

Permit Fact Sheet

General Information

Permit Number:	WI-0029041-11-0	
Permittee Name:	VILLAGE OF ROCK SPRINGS	
Address:	101 1st Street PO Box 26	
City/State/Zip:	Rock Springs WI 53961	
Discharge Location:	East bank of the Baraboo River, approx. ½ mile downstream of STH 136 Bridge. SE ¼ of SW ¼, Section 33, T12N R5E (Lat: 43.46917° N / Lon: 89.91055° W)	
Receiving Water:	Baraboo River	
StreamFlow (Q _{7,10}):	50 cfs	
Stream Classification:	Warm Water Sport Fish (WWSF), non-public water supply	
Discharge Type:	Existing, Continuous	
Design Flow	Annual Average	0.076 MGD
Significant Industrial Loading?	None.	
Operator at Proper Grade?	Facility is Basic with subclasses A4 – Ponds, Lagoons, and Natural Systems, SS – Sanitary Sewage Collection System. One operator is certified.	
Approved Pretreatment Program?	N/A	

Facility Description

The Village of Rock Springs operates a two cell, flow through, clay lined, stabilization pond system with continuous effluent discharge to the Baraboo River. The primary pond is approximately 5 acres and the finishing pond is approximately 2 acres. Influent flow and grab samples are taken at Lift Station 1, with effluent flow continuously monitored and grab samples taken at the secondary pond effluent manhole. The facility serves a population of approximately 360 residents with no significant industry and is designed to treat an average daily flow of 0.076 MGD and presently discharges an average of 0.05 MGD. Ferric chloride is added before Lagoon #2 for phosphorus removal. In 2023, a new building was constructed for the chemical treatment system which houses the chemical pumps, controls, and chemical storage tank for the ferric chloride. Sludge was last removed from the ponds in 2012.

Substantial Compliance Determination

After a desktop review of all discharge monitoring reports, land application reports, compliance schedule items, and a site visit on 6/27/2023, the permittee has been found to be in substantial compliance with their current WPDES permit.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)
701	0.021 MGD (2023)	INFLUENT: Representative influent samples shall be collected at lift station #1, in wet well after comminutor.
001	0.025 (January 2019- May 2024)	EFFLUENT: Representative effluent samples shall be collected from the effluent manhole after the secondary pond, prior to discharge to the Baraboo River.
002	Sludge was last removed in 2012 and not expected to be removed this permit term.	LAGOON SLUDGE: Representative lagoon sludge sample taken from the bottom of the pond.

1 Influent – Monitoring Requirements

Sample Point Number: 701- INFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	Weekly	Grab	
Suspended Solids, Total		mg/L	Weekly	Grab	

Changes from Previous Permit:

Changes highlighted in table above.

Flow- The sample frequency for flow has been changed from “continuous” to “daily” for eDMR reporting purposes.

BOD and TSS- Sampling frequency increased from 2/month to weekly.

Explanation of Limits and Monitoring Requirements

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

Monitoring frequency for a permitted sewage treatment work is evaluated on a case-by-case basis pursuant s. NR 210.04, Wis. Adm. Code. Appropriate monitoring is evaluated based on the size and type of facility, the ability to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. After evaluation, an increase in sampling frequency for BOD5 and TSS is warranted to align with sampling frequencies of similarly sized facilities with similar effluent quality throughout the state.

2 Surface Water - Monitoring and Limitations

Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	45 mg/L	Weekly	Grab	
BOD5, Total	Monthly Avg	30 mg/L	Weekly	Grab	
Suspended Solids, Total	Weekly Avg	45 mg/L	Weekly	Grab	
Suspended Solids, Total	Monthly Avg	30 mg/L	Weekly	Grab	
pH Field	Daily Max	9.0 su	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	
Nitrogen, Ammonia Variable Limit		mg/L	2/Week	See Table	Look up the variable ammonia limit from the 'Variable Ammonia Limitation' table and report the variable limit in the Ammonia Variable Limit column on the eDMR.
Nitrogen, Ammonia (NH3-N) Total	Daily Max - Variable	mg/L	2/Week	Grab	Report the daily maximum Ammonia result in the Nitrogen, Ammonia (NH3-N) Total column of the eDMR. See Ammonia Limitation Section.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	108 mg/L	2/Week	Grab	
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	108 mg/L	2/Week	Grab	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit effective May through September annually starting in 2029 per the Effluent Limitations

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					for E. coli Schedule.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit effective May through September annually starting in 2029 per the Effluent Limitations for E. coli Schedule. See the E. coli Percent Limit section below. Enter the result in the DMR on the last day of the month.
Phosphorus, Total	Monthly Avg	4.4 mg/L	Weekly	Grab	
Phosphorus, Total	Monthly Avg	0.43 lbs/day	Monthly	Calculated	See TMDL section.
Phosphorus, Total		lbs/month	Weekly	Calculated	Calculate the Total Monthly Discharge of phosphorus and report on the last day of the month on the DMR. See TMDL 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 DMR. See TMDL section.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. See Nitrogen Series Monitoring section. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.

Changes from Previous Permit

Changes highlighted in table above.

Flow- The sample frequency for flow has been changed from “continuous” to “daily” for eDMR reporting purposes.

BOD5- Sampling frequency increased from 2/month to Weekly.

TSS- Weekly average added to permit. Sampling frequency increased from 2/month to Weekly.

pH- Sampling frequency increased from weekly to 5/week.

Nitrogen Ammonia- Sampling frequency increased from 2/month to 2/week.

Phosphorus- Sample frequency increased from 2/month to Weekly.

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

Explanation of Limits and Monitoring Requirements

Refer to the Water Quality-Based Effluent Limitations (WQBELs) memo for Rock Springs Wastewater Treatment Facility, prepared by Zainah Masri dated July 16, 2024.

Monitoring Frequencies- The Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. The permit will include an increased monitoring frequency for BOD5, TSS, pH, phosphorus, ammonia-nitrogen.

The department has determined at this time that an increase in monitoring frequency is warranted to align with sampling frequencies of similarly sized facilities with similar effluent quality throughout the state.

BOD5 and pH- Categorical limits and WQBELs are included in the permit as outlined in ch. NR 210, Wis. Adm. Code. The effluent limitations for BOD5, Total Suspended Solids, and pH are carried over from the previous permit and are not subject to change at this time because the receiving water characteristics have not changed.

TSS- The Rock Springs Wastewater Treatment facility is no longer eligible for the previous TSS variance limit based on s. NR 210.07(2), Wis. Adm. Code, where aerated lagoons and stabilization ponds are the principal treatment processes, as chemical addition is now used for phosphorus removal.

Wisconsin River Total Maximum Daily Load (TMDL): The permitted facility is included within the Wisconsin River Basin Total Maximum Daily Load (TMDL), which was approved by EPA April 26, 2019. The TMDL establishes Waste Load Allocations (WLAs) for point source dischargers and determines the maximum amounts of phosphorus that can be discharged and still protect water quality. The final effluent limits and monitoring expressed in the permit were derived from Site-Specific Criteria (SSC) for Lakes Petenwell, Castle Rock, and Wisconsin originally included in Appendix K of the TMDL report and approved by the U.S. Environmental Protection Agency on July 9, 2020. The permittee’s approved SSC-based limits are consistent with the assumptions and requirements of the EPA-approved WLA in the TMDL, which is 85 lbs/yr for the permitted facility.

The approved TMDL expresses WLAs as lbs/year and lbs/day (maximum annual load divided by 365 days). As outlined in Section 4.6 of the department’s *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Program*, mass limits must be given in the permit that are consistent with the TMDL WLA and the

phosphorus impracticability agreement that was approved by USEPA in 2012 (see NPDES MOA Addendum dated July 12, 2012 at <https://prodoasint.dnr.wi.gov/swims/downloadDocument.do?id=167886175>). Continuously discharging facilities covered by the WRB TMDL are given monthly average mass limits. If the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits (averaging period of May through October and November through April) are also included. The equivalent effluent concentration of 0.367 mg/L was calculated for the facility, thus, TMDL based mass limits are expressed as a monthly average.

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

Total Nitrogen Monitoring (NO₂+NO₃, TKN and Total N)- The Department has included effluent monitoring for Total Nitrogen in the permit through the authority under §§ 283.55(1)(e), Wis. Stats., which allows the department to require the permittee to submit information necessary to identify the type and quantity of any pollutants discharged from the point source, and through s. NR 200.065(1)(h), Wis. Adm. Code, which allows for this monitoring to be collected during the permit term. More information on the justification to include total nitrogen monitoring in wastewater permits can be found in the “Guidance for Total Nitrogen Monitoring in Wastewater Permits” dated October 1, 2019. Annual tests are scheduled in the following rotating quarters: **April – June 2025, July – Sept 2026, October – December 2027, April – June 2028, January – March 2029.**

PFAS- 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.

Whole Effluent Toxicity (WET) - A satisfactory phosphorus chemical SOP was submitted to the department and established by the permittee therefore no WET testing is recommended in the reissued permit.

3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
002	B	Liquid	Fecal Coliform	Injection/ Incorporation	Does Not Land Apply Sludge	
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.						

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)
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Is a priority pollutant scan required? **No**, design flow is less than 5 MGD (0.076 MGD).

Sample Point Number: 002- LAGOON SLUDGE

Monitoring Requirements and Limitations

Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Solids, Total		Percent	Once	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Once	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Once	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Once	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Once	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Once	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Once	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Once	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Once	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Once	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Once	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Once	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Once	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Once	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Once	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Once	Composite	
Nitrogen, Total Kjeldahl		Percent	Once	Composite	Sampling only if land application occurs.
Nitrogen, Ammonia (NH3-N) Total		Percent	Once	Composite	Sampling only if land application occurs.
Phosphorus, Total		Percent	Once	Composite	Sampling only if land application occurs.
Phosphorus, Water		% of Tot P	Once	Composite	Sampling only if land

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Extractable					application occurs.
Potassium, Total Recoverable		Percent	Once	Composite	Sampling only if land application occurs.
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in calendar year 2026.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in calendar year 2026.
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:

Changes highlighted in table above.

List 2 (Nutrients)- Monitoring for nutrients prior to land application has been added to the permit.

PCB- Monitoring year updated to 2026.

PFAS- Monitoring once during the permit term is included in the permit 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), Wis. Adm. Code. Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7), Wis. Adm. Code, for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k), Wis. Adm. Code.

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

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

4 Schedules

4.1 Land Application Management Plan

A sludge management plan is required for the removal of sludge and land application.

Required Action	Due Date
<p>Land Application Management Plan Submittal: The permittee shall submit an updated Land Application Management Plan for approval if removal of sludge will occur during this permit term. The plan shall demonstrate compliance with ch. NR 204, Wis. Adm. Code and at minimum address 1) How and where is sludge sampled; 2) Available sludge storage details and location(s); 3) How will the sludge be removed with details on volume, characterization and how will the treatment plant continue to function during the drawdown; 4) describe the type of transportation and spreading vehicles and loading and unloading practices; 5) identify approved land application sites, apply for needed sites, site limitations, total acres needed and vegetative cover management; 6) specify record keeping procedures including siteloading; 7) address contingency plans for adverse weather and odor/nuisance abatement; and 8) include any other pertinent information such as other disposal options that may be used or specifications of any pretreatment processes</p> <p>Once approved, all sludge management activities shall be conducted in accordance with the plan. Any changes to the plan must be approved by the Department prior to implementing the changes. No desludging may occur unless approval from the Department is obtained. Daily logs shall be kept that record where the sludge has been disposed.</p>	<p>60 days prior to desludging.</p>

Explanation of Schedule

If a lagoon will be desludged during this permit term a management plan is needed to explain how the sludge will be safely removed, what contingencies are in place, the type of equipment that will be used and how the sludge will be land applied to ensure the proper precautions are in place to prevent any negative impacts to surface water or groundwater. The 60 days allows the department adequate time to review the sludge management plan and approve sites for land application of sludge should the facility select this as the means for final disposition. This timeframe presumes that the sludge management plan and site request packages are complete.

Special Reporting Requirements

None.

Other Comments:

None.

Attachments:

Water Quality-Based Effluent Limitations for Rock Springs Wastewater Treatment Facility, prepared by Zainah Masri, dated July 16, 2024.

Water Quality Based Effluent Limitations for Rock Springs Water Treatment Facility Addendum, prepared by Zainah Masri, dated October 7, 2024.

Expiration Date:

December 31, 2029

Justification Of Any Waivers From Permit Application Requirements

No waivers were requested or given in the permit application.

Prepared By: Melanie Burns, Wastewater Specialist

Date: September 25, 2024

Date Post Fact Check: October 11, 2024 (Removed E.coli monitoring and limits due to lagoon detention data the permittee submitted to the department for review).

Date Post Public Notice:

DATE: July 16, 2024

TO: BetsyJo Howe – SCR/Fitchburg

FROM: Zainah Masri – WY/3

SUBJECT: Water Quality-Based Effluent Limitations for Rock Springs Wastewater Treatment Facility
WPDES Permit No. WI-0029041-10-0

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from the Rock Springs Wastewater Treatment Facility in Sauk County. This municipal wastewater treatment facility (WWTF) discharges to the Baraboo River, located in the Narrows Creek/Baraboo Watershed in the Lower Wisconsin River Basin. This discharge is included in the Wisconsin River TMDL as approved by EPA on April 26, 2019, with site-specific criteria approved by EPA on July 9, 2020. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD ₅			45 mg/L	30 mg/L	2
TSS			45 mg/L	30 mg/L	3
pH	9.0 s.u.	6.0 s.u.			2
Ammonia Nitrogen Year-round	Variable		108 mg/L	108 mg/L	2,5,6
Bacteria					
<i>E. Coli</i>				126 #/100 mL geometric mean	7
Phosphorus Final				4.4 mg/L 0.43 lbs/day	2,4
TKN, Nitrate+Nitrite, and Total Nitrogen					8
Acute WET					9

Footnotes:

1. Monitoring only.
2. No changes from the current permit.
3. The Rock Springs Wastewater Treatment facility is no longer eligible for the previous TSS variance limit based on s. NR 210.07(2), Wis. Adm. Code, where aerated lagoons and stabilization ponds are the principal treatment processes, as chemical addition is now used for phosphorus removal.

4. A Total Maximum Daily Load (TMDL) has been developed for the Wisconsin River TMDL area. TMDL-derived limits may be included in lieu of or in addition to the calculated limits upon permit reissuance or modification once the TMDL has been approved by U.S. EPA, according to s. NR 217.16, Wis. Adm. Code.
5. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7) are included in bold.
6. The variable daily maximum table corresponding to various effluent pH values may be included in the permit in place of the single limit.

Effluent pH s.u.	NH ₃ -N Limit mg/L	Effluent pH s.u.	NH ₃ -N Limit mg/L	Effluent pH s.u.	NH ₃ -N Limit mg/L
6.0 < pH ≤ 6.1	108	7.0 < pH ≤ 7.1	66	8.0 < pH ≤ 8.1	14
6.1 < pH ≤ 6.2	106	7.1 < pH ≤ 7.2	59	8.1 < pH ≤ 8.2	11
6.2 < pH ≤ 6.3	104	7.2 < pH ≤ 7.3	52	8.2 < pH ≤ 8.3	9.4
6.3 < pH ≤ 6.4	101	7.3 < pH ≤ 7.4	46	8.3 < pH ≤ 8.4	7.8
6.4 < pH ≤ 6.5	98	7.4 < pH ≤ 7.5	40	8.4 < pH ≤ 8.5	6.4
6.5 < pH ≤ 6.6	94	7.5 < pH ≤ 7.6	34	8.5 < pH ≤ 8.6	5.3
6.6 < pH ≤ 6.7	89	7.6 < pH ≤ 7.7	29	8.6 < pH ≤ 8.7	4.4
6.7 < pH ≤ 6.8	84	7.7 < pH ≤ 7.8	24	8.7 < pH ≤ 8.8	3.7
6.8 < pH ≤ 6.9	78	7.8 < pH ≤ 7.9	20	8.8 < pH ≤ 8.9	3.1
6.9 < pH ≤ 7.0	72	7.9 < pH ≤ 8.0	17	8.9 < pH ≤ 9.0	2.6

7. 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.
8. As recommended in the Department's October 1, 2019, Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate (NO₃), nitrite (NO₂), and total kjeldahl nitrogen (TKN) (all expressed as N).
9. Three acute whole effluent toxicity (WET) tests are recommended during the reissued permit term. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued). If a satisfactory phosphorus chemical SOP is established and implemented at the facility prior to permit reissuance, then no WET testing is recommended in the reissued permit.

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

Attachments (3) – Narrative, Map, and Ammonia Nitrogen calculations

PREPARED BY: Zainah Masri, Sen. Water Resources Engineer, WY/3

Zainah Masri

APPROVED BY:

Diane Figiel
Diane Figiel, P.E.,
Water Resources Engineer

Date: 07/16/2024

E-cc: Tanner Connors, Wastewater Engineer – SCR/Fitchburg
Nate Willis, Wastewater Engineer – WY/3
Diane Figiel, Water Resources Engineer – WY/3
Kari Fleming, Environmental Toxicologist – WY/3

**Water Quality-Based Effluent Limitations for
Rock Springs Wastewater Treatment Facility**

WPDES Permit No. WI-0029041-10-0

Prepared by: Zainah Masri

PART 1 – BACKGROUND INFORMATION

Facility Description

The Village of Rock Springs operates a two cell, flow through, clay lined wastewater stabilization pond system with a continuous effluent discharge to the Baraboo River. The primary pond is approximately 5 acres, and the finishing pond is approximately 2 acres. Between the primary and secondary lagoon ferric chloride is added to the manhole to treat for phosphorus in the secondary lagoon prior to discharge. Influent flow and grab samples are taken at the secondary pond effluent manhole. The facility serves a population of approximately 360 with no significant industrial contributors and is designed to treat an average daily flow 0.076 MGD.

The Rock Springs Wastewater Treatment facility is no longer eligible for the previous TSS variance limit based on s. NR 210.07(2), Wis. Adm. Code, where aerated lagoons and stabilization ponds are the principal treatment processes, as chemical addition is now used for phosphorus removal.

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

Existing Permit Limitations

The current permit, which expired on December 31, 2023, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD ₅			45 mg/L	30 mg/L	2
TSS				60 mg/L	3
pH	9.0 s.u.	6.0 s.u.			2
Ammonia Nitrogen Year-Round	Variable		108 mg/L	108 mg/L	2,4,5
Phosphorus Interim Final				4.4 mg/L 0.43 lbs/day	5

Footnotes:

1. Monitoring Only

Attachment #1

2. 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.
3. TSS variance limit based on s. NR 210.07(2), Wis. Adm. Code, where aerated lagoons and stabilization ponds are the principal treatment processes,
4. The variable daily maximum table corresponding to various effluent pH values may be included in the permit in place of the single limit.

Effluent pH s.u.	NH ₃ -N Limit mg/L	Effluent pH s.u.	NH ₃ -N Limit mg/L	Effluent pH s.u.	NH ₃ -N Limit mg/L
6.0 < pH ≤ 6.1	108	7.0 < pH ≤ 7.1	66	8.0 < pH ≤ 8.1	14
6.1 < pH ≤ 6.2	106	7.1 < pH ≤ 7.2	59	8.1 < pH ≤ 8.2	11
6.2 < pH ≤ 6.3	104	7.2 < pH ≤ 7.3	52	8.2 < pH ≤ 8.3	9.4
6.3 < pH ≤ 6.4	101	7.3 < pH ≤ 7.4	46	8.3 < pH ≤ 8.4	7.8
6.4 < pH ≤ 6.5	98	7.4 < pH ≤ 7.5	40	8.4 < pH ≤ 8.5	6.4
6.5 < pH ≤ 6.6	94	7.5 < pH ≤ 7.6	34	8.5 < pH ≤ 8.6	5.3
6.6 < pH ≤ 6.7	89	7.6 < pH ≤ 7.7	29	8.6 < pH ≤ 8.7	4.4
6.7 < pH ≤ 6.8	84	7.7 < pH ≤ 7.8	24	8.7 < pH ≤ 8.8	3.7
6.8 < pH ≤ 6.9	78	7.8 < pH ≤ 7.9	20	8.8 < pH ≤ 8.9	3.1
6.9 < pH ≤ 7.0	72	7.9 < pH ≤ 8.0	17	8.9 < pH ≤ 9.0	2.6

5. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code, are included in bold.
6. There is a compliance schedule in place to meet the limits based on the Wisconsin River TMDL by December 31, 2023.

Receiving Water Information

- Name: Baraboo River
- Waterbody Identification Code (WBIC): 1271100
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code:
 - 7-Q₁₀ = 50 cfs (cubic feet per second)
 - 7-Q₂ = 74 cfs
 - 90-Q₁₀ = 62.90 cfs
 - Harmonic Mean Flow = 137.66 cfs
 - The Harmonic Mean has been estimated based on average flow and the 7-Q₁₀ using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).
- Hardness = 181 mg/L as CaCO₃. This value represents the geometric mean of data from WET Tests conducted by Rock Springs WWTF from 2008-2014.
- Source of background concentration data: Metals data from Baraboo River is used for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5, Wis. Adm. Code: 25%
- Multiple dischargers: There are several other dischargers to the Baraboo River, however, they are not

in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.

- Impaired water status: The Baraboo River in Sauk County (River Miles 0-86.79) is impaired for total phosphorus.

Effluent Information

- Flow rate:
 Design annual average = 0.076 MGD (Million Gallons per Day)
 For reference, the actual average flow from January 2019 to May 2024 was 0.025 MGD.
- Hardness = 129 mg/L as CaCO₃. This value represents the geometric mean of data (n=4) from October 2022 to November 2022 from the permit application.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water source: Domestic wastewater with water supply from wells.
- Additives: Ferric Chloride
- 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.

Copper Effluent Data

Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)
9/20/2022	5.2	10/7/2022	6.0	10/22/2022	6.0
9/24/2022	7.8	10/11/2022	5.3	10/26/2022	5.4
9/28/2022	6.5	10/14/2022	<5.2	11/2/2022	<5.2
10/03/2022	6.0	10/18/2022	<5.2		
Mean = 4.4 µg/L					

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

Chloride Effluent Data

Sample Date	Chloride (mg/L)
10/18/2022	95
10/22/2022	95
10/26/2022	93
11/02/2022	96
Mean	94.8

The following table presents the average concentrations and loadings at Outfall 001 from January 2019 to May 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	14.65 mg/L	
TSS	24.5 mg/L	
pH field	7.1 s.u.	
Phosphorus	2.4 mg/L	0.66 lbs/day
Ammonia Nitrogen	5.7 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 P₉₉) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q₁₀

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Code, (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q₁₀ receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

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

Where:

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

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

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

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

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q₁₀ method of limit calculation produces the most stringent daily maximum limitations and should be used while making

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reasonable potential determinations. This is not the case for Rock Springs and the limits are set based on two times the acute toxicity criteria.

The following tables list the calculated WQBELs for this discharge along with the results of effluent sampling for all the detected substances.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 40 cfs, (1-Q₁₀ (estimated as 80% of 7-Q₁₀)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD. mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Chlorine		19.0		38.1	7.61	
Arsenic		340	3.7	672.2	134.4	<7.7
Cadmium	129	13.8		27.6	5.5	<4.1
Chromium	129	2221	1.7	4439	888	<1.1
Copper	129	20	3.1	33.3		4.4
Lead	129	137	2.4	268.7	53.7	<1.4
Nickel	129	582		1163.9	233	1.7
Zinc	129	150		300.8	60.2	6.0
Chloride (mg/L)		757	8.2	1497.6	300	95

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 12.5 cfs (¼ of the 7-Q₁₀), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Chlorine		7.28		66.09	13.22	
Arsenic		152.2	3.7	15938	3187.5	<7.7
Cadmium	181	3.8		409.8	82	<4.1
Chromium	181	214.8	1.7	22864	4572.8	<1.1
Copper	181	17.2	3.1	1516	303.2	4.4
Lead	181	49.7	2.4	5075.5	1015.1	<1.4
Nickel	181	86.2		9251	1850.3	1.7
Zinc	181	202.3		21701	4340.3	6.0
Chloride (mg/L)		395	8.2	41512	8302.3	95

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 = 34.41 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370		108655	21731.1	<4.1
Chromium (+3)	3818000	1.70	1121206168	224241234	<1.1
Lead	140	2.4	40410	8082.1	<1.4
Nickel	43000		12627524	2525505	1.70

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 34.4 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3	3.7	13.3	2.66	<7.7

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

Conclusions and Recommendations

Based on a comparison of the effluent data and calculated effluent limitations, **effluent limitations are not required for any substance.**

Chloride – Considering available effluent data from the current permit term from date has a mean of 94.8 mg/L. These effluent concentrations are well below the calculated WQBELs for chloride; **therefore, no effluent limits or monitoring are needed.**

Mercury – The permit application did not require monitoring for mercury because the Rock Springs Wastewater Treatment Facility 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 the sample result was within expected analytical ranges and well below the 17 mg/kg level. The single concentration in the sludge in August 2020 was 0.13 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. 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. Because of the lack of nondomestic contributions, **no monitoring is required during the current permit term.**

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

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

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

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

Where:

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

The effluent pH data was examined as part of this evaluation. A total of 1304 sample results were reported from January 2019 to May 2024. The maximum reported value was 9.81 s.u. (Standard pH Units). The effluent pH was 9.12 s.u. or less 99% of the time. The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.64 s.u. The mean plus the standard deviation multiplied by a factor of 2.3, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 9.56 s.u. Therefore, a value of 9.0 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 9.0 s.u. into the equation above yields an ATC = 1.32 mg/L.

Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method

In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are calculated using the 1-Q₁₀ receiving water low flow if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits shall apply.

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-Q₁₀ (estimated as 80 % of 7-Q₁₀) and the 2×ATC approach is shown below.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	2.65
1-Q ₁₀	14.0

The 2XATC method yields the most stringent limits for Rock Springs Wastewater Treatment Facility.

Rock Springs Wastewater Treatment Facility

The current permit has variable daily maximum effluent limits based on effluent pH as shown in the table below.

Daily Maximum Ammonia Nitrogen Limits – WWSF, WWFF & LFF

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

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

Weekly and monthly average limits are not included in the current permit but are being evaluated here due to changes to ch. NR 106, Wis. Adm. Code. **The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do not change** because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous WQBEL memo are shown in Attachment #3.

Effluent Data

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

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	April - May	June - September	October - March
1-day P ₉₉	7.5	1.8	6.9
4-day P ₉₉	4.1	1.0	3.7
30-day P ₉₉	1.95	0.44	1.79
Mean	1.08	0.21	0.99
Std	1.62	0.41	1.48
Sample size	130	264	388
Range	0.047 - 11.1	<0.047 - 3.55	0.047 - 8.98

Based on this comparison, **daily limits are required in year round**. Additionally, since the permit currently has weekly and monthly limits year-round, **these limits must be retained regardless of reasonable potential**, consistent with s. NR 106.33(1)(b), Wis. Adm. Code: 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 Rock Springs Wastewater Treatment Facility 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.

In this case, the recommended daily maximum limits vary with effluent pH, so additional limits should be set equal to the highest recommended limit. Therefore, **monthly, and weekly average limits of 108 mg/L** are recommended in the permit.

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.

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
Year-round	Variable	108 mg/L	108 mg/L

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 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.

The effluent flow (annual average design flow) to receiving water flow (100% of $Q_{7,10}$) must be greater than 1:1,000 at the point of standards application to qualify for the disinfection exemption to protect the recreational use, according to s. NR 210.06(3)(e), Wis. Adm. Code, and as discussed in the “Disinfection

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Requirements for Discharges to Surface Waters” guidance. Rock Springs Wastewater Treatment Facility has a ratio of 1:427, and therefore, does not qualify for exemption of disinfection.

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.

Annual Average Mass Total Phosphorus Loading

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
January 2023	0.68	4.2	23.6
February 2023	0.69	4.3	24.8
March 2023	1.41	2.7	31.4
April 2023	1.21	1.9	19.7
May 2023	0.39	2.6	8.40
June 2023	0.0031	3.7	0.094
July 2023	0.007	3.0	0.17
August 2023	0.25	4.1	8.3
September 2023	0.006	3.4	0.2
October 2023	0.36	1.8	5.5
November 2023	0.08	2	1.3
December 2023	0.59	3.5	17.4
Average		12	

Rock Springs Wastewater Treatment Facility currently has an average monthly discharge of 12 lbs/month which is below the 150 pounds of total phosphorus per month threshold for municipal treatment facilities, and **therefore no technology based limit is required.**

TMDL Limits – Phosphorus

Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs*

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

Total Phosphorus WLA: 85 lbs/year (see Appendix K of the TMDL document)

For the reasons explained in the April 30, 2012, paper entitled *Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin*, WDNR has determined that the phosphorus WQBELs set equal to WLAs would not be consistent with the assumptions and requirements of the TMDL.

Therefore, limits given to continuously discharging facilities covered by the WRB TMDL are given monthly average mass limits. If the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits are also included. The following equation shows the calculation of equivalent effluent concentration:

$$\begin{aligned} \text{TP Equivalent Effluent Concentration} &= \text{Daily WLA} \div (\text{Flow Rate} * \text{Conversion Factor}) \\ &= 0.233 \text{ lbs/day} \div (0.076 \text{ MGD} * 8.34) \\ &= 0.367 \text{ mg/L} \end{aligned}$$

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

$$\begin{aligned} \text{TP Monthly Average Permit Limit} &= \text{daily WLA} * \text{monthly average multiplier} \\ &= 0.233 \text{ lbs/day} * 1.85 \\ &= 0.43 \text{ lbs/day} \end{aligned}$$

The multiplier used in the monthly average calculation was used as recommended in TMDL implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 1.85. The facility is able to meet the permit limits based on the WLA, so the current CV is used. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as weekly; if a different monitoring frequency is used, the stated limits should be reevaluated.

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

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

monthly loads for TP. Rolling 12-month sums can be compared directly to the annual wasteload allocation.

Effluent Data

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

Total Phosphorus Effluent		
	Concentration mg/L	Mass Discharge lbs/day
1-day P ₉₉	6.6	4.7
4-day P ₉₉	4.2	2.6
30-day P ₉₉	2.95	1.21
Mean	2.38	0.66
Std	1.23	1.02
Sample Size	238	227
Range	0.3 - 5.7	0 - 12.5

Conclusions

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

- Monthly average Total Phosphorus mass limit of 0.43 lbs/day.
- Monthly average Total Phosphorus concentration limit of 4.4 mg/L. This was previously an interim limit but is retained to prevent backsliding.

PART 5 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

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

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation.

Due to the amount of upstream flow available for dilution in the limit calculation ($Q_s:Q_e > 20:1$), the lowest calculated limitation is 120° F (s. NR 106.55(6)(a), Wis. Adm. Code). For lagoon systems of domestic waste, there is no reasonable potential for the discharge to exceed this limit. Therefore, **no effluent limits are recommended for temperature.**

PART 6 – WHOLE EFFLUENT TOXICITY (WET)

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

Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC₅₀ (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.

Chronic testing is usually not recommended where the ratio of the 7-Q₁₀ to the effluent flow exceeds 100:1. For the Rock Springs Wastewater Treatment Facility, that ratio is approximately 658:1. With this amount of dilution, there is believed to be little potential for chronic toxicity effects in the Baraboo River associated with the discharge from the Rock Springs Wastewater Treatment Facility. **Therefore, chronic WET testing is not recommended during the reissued permit term.**

According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit. Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations. Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005. Therefore, WET tests performed from June 2005 to present are shown in the table below:

WET Data History

Date Test Initiated	Acute Results LC ₅₀ %			
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?
09/03/2014	>100	>100	Pass	Yes

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.

Attachment #1

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 LC₅₀, IC₂₅ or IC₅₀ ≥ 100%).

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

The WET checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other related permit conditions. The checklist indicates whether acute and chronic WET limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code. The checklist steps the user through a series of questions, assesses points based on the potential for effluent toxicity, and suggests monitoring frequencies based on points accumulated during the checklist analysis. As toxicity potential increases, more points accumulate, and more monitoring is recommended to ensure that toxicity is not occurring. A summary of the WET checklist analysis completed for this permittee is shown in the table below. Staff recommendations based on best professional judgment are provided below the summary table. For guidance related to reasonable potential and the WET checklist, see Chapter 1.3 of the WET Guidance Document: <https://dnr.wisconsin.gov/topic/Wastewater/WET.html>.

WET Checklist Summary

	Acute
AMZ/IWC	Not applicable. 0 Points
Historical Data	No acute tests collected within past 5 years. 5 Points
Effluent Variability	Little variability, no violations, or upsets, consistent WWTF operations. 0 Points
Receiving Water Classification	WWSF community. 5 Points
Chemical-Specific Data	No reasonable potential for limits based on ATC; Ammonia nitrogen, Zinc, Copper, Nickel, and Chloride detected. No additional compounds of concern. 3 Points
Additives	No biocides and one water quality conditioner added. Permittee has proper P chemical SOPs in place: No. 16 Points
Discharge Category	No industrial contributors. 0 Points
Wastewater Treatment	Secondary or better. 0 Points
Downstream Impacts	No impacts known. 0 Points
Total Checklist Points:	29 Points

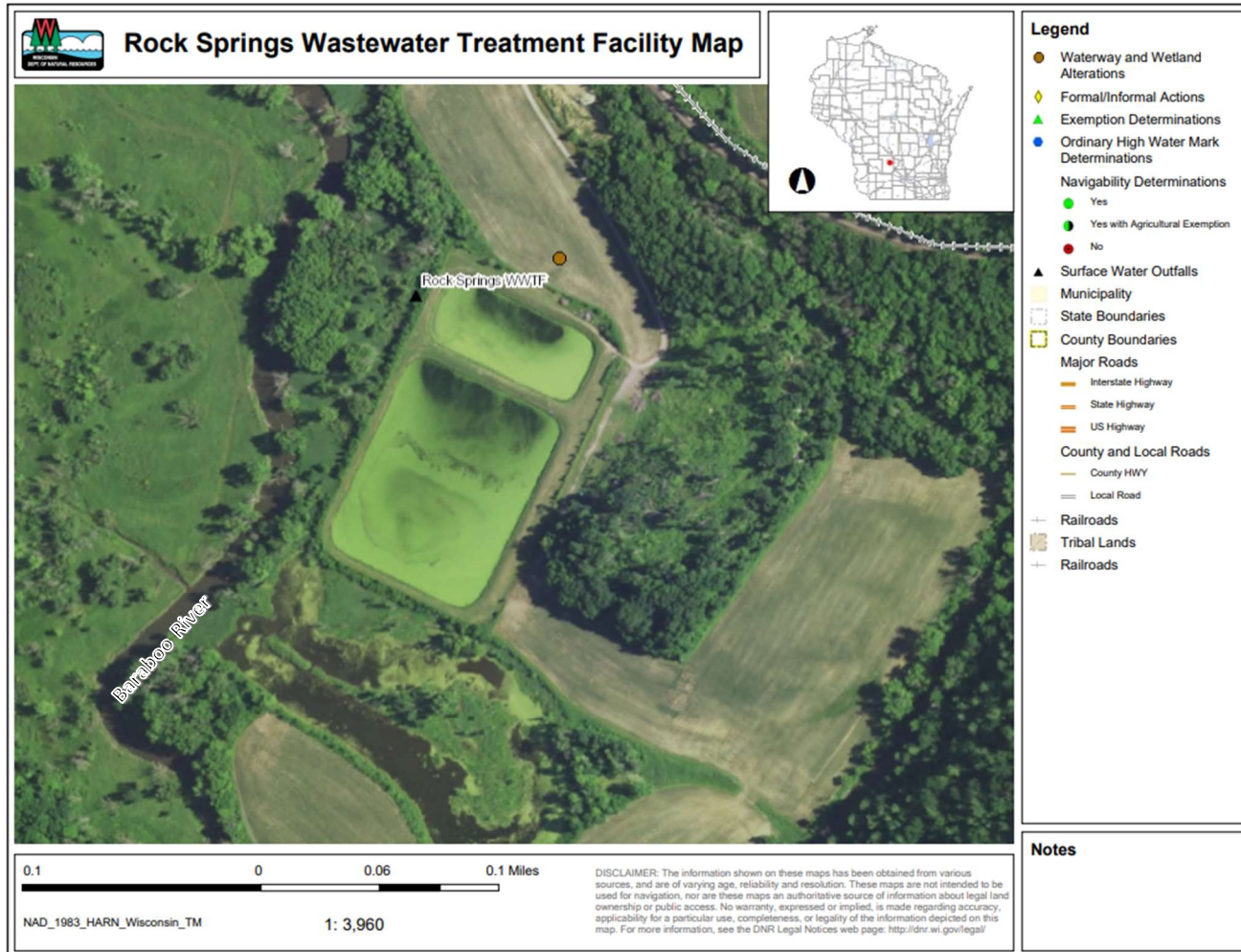
Attachment #1

	Acute
Recommended Monitoring Frequency (from Checklist):	Three Acute tests in permit term (rotating quarters)
Limit Required?	No.
TRE Recommended? (from Checklist)	No.

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, **three acute WET tests are recommended during the reissued permit term.** Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued). **If a satisfactory phosphorus chemical SOP is established and implemented at the facility prior to permit reissuance, then no WET testing is required.**

Attachment #2

Site Map



Attachment #3

Ammonia Nitrogen Calculations from 2018 Memo

		<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>
Background Information	7-Q ₁₀ (cfs)	63	64	84	130	92	70
	7-Q ₂ (cfs)	93	94	124	192	136	104
	Ammonia (mg/L)	0.12	0.12	0.12	0.06	0.06	0.06
	Temperature (°C)	0.56	1.11	3.33	8.89	14.44	18.89
	pH (s.u.)	7.9	7.9	7.9	8.09	8.09	8.09
	% of Flow used	25	25	25	25	50	100
	Reference Weekly Flow (cfs)	0.0125	0.01	0.02	0.0375	0.045	0.05
	Reference Monthly Flow (cfs)	0.053125	0.04675	0.104125	0.15725	0.2295	0.3485
Criteria mg/L	4-day Chronic						
	Early Life Stages Present	6.99	6.99	6.99	5.32	5.32	4.02
	Early Life Stages Absent	11.36	11.36	11.36	7.65	5.35	4.02
	30-day Chronic						
	Early Life Stages Present	2.80	2.80	2.80	2.13	2.13	1.61
Effluent Limitations mg/L	Early Life Stages Absent	4.54	4.54	4.54	3.06	2.14	1.61
	Weekly Average						
	Early Life Stages Present					2064	2359
	Early Life Stages Absent	1516	1540	2018	2106		
	Monthly Average						
	Early Life Stages Present					1019	1164
Early Life Stages Absent	748	756	996	1044			

		<i>Jul</i>	<i>Aug</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
Background Information	7-Q ₁₀ (cfs)	60	57	64	70	84	64
	7-Q ₂ (cfs)	89	84	95	104	124	95
	Ammonia (mg/L)	0.06	0.06	0.06	0.05	0.05	0.05
	Temperature (°C)	20.56	19.44	15.56	10.00	4.44	1.67
	pH (s.u.)	8.08	8.08	8.08	8.06	8.06	8.06
	% of Flow used	100	100	50	25	25	25

		<i>Jul</i>	<i>Aug</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
	Reference Weekly Flow (cfs)	0.05	0.04	0.025	0.015	0.0175	0.0125
	Reference Monthly Flow (cfs)	0.306	0.272	0.14025	0.074375	0.085	0.065875
Criteria mg/L	4-day Chronic						
	Early Life Stages Present	3.66	3.94	5.05	5.57	5.57	5.57
	Early Life Stages Absent	3.66	3.94	5.05	7.45	9.04	9.04
	30-day Chronic						
	Early Life Stages Present	1.46	1.57	2.02	2.23	2.23	2.23
Effluent Limitations mg/L	Early Life Stages Absent	1.46	1.57	2.02	2.98	3.62	3.62
	Weekly Average						
	Early Life Stages Present	1841	1882	1364			
	Early Life Stages Absent				1109	1615	1233
	Monthly Average						
	Early Life Stages Present	905	921	676			
Early Life Stages Absent				554	803	616	

DATE: October 7, 2024

TO: BetsyJo Howe – SCR/Fitchburg

FROM: Zainah Masri – WY/3

SUBJECT: Updated Water Quality-Based Effluent Limitations for the Rock Springs
Wastewater Treatment Facility
WPDES Permit No. WI-0029041-11-0

This is in response to your request for an evaluation of the need for water quality based effluent limitations for bacteria using chs. NR 102 and 210, Wis. Adm. Codes (where applicable), for the Rock Springs wastewater treatment facility (WWTF). This (WWTF) discharges to the Baraboo River in the Narrows Creek/Baraboo Watershed the Lower Wisconsin River Basin.

The current WQBEL Evaluation dated July 16, 2024 had determined disinfection was necessary for Outfall 001 to meet the bacteria water quality standards of the Baraboo River and recommended an *e. Coli* monthly average limitation of 400#/100 mL. The facility has provided dimensional information for their two lagoons to support that disinfection is not needed for Outfall 001 via a sufficient detention time. This evaluation will consider the updated information provided for bacteria. **Determinations made for other parameters in the previous WQBEL Evaluation (July 16, 2024) will remain the same.**

Receiving Water Information

- Name: Baraboo River
- Classification: Warmwater Sport Fish (WWSF) community, non-public water supply.

Effluent Information

- Design flow rate(s):
Annual average = 0.076 million gallons per day (MGD)
For reference, the actual average flow from January 2019 to August 2024 was 0.034 MGD excluding days discharge did not occur.

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.

Since data shows that the facility provides ≥ 180 -d detention time, disinfection is not required and effluent limits and monitoring are not needed in the permit.

$$(\text{Detention Time [days]} = \frac{\text{Total Pond Volume [MG]}}{180\text{-d average flow rate [mgd]})$$

It is recognized Rock Springs Wastewater Treatment Facility potentially has a detention time of at least 180 days, in which the resulting discharged effluent is thought to not pose a risk to human and animal health, as described in s. NR 210.06(3)(h), Wis. Adm. Code.

The maximum 180-day rolling average flowrate for the facility is 0.05 MGD (January 2019 – August 2024) including days discharge did not occur. The volumetric capacity of the lagoons is approx. 10.6 MG, calculated based on dimensions provided by the facility and an assumed horizontal side slope of 3:1. Therefore, the estimated shortest detention time for the facility is approximately $10.6 \text{ MG} / 0.05 \text{ MGD} = 210$ days and is significantly greater than the 180-day minimum. This detention time is essentially providing disinfection where additional disinfection treatment is not expected to be needed. **Therefore, bacteria limits or monitoring are not recommended during the reissued permit term.**

If there are any questions or comments, please contact Zainah Masri at Zainah.Masri@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

PREPARED BY: Zainah Masri – WY/3

APPROVED BY: Diane Figiel date: 10/07/2024
Diane Figiel, Water Resources Engineer

cc: Tanner Connors, Wastewater Engineer – Fitchburg/SCR