

Permit Fact Sheet

General Information

Permit Number	WI-0021075-12-0
Permittee Name and Address	Village of Prentice PO Box 78 403 Center Street, PRENTICE, WI 54556
Permitted Facility Name and Address	Village of Prentice 1055 Granberg Road, Prentice, Wisconsin
Permit Term	January 01, 2026 to December 31, 2030
Discharge Location	South bank of the Jump River next to the bridge (NE¼ SW¼ Section 1; T35N-R1E)
Receiving Water	South Fork of the Jump River in Upper South Fork Jump River watershed of Chippewa River (upper) river basin in Price County
Stream Flow (Q _{7,10})	0.52 cfs
Stream Classification	Fish and aquatic life warm water sport fish, Exceptional Resource Water, non-drinking water supply and within the ceded territory.
Wild Rice Impacts <i>(no specific wild rice standards exist at this time)</i>	No impacts identified at this location. The conclusion of no impact is based on no wild rice waters inventoried near the outfall. (Evaluation completed March 2017)
Discharge Type	Existing continuous discharger
Annual Average Design Flow (MGD)	0.081 MGD
Industrial or Commercial Contributors	SpecSys – engineering and equipment manufacturing Biewers – lumber company Multitek North America – forestry equipment V&H – truck sales and service
Plant Classification	A1 - Suspended Growth Processes; B - Solids Separation; C - Biological Solids/Sludges; D - Disinfection; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The Village of Prentice owns and operates a domestic wastewater treatment system. The plant designed to treat 81,000 gallons per day currently treats an average of 65,000 gallons per day (June 2020- June 2025 data). The facility has an activated sludge treatment system which consists of a screen to remove debris from the waste stream. Wastewater then enters aeration chambers (air added) and mixes with activated sludge. Activated sludge, composed of settled solids containing naturally occurring bacteria recycled from the treatment system, works to metabolize organic matter. The water is then pumped into a clarifier where solids are settled out. Some of the settled solids (sludge) are returned to the head of the aeration chambers to re-seed the new wastewater entering the system while the rest of the sludge is sent to waste. The cleaned wastewater (effluent) is seasonally disinfected (May 1 through September 31 annually) by Ultraviolet light before being discharged to the South Fork of the Jump River.

The waste sludge that is removed from the clarifier is treated by bacteria and organisms through aerobic digestion; reducing harmful pathogens to safe levels. Treated sludge is stored as liquid in a storage tank until it is landspread on

department approved agricultural sites. Land application of waste shall be done in accordance with permit conditions and applicable codes. All land application sites are approved prior to their use.

Substantial Compliance Determination

Enforcement During Last Permit:

- There was a Notice of Non-Compliance issued to this facility for failure to complete required Whole Effluent Toxicity (WET) retests associated with a positive for toxicity WET test in 2021. With Department approval, further WET retests and additional WET testing requirements were postponed until completion of the facility upgrade.
- It is expected that with the facility upgrade completed in 2025, further effluent limit exceedances should not occur. However, repeated errors in calculations on monthly DMRs and missed samples should not occur and need to be addressed by the facility. Notices of non-compliance and escalated enforcement actions towards the Prentice WWTF are likely in the future if these problems are not corrected.

After a desk top review of all discharge monitoring reports, CMARs, land app reports, compliance schedule items, and a site visit on 8/27/2024, by Arthur Ryzak, WDNR, the Village of Prentice has been found to be in substantial compliance with their current permit.

Sample Point Descriptions

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	INFLUENT An average of 0.07 MGD (June 2020- June 2025 data)	Representative samples shall be collected from the influent channel to the wastewater treatment plant.
002	EFFLUENT An average of 0.065 MGD (June 2020- June 2025 data)	Representative samples shall be collected at the end of the effluent channel prior to discharge to the South Fork of the Jump River.
003	SLUDGE An estimate of 90 tons per year (information taken from the application)	Samples shall be collected at a location and in a manner that will produce samples representative of the sludge being land applied. The samples shall be collected at a time appropriate for the specific test.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 701- INFLUENT PLANT

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	

Changes from Previous Permit:

Influent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under “Explanation of Limits and Monitoring Requirements” below.

- The **flow rate** sample frequency was changed from “Continuous” to “Daily” to reflect currently acceptable practices at the facility.
- The sample frequency for **BOD5** and **Total Suspended Solids** was increased from twice a week to three times a week to match the effluent monitoring frequency.

Explanation of Limits and Monitoring Requirements

Monitoring of influent flow, BOD5 and total suspended solids is required by s. NR 210.04(2), Wis. Adm. Code, to assess wastewater strengths and volumes and to demonstrate the percent removal requirements in s. NR 210.05, Wis. Adm. Code and the Standard Requirements section of the permit.

2 Surface Water - Monitoring and Limitations

2.1 Sample Point Number: 002- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Daily Total	
BOD5, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through April.
BOD5, Total	Weekly Avg	25 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May through October.
BOD5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through April.
BOD5, Total	Monthly Avg	25 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May through October.
BOD5, Total	Weekly Avg	19 lbs/day	3/Week	Calculated	Limit effective May through October.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Suspended Solids, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through April.
Suspended Solids, Total	Monthly Avg	25 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May through October.
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through April.
Suspended Solids, Total	Weekly Avg	25 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May through October.
Suspended Solids, Total	Weekly Avg	19 lbs/day	3/Week	24-Hr Flow Prop Comp	Limit effective May through October.
pH Field	Daily Min	6.0 su	5/Week	Grab	
pH Field	Daily Max	9.0 su	5/Week	Grab	
Dissolved Oxygen	Daily Min	6.0 mg/L	5/Week	Grab	
Nitrogen, Ammonia (NH3-N) Total	Daily Max	21 mg/L	2/Weekly	24-Hr Flow Prop Comp	Monitoring is effective year-round, but the limit is effective June through September.
E. coli	Monthly Avg	126 #/100 ml	Weekly	Grab	Monitoring and limit effective May through September.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Monitoring and limit effective May through September. See the E. coli Percent Limit permit section. Enter the result in the DMR on the last day of the month.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring shall occur during the 2028 calendar year.
Copper, Total Recoverable	Daily Max	65 ug/L	Monthly	24-Hr Flow Prop Comp	
Copper, Total Recoverable	Weekly Avg	29 ug/L	Monthly	24-Hr Flow Prop Comp	
Copper, Total Recoverable	Monthly Avg	29 ug/L	Monthly	24-Hr Flow Prop Comp	
Copper, Total Recoverable	Daily Max	0.13 lbs/day	Monthly	Calculated	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Copper, Total Recoverable	Weekly Avg - Variable	lbs/day	Monthly	Calculated	Enter the copper result on the eDMR and compare it to the Copper Variable Limit column to determine compliance.
Copper Variable Limit		lbs/day	Monthly	See Table	Look up the applicable copper limit using the permit table in the Alternative Wet Weather Mass Limit section and report the variable limit on the eDMR.
Hardness, Total as CaCO ₃		mg/L	Quarterly	24-Hr Flow Prop Comp	Monitoring should coincide with copper sampling.
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.
Phosphorus, Total	Monthly Avg	0.44 mg/L	Weekly	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	0.3 lbs/day	Weekly	Calculated	
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Nitrogen Series Monitoring permit section for testing schedule.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Nitrogen Series Monitoring permit section for testing schedule.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Total Nitrogen = Total Nitrogen Kjeldahl (mg/L) + Nitrite + Nitrate Nitrogen (mg/L). See the Nitrogen Series Monitoring permit section for testing schedule.
Temperature Maximum		deg F	3/Week	Multiple Grab	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Temperature Maximum	Weekly Avg	54 deg F	3/Week	Multiple Grab	Monitoring is required in November, the limit becomes effective at the end of the Temperature Limits Compliance and Dissipative Cooling Evaluation schedule.
Acute WET	Monthly Avg	1.0 TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	Quarterly monitoring is required during the first year and the limit will begin at the end of the Whole Effluent Toxicity Limit schedule. See the Whole Effluent Toxicity (WET) Testing permit section for details.
Chronic WET	Monthly Avg	1.9 TUC	See Listed Qtr(s)	24-Hr Flow Prop Comp	Quarterly monitoring is required during the first year and the limit will begin at the end of the Whole Effluent Toxicity Limit schedule. See the Whole Effluent Toxicity (WET) Testing permit section for details.

Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under “Explanation of Limits and Monitoring Requirements” below.

- The **flow rate** sample frequency was changed from “Continuous” to “Daily” to reflect currently acceptable practices at the facility.
- The monitoring frequency for **BOD5** and **total suspended solids** has increased from 2 times a week to 3 times a week; **ammonia** has increased from weekly to 2 times a week, and **dissolved oxygen** and **pH** monitoring has been increased from 2 times a week to 5 times a week. The frequency change was implemented to meet standard monitoring frequencies post upgrade which is based on the size and type of the facility.
- **BOD5** and **TSS** weekly average mass limits changed from 21 lb/day to 19 lbs/day due to the change in the annual average design flow after the facility upgrade from 0.1 MGD to 0.081 MGD.
- It was determined an **ammonia** daily maximum limit was needed to protect water quality. The permittee was given a choice of a variable limit year-round or a single limit of 21 mg/L June – September. They chose the single limit effective June - September.
- **Escherichia coli (E. coli)** monitoring and limits have been included.

- **PFOS and PFOA** monitoring once every two months has been included based on indirect discharger(s) that may be a potential source.
- The **phosphorus** monthly average concentration and mass limits have changed from 0.45 mg/L and 0.39 lbs/day to 0.44 mg/L and 0.3 lbs/day due to the change in the annual average design flow after the facility upgrade.
- Annual **Total Nitrogen Monitoring (TKN, NO₂+NO₃ and Total N)** monitoring is required in specific quarters as outlined in the permit.
- A **thermal** weekly average limit for the month of November will be effective at the end to the thermal schedule.
- Quarterly **acute** and **chronic WET** testing has been set for the first year of the permit term. If all test pass during that period, the permittee may request a monitoring reduction to one additional test and waive implementation of the WET limit schedule and limit.

Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo dated March 28, 2025.

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, the need to characterize effluent quality and variability, to detect events of noncompliance, and to ensure 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.

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 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.

PFOS & 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.

Total Nitrogen Monitoring (NO₂+NO₃, TKN and Total N) - The Department has included effluent monitoring for Total Nitrogen through the authority under s. 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 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 as outlined in the permit

Whole Effluent Toxicity (WET) - Due to treatment system updates at the facility and industries with the potential of discharges with variable strengths, past WET testing data from the facility may not be representative of the upgraded facility. Because of this, a WET limit trigger has been set for this permit term to establish more clearly whether changes have removed past toxicity. If a chronic WET test is positive (a failure) during the first year of the permit term, the Whole Effluent Compliance Schedule (Schedule 4.3) will be initiated, requiring the facility to perform a Toxicity Reduction Evaluation (TRE). After the compliance schedule is completed, quarterly monitoring would continue for the remainder of the proposed permit term and daily maximum Acute WET limit of 1.0 TUa and a monthly average Chronic WET limit of 1.9 TUC would become effective. If there are no toxicity positives (failures) of the initial tests fail the permittee may request a reduced schedule to one additional set of tests in 2029 and a waiver from initiating the schedule and associated limit. A permit modification is not required to initiate the changes associated with the WET limit trigger requirements. The Water Quality-Based Effluent Limitations memo dated March 28, 2025 recommended three test during the remainder of the permit term if the initial tests are passing. A consensus among department staff felt that the four initial test and one later in the permit term was adequate to determine compliance.

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>.

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)
003	B	Liquid	Fecal Coliform	Incorporation	Land spreading	90 dry tons/year
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, the most recent sample (0.236 pCi/liter) taken in 2020 was below the threshold.						
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						

3.1 Sample Point Number: 003- Aerobically Digested 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	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
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	
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 (NH ₄ -N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	See the Sludge Analysis for PCBs permit section.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	See the Sludge Analysis for PCBs permit section.
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:

Sludge limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under “Explanation of Limits and Monitoring Requirements” below.

PFAS –Monitoring is required annually pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.

Explanation of Limits and Monitoring Requirements

Requirements for disposal, including 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).

PFAS - The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA has developed a draft risk assessment to determine future land application rates and released this risk assessment in January of 2025. The department is evaluating this new information. Until a decision is made, the “Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS” should be followed

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 this WPDES permit pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9., Wis. Adm. Code.

4 Schedules

4.1 Temperature Limits Compliance and Dissipative Cooling Evaluation

This compliance schedule requires the permittee to achieve compliance by the specified date

Required Action	Due Date
Preliminary Compliance Report: Submit a preliminary compliance report indicating alternatives to achieve the final temperature limits. Informational Note: Refer to the Surface Water subsection titled 'Dissipative Cooling Demonstration - POTW Weekly Average Limits' regarding requests for Department consideration of dissipative cooling per NR 106.59, Wis. Adm. Code, as well as re-evaluation of the limits pursuant to NR 106 Subchapters V & VI or NR 102.26, Wis. Adm. Code.	12/31/2026
Action Plan: Submit an action plan for complying with all applicable effluent temperature limits.	12/31/2027
Construction Plans: Submit construction plans (if construction is required for complying with effluent temperature limits) and include plans and specifications with the submittal.	06/30/2028
Initiate Actions: Initiate actions identified in the plan.	12/31/2028
Complete Actions: Complete actions necessary to achieve compliance with effluent temperature limits.	12/31/2029

Explanation of Schedule

Temperature Limits Compliance and Dissipative Cooling Evaluation - A schedule is included to provide time for the permittee to investigate options for meeting the limit while coming into compliance with the limit as soon as reasonably possible.

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.	12/31/2026
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.	12/31/2027

Explanation of Schedule

PFOS/PFOA Minimization Plan Determination of Need- As stated above, ch. NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Section 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.

4.3 Whole Effluent Toxicity Limit

This compliance schedule requires the permittee to achieve compliance by the specified date

Required Action	Due Date
Toxicity Reduction Evaluation - Part 1: Submit part one of a Toxicity Reduction Evaluation (TRE) plan describing procedures to be used to identify the source(s) responsible for the effluent toxicity. Part one shall be submitted 30 days after the first positive test noted during the first year of the permit term. If no positive tests are collected during that period, the rest of this schedule may be nullified	Within 30 days of a positive result occurring

upon request by the permittee.	prior to 12/31/2026
Implementation - Part 1: Implement part one of the TRE plan, make a reasonable attempt to identify the source(s) of the toxicity, and submit a report to the Department presenting the results of the evaluation.	12/31/2027
Toxicity Reduction Evaluation - Part 2: Submit part two of the TRE Plan describing actions to be taken to reduce or eliminate the toxicity identified in part one of the TRE and the dates by which those actions will be implemented.	01/31/2028
Progress Report: Submit a progress report identifying the actions taken to date to implement part two of the TRE plan.	08/31/2029
Complete Actions: Complete all actions identified in the TRE Plan and achieve compliance with the effluent toxicity limitation.	04/30/2029

Explanation of Schedule

Whole Effluent Toxicity Limit - This schedule requires the facility to perform a Toxicity Reduction Evaluation if the facility has a failed WET test within the first year. Following a failed test the facility shall submit part one of their TRE within 30 days of the failed test.

Attachments

Water Flow Schematic

Water Quality Based Effluent Limits memo dated March 28, 2025

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance

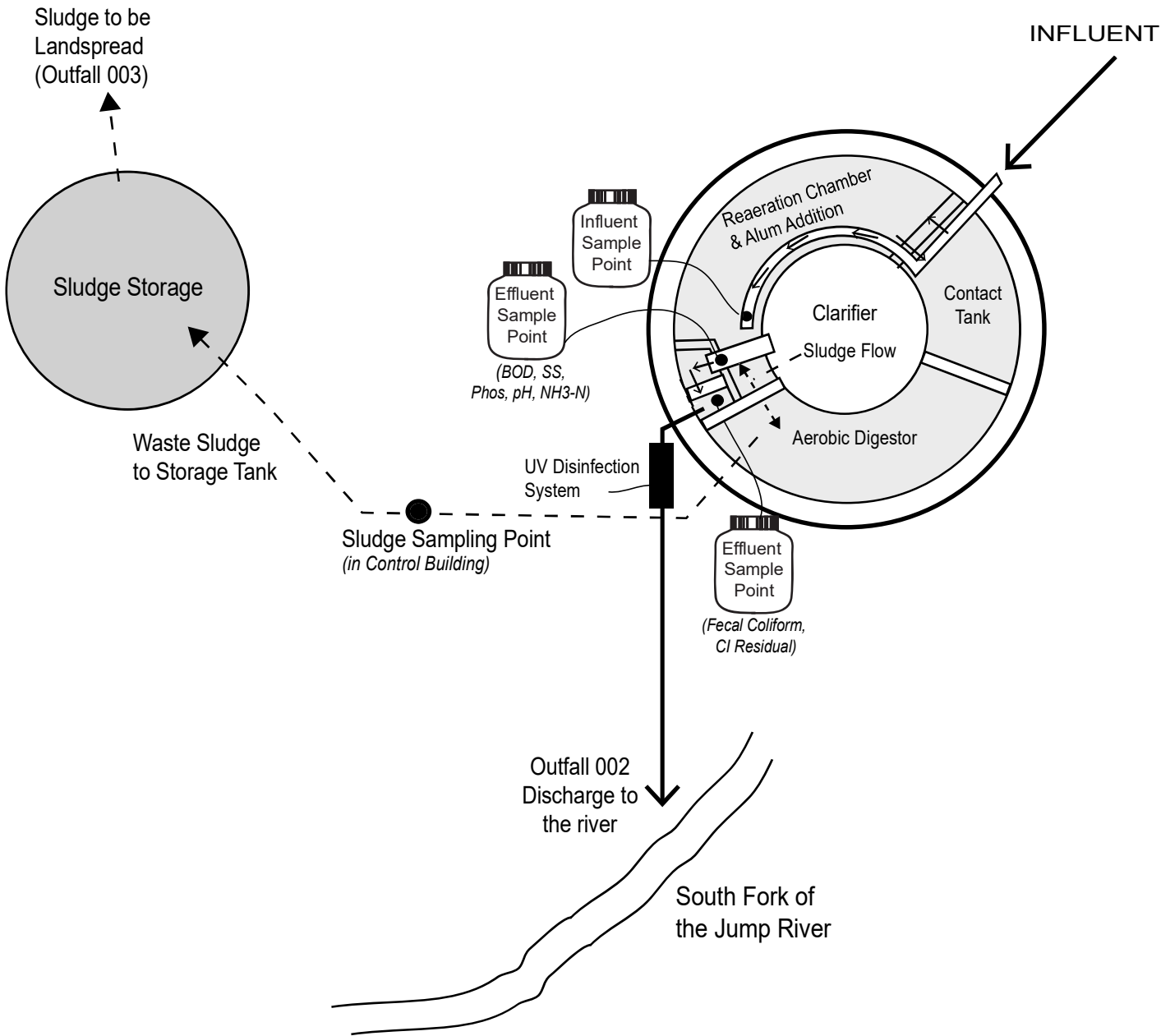
Prepared By: Sheri A. Snowbank

Wastewater Specialist

Date: September 26, 2025

VILLAGE OF PRENTICE Wastewater Treatment Facility

The Prentice wastewater treatment facility consists of an activated sludge package plant. Seasonal disinfection using a UV unit is required from May to September of each year. The effluent is discharged to the South Fork of the Jump River. Sludge is treated in an aerobic digester, stored as a liquid in the storage tank, and spread as a soil conditioner on approved cropland. The diagram below shows the treatment units and sampling locations.



NOT TO SCALE

- Represents Sample Points
- Wastewater Flow
- - - Sludge Flow

Design Flow: 0.081 MGD
Construction Year: 2025

CORRESPONDENCE/MEMORANDUM**State of Wisconsin**

DATE: March 28, 2025

TO: Sheri Snowbank – Spooner/NOR

FROM: Zainah Masri – WY/3

SUBJECT: Water Quality-Based Effluent Limitations for the Village of Prentice
WPDES Permit No. WI-0021075-12-0

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 Village of Prentice in Price County. This municipal wastewater treatment facility (WWTF) discharges to the South Fork of the Jump River located in the Jump River Watershed in the Upper Chippewa River 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 002:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					2
BOD ₅ November – April May – October			45 mg/L 25 mg/L 19 lbs/day	30 mg/L 25 mg/L	1,3
TSS November – April May – October			45 mg/L 25 mg/L 19 lbs/day	30 mg/L 25 mg/L	1
pH	9.0 s.u.	6.0 s.u.			1
Dissolved Oxygen		6.0 mg/L			1
Ammonia Nitrogen June – September or year-round	21 mg/L variable		-	-	9
Bacteria Final Limit <i>E. coli</i>				126 #/100 mL geometric mean	4
Chloride					5
Copper Mass Limit Wet Mass Limit	65 µg/L 0.13 lbs/day		29 µg/L 0.024 lbs/day 0.056 lbs/day	29 µg/L	6,10
Hardness					7
PFOS and PFOA					8
Phosphorus				0.44 mg/L 0.30 lbs/day	
TKN, Nitrate+Nitrite, and Total Nitrogen					11

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Temperature November			54 °F		12
Acute WET	1.0 TUa				13,14
Chronic WET				1.9 TUC	13, 14, 15, 16

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. The previous recommendation in the facility planning memo for the Village of Prentice was 19 lbs/day on August 11, 2021, and thus should be included in the reissued permit.
4. Bacteria limits apply during the disinfection season of May through September. 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. Monitoring at a frequency to ensure that 11 samples are available at the next permit issuance.
6. These are the WQBELs for copper. If this limit is included in the permit, mass limits would also need to be included.
7. Quarterly hardness monitoring is also recommended because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.
8. PFOS and PFOA monitoring is recommended at a once every two months frequency in accordance with s. NR 106.98(2), Wis. Adm. Code.
9. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values may be included in the permit in place of the single limit. These limits apply year-round.

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
6.0 ≤ pH ≤ 6.1	108	7.0 < pH ≤ 7.1	66	8.0 < pH ≤ 8.1	14
6.1 < pH ≤ 6.2	106	7.1 < pH ≤ 7.2	59	8.1 < pH ≤ 8.2	11
6.2 < pH ≤ 6.3	104	7.2 < pH ≤ 7.3	52	8.2 < pH ≤ 8.3	9.4
6.3 < pH ≤ 6.4	101	7.3 < pH ≤ 7.4	46	8.3 < pH ≤ 8.4	7.8
6.4 < pH ≤ 6.5	98	7.4 < pH ≤ 7.5	40	8.4 < pH ≤ 8.5	6.4
6.5 < pH ≤ 6.6	94	7.5 < pH ≤ 7.6	34	8.5 < pH ≤ 8.6	5.3
6.6 < pH ≤ 6.7	89	7.6 < pH ≤ 7.7	29	8.6 < pH ≤ 8.7	4.4
6.7 < pH ≤ 6.8	84	7.7 < pH ≤ 7.8	24	8.7 < pH ≤ 8.8	3.7
6.8 < pH ≤ 6.9	78	7.8 < pH ≤ 7.9	20	8.8 < pH ≤ 8.9	3.1
6.9 < pH ≤ 7.0	72	7.9 < pH ≤ 8.0	17	8.9 < pH ≤ 9.0	2.6

10. 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.
11. 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 (NO₃), nitrite (NO₂), and Total Kjeldahl Nitrogen (TKN) (all expressed as N).
12. A weekly average temperature maximum limit is necessary for the month of November. A compliance schedule may be included in the permit and a dissipative cooling (DC) study conducted in November should be considered. Monitoring is recommended for one year of the permit term.
13. After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above **quarterly acute and quarterly chronic**

WET tests are recommended throughout the permit term 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).

14. According to the requirements specified in s. NR 106.08, Wis. Adm. Code, **acute and chronic WET limits are required.** The acute WET limit shall be expressed as 1.0 TUa as a daily maximum in the effluent limits table of the permit. The chronic WET limit shall be expressed as 1.9 TUc [=100/54] as a monthly average in the effluent limits table of the permit.
15. **It is recommended that an acute and chronic WET limit trigger be placed in the reissued permit.** If all acute and chronic tests pass during the 12 months of testing, then testing can be reduced to three tests throughout the remainder of the permit term to be completed in rotating quarters.
16. The Instream Waste Concentration (IWC) to assess chronic test results is 54%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 75%, 50%, 25% & 12.5% and the dilution water used in WET tests conducted on Outfall 002 shall be a grab sample collected from the South Fork of the Jump River.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Zainah Masri at Zainah.Masri@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (3) – Narrative, Thermal Table and Map

PREPARED BY: Zainah Masri, Water Resources Engineer

APPROVED BY: _____ Date: _____
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Attachment #1
**Water Quality-Based Effluent Limitations for
the Village of Prentice**

WPDES Permit No. WI-00210575-12-00

Prepared by: Zainah Masri

PART 1 – BACKGROUND INFORMATION

Facility Description

The Village of Prentice owns and operates a wastewater treatment plant designed to treat 0.10 million gallons per day. The facility is an activated sludge plant operated in extended aeration mode. The effluent is discharged directly from the package plant to the South Fork of the Jump River through Outfall 002. Seasonal disinfection is required from May 1 through September 30 of each year. One of the two ponds on site which were previously used as polishing ponds is now used as a flow equalization pond. The sludge is treated in an aerobic digester, stored as liquid in the storage tank, and spread as a soil conditioner on approved land.

Attachment #2 is a map of the area showing the approximate location of Outfall 002.

Existing Permit Limitations

The current permit, which expired on September 30, 2024 includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					3
BOD ₅ November – April May – October			45 mg/L 25 mg/L 21 lbs/day	30 mg/L 25 mg/L	1
TSS November – April May – October			45 mg/L 25 mg/L 21 lbs/day	30 mg/L 25 mg/L	1
pH	9.0 s.u.	6.0 s.u.			1
Dissolved Oxygen		6.0 mg/L			1
Ammonia Nitrogen	21 mg/L				2
Fecal Coliform May – September			656#/100 mL geometric mean	400#/100 mL geometric mean	
Copper Dry Weather Mass Wet Weather Mass	65 µg/L 0.13 lbs/day		29 µg/L 0.024 lbs/day 0.056 lbs/day	29 µg/L	4
Zinc					2
Hardness					2
Phosphorus				0.45 mg/L 0.30 lbs/day	
Temperature					3

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Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
WET					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. The monthly average BOD limit of 25 mg/L is listed in the permit as effective November through April however this was a typo and this should apply May through October as included in the table above.
2. Monitoring only
3. Monitoring in November only
4. There is a compliance schedule in place where the final limit is to take effect October 1, 2022.
5. **Acute** and **Chronic** tests shall be conducted three times over the permit period in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

Receiving Water Information

- Name: South Fork of the Jump River
- Waterbody Identification Code (WBIC): 2190900
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Fish and Aquatic Life Warm Water Sport Fish Community, Exceptional Resource Water
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q₁₀ and 7-Q₂ values are from USGS for Station UC23 NE ¼ - SW ¼ of Section 1; T35N – RE1, where Outfall 002 is located.
 $7\text{-}Q_{10} = 0.52 \text{ cfs (cubic feet per second)}$
 $7\text{-}Q_2 = 1.3 \text{ cfs}$
 $90\text{-}Q_{10} = 1.1 \text{ cfs}$
 Harmonic Mean Flow = 5.5 cfs
- Hardness = 99 mg/L as CaCO₃. This value represents the geometric mean of data from WET tests performed from 01/26/1999 – 8/15/2017.
- % 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: Ambient Metals Summary data from South Fork of the Jump River is used for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: None
- Impaired water status: None

Effluent Information

- Design flow rate(s):
 Annual average = 0.081 MGD (Million Gallons per Day)
 Peak daily design = 0.19 MGD
 Peak weekly design = 0.15 MGD

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The annual and daily flows are from the Prentice Effluent Limits Request Letter (February 2021) for the 2041 design year.

For reference, the actual average flow from January 2019 to October 2024 was 0.07 MGD.

- Hardness = 219 mg/L as CaCO₃. This value represents the mean of DMR data from October 2019 to October 2024.
- 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 water from municipal supply wells 2 and 3, and industrial contributors SpecSys, Biewers, Multitek and V&H.
- Additives: none
- 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 ammonia, chloride, hardness and phosphorus.
- Effluent data for substances for which a single sample was analyzed are 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.

Effluent Copper Data

	Copper µg/L
1-day P ₉₉	284
4-day P ₉₉	157
30-day P ₉₉	72
Mean	38
Std	63
Sample size	60
Range	11- 440

Effluent Zinc Data

Sample Date	Zinc µg/L	Sample Date	Zinc µg/L	Sample Date	Zinc µg/L
12/19/2018	43	06/16/2022	51	10/19/2022	45
02/24/2022	63	07/26/2022	41	11/22/2022	32
03/29/2022	36	08/23/2022	28	12/21/2022	49
04/29/2022	29	09/14/2022	21		
1-day P ₉₉ = 76 µg/L					
4-day P ₉₉ = 56 µg/L					

Effluent Chloride Data

Sample Date	Zinc µg/L	Sample Date	Zinc µg/L	Sample Date	Zinc µg/L
12/19/2018	290	06/16/2022	410	10/19/2022	430
02/24/2022	640	07/26/2022	420	11/22/2022	430
03/29/2022	240	08/23/2022	280	12/21/2022	440
04/29/2022	290	09/14/2022	330		
1-day P ₉₉ = 717 µg/L					
4-day P ₉₉ = 532 µg/L					

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The following table presents the average concentrations and loadings at Outfall 002 from January 2019 to October 2024 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code. Please note that the copper average mass discharged was calculated using the average actual flow rate of 0.07 MGD and the average concentration due to the copper measurements being incorrectly reported on the DMR:

Parameter Averages with Limits

	Average Measurement	Average Mass Discharged
BOD ₅	8.0 mg/L*	4.4 lbs/day
TSS	8.1 mg/L	5.0 lbs/day
pH field	7.3 s.u.	-
Phosphorus	0.35 mg/L	0.21 lbs/day
Ammonia Nitrogen	2.0 mg/L*	-
Fecal Coliform	15 #/100 mL	-
Copper	38 µg/L	0.022 lbs/day
Temperature	49 °F	-
Acute WET	1.3 TU _a	-
Chronic WET	2.8 TU _c	-

*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 P₉₉) 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-Q₁₀

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-Q₁₀ 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.

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

Where:

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

Code.

Q_s = average minimum 1-day flow which occurs once in 10 years (1-day Q₁₀)
if the 1-day Q₁₀ flow data is not available = 80% of the average minimum 7-day flow
which occurs once in 10 years (7-day Q₁₀).

Q_e = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

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

C_s = 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-Q₁₀ 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 the Village of Prentice and the limits are set based on two times the acute toxicity criteria.

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

In this case the effluent hardness of 218 mg/L is significantly greater than the receiving water hardness of 99 mg/L with moderate dilution. A mixed hardness based on instream waste concentration (IWC) will be utilized in place of the receiving water hardness to calculate weekly average limits based on chronic toxicity criteria.

$$H_m = \frac{(H_e * IWC) + (H_{rw} * (1 - IWC))}{100}$$

Where:

H_m = Mixed hardness in mg/L

H_e = Effluent hardness = 219 mg/L

H_{rw} = Receiving water hardness = 99 mg/L

IWC = Instream waste concentration = 54 % as calculated in Part 6

After calculation the above equation yields a mixed hardness value of 164 mg/L, which will be utilized as the receiving water hardness for CTC limit calculations.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0.42 cfs, (1-Q₁₀ (estimated as 80% of 7-Q₁₀)), 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	680	136	<1.0		
Cadmium	219	25	51	10	<0.19		
Chromium	219	3426	6853	1371	<0.83		
Copper	219	33	65			38	440
Lead	219	228	456	91	<4.3		
Nickel	219	911	1821	364	3.2		
Zinc	219	239	478			76	63

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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.
Chloride (mg/L)		757	1514			717	640

* The $2 \times$ ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q₁₀ 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 = 0.13 cfs (¼ of the 7-Q₁₀), 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		310	62	<1.0	
Cadmium	164	3.6		7.4	1.5	<0.19	
Chromium	164	198		404	81	<0.83	
Copper	164	16	0.57	32			157
Lead	164	45		92	16	<4.3	
Nickel	164	79		146	29	3.2	
Zinc	164	186		162			56
Chloride (mg/L)		395	4.7	805			532

Monthly Average Limits based on Wildlife Criteria (WC)

The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

Monthly Average Limits based on Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 1.4 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	4429	893	<0.19
Chromium (+3)	3,818,000	457,05,820	91,41,164	<0.83
Lead	7,636	91,412	18,282	3.2
Nickel	43,000	514,759	102,952	3.2

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 1.4 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3	132	26	<1.0

Conclusions and Recommendations

Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are required for copper, and monitoring is continued to require for chloride.

Copper – Considering available effluent data from October 2019 to October 2024 the 1-day P₉₉ concentration is 38 µg/L, with a maximum concentration of 440 µg/L. The maximum effluent concentration of the effluent data exceeds the calculated daily maximum limit, therefore **concentration and mass limits, as well as monthly monitoring, are required to continue.**

The **acute mass limitation of 0.10 lbs/day** is based on the concentration limit and the peak daily design flow rate of 0.19 MGD ($65 \mu\text{g/L} * 0.19 \text{ MGD} * 8.34/1000$) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

The **chronic mass limitation of 0.020 lbs/day** is based on the concentration limit and the annual average design flow rate of 0.081 MGD ($29 \mu\text{g/L} * 0.081 \text{ MGD} * 8.34/1000$) in accordance with s. NR 106.07(2)(c)

In addition, a **weekly average wet weather limit of 0.036 lbs/day is required** using the peak weekly design flow of 0.15 MGD ($29 \mu\text{g/L} * 0.15 \text{ MGD} * 8.34/1000$) based on s. NR 106.07(9).

The peak daily design flow of 0.19 MGD and peak weekly design flow of 0.15 MGD were from the Prentice Effluent Limits Request Letter (February 2021) for the 2041 design year.

Quarterly hardness monitoring is also recommended because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.

Chloride – Considering available effluent data from October 2019 to October 2024 the 1-day P₉₉ chloride concentration is 717 mg/L, and the 4-day P₉₉ of effluent data is 532 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 Village of Prentice 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 five 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 July 2019 to July 2023 was 0.50 mg/kg, with a maximum reported concentration of 1.0 mg/kg. Therefore, **no mercury monitoring is recommended** at Outfall 003.

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 types of indirect dischargers contributing to the collection system, **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,

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Wis. Adm. Code, effective March 1, 2004, which includes criteria based on both acute and chronic toxicity to aquatic life. The current permit has monitoring only. 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.
- Section NR 106.07(3), Wis. Adm. Code requires weekly and monthly average limits for municipal treatment plants.

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 Village of Prentice 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:

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

Where:

A = 0.411 and B = 58.4 for a Warm Water Sport fishery,
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 688 sample results were reported from January 2019 to October 2024. The maximum reported value was 8.00 s.u. (Standard pH Units). The effluent pH was 7.81 s.u. or less 99% of the time. The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.88 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 7.88 s.u. Therefore, a value of 7.88 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 7.88 s.u. into the equation above yields an ATC = 10.51 mg/L.

Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method

In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are calculated using the 1-Q₁₀ receiving water 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-Q₁₀ (estimated as 80 % of 7-Q₁₀) and the 2×ATC approach are shown below.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	21
1-Q	39

The 2×ATC method yields the most stringent limits for Village of Prentice.

Presented below is a table of daily maximum limitations corresponding to various effluent pH values. Use of this table is not necessarily recommended in the permit, but it is presented herein for informational purposes.

Daily Maximum Ammonia Nitrogen Limits – WWSF

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
$6.0 \leq \text{pH} \leq 6.1$	108	$7.0 < \text{pH} \leq 7.1$	66	$8.0 < \text{pH} \leq 8.1$	14
$6.1 < \text{pH} \leq 6.2$	106	$7.1 < \text{pH} \leq 7.2$	59	$8.1 < \text{pH} \leq 8.2$	11
$6.2 < \text{pH} \leq 6.3$	104	$7.2 < \text{pH} \leq 7.3$	52	$8.2 < \text{pH} \leq 8.3$	9.4
$6.3 < \text{pH} \leq 6.4$	101	$7.3 < \text{pH} \leq 7.4$	46	$8.3 < \text{pH} \leq 8.4$	7.8
$6.4 < \text{pH} \leq 6.5$	98	$7.4 < \text{pH} \leq 7.5$	40	$8.4 < \text{pH} \leq 8.5$	6.4
$6.5 < \text{pH} \leq 6.6$	94	$7.5 < \text{pH} \leq 7.6$	34	$8.5 < \text{pH} \leq 8.6$	5.3
$6.6 < \text{pH} \leq 6.7$	89	$7.6 < \text{pH} \leq 7.7$	29	$8.6 < \text{pH} \leq 8.7$	4.4
$6.7 < \text{pH} \leq 6.8$	84	$7.7 < \text{pH} \leq 7.8$	24	$8.7 < \text{pH} \leq 8.8$	3.7
$6.8 < \text{pH} \leq 6.9$	78	$7.8 < \text{pH} \leq 7.9$	20	$8.8 < \text{pH} \leq 8.9$	3.1
$6.9 < \text{pH} \leq 7.0$	72	$7.9 < \text{pH} \leq 8.0$	17	$8.9 < \text{pH} \leq 9.0$	2.6

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

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

Weekly and monthly average limits based on chronic toxicity criteria for ammonia are also calculated to determine the weekly and monthly average limits to meet the requirements of s. NR 106.07(3), Wis. Adm. Code.

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

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

Where:

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

E = 0.854,

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

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

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

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

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q₁₀ (4-Q₃, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q₅ (estimated as 85% of the 7-Q₂ if the 30-Q₅ is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the

flow is used if the Temperature ≥ 16 °C, 25% of the flow is used if the Temperature < 11 °C, and 50% of the flow is used if the Temperature ≥ 11 °C but < 16 °C.

Section NR 106.32 (3), Wis. Adm. Code, provides a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 °C, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the South Fork of the Jump River, based on conversations with local fisheries biologists.

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

Weekly and Monthly Ammonia Nitrogen Limits – WWSF

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
Effluent Flow	Qe (MGD)	0.081	0.081	0.081
Background Information	7-Q ₁₀ (cfs)	0.52	0.52	0.52
	7-Q ₂ (cfs)	1.30	1.30	1.30
	Ammonia (mg/L)	0.07	0.04	0.08
	Temperature (°C)	12	19	4
	Maximum Temperature (°C)	14	21	10
	pH (s.u.)	7.59	7.69	7.72
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	0.26	0.52	0.13
	Reference Monthly Flow (cfs)	0.5525	1.105	0.27625
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	10.04	6.13	8.75
	Early Life Stages Absent	10.09	6.13	11.70
	30-day Chronic			
	Early Life Stages Present	4.01	2.45	3.50
	Early Life Stages Absent	4.03	2.45	4.68
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	30.72	31.39	17.74
	Early Life Stages Absent	30.86	31.39	23.76
	Monthly Average			
	Early Life Stages Present	21.41	23.71	11.03
	Early Life Stages Absent	21.51	23.71	14.83

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from January 2019 to October 2024 with those results being compared to the calculated limits to determine the need to include ammonia limits in the Village of Prentice permit for the respective month ranges. That need is determined by calculating 99th upper percentile (or P₉₉) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

Four samples for ammonia nitrogen were taken from January 2019 October 2024 and their results were as follows:

Ammonia Nitrogen Effluent Data

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Ammonia Nitrogen mg/L	Spring (April – May)	Summer (June – September)	Winter (October – March)
1-day P ₉₉	17.7	21.6	18.6
4-day P ₉₉	10.3	11.9	10.6
30-day P ₉₉	4.43	5.53	4.65
Mean*	1.99	2.95	2.23
Std	4.22	4.74	4.29
Sample size	53	75	121
Range	0.04 - 14.9	0.03 - 17.8	0.029 - 18.8

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

Based on this comparison, daily limits are required in the summer and monitoring is recommended throughout the permit term.

Conclusions and Recommendations

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L
Spring (April - May)	-
Summer (June – September)	21 mg/L
Winter (October – March)	-

In summary, after rounding to two significant figures, a daily maximum ammonia nitrogen limitation of 21 mg/L is recommended for the months of June through September. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

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 Village of Prentice 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 Village of Prentice has monitored effluent *E. coli* from June 2023 to September 2023 and a total of 30 results are available. A geometric mean of 126 counts/100 mL was not exceeded. Effluent data has not exceeded 410 counts/100 mL. The maximum reported value was 37 counts/100 mL. Based on this effluent data it appears that the facility can meet new *E. coli* limits and a compliance schedule is not needed in the reissued permit.

PART 5 – PHOSPHORUS

Technology-Based Effluent Limit

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

Because the Village of Prentice currently has a limit more restrictive than 1.0 mg/L, a TBEL will not need to 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 0.075 mg/L applies for South Fork of the Jump River.

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

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

Where:

WQC = 0.075 mg/L for South Fork of the Jump River.

Q_s = 100% of the 7- Q_2 of 1.3 cfs

C_s = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code

Q_e = effluent flow rate = 0.081 MGD = 0.125 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

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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.

A previous evaluation resulted in a WQBEL of 0.45 mg/L using a background concentration of 0.032 mg/L. 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 12 samples (September 2003 – October 2008) stored in the Surface Water Integrated Monitoring System database indicates the median background total phosphorus concentration in South Fork of the Jump River is 0.031 mg/L, just upstream from the point of discharge to South Fork of the Jump River. The following monitoring station data were considered in estimating the background phosphorus concentration:

SWIMS ID	513156	10029467	10029466	10029465
Station Name	200 ft upstream of Outfall 002	150 m downstream of Prentice Millpond Dam	Prentice Millpond Dam Spillway	South Fork Jump River at Highway 8
Waterbody	South Fork Jump River	South Fork Jump River	Prentice Flowage	South Fork Jump River
Sample Count	9	1	1	1
First Sample	09/23/2003	10/29/2008	10/29/2008	10/29/2008
Last Sample	10/24/2008	10/29/2008	10/29/2008	10/29/2008
Mean	0.032 mg/L	0.030 mg/L	0.028 mg/L	0.027 mg/L
Median	0.031 mg/L	0.030 mg/L	0.028 mg/L	0.027 mg/L

Substituting a median value of 0.031 mg/L into the limit calculation equation above, **the calculated limit is 0.44 mg/L**. The procedures for calculating ambient phosphorus data has been revised in s. NR 217.13 (2)(d) Wis. Adm. Code since the last issuance, which is why the calculated limit is different.

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from January 2019 to October 2024.

Total Phosphorus Effluent Data

	Phosphorus mg/L
1-day P ₉₉	1.4
4-day P ₉₉	0.8
30-day P ₉₉	0.48
Mean	0.35
Std	0.27
Sample size	305
Range	0.027 - 2.3

Reasonable Potential Determination

The Village of Prentice discharge has reasonable potential to cause or contribute to an exceedance of the water quality criterion because the 30-day P₉₉ of reported effluent total phosphorus data is greater than the calculated WQBEL. Therefore, **a WQBEL is required**.

Mass Limits

A mass limit is also required, pursuant to s. NR 217.14(1)(a), Wis. Adm. Code, because the discharge is to a surface water that is to or upstream of an Exceptional Resource Water. **This final mass limit shall be $0.44 \text{ mg/L} \times 8.34 \times 0.081 \text{ MGD} = 0.30 \text{ lbs/day}$ expressed as a monthly average.**

PART 5 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

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

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from January 2019 to June 2024.

The table below summarizes the maximum temperatures reported during monitoring from November 2019 to November 2023.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
JAN	-	-	62	101
FEB	-	-	58	78
MAR	-	-	60	83
APR	-	-	63	75
MAY	-	-	66	75
JUN	-	-	71	79
JUL	-	-	69	79
AUG	-	-	67	80
SEP	-	-	63	83
OCT	-	-	56	85
NOV	62	62	54	93
DEC	-	-	59	98

Reasonable Potential

Permit limits for temperature are recommended based on the procedures in s. NR 106.56, Wis. Adm.

Code.

- An acute limit for temperature is recommended for each month in which the representative daily maximum effluent temperature for that month exceeds the acute WQBEL. The representative daily maximum effluent temperature is the greater of the following:
 - (a) The highest recorded representative daily maximum effluent temperature
 - (b) The projected 99th percentile of all representative daily maximum effluent temperatures
- A sub-lethal limitation for temperature is recommended for each month in which the representative weekly average effluent temperature for that month exceeds the weekly average WQBEL. The representative weekly average effluent temperature is the greater of the following:
 - (a) The highest weekly average effluent temperature for the month.
 - (b) The projected 99th percentile of all representative weekly average effluent temperatures for the month

Comparing the representative highest effluent temperature to the calculated effluent limits determines the reasonable potential of exceeding the effluent limits. The months in which limitations are recommended are shown in bold. Based on this analysis, **a weekly average temperature maximum limit is needed for November.**

The Village of Prentice does not have effluent temperature monitoring data from the current permit term to determine reasonable potential with calculated effluent limits for the other months of the year. Section NR 106.59(2)(b) allows the use of temperature effluent data, on a case-by-case basis, from at least two other POTWs within a 100 mi radius that utilize similar wastewater treatment technology and have a similar ratio of domestic to industrial waste stream composition, or representative data of the POTW. In this case the Village of Rib Lake and the City of Tomahawk WWTFs share similar characteristics to the Village of Prentice, whose effluent temperature data is acceptable to utilize for reasonable potential determination. Although, based on data from similar facilities there is no reasonable potential for the **monitoring is recommended for one year of the permit term.**

Month	Representative Highest Monthly Effluent Temperature				Calculated Effluent Limit	
	Rib Lake WWTF		Tomahawk WWTF		Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	Weekly Average	Daily Maximum	Weekly Average	Daily Maximum		
	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
JAN	45	46	46	48	62	107
FEB	43	45	46	47	61	99
MAR	44	45	46	47	61	96
APR	47	47	49	49	58	91
MAY	55	56	59	62	68	91
JUN	60	61	61	61	82	92
JUL	66	68	65	66	91	95
AUG	66	67	67	67	93	95
SEP	66	67	66	67	81	92
OCT	63	63	64	64	64	83
NOV	58	59	59	59	56	99

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	Representative Highest Monthly Effluent Temperature				Calculated Effluent Limit	
					Daily Maximum Effluent Limitation	
	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
DEC	51	53	53	54	58	96

The following general options are available for a facility to explore potential relief from the temperature limits:

- Effluent monitoring data: Verification or additional effluent monitoring (flow and/or temperature) may be appropriate if there were questions on the representativeness of the current effluent data.
- Monthly low receiving water flows: Contract with USGS to generate monthly low flow estimates for the receiving water to be used in place of the annual low flow.
- Mixing zone studies: A demonstration of rapid and complete mixing may allow for the use of a mixing zone other than the default 25%.
- Dissipative cooling demonstration: Effluent limitations based on sub-lethal criteria may be adjusted based on the potential for heat dissipation from municipal treatment plants as described in s. NR 106.59(4), Wis. Adm. Code.
- Collection of site-specific ambient temperature: default background temperatures for streams in Wisconsin, so actual data from the direct receiving water may provide for relaxed thermal limits but only if the site-specific temperatures are lower than the small stream defaults used in the above tables
- A variance to the water quality standard: This is typically considered to be the least preferable and most complex option as it requires the evaluation of the other alternatives.

These options are explained in additional detail in the August 15, 2013 Department *Guidance for Implementation of Wisconsin's Thermal Water Quality Standards*
<https://dnr.wisconsin.gov/topic/Wastewater/Thermal.html>

PART 6 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. Decisions below related to the selection of representative data and the need for WET limits were made according to ss. NR 106.08 and 106.09, Wis. Adm. Code. WET monitoring frequency and toxicity reduction evaluation (TRE) recommendations were made using the best professional judgment of staff familiar with the discharge after consideration of the guidance in the *Whole Effluent Toxicity (WET) Program Guidance Document* (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 LC₅₀ (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm. Code.

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- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC₂₅ (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 54 shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

$$\text{IWC (as \%)} = Q_e \div \{(1 - f) Q_e + Q_s\} \times 100$$

Where:

Q_e = annual average flow = 0.100 MGD = 0.155 cfs

f = fraction of the Q_e withdrawn from the receiving water = 0

Q_s = 1/4 of the 7-Q₁₀ = 0.52 cfs ÷ 4 = 0.13 cfs

- 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.
- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 002 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.
- Shown below is a tabulation of all available WET data for Outfall 002. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data. Data which is not believed to be representative of the discharge is not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations. Many WET tests were performed for this WWTF, however data collected prior to January 2015 are not used in WET determinations. WWTF upgrades include disinfection change from chlorination to UV light (October 2014) and chemical phosphorus removal (January 2015), which moot data prior to January 2015 of being representative of current effluent discharge conditions.

WET Data History

Date Test Initiated	Acute Results LC ₅₀ %				Chronic Results IC ₂₅ %					Footnotes or Comments
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	<i>C. dubia</i>	Fathead Minnow	Algae (IC ₅₀)	Pass or Fail?	Use in RP?	
01/26/1999	>100	>100	Pass	No	>100	>100		Pass	No	1
07/28/2005	>100	>100	Pass	No	>100	>100		Pass	No	1
05/20/2008	>100	>100	Pass	No	>100	-		Pass	No	2
09/24/2009	>100	>100	Pass	No	>100	>100		Pass	No	2
06/07/2011	-	-	-		79.64	-	-	Fail	No	2
08/09/2011	>100	>100	Pass	No	-	85.6		Fail	No	2

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08/15/2017	>100	>100	Pass	Yes	>100	>100		Pass	Yes	
02/02/2021	78.1	>100	Fail	Yes	35.7	>100		Fail	Yes	
10/26/2021	>100	>100	Pass	Yes	>100	>100		Pass	Yes	
11/09/2021	>100	>100	Pass	Yes	>100	>100		Pass	Yes	

Footnotes:

1. *Data Not Representative.* 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. It may be appropriate to exclude data collected before July 1, 2005, unless 1) it shows repeated toxicity that was never resolved or 2) older data is all that is available, and no significant changes have occurred which obviously make it unrepresentative. Ammonia limits were added to the permit in 2005 based on updated water quality criteria.
 2. *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 = [(TU_a effluent) (B)]

Chronic Reasonable Potential = [(TU_c effluent) (B)(IWC)]

According to s. NR 106.08(6)(d), Wis. Adm. Code, TU_a and TU_c effluent values are equal to zero whenever toxicity is not detected (i.e. when the LC₅₀, IC₂₅ or IC₅₀ ≥ 100%).

Acute Reasonable Potential = [(TU_a effluent) (B)]

Acute WET Limit Parameters

TU _a (maximum) 100/LC ₅₀	B (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)
100/78.1 = [TU _a]	6.2 Based on 1 detects

$$[(TU_a \text{ effluent}) (B)] = (1.3)(6.2) = 7.79 > 1.0$$

Chronic Reasonable Potential = [(TU_c effluent) (B)(IWC)]

Chronic WET Limit Parameters

TU _c (maximum) 100/IC ₂₅	B (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
100/ 35.7 = [TU]	6.2 Based on 1 detects	54%

$$[(TU_c \text{ effluent}) (B)(IWC)] = (2.8)(6.2)(0.54) = 9.4 > 1.0$$

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Therefore, reasonable potential is shown for acute and chronic WET limits using the procedures in s. NR 106.08(6) and representative data from January 1999 to October 2021.

Expression of WET limits

Acute WET limit = 1.0 TU_a (daily maximum)

Chronic WET limit = [100/IWC] TU_c = 100/54=1.9 TU_c expressed as a monthly average

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	Chronic
AMZ/IWC	Not Applicable. 0 Points	IWC = 54 %. 10 Points
Historical Data	4 tests used to calculate RP. 1 test failed. 0 Points	4 tests used to calculate RP. 1 test failed. 0 Points
Effluent Variability	Little variability, history of violations 5 Points	Same as Acute. 5 Points
Receiving Water Classification	Exceptional Resource Water 12 Points	Same as Acute. 12 Points
Chemical-Specific Data	Reasonable potential for limits for ammonia nitrogen and copper based on ATC; Zinc, Chloride, Nickel detected. 8 Points	Reasonable potential for limits for copper based on ATC; Ammonia nitrogen, Zinc, Chloride, Nickel detected. 8 Points
Additives	No Biocides or Water Quality Conditioners added. No P chemicals in use 0 Points	No additives used. 0 Points
Discharge	3 Industrial Contributors.	Same as Acute.

	Acute	Chronic
Category	7 Points	7 Points
Wastewater Treatment	Secondary or Better 0 Points	Same as Acute. 0 Points
Downstream Impacts	No impacts known 0 Points	Same as Acute. 0 Points
Total Checklist Points:	34 Points	43 Points
Recommended Monitoring Frequency (from Checklist):	Quarterly Acute WET testing	Quarterly chronic WET testing
Limit Required?	Yes Limit = 1.0 TU _a	Yes Limit = 1.9 TU _c
TRE Recommended? (from Checklist)	Yes	Yes

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above **quarterly acute and quarterly chronic WET tests are recommended throughout the permit term 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).
- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, **acute and chronic WET limits are required.** The acute WET limit shall be expressed as 1.0 TU_a as a daily maximum in the effluent limits table of the permit. The chronic WET limit shall be expressed as 1.9 TU_c [=100/54] as a monthly average in the effluent limits table of the permit.
- A minimum of **annual acute and chronic monitoring is required because acute and chronic WET limits are required.** Federal regulations in 40 CFR Part 122.44(i) require that monitoring occur at least once per year when a limit is present.
- Historical WET data suggests there is concern for chronic toxicity in this effluent. However, it is questionable whether this WET data is still representative of the current effluent quality. The historical WET data was collected prior to construction of the current WWTF and it is unclear whether the upgraded plant will change effluent toxicity. **Therefore, it is recommended that a chronic WET limit trigger be placed in the reissued permit.**
- Acute WET Limit Trigger: **Acute WET tests should be performed quarterly for 12 months. If all tests pass** during that period and based on the size of the facility and the type of industrial contributors present, acute WET monitoring can be reduced **to three test during the permit term and the acute WET limit and TRE will not be required. If any WET tests fail in the first 12 months, a compliance schedule shall be initiated which requires a TRE to be completed, followed by the imposition of an acute WET limit and quarterly chronic testing for the remainder of the permit term.** The chronic WET limit shall be expressed as 1.0 TU_a as a monthly

average in the effluent limits table of the permit.

- Chronic WET Limit Trigger: **Chronic WET tests should be performed quarterly for 12 months. If all tests pass** during that period and based on the size of the facility and the type of industrial contributors present, chronic WET monitoring can be reduced **to three test during the permit term and the chronic WET limit and TRE will not be required. If any WET tests fail in the first 12 months, a compliance schedule shall be initiated which requires a TRE to be completed, followed by the imposition of a chronic WET limit and quarterly chronic testing for the remainder of the permit term.** The chronic WET limit shall be expressed as 1.9 TUC as a monthly average in the effluent limits table of the permit.

Attachment #2

Temperature Table:

Temperature limits for receiving waters with unidirectional flow													
(calculation using default ambient temperature data)													
Facility:	Village of Prentice				7-Q ₁₀ :	0.52 cfs		Temp Dates	Flow Dates				
Outfall(s):	002				Dilution:	25%		Start:	11/04/19	01/01/19			
Date Prepared:					f:	0		End:	11/29/23	06/23/24			
Design Flow (Q _e):	0.10 MGD				Stream type:	Small warm water sport or forage fish commu ▼							
Storm Sewer Dist.	0 ft				Q _s :Q _e ratio:	0.8 :1							
					Calculation Needed?	YES							
Month	Water Quality Criteria			Receiving Water Flow Rate (Q _s)	Representative Highest Effluent Flow Rate (Q _e)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit		Adjusted Thermal Limits	
	T _a (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Q _{esl}) (MGD)	Daily Maximum Flow Rate (Q _{ea}) (MGD)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation	Weekly Average	Daily Maximum
	(°F)	(°F)	(°F)	(cfs)	(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	0.52	0.066	0.084	0			69	119	69.2	119.3
FEB	34	50	76	0.52	0.081	0.279	0			67	89	66.7	88.6
MAR	38	52	77	0.52	0.113	0.179	0			62	95	62.4	95.4
APR	48	55	79	0.52	0.138	0.361	0			59	86	59.3	86.2
MAY	58	65	82	0.52	0.209	0.434	0			68	87	67.8	86.7
JUN	66	76	84	0.52	0.103	0.113	0			84	97	84.2	97.4
JUL	69	81	85	0.52	0.106	0.118	0			91	96	90.5	96.4
AUG	67	81	84	0.52	0.110	0.125	0			92	95	91.7	95.5
SEP	60	73	82	0.52	0.096	0.118	0			84	98	84.4	97.7
OCT	50	61	80	0.52	0.102	0.118	0			70	101	70.1	101.4
NOV	40	49	77	0.52	0.096	0.099	0	62	62	57	108	56.9	108.4
DEC	35	49	76	0.52	0.068	0.093	0			66	113	66.3	113.2

Attachment #3

Site Map:

