorus TMDL Limits: An interim limit of 4.5 mg/L goes into effect upon reissuance and will remain in effect unless a more stringent limit is required at a future permit issuance by ss. NR 217.13 and NR 217.16(2), Wis. Adm. Code, or the limit is relaxed following procedures outlined in ch. NR 207, Wis. Adm. Code. Discharge effluent concentration

(mg/L) shall be reported 2 times per week upon permit reissuance and will be used to calculate amounts reported for mass-based parameters. An additional reporting requirement for lbs/month will be used to calculate the facility's 12-month rolling sum of total monthly discharge, which can be compared directly to the facility's designated WLA. Final TMDL WLA-based effluent limits of 0.78 lbs/day as a monthly average and 0.26 lbs/day as a six-month average will go into effect in accordance with phosphorus compliance schedule.

Chloride: Monitoring monthly for 1 year has been included in the permit.

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

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

Explanation of Limits and Monitoring Requirements

Please refer to the Water Quality Based Effluent Limitations memo for the Shiocton Wastewater Treatment Facility prepared by Michael Polkinghorn dated August 23, 2023, and used for this reissuance.

BOD_5 and pH Categorical Limits: No changes are recommended in the categorical permit limitations for BOD_5, TSS, and pH. Because the 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. Where the receiving water is classified as fish and aquatic life (Warm Water Sport Fish in this case) as defined in s. NR 102.04(3)(b), Wis. Adm. Code the categorical limits for BOD_5, TSS, and pH are those limits enumerated in s. NR 210.05(1)(a)-(c), Wis. Adm. Code.

Upper Fox Wolf River Total Maximum Daily Load (TMDL): The permitted facility is located within the Upper Fox Wolf River Basin Total Maximum Daily Load (TMDL), which was approved by EPA February 27, 2020. The TMDL establishes Waste Load Allocations (WLAs) for point source dischargers and determines the maximum amounts of phosphorus and total suspended solids that can be discharged and still protect water quality. The final effluent limits and monitoring expressed in the permit were derived from and comply with the applicable water quality criterion and are consistent with the assumptions and requirements of the EPA-approved WLAs in the TMDL, which are 78 lbs/yr for phosphorus and 8,937 lbs/yr for TSS for the permitted facility.

The approved TMDL expresses WLAs as lbs/year and lbs/day (maximum annual load divided by 365 days). As outlined in Section 4.6 of the department's 2020 *TMDL Implementation Guidance for Wastewater Permits*, TMDL limits must be given in the permit that are consistent with the TMDL WLA permit limits derived from TMDL and need to be expressed as specified by 40 CFR 122.45 (d), s. NR 212.76 (4), and s. NR 205.065 (7),Wis. Adm. Code, unless determined to be impracticable. Impracticability has already been determined for phosphorus limits as laid out in the phosphorus impracticability agreement that was approved by USEPA in 2012 (see NPDES MOA Addendum dated July 12, 2012 at https://prodoasint.dnr.wi.gov/swims/downloadDocument.do?id=167886175).

> **For phosphorus**, continuously discharging facilities covered by the UFWRB TMDL are given monthly average mass limits. If the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits (averaging period of May through October and November through April) are also included. The equivalent effluent concentration of 0.17 mg/L was calculated for the facility, thus, TMDL based mass limits are expressed as a six-month average and a monthly average equal to three times the six-month average limits.
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> **For TSS**, continuously discharging municipal facilities covered by the UFWRB TMDL are given monthly average and weekly average mass limits. These mass limits are in addition to the categorical concentration limits that are retained.

Facilities with UFWRB TMDL based effluent limits for phosphorus and TSS must report the 12-month rolling sum of total monthly discharge (lbs/yr). If reported 12-month rolling sums exceed the facility's max annual WLA, the facility's mass limits (monthly average and six-month average) may be recalculated using more appropriate CVs or monitoring frequencies when the permit is reissued to bring discharge levels into compliance with the facility's given WLA.

Phosphorus: Phosphorus requirements are based on the Phosphorus Rules that became effective 12/1/2010 as detailed in NR 102 Water Quality Standards and NR 217 Effluent Standards and Limitations for Phosphorus. Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters.

The final phosphorus limits based on the UFWRB TMDL recommended in the August 2023 Water Quality Based Effluent Limitations memo are 0.83 lbs/day as a monthly average and 0.28 lbs/day as a six-month average. These were based on the annual WLA of 78 lbs/yr (0.2 lbs/day), limit multiplier of 1.30, CV = 0.6, weekly monitoring frequency, and calculating a six-month average limit. The appropriate monitoring frequency of 2/week is included in the permit and changes the multiplier to 1.21. Therefore, the updated final phosphorus limits are 0.78 lbs/day as a monthly average and 0.26 lbs/day as a six-month average.

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. 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.

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. Monthly monitoring for 2 years during May through October has been included in the permit to determine the need for limits during that season at the next permit reissuance.

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.The permittee's effluent data shows that there is no reasonable potential to exceed the calculated WQBELs for chloride. Monthly monitoring in 2028 is included in the proposed permit and the data collected will be used to determine reasonable potential for the next reissuance.

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.

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.

The department has been revisiting the sampling frequencies at every facility to evaluate whether current frequencies are appropriate or if an increase is warranted. The frequencies for ammonia and phosphorus were increased to align Shiocton with other facilities of similar size to ensure fairness and in consideration of department guidance on sampling frequencies.

Requirements in administrative code (NR 108, 205, 210, and 214 Wis. Adm. Code) and Sections 283.55, Wis. Stats., were considered, where applicable, when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. The department has determined at this time that the aforementioned changes in monitoring frequency are warranted based on the size and type of the facility.

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. Minor changes have been made to residual chlorine and ammonia.

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	Cake	Fecal Coliform	Incorporation	Land Application	15
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? **No.** 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? **No, design flow is less than 5 MGD.** 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: 002- Cake Sludge

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 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	High Quality	10 mg/kg	Once	Composite	January - December 2026
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	January - December 2026

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

Changes from Previous Permit:

PCB: The timeframe for monitoring PCBs is 2026.

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

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), Wis. Adm. Code. Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07(7), Wis. Adm. Code, for vector attraction requirements. Limitations for PCBs are addressed in s. 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.

Water Extractable Phosphorus: Water extractable phosphorus (WEP) is the coefficient for determining plant available phosphorus from measured total phosphorus. In Wisconsin, the Penn State Method is utilized and is expressed in percent. While a total P may be significant, the WEP may show that only a small percentage of the P is available to plants because of factors such as treatment processes and chemical addition that "tie-up" phosphorus limiting the amount of phosphorus that is plant available. As part of the Wisconsin's nutrient management plan (NMP) requirements, the accounting of all fertilizers must be included over the NMP cycle. The fertilizer value of the waste needs to be communicated to the farmer and accounted for in the NMP.

4 Schedules

4.1 Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus

The permittee shall comply with the WQBELs for Phosphorus as specified. No later than 14 days following each compliance date, the permittee shall notify the Department in writing of its compliance or noncompliance. If a submittal is required, a timely submittal fulfills the notification requirement.

Required Action	Due Date
Operational Evaluation Report: The permittee shall prepare and submit to the Department for approval an operational evaluation report. The report shall include an evaluation of collected effluent data, possible source reduction measures, operational improvements or other minor facility modifications that will optimize reductions in phosphorus discharges from the treatment plant during the period prior to complying with final phosphorus WQBELs and, where possible, enable compliance with final phosphorus WQBELs by **March 31, 2027**. The report shall provide a plan and schedule for implementation of the measures, improvements, and modifications as soon as possible, but not later than **March 31, 2027** and state whether the measures, improvements, and modifications will enable compliance with final phosphorus WQBELs. Regardless of whether they are expected to result in compliance, the permittee shall implement the measures, improvements, and modifications in accordance with the plan and schedule specified in the operational evaluation report. If the operational evaluation report concludes that the facility can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the permittee shall comply with the final phosphorus WQBEL by **March 31, 2027** and is not required to comply with the milestones identified below for years 3 through 9 of this compliance schedule ('Preliminary Compliance Alternatives Plan', 'Final Compliance Alternatives Plan', 'Final Plans and Specifications', 'Treatment Plant Upgrade to Meet WQBELs', 'Complete Construction', 'Achieve Compliance'). STUDY OF FEASIBLE ALTERNATIVES - If the Operational Evaluation Report concludes that the permittee cannot achieve final phosphorus WQBELs with source reduction measures, operational improvements and other minor facility modifications, the permittee shall initiate a study of feasible alternatives for meeting final phosphorus WQBELs and comply with the remaining required actions of this schedule of compliance. If the Department disagrees with the conclusion of the report, and determines that the permittee can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the Department may reopen and modify the permit to include an implementation schedule for achieving the final phosphorus WQBELs sooner than **July 1, 2031.**	03/31/2025
Compliance Alternatives, Source Reduction, Improvements and Modifications Status: The permittee shall submit a 'Compliance Alternatives, Source Reduction, Operational Improvements and Minor Facility Modification' status report to the Department. The report shall provide an update on the permittee's: (1) progress implementing source reduction measures, operational improvements, and minor facility modifications to optimize reductions in phosphorus discharges and, to the extent that such measures, improvements, and modifications will not enable compliance with the WQBELs, (2) status evaluating feasible alternatives for meeting phosphorus WQBELs.	03/31/2026
Preliminary Compliance Alternatives Plan: The permittee shall submit a preliminary compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee’s wastewater treatment facility is necessary to achieve final phosphorus WQBELs, the submittal shall include a preliminary engineering design	03/31/2027

report. If the plan concludes Adaptive Management will be used, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 without the Adaptive Management Plan. If water quality trading will be undertaken, the plan must state that trading will be pursued.	
Final Compliance Alternatives Plan: The permittee shall submit a final compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee's wastewater treatment is necessary to meet final phosphorus WQBELs, the submittal shall include a final engineering design report addressing the treatment plant upgrades, and a facility plan if required pursuant to ch. NR 110, Wis. Adm. Code. If the plan concludes Adaptive Management will be implemented, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 and an engineering report addressing any treatment system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the plan concludes water quality trading will be used, the submittal shall identify potential trading partners. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	03/31/2028
Final Plans and Specifications: Unless the permit has been modified, revoked and reissued, or reissued to include Adaptive Management or Water Quality Trading measures or to include a revised schedule based on factors in s. NR 217.17, Wis. Adm. Code, the permittee shall submit final construction plans to the Department for approval pursuant to s. 281.41, Stats., specifying treatment plant upgrades that must be constructed to achieve compliance with final phosphorus WQBELs, and a schedule for completing construction of the upgrades by the complete construction date specified below. (Note: Permit modification, revocation and reissuance, and reissuance are subject to s. 283.53(2), Stats.) Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	03/31/2029
Treatment Plant Upgrade to Meet WQBELs: The permittee shall initiate construction of the upgrades. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41. Stats. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	06/30/2029
Construction Upgrade Progress Report: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	06/30/2030
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	06/30/2031
Achieve Compliance: The permittee shall achieve compliance with final phosphorus WQBELs. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	07/01/2031

Explanation of Schedule

Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus: Subsection NR 217.17, Wis Adm. Code, allows the department to provide a schedule of compliance for water quality-based phosphorus limits where the permittee cannot immediately achieve compliance. This compliance schedule requires the permittee to comply with the final water quality-based phosphorus limit within 7 years. The duration of this compliance schedule will be re-evaluated upon permit reissuance to determine if the compliance schedule length is still necessary and appropriate. As part of the compliance schedule the permittee is required to submit:

- An Operational Evaluation Report to optimize reductions in phosphorus and proceed with implementation of the plans for reduction;
- A Study of Feasible Alternatives for meeting final phosphorus WQBELs and complying with the remaining required actions of this schedule of compliance;
- A Status Report on compliance alternatives, source reductions, and improvements;
- A Preliminary and Final Compliance Alternatives Plan to select a preferred compliance option for meeting final phosphorus WQBELs; and

Assuming that facility upgrades will be made to comply with the final phosphorus WQBELs, the last steps of the phosphorus compliance schedule are to: submit final plans and specifications for construction, initiate construction, submit construction progress reports, and, finally, complete construction and comply with final phosphorus WQBELs. If an alternative compliance option is selected such as water quality trading or adaptive management, the compliance schedule will be amended to reflect these compliance options through either permit reissuance or permit modification. The permittee may be required to meet the final phosphorus WQBELs sooner than July 1, 2031 (less than 7 years) if the required "Operational Evaluation Report" concludes that the phosphorus WQBEL can be met using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications. Also, the permittee will conduct a "Study of Feasible Alternatives" to determine whether Water Quality Trading or Adaptive Management, either alone or in combination with plant upgrades will allow the plant to meet the phosphorus WQBELs.

It is probable that, in order to consistently comply with the mass limits, Shiocton will need to evaluate and implement any number of the following approaches:

- Plant optimization;
- Phosphorus source reduction;
- Pilot testing of new or additional treatment processes;
- Additional treatment processes;
- Multiple treatment processes;
- Obtaining financing for construction; or
- Potential for adaptive management and/or pollutant trading with upstream contributors, and implementation of such trades.

The Department believes that the compliance schedule suggested in the permit (7 years) provides the appropriate length of time for the permittee to evaluate these options, implement the chosen option, and meet the final phosphorus limits (WQBELs).

4.2 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.	03/31/2025
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.	03/31/2026

Explanation of Schedule

PFOS/PFOA Minimization Plan Determination of Need: 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.

Special Reporting Requirements

None.

Other Comments:

None.

Attachments:

Water Quality Based Effluent Limits

Expiration Date:

March 31, 2029

Justification Of Any Waivers From Permit Application Requirements

No waivers were requested or given from permit application requirements.

Prepared By: BetsyJo Howe, Wastewater Specialist **Date:** 2/20/2024

Updated (based on fact check comments):

Updated (based on public notice comments):

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: August 23, 2023

TO: Sarah Adkins – NER/Oshkosh Service Center

FROM: Michael Polkinghorn – NOR/Rhinelander Service Center

SUBJECT: Water Quality-Based Effluent Limitations for the Shiocton Wastewater Treatment Facility
WPDES Permit No. WI-0028100-10-0

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 Shiocton Wastewater Treatment Facility in Outagamie County. This municipal wastewater treatment facility (WWTF) discharges to the Wolf River, located in the located in the Bear Creek-Wolf River Watershed in the Wolf River Basin. This discharge is included in the Upper Fox/Wolf Rivers Basin (UFWRB) Total Maximum Daily Load (TMDL) as approved by EPA on 02/27/2020. 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	Six-Month Average	Footnotes
Flow Rate						1
BOD_5			45 mg/L	30 mg/L		1, 2
TSS			45 mg/L 58 lbs/day	30 mg/L 39 lbs/day		2, 3
pH	9.0 s.u.	6.0 s.u.				1, 2
E. coli May – September				126 #/100 mL geometric mean		4
Residual Chlorine	38 µg/L		**38 µg/L**	**38 µg/L**		1, 5
Ammonia Nitrogen November – April	24 mg/L		**24 mg/L**	**24 mg/L**		1, 5
Phosphorus						3
Interim				4.5 mg/L		
Final				0.83 lbs/day	0.28 lbs/day	
Chloride						6
PFOS and PFOA						7
TKN, Nitrate+Nitrite, and Total Nitrogen						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. The total suspended solids (TSS) and phosphorus mass limits are based on the TMDL for the UFWRB to address TSS and phosphorus water quality impairments within the TMDL area. The monthly average limit of 4.5 mg/L, based on the maximum monthly average of effluent phosphorus data, will serve as an interim limit during the phosphorus compliance schedule.

4. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
5. 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.
6. Monitoring at a frequency to ensure that 11 samples are available at the next permit issuance.
7. Monitoring at a frequency of once every 2 months is required in accordance with s. NR 106.98(2), Wis. Adm. Code.
8. 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).

No WET testing is required because information related to the discharge indicates low to no risk for toxicity. 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 limit calculation.

PREPARED BY: Michael A. Polkinghorn, E.I.T. – Water Resources Engineer

E-cc: Barti Oumarou, Wastewater Engineer – NER/Oshkosh Service Center
Heidi Schmitt-Marquez, Regional Wastewater Supervisor – NER/Green Bay Service Center
Diane Figiel, P.E., Water Resources Engineer – WY/3
Nathanial Willis, P.E., Wastewater Engineer – WY/3

Attachment #1

Water Quality-Based Effluent Limitations for
Shiocton Wastewater Treatment Facility

WPDES Permit No. WI-0028100-10-0

Prepared by: Michael A. Polkinghorn, E.I.T.

PART 1 – BACKGROUND INFORMATION

Facility Description

The Village of Shiocton owns and operates a secondary treatment activated sludge wastewater treatment facility. The facility was constructed in 1980 with additional upgrades in 1995. Treatment consists of a raw sewage wet well, dual submersible pumps, comminutor/grinder, backup bar screen, circular primary clarifier, dual secondary-activated sludge aeration basins, and a final clarifier. Wastewater is then disinfected during May – September with gaseous chlorine and dechlorinated using sodium bisulfite. Effluent is discharge on a continuous basis via Outfall 001 through 900 ft of pipe to the east bank of the Wolf River, approx. 0.5 mi south of Highway 54 near old Highway 54.

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

Existing Permit Limitations

The current permit, 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_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
Residual Chlorine	38 µg/L		**38 µg/L**	**38 µg/L**	3
Ammonia Nitrogen November – April	24 mg/L		**24 mg/L**	**24 mg/L**	3
Phosphorus					4

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. Monitoring only.

Receiving Water Information

- Name: Wolf River
- Waterbody Identification Code (WBIC): 241300
- 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 values shown below are estimates for the Wolf River at Shiocton, WI. The 7-Q_{10} low flow is based on the 7-Q_{10} low flow (310 cfs) at the USGS station in Keshena, WI multiplied by the ratio of the drainage areas between the USGS stations in Keshena and New London. The 7-Q_2 low flow was determined by multiplying the previous 7-Q_{10} low flow by the ratio (1.46) between the 7-Q_2 (689 cfs) to the 7-Q_{10} (471 cfs) low flows at the USGS station in New London, WI.

  7-Q_{10} = 362 cubic feet per second (cfs)
  7-Q_2 = 530 cfs
  Harmonic Mean Flow = 730 cfs

  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 = 145 mg/L as $CaCO_3$. This value represents the geometric mean of data (n = 6, August 2017 – March 2022) from the Wolf Treatment Plant's chronic whole effluent toxicity (WET) data. The Wolf Treatment Plant if approx. 31 mi upstream of Outfall 001.
- % 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 at New London, WI is used for this evaluation. This location is approx. 20 mi downstream of Outfall 001 so the assimilative capacity of the various substances in the Wolf River upstream of Outfall 001 is expected to be greater than estimated. 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 Wolf 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: There are no known impairments to the Wolf River at this section. The Wolf River is included the UFWRB TMDL area to address TSS and phosphorus impairments in the TMDL area.

Effluent Information

- Design flow rate(s):

  Annual average = 0.151 million gallons per day (MGD)

  For reference, the actual average flow from October 2017 – June 2023 was 0.104 MGD.
- Hardness = 273 mg/L as $CaCO_3$. This value represents the geometric mean of data (n = 4, February 2022 – March 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. Water supply is from 2 wells.
- Total Phosphorus Wasteload Allocation: 78 lbs/year, 0.2 lbs/day (See page 10 of Appendix H of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids Upper Fox and Wolf Basins Report, February 27, 2020*).
- Total Suspended Solids Wasteload Allocation: 8,937 lbs/year, 24 lbs/day (See page 10 of Appendix I of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids Upper Fox and Wolf Basins Report, February 27, 2020*).
- Additives: Chlorine for disinfection and sodium bisulfite for dechlorination.
- 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 required phosphorus monitoring.
- 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.
- Additional historic effluent chloride data (n = 7, February 2003 – December 2012) is used in this evaluation to better determine the need for chloride limits in the reissued permit.

Copper Effluent Data

Sample Date	Conc. (µg/L)	Sample Date	Conc. (µg/L)	Sample Date	Conc. (µg/L)
01/17/2022	13	02/01/2022	25	02/21/2022	26
01/21/2022	14	02/02/2022	27	02/25/2022	31
01/25/2022	13	02/11/2022	23	03/01/2022	17
01/29/2022	17	02/17/2022	14		
1-day P_{99} = 40 µg/L					
4-day P_{99} = 29 µg/L					

Chloride Effluent Data

Sample Date	Conc. (mg/L)	Sample Date	Conc. (mg/L)	Sample Date	Conc. (mg/L)
		12/11/2012	322	02/08/2022	410
02/27/2003	418	12/14/2012	439	02/10/2022	380
03/03/2003	276	12/18/2012	425	02/22/2022	332
11/30/2007	597	12/21/2012	394	03/01/2022	681
1-day P_{99} = 773 mg/L					
4-day P_{99} = 581 mg/L					

The following table presents the average concentrations and loadings at Outfall 001 from October 2017 – June 2023 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

Parameter	Average Measurement*
BOD_5	6.2 mg/L

Attachment #1

TSS	9.2 mg/L
pH field	7.3 s.u.
Fecal Coliform	38 #/100 mL
Residual Chlorine	0.340 µg/L
Ammonia Nitrogen	0.53 mg/L

*Any results below the level of detection (LOD) are 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 = ATC 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 Shiocton WWTF 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 = 290 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.
Chlorine		19.0	**38.1**	7.6	0.340		**100**
Arsenic		340	680	136	<14		<14
Cadmium	273	32.7	65.3	13.1	<0.3		<0.3
Chromium	273	4,108	8,216	1,643	<1.3		<1.3
Copper	273	40.1	80.1			40	31
Lead	273	282	566	113	<3.5		<3.5
Nickel	268	1,080	2,161	432	3.8		3.8
Zinc	273	290	580	116	57		57
Chloride (mg/L)		757	1,514			773	681

* 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 = 91 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}
Chlorine		7.28		2,827	565	0.340	
Arsenic		152.2		59,107	11821	<14	
Cadmium	145	3.29	0.133	1,226	245	<0.3	
Chromium	145	178.82	0.704	69,172	13,835	<1.3	
Copper	145	14.20	1.06	5,104			29
Lead	145	40.03	0.247	15,450	3,090	<3.5	
Nickel	145	71.36		27,713	5,543	3.8	
Zinc	145	166.32	1.8	63,893	12,779	57	
Chloride (mg/L)		395	13.0	148,363			581

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 = 183 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	0.133	289,282	57,856	<0.3
Chromium	3,818,000	0.704	2,986,149,539	597,229,908	<1.3
Lead	140	0.247	109,304	21,861	<3.5
Nickel	43,000		33,631,339	6,726,268	3.8

Monthly Average Limits based on Human Cancer Criteria (HCC)
RECEIVING WATER FLOW = 183 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		10,402	2,080	<14

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 recommended for chlorine.** Monitoring recommendations are made in the paragraphs below:

Total Residual Chlorine – Because chlorine is added as a disinfectant, effluent limitations are recommended to assure proper operation of the de-chlorination system. Section NR 210.06(2)(b), Wis. Adm. Code, states, "When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L." Because the WQBELs are more restrictive, they are recommended instead. **Specifically, a daily maximum limit of 38 µg/L is required.** Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required.

The current permit has the weekly average and monthly average chlorine limits of 38 µg/L to satisfy the expression of limits requirements as described in ss. NR 106.07, and NR 205.065(7), Wis. Adm. Codes. **These are required to be retained during the reissued permit term.**

Chloride – Considering available effluent data historically and from the current permit term (February 2003 – March 2022), the 1-day P_{99} chloride concentration is 773 mg/L, and the 4-day P_{99} of effluent data is 581 mg/L. **These effluent concentrations are below the calculated WQBELs for chloride; 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 Shiocton WWTF 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 in the sludge from October 2017 – November 2022 was 0.264 mg/kg, with a maximum reported concentration of 0.769 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, the effluent flow rate, the types of indirect dischargers contributing to the collection system and/or 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. The current permit has daily maximum, weekly average and monthly average limits during November – April. These limits are re-evaluated at this time due to the following changes:

- Subchapter IV of ch. NR 106, Wis. Adm. Code allows limits based on available dilution instead of limits set to twice the acute criteria.
- The maximum effluent pH has potentially changed.

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 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 1,500 sample results were reported from October 2017 – June 2023. The maximum reported value was 8.0 s.u. (Standard pH Units). The effluent pH was 7.7 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 7.6 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 7.6 s.u. Therefore, a value of 7.6 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 7.6 s.u. into the equation above yields an ATC = 16.49 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 1-Q_{10} low flow method 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	33
1-Q_{10}	20,413

The 2×ATC method yields the most stringent limits for Shiocton WWTF.

This limit is greater than the current daily maximum limit of 24 mg/L. If Shiocton WWTF would like to request an increase to the existing permit limits an assessment of their effluent data consistent with the requirements of ss. NR 207.04(1)(a) and (c), Wis. Adm. Code, must be provided. This evaluation is on a parameter by parameter basis and includes consideration of operations, maintenance and temporary upsets. Without a demonstration of need for a higher limit in accordance with s. NR 207.04, Wis. Adm. Code, the current limits must be continued in the reissued permit. The Department would be unable to increase the limit due to the lack of need as shown via the antidegradation rule (ch. NR 207, Wis. Adm. Code) because the highest reported concentration was 7.6 mg/L during the current permit term.

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)
The weekly and monthly average ammonia nitrogen limits calculation from the previous limit evaluation (June 2008) do not change because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous limit evaluation are included as attachment #3.

Effluent Data
The following table evaluates the statistics based upon ammonia data reported from October 2017 – June 2023, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Shiocton WWTF 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 (mg/L)	November – April
1-day P_{99}	6.6
4-day P_{99}	3.9
30-day P_{99}	1.6
Mean*	0.53
Std	2.27
Sample size	35
Range	<0.1 - 7.6

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

Based on this comparison, limits are not recommended during November – April on the basis of reasonable potential. The current permit has daily maximum, weekly average and monthly average limits during November – April. **Where there are existing ammonia nitrogen limits in the permit, the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:**

> (b) If a permittee is subject to an ammonia limitation in an existing permit, the limitation shall be included in any reissued permit. Ammonia limitations shall be included in the permit if the permitted facility will be providing treatment for ammonia discharges.

Shiocton WWTF was not required in the current permit to monitor ammonia nitrogen at Outfall 001 during May – October so the need for limits during that season cannot be determined at this time. **Monthly monitoring is recommended for 2 years during May – October of the reissued permit term to determine the need for limits during that season at the next permit reissuance.**

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 Shiocton WWTF'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. No changes are recommended to the current recreational period and the required disinfection season.

Effluent Data

The Shiocton WWTF has monitored effluent *E. coli* from May 2021 – September 2021 and a total of 20 results are available. A geometric mean of 126 counts/100 mL was never exceeded with a maximum monthly geometric mean of 14 counts/100 mL. Effluent data has never exceeded 410 counts/100 mL with a maximum reported value of 54.5 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 & TSS

Technology-Based Effluent Limit – Phosphorus

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 Shiocton WWTF does not currently have an existing technology-based limit, the need for this limit in the reissued permit is evaluated. October 2022 mass phosphorus data is not available because phosphorus was not sampled at Outfall 001 during that month. The data in the table below demonstrates that the annual monthly average phosphorus loading is less than 150 lbs/month, which is the threshold for municipalities in accordance with s. NR 217.04(1)(a)1, Wis. Adm. Code. **Therefore, a technology-based limit is not recommended during the reissued permit term.**

Annual Average Mass Total Phosphorus Loading

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
July 2022	3.5	0.95	28
Aug. 2022	2.3	1.5	28
Sept. 2022	1.4	1.8	21
Nov. 2022	1.7	2.2	31
Dec. 2022	2.0	1.8	31
Jan. 2023	1.0	2.4	20
Feb. 2023	0.75	1.8	11
March 2023	0.11	3.7	3.4
April 2023	0.37	4.6	14
May 2023	0.76	2.6	16
June 2023	2.9	0.89	22
		Average =	20

Total P (lbs/month) = Monthly average (mg/L) × total flow (MG/month) × 8.34 (lbs/gallon)
Where total flow is the sum of the actual flow (MGD) for that month.

TMDL Limits – Phosphorus

Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs (*April 2020) and are based on the annual phosphorus WLA given in pounds per year. This WLA found in Appendix H of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Upper Fox and Wolf River Basins (UFWRB TMDL)* report dated February 2020 are expressed as maximum annual loads (lbs/year). For the Shiocton WWTF, these phosphorus WLAs are 78 lbs/yr and 0.2 lbs/day.

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 the phosphorus WQBELs set equal to WLAs would not be consistent with the assumptions and requirements of the TMDL. Therefore, limits given to facilities included in the UFWRB TMDL are given monthly average mass limits and, if the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits are also included. The following equation shows the calculation of equivalent effluent concentration:

TP Equivalent Effluent Concentration = WLA ÷ (365 days/yr * Flow Rate * Conversion Factor)
= 78 lbs/yr ÷ (365 days/yr * 0.151 MGD * 8.34)
= 0.17 mg/L

Since this value is less than 0.3 mg/L, both a six-month average mass limit and a monthly average mass limit are applicable for total phosphorus. The monthly average limit is set equal to three times the six-month average limit.

TP 6-Month Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (78 lbs/yr ÷ 365 days/yr) * 1.30
= 0.28 lbs/day

TP Monthly Average Permit Limit = TP 6-Month Average Permit Limit * 3
= 0.28 lbs/day * 3
= 0.83 lbs/day

The multiplier used in the six-month average calculation was determined according to the implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 1.1. This is the standard deviation divided by the mean of mass data. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived phosphorus permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by any facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as monthly but will be no lower than weekly during the reissued permit term. If a monitoring frequency beyond weekly is used, the stated limits should be reevaluated.

The 6-month average and monthly average mass limits of 0.28 and 0.83 lbs/day respectively are recommended during the reissued permit term for Outfall 001 rounding to 2 significant figures. The limits are equivalent to the concentrations of 0.22 and 0.66 mg/L respectively at an effluent flow of 0.151 MGD.

The UFWRB TMDL establishes TP wasteload allocations to reduce the loading in the entire watershed including WLAs to meet water quality standards for tributaries to the Upper Fox and Wolf River. Therefore, WLA-based WQBELs are protective of immediate receiving waters and TP WQBELs derived according to s. NR 217.13, Wis. Adm. Code are not required.

Since wasteload allocations are expressed as annual loads (lbs/yr), permits with TMDL-derived monthly average permit limits should require the permittee to calculate and report rolling 12-month sums of total monthly loads for TP. Rolling 12-month sums can be compared directly to the annual wasteload allocation.

Interim Limit – Phosphorus
Effluent phosphorus concentration was sampled during November 2019 – June 2023. Mass effluent data is calculated using the concentration data and the actual effluent flow that occurred on the same day.

Phosphorus Effluent Data

Statistics	Conc. (mg/L)	Mass Discharge (lbs/day)
1-day P_{99}	5.8	6.3

4-day P_{99}	3.4	3.4
30-day P_{99}	2.2	1.9
Mean	1.7	1.2
Std	1.1	1.3
Sample Size	42	42
Data Range	0.11 - 4.5	0.097 – 7.9
Date Range	November 2019 – June 2023	

A comparison of the calculated monthly average and 6-month average mass-based effluent phosphorus data with the phosphorus TMDL limits shows the Shiocton WWTF cannot currently meet the limits. Therefore, a compliance schedule and an interim limit are needed in the permit to meet the phosphorus TMDL limits. This limit should reflect a value which the facility is able to currently meet; however, it should also consider the receiving water quality, keeping the water from further impairment. **It is recommended that the interim limit be set equal to 4.5 mg/L as a monthly average,** equal to the maximum monthly average phosphorus value the facility has demonstrated over the current permit term. This value is recommended to allow for operational flexibility when the facility continues phosphorus treatment optimization activities, which often consist of trial and error.

TMDL Limits – TSS

Total Suspended Solids (TSS) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs (*April 2020). This WLA found in Appendix I of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Upper Fox and Wolf Basins (UFW TMDL)* report dated February 2020 are expressed as maximum annual loads (lbs/year). For the Shiocton WWTF, these TSS WLAs are 8,937 lbs/yr and 24 lbs/day.

Revisions to chs. NR 106 and 205, Wis. Adm. Code align Wisconsin water quality-based effluent limits with 40 CFR 122.45(d), which requires WPDES permits to contain the following concentration limits, whenever practicable and necessary to protect water quality:

- Weekly average and monthly average limitations for continuous discharges subject to ch. NR 210.
- Daily maximum and monthly average limitations for all other discharges.

The Shiocton WWTF is a municipal facility and is therefore subject to weekly average and monthly average TSS limits derived from TSS annual WLAs.

TSS Weekly Average Permit Limit = Daily WLA * Weekly multiplier
= (8,937 lbs/yr ÷ 365 days/yr) * 2.37
= 58 lbs/day

TSS Monthly Average Permit Limit = Daily WLA * Monthly multiplier
= (8,937 lbs/yr ÷ 365 days/yr) * 1.59
= 39 lbs/day

The multipliers used in the weekly average and monthly average calculation were determined according to implementation guidance. A coefficient of variation was calculated, based on TSS mass monitoring data, to be 1.9. However, it is believed that the optimization of the wastewater treatment system to

achieve the WLA-derived phosphorus permit limits will also reduce effluent variability with respect to TSS. Thus, the maximum anticipated coefficient of variation expected by any facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies TSS monitoring as 2x/wk; if a different monitoring frequency is used, the stated limits should be reevaluated.

The weekly average and monthly average mass limits of 58 and 39 lbs/day respectively are recommended during the reissued permit term for Outfall 001, rounding to 2 significant figures. The limits are equivalent to the concentrations of 46 and 31 mg/L respectively at an effluent flow of 0.151 MGD. **These TMDL-based mass effluent limitations should be included in the permit along with the currently imposed TSS concentration limits.**

Since wasteload allocations are expressed as annual loads (lbs/yr), permits with TMDL-derived monthly average permit limits should require the permittee to calculate and report rolling 12-month sums of total monthly loads for TSS. Rolling 12-month sums can be compared directly to the annual wasteload allocation.

Effluent TSS concentration was sampled during October 2017 – June 2023. Mass effluent data is calculated using the concentration data and the actual effluent flow that occurred on the same day.

TSS Effluent Data

Statistics	Conc. (mg/L)	Mass Discharge (lbs/day)
1-day P_{99}	81	65
4-day P_{99}	47	37
30-day P_{99}	20	16
Mean	9.2	7.8
Std	19	15
Sample Size	600	595
Data Range	0.8 - 252	0 - 174
Date Range	October 2017 – February 2023	

A comparison of both concentration and mass-based effluent TSS P_{99} statistics with the equivalent concentration and mass-based TSS TMDL limits shows the Shiocton WWTF currently can meet those limits. Therefore, a compliance schedule and an interim limit are not needed in the permit to meet the TSS TMDL limits.

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.

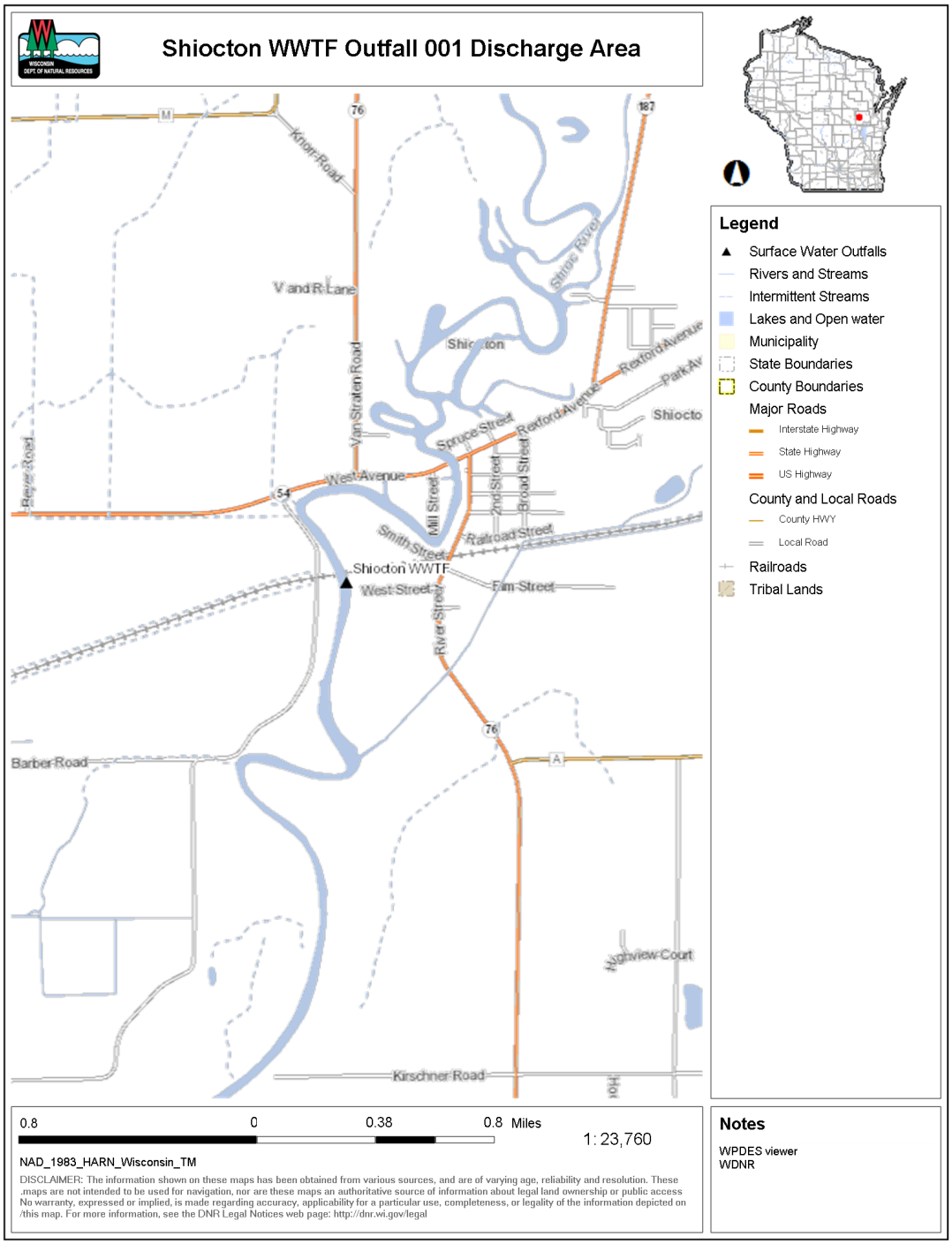
Due to the amount of upstream flow available for dilution in the limit calculation (Qs:Qe >20:1), the lowest calculated limitation is 120° F as a daily maximum as described in s. NR 106.55(6)(a), Wis. Adm.

Code. At temperatures above approx. 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, so 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).*

- Chronic testing is usually not recommended where the ratio of the 7-Q_{10} to the effluent flow exceeds 100:1 and acute testing is not typically recommended if the ratio exceeds 1000:1. For the Shiocton WWTF, this ratio is approximately 1,549:1. With this amount of dilution, there is believed to be little potential for acute or chronic toxicity effects in the Wolf River associated with the discharge from the Shiocton WWTF. **Therefore, WET testing is not recommended during the reissued permit term.**


Shiocton WWTF Outfall 001 Discharge Area
Legend
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
Shiocton WWTF
Van Straten Road
Knorr Road
V and R Lane
Shiocton
Rexford Avenue
Spruce Street
West Avenue
Mill Street
2nd Street
Broad Street
Railroad Street
Smith Street
West Street
Elm Street
River Street
Barber Road
Kirschner Road
Highview Court
Shiocton Creek
0.8 0 0.38 0.8 Miles
1:23,760
NAD_1983_HARN_Wisconsin_TM
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Notes
WPDES viewer
WDNR

Attachment #3

Weekly & Monthly Average Ammonia Nitrogen WQBELs – June 2008 WQBEL Evaluation

		Summer	Winter	Spring
		June – Sept.	**Oct. - March**	**April & May**
Background Information:	7-Q_{10} (cfs)	362	362	362
	7-Q_2 (cfs)	530	530	530
	Ammonia (mg/L)	0.03	0.11	0.04
	Temperature (°C)	25	7	10
	pH (s.u.)	8.21	7.97	8.21
	% of Flow used	100	25	25
	Reference Weekly Flow (cfs)	362	90.5	90.5
	Reference Monthly Flow (cfs)	450.5	112.625	112.625
Criteria mg/L:	4-Day Chronic			
	Early Life Stages Present	2.24	6.35	4.41
	Early Life Stages Absent	2.24	10.31	5.90
	30-Day Chronic			
	Early Life Stages Present	0.90	2.54	1.76
	Early Life Stages Absent	0.90	4.12	2.36
Effluent Limitations mg/L:	Weekly Average			
	Early Life Stages Present	3,433	2,424	1,698
	Early Life Stages Absent		3,962	
	Monthly Average			
	Early Life Stages Present	1,674	1,174	833
	Early Life Stages Absent		1,939	