

Permit Fact Sheet

General Information

Permit Number:	WI-0022110-10-0	
Permittee Name:	CITY OF BOSCOBEL	
Address:	1006 Wisconsin Avenue	
City/State/Zip:	Boscobel WI 53805	
Discharge Location:	South bank of the Wisconsin River, 400 feet east of the Hwy 61 bridge. Lat: 43.15042° N / Lon: 90.713074° W	
Receiving Water:	Wisconsin River (Green River/Crooked Creek Watershed, LW07 – Lower Wisconsin River Basin) in Grant County	
StreamFlow (Q _{7,10}):	2,680 cfs	
Stream Classification:	Warm water sport fish, Exceptional resource water, non-public water supply	
Design Flow(s)	Annual Average	0.474 MGD
Significant Industrial Loading?	None	
Operator at Proper Grade?	Yes, Required: Basic A1, B, C, P, D, L and SS.	
Approved Pretreatment Program?	N/A	

Facility Description

The City of Boscobel operates an extended aeration activated sludge wastewater treatment facility that consists of influent screening, grit chamber, selector tanks, aeration basins, a chemical feed system for phosphorus removal, final clarification, and effluent chlorine contact for disinfection and dechlorination. The facility is in the process of replacing the chlorine system with ultraviolet disinfection. Sludge from the treatment processes is aerobically digested and thickened by a gravity belt thickener prior to onsite storage and is later applied to Department approved fields. The facilities current design average flow is 474,000 gallons per day (0.474 MGD).

Substantial Compliance Determination

Enforcement During Last Permit: There were several permit violations during the previous permit term; however, the permittee has taken the necessary corrective actions and nothing further was required.

After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items, and a site visit on 7/12/2023, this facility has been found to be in substantial compliance with their current permit.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)
701	0.273 MGD (Oct. 2018 – Sept.	Influent: 24-Hr flow proportional composite samples collected after flume influent channel prior to the grit chamber. Flow meter located

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)
	2023 Average)	between the mechanical screen and grit chamber.
001	N/A – Not Reported	Effluent: 24-Hr flow proportional composite samples and grab samples collected after the chlorine contact tank and dechlorination, prior to discharge to the Wisconsin River. Flow meter located in channel right before chlorine contact tank.
003	89 Dry U.S. Tons	

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	
BOD ₅ , 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:

Sample frequency for Flow Rate updated to reflect eDMR reporting.

Explanation of Limits and Monitoring Requirements

BOD₅ & Total Suspended Solids – Tracking of BOD₅ and Total Suspended Solids are 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	
BOD ₅ , Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD ₅ , Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
				Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
pH Field	Daily Max	9.0 su	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit effective May through September.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit effective May through September. See 'E. coli Percent Limit' section of the permit. Enter the result on the DMR on the last day of the month.
Chlorine, Total Residual	Daily Max	38 ug/L	Daily	Grab	May through September
Chlorine, Total Residual	Weekly Avg	38 ug/L	Daily	Grab	May through September
Chlorine, Total Residual	Monthly Avg	38 ug/L	Daily	Grab	May through September
Phosphorus, Total	Monthly Avg	1.0 mg/L	3/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring only in 2028.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring only in 2028.
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

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.

Changes from Previous Permit

Updates have been highlighted in table above.

- To comply with s. NR 205.07(1)(r)2, Wis. Adm. Code, effluent flow reporting requirements were added.
- Fecal coliform monitoring and limits have been replaced with *Escherichia coli* (E. coli) monitoring and limits. E. coli monitoring is required at the permit effective date. E. coli limits of 126 #/100 ml as a monthly geometric mean may not be exceeded and 410 #/100 ml as a daily maximum may not be exceeded more than 10 percent of the time in any calendar month apply.
- Monitoring frequency for pH increased to 5/week.
- Ammonia and chloride sampling year updated.
- Nitrogen series monitoring added.

Explanation of Limits and Monitoring Requirements

Please refer to the Water Quality Based Effluent Limits Memo prepared by Sarah Luck dated November, 17, 2023 for the detailed calculations and explanation.

BOD5, TSS, Fecal Coliform and pH - No changes are recommended in the categorical permit limitations for BOD5, TSS, or pH. Because the reference 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. However, on May 1, 2020 revisions to the bacteria surface water criteria became effective. Therefore, this permit has been updated to include *E. coli* monitoring and limits. Where the receiving water is classified as Warm Water Sport Fish in s. NR 102.04(3)(a), Wis. Adm. Code the surface water criterion and categorical limits for BOD5, TSS and pH are those limits enumerated in s. NR 102.04(4), in s. NR 102.04(4), Wis. Adm. Code. Sample frequency of pH are increased to 5/week.

Phosphorus – Phosphorus requirements are based on the Phosphorus Rules that became effective 12/1/2010 as detailed in ch. 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 industrial dischargers of more than 60 pounds of phosphorus per month and municipal dischargers of more than 150 pounds of phosphorus per month to 1.0 mg/L unless an alternative limit is approved. Chapter NR 217 also specifies WQBELs (water quality based effluent limits) for discharges of phosphorus to surface waters of the state from publicly and privately-owned wastewater facilities, noncontact cooling water discharges which contain phosphorus, concentrated animal feeding operations that discharge through alternative treatment facilities and a facility/site that is regulated under ch. NR 216 where the standards in chs. NR 151 and 216 are not sufficient to meet phosphorus criteria. WQBELs for phosphorus are needed whenever the discharge contains phosphorus at concentrations or loadings that will cause or contribute to an exceedance of the water quality standards. The calculated water quality based limit for total phosphorus for the facility is less stringent than the 1.0 mg/L technology based limit. Therefore, the 1.0 mg/L monthly average technology based limit is retained.

Chlorine – Effluent limitations for chlorine are included in the proposed permit to assure proper operation of the de-chlorination system since chlorine is added as a disinfectant. Section NR 210.06(2)(b), Wis. Adm. Code, states “When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L.” Since the calculated water quality-based effluent limitations for chlorine are more restrictive, the water quality-based limits are retained in the proposed permit. The permittee is installing UV disinfection and will likely have

the installation complete prior to the 2024 disinfection season. The permittee must request a permit modification to remove chlorine sampling and limits upon completion of the change and use of chlorine for disinfection has stopped.

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

Chloride – Acute and chronic chloride toxicity criteria for the protection of aquatic life are included in Tables 1 and 5 of ch. NR 105, Wis. Adm. Code. Subchapter VII of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for chloride. The permittee's effluent data shows that there is no reasonable potential to exceed the calculated WQBELs for chloride. Monthly monitoring is included in calendar year 2028 of the proposed permit and the data collected will be used to determine reasonable potential for the next reissuance.

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. Annual effluent monitoring in rotating quarters for Total Nitrogen is included in the permit. 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.

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 in the effluent 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.

Expression of Limits – In accordance with the federal regulation 40 CFR 122.45(d), limits in this permit are to be expressed as weekly average and monthly average limits whenever practicable.

Monitoring Frequency Evaluation - Monitoring frequencies for parameters that have final effluent limits in effect during this permit term were evaluated taking into consideration the size and type of the facility, and whether the monitoring occurs frequently enough to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Monitoring frequency decisions are based on requirements in s. NR 205.066(1), Wis. Adm. Code, (decisions are case-by-case) and considering the factors in s. NR 210.04 (a) through (e), Wis. Adm. Code, along with recommendations provided in the *Monitoring Frequencies for Individual Wastewater Permits* guidance (April 12, 2021).

The department has determined at this time that an increase in monitoring frequency for pH Field to 5/Week is appropriate due to be consistent with facilities of similar size and effluent quality across the state. An additional consideration for increasing sample frequency for process control parameters (DO, pH) is that they are tested for in-house, can quickly provide information on how well a treatment system is performing and help identify potential compliance issues. The increased monitoring frequency also ensures better calibration of sampling equipment, improves data reliability and ensures more frequent operator oversight of the treatment plant.

3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
003	B	Liquid	Fecal Coliform	Injection/Incorporation	Land Application	89
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? Yes						
If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility						
Is a priority pollutant scan required? No , design flow is less than 5 MGD (0.474 MGD)						
Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

Sample Point Number: 003- SLUDGE

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

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	
Nitrogen, Ammonium (NH ₄ -N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	
Radium 226 Dry Wt		pCi/g	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2025.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2025.
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOS and PFAS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

Changes from Previous Permit:

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

Explanation of Limits and Monitoring Requirements

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

Required Action	Due Date
Land Application Management Plan Submittal: Submit a management plan to optimize the land application system performance and demonstrate compliance with ch. NR 204, Wis. Adm. Code, by the Due Date. This management plan shall 1) specify information on pretreatment processes (if any); 2) identify land application sites; 3) describe site limitations; 4) address vegetative cover management and removal; 5) specify availability of storage; 6) describe the type of transporting and spreading vehicle(s); 7) specify monitoring procedures; 8) track site loading; 9) address contingency plans for adverse weather and odor/nuisance abatement; and 10) include any other pertinent information. Once approved, all landspreading 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.	10/01/2024

Explanation of Schedules

This schedule requires a Land Application Management Plan be submitted to ensure sludge management practices comply with ch. NR 204, Wis. Adm. Code, pursuant to s. NR 204.11, Wis. Adm. Code. The management plan shall also include all department issued approval maps and Land Application Approval Forms (3400-122) for all approved sites, to comply with s. NR 204, Wis. Adm. Code. Sites that no longer match approval conditions in the department issued approval maps and Land Application Approval Forms (3400-122) in the management plan must be reviewed and potentially reauthorized to comply with ch. NR 204, Wis. Adm. Code.

Attachments:

Water Quality Based Effluent Limits with Maps dated – November 17, 2023

Proposed Expiration Date:

March 31, 2029

Justification of Any Waivers from Permit Application Requirements

No waivers were requested in the permit application.

Prepared By: Jennifer Jerich, Wastewater Specialist

Date:1/10/2024

Revision date post fact check: 1/23/2024

Revision date post public notice & hearing:

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: December 8, 2023

TO: Jennifer Jerich – SCR/Horicon

FROM: Sarah Luck – SCR/Fitchburg

SUBJECT: Water Quality-Based Effluent Limitations for the Edgerton Wastewater Treatment Facility
WPDES Permit No. WI-0020346-10-0

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 Edgerton Wastewater Treatment Facility in Rock County. This municipal wastewater treatment facility (WWTF) discharges to the Rock River, located in the Rock River/Milton Watershed in the Lower Rock River Basin. This discharge is included in the Rock River TMDL as approved by EPA. 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	2,6
pH	9.0 s.u.	6.0 s.u.			3
Ammonia Nitrogen October – April	24 mg/L		24 mg/L	24 mg/L	2,4
Bacteria <i>E. coli</i>				126 #/100 mL geometric mean	5
Phosphorus				1.0 mg/L	6,7
Chloride					8
TKN, Nitrate+Nitrite, and Total Nitrogen					9

Footnotes:

1. Monitoring only.
2. No changes from the current permit.
3. The daily maximum pH was changed from 7.8 s.u. to 9.0 s.u.
4. 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.
5. Bacteria limits apply during the disinfection season of May through September Additional limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.

6. Additional phosphorus and TSS mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL.


Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave Total P Effluent Limit (lbs/day)
Jan	172	230	64.29
Feb	190	255	92.24
March	172	230	63.20
April	176	236	39.59
May	172	230	59.24
June	176	236	13.79
July	172	230	10.31
Aug	172	230	2.46
Sept	176	236	19.92
Oct	172	230	16.52
Nov	176	236	20.00
Dec	172	230	37.73

7. The monthly average phosphorus limit is a technology-based limit which should be retained unless a more stringent water quality-based effluent limit is given.
8. Monitoring during the fourth year of the permit term at a frequency to ensure that 11 samples are available at the next permit issuance.
9. 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).

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

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Sarah Luck (Sarah.Luck@wisconsin.gov) or Diane Figiel (Diane.Figiel@wisconsin.gov).

Attachments (3) – Narrative, Site Map, and Ammonia Nitrogen Calculations

PREPARED BY:  Date: December 8, 2023
Sarah Luck
Water Resources Engineer

E-cc: Ashley Brechlin, Wastewater Engineer – SCR/Fitchburg
Tom Bauman, Regional Wastewater Supervisor – SCR/Fitchburg
Diane Figiel, Water Resources Engineer – WY/3

Water Quality-Based Effluent Limitations for Edgerton Wastewater Treatment Facility

WPDES Permit No. WI-0020346

PART 1 – BACKGROUND INFORMATION

Facility Description

The Edgerton Wastewater Treatment Facility consists of mechanical screening, a grit removal tank, activated sludge with biological phosphorus removal, two secondary clarifiers, and UV disinfection. Chemical phosphorus removal is also provided through the addition of ferric chloride. Biosolids are aerobically digested prior to storage in drying beds. When the drying beds are cleaned, solids are land applied on Department-approved agricultural land. The facility was upgraded in 2017; upgrades included RBC replacement with Bio-P selector basins and activated sludge treatment.

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, 2023, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD ₅			45 mg/L	30 mg/L		2
TSS			45 mg/L	30 mg/L		2,3
pH	7.8 s.u.	6.0 s.u.				4
Ammonia Nitrogen October - April	24 mg/L		24 mg/L	24 mg/L		5
Fecal Coliform May – September			656#/100 mL geometric mean	400#/100 mL geometric mean		5
Phosphorus				1.0 mg/L		3
Chloride						1

Footnotes:

1. Monitoring only.
2. These limitations are not being evaluated as part of this review. Since 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. Additional phosphorus and TSS mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL.

Attachment #1

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave Total P Effluent Limit (lbs/day)
Jan	172	230	64.29
Feb	190	255	92.24
March	172	230	63.20
April	176	236	39.59
May	172	230	59.24
June	176	236	13.79
July	172	230	10.31
Aug	172	230	2.46
Sept	176	236	19.92
Oct	172	230	16.52
Nov	176	236	20.00
Dec	172	230	37.73

- The daily maximum pH was changed to 7.8 s.u. in 2008 in lieu of the typical daily maximum pH of 9.0 s.u. More information is in Part 3.
- 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.

Receiving Water Information

- Name: Rock River
- Waterbody Identification Code (WBIC): 788800
- 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: The following 7-Q₁₀ and 7-Q₂ values are from USGS estimated in 2003 at the Indianford Dam.
 7-Q₁₀ = 140 cfs (cubic feet per second)
 7-Q₂ = 290 cfs
 90-Q₁₀ = 246.5 cfs
 Harmonic Mean Flow = 609 cfs using a drainage area of 2,630 mi²
 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 = 270 mg/L as CaCO₃. This value represents the geometric mean of data (n=2) from WET tests conducted on 6/9/20 and 7/26/22 by the Milton WWTF, located approximately 1.3 miles upstream of Outfall 001.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from the Rock River below Davy Creek (upstream of the outfall location) is used for this evaluation. The geometric means of these 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.
- Multiple dischargers: Consolidated Koshkonong WWTF and Milton WWTF share a discharge pipe approximately 1.3 miles upstream. However, due to the amount of streamflow in the receiving water, these dischargers are not considered as part of this evaluation.

Attachment #1

- Impaired water status: The Rock River is listed as impaired for total phosphorus and total suspended solids at the point of discharge.

Effluent Information

- Flow rate:
Design annual average = 0.960 MGD (Million Gallons per Day)
For reference, the actual average flow from October 2018 through September 2023 was 0.62 MGD.
- Hardness = 397 mg/L as CaCO₃. This value represents the geometric mean of data (n=4) from April 2023 reported on 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 (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.

Copper Effluent Data

Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)
4/13/2023	8.7	4/29/2023	9.9	5/15/2023	6.8
4/17/2023	9.9	5/3/2023	9.4	5/19/2023	8.9
4/21/2023	12	5/7/2023	8.0	5/23/2023	9.1
4/25/2023	9.1	5/11/2023	1.7		
1-day P ₉₉ = 16 µg/L					
4-day P ₉₉ = 12 µg/L					

Chloride Effluent Data

Sample Date	Chloride (mg/L)	Sample Date	Chloride (mg/L)	Sample Date	Chloride (mg/L)
1/14/2022	330	5/26/2022	300	9/14/2022	160
2/11/2022	330	6/13/2022	280	10/14/2022	280
3/11/2022	340	7/13/2022	280	11/15/2022	290
4/13/2022	260	8/12/2022	300	12/14/2022	320
1-day P ₉₉ = 417 mg/L					
4-day P ₉₉ = 349 mg/L					

The following table presents the average concentrations and loadings at Outfall 001 from October 2018 through September 2023 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter Averages with Limits

	Average Measurement	Average Mass Discharged
BOD ₅	4 mg/L*	
TSS	5 mg/L*	26 lbs/day
pH field	7.5 s.u.	
Phosphorus	0.24 mg/L	1.2 lbs/day
Ammonia Nitrogen	0.30 mg/L*	
Fecal coliform	14#/100 mL	

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

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

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

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P₉₉) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q₁₀

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

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

Where:

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

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

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

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

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

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

reasonable potential determinations. This is not the case for Edgerton Wastewater Treatment Facility, 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. All concentrations are expressed in terms of micrograms per Liter ($\mu\text{g/L}$), except for hardness and chloride (mg/L).

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 112 cfs, (1- Q_{10} (estimated as 80% of 7- Q_{10})), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P ₉₉	1-day MAX. CONC.
Arsenic		340	679.6	135.9	0.56		
Cadmium	397	50.2	100.3	20.1	<0.15		
Chromium	301	4446	8891.7	1778	<2.3		
Copper	397	57.0	114.1			16	12
Lead	356	365	729.3	145.9	<0.16		
Nickel	268	1080	2160.6	432	2.4		
Zinc	333	345	689.4	137.9	15		
Chloride (mg/L)		757	1514			417	340

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

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

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 35 cfs ($\frac{1}{4}$ of the 7- Q_{10}), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK- GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P ₉₉
Arsenic		152.2		3738	747.7	0.56	
Cadmium	175	3.82	0.31	86.53	17.3	<0.15	
Chromium	270	298.00	1.8	7277	1455.5	<2.3	
Copper	270	24.21	2.0	547.5			12
Lead	270	73.12		1796.0	359.2	<0.16	
Nickel	268	120.18	2.6	2891	578.1	2.4	
Zinc	270	286.92	2.5	6989	1397.7	15	
Chloride (mg/L)		395	63	8218			349

* 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 = 152 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK- GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	0.31	38276	7655.3	<0.15
Chromium (+3)	3818000	1.8	395299108	79059822	<2.3
Lead	140		14495	2899.0	<0.16
Nickel	43000	2.6	4451768	890354	2.4

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 152 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		1377	275.4	0.56

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, **no effluent limitations are required.**

Chloride – Considering available effluent data from the current permit term (January 2022 through December 2022), the 1-day P₉₉ chloride concentration is 417 mg/L, and the 4-day P₉₉ of effluent data is 349 mg/L. These effluent concentrations are below the calculated WQBELs for chloride; therefore, **no effluent limits are needed. Chloride monitoring is recommended in the fourth year of the permit term at a frequency to ensure that 11 sample results are available at the next permit issuance** to meet the data requirements of s. NR 106.85, Wis. Adm. Code.

Mercury – The permit application did not require monitoring for mercury because the Edgerton 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 all the sample results (n=4) are within expected analytical ranges and well below the 17 mg/kg level. The average concentration in the sludge from April 2019 through September 2022 was 0.90 mg/kg, with a maximum reported concentration of 2.2 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, the effluent flow rate, and lack of indirect dischargers, **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 pH AND 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.
- The maximum expected effluent pH has changed.

pH Limits

The daily maximum pH was changed to 7.8 s.u., with an effective date of June 1, 2008, in lieu of the water quality criteria daily maximum pH limit of 9.0 s.u. Previous WQBEL memos indicate that this change was requested by the city and their consultant so as to have a higher ammonia nitrogen limit of 24 mg/L. The WQBEL memo dated July 10, 2018 noted that Edgerton WWTF would perform “pH adjustment to meet a higher daily max ammonia limit.” However, a phone conversation with the facility operators on December 7, 2023 revealed that no pH management is occurring, or has occurred, since the pH limit of 7.8 s.u. went into effect. Since pH is not being managed, **it is recommended the pH limits revert to the water quality criteria set forth in s. NR 102.04(4)(c), Wis. Adm. Code.** This change does not constitute an increased discharge as defined in ch. NR 207, Wis. Adm. Code, since pH limits are given to ensure water quality criteria are met, not calculated water quality-based effluent limitations.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

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

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

Where:

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

The effluent pH data was examined as part of this evaluation. A total of 720 sample results were reported from October 2018 through September 2023. The maximum reported value was 7.8 s.u. (Standard pH Units). The effluent pH was 7.7 s.u. or less 99% of the time. The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.8 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 7.8 s.u. Therefore, a value of 7.8 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 7.8 s.u. into the equation above yields an ATC = 12.14 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 ($2 \times \text{ATC}$) 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 $2 \times \text{ATC}$ approach are shown below.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
$2 \times \text{ATC}$	24
1- Q_{10}	924

The $2 \times \text{ATC}$ method yields the most stringent limits for Edgerton Wastewater Treatment Facility.

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

Daily Maximum Ammonia Nitrogen Limits – WWSF

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

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

Due to the available dilution in the receiving water, calculated weekly and monthly limits are much greater than the maximum effluent concentration of 19 mg/L (the lowest calculated weekly or monthly limit being 87 mg/L) and are therefore not considered further. The calculated limits from the 2018 WQBEL memo are presented in Attachment #3.

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from October 2018 through April 2023 (monitoring is only required during the months of October through April), with those results being compared to the calculated limits to determine the need to include ammonia limits in the Edgerton Wastewater Treatment Facility 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.

October – April Ammonia Nitrogen Effluent Data

	Ammonia Nitrogen mg/L
1-day P ₉₉	4.38
4-day P ₉₉	3.05
30-day P ₉₉	1.43
Mean*	0.30
Std	2.04
Sample size	480 (195 ND)
Range	<0.1 - 19

*“<” means 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 (ND) result.

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

Conclusions and Recommendations

In summary, after rounding to two significant figures, **the ammonia nitrogen limitations in the table below are recommended**. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

Final Ammonia Nitrogen Limits

	pH	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
April		24	24	24
May – September		-	-	-
October – March		24	24	24

Additional limits to meet the requirements in s. NR 106.07, Wis. Adm Code, are denoted in bold text above.

**PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS
FOR BACTERIA**

On May 1, 2020, revisions to chs. NR 102 and NR 210, Wis. Adm. Codes, became effective which replace fecal coliform limits with new *Escherichia coli* (*E. coli*) limits for protection of recreational uses. Section NR 210.06(2)(a)1, Wis. Adm. Code, includes two limits which must be included in permits for facilities which are required to disinfect:

1. The geometric mean of *E. coli* bacteria in effluent samples collected in any calendar month may not exceed 126 counts/100 mL.

2. No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 counts/100 mL.

E. coli monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Since Edgerton's permit requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit.

These limits are required during May through September. No changes are recommended to the current recreational period and the required disinfection season.

Effluent Data

Edgerton Wastewater Treatment Facility has monitored effluent *E. coli* from July 2022 through September 2023, and a total of 33 results are available. A geometric mean of 126 counts/100 mL was not exceeded, with a maximum monthly geometric mean of 44 counts/100 mL. Effluent data did not exceed 410 counts/100 mL. The maximum reported value was 101 counts/100 mL. Based on this effluent data it appears that **the facility can meet new *E. coli* limits, and a compliance schedule is not needed in the reissued permit.**

PART 5 – PHOSPHORUS

Technology-Based Effluent Limit

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

Since Edgerton Wastewater Treatment Facility currently has a limit of 1.0 mg/L, this limit should be included in the reissued permit. This limit remains applicable unless a more stringent WQBEL is given.

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

Water Quality-Based Effluent Limits (WQBEL)

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL-derived water quality based effluent limit (WQBEL) for phosphorus in addition to, or in lieu of, a s. NR 217.13, Wis. Adm. Code, WQBEL in a WPDES permit. The Rock River TMDL was developed to protect the water quality of impaired waters within the watershed, and the discharge from the Edgerton Wastewater Treatment Facility is to the Rock River in Rock County. Since the Rock River was listed as impaired prior to the TMDL development, the TMDL-based phosphorus limits were included in the permit at the last reissuance rather than the s. NR 217.13, Wis. Adm. Code WQBEL.

The Rock River remains impaired for phosphorus meaning the Rock River TMDL limits remain applicable. The following limits from the current permit are recommended to be retained for phosphorus.

Total Phosphorus Effluent Limitations

Attachment #1

Month	Monthly Total P WLA ¹ (lbs/month)	Days Per Month	Monthly Ave Total P Effluent Limit ² (lbs/day)	Equivalent Concentration for informational purposes only (mg/L)
Jan	1992.96	31	64.29	8.03
Feb	2582.65	28	92.24	11.5
March	1959.19	31	63.20	7.89
April	1187.58	30	39.59	4.94
May	1836.42	31	59.24	7.40
June	413.68	30	13.79	1.72
July	319.6	31	10.31	1.29
Aug	76.27	31	2.46	0.31
Sept	597.54	30	19.92	2.49
Oct	512.08	31	16.52	2.06
Nov	600.05	30	20.00	2.50
Dec	1169.72	31	37.73	4.71

Footnotes:

1- Rock River TMDL Appendix P. Monthly Total Phosphorus Allocations by Wastewater Treatment Facility (p. 147)

2- monthly average Total P effluent limit (lbs/day) = monthly Total P WLA (lbs/month) ÷ days per month

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from October 2018 through September 2023.

Total Phosphorus Effluent Data

	mg/L	lbs/day
1-day P ₉₉	0.56	3.8
4-day P ₉₉	0.38	2.3
30-day P ₉₉	0.29	1.6
Mean	0.24	1.2
Std	0.10	0.73
Sample size	720	720
Range	0.02 - 0.73	0.1 - 7.9

PART 6 – TOTAL SUSPENDED SOLIDS

The Rock River TMDL also has wasteload allocations (WLA) for total suspended solids (TSS). For a municipal facility the limits for TSS must be expressed as weekly and monthly averages. The current permit includes a weekly average concentration limit of 45 mg/L and a monthly average concentration limit of 30 mg/L.

Monthly average and weekly average mass effluent limitations should be included in the permit according to the table below, along with the currently imposed concentration limits. For reference, the mass limits shown are equivalent to concentrations ranging from 21.5 mg/L – 23.7 mg/L as a monthly average and 28.7 mg/L – 31.8 mg/L as a weekly average at the design flow rate of 0.960 MGD.

Total Suspended Solids Effluent Limitations

Month	Monthly TSS WLA¹ (tons/month)	Days Per Month	Monthly Ave TSS Effluent Limit² (lbs/day)	Weekly Ave TSS Effluent Limit³ (lbs/day)
January	2.66	31	172	230
February	2.66	28	190	255
March	2.66	31	172	230
April	2.64	30	176	236
May	2.66	31	172	230
June	2.64	30	176	236
July	2.66	31	172	230
August	2.66	31	172	230
September	2.64	30	176	236
October	2.66	31	172	230
November	2.64	30	176	236
December	2.66	31	172	230

Footnotes:

1- Rock River TMDL Appendix Q. Monthly Total Suspended Solids Allocations by Wastewater Treatment Facility (p. 149)

2- Monthly average TSS effluent limit (lbs/day) = maximum monthly TSS WLA (tons/month) ÷ days per month x 2,000 lbs/ton

3- Weekly average effluent limit (lbs/day) = monthly average limit (lbs/day) x multiplier

Weekly average mass limits were calculated in 2012. At that time, the coefficient of variation (the standard deviation divided by the mean) was determined to be 0.5, and the monitoring frequency was 3x/week. Given these two factors, a multiplier of 1.34 was used. Using updated mass data, the coefficient of variation was calculated to be 0.7 (= 18.4 ÷ 26). This value, along with the 3x/week monitoring frequency, would yield a higher multiplier and therefore increased limits. An increase in limits is not permitted unless a demonstration of need is shown in accordance with ch. NR 207, Wis. Adm. Code. Therefore, the previous multiplier and limits are retained. If a different monitoring frequency is used, the stated limits should be re-evaluated.

Limits based on a WLA should be given in a permit regardless of reasonable potential. However, for informational purposes, the table on the next page lists the statistics for total suspended solids discharge as both a concentration and a mass, from October 2018 through September 2023.

Sample Type	TSS (mg/L)	TSS (lbs/day)
1-day P ₉₉	13	93
4-day P ₉₉	8	55
30-day P ₉₉	6	35
Mean*	5	26
Std	2.3	18.4
Sample Size	720 (8 ND)	728 (8 zeros)
Range	<2 - 18	0 - 211

*“<” means 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 (ND) result.

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.

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). At temperatures above approximately 103°F, conventional biological treatment systems do not function properly and experience upsets. There is no indication that this has ever occurred in this treatment system. Therefore, there is no reasonable potential for the discharge to exceed this limit. **No monitoring or effluent limits are recommended for temperature.**

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 4%, 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:

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

Where:

Q_e = annual average flow = 0.960 MGD = 1.485 cfs

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

Q_s = $\frac{1}{4}$ of the 7- Q_{10} = 140 cfs \div 4 = 35 cfs

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the

Department prior to use. The primary control water must be specified in the WPDES permit.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 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.

Tests conducted prior to 2005 are not presented in the table below due to significant changes that were made to WET test methods in 2004. These changes were assumed to be fully implemented by certified labs by no later than June 2005.

WET Data History

Date Test Initiated	Acute Results LC ₅₀ %				Footnotes or Comments
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	
07/26/2006	>100	>100	Pass	No	1
06/23/2015	>100	>100	Pass	No	1
08/30/2017	>100	>100	Pass	Yes	

Footnotes:

- Data Not Representative.* The facility completed an upgrade in 2017 which renders prior data prior unrepresentative.
- 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.**

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

Acute Reasonable Potential = 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

Attachment #1

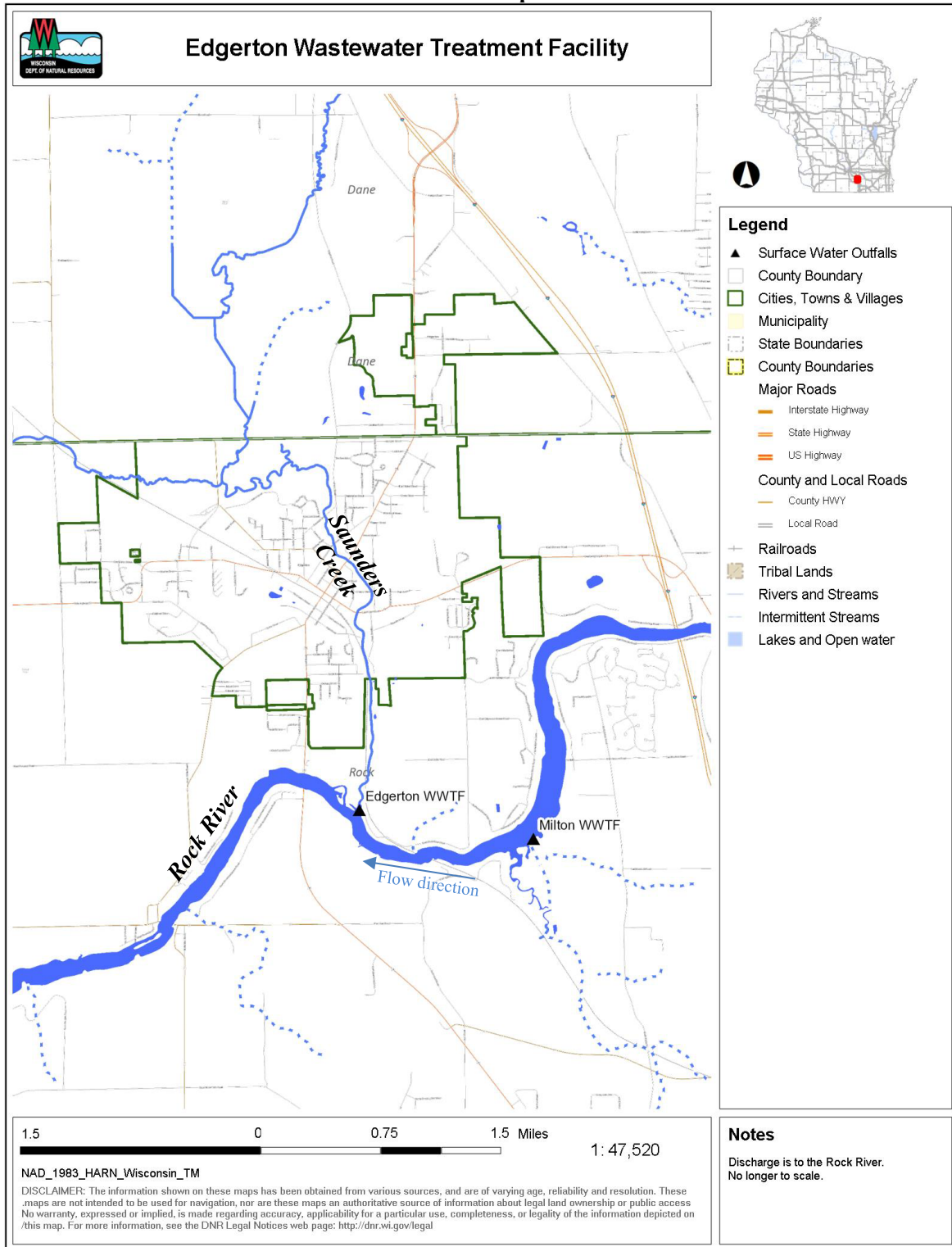
suggests monitoring frequencies based on points accumulated during the checklist analysis. As toxicity potential increases, more points accumulate, and more monitoring is recommended to ensure that toxicity is not occurring. A summary of the WET checklist analysis completed for this permittee is shown 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 = 4% 0 Points
Historical Data	No data collected since 2017. 5 Points	No data. 5 Points
Effluent Variability	Little variability, few violations, no upsets, and consistent WWTF operations. 0 Points	Same as Acute. 0 Points
Receiving Water Classification	WWSF 5 Points	Same as Acute. 5 Points
Chemical-Specific Data	No reasonable potential for limits based on ATC. Ammonia nitrogen limit carried over from the current permit. Arsenic, chloride, copper, nickel, and zinc detected. Additional Compounds of Concern: None. 3 Points	No reasonable potential for limits based on ATC. Ammonia nitrogen limit carried over from the current permit. Arsenic, chloride, copper, nickel, and zinc detected. Additional Compounds of Concern: None. 3 Points
Additives	No biocides and one water quality conditioner (ferric chloride) added. Permittee has proper P chemical SOP in place. 1 Point	Ferric chloride is used more than once per 4 days. 1 Point
Discharge Category	No 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	14 Points
Recommended Monitoring Frequency (from Checklist):	None.	None.
Limit Required?	No	No
TRE Recommended? (from Checklist)	No	No

No WET testing is required because information related to the discharge indicates the potential for effluent toxicity is believed to be low.

Attachment #2
Site Map



Ammonia Nitrogen Calculations from the WQBEL Memo Dated July 10, 2018

The rules provide a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 °C, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the Rock River, based on conversations with local fisheries biologists. So “ELS Absent” criteria apply from October through March, and “ELS Present” criteria will apply from April through September for a full fish and aquatic life waterbody.

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

		Summer	Winter	Spring
		June – Sept.	Oct. - March	April & May
Background Information	7-Q ₁₀ (cfs)	140	140	140
	7-Q ₂ (cfs)	290	290	290
	Ammonia (mg/L)	0.07	0.135	0.09
	Temperature (°C)	19	4	6
	pH (s.u.)	8.08	7.98	8.09
	% of Flow used	100	25	25
	Reference Weekly Flow (cfs)	140	35	35
	Reference Monthly Flow (cfs)	246.5	61.625	61.625
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	4.15	6.26	5.35
	Early Life Stages Absent	3.56	8.38	5.50
	30-day Chronic			
	Early Life Stages Present	1.66	2.50	2.13
	Early Life Stages Absent	1.42	3.35	2.20
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	388.84	150.61	128.64
	Early Life Stages Absent	332.39	202.62	133.09
	Monthly Average			
	Early Life Stages Present	265.62	100.80	86.74
	Early Life Stages Absent	226.05	136.79	89.82