Wonewoc Modified Permit Fact Sheet

General Information

Permit Number	WI-0029688-10-4
Permittee	Village of Wonewoc, 121 West Colvin St, P O Box 37, Wonewoc WI 53968
Permit Term	April 01, 2025 to December 31, 2025
Discharge Type	Continuous, Existing
Industrial or Commercial Contributors	None
Approved Pretreatment Program?	N/A
PREUPGADE (CURRENT) FACILITY	
Preupgrade Permitted Facility:	Wonewoc Wastewater Treatment Facility (WWTF), 121 W Colvin, Wonewoc, WI 53968
Preupgrade Discharge Location:	43.6477 degrees, 90.2236 degrees
Preupgrade Receiving Water:	the Baraboo River in the Crossman Creek/Little Baraboo River watershed of the Lower Wisconsin River Drainage Basin located in Juneau County.
Preupgrade Stream Flow ($Q_{7,10}$):	21.0 cfs
Preupgrade Stream Classification:	Warmwater Sport Fish, Non-public Water Supply
Preupgrade Design Flow(s)	0.142 MGD
Plant Classification- Preupgrade	A2 - Attached Growth Processes; B - Solids Separation; C - Biological Solids/Sludges; D - Disinfection; SS - Sanitary Sewage Collection System
POSTUPGRADE (NEW) FACILITY	
Postupgrade Permitted Facility:	Wonewoc Wastewater Treatment Facility (WWTF), 431 Washington Street, Wonewoc, WI 53968
Postupgrade Discharge Location:	Latitude: 43.647 degrees, Longitude: 90.2254 degrees
Postupgrade Receiving Water:	the Baraboo River in the Crossman Creek/Little Baraboo River watershed of the Lower Wisconsin River Drainage Basin located in Juneau County.
Postupgrade Stream Flow ($Q_{7,10}$):	21.0 cfs
Postupgrade Stream Classification:	Warmwater Sport Fish, Non-public Water Supply
Postupgrade Design Flow(s)	0.147 MGD
Plant Classification- Postupgrade	B - Solids Separation; C - Biological Solids/Sludges; D - Disinfection; SS - Sanitary Sewage Collection System; P Total Phosphorus, A1 Suspended Growth Processes

Facility Description

The Village of Wonewoc owns and operates a wastewater treatment facility (WWTF) with secondary treatment capability for treating domestic wastewater. The current, preupgrade, facility has an annual average design flow of 0.142 million gallons per day (MGD). The preupgrade WWTF has influent fine screening, primary clarification, rotating biological contactors (RBCs), final clarification and aerobic digestion. Effluent is currently disinfected seasonally via chlorination prior to discharge to the Baraboo River. Wonewoc is upgrading their WWTF by building a new WWTF approximately 0.2 miles west of the current WWTF, across the Baraboo River. The effluent outfall to the Baraboo River is approximately 300 yards upstream from the current discharge location, therefore the discharge is considered an existing discharge. The newly constructed (postupgrade) wastewater treatment system involves fine screening, an extended aeration activated sludge package plant and final clarification. Prior to final clarification, ferric chloride will be added for phosphorus removal. In addition, the package plant is capable of biological phosphorus removal. Effluent will be disinfected via ultraviolet light prior to discharge to the Baraboo River.

At the current, preupgrade facility sludge removed from the primary and secondary clarifier is treated in an aerobic digester. At the new, postupgrade WWTF sludge will be removed from the clarifier and treated in an aerobic digester prior to storage in a covered tank. Digested sludge is and will be hauled by United Liquid Waste (ULW) and landspread on ULW's approved sites.

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 sample point at preupgrade WWTF	Representative influent samples to the preupgrade WWTF shall be collected between the fine screen and the Parshall flume. Permittee shall notify the department within 14 days of discontinued influent flow to the pre-upgraded plant so that appropriate monitoring forms can be provided.
702	Influent at new, postupgrade WWTF	Representative influent samples to the postupgrade WWTF shall be collected from the influent forcemain prior to the activated sludge package plant.
001	Effluent outfall from preupgrade WWTF	Representative effluent samples from the preupgrade WWTF shall be collected at the end of the chlorine contact tank and prior to discharge to the Baraboo River. The permittee shall notify the department within 14 days of discontinued use of this outfall so that appropriate reporting forms can be provided.
004	Effluent outfall from postupgrade WWTF	Representative effluent samples from the postupgrade WWTF shall be collected from the UV disinfection structure prior to the UV Bulb Banks. However, grab samples for E. coli ONLY shall be collected after UV light disinfection treatment.
002	Hauled sludge	Representative liquid sludge samples shall be collected prior to hauling and test results shall be reported on Form 3400-49 'Waste Characteristics Report'. Hauled sludge reports shall be reported on Form 3400-52 'Other Methods of Disposal or Distribution Report'.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 701- INFLUENT to PREUPGRADE WWTF and 702- INFLUENT to POSTUPGRADE WWTF

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	

1.1.1 Changes from Previous Permit:

Influent monitoring requirements at Sample Point 701 were evaluated when the permit was originally reissued in December 2021. The only change made during this permit modification is the addition of Sample Point 702 that will track influent flow to the postupgrade WWTF.

1.1.2 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 in the Standard Requirements section of the permit.

2 Surface Water - Monitoring and Limitations

2.1 Sample Point Number: 001- EFFLUENT – CURRENT, PREUPGRADE WWTF

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
BOD5, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
pH Field	Daily Min	6.0 su	Daily	Grab	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
pH Field	Daily Max	9.0 su	Daily	Grab	
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual monitoring required. See Nitrogen Series Monitoring section below& in permit. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual monitoring required. See Nitrogen Series Monitoring section below& in permit.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual monitoring required. See Nitrogen Series Monitoring section below & in permit.
Nitrogen, Ammonia (NH_3-N) Total		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring in years 2023 and 2024 only.
Phosphorus, Total	Monthly Avg	4.0 mg/L	3/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	0.56 lbs/day	3/Week	Calculated	Limit effective 12/31/2025. See Phosphorus section in permit and compliance schedule 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 Phosphorus section(s) below & in permit.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of phosphorus discharged and report on the last day of the month on the DMR. See Phosphorus section below & in permit.
Chlorine, Total	Daily Max	38 ug/L	Daily	Grab	Limit and monitoring apply

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Residual					May-Sept
Chlorine, Total Residual	Weekly Avg	38 ug/L	Daily	Grab	Limit and monitoring apply May-Sept
Chlorine, Total Residual	Monthly Avg	38 ug/L	Daily	Grab	Limit and monitoring apply May-Sept
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit and monitoring apply May-Sept
E. coli	Geometric Mean - Monthly	10 Percent	Monthly	Calculated	Limit and monitoring apply May-Sept. See the E. coli Percent Limit section in the permit. Enter the result in the DMR on the last day of the month.

2.1.1 Changes from Previous Permit

For permit modification -04, no changes were made to the limits or monitoring requirements made to Outfall 001, the outfall that tracks the treated effluent from the preupgrade WWTF.

2.1.2 Explanation of Limits and Monitoring Requirements – Outfall 001

Detailed discussions of limits and monitoring requirements for Outfall 001 (preupgrade outfall) can be found in the following documents: the WQBEL memo from Pat Oldenburg to Angela Parkhurst dated July 18, 2017, the TMDL addendum memo from Wade Strickland to Angela Parkhurst dated August 12, 2019, and the E. coli addendum memo form Wade Strickland to Tim Ryan dated May 1, 2020.

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 and monthly average whenever practicable.

BOD5, Total Suspended Solids and pH- Categorical limits and WQBELs are included in the permit as outlined in ch. NR 210, 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. Testing is required annually; see permit for specific quarter and information about additional testing if the permit is not reissued on time during the next reissuance.

Phosphorus- Chapter NR 217, Wis. Adm. Code. specifies WQBELs (water quality-based effluent limits) for discharges of phosphorus to surface waters of the state. WQBELs for phosphorus are needed whenever the discharge contains phosphorus at concentrations or loadings that will cause or contribute to an exceedance of the water quality standards.

Wonewoc is included within the Wisconsin River Basin (WRB) total maximum daily load (TMDL), which was approved by EPA April 26, 2019. The TMDL establishes Waste Load Allocations (WLAs) for point source dischargers and

determines the maximum amount of phosphorus that can be discharged and still protect water quality. The final effluent limits and monitoring expressed in the permit were derived from Site-Specific Criteria (SSC) for Lakes Petenwell, Castle Rock, and Wisconsin originally included in Appendix K of the TMDL report and approved by the U.S. Environmental Protection Agency on July 9, 2020. The permittee's approved SSC-based WLA for this permittee at the preupgrade WWTF is 158 lbs/yr and results in a calculated phosphorus mass limit of 0.56 lbs/day expressed as a monthly average.

Facilities with WRB TMDL based effluent limits for phosphorus 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) 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.

Disinfection/*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. At the preupgrade WWTF the facility seasonally chlorinates the effluent prior to discharge to Baraboo River. Therefore, chlorine limits apply at Outfall 001 for the preupgrade WWTF.

2.2 Sample Point Number: 004- EFFLUENT – NEW, POSTUPGRADE WWTF

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	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
pH Field	Daily Min	6.0 su	Daily	Grab	
pH Field	Daily Max	9.0 su	Daily	Grab	
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual monitoring required. See Nitrogen Series Monitoring section below & in permit. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite +

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					Nitrate Nitrogen.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual monitoring required. See Nitrogen Series Monitoring section in permit.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual monitoring required. See Nitrogen Series Monitoring section in permit.
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit & monitoring apply May-Sept
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit & monitoring apply May-Sept. See the E. coli Percent Limit section below and in permit. Enter the result in the DMR on the last day of the month.
Phosphorus, Total	Monthly Avg	3.1 mg/L	3/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	0.63 lbs/day	3/Week	Calculated	See TMDL section below & in permit.
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 section below & in permit.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of phosphorus discharged and report on the last day of the month on the DMR. See TMDL section below & in permit.

2.2.1 Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and the significant change is the addition of Outfall 004 that will track effluent from the postupgrade WWTF. See additional explanation of limits under "Explanation of Limits and Monitoring Requirements" below.

2.2.2 Explanation of Limits and Monitoring Requirements at Outfall 004

Detailed discussions of limits and monitoring requirements can be found in the attached facility planning water quality-based effluent limits (WQBEL) memo dated June 18, 2021 from Ben Hartenbower to Emma Lorenzen.

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 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. No changes in monitoring frequency are proposed for Outfall 004, from Outfall 001.

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 and monthly average whenever practicable.

BOD5, Total Suspended Solids and pH- Categorical limits and WQBELs are included in the permit as outlined in ch. NR 210, 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. Testing is required annually; see permit for specific quarter and information about additional testing if the permit is not reissued on time during the next reissuance.

Disinfection/*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. At the postupgrade WWTF the facility will seasonally disinfect the effluent via ultraviolet (UV) light prior to discharge to the Baraboo River. Therefore, the chlorine limits recommended in the facility planning limits memo are not included at Outfall 004 for the postupgrade WWTF.

Phosphorus- Chapter NR 217, Wis. Adm. Code. specifies WQBELs (water quality-based effluent limits) for discharges of phosphorus to surface waters of the state. WQBELs for phosphorus are needed whenever the discharge contains phosphorus at concentrations or loadings that will cause or contribute to an exceedance of the water quality standards.

Wonewoc is included within the Wisconsin River Basin (WRB) total maximum daily load (TMDL), which was approved by EPA April 26, 2019. The TMDL establishes Waste Load Allocations (WLAs) for point source dischargers and determines the maximum amount of phosphorus that can be discharged and still protect water quality. The final effluent limits and monitoring expressed in the permit were derived from Site-Specific Criteria (SSC) for Lakes Petenwell, Castle Rock, and Wisconsin originally included in Appendix K of the TMDL report and approved by the U.S. Environmental Protection Agency on July 9, 2020. The permittee's approved SSC-based WLA for this permittee at the postupgrade WWTF is 158 lbs/yr and results in a calculated phosphorus mass limit of 0.63 lbs/day expressed as a monthly average.

Facilities with WRB TMDL based effluent limits for phosphorus 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) 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.

3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	**Sludge Class (A or B)**	**Sludge Type (Liquid or Cake)**	**Pathogen Reduction Method**	**Vector Attraction Method**	**Reuse Option**	**Amount Reused/Disposed (Dry Tons/Year)**
002	B	Liquid	At the preupgrade and postupgrade WWTF, digested sludge is and will be hauled by United Liquid Waste (ULW) and landspread on ULW's approved sites.			
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						
Is a priority pollutant scan required? No Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

3.1 Sample Point Number: 002- PRIOR TO HAULING

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Annual	Grab	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Grab	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Grab	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Grab	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Grab	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Grab	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Grab	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Grab	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Grab	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Grab	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Grab	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Grab	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Grab	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Grab	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Grab	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Grab	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Grab	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Grab	

3.1.1 Changes from Previous Permit:

No changes in the permit modification. The permittee will have their sludge hauled at the preupgrade and postupgrade WWTF.

3.1.2 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).

4 Schedules

4.1 Effluent Limitations for Phosphorus

Required Action	Due Date
Facility Plan: Submit a Facility Plan that evaluates feasible alternatives for meeting the final Wisconsin River Total Maximum Daily Load (TMDL) Limits based on site-specific criteria for phosphorus which may include: facility upgrading, consolidation with other sewerage systems, alternative effluent discharge locations, the Watershed Adaptive Management Option, Water Quality Trading Plan or a water quality standards variance.	12/31/2021
Construction Plans and Specifications: Submit construction plans and specifications for approval if the approved Facility Plan calls for upgrading the treatment facility.	12/31/2022
Progress Report: Submit a progress report on meeting the final Wisconsin River Total Maximum Daily Load (TMDL) Limits based on site-specific criteria for phosphorus.	12/31/2023
Progress Report: Submit a progress report on meeting the final Wisconsin River Total Maximum Daily Load (TMDL) Limits based on site-specific criteria for phosphorus.	12/31/2024
Complete Actions: Complete actions to meet the final Wisconsin River Total Maximum Daily Load (TMDL) Limits based on site-specific criteria for phosphorus. Comply with the new phosphorus final limits.	12/31/2025

Other Comments

Publishing Newspaper: The Hillsboro Sentry Enterprise, Hillsboro, 839 Water Ave, Hillsboro, WI

Attachments

Facility Planning Water Quality Based Effluent Quality Based Effluent Limitations for the Wonewoc Wastewater Treatment Facility WPDES Permit No. WI-0029688

Justification Of Any Waivers From Permit Application Requirements

N/A

Prepared By: Holly Heldstab, Wastewater Specialist **Date:** February 10, 2025

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: June 18, 2021

TO: Emma Lorenzen – WY/3

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Planning Water Quality-Based Effluent Limitations for the Wonewoc Wastewater Treatment Facility
WPDES Permit No. WI-0029688

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 Wonewoc Wastewater Treatment Facility in Juneau County. This municipal wastewater treatment facility (WWTF) discharges to the Baraboo River, located in the Crossman Creek and Little Baraboo River Watershed in the Lower Wisconsin River Basin. This discharge is included in the Wisconsin River TMDL as approved by EPA on April 26, 2019 with site-specific criteria approved by EPA on July 9, 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	Footnotes
BOD_5			45 mg/L	30 mg/L	1
TSS			45 mg/L	30 mg/L	1
pH	9.0 s.u.	6.0 s.u.			1
Bacteria					1,2
Interim Limit Fecal Coliform				400 #/100 mL geometric mean	
Final Limit *E. coli*				126 #/100 mL geometric mean	
Residual Chlorine	38 µg/L		**38 µg/L**	**38 µg/L**	1,3
Phosphorus				3.1 mg/L 0.63 lbs/day	4
Nitrite + Nitrate					1,5,6
Nitrogen, Total Kjeldahl					1,5,6
Total Nitrogen					1,5,6

Footnotes:

1. No changes from the current permit.
2. Bacteria limits apply during the disinfection season of May through September. The fecal coliform interim limit will apply until the end of the compliance schedule when *E. coli* limits take effect. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
3. Limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7) are included in bold.
4. The phosphorus mass limit is based on the Total Maximum Daily Load (TMDL) for the Wisconsin River Basin to address phosphorus water quality impairments within the TMDL area.

The TMDL was approved by EPA on April 26, 2019 with site-specific criteria approved by EPA on July 9, 2020.

5. Monitoring only.
6. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen (total kjeldahl nitrogen and nitrate/nitrite) monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total kjeldahl nitrogen (all expressed as N).

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Benjamin Hartenbower at (715) 225-4705 or Benjamin.Hartenbower@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (2) – Narrative & Map

PREPARED BY: _____ Date: 6/18/2021

Benjamin Hartenbower, PE,
Water Resources Engineer

E-cc: Pete Pfefferkorn, Wastewater Engineer – WCR/Wisconsin Rapids
Geisa Thielen, Regional Wastewater Supervisor – WCR/Eau Claire
Diane Figiel, Water Resources Engineer – WY/3
Scott Provost, Water Quality Biologist – WCR/Wisconsin Rapids

Attachment #1

Water Quality-Based Effluent Limitations for
Wonewoc Wastewater Treatment Facility

WPDES Permit No. WI-0029688

Prepared by: Benjamin P. Hartenbower

PART 1 – BACKGROUND INFORMATION

Facility Description:
The Village of Wonewoc is completing a facility planning study of their Wastewater Treatment Facility (WWTF). The study is to identify the most cost effective and environmentally beneficial treatment alternative that can meet future WPDES permit requirements and to address the critical issues associated with the existing treatment processes and structures.

The Village of Wonewoc owns and operates a WWTF that servers residential, commercial, public, and industrial users of the wastewater collection system. Wastewater treatment for the service area consists of influent screen, raw wastewater pumps, influent flow measurement, primary clarifier, rotating biological contractor (RBC), final clarifier, influent and effluent sampling, chlorine disinfection, and an aerobic digester. Final effluent discharges to the Baraboo River, located in the Crossman Creek/Little Baraboo River Watershed of the Lower Wisconsin River Drainage Basin in Juneau County.

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

Existing Permit Limitations: The current permit, expiring on December 31, 2025, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
BOD_5			45 mg/L	30 mg/L	1
TSS			45 mg/L	30 mg/L	1
pH	9.0 s.u.	6.0 s.u.			1
Bacteria					
Interim Limit Fecal Coliform				400 #/100 mL geometric mean	2
Final Limit *E. coli*				126 #/100 mL geometric mean	
Residual Chlorine	38 µg/L		38 µg/L	38 µg/L	
Phosphorus Interim Final				4.0 mg/L 0.56 lbs/day	3
Nitrite + Nitrate					4
Nitrogen, Total Kjeldahl					4
Total Nitrogen					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. Bacteria limits apply during the disinfection season of May through September. The fecal coliform interim limit will apply until the end of the compliance schedule when *E. coli* limits take effect. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL
3. A compliance schedule is in the current permit to meet the phosphorus mass limit based on the Total Maximum Daily Load (TMDL) for the Wisconsin River Basin by January 1, 2024.
4. Monitoring only.

Receiving Water Information:

- Name: Baraboo River
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water sport fish community, non-public water supply
- Low Flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q_{10} and 7-Q_2 values are from USGS for Station 05404123 in the Baraboo River at Wonewoc where Outfall 001 is located.

  7-Q_{10} = 21.0 cfs (cubic feet per second)
  7-Q_2 = 32.0 cfs
  Harmonic Mean Flow = 61 cfs using a drainage area of 174 mi^2

  The Harmonic Mean has been estimated based on average flow and the 7-Q_{10} using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).
- Hardness = 169 mg/L as $CaCO_3$. This value represents the geometric mean of data from Baraboo River samples taken at the ST Hwy 23 Bridge from 07/29/1992 to 10/29/1997 (n=12)
- % 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 Kickapoo River at Oil City is used for this evaluation because there is no data available for the Baraboo River. The Kickapoo River is within the same ecological landscape so ambient water quality characteristics are expected to be similar. 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 other dischargers to the Baraboo River however they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: The Baraboo River is listed as impaired for Total Phosphorus.

Effluent Information:

- Design Flow Rate:

  For the purposes of the effluent limits calculation, the originally permitted annual average design flow of 0.142 MGD (Million Gallons per Day) is maintained as it is anticipated flow will be reduced below this during collection system upgrades.

  For reference, the actual average flow from January 2016 to April 2021 was 0.139 MGD.

- Hardness = 132 mg/L as $CaCO_3$. This value represents the geometric mean of 4 effluent samples taken from 11/01/2016 to 11/15/2016
- Acute dilution factor used in accordance with s. NR 106.06 (3) (c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water Source: Domestic wastewater with water supply from wells.
- Additives: none
- Total Phosphorus Wasteload Allocation: 158 lbs/year (see Appendix K of the TMDL document)
- 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, and Hardness. The permit-required monitoring for Phosphorus from January 2016 to April 2021 is used in this evaluation.

Sample Date	Copper µg/L	Sample Date	Chloride mg/L
11/01/2016	7.8	11/01/2016	57
11/04/2016	5.5	11/04/2016	59
11/07/2016	11.0	11/07/2016	63
11/15/2016	6.6	11/15/2016	64
11/18/2016	5.2		
11/21/2016	6.2		
11/25/2016	5.4		
11/29/2016	5.6		
12/02/2016	3.5		
12/05/2016	4.0		
12/08/2016	6.1		
1-day P_{99}	12.2	Mean	61
4-day P_{99}	8.8		

The following table presents the average concentrations and loadings at Outfall 001 from January 2016 to April 2021 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6):

	Average Measurement	Average Mass Discharged
BOD_5	12 mg/L*	
TSS	11 mg/L*	
pH field	7.15 s.u.	
Phosphorus	2.02 mg/L	2.02 lbs/day
Fecal Coliform	56#/100 mL	
Chlorine	23 µg/L	

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

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.".

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. Adm. 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.

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

Where:

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

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 the Wonewoc Wastewater Treatment Facility and the limits are set based on two times the acute toxicity criteria.

The following tables list the calculated water quality-based effluent limitations 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).

Attachment #1

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 16.8 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	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Chlorine		19.0		38.1			117	100
Arsenic		339.8		680	136	<1.0		
Cadmium	132	14.23	0.0253	28.5	5.7	0.34		
Chromium	132	2269	0.836	4539	908	0.68		
Copper	132	20.22	1.093	40.4			12.2	11.0
Lead	132	140.3	0.9501	281	56	<1.5		
Nickel	132	595.0		1190	238	<1.1		
Zinc	132	153.9	2.935	308	62	25		
Chloride (mg/L)		757		1514	303	61		64

* * The 2 × 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 = 5.3 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		181			71
Arsenic	169	152.2		3789	758	<1.0	
Cadmium	169	3.72	0.0253	92.0	18.4	0.34	
Chromium	169	203.0	0.836	5035	1007	0.68	
Copper	169	16.22	1.093	377.7			8.8
Lead	169	46.50	0.9501	1135	227	<1.5	
Nickel	169	81.36		2025	405	<1.1	
Zinc	169	190	2.935	4672	934	25	
Chloride (mg/L)		395		9833	1967	61	

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 = 15.2 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	0.0253	25919	5184	0.34
Chromium (+3)	3818000	0.836	267473106	53494621	0.68
Lead	140	0.9501	9742	1948	<1.5
Nickel	43000		3012401	602480	<1.1

Monthly Average Limits based on Human Cancer Criteria (HCC)
RECEIVING WATER FLOW = 15.2 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		932	186	<1.0

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

Conclusions and Recommendations: Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are required for Chlorine.

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 (38.06, rounded to two significant figures) is required. Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required. Weekly average limitations are not needed based on reasonable potential as the daily maximum limitations will provide adequate protection of the resource however additional limits are discussed in the expression of limits section of this memo.

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

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. Given the fact that the Wonewoc Wastewater Treatment Facility 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.

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

Where:

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

The effluent pH data was examined as part of this evaluation. A total of 1946 sample results were reported from January 2016 to April 2021. The maximum reported value was 7.60 s.u. (Standard pH Units). The effluent pH was 7.50 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 7.57 s.u. and 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 7.56 s.u. Therefore, a value of 7.57 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 7.57 s.u. into the equation above yields an ATC = 17.95 mg/L.

Potential changes to daily maximum Ammonia Nitrogen effluent limitations:
Subchapter IV of ch. NR 106, Wis. Adm. Code (effective September 1, 2016) specifies methods for the use of the 1-Q_{10} receiving water low flow to calculate daily maximum ammonia nitrogen limits 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.

	Ammonia Nitrogen Limit mg/L
2×ATC	36
1-Q_{10}	1385

The 2×ATC method yields the most stringent limits for the Wonewoc Wastewater Treatment Facility.

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, WWFF & LFF

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

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, since those limits relate to the assimilative capacity of the receiving water.

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

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

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

Where:

pH = the pH (s.u.) of the receiving water,
E = 0.854,
C = the minimum of 2.85 or $1.45 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Present), or
C = $1.45 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Absent), and
T = the temperature (ºC) of the receiving water – (Early Life Stages Present), or
T = the maximum of the actual temperature (ºC) and 7 - (Early Life Stages Absent)

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q_{10} (4-Q_3, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q_5 (estimated as 85% of the 7-Q_2 if the 30-Q_5 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 ºC, 25% of the flow is used if the Temperature < 11 ºC, and 50% of the flow is used if the Temperature ≥ 11 ºC but < 16 ºC.

Since minimal ambient data is available, the "default" basin assumed values are used for Temperature, pH and background ammonia concentrations, shown in the table below, with the resulting criteria and effluent limitations.

		Spring April-May	Summer June-Sept	Winter Oct-Mar
Effluent Flow	Qe (MGD)	0.142	0.142	0.142
Background Information	7-Q_{10} (cfs)	21.0	21.0	21.0
	7-Q_2 (cfs)	32	32	32
	Ammonia (mg/L)	0.07	0.04	0.14
	Temperature (°C)	14	21	10
	pH (s.u.)	7.69	7.87	7.51
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	10.5	21.0	5.3
	Reference Monthly Flow (cfs)	13.6	27.2	6.8
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	9.05	4.93	10.81
	Early Life Stages Absent	9.09	4.93	14.47

Attachment #1

		Spring	Summer	Winter
		April-May	June-Sept	Oct-Mar
	30-day Chronic			
	Early Life Stages Present	3.62	1.97	4.33
	Early Life Stages Absent	3.64	1.97	5.79
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	438	472	266
	Early Life Stages Absent	440	472	357
	Monthly Average			
	Early Life Stages Present	223	241	134
	Early Life Stages Absent	224	241	181

Effluent Data
Four samples for ammonia nitrogen were taken from 11/01/2016 to 11/15/2016, and their results were as follows:

Sample Date	Ammonia Nitrogen mg/L
11/01/2016	1.8
11/04/2016	2.6
11/07/2016	2.4
11/15/2016	1.6

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

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

On May 1, 2020, revisions to chs. NR 102 and NR 210, Wis. Adm. Code 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 Wonewoc Wastewater Treatment Facility's permit requires twice 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.

Interim Limit
At this time, there is no effluent *E. coli* data available to determine if these limits are currently met. The permit will include a compliance schedule to meet these limits. During the compliance schedule, an interim limit applies to prevent back-sliding from the current level of disinfection during the compliance schedule period. Therefore, the current **fecal coliform limit shall be included in the reissued permit as an interim limit of 400 counts/100 mL as a monthly geometric mean**.

PART 5 – PHOSPHORUS

Technology Based Phosphorus 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 Wonewoc Wastewater Treatment Facility does not currently have an existing technology-based limit, the need for this limit in the reissued permit is evaluated. The data demonstrates that the annual monthly average phosphorus loading is less than 150 lbs/month, which is the threshold for municipalities in accordance to s. NR 217.04 (1) (a) 1, Wis. Adm. Code, and therefore a technology-based limit is not required.

Month	Monthly Avg. mg/L	Total Flow MG/month	Total Phosphorus lb./mo.
May 2020	1.88	3.358	52.77
June 2020	2.01	3.905	65.31
July 2020	2.27	3.393	64.37
Sept 2020	3.37	2.365	66.45
Oct 2020	2.54	3.176	67.35
Nov 2020	2.44	3.059	62.29
Dec 2020	1.83	3.578	54.51
Jan 2021	2.19	2.963	54.04
Feb 2021	2.48	2.530	52.31
Mar 2021	2.53	1.990	41.92
Apr 2021	2.07	3.300	56.89
Average =			57.08

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 (not design) flow (in MGD) for that month

In addition, the need for a WQBEL for phosphorus must be considered.

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 (*May 2020). The wasteload allocations (WLA) that implement site-specific criteria for Lakes Petenwell, Castle Rock, and Wisconsin are found in Appendix K of the *Total Maximum Daily Loads for Total Phosphorus in the Wisconsin River Basin (WRB TMDL)* report dated April 26, 2019 and are expressed as maximum annual loads (lbs/year) and maximum daily loads (lbs/day). The WLA that implement statewide criteria found in Appendix J of the TMDL report are no longer applicable following approval of these site-specific criteria. The daily WLAs in the WRB TMDL equals the annual WLA divided by the number of days in the year. Therefore, the daily WLA is an annual average. Since the derivation of daily WLAs from annual WLAs does not take effluent variability or monitoring frequency into consideration, maximum daily WLAs from the WRB TMDL should not be used directly as permit effluent limits.

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 continuously discharging facilities covered by the WRB 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 are also included. The following equation shows the calculation of equivalent effluent concentration:

$$\text{TP Equivalent Effluent Concentration} = \text{Daily WLA} \div (\text{Flow Rate} * \text{Conversion Factor})$$
$$= 0.433 \text{ lbs/day} \div (0.142 \text{ MGD} * 8.34)$$
$$= 0.365 \text{ mg/L}$$

Since this value is greater than 0.3 mg/L, the WLA should be expressed as a monthly average mass limit for total phosphorus and no six-month average limit is required.

$$\text{TP Monthly Average Permit Limit} = \text{daily WLA} * \text{monthly average multiplier}$$
$$= 0.433 \text{ lbs/day} * 1.45$$
$$= 0.63 \text{ lbs/day}$$

The multiplier used in the monthly average calculation was used as recommended in TMDL implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 0.30. However, for facility planning purposes, 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 thrice weekly; if a different monitoring frequency is used, the stated limits should be reevaluated.

The WRB TMDL establishes TP wasteload allocations to reduce the loading in the entire watershed including WLAs to meet water quality standards, for tributaries to the Wisconsin 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

An interim limit is needed when a compliance schedule is included in the permit to meet the 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 3.1 mg/L, expressed as a monthly average. This value reflects the 4-day P_{99} concentration of 3.05 mg/L from January 2016 to April 2021. This value is recommended instead of the 30-day P_{99} concentration of 2.36 mg/L to allow operational flexibility when the facility begins to initiate phosphorus treatment optimization activities, which often consist of trial and error. The following table lists the statistics for effluent phosphorus levels from January 2016 to April 2021 for informational purposes. In the cases where reporting the mass discharge is not required in the current permit, the mass is calculated using the reported phosphorus concentration and the effluent flow rate for that day.

Total Phosphorus Statistics		
	Concentration mg/L	Mass Discharge lbs/day
1-day P_{99}	4.39	3.85
4-day P_{99}	3.05	2.84
30-day P_{99}	2.36	2.30
Mean	2.02	2.02
Std	0.75	0.61
Sample Size	830	830
Range	0.45 - 4.54	0.36 – 7.05

Conclusions:

In summary, the following limits are recommended by this evaluation:

- Monthly average Total Phosphorus mass limit of 0.63 lbs/day
- Monthly average Total Phosphorus concentration limit of 3.1 mg/L

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 (s. NR 106.55(6)(a), Wis. Adm. Code). For activated sludge treatment systems of domestic waste, there is no reasonable potential for the discharge to exceed this limit.

PART 7 – EXPRESSION OF LIMITS

Revisions to chs. NR 106 and 205, Wis. Adm. Code align Wisconsin's water quality-based effluent limits with 40 CFR 122.45(d), which requires WPDES permits 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 Wonewoc Wastewater Treatment Facility is a municipal treatment facility and is therefore subject to weekly average and monthly average limitations whenever limitations are determined to be necessary.

This evaluation provides additional limitations necessary to comply with the expression of limits in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code. Pollutants already compliant with these rules or that have an approved impracticability demonstration, are excluded from this evaluation including water-quality based effluent limitations for phosphorus, temperature, pH, and *E. coli* among other parameters. Mass limitations are not subject to the limit expression requirements if concentrations limits are given.

Method for calculation:
The methods for calculating limitations for continuous discharges subject to ch. NR 210 to conform to 40 CFR 122.45(d) are specified in s. NR 106.07(3), Wis. Adm. Code, and are as follows:

1. Whenever a daily maximum limitation is determined necessary to protect water quality, a weekly and monthly average limitation shall also be included in the permit and set equal to the daily maximum limit unless a more restrictive limit is already determined necessary to protect water quality.
2. Whenever a weekly average limitation is determined necessary to protect water quality, a monthly average limitation shall also be included in the permit and set equal to the weekly average limit unless a more restrictive limit is already determined necessary to protect water quality.
3. Whenever a monthly average limitation is determined necessary to protect water quality, a weekly average limit shall be calculated using the following procedure and included in the permit unless a more restrictive limit is already determined necessary to protect water quality:
   Weekly Average Limitation = (Monthly Average Limitation × MF)
   Where:
   MF= Multiplication factor as defined in Table 1
   CV= coefficient of variation (CV) as calculated in s. NR 106.07(5m)
   n= the number of samples per month required in the permit

s. NR 106.07 (3) (e) 4. Table 1 — Multiplication Factor (for CV = 0.6)

CV	n=1	n=2	n=3	n=4	n=8	n=12	n=16	n=20	n=24	n=30
0.6	1.00	1.31	1.51	1.64	1.95	2.12	2.23	2.30	2.36	2.43

Note: This methodology is based on the *Technical Support Document for Water Quality-based Toxics Control* (March 1991). PB91-127415.

Summary of Additional Limitations:
In conclusion, the following additional limitations are required to comply with ss. NR 106.07 and NR 205.065(7) Expression of Limits.

Parameter	Daily Maximum	Weekly Average	Monthly Average
Residual Chlorine	38 µg/L	**38 µg/L**	**38 µg/L**

Chlorine
The weekly and monthly average limitations for chlorine are recommended to be set equal to the daily maximum limitation of 38 µg/L.


Wonewoc WWTF
West Colvin Road
Wonewoc
Wonewoc
Wonewoc WWTF
Legend
Surface Water Outfalls
Notes
0.0
0
0.01
0.0 Miles
NAD_1983_HARN_Wisconsin_TM
1: 495
DISCLAIMER: The information shown on these maps has been obtained from various sources, and are of varying age, reliability and resolution. These maps are not intended to be used for navigation, nor are these maps an authoritative source of information about legal land ownership or public access. No warranty, expressed or implied, is made regarding accuracy, applicability for a particular use, completeness, or legality of the information depicted on this map. For more information, see the DNR Legal Notices web page: http://dnr.wi.gov/legal/