Permit Fact Sheet

General Information

Permit Number:	WI-0028428-10-0	
Permittee Name:	Village of Rosendale	
Address:	211 N. Grant Street	
City/State/Zip:	Rosendale WI 54974	
Discharge Location:	The northeast part of the Village, to a tributary of the West Branch of the Fond du Lac River	
Receiving Water:	An unnamed tributary (WBIC number 134900) to the West Branch of the Fond du Lac River, in the Fond du Lac River Watershed (UF03) of the Upper Fox River Basin, in Fond du Lac County	
Stream Flow ($Q_{7,10}$):	0 cfs	
Stream Classification:	Unnamed Tributary: Limited Forage Fish (LFF) West Branch of the Fond du Lac River: Warm Water Sport Fish (WWSF); non-public water supply	
Discharge Type:	Existing; Continuous	
Design Flow(s)	Annual Average	0.216 MGD
Significant Industrial Loading?	None	
Operator at Proper Grade?	Facility Level & Subclass: Advanced Level; Subclasses A1, B, C, D, L, and SS OIC Level & Subclasses: Shawn Geiger, WW Operator; A1, B, C, D, L, and SS – Advanced	
Approved Pretreatment Program?	N/A	

Facility Description

The Village of Rosendale, located in northern Fond du Lac County, owns and operates a mechanical activated sludge-extended aeration treatment facility with fine screening for primary treatment. Treatment consists of an aeration basin followed by two secondary clarifiers and aerobic digestion with digested solids pumped to a screw thickener. Thickened solids are pumped to a sludge storage tank and then hauled to another wastewater treatment plant for further digestion and/or land application on Department approved agricultural fields. The wastewater treatment facility (WWTF) was upgraded in 2021 to add a mechanical fine screen, new submersible raw wastewater pumps, new packaged activated sludge aerobic treatment, two new circular final clarifiers, a new RAS/WAS pump station, a new aerobic digester, a new screw-type sludge thickener, and a new aerobic sludge storage tank. Treated effluent is discharged through an outfall directly east of the WWTF and directly to an unnamed tributary of the West Branch of the Fond du Lac River.

Substantial Compliance Determination

Enforcement During Last Permit: A Notice of Noncompliance (NON) was sent in February 2022 for chloride effluent limit exceedances over the previous 3 months. An additional NON was sent in June 2022 for chloride effluent limit exceedance in February and March 2022. The facility has completed all previously required actions as part of the enforcement process.

After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items, and a site visit on 5/3/22, this facility has been found to be in substantial compliance with their current permit.

Compliance determination entered by Mark Stanek, Wastewater Engineer on July 16, 2024.

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
701	N/A – no flow monitoring	Influent - Representative samples shall be collected from the influent wet well.
001	Avg. Flow Rate 0.108 MGD (10/1/17-6/30/24)	Effluent - Representative samples shall be collected from the effluent manhole except that samples for pH and Dissolved Oxygen shall be taken from the effluent discharge channel.
003	Did not land apply during the previous permit term (10/1/17-6/30/24); Sludge is hauled to another facility and the volume hauled varies each year (approx. 210,000 gals hauled in 2023)	Hauled Sludge - Representative sludge samples shall be collected prior to hauling sludge and test results shall be reported on Form 3400-49 "Waste Characteristics Report". Hauled sludge reports shall be submitted on Form 3400-52 "Other Methods of Disposal or Distribution Report" following each year that sludge is hauled.

1 Influent – Monitoring Requirements

Sample Point Number: 701- Influent

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
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 monitoring requirements were re-evaluated for the proposed permit term and no changes were made from the previous permit.

Explanation of Limits and Monitoring Requirements

BOD_5 and Total Suspended Solids (TSS) – Monitoring and reporting of BOD_5 and TSS is required for percent removal requirements found in s. NR 210.05, Wis. Adm. Code.

2 Surface Water - Monitoring and Limitations

Sample Point Number: 001- Effluent

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Daily Max	30 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	15 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Daily Max	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 lbs/day	3/Week	Calculated	
Suspended Solids, Total	Monthly Avg	32 lbs/day	3/Week	Calculated	
Suspended Solids, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of TSS and report on the last day of the month on the eDMR. See TMDL Calculations permit section.
Suspended Solids, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of TSS discharged and report on the last day of the month on the eDMR. See TMDL Calculations permit section.
pH Field	Daily Min	6.0 su	5/Week	Grab	
pH Field	Daily Max	9.0 su	5/Week	Grab	
Dissolved Oxygen	Daily Min	4.0 mg/L	5/Week	Grab	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Monitoring and limit effective May through September annually per the Effluent Limitations for E. coli Schedule.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Monitoring and limit

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					effective May through September annually per the Effluent Limitations for E. coli Schedule. See the E. coli Percent Limit section. Enter the result in the eDMR on the last day of the month.
Nitrogen, Ammonia (NH3-N) Total	Daily Max	8.4 mg/L	3/Week	24-Hr Flow Prop Comp	Applies year-round.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	8.4 mg/L	3/Week	24-Hr Flow Prop Comp	Applies October-March.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	4.5 mg/L	3/Week	24-Hr Flow Prop Comp	Applies in April.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	4.6 mg/L	3/Week	24-Hr Flow Prop Comp	Applies in May.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	3.0 mg/L	3/Week	24-Hr Flow Prop Comp	Applies June-September.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	3.5 mg/L	3/Week	24-Hr Flow Prop Comp	Applies October-March.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	1.9 mg/L	3/Week	24-Hr Flow Prop Comp	Applies April-May.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	1.3 mg/L	3/Week	24-Hr Flow Prop Comp	Applies June-September.
Chloride	Daily Max	980 mg/L	4/Month	24-Hr Flow Prop Comp	Interim limit. See the Chloride Variance - Implement Source Reduction Measures permit section and the Chloride Source Reduction Measures (Target Value) Schedule.
Chloride	Weekly Avg	613 mg/L	4/Month	24-Hr Flow Prop Comp	Interim limit. See the Chloride Variance - Implement Source Reduction Measures permit section and the Chloride Source Reduction Measures (Target Value) Schedule.
Phosphorus, Total	Monthly Avg	3.2 mg/L	3/Week	24-Hr Flow Prop Comp	Interim limit. See the TMDL Water Quality Based Effluent Limits

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					(WQBELs) for Total Phosphorus Schedule.
Phosphorus, Total	Monthly Avg	1.1 lbs/day	3/Week	Calculated	Monitoring only upon permit effective date. Final TMDL-based mass limits go into effect per the TMDL Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus Schedule. See TMDL Calculations permit section.
Phosphorus, Total	6-Month Avg	0.36 lbs/day	3/Week	Calculated	Monitoring only upon permit effective date. Final TMDL-based mass limits go into effect per the TMDL Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus Schedule. See TMDL Calculations permit 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 eDMR. See TMDL Calculations permit section.
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 eDMR. See TMDL Calculations permit section.
Temperature		deg F	3/Week	Grab	Monitoring only year-round.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring permit section.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					Monitoring permit section.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. See Nitrogen Series Monitoring permit section. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Chronic WET	Monthly Avg	1.0 TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Whole Effluent Toxicity (WET) Testing permit section.

Changes from Previous Permit:

- Updated TMDL-based mass limits for TSS.
- Updated ammonia nitrogen effluent limits.
- Reduced monitoring for pH and dissolved oxygen to 5x/week instead of daily. Rosendale no longer has industries in town discharging to the plant (Power Packaging/MSI which had highly variable influent wastewater).
- Addition of Escherichia coli (E. coli) monitoring and limits, to become effective per the Effluent Limitations for E. coli Schedule.
- Addition of a chloride variance interim limit of 980 mg/L as a daily maximum and updated source reduction measures (SRMs) throughout the permit term.
- Updated interim effluent limit and addition of TMDL-based mass limits for total phosphorus, to become effective per the Total Phosphorus Schedule.
- Changed temperature monitoring to year-round.
- Addition of annual total nitrogen monitoring (TKN, NO_2+NO_3 and Total N) in rotating quarters throughout the permit term.
- Addition of a Chronic Whole Effluent Toxicity (WET) testing effluent limit.

Explanation of Limits and Monitoring Requirements

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

Categorical Limits

BOD_5, Total Suspended Solids, pH, and Dissolved Oxygen – Standard municipal wastewater requirements for total suspended solids and pH are included based on ch. NR 210, Wis. Adm. Code, 'Sewage Treatment Works' requirements

for discharges to fish and aquatic life streams. Monitoring and reporting of BOD_5 and total suspended solids is required for percent removal requirements found in s. NR 210.05, Wis. Adm. Code, and in the Standard Requirements section of the permit. Chapter NR 102, Wis. Adm. Code, 'Water Quality Standards for Surface Waters' also specifies requirements for pH for fish and aquatic life streams.

Water Quality-Based Limits

Refer to the WQBEL memo, Water Quality-Based Effluent Limitations for Rosendale Wastewater Treatment WPDES Permit No. WI-0028428-10, for the detailed calculations, prepared by the Water Quality Bureau, Nicole Krueger, Water Resources Engineer, dated May 16, 2024, used for this reissuance.

Expression of Limits – In accordance with the federal regulation 40 CFR 122.45(d) and s. NR 205.065, Wis. Adm. Code. limits in this permit are to be expressed as weekly average and monthly average limits whenever practicable. Minor changes have been made to the ammonia nitrogen effluent limits.

Ammonia – Current acute and chronic ammonia toxicity criteria for the protection of aquatic life are included in Tables 2C and 4B of ch. NR 105, Wis. Adm. Code. Subchapter IV of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for ammonia.

Chloride – Acute and chronic chloride toxicity criteria for the protection of aquatic life are included in Tables 1 and 5 of ch. NR 105 Wis. Adm. Code. Subchapter VII of ch. NR 106 establishes the procedure for calculating WQBELs for chloride. Effluent limits are necessary in accordance with the reasonable potential analysis presented in the May 16, 2024 WQBEL memo. Section NR 106.83 of subchapter VII also provides for some permittees to obtain temporary relief from a chloride WQBEL through the use of a chloride variance. The Village of Rosendale applied for a chloride variance, under the provisions of s. NR 106.83, Wis. Adm. Code, with its application for permit reissuance. The previous permit also included a chloride variance.

The Department reviewed Rosendale's application for a chloride variance. The information supplied in the application supports the establishment of interim effluent limits. The permittee and the Department have reached agreement on interim chloride limits of 980 mg/L (expressed as a daily maximum) and 613 mg/L (expressed as a weekly average), a target value of 550 mg/L, implementation of chloride source reduction measures, and submittal of annual progress reports each year by March 31st. The chloride source reduction measures that are required to be implemented can be found in the proposed permit.

The Department concludes that Rosendale is qualified for a variance from the water quality standard for chloride and proposes reissuance of this permit with the proposed variance.

Disinfection and 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.

Section NR 102.04(5)(a), Wis. Adm. Code, states that all surface waters shall be suitable for recreational use and meet the E. coli criteria established to protect this use. Section NR 102.04(5)(b), Wis. Adm. Code, states that exceptions to the disinfection requirement can be made if the Department determines, in accordance with the procedures specified in s. NR 210.06(3), Wis. Adm. Code, that disinfection is not required to meet water quality criteria. As part of the reissuance process, the requirements for disinfection were reviewed under s. NR 210.06(3), Wis. Adm. Code.

It was determined that the permittee is required to disinfect, during the following months May – September. See the WQBEL memo for further explanation.

At the end of the compliance schedule, disinfection requirements and E. coli limits of 126 #/100 ml as a monthly geometric mean that may not be exceeded and 410 #/100 ml as a daily maximum that may not be exceeded more than 10 percent of the time in any calendar month will apply. Monitoring is not required until the limit becomes effective at the end of the compliance schedule.

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

limits municipal dischargers of more than 150 pounds of phosphorus per month to 1.0 mg/L. The data demonstrates that the annual monthly average phosphorus loading is less than 150 lbs/month, which is the threshold for municipalities, in accordance with s. NR 217.04(1)(a)1, Wis. Adm. Code, and therefore the 1.0 mg/L limit is not required.

Total Maximum Daily Load (TMDL) Derived Limits – Upper Fox and Wolf River Basins (UFWRB) TMDL Approved – Waste load allocations (WLAs) specified in TMDLs are expressed as WQBELs (water quality-based effluent limits). The WLA-derived WQBELs are consistent with the assumptions and requirements of the approved UFWRB TMDL. The UFWRB TMDL sets TSS and total phosphorus WLAs for dischargers throughout the project area. WLA-derived limits must be included in WPDES permits once the TMDL has been approved by US EPA (UFWRB TMDL approved in February 2020). Since WLAs are expressed as annual loads (lbs/yr), permits with TMDL-derived monthly average permit limits require the permittee to calculate and report rolling 12-month sums of total monthly loads for TSS and total phosphorus. Rolling 12-month sums can be compared directly to the annual WLA. Rosendale can currently meet the TMDL-based limits for TSS; the remainder of an existing compliance schedule for meeting the TMDL-based limits for total phosphorus is included in the reissued permit. 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. The interim limit included in the permit is 3.2 mg/L expressed as a monthly average. This value reflects the 4-day P_{99} concentration of 3.2 mg/L from the current permit term.

Total Nitrogen Monitoring (TKN, NO_2+NO_3 and Total N) – The Department has included effluent monitoring for Total Nitrogen in the permit through the authority under §§ 283.55(1)(e), Wis. Stats., which allows the Department to require the permittee to submit information necessary to identify the type and quantity of any pollutants discharged from the point source, and through s. NR 200.065(1)(h), Wis. Adm. Code, which allows for this monitoring to be collected during the permit term. More information on the justification to include total nitrogen monitoring in wastewater permits can be found in the "Guidance for Total Nitrogen Monitoring in Wastewater Permits" dated October 1, 2019. Annual tests are scheduled in the following rotating quarters: **April – June 2025; January – March 2026; July – September 2027; October – December 2028; and April – June 2029**.

Whole Effluent Toxicity (WET) – WET testing requirements and limits are determined in accordance with ss. NR 106.08 and NR 106.09, Wis. Adm. Code, as revised August 2016. Chronic WET tests are scheduled annually in the following rotating quarters: **April – June 2025; January – March 2026; July – September 2027; October – December 2028; and April – June 2029.** Additionally, a Chronic WET limit has been included in the permit.

Thermal – Requirements for Temperature are included in NR 102 Subchapter II Water Quality Standards for Temperature and NR 106 Subchapter V Effluent Limitations for Temperature. Thermal discharges must meet the Public Health criterion of 120 degrees F and the Fish & Aquatic Life criteria which are established to protect aquatic communities from lethal and sub-lethal thermal effects. Temperature monitoring has been increased to year-round throughout the permit term.

PFOS and PFOA – NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Pursuant to s. NR 106.98(3)(b), 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, the department has determined the permittee does not need to sample for PFOS or PFOA as part of this permit reissuance. The department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

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	N/A	N/A	Hauled to another facility	In 2023, approx. 210,000 gals hauled to another facility
Does sludge management demonstrate compliance? Yes.						
Is additional sludge storage required? No.						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No.						
Is a priority pollutant scan required? N/A						

Sample Point Number: 003- Hauled Sludge

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Annual	Composite	Limits applicable only when sludge is land applied.
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Monitoring required in 2026. See Sludge Analysis for PCBs and the Standard Requirements section for Monitoring and Calculating PCB Concentrations in Sludge.
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Monitoring required in 2026. See Sludge Analysis for PCBs and the Standard Requirements section for Monitoring and Calculating PCB Concentrations in Sludge.
PFOA + PFOS		ug/kg	Once	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information
PFAS Dry Wt			Once	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

Changes from Previous Permit:

- The year in which PCB monitoring is required has been updated to 2026.
- Addition of PFAS (PFOA + PFOS) monitoring once during the permit term, pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.

Explanation of Limits and Monitoring Requirements

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

PFAS – The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA is currently developing a risk assessment to determine future land application rates and expects to release this risk assessment by the end of 2024. In the interim, the Department has developed the "Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS".

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

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

4 Schedules

4.1 Chloride Source Reduction Measures (Target Value)

As a condition of the variance to the water quality based effluent limitation(s) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code, the permittee shall perform the following actions.

Required Action	Due Date
Annual Chloride Progress Report: Submit an annual chloride progress report related to the source reduction activities for the previous year. The annual chloride progress report shall: Indicate which chloride source reduction measures or activities in the Source Reduction Plan have been implemented and state which, if any, source reduction measures from the Source Reduction Plan were not pursued and why. Include an assessment of whether each implemented source reduction measure appears to be effective or ineffective at reducing pollutant discharge concentrations and identify actions planned for the upcoming year; Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data; and Include an analysis of how effluent chloride varies with time and with significant loadings of chloride. Note that the interim limitation listed in the Surface Water section of this permit remains enforceable until new enforceable limits are established in the next permit issuance. The first annual chloride progress report is to be submitted by the Date Due.	03/31/2025
Annual Chloride Progress Report #2: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.	03/31/2026
Annual Chloride Progress Report #3: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.	03/31/2027
Annual Chloride Progress Report #4: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.	03/31/2028
Final Chloride Report: Submit the final chloride report documenting the success in meeting the chloride target value of 550 mg/L, as well as the anticipated future reduction in chloride sources and chloride effluent concentrations. The report shall: Summarize chloride source reduction measures that have been implemented during the current permit term and state which, if any, source reduction measures from the Source Reduction Plan were not pursued and why; Include an assessment of which source reduction measures appear to have been effective or ineffective. Evaluate any needed changes to the pollutant reduction strategy accordingly;	03/31/2029

Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data during the current permit term; and Include an analysis of how influent and effluent chloride varies with time and with significant loadings of chloride as identified in the source reduction plan. If the permittee intends to reapply for a chloride variance, for the reissued permit, proposed target limits and a detailed source reduction measures plan, outlining the source reduction activities proposed for the upcoming permit term, shall also be included per ss. NR 106.90 (5) and NR 106.83 (4), Wis. Adm. Code. An updated source reduction measures plan shall: Include an explanation of why or how each source reduction measure will result in reduced discharge of the target pollutant; and Evaluate any available information on pollutant sources, timing, and concentration to update the mass balance assumptions and expected sources of the pollutant, and Identify any information needs that would help to better determine pollutant sources and make plans to collect that information. Note that the target value is the benchmark for evaluating the effectiveness of the chloride source reduction measures but is not an enforceable limitation under the terms of this permit.	
Annual Chloride Reports After Permit Expiration: In the event that this permit is not reissued by the date the permit expires the permittee shall continue to submit annual chloride reports for the previous year following the due date of Annual Chloride Progress Reports listed above. Annual Chloride Progress Reports shall include the information as defined above.	

4.2 TMDL Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus

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

Required Action	Due Date
Construction Upgrade Progress Report #2: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	12/31/2025
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance’ in the Surface Water section of this permit.	09/30/2026
Achieve Compliance: The permittee shall achieve compliance with final phosphorus WQBELs. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance’ in the Surface Water section of this permit.	10/01/2026

4.3 Disinfection and Effluent Limitations for E. coli

The permittee shall install disinfection treatment and comply with surface water limitations for E. coli as specified. No later than 14 days following each compliance date, the permittee shall notify the Department in writing of its compliance or noncompliance. If a submittal is required, a timely submittal fulfills the notification requirement.

Required Action	Due Date
Progress Report: The permittee shall submit a progress report on development and submittal of a facility plan for upgrades to meet disinfection requirements and E. coli limits.	09/30/2025
Submit Facility Plan: The permittee shall submit a Facility Plan per s. NR 110.09, Wis. Adm. Code for meeting disinfection requirements and complying with E. coli surface water limitations. The permittee may submit an abbreviated facility plan if the Department determines that the modifications are minor.	04/30/2026
Final Plans and Specifications: The permittee shall submit final construction plans to the Department for approval pursuant to ch. NR 108, Wis. Adm. Code, specifying treatment plant upgrades that must be constructed to meet disinfection requirements per s. NR 210.06(1), Wis. Adm Code, achieve compliance with final E. coli limitations, and a schedule for completing construction of the upgrades by the complete construction date specified below.	03/31/2027
Treatment Plant Upgrade to Meet Limitations: The permittee shall initiate bidding, procurement, and/or construction of the project. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41. Stats., prior to initiating activities defined as construction under ch. NR 108, Wis. Adm. Code. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications.	09/30/2027
Construction Upgrade Progress Report: The permittee shall submit a progress report on construction upgrades.	09/30/2028
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades.	03/31/2029
Achieve Compliance: The permittee shall achieve compliance with final E. coli limitations.	04/30/2029

Explanation of Schedules

4.1 – Chloride Source Reduction Measures (Target Value) – This schedule is required to ensure that the permittee maintains compliance with the conditions and requirements of receiving a variance from the water quality-based chloride effluent limits of 395 mg/L as a weekly average and 757 mg/L as a daily maximum. Since a compliance schedule is being granted, an interim limit is required, and for Rosendale the limits are established as 613 mg/L (as a weekly average) and 980 mg/L (as a daily maximum). The schedule requires that annual reports shall indicate which source reduction measures Rosendale has implemented during each calendar year, and an analysis of chloride concentration and mass discharge data based on chloride sampling and flow data. The annual reports shall document progress made towards meeting the chloride target value of 550 mg/L by the end of the permit term.

4.2 – TMDL Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus – This compliance schedule contains the remaining Required Actions from the previous permit in order to achieve compliance with the TMDL-based WQBELs for total phosphorus by October 1, 2026.

4.3 – Disinfection and Effluent Limitations for E. coli – A compliance schedule is included in the permit to provide time for the permittee to submit plans and specs and install disinfection treatment for meeting effluent E. coli water quality-based effluent limits and disinfection requirements pursuant s. NR 210.06, Wis. Adm. Code.

Attachments:

WQBEL Memo: Water Quality-Based Effluent Limitations for Rosendale Wastewater Treatment WPDES Permit No. WI-0028428-10, by Nicole Krueger, Water Resources Engineer, dated May 16, 2024

Chloride Variance EPA Data Sheet

SRM (Source Reduction Measures) Plan, dated 2024

Expiration Date:

December 31, 2029

Justification Of Any Waivers From Permit Application Requirements

No waivers from permit application requirements were requested or granted.

Prepared By: Sarah Donoughe, Wastewater Specialist-Adv **Date:** August 22, 2024

Notice of reissuance is published in The Reporter, PO Box 1955, Fond du Lac, WI 54937-1955.

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 05/16/2024

TO: Sarah Donoughe – SER

FROM: Nicole Krueger – SER Nicole Krueger

SUBJECT: Water Quality-Based Effluent Limitations for Rosendale Wastewater Treatment
WPDES Permit No. WI-0028428-10

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from Rosendale Wastewater Treatment facility in Fond du Lac County. This municipal wastewater treatment facility (WWTF) discharges to an unnamed tributary to the West Branch of the Fond du Lac River, located in the Fond du Lac River Watershed in the Upper Fox River Basin. This discharge is included in the Upper Fox River Basin TMDL as approved by EPA in February 2020. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD_5	30 mg/L			15 mg/L		1
TSS TMDL	30 mg/L		 45 lbs/day	20 mg/L 32 lbs/day		1,3
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		4.0 mg/L				1
Bacteria						4
E. coli				126 #/100 mL geometric mean		
Ammonia Nitrogen April May June – September October – March	 8.4 mg/L 8.4 mg/L 8.4 mg/L 8.4 mg/L		 4.5 mg/L 4.6 mg/L 3.0 mg/L **8.4 mg/L**	 1.9 mg/L 1.9 mg/L 1.3 mg/L 3.5 mg/L		5
Chloride	757 mg/L		395 mg/L			6
Phosphorus Interim TMDL				 3.2 mg/L 1.1 lbs/day	 0.36 lbs/day	3
Temperature						2
TKN, Nitrate+Nitrite, and Total Nitrogen						7
Chronic WET				1.0 TUc		8,9

Footnotes:

1. No changes from the current permit.
2. Monitoring only.

3. The TSS and phosphorus mass limits are based on the Total Maximum Daily Load (TMDL) for the Upper Fox and Wolf River Basin address phosphorus water quality impairments within the TMDL area. The TMDL was approved by EPA February 2020.
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. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
6. These are the WQBELs for chloride. Alternative effluent limitations of 980 mg/L as a daily maximum and 613 mg/L as a weekly average, equal to the current 1-day P_{99} and previous 4-day P_{99}. These may be included in the permit in place of this limit if the chloride variance application that was submitted is approved by EPA. If the variance is not approved, a wet weather mass limit would also be required.
7. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total kjeldahl nitrogen (TKN) (all expressed as N).
8. Annual chronic WET tests are recommended. The Instream Waste Concentration (IWC) to assess chronic test results is 100%. 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 001 shall be a grab sample collected from the unnamed tributary.
9. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).

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

Attachments (3) – Narrative, Outfall Map, & Thermal Table

PREPARED BY: Nicole Krueger, Water Resources Engineer – SER

E-cc: Mark Stanek, Wastewater Engineer – NER
Heidi Schmitt Marquez, Regional Wastewater Supervisor – NER
Diane Figiel, Water Resources Engineer – WY/3
Kari Fleming, Environmental Toxicologist – WY/3
Michael Polkinghorn, Water Resources Engineer – NOR/Rhinelander Service Center
Nate Willis, Wastewater Engineer – WY/3

Attachment #1

Water Quality-Based Effluent Limitations for
Rosendale Wastewater Treatment Facility

WPDES Permit No. WI-0028428-10

Prepared by: Nicole Krueger

PART 1 – BACKGROUND INFORMATION

Facility Description

The Village of Rosendale, located in northern Fond du Lac County, owns and operates an extended aeration activated sludge treatment plant. Treatment consists of above ground circular steel tanks that contain activated sludge, sludge digestion and final clarification. In 1990, a new rectangular aeration basin was constructed to increase treatment capacity. Waste activated sludge is aerobically digested in an above ground tank and solids are dewatered using a gravity belt thickener. Thickened solids are contract hauled and taken to another WWTP for further digestion and land application. Treated effluent is discharged through an outfall directly east of the WWTP and directly to an unnamed tributary of the West Branch of the Fond du lac River.

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

Existing Permit Limitations

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD_5	30 mg/L			15 mg/L	2
TSS TMDL	30 mg/L		 45.5 lbs/day	20 mg/L 32.3 lbs/day	2
pH	9.0 s.u.	6.0 s.u.			3
Dissolved Oxygen		4.0 mg/L			2
Ammonia Nitrogen October – March April – May June – September	 14 mg/L 14 mg/L 14 mg/L		 11 mg/L 4.7 mg/L 3.5 mg/L	 4.9 mg/L 2.1 mg/L 1.9 mg/L	
Chloride			613 mg/L		4
Phosphorus Interim Final				 3.6 mg/L TMDL	5
Temperature					1
WET					6

Footnotes:

1. Monitoring only.

2. These limits are based on the Limited Forage Fish (LFF) community of the immediate receiving water as described in s. NR 104.02(3)(a), Wis. Adm. Code.
3. 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.
4. This is a variance interim limit equal to the 4-day P_{99} from the previous permit term.
5. A compliance schedule is in the current permit to meet the final WQBEL by 10/01/2026.
6. Acute WET testing is required once every other year and chronic WET testing is required annually. The IWC for chronic WET is 93%.

Receiving Water Information

- Name: Unnamed Tributary to the West Branch of the Fond du Lac River
- Waterbody Identification Code (WBIC): 134900
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: The immediate receiving water is classified as Limited Forage Fish (LFF) per Table 5 in ch. NR 104, Wis. Adm. Code from the Outfall to the confluence with the West Branch Fond du Lac River. The West Branch Fond du Lac River is classified as Warm Water Sport Fish (WWSF) community, non-public water supply. Note: Cold Water and Public Water Supply criteria are used for bioaccumulating compounds of concern, because the discharge is within the Great Lakes basin.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q_{10} and 7-Q_2 values are from USGS for Station UF43, where Outfall 001 is located. The previous WQBEL memo used a 7-Q_2 of 0.03 cfs which is from a different tributary where Rosendale is not located.

  Unnamed Tributary (LFF classification)
  7-Q_{10} = 0.0 cfs (cubic feet per second)
  7-Q_2 = 0.02 cfs

  West Branch of the Fond du Lac River (WWSF classification)
  7-Q_{10} = 0.17 cfs
  7-Q_2 = 0.76 cfs

- Hardness = 352 mg/L as $CaCO_3$. This value represents the geometric mean of data from chronic WET testing from 10/31/2017 – 03/22/2022.
- % 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 is not needed because the 7-Q_{10} is 0 cfs, so calculated limits are set equal to criteria. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: None
- Impaired water status: The West Branch of the Fond du Lac River, approximately 1 mile downstream of Outfall 001, is 303(d) listed as impaired for total phosphorus.

Effluent Information

- Design flow rate(s):
  Annual average = 0.216 MGD (Million Gallons per Day)
  Peak daily = 0.5033 MGD
  Peak weekly = 0.3977 MGD

Peak monthly = 0.3358 MGD

For reference, the actual average flow from 04/01/2018 – 02/29/2024 was 0.11 MGD.

- Hardness = 464 mg/L as $CaCO_3$. This value represents the geometric mean of data from the permit reissuance application from 03/08/2022 – 03/17/2022.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water source: Domestic wastewater with water supply from wells.
- Additives: Ferric sulfate is used for phosphorus removal.
- 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 is shown in the tables in Part 2 below, in the column titled "MEAN EFFL. CONC.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

Effluent Copper Data

Sample Date	Copper µg/L	Sample Date	Copper µg/L	Sample Date	Copper µg/L
03/08/2022	18	03/21/2022	26	04/02/2022	19
03/11/2022	18	03/24/2022	22	04/05/2022	15
03/14/2022	18	03/27/2022	22	04/08/2022	15
03/17/2022	19	03/30/2022	23		
1-day P_{99} = 29 µg/L					
4-day P_{99} = 24 µg/L					

Effluent Chloride Data

	Chloride mg/L
1-day P_{99}	979
4-day P_{99}	750
30-day P_{99}	625
Mean	561
Std	144
Sample size	274
Range	277 – 1120

The following table presents the average concentrations and loadings at Outfall 001 from 04/01/2018 – 02/29/2024 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter Averages with Limits

	Average Measurement	Average Mass Discharged
BOD_5	5.9 mg/L*	
TSS	8.7 mg/L	4.2 lbs/day
pH field	7.4 s.u.	
Phosphorus	1.2 mg/L*	0.75 lbs/day

Attachment #1

	Average Measurement	Average Mass Discharged
Ammonia Nitrogen	0.10 mg/L*	
Chloride	565 mg/L	

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

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

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

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

Acute Limits based on 1-Q_{10}

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

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

Where:

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

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

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

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

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q_{10} method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is the case for Rosendale.

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0 cfs

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.
Arsenic		340		340	68.0	1.0		
Cadmium	457	58.9		58.9	11.8	<0.3		
Chromium	301	4446		4446	889	1.4		
Copper	464	66.0		66.0			29	26
Lead	356	365		365	72.9	<3.5		
Nickel	268	1080		1080	216	8.4		
Zinc	333	345		345	68.9	44		
Chloride (mg/L)		757		757			**979**	**1120**

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

* * Per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016 consideration of ambient concentrations and 1-Q_{10} flow rates yields a more restrictive limit than the 2 × ATC method of limit calculation.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}	4-day MAX. CONC.
Arsenic		152		152	30.4	1.0		
Cadmium	175	3.82		3.82	0.76	<0.3		
Chromium	301	326		326	65.2	1.40		
Copper	352	30.4		30.4			24	
Lead	352	94.5		94.5	18.9	<3.5		
Nickel	268	120		120	24.0	8.4		
Zinc	333	345		345	68.9	44		
Chloride (mg/L)		395		395			**750**	**923**

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

Monthly Average Limits based on Wildlife Criteria (WC)

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 = 0 cfs

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370		370	74.0	<0.3
Chromium (+3)	3818000		3818000	763600	1.4

Lead	140		140	28.0	<3.5
Nickel	43000		43000	8600	8.4

Monthly Average Limits based on Human Cancer Criteria (HCC)
RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3		13.3	2.66	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 chloride.

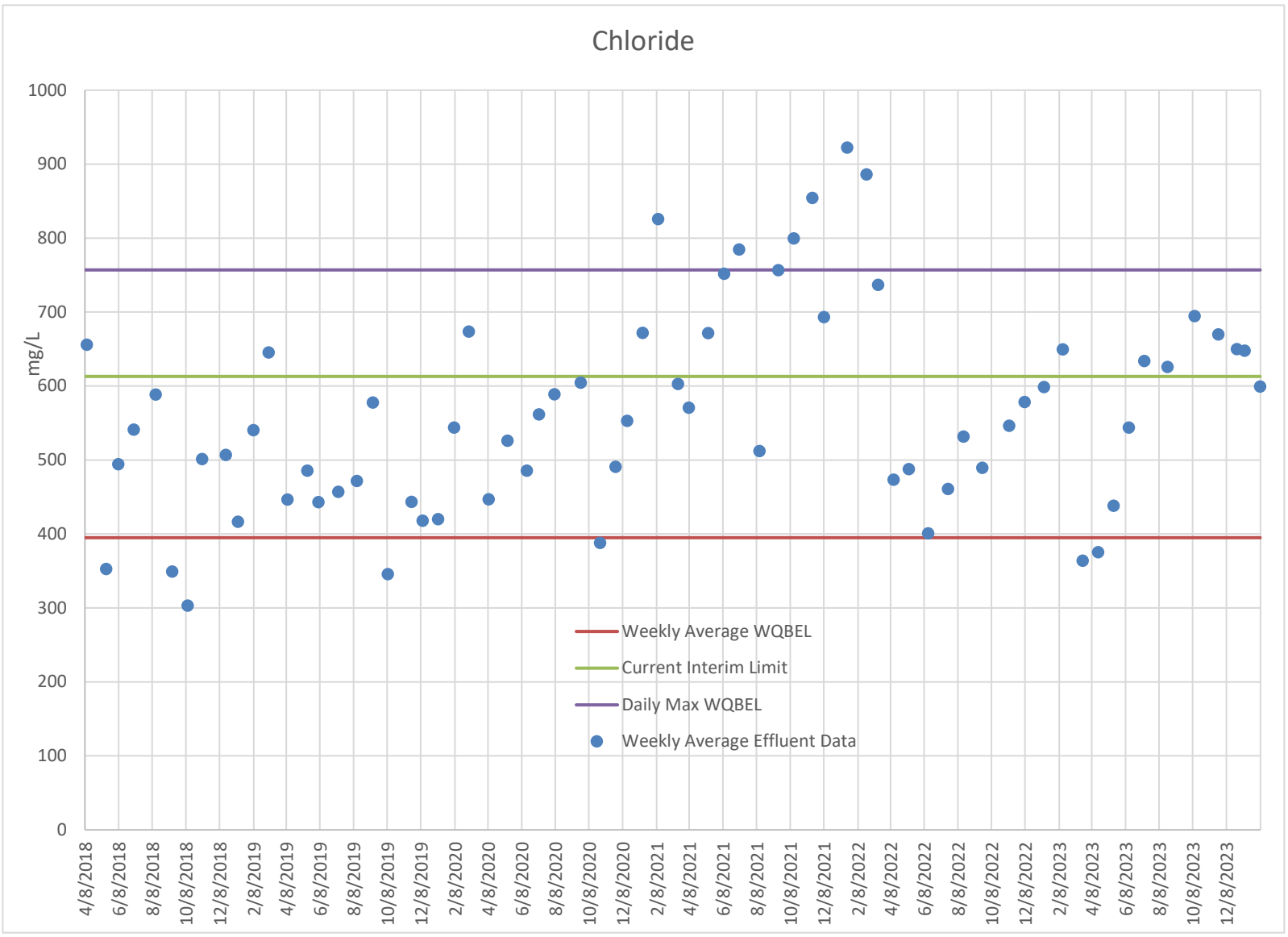
Chloride – Considering available effluent data from the current permit term (04/08/2018 – 02/07/2024), the 1-day P_{99} chloride concentration is 979 mg/L, and the 4-day P_{99} of effluent data is 750 mg/L.

Because the 1-day P_{99} and 4-day P_{99} exceed the calculated daily maximum and weekly average WQBELs, effluent limits are needed in accordance with s. NR 106.05(4)(b), Wis. Adm. Code.

However, Subchapter VII of ch. NR 106, Wis. Adm. Code, provides for a variance from water quality standards for this substance, and Rosendale has requested such a variance. That variance may be granted subject to the following conditions:
1) The permit shall include an "Interim" limitation intended to prevent an increase in the discharge of Chloride;
2) The permit shall specify "Source Reduction Measures" to be implemented during the permit term, with periodic progress reports; and
3) The permit shall include a "Target Limit" or "Target Value" to gage the effectiveness of the Source Reduction Measures, and progress toward the WQBELs.

Interim Limits for Chloride
Section NR 106.82(4), Wis. Adm. Code, defines a "Daily maximum interim limitation" as either the 1-day P99 concentration or 105% of the highest concentration of the representative data and s. NR 106.82(9), Wis. Adm. Code, defines a "Weekly average interim limitation" as either the 4-day P_{99} concentration or 105% of the highest weekly average concentration of the representative data.

The graph below shows the effluent chloride data from the current permit term compared with the WQBEL and current interim weekly average limit of 613 mg/L. The data from 06/10/2021 (1680 mg/L) is removed from this evaluation because it is an outlier due to abnormally low flows.



Ideally, the effluent chloride concentration at facilities with variances will trend downward as time goes on as a result of source reduction measures. It appears that chloride has increased during this permit term, with a 4-day P99 of 775 mg/L.

A daily maximum of 980 mg/L interim chloride limit is recommended for permit reissuance, based on the 1-day P_{99} (rounded to two significant figures). A weekly average of 613 mg/L interim chloride limit is recommended, which is equal to the current weekly average interim limit. This is the 4-day P_{99} from the previous permit term because the current 4-day P_{99} is higher and the Department does not find it appropriate to increase the interim concentration limit in the reissued permit, because it would be counterproductive to meeting the final WQBEL.

A target limit and permit language for Source Reduction Measures are not recommended as part of this evaluation. These should follow contact with Rosendale. Though if the Department and Rosendale are unable to reach agreement on all the terms of a Chloride Variance, the calculated limits described earlier should be included in the permit, in accordance with s. NR 106.83(3), Wis. Adm. Code.

Chloride Monitoring Recommendations
Four samples per month (on consecutive days) are recommended. This allows for averaging of the results to compare with the interim limit and allows the use of the average in determining future interim limits, and degree of success with chloride reduction measures.

In the absence of a variance, Rosendale would be subject to the WQBELs of 757 mg/L as a daily maximum and 395 mg/L as a weekly average; and a weekly average mass limit of 710 lbs/day (395 mg/L × 0.216 MGD × 8.34); and an alternative wet weather mass limit.

Mercury – The permit application did not require monitoring for mercury because Rosendale 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 11/04/2019 – 11/30/2023 was 0.16 mg/kg, with a maximum reported concentration of 0.816 mg/kg. Therefore, no mercury monitoring is recommended at Outfall 001.

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the type of discharge and the effluent flow rate, levels of PFOS/PFOA in the source water PFOS and PFOA monitoring is not recommended. The Department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

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

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. The current permit has daily maximum, weekly average and monthly average limits. 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 maximum expected effluent pH has changed.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)
Daily maximum limitations are based on acute toxicity criteria in ch. NR 105, Wis. Adm. Code, which are a function of the effluent pH and the receiving water classification. The 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 Limited Forage Fishery, and
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 2158 sample results were reported from 04/02/2018 – 02/29/2024. The maximum reported value was 8.6 s.u. (Standard pH Units). The effluent pH was 8.0 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 8.0 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 8.0 s.u. Therefore, a value of 8.0 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 8.0 s.u. into the equation above yields an ATC = 8.4 mg/L.

Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method

In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are calculated using the the 1-Q_{10} 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-Q_{10} (estimated as 80 % of 7-Q_{10}) and the 2×ATC approach are shown below.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	17
1-Q_{10}	8.4

The 1-Q_{10} method yields the most stringent limits for Rosendale.

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

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

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

Immediate receiving water: limited forage fish

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as a Limited Forage 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 = 1.0,

C = the minimum of 3.09 or $3.73 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Present), or
C = $3.73 \times 10^{(0.028 \times (25 - T))}$ – (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.

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 ºC, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the unnamed tributary. So "ELS Absent" criteria apply from October through April, and "ELS Present" criteria will apply from May through September for an LFF classification.

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

Weekly and Monthly Ammonia Nitrogen Limits – LFF

		Spring	Summer	Winter
		May	June – Sept.	Oct. – April
Effluent Flow	Qe (MGD)	0.216	0.216	0.216
Background Information	7-Q_{10} (cfs)	0	0	0
	7-Q_2 (cfs)	0.02	0.02	0.02
	Ammonia (mg/L)	0.02	0.03	0.05
	Average Temperature (°C)	12	19	4
	Maximum Temperature (°C)	14	21	10
	pH (s.u.)	8.21	8.21	7.97
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	0	0	0
	Reference Monthly Flow (cfs)	0.0085	0.017	0.00425
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	5.60	5.60	
	Early Life Stages Absent			25.6
	30-day Chronic			
	Early Life Stages Present	2.24	2.24	
	Early Life Stages Absent			10.2
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	5.6	5.6	
	Early Life Stages Absent			26
	Monthly Average			
	Early Life Stages Present	2.3	2.4	
	Early Life Stages Absent			10

West Branch of the Fond du Lac River (1 mile downstream)

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.

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 ºC, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the West Branch Fond du Lac River. So, "ELS Absent" criteria apply from October through March, and "ELS Present" criteria will apply from April through September for a WWSF classification.

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

Weekly and Monthly Ammonia Nitrogen Limits – WWSF

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
Effluent Flow	Qe (MGD)	0.216	0.216	0.216
Background Information	7-Q_{10} (cfs)	0	0	0
	7-Q_2 (cfs)	0.03	0.03	0.03
	Ammonia (mg/L)	0.02	0.03	0.05
	Average Temperature (°C)	12	19	4
	Maximum Temperature (°C)	14	21	10
	pH (s.u.)	8.21	8.21	7.97
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	0	0	0
	Reference Monthly Flow (cfs)	0.01275	0.0255	0.006375
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	4.41	2.99	
	Early Life Stages Absent			8.50

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
	30-day Chronic			
	Early Life Stages Present	1.76	1.20	
	Early Life Stages Absent			3.40
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	4.4	3.0	
	Early Life Stages Absent			8.5
	Monthly Average			
	Early Life Stages Present	1.8	1.3	
	Early Life Stages Absent			3.5

Ammonia Decay

The Department must establish limits to protect downstream uses, according to s. NR 106.32(1)(b), Wis. Adm. Code. Ammonia decay may be considered when determining limits at the outfall to protect the downstream classification, according to s. NR 106.32(4)(c), Wis. Adm. Code. Where the calculated limits are more restrictive based on downstream uses, ammonia decay can be considered to determine if these more restrictive limits are needed or if the ammonia will decay before it reaches the point of the classification change.

Ammonia decay rates are dependent on temperature with in-stream nitrification essentially non-existent in the winter. In-stream decay is expected so a first order decay model should be used. Based on the available literature, a decay rate of 0.25 day^{-1} at 20°C has been suggested as a default rate. A temperature correction factor of $\theta = 1.08$ is ($k_{.t} = k_{20}\,\theta^{(T-20)}$). The ammonia nitrogen decay equation is provided below.

$$N_{Limit} = \left(\frac{N_{down}}{EXP(-k_t T)} \right)$$

Where: N_{Limit} = Ammonia limit needed to protect downstream use (mg/L)
N_{down} = Ammonia limit calculated based on downstream classification and flow (mg/L)
$-k_t$ = Ammonia decay rate at background stream temperature (day^{-1})
T = Travel time from outfall to downstream use (day)

The velocity of receiving water is assumed to be 5 miles per day and the distance from the point of discharge to the classification change is approximately 1 mile for a travel time of 0.2 days. This equation shows that at the location where the classification change, 96%-99% of the ammonia remains at the WWSF classification, depending on the season. After decay, the limits are increased as shown in the following table.

Ammonia Nitrogen Decay Limits Comparison

	LFF		WWSF		After decay		Current Limits	
Months Applicable	Weekly Average mg/L	Monthly Average mg/L	Weekly Average mg/L	Monthly Average mg/L	Weekly Average mg/L	Monthly Average mg/L	Weekly Average mg/L	Monthly Average mg/L
April	26	10	4.4	1.8	**4.5**	**1.9**	4.7	2.1
May	5.6	2.3	4.4	1.8	**4.6**	**1.9**	4.7	2.1
June – September	5.6	2.4	3.0	1.3	**3.0**	**1.3**	3.5	1.9
October – March	26	10	8.5	3.5	**8.6**	**3.5**	11	4.9

The calculated limits in this evaluation are more stringent than the current limits.

Effluent Data
The following table evaluates the statistics based upon ammonia data reported from 04/01/2018 – 02/27/2024, with those results being compared to the calculated limits to determine the need to include ammonia limits in Rosendale's permit for the respective month ranges. That need is determined by calculating 99th upper percentile (or P_{99}) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	April	May	June - September	October - March
1-day P_{99}	0.21	0.85	1.78	0.82
4-day P_{99}	0.11	0.47	1.21	0.45
30-day P_{99}	0.05	0.21	0.53	0.20
Mean*	0.02	0.10	0.13	0.09
Std	0.06	0.21	0.69	0.22
Sample size	77	80	310	452
Range	<0.029 – 0.346	<0.029 - 1.22	<0.029 - 6.92	<0.029 - 1.79

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

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

The permit currently has daily maximum, weekly average, and monthly average limits year-round. Where there are existing ammonia nitrogen limits in the permit, the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:

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

Expression of Limits
Revisions to ch. NR 106, Wis. Adm. Code, in September 2016 aligned Wisconsin's WQBELs with 40 CFR § 122.45(d), which specifies that effluent limits for continuous dischargers must be expressed as weekly and monthly averages for publicly owned treatment works and as daily maximums and monthly averages for all other dischargers, unless shown to be impracticable. Because a daily maximum ammonia limit is necessary for Rosendale, weekly and monthly average limits are also required under this code revision.

The methods for calculating limitations for municipal treatment facilities to conform to 40 CFR 122.45(d) are specified in s. NR 106.07(3), Wis. Adm. Code, and are as follows:

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. The calculated daily maximum limit is 8.4 mg/L which is more stringent than the calculated weekly average limit of 8.6 mg/L for October – March.

Conclusions and Recommendations
In summary, after rounding to two significant figures, the following ammonia nitrogen limitations are recommended. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code. Additional limits to meet the requirements in s. NR 106.07, Wis. Adm Code, are shown below in bold.

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
April	8.4	4.5	1.9
May	8.4	4.6	1.9
June – September	8.4	3.0	1.3
October – March	8.4	**8.4**	3.5

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

Section NR 102.04(5), Wis. Adm. Code, states that all surface waters shall be suitable for supporting recreational use and shall meet E. coli criteria during the recreation season. Section NR 102.04(5)(b), Wis. Adm. Code, allows the Department to make exceptions when it determines, in accordance with s. NR 210.06(3), Wis. Adm. Code, that wastewater disinfection is not required to meet E. coli limits and protect the recreational use. Section NR 210.06(3), Wis. Adm. Code, tasks the Department with determining the need for disinfection using a site-specific analysis based on potential risk to human or animal health. It sets out the factors that must be considered in determining the necessity to disinfect municipal wastewater or to change the length of the disinfection season.

Rosendale had previously been exempted from disinfection based on the limited forage fish community classification of the receiving water. Section NR 210.06(3)(g), Wis. Adm. Code, states that disinfection decisions may be made based on the hydrologic classifications listed in s. NR 104.02(1), Wis. Adm. Code (not on the water quality classifications - i.e., limited forage fish, limited aquatic life - that are defined in s. NR 104.02(3), Wis. Adm. Code). The hydrologic classification for the unnamed tributary is listed in ch. NR 104, Wis. Adm. Code, as continuous. Continuous streams have a higher likelihood of providing opportunities for full contact recreational activities. Therefore, disinfection should not be exempted based solely on this hydrological classification.

The Department has considered the information required by s. NR 210.06(3), Wis. Adm. Code, and has determined that the discharge cannot meet bacteria limits without disinfection. 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.

These limits are required during May through September. The permit will include a compliance schedule to meet these limits.

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 Rosendale 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 no technology-based limit is required.

Annual Average Mass Total Phosphorus Loading

Month	Monthly Avg. mg/L	Total Flow MG/month	Total Phosphorus lb./mo.
Mar 2023	0.16	5.6	7.5
Apr 2023	0.19	5.9	9.5
May 2023	0.29	4.0	10
Jun 2023	3.22	3.0	82
Jul 2023	0.31	2.5	6.6
Aug 2023	0.29	2.6	6.2
Sep 2023	0.33	2.2	6.1
Oct 2023	1.61	2.3	31
Nov 2023	2.47	2.2	46
Dec 2023	0.77	2.3	15
Jan 2023	0.37	2.4	7.4
Feb 2023	0.39	2.4	7.7
Average			19

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
Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs (*April 2020) and are based on the annual phosphorus wasteload allocation (WLA) given in pounds per year. This WLA found in Appendix H of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Upper Fox and Wolf River Basins (UFWRB TMDL)* report dated February 2020 are expressed as maximum annual loads (lbs/year). The annual WLA for Rosendale is 112 lbs/year.

For the reasons explained in the April 30, 2012 paper entitled *Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin*, WDNR has determined that the phosphorus WQBELs set equal to WLAs would not be consistent with the assumptions and requirements of the TMDL. Therefore, limits given to facilities included in the Upper Fox and Wolf River Basins TMDL are given monthly average mass limits and, if

the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits are also included. The following equation shows the calculation of equivalent effluent concentration:

TP Equivalent Effluent Concentration = WLA ÷ (365 days/yr * Flow Rate * Conversion Factor)
= 112 lbs/yr ÷ (365 days/yr * 0.216 MGD * 8.34)
= 0.17 mg/L

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

TP 6-Month Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (112 lbs/yr ÷ 365 days/yr) * 1.17
= 0.36 lbs/day

TP Monthly Average Permit Limit = TP 6-Month Average Permit Limit * 3
= 0.359 lbs/day * 3
= 1.1 lbs/day

The multiplier used in the six-month average calculation was determined according to the implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 0.8. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by the facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as 3/week; if a different monitoring frequency is used, the stated limits should be reevaluated.

Six-month average and monthly average mass effluent limits are recommended for this discharge. The limits are equivalent to a concentration of 0.199 mg/L as a six-month average and 0.598 mg/L as a monthly average at the facility design flow of 0.216 MGD.

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

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

Effluent Data
The following table summarizes effluent total phosphorus monitoring data from 04/01/2018 – 02/27/2024.

Total Phosphorus Effluent Data

	Phosphorus mg/L	**Phosphorus lbs/day**
1-day P_{99}	5.92	5.18

Attachment #1

	Phosphorus mg/L	Phosphorus lbs/day
4-day P_{99}	3.24	2.84
30-day P_{99}	1.80	1.57
Mean	1.19	1.04
Std	1.21	1.06
Sample size	915	915
Range	<0.048 - 6.7	0 - 7.8

Interim Limit

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's recommended that the interim limit be set equal to 3.2 mg/L expressed as a monthly average. This value reflects the 4-day P_{99} concentration of 3.2 mg/L from the current permit term.

PART 6 – TOTAL SUSPENDED SOLIDS

Total Suspended Solids (TSS) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs (*April 2020). This WLAs found in Appendix I of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Upper Fox and Wolf Basins (UFW TMDL)* report dated February 2020 are expressed as maximum annual loads (lbs/year). The annual WLA for Rosendale is 7,896 lbs/year.

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

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

Rosendale is a municipal treatment facility and is therefore subject to weekly average and monthly average TSS limits derived from TSS annual WLAs.

TSS Monthly Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (7,896 lbs/yr ÷ 365 days/yr) * 2.07
= 45 lbs/day

TSS Weekly Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (7,896 lbs/yr ÷ 365 days/yr) * 1.47
= 32 lbs/day

The multiplier used in the weekly average and monthly average calculation was determined according to implementation guidance. A coefficient of variation was calculated, based on TSS mass monitoring data, to be 1.3. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by the facility is 0.6. This value, along with monitoring frequency, is used to select the

multiplier. The current permit specifies TSS monitoring as 3/week; if a different monitoring frequency is used, the stated limits should be reevaluated.

Effluent Data
The following table lists the statistics for effluent phosphorus levels from 04/01/2018 – 02/27/2024.

Total Suspended Solids Statistics

	Concentration (mg/L)	Mass Discharge (lbs/day)
1-day P_{99}	33.6	54.8
4-day P_{99}	19.2	29.6
30-day P_{99}	11.9	14.9
Mean	8.71	8.90
Std	6.66	11.5
Sample Size	1164	1164
Range	1.9 - 141	0.7 – 228

Rosendale is currently meeting the TMDL-based limits and no compliance schedule is needed.

PART 7 – 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 04/01/2018 – 02/29/2024.

The table below summarizes the maximum temperatures reported during monitoring from 02/09/2012 – 12/31/2023.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	53	54	54	78

Attachment #1

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
FEB	52	52	54	79
MAR	56	59	57	80
APR	57	58	63	81
MAY	61	62	70	84
JUN	69	70	77	85
JUL	72	73	81	86
AUG	72	73	79	86
SEP	70	71	73	85
OCT	70	71	**63**	83
NOV	61	63	**54**	80
DEC	58	64	**54**	79

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, weekly average temperature maximum limits are necessary for the months of October, November, and December.

Dissipative Cooling
Rosendale has submitted a request for consideration of dissipative cooling in 2018 which demonstrated that the temperature from the effluent has minimal thermal impact on the receiving water and the heat is expected to fully dissipate within several stream widths. The permittee has certified that there haven't been any changes to thermal loadings and operations. Based on this information, the department has

found that it is not necessary to include temperature limits in the reissued permit. **Temperature monitoring is recommended year-round** per the requirements of s. NR 106.59(7), Wis. Adm. Code.

Future WPDES Permit Reissuance
Dissipative cooling requests must be re-evaluated every permit reissuance. The permittee is responsible for submitting an updated DC request prior to permit reissuance. Such a request must either include:
a) A statement by the permittee that there have been no substantial changes in operation of, or thermal loadings to, the treatment facility and the receiving water; or
b) New information demonstrating DC to supplement the information used in the previous DC determination. If significant changes in operation or thermal loads have occurred, additional DC data must be submitted to the Department.

PART 8 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. Decisions below related to the selection of representative data and the need for WET limits were made according to ss. NR 106.08 and 106.09, Wis. Adm. Code. WET monitoring frequency and toxicity reduction evaluation (TRE) recommendations were made using the best professional judgment of staff familiar with the discharge after consideration of the guidance in the *Whole Effluent Toxicity (WET) Program Guidance Document (2022).*

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC_{50} (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic 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 IC_{25} (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 **100%** 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:

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

Where:

Q_e = annual average flow = 0.216 MGD = 0.334 cfs
f = fraction of the Q_e withdrawn from the receiving water = 0
Q_s = ¼ of the 7-Q_{10} = 0 cfs ÷ 4 = 0 cfs

*The current IWC is based on the 7-Q_{10} of the West Branch of the Fond du Lac River because the immediate receiving water is classified as LFF. It's been determined by department biologists that the immediate receiving water is capable of supporting a warmwater forage fish community.

- 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 001 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 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations.

WET Data History

Date Test Initiated	Acute Results LC_{50} %				Chronic Results IC_{25} %				Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	*C. dubia*	Fathead Minnow	Pass or Fail?	Use in RP?	
04/07/2005	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
01/17/2006					>100	>100	Pass	Yes	
10/19/2006	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
09/11/2007					>100	>100	Pass	Yes	
10/23/2008					>100	>100	Pass	No	1
09/01/2009					>100	>100	Pass	No	1
06/17/2010	>100	>100	Pass	No	>100	>100	Pass	No	1
02/24/2011					>100	>100	Pass	No	1
03/12/2013	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
10/31/2017					>100	>100	Pass	Yes	
04/28/2020	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
11/30/2021					75	>100	Fail	Yes	
02/08/2022					>100	>100	Pass	Yes	
03/22/2022					>100	>100	Pass	Yes	

Footnotes:

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

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

  Acute Reasonable Potential = [(TUa effluent) (B)(AMZ)]
  Chronic Reasonable Potential = [(TUc effluent) (B)(IWC)]

According to s. NR 106.08(6)(d), Wis. Adm. Code, TUa and TUc effluent values are equal to zero whenever toxicity is not detected (i.e. when the LC_{50}, IC_{25} or $IC_{50} \geq 100\%$).

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

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

Chronic WET Limit Parameters

TUc (maximum) $100/IC_{25}$	**B** (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
100/75= 1.3	6.2 Based on 1 detect	100%

[(TUc effluent) (B)(IWC)] = 7.2 > 1.0

Therefore, reasonable potential is shown for chronic WET limits using the procedures in s. NR 106.08(6) and representative data from 04/07/2005 – 03/22/2022.

Expression of WET limits

Chronic WET limit = [100/IWC] TU_c = 1.0 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

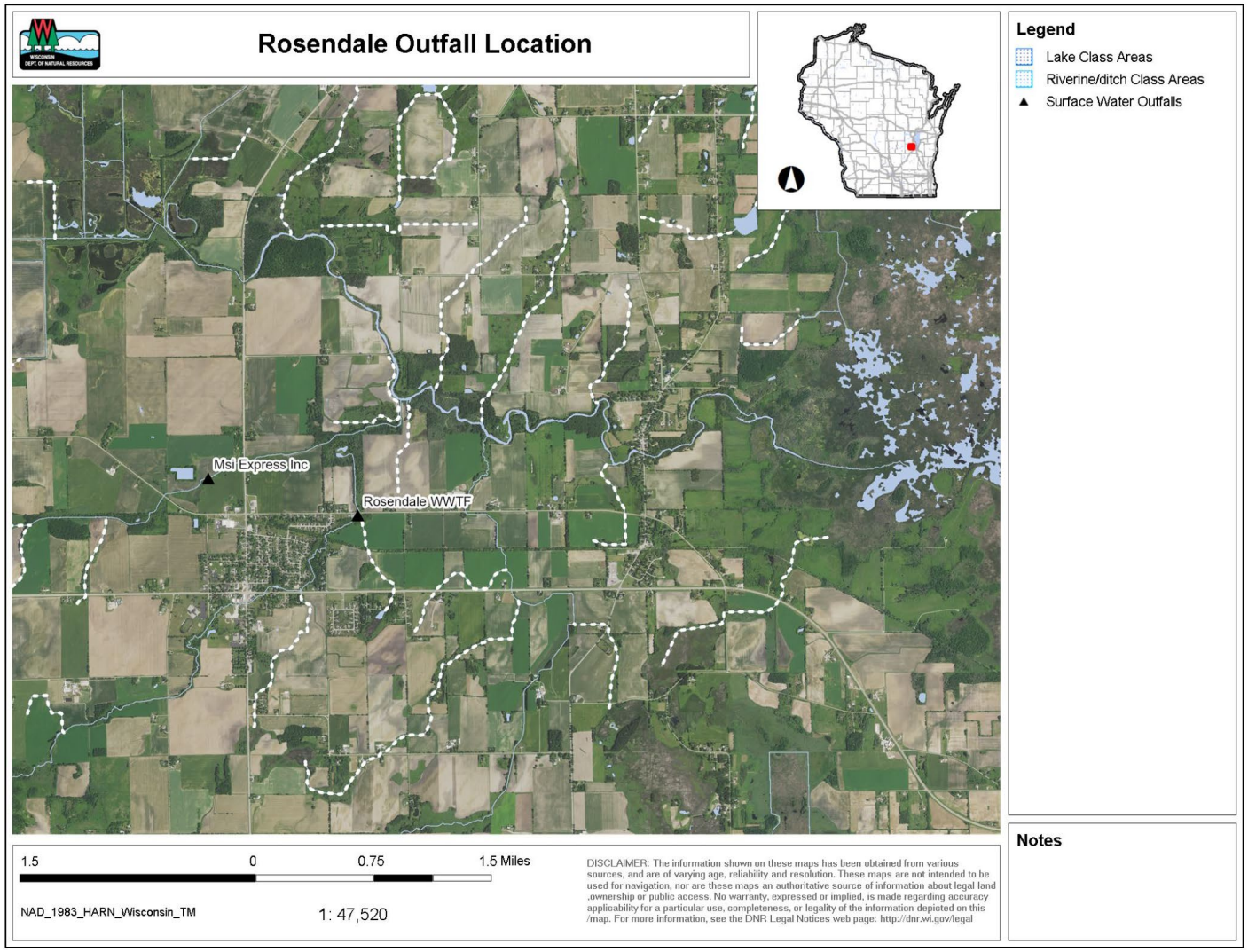
	Acute	**Chronic**
AMZ/IWC	Not Applicable. **0 Points**	IWC = 100%. **15 Points**
Historical Data	3 tests used to calculate RP. No tests failed. **0 Points**	9 tests used to calculate RP. 1 test failed. **0 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. **0 Points**	Same as Acute. **0 Points**
Receiving Water Classification	Limited forage fish, less than 4 miles to the warmwater sport fish classification.	Same as Acute.

Attachment #1

	Acute	Chronic
	5 Points	**5 Points**
Chemical-Specific Data	Reasonable potential for limits for chloride based on ATC; Ammonia nitrogen limit carried over from the current permit. Ammonia, copper, nickel, and zinc detected. Additional Compounds of Concern: None. **8 Points**	Reasonable potential for limits for chloride based on CTC; Ammonia nitrogen limit carried over from the current permit. Ammonia, copper, nickel, and zinc detected. Additional Compounds of Concern: None. **8 Points**
Additives	1 Water Quality Conditioner added: ferric sulfate for phosphorus removal. Permittee has proper P chemical SOPs in place. **1 Point**	All additives used more than once per 4 days. **1 Point**
Discharge Category	0 Industrial Contributors. **0 Points**	Same as Acute. **0 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:	**14 Points**	**29 Points**
Recommended Monitoring Frequency (from Checklist):	No tests recommended.	1x yearly
Limit Required?	No	Yes Limit = 1.0 TU_c
TRE Recommended? (from Checklist)	No	No

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, annual chronic WET tests are recommended in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).
- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, a chronic WET limit is required. The chronic WET limit shall be expressed as 1.0 TUc as a monthly average in the effluent limits table of the permit.

Attachment #2



Attachment #3

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

						Temp Dates	Flow Dates
Facility:	Rosendale WWTF	**7-Q_{10}:**	0.00 cfs				
Outfall(s):	001	**Dilution:**	25%		**Start:**	02/09/12	04/01/18
Date Prepared:	4/25/2024	**f:**	0		**End:**	12/31/23	02/29/24
Design Flow (Qe):	0.22 MGD	**Stream type:**	Limited forage fish community				
Storm Sewer Dist.	0 ft	**Qs:Qe ratio:**	0.0 :1				
		Calculation Needed?	YES				

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs)	Representative Highest Effluent Flow Rate (Qe)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qea)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(cfs)	(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)
JAN	37	54	78	0.00	0.147	0.194	0	53	54	54	78
FEB	39	54	79	0.00	0.129	0.205	0	52	52	54	79
MAR	43	57	80	0.00	0.206	0.392	0	56	59	57	80
APR	50	63	81	0.00	0.278	0.342	0	57	58	63	81
MAY	59	70	84	0.00	0.338	0.529	0	61	62	70	84
JUN	64	77	85	0.00	0.147	0.179	0	69	70	77	85
JUL	69	81	86	0.00	0.130	0.215	0	72	73	81	86
AUG	68	79	86	0.00	0.183	0.313	0	72	73	79	86
SEP	63	73	85	0.00	0.203	0.240	0	70	71	73	85
OCT	55	63	83	0.00	0.254	0.357	0	70	71	**63**	83
NOV	46	54	80	0.00	0.148	0.163	0	61	63	**54**	80
DEC	40	54	79	0.00	0.145	0.166	0	58	64	**54**	79

Facility Specific Chloride Variance Data Sheet

Directions: Please complete this form electronically. Record information in the space provided. Select checkboxes by double clicking on them. Do not delete or alter any fields. For citations, include page number and section if applicable. Please ensure that all data requested are included and as complete as possible. Attach additional sheets if needed.

Section I: General Information

A. Name of Permittee: Village of Rosendale

B. Facility Name: Rosendale Wastewater Treatment Facility

C. Submitted by: Wisconsin Department of Natural Resources

D. State: Wisconsin **Substance:** Chloride **Date completed:** August 22, 2024

E. Permit #: WI-0028428-10-0 **WQSTS #:** (EPA USE ONLY)

F. Duration of Variance **Start Date:** January 1, 2025 **End Date:** December 31, 2029

G. Date of Variance Application: March 11, 2022

H. Is this permit a:
☐ **First time submittal for variance**
☒ **Renewal of a previous submittal for variance** *(Complete Section IX)*

Description of proposed variance: The Village of Rosendale Wastewater Treatment Facility (WWTF) discharges to an unnamed tributary to the West Branch of the Fond du Lac River in Fond du Lac County. The Village of Rosendale seeks a variance to the water quality standards for chloride for its WWTF.

The Department concludes that the Village of Rosendale has met the requirements of s. NR 106.83(2), Wisconsin Administrative Code, and s. 283.15, Wisconsin Statutes. The Department further concludes that requiring the Village of Rosendale to meet the water quality standard for chloride would result in substantial and widespread adverse social and economic impacts in its service area. Furthermore, the Department concludes that there is no feasible pollutant control technology that can be applied to achieve compliance with the chloride water quality-based effluent limit (WQBEL). The Department therefore proposes that this permit include a discharger-specific variance to the chloride water quality standard for aquatic life.

The proposed variance for chloride is from the WQBELs of 395 mg/L as a weekly average and 757 mg/L as a daily maximum, to interim limits of 613 mg/L expressed as a weekly average limit and 980 mg/L expressed as a daily maximum limit. The Department concludes that the interim limits reflect the greatest pollutant reduction achievable by the permittee with the pollutant control technologies currently applied in the permittee's WWTF. The permit requires the permittee to implement Source Reduction Measures (SRMs). The Department considers the highest attainable condition (HAC) of the receiving water to be the interim limit – applied for the term of the variance – combined with the permittee's implementation of SRMs. The term of the proposed variance is five years, concurrent with the term of the proposed WPDES permit. The underlying designated uses and criteria of Wisconsin's chloride water quality standards (WQS) will be retained, and all other applicable WQS will remain in effect with adoption of the proposed variance.

This is a renewal of a previous submittal to EPA for a chloride variance for this permittee. The previous permit for this facility contained an interim chloride limit, target value and requirements to implement source reduction measures, in accordance with s. NR 106.83(2), Wis. Adm. Code.

Citation: An interim chloride effluent limitation under s. NR 106.83(2), Wis. Adm. Code represents a variance to water quality standards authorized by s. 283.15, Wis. Stats., and 40 CFR §131.14.

I. List of all who assisted in the compilation of data for this form

Name	Email	Phone	Contribution
Sarah Donoughe	Sarah.Donoughe@Wisconsin.gov	920-366-6076	Permit Drafter
Mark Stanek	Mark.Stanek@Wisconsin.gov	920-808-0670	Compliance Engineer
Nicole Krueger	Nicole.Krueger@Wisconsin.gov	414-897-5750	Parts II D-H and J

Section II: Criteria and Variance Information

A. Water Quality Standard from which variance is sought: Chloride

B. List other criteria likely to be affected by variance: None

C. Source of Substance: The following have been identified as the major sources of chloride discharged to the Rosendale WWTF: 1) Industrial and commercial sources that discharge wastewater to the WWTF from water softening and processing/manufacturing; 2) Residential water softening.

D. Ambient Substance Concentration: 0 mg/L ☐ **Measured** ☒ **Estimated** ☐ **Default** ☐ **Unknown**

E. If measured or estimated, what was the basis? Include citation. The receiving water 7Q10 is 0 cfs, so the ambient concentration is assumed to be zero.

F. Average effluent discharge rate: 0.11 MGD (average from 04/01/2018 – 02/29/2024) **Maximum effluent discharge rate:** 0.50 MGD (peak daily from 04/01/2018 – 02/29/2024)

G. Effluent Substance Concentration: Average = 561 mg/L; 1-day P99 = 979 mg/L; 4-day P99 = 750 mg/L ☒ **Measured** ☐ **Default** ☐ **Estimated** ☐ **Unknown**

H. If measured or estimated, what was the basis? Include Citation. Permit-required monitoring from 04/01/2018 – 02/29/2024.

I. Type of HAC:
☐ **Type 1: HAC reflects waterbody/receiving water conditions**
☐ **Type 2: HAC reflects achievable effluent conditions**
☒ **Type 3: HAC reflects current effluent conditions**

J. Statement of HAC: The Department has determined the highest attainable condition of the receiving water is achieved through the application of the variance limit in the permit, combined with a permit requirement that the permittee implement its Chloride SRM plan. Thus, the HAC at commencement of this variance is 613 mg/L as a weekly average and 980 mg/L as a daily maximum, which reflect the greatest chloride reduction achievable with the current treatment processes, in conjunction with the implementation of the permittee's Chloride SRM plan. The current effluent condition is reflective of on-site optimization measures that have already occurred. This HAC determination is based on the economic feasibility of available compliance options for The Village of Rosendale WWTF at this time (see Economic Section below). The permittee may seek to renew this variance in the subsequent reissuance of this permit; the Department will reevaluate the HAC in its review of such a request. A subsequent HAC cannot be defined as less stringent than this HAC.

K. Variance Limit: 980 mg/L as a daily maximum and 613 mg/L as a weekly average

L. Level currently achievable (LCA): 980 mg/L as a daily maximum and 613 mg/L as a weekly average

M. What data were used to calculate the LCA, and how was the LCA derived? (*Immediate compliance with LCA is required.)*

Rosendale submits monthly discharge monitoring reports and they sample 4 days per month. The Department used the data collected from the date range of 4/2018 through 12/2023. A daily maximum of 980 mg/L interim chloride limit is recommended for permit reissuance, based on the 1-day P_{99} (rounded to two significant figures). A weekly average of 613 mg/L interim chloride limit is recommended, which is equal to the current weekly average interim limit. This is the 4-day P_{99} from the previous permit term because the current 4-day P_{99} is higher and the Department does not find it appropriate to increase the interim concentration limit in the reissued permit, because it would be counterproductive to meeting the final WQBEL.

N. Explain the basis used to determine the variance limit (which must be ≤ LCA). Include citation.

The variance limits = 1-day P_{99} (rounded to two significant figures and 4-Day P_{99}. The limits are established in accordance with s. 283.15 (5), Wis. Stats. and ch. NR 106 Subchapter II, Wis. Adm. Code. Chapter NR 106, Subchapter VII, Wis. Adm. Code, allows for a variance; the imposition of a less restrictive interim limit; a compliance schedule that stresses source reduction and public education; and allowance for a target value or limit to be a goal for reduction.

O. Select all factors applicable as the basis for the variance provided under 40 CFR 131.10(g). Summarize justification below: ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☒ **6**

The use of a reverse osmosis system was evaluated. The cost of the system was estimated to an average cost per household that would result in a MHI of 7.31%. Without a variance, meeting the water quality standards of 395

mg/L as a weekly average and 757 mg/L as a daily maximum would result in substantial and widespread economic and social impacts.

Section III: Location Information

A. Counties in which water quality is potentially impacted: Fond du Lac

B. Receiving waterbody at discharge point: Unnamed tributary to the West Branch of the Fond du Lac River (WBIC no. 134900)

C. Flows into which stream/river? West Branch of the Fond du Lac River **How many miles downstream?** 1 mile

D. Coordinates of discharge point (UTM or Lat/Long): 43º 46' 52" N Latitude, 88º 39' 38" W Longitude

E. What is the distance from the point of discharge to the point downstream where the concentration of the substance falls to less than or equal to the chronic criterion of the substance for aquatic life protection?
Approximately 2 miles

F. Provide the equation used to calculate that distance *(Include definitions of all variables, identify the values used for the clarification, and include citation):*
Mass balance equation solving for the cumulative stream flow needed to result in an instream concentration less than or equal to the aquatic acute toxicity criteria of 757 mg/L and the chronic toxicity criteria of 395 mg/L.

(interim limit in mg/L x effluent design flow in cfs) + (background concentration in mg/L x background stream flow in cfs)) / (effluent design flow in cfs + background stream flow in cfs) = $\leq$ 395 mg/L.

Assuming a background concentration of 25.1 mg/L (from the West Branch Fond du Lac River at station ID 205007), the minimum low flow needed to meet the chronic toxicity criteria in stream is 0.2 cfs. Approximately 2 miles downstream of Outfall 001, the estimated low flow is 0.22 cfs in the West Branch Fond du Lac River. If Rosendale discharges at the proposed interim limits of 980 mg/L as a daily maximum and 613 mg/L as a weekly average, the instream concentration would be 623 mg/L and 393 mg/L, respectively.

G. What are the designated uses associated with the direct receiving waterbody, and the designated uses for any downstream waterbodies until the water quality standard is met?
The receiving water and downstream waters are designated for recreation, non-public water supply, and fish and aquatic life uses. The receiving water's fish and aquatic life classification is Limited Forage Fish, from the point of discharge downstream to the West Branch of the Fond du Lac River. The West Branch of the Fond du Lac River is classified as Warm Water Sport Fish.

H. Identify all other variance permittees for the same substance which discharge to the same stream, river, or waterbody in a location where the effects of the combined variances would have an additive effect on the waterbody: There are no other permittees that discharge to this stream – or in the West Branch of the Fond du Lac River watershed – which have chloride variances (see attached map "Current Outfall Variances July 2024").

Permit Number	Facility Name	Facility Location	Variance Limit [mg/L]

I. Please attach a map, photographs, or a simple schematic showing the location of the discharge point as well as all variances for the substance currently draining to this waterbody on a separate sheet
See attached map "Current Outfall Variances July 2024"

J. Is the receiving waterbody on the CWA 303(d) list? If yes, please list the impairments below. ☐ **Yes** ☒ **No** ☐ **Unknown**
Proposed for 303(d) list for total phosphorus, but no impairments listed related to chloride.

***K.* Please list any contributors to the POTW in the following categories:**
May need to contact facility for this information

Food processors (cheese, vegetables, meat, pickles, soy sauce, etc.)	None
Metal Plating/Metal Finishing	None
Car Washes	None
Municipal Maintenance Sheds (salt storage, truck washing, etc.)	None
Laundromats	None
Other presumed commercial or industrial chloride contributors to the POTW	Two schools have large softeners. Industrial contributors discharge only domestic sewage, softener and iron filter regeneration water and boiler drains.

L. If the POTW does not have a DNR-approved pretreatment program, is a sewer use ordinance enacted to address the chloride contributions from the industrial and commercial users? If so, please describe.
There is no sewer use ordinance that addresses chloride from industrial users.

Section IV: Pretreatment (complete this section only for POTWs with DNR-Approved Pretreatment Programs. See w:\Variances\Templates and Guidance\Pretreatment Programs.docx)

A. Are there any industrial users contributing chloride to the POTW? If so, please list.
N/A

B. Are all industrial users in compliance with local pretreatment limits for chloride? If not, please include a list of industrial users that are not complying with local limits and include any relevant correspondence between the POTW and the industry (NOVs, industrial SRM updates and timeframe, etc.)
N/A

C. When were local pretreatment limits for chloride last calculated?
N/A

D. Please provide information on specific SRM activities that will be implemented during the permit term to reduce the industry's discharge of the variance pollutant to the POTW
N/A

Section V: Public Notice

A. Has a public notice been given for this proposed variance? ☒ Yes ☐ No

B. If yes, was a public hearing held as well? ☒ Yes ☐ No ☐ N/A

C. What type of notice was given?
☒ Notice of variance included in notice for permit ☐ Separate notice of variance

D. Date of public notice: TBD (Aug 2024) **Date of hearing:** October 16, 2024

E. Were comments received from the public in regards to this notice or hearing? *(If yes, see notice of final determination)* ☐ Yes ☐ No

Section VI: Human Health

A. Is the receiving water designated as a Public Water Supply? ☐ Yes ☒ No

B. Applicable criteria affected by variance: No human health criteria for chloride

C. Identify any expected impacts that the variance may have upon human health, and include any citations:
None

Section VII: Aquatic Life and Environmental Impact

A. Aquatic life use designation of receiving water: Limited Forage Fish classification from the outfall to the West Branch of the Fond du Lac River, where the classification changes to Warm Water Sport Fish.

B. Applicable criteria affected by variance: Acute and chronic toxicity criteria for chloride is 757 mg/L and 395 mg/L, respectively, per ch. NR 105, Wis. Adm. Code.

C. Identify any environmental impacts to aquatic life expected to occur with this variance, and include any citations:
Due to the zero flow stream, it is assumed that the instream concentrations would be equal to the proposed interim limits of 980 mg/L as a daily maximum and 613 mg/L as a weekly average. These values exceed the genus mean chronic value for one of the 13 species used to determine the criteria (Water flea - Ceriodaphnia dubia; 417 mg/L).

D. List any Endangered or Threatened species known or likely to occur within the affected area, and include any citations: None that would affect the water quality criterion, as the chronic toxicity criterion for chloride is more stringent than all genus mean chronic values for organisms with chloride toxicity data. As a result, no endangered species with data would need more protection than already provided by the existing criterion**.**

Citation: U.S. Fish & Wildlife Service – Environmental Conservation Online System (http://www.fws.gov/endangered/) and National Heritage Index (http://dnr.wi.gov/topic/nhi/)

Section VIII: Economic Impact and Feasibility

A. Describe the permittee's current pollutant control technology in the treatment process: The permittee's WWTF is a secondary treatment system, using the activated sludge process. Chlorides are a pollutant that cannot be removed by the WWTF, so it passes through the treatment process and there is no removal.

B. What modifications would be necessary to comply with the current limits? Include any citations.
Upgrading Rosendale's treatment plant to include a reverse osmosis (RO) treatment system for removing chloride from the wastewater effluent would allow the permittee to comply with the chloride WQBELs.

Upgrading to a public water supply with a centralized lime softening treatment system would eliminate the need for residential water softeners and potentially eliminate the major source of chlorides to the wastewater treatment facility (water softener regeneration brine).

C. How long would it take to implement these changes?
It would not be economically feasible for the Village of Rosendale to install reverse osmosis treatment at the WWTF. Obtaining the funds to install reverse osmosis would be the limiting factor. The cost of installing a municipal water supply system that includes lime softening treatment is not known.

D. Estimate the capital cost *(Citation)***:** $243,000 for RO treatment (source: WDNR Form 3400-193 Chloride Variance Application from permittee)

E. Estimate additional O & M cost *(Citation)***:** $78,840/yr for RO treatment (source: WDNR Form 3400-193 Chloride Variance Application from permittee)

F. Estimate the impact of treatment on the effluent substance concentration, and include any citations:
Reverse osmosis systems can be operated to achieve low levels of chloride and levels much below the water quality standard of 395 mg/L. However, it is not economically feasible for the Village of Rosendale at this time.

G. Identify any expected environmental impacts that would result from further treatment, and include any citations:
End-of-pipe RO wastewater treatment technology for chloride produces concentrated brine that can be as much or more of an environmental liability than the untreated effluent. Since the concentrated brine cannot be further treated, the only recourse for the disposal of the brine is transfer to another community, which is often not feasible. Appropriate chloride source reduction activities are preferable environmentally to effluent end-of-pipe treatment in most cases since the end product of treatment (production of a concentrated brine) does not remove the load of chloride from the environment.

There would be some impacts based on disposal of brine from RO. These include air pollution impacts from trucking brine and increased chloride impacts at the point where brine is discharged.

H. Is it technically and economically feasible for this permittee to modify the treatment process to reduce the level of the substance in the discharge? ☐ Yes ☒ No ☐ Unknown

Reverse osmosis treatment of the Village of Rosendale WWTF effluent to meet the WQBEL is technically feasible. However, it is not economically feasible. See DNR variance application and screening tool for costs of RO. Use of RO was evaluated. The resulting total cost for sewer user rates was estimated to result in an average cost to households that would be 7.31% of the MHI. An increase of this magnitude would cause substantial and widespread adverse social and economic impacts in the area where the discharge is located.

I. If treatment is possible, is it possible to comply with the limits on the substance? ☒ Yes ☐ No ☐ Unknown

J. If yes, what prevents this from being done? Include any citations.

The cost of adding RO to the existing treatment plant's treatment train would cause substantial and widespread adverse social and economic impacts in the area where the discharge is located. Implementation of the SRMs in the proposed permit is preferable economically and environmentally to installing RO.

K. List any alternatives to current practices that have been considered, and why they have been rejected as a course of action, including any citations:

Alternative water supply sources were considered, since water softening was determined to be a primary source of chloride discharged by the WWTF. The City of Oshkosh draws its water from the relatively 'softer' Lake Winnebago; however, it is more than 13 miles from the Village of Rosendale to the City of Oshkosh. In projects in which one municipality has supplied water to another, the Department has witnessed costs in the range of $1 million per mile to install the pipeline between the two municipalities. The costs associated with the Village of Rosendale obtaining its water supply from the City of Oshkosh makes this option cost prohibitive.

An alternative to the current practice of having the Village of Rosendale's residents provide their own water softening has been identified as a potential practice for consideration. Specifically, that alternative involves installing a municipal lime softening system to serve the Village. The technical and economic feasibility of that alternative is not known, but is required to be investigated by the Village of Rosendale as a condition of approval of this variance.

As noted above, the cost of RO treatment at the WWTF is prohibitive; the Department has considered other wastewater treatment options, including hauling or piping wastewater to another POTW. In this situation, piping wastewater to another POTW can realistically only be considered to the City of Fond du Lac, more than 10 miles away (City of Ripon is approximately 9 miles away, but that WWTF also has a chloride variance). The cost of installing a wastewater pipeline over that distance would be comparable to that identified above for a water pipeline – and that cost would be prohibitive. Hauling wastewater from the Village of Rosendale to another POTW for treatment – approximately 100,000 gal/day – was deemed to be practicably unfeasible.

See guidance document Justification for Variances to Water Quality Standards for Chloride in Wisconsin (07/09/2010 DRAFT).

Section IX: Compliance with Water Quality Standards

A. Describe all activities that have been, and are being, conducted to reduce the discharge of the substance into the receiving stream. This may include existing treatments and controls, consumer education, promising centralized or remote treatment technologies, planned research, etc. Include any citations.

The Village of Rosendale has inspected residential water softeners and has a rebate program to encourage homeowners to purchase new water softeners. Through an intense sampling and monitoring effort of an industrial user, Rosendale determined that this facility was discharging a high concentration of chlorides to the sanitary sewer and actions were taken to eliminate this discharge.

B. Describe all actions that the permit requires the permittee to complete during the variance period to ensure reasonable progress towards attainment of the water quality standard. Include any citations.

Rosendale will continue educating homeowners and efforts to encourage updating and improving their water softeners. Rosendale will be reviewing its sewer use ordinances and may make changes that would require improvements to homeowners' water softeners.

Section X: Compliance with Previous Permit *(Variance Reissuances Only)*

A. Date of previous submittal: June 6, 2017 **Date of EPA Approval:** June 27, 2017

B. Previous Permit #: WI-0028428-09-1 **Previous WQSTS #:** (EPA USE ONLY)

C. Effluent substance concentration: 750 mg/L 4-day P_{99}; 979 mg/L 1-day P_{99} **Variance Limit:** 613 mg/L as a weekly average; 980 mg/L as a daily maximum

D. Target Value(s): 550 mg/L **Achieved?** ☐ **Yes** ☐ **No** ☒ **Partial**

E. For renewals, list previous steps that were to be completed. Show whether these steps have been completed in compliance with the terms of the previous variance permit. Attach additional sheets if necessary.

Condition of Previous Variance	Compliance
Identify any new or additional source of chloride to the sewer system.	☒ **Yes** ☐ **No**
Continue to educate homeowners on the impact of chloride from residential softeners, discuss options available for increasing softener salt efficiency, and seek reduction.	☒ **Yes** ☐ **No**
Continue rebate program for replacement of old softeners with demand-initiated regeneration (DIR) softeners.	☒ **Yes** ☐ **No**
Conduct an inventory of water softeners in use in the Village to collect information about the age, type of regeneration control unit and when each was last tuned-up.	☒ **Yes** ☐ **No**
Mandate through ordinance a chloride limit on industrial sources.	☒ **Yes** ☐ **No**
Mandate through ordinance a DIR and high salt efficiency standard for new residential and commercial softeners.	☒ **Yes** ☐ **No**
Mandate though ordinance participation in a residential and commercial softener tune-up program involving qualified servicing to ensure proper control settings and adjustments.	☒ **Yes** ☐ **No**
Evaluate the feasibility, in terms of both technical and economic aspects, of installing a municipal water system with lime softening technology and submit these findings in the final chloride report.	☐ **Yes** ☒ **No**

Chloride Source Reduction Measures and Schedule

SRM/PMP Activities	Year 1	Year 2	Year 3	Year 4	Year 5
1. Educate owners on salt usage and investigate rebate programs for voluntary replacement.	**On Going**	**X**	**X**	**X**	**X**
2. Keep the softener survey records up to date for all homes in Rosendale.	**On Going**	**X**	**X**	**X**	**X**
a. Analyze survey results. Update list of softener deficiencies and recommend repair or replacement by sending letters to respective homeowners.		**X**			
b. Evaluate the potential of subsidies for a reduced-cost residential softener tune-up program.		**X**	**X**	**X**	**X**
3. Send letters to municipal and commercial customers requesting water softener inspections, necessary service, and optimization of units if possible by local technician.	**On Going**	**X**	**X**	**X**	**X**
4. Chloride sampling on WWTF effluent per WPDES permit requirements (4 samples/month) to monitor SRM effectiveness. *Note, the Village's collection system consists of all gravity sewer (no lift stations or wet wells), therefore chloride sampling at the plant is the most feasible and representative sampling location.*	**On Going**	**X**	**X**	**X**	**X**
Actions to Minimize Pollutant Sources					
1. Develop and distribute new information and education materials to homeowners on operation and maintenance of their water softeners, the impact of chlorides to the environment, and an explanation of the Village's permit limits.	**On Going**	**X**	**X**	**X**	**X**
2. Recommend residential softener tune ups and reduction of salt usage on a voluntary basis.	**On Going**	**X**	**X**	**X**	**X**
3. Educate licensed installers and self-installers of softeners on providing optional hard water for outside faucets for residences. Educate homeowners on the benefits of hard water for outside faucets such as reduced salt usage.	**On Going**	**X**	**X**	**X**	**X**
4. Evaluate the Implementation of a softener tune-up program.			**X**		

SRM/PMP Activities	Year 1	Year 2	Year 3	Year 4	Year 5
a. Determine if Rosendale resources can support a mandated or only a voluntary program.			X		
5. Review Rosendale's ordinances to require flow-based regenerated water softeners for new construction and for replacement softeners.			X		
6. Review Rosendale's ordinance for policing and determining fines for violations of ordinances concerning the discharge of pollutants of concern from residential dischargers.				X	
7. Update the Rosendale's ordinance as needed.				X	
8. Develop, disseminate, and implement winter road maintenance plan.					X