Permit Fact Sheet

General Information

Permit Number	WI-0024627-10-0
Permittee Name and Address	VILLAGE OF MARSHALL P O Box 45, 130 South Pardee Street Marshall WI 53559-0045
Permitted Facility Name and Address	Marshall Wastewater Treatment Facility 616 WEST KAREM DRIVE, MARSHALL, WISCONSIN
Permit Term	April 01, 2025 to March 31, 2030
Discharge Location	Maunesha River
Receiving Water	Maunesha River in Maunesha River of Rock River (upper) in Dane county
Stream Flow ($Q_{7,10}$)	1.0 cfs
Stream Classification	Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply.
Discharge Type	Existing, Continuous
Annual Average Design Flow (MGD)	0.57 MGD
Industrial or Commercial Contributors	None
Plant Classification	Advanced, A1 - Suspended Growth Processes; B - Solids Separation; C - Biological Solids/Sludges; P - Total Phosphorus; D - Disinfection; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The Village of Marshall serves a population of approximately 3,860 people with no significant industrial contributions and no significant anticipated growth. The Village operates a wastewater treatment facility (WWTF) constructed in 1998 providing secondary treatment and nutrient removal. The facility includes: a raw influent lift station, a mechanical bar screen and grit removal, a three-channel extended aeration oxidation ditch, two final clarifiers, ultraviolet disinfection, and step aeration. Phosphorus is removed biologically, and ferric chloride may be added for polishing. Biosolids are digested aerobically, concentrated on a gravity belt thickener and stored in a liquid sludge storage tank prior to land application on Department approved farmland.

Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items on 11/6/2024, and a site visit on 5/15/2023, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Ashley Brechlin on 11/6/2024.

Sample Point Descriptions

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
701	0.35 MGD (2023)	Influent: 24-hr flow proportional composite samples taken from the influent pump station wet well. Flow meter located in the influent wet well.
001	0.35 MGD (2023)	Effluent: 24-hr flow proportional composite samples are taken prior to the UV channel. Grab samples are taken from the bottom of the aeration steps prior to discharge to the Maunesha River. Flow meter located in the UV chamber after disinfection.
003	68 dry US ton (reported in permit application)	Aerobically digested, Thickened, Liquid, Class B. Representative sludge samples shall be collected from the sludge storage tank.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 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	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	

Changes from Previous Permit:

Influent limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section.

Explanation of Limits and Monitoring Requirements

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

2 Surface Water - Monitoring and Limitations

2.1 Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	11 mg/L	3/Week	24-Hr Flow Prop Comp	May through October
BOD5, Total	Weekly Avg	22 mg/L	3/Week	24-Hr Flow Prop Comp	November through April
BOD5, Total	Monthly Avg	11 mg/L	3/Week	24-Hr Flow Prop Comp	May through October
BOD5, Total	Monthly Avg	22 mg/L	3/Week	24-Hr Flow Prop Comp	November through April
BOD5, Total	Weekly Avg	51 lbs/day	3/Week	Calculated	May through October
BOD5, Total	Weekly Avg	110 lbs/day	3/Week	Calculated	November through April
Suspended Solids, Total	Weekly Avg	11 mg/L	3/Week	24-Hr Flow Prop Comp	May through October
Suspended Solids, Total	Weekly Avg	22 mg/L	3/Week	24-Hr Flow Prop Comp	November through April
Suspended Solids, Total	Monthly Avg	11 mg/L	3/Week	24-Hr Flow Prop Comp	May through October
Suspended Solids, Total	Monthly Avg	22 mg/L	3/Week	24-Hr Flow Prop Comp	November through April
Suspended Solids, Total	Weekly Avg	71 lbs/day	3/Week	Calculated	January, March, and December
Suspended Solids, Total	Weekly Avg	82.6 lbs/day	3/Week	Calculated	Feburary
Suspended Solids, Total	Weekly Avg	70.5 lbs/day	3/Week	Calculated	April and November
Suspended Solids, Total	Weekly Avg	51 lbs/day	3/Week	Calculated	May through October
Suspended Solids, Total	Monthly Avg	50.3 lbs/day	3/Week	Calculated	January, March, May, July, August, October, and December
Suspended Solids, Total	Monthly Avg	58.6 lbs/day	3/Week	Calculated	February
Suspended Solids, Total	Monthly Avg	50 lbs/day	3/Week	Calculated	April, June, September, and November

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
pH Field	Daily Max	9.0 su	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	
Dissolved Oxygen	Daily Min	7.0 mg/L	5/Week	Grab	
Nitrogen, Ammonia (NH3-N) Total	Daily Max	8.9 mg/L	3/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	8.3 mg/L	3/Week	24-Hr Flow Prop Comp	April, May, September and October
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	6.0 mg/L	3/Week	24-Hr Flow Prop Comp	June through August
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	8.9 mg/L	3/Week	24-Hr Flow Prop Comp	November through March
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	4.7 mg/L	3/Week	24-Hr Flow Prop Comp	April, June through August, and October
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	6.5 mg/L	3/Week	24-Hr Flow Prop Comp	May
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	6.9 mg/L	3/Week	24-Hr Flow Prop Comp	September
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	7.6 mg/L	3/Week	24-Hr Flow Prop Comp	November through March
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	May through September
E. coli	% Exceedance	10 Percent	Monthly	Calculated	May through September. See the E. coli Percent Limit section. Enter the result in the DMR on the last day of the month.
Phosphorus, Total	Monthly Avg	1.0 mg/L	3/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	3.35 lbs/day	3/Week	Calculated	January
Phosphorus, Total	Monthly Avg	4.04 lbs/day	3/Week	Calculated	February
Phosphorus, Total	Monthly Avg	3.23 lbs/day	3/Week	Calculated	March
Phosphorus, Total	Monthly Avg	2.91 lbs/day	3/Week	Calculated	April
Phosphorus, Total	Monthly Avg	2.72 lbs/day	3/Week	Calculated	May
Phosphorus, Total	Monthly Avg	3.26 lbs/day	3/Week	Calculated	June

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Total	Monthly Avg	3.12 lbs/day	3/Week	Calculated	July
Phosphorus, Total	Monthly Avg	3.18 lbs/day	3/Week	Calculated	August
Phosphorus, Total	Monthly Avg	3.46 lbs/day	3/Week	Calculated	September
Phosphorus, Total	Monthly Avg	3.28 lbs/day	3/Week	Calculated	October
Phosphorus, Total	Monthly Avg	3.44 lbs/day	3/Week	Calculated	November
Phosphorus, Total	Monthly Avg	3.09 lbs/day	3/Week	Calculated	December
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring only in 2029
Temperature Maximum		deg F	Daily	Continuous	
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 Kjedahl Nitrogen and Total Nitrate + Nitrate Nitrogen.
Chronic WET	Monthly Avg	1.3 TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET section.

Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under "Explanation of Limits and Monitoring Requirements" below. Changes highlighted in the table above.

- **DO and pH**- monitoring frequency increased to the minimum standard frequency.
- **Ammonia-** Weekly average limit in November through March updated.
- **TSS-** Weekly average limit May – October updated to the correct limits that were effective in the -08 permit term.
- **E. coli-** Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.
- **Temperature-** Sample frequency listed as 'daily' as the permittee has a continuous temperature meter and therefore must report all temperature data collected.

- **Total Nitrogen Monitoring (TKN, N02+N03 and Total N)-** Annual monitoring is required in specific quarters as outlined in the permit.
- **Chronic WET-** A Chronic WET limit has been added along with required annual sampling in quarters listed in the permit.

Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo dated **October 29, 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 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. Changes in pH and DO were included to increase sampling to 5/week. Temperature sampling is now listed as 'daily' as the permittee takes daily continuous temperature readings.

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 rotating quarters.

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.

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	Aerobic Digestion	Fecal Coliform	Injection	68
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** If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility						

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)**
Is a priority pollutant scan required? **No** Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

3.1 Sample Point Number: 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	
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 (NH4-N) Total		Percent	Annual	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2026
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2026
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

3.1.1 Changes from Previous Permit:

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

PCB - sampling year updated.

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

3.1.2 Explanation of Limits and Monitoring Requirements

Requirements for disposal, including land application of municipal sludge, are determined in accordance with ch. NR 204, Wis. Adm. Code. Ceiling and high-quality limits for metals in sludge are specified in s. NR 204.07(5), 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 this WPDES permit pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9, Wis. Adm. Code.

4 Schedules

4.1 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
Land Application Management Plan Submittal: Submit an update to the 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.	04/01/2026

4.1.1 Explanation of Schedule

An up-to-date Land Application Management Plan is required that documents how the permittee will manage the land application of biosolids consistent with ch. NR 204, Wis. Adm. Code

Other Comments

None

Attachments

Water Quality Based Effluent Limits dated October 29, 2024

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance

Prepared By: Jennifer Jerich, Wastewater Specialist

Date: 11/6/2024

Revision date post fact check: 11/22/2024

Revision date post public notice:

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: October 29, 2024

TO: Jennifer Jerich – SCR/Horicon

FROM: Sarah Luck – SCR/Fitchburg

SUBJECT: Water Quality-Based Effluent Limitations for the Marshall Wastewater Treatment Facility
WPDES Permit No. WI- WI-0024627-10-0

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 Marshall Wastewater Treatment Facility in Dane County. This municipal wastewater treatment facility (WWTF) discharges to the Maunesha River, located in the Maunesha River Watershed in the Upper 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					2
May – October			11 mg/L 51 lbs/day	11 mg/L	
November - April			22 mg/L 110 lbs/day	22 mg/L	
TSS					3
May – October			11 mg/L	11 mg/L	
November - April			22 mg/L	22 mg/L	
pH	9.0 s.u.	6.0 s.u.			2
Dissolved Oxygen		7.0 mg/L			2
Ammonia Nitrogen					4
April	8.9 mg/L		8.3 mg/L	4.7 mg/L	
May	8.9 mg/L		8.3 mg/L	6.5 mg/L	
June – August	8.9 mg/L		6.0 mg/L	4.7 mg/L	
September	8.9 mg/L		8.3 mg/L	6.9 mg/L	
October	8.9 mg/L		8.3 mg/L	4.7 mg/L	
November – March	8.9 mg/L		**8.9 mg/L**	7.6 mg/L	
Bacteria					5
E. coli				126 #/100 mL geometric mean	
Chloride					6
Phosphorus				1.0 mg/L	2,3
Temperature					7

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
TKN, Nitrate+Nitrite, and Total Nitrogen					8
Chronic WET				1.3 TUc	9

Footnotes:

1. Monitoring only.
2. No changes from the current permit.
3. Additional phosphorus and TSS mass limitations are required in accordance with the waste load allocations specified in the Rock River TMDL:

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Average Total P Effluent Limit (lbs/day)
Jan	50.3	71.0	3.35
Feb	58.6	82.6	4.04
March	50.3	71.0	3.23
April	50.0	70.5	2.91
May	50.3	51*	2.72
June	50.0	51*	3.26
July	50.3	51*	3.12
Aug	50.3	51*	3.18
Sept	50.0	51*	3.46
Oct	50.3	51*	3.28
Nov	50.0	70.5	3.44
Dec	50.3	71.0	3.09

*The TSS mass limit of 51 lbs/day, which was in effect prior to the development of the TMDL, remains effective pursuant to ch. NR 207, Wis. Adm. Code.

4. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
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. Monitoring at a frequency to ensure that 11 samples are available at the next permit issuance.
7. Continued temperature monitoring throughout the permit term is recommended.
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 (NO_3), nitrite (NO_2), and total kjeldahl nitrogen (TKN) (all expressed as N).
9. Annual chronic WET testing is required. The Instream Waste Concentration (IWC) to assess chronic test results is 78%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 75%, 50%, 25% & 12.5%, and the dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the Maunesha River. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).

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

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

PREPARED BY: Sarah Luck _____ Date: October 29, 2024

Sarah Luck
Water Resources Engineer

E-cc: Ashley Brechlin, Wastewater Engineer – SCR/Fitchburg
Diane Figiel, Water Resources Engineer – WY/3
Nate Willis, Wastewater Engineer – WY/3

Attachment #1

Water Quality-Based Effluent Limitations for
Marshall Wastewater Treatment Facility

WPDES Permit No. WI-0024627-10-0

PART 1 – BACKGROUND INFORMATION

Facility Description

The Village of Marshall serves a population of approximately 3,860 people with no significant industrial contributions and no significant anticipated growth. The Village operates a wastewater treatment facility (WWTF) constructed in 1998 providing secondary treatment and nutrient removal. The facility includes: a raw influent lift station, a mechanical bar screen and grit removal, a three-channel extended aeration oxidation ditch, two final clarifiers, ultraviolet disinfection, and step aeration. Phosphorus is removed biologically, and ferric chloride may be added for polishing. Biosolids are digested aerobically, concentrated on a gravity belt thickener and stored in a liquid sludge storage tank prior to land application on Department approved farmland.

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

Existing Permit Limitations

The current permit, which expired on March 31, 2024, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD_5					2
May – October			11 mg/L 51 lbs/day	11 mg/L	
November - April			22 mg/L 110 lbs/day	22 mg/L	
TSS					3
May – October			11 mg/L	11 mg/L	
November - April			22 mg/L	22 mg/L	
pH	9.0 s.u.	6.0 s.u.			2
Dissolved Oxygen		7.0 mg/L			2
Ammonia Nitrogen					-
April	8.9 mg/L		8.3 mg/L	4.7 mg/L	
May	8.9 mg/L		8.3 mg/L	6.5 mg/L	
June – August	8.9 mg/L		6.0 mg/L	4.7 mg/L	
September	8.9 mg/L		8.3 mg/L	6.9 mg/L	
October	8.9 mg/L		8.3 mg/L	4.7 mg/L	
November – March	8.9 mg/L		14 mg/L	7.6 mg/L	
Fecal Coliforms			**656#/100 mL** **geometric mean**	400#/100 mL geometric mean	4
May – September					

Attachment #1

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Phosphorus				1.0 mg/L	3
Temperature					1
Chronic WET					5

Footnotes:

1. Monitoring only.
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. Additional phosphorus and TSS mass limitations are required in accordance with the waste load allocations specified in the Rock River TMDL:

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Average Total P Effluent Limit (lbs/day)
Jan	50.3	71.0	3.35
Feb	58.6	82.6	4.04
March	50.3	71.0	3.23
April	50.0	70.5	2.91
May	50.3	71*, **	2.72
June	50.0	70.5*, **	3.26
July	50.3	71*, **	3.12
Aug	50.3	71*, **	3.18
Sept	50.0	70.5*, **	3.46
Oct	50.3	71*, **	3.28
Nov	50.0	70.5	3.44
Dec	50.3	71.0	3.09

*This is the calculated weekly average TMDL mass limit.
**The existing TSS mass limit of 51 lbs/day should have been retained pursuant to ch. NR 207, Wis. Adm. Code.

4. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7) are included in bold.
5. Two chronic WET tests were required and the IWC was 76%.

Receiving Water Information

- Name: Maunesha River
- Waterbody Identification Code (WBIC): 837500
- 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-Q_{10} and 7-Q_2 values are from USGS for Station #UR56, (USGS gaging station # 05425840), where Outfall 001 is located.
  7-Q_{10} = 1.0 cfs (cubic feet per second)
  7-Q_2 = 3.9 cfs
  90-Q_{10} = 3.3 cfs
  Harmonic Mean Flow = 9.05 cfs

The Harmonic Mean has been estimated based on average flow and the 7-Q_{10} using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7-Q_{10} (cfs)	2.3	2.8	5.8	13	5.5	2.9	1.9	1.5	1.2	1.7	2.4	2.2
7-Q_2 (cfs)	9.5	10.4	28	38	17	10.3	6.7	5.4	5.4	6.7	9.9	9.2

- Hardness = 331 mg/L as $CaCO_3$. This value represents the geometric mean of data from four WET tests conducted by Marshall Wastewater Treatment Facility between 2020 and 2022.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from Koshkonong Creek is used for this evaluation because there is no data available for the Maunesha River. Koshkonong Creek is within the same ecological landscape so ambient water quality characteristics are expected to be similar. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: None.
- Impaired water status: Outfall 001 discharges to the Maunesha River which is listed as impaired for phosphorus. The Maunesha River is in the Rock River basin which has an EPA-approved TMDL that addresses the phosphorus and TSS impairments in the watershed.

Effluent Information

- Flow rate:
  Design annual average = 0.57 MGD (Million Gallons per Day)
  For reference, the actual average flow from April 2019 through September 2024 was 0.37 MGD.
- Hardness = 362 mg/L as $CaCO_3$. This value represents the geometric mean of four samples from June 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 for phosphorus removal.
- Effluent characterization: This facility is categorized as a minor municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus ammonia, chloride, hardness, and phosphorus.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled "MEAN EFFL. CONC.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

Copper Effluent Data

Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)
05/19/23	9.1	06/02/23	9.7	06/16/23	12
05/23/23	17	06/06/23	11	06/20/23	15
05/26/23	11	06/09/23	9.2	06/23/23	15

Attachment #1

Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)
05/30/23	15	06/13/23	18		
1-day P_{99} = 22 µg/L					
4-day P_{99} = 17 µg/L					

Chloride Effluent Data

Sample Date	Chloride (mg/L)
06/13/23	270
06/16/23	290
06/20/23	280
06/23/23	260
Average	275

The following table presents the average concentrations and loadings at Outfall 001 from April 2019 through September 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	2 mg/L*	5 lbs/day
TSS	2 mg/L*	7.4 lbs/day
pH field	7.6 s.u.	
Phosphorus	0.22 mg/L	0.70 lbs/day
Ammonia Nitrogen	0.27 mg/L*	
Dissolved Oxygen	10.2 mg/L	
Fecal Coliform	2 #/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 P_{99}) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q_{10}

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Code, (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q_{10} receiving water low flow to determine if more restrictive effluent

limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

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

Where:

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

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

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

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

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

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

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0.80 cfs, (1-Q_{10} (estimated as 80% of 7-Q_{10})), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Arsenic		340		648.0	129.6	<1.1		
Cadmium	362	45.1		86.1	17.2	<0.19		
Chromium	301	4446		8478.6	1696	<1.1		
Copper	362	52.3		99.7			22	18
Lead	356	365		695.4	139.1	<4.3		
Nickel	268	1080		2060.2	412	1.2		
Zinc	333	345		657.3	131.5	17		
Chloride (mg/L)		757	0.05	1443.7	289	275		290

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

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

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 0.25 cfs (¼ of the 7-Q_{10}), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Arsenic		152.2		195	39.1		
Cadmium	175	3.82		4.90	1.0		
Chromium	301	325.75		418	83.6		
Copper	331	28.83		37.0			17
Lead	331	89.02		114.3	22.9	<4.3	
Nickel	268	120.18		154	30.8	1.2	
Zinc	331	342.87		440	88.0	17	
Chloride (mg/L)		395	0.05	507	101.4	**275****	

* 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.

**Please see chloride discussion below tables.

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 = 2.26 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	1319	263.8	<0.19
Chromium (+3)	3818000	13612535	2722507	<1.1
Lead	140	499	99.8	<4.3
Nickel	43000	153310	30662	1.2

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 2.26 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3	47.4	9.48	<1.1

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.**

Chloride – Only four samples of chloride were collected for during the previous permit term, and the mean of those results (275 mg/L) exceeds 1/5th of the chronic limit of 507 mg/L (101 mg/L). However, since there have been no substantive changes to the operations and loadings at the treatment facility, chloride effluent data from January 2018 through November 2018 is still considered to be representative. Using data from 2018 and 2023 (n=48), the calculated 4-day P_{99} of effluent data (354 mg/L) is below the chronic limit (507 mg/L). Therefore, **no effluent limits are needed. Chloride monitoring is recommended to ensure that 11 sample results are available at the next permit issuance** to meet the data requirements of s. NR 106.85, Wis. Adm. Code.

Mercury – The permit application did not require monitoring for mercury because Marshall 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 are within expected analytical ranges and well below the 17 mg/kg level. The average concentration in the sludge from March 2020 through April 2023 was 0.39 mg/kg, with a maximum reported concentration of 0.61 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 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.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

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

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

Where:

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

The effluent pH data was examined as part of this evaluation. A total of 792 sample results were reported from April 2019 through September 2024. The maximum reported value was 7.9 s.u. (Standard pH Units). The effluent pH was 7.9 s.u. or less 99% of the time. The 1-day P_{99}, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.0 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 7.9 s.u. Therefore, a value of 7.9 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 7.9 s.u. into the equation above yields an ATC = 10.13 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-Q_{10} receiving water low flow if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits shall apply.

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-Q_{10} (estimated as 80 % of 7-Q_{10}) and the 2×ATC approach are shown below.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	20
1-Q_{10}	19

The 1-Q_{10} method yields the most stringent limits for Marshall Wastewater Treatment Facility.

This limit is greater than the current daily maximum limit of 8.9 mg/L. If Marshall Wastewater Treatment Facility would like to request an increase to the existing permit limits an assessment of their effluent data consistent with the requirements of ss. NR 207.04(1)(a) and (c), Wis. Adm. Code, must be provided. This evaluation is on a parameter-by-parameter basis and includes consideration of operations, maintenance, and temporary upsets. Without a demonstration of need for a higher limit in accordance with s. NR 207.04, Wis. Adm. Code, the current limits must be continued in the reissued permit.

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 Limits Using 1-Q_{10} – Warm Water Sport Fish

Effluent pH s.u.	Ammonia Limit mg/L	Effluent pH s.u.	Ammonia Limit mg/L	Effluent pH s.u.	Ammonia Limit mg/L
6.0 < pH ≤ 6.1	103	7.0 < pH ≤ 7.1	63	8.0 < pH ≤ 8.1	13
6.1 < pH ≤ 6.2	101	7.1 < pH ≤ 7.2	56	8.1 < pH ≤ 8.2	11
6.2 < pH ≤ 6.3	99	7.2 < pH ≤ 7.3	50	8.2 < pH ≤ 8.3	8.9
6.3 < pH ≤ 6.4	96	7.3 < pH ≤ 7.4	44	8.3 < pH ≤ 8.4	7.3
6.4 < pH ≤ 6.5	93	7.4 < pH ≤ 7.5	38	8.4 < pH ≤ 8.5	6.0
6.5 < pH ≤ 6.6	89	7.5 < pH ≤ 7.6	32	8.5 < pH ≤ 8.6	5.0

Attachment #1

Effluent pH s.u.	Ammonia Limit mg/L	Effluent pH s.u.	Ammonia Limit mg/L	Effluent pH s.u.	Ammonia Limit mg/L
6.6 < pH ≤ 6.7	85	7.6 < pH ≤ 7.7	28	8.6 < pH ≤ 8.7	4.1
6.7 < pH ≤ 6.8	80	7.7 < pH ≤ 7.8	23	8.7 < pH ≤ 8.8	3.4
6.8 < pH ≤ 6.9	75	7.8 < pH ≤ 7.9	19	8.8 < pH ≤ 8.9	2.9
6.9 < pH ≤ 7.0	69	7.9 < pH ≤ 8.0	16	8.9 < pH ≤ 9.0	2.4

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)
The weekly and monthly average ammonia nitrogen limits calculation from 2004 do not change because there have been no changes in the effluent and receiving water flow rates. The calculations from the 2004 WQBEL memo are shown in Attachment #3.

Effluent Data
The following table evaluates the statistics based upon ammonia data reported from April 2019 through September 2024.

Ammonia Nitrogen Effluent Data

mg/L	April	May	June - August	September	October	November - March
1-day P_{99}	1.12	1.45	0.73	0.39		6.99
4-day P_{99}	0.60	0.81	0.45	0.24		4.01
30-day P_{99}	0.25	0.34	0.20	0.10		1.67
Mean*	0.08	0.09	0.04	0.02	0.02	0.63
Std	0.43	0.65	0.37	0.25		2.10
Sample size	72 (50 ND)	72 (53 ND)	216 (151 ND)	72 (58 ND)	60 (50 ND)	300 (121 ND)
Range	<0.03 - 1.48	<0.03 - 2.41	<0.03 - 2.67	<0.03 - 0.97	<0.03 - 0.59	<0.03 - 10.17

*"<" 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.

Reasonable Potential
Reasonable potential is determined by calculating 99th upper percentile (or P_{99}) values for ammonia effluent data, shown in the table above, and comparing those to the calculated limits for the respective month or month ranges. Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits. However, since the permit currently has daily maximum, weekly, and monthly limits year-round, **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 following ammonia nitrogen limitations are recommended. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

Attachment #1

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
April	8.9	8.3	4.7
May	8.9	8.3	6.5
June – August	8.9	6.0	4.7
September	8.9	8.3	6.9
October	8.9	8.3	4.7
November – March	8.9	**8.9**	7.6

An additional limit to meet the requirements in s. NR 106.07, Wis. Adm Code, is denoted in bold text above.

Expression of Limits

Additional limitations are necessary to comply with the expression of limits in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code.

The methods for calculating limitations for continuous discharges subject to ch. NR 210, Wis. Adm. Code, 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.

Therefore, **a weekly average limit of 8.9 mg/L during November through March, equal to the daily maximum limit, is required** in place of the previous weekly average limit of 14 mg/L since 8.9 mg/L is more restrictive.

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 Marshall'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
Marshall Wastewater Treatment Facility has monitored effluent *E. coli* from May through September 2024 for a total of 20 results. A geometric mean of 126 counts/100 mL was not exceeded; all results were 0 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 AND TOTAL SUSPENDED SOLIDS

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 Marshall Wastewater Treatment Facility currently has a limit of 1.0 mg/L, this limit should be retained in the reissued permit.

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

Phosphorus Water Quality-Based Effluent Limits (WQBEL)
Revisions to administrative rules regulating phosphorus took effect on December 1, 2010. These rule revisions include additions to ch. NR 102 (s. NR 102.06), Wis. Adm. Code, which establish phosphorus standards for surface waters. Revisions to ch. NR 217 (s. NR 217, Subchapter III), Wis. Adm. Code, establish procedures for determining water quality-based effluent limits for phosphorus, based on the applicable standards in ch. NR 102, Wis. Adm. Code.

The Department has developed a TMDL for the Upper and Lower Rock River Basins. The US EPA approved the Rock River TMDL on September 28, 2011. The document, along with the referenced appendices can be found at: https://dnr.wisconsin.gov/topic/TMDLs/RockRiver/index.html.

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. Since the Rock River Basin TMDL was developed to protect and improve the water quality of phosphorus-impaired waters within the basin and the discharge from Marshall Wastewater Treatment Facility is to the Maunesha River, which is classified as phosphorus-impaired, the TMDL-based limit can be included in the WPDES permit absent the s. NR 217.13, Wis. Adm. Code, WQBEL. This limit should be expressed in a manner consistent with the wasteload allocation and assumptions of the TMDL. If the Department determines the nonpoint source load allocation has not been substantially reduced, the Department may include the s. NR 217.13, Wis. Adm. Code, WQBEL unless these reductions are likely to occur.

Phosphorus TMDL Limits
The monthly average total phosphorus (Total P) effluent limits in lbs/day are calculated based on the monthly phosphorus wasteload allocation (WLA) given in pounds per month as suggested in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* dated April 15, 2013. The WLA for this facility is found in the *Total Maximum Daily Loads for Total*

Phosphorus and Total Suspended Solids in the Rock River Basin report dated July 2011. These limits are equivalent to concentrations ranging from 0.57 mg/L to 0.85 mg/L at the facility design flow of 0.57 MGD. **Monthly average mass effluent limits in accordance with the following table are recommended for this discharge.**

Total Phosphorus Effluent Limitations

Month	Monthly Total P WLA[1] (lbs./month)	Days Per Month	Monthly Ave Total P Effluent Limit[2] (lbs./day)
Jan	103.9	31	**3.35**
Feb	113.17	28	**4.04**
March	100.13	31	**3.23**
April	87.24	30	**2.91**
May	84.31	31	**2.72**
June	97.91	30	**3.26**
July	96.76	31	**3.12**
Aug	98.45	31	**3.18**
Sept	103.68	30	**3.46**
Oct	101.56	31	**3.28**
Nov	103.18	30	**3.44**
Dec	95.85	31	**3.09**

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

Phosphorus Effluent Data

For informational purposes, the following table lists the statistics for total phosphorus in the discharge as concentration and mass from April 2019 through September 2024.

Total Phosphorus Effluent Data

	mg/L	lbs/day
1-day P_{99}	0.96	3.44
4-day P_{99}	0.54	1.88
30-day P_{99}	0.32	1.05
Mean	0.22	0.70
Std	0.19	0.70
Sample size	795	795
Range	0.04 - 2.26	0.09 - 8.46

TSS Concentration Limits

The TSS concentration limits currently in effect are recommended to continue.

TSS TMDL Limits

Weekly average and monthly average mass effluent limitations should be included in the permit according to the table below in addition to the weekly average and monthly average concentration limits and the existing weekly average TSS mass limit of 51 lbs/day effective from May – October.

For reference, the mass limits shown are equivalent to concentrations ranging from 10.3 – 12.3 mg/L as a monthly average and 14.8 – 17.4 mg/L as a weekly average at the design annual average flow of 0.57 MGD.

Total Suspended Solids Effluent Limitations

Month	Monthly TSS WLA[1] (tons/month)	Days Per Month	Monthly Ave TSS Effluent Limit[2] (lbs/day)	Weekly Ave TSS Effluent Limit[3] (lbs/day)
Jan	0.78	31	**50.3**	**71.0**
Feb	0.82	28	**58.6**	**82.6**
March	0.78	31	**50.3**	**71.0**
April	0.75	30	**50.0**	**70.5**
May	0.78	31	**50.3**	**71.0[4]**
June	0.75	30	**50.0**	**70.5[4]**
July	0.78	31	**50.3**	**71.0[4]**
Aug	0.78	31	**50.3**	**71.0[4]**
Sept	0.75	30	**50.0**	**70.5[4]**
Oct	0.78	31	**50.3**	**71.0[4]**
Nov	0.75	30	**50.0**	**70.5**
Dec	0.78	31	**50.3**	**71.0**

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.
4-The TSS mass limit of 51 lbs/day from May-October, which was already in effect prior to the TMDL development, should be retained in the permit since it is more restrictive.

Since Marshall Wastewater Treatment Facility is meeting the current wasteload allocation, the limits will not be recalculated at this time.

TSS Effluent Data

Limits based on a WLA should be given in a permit regardless of reasonable potential. However, for informational purposes, the following table summarizes effluent TSS monitoring data from April 2019 through September 2024.

Total Suspended Solids Effluent Data

	mg/L	lbs/day
1-day P_{99}	7	29.0
4-day P_{99}	5	16.5
30-day P_{99}	3	10.2
Mean	2*	7.4
Std	1	5.8
Sample size	792 (204 ND)	792
Range	<2 - 11	0 - 34.3

*"<" 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.

Attachment #1

PART 6 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

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

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

The table below summarizes the maximum temperatures reported during monitoring from April 2019 through September 2024.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	51	52	55	91
FEB	49	51	55	84
MAR	51	51	56	86
APR	55	55	56	84
MAY	64	64	67	87
JUN	71	71	78	87
JUL	72	72	83	87
AUG	72	73	85	89
SEP	72	72	76	86
OCT	69	70	**63**	85
NOV	59	61	**52**	89
DEC	54	54	**54**	88

Reasonable Potential

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

- An acute limit for temperature is recommended for each month in which the representative daily maximum effluent temperature for that month exceeds the acute WQBEL. The representative daily maximum effluent temperature is the greater of the following:
  (a) The highest recorded representative daily maximum effluent temperature

(b) The projected 99th percentile of all representative daily maximum effluent temperatures

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

Comparing the representative highest effluent temperature to the calculated effluent limits determines the reasonable potential of exceeding the effluent limits. Based on this analysis, weekly average temperature maximum limits are necessary for the months of October, November, and December. However, Marshall Wastewater Treatment Facility completed a dissipative cooling study in accordance with NR 106.59, Wis. Adm. Code, which was approved on 09/24/2020. The study, conducted on October 18, 2019 and November 22, 2019, showed the temperature was above the sub-lethal water quality criteria at the outfall, but that the temperature was below the sub-lethal water quality criteria within 10-60 feet downstream. The maximum stream width where the temperature increase was noticeable was one-third of the total stream width which provides a sufficient zone of free passage of more than 50% of the stream width. The facility certified on their permit application that there have been no substantial changes in operation or thermal loadings since the study was conducted. Therefore, **temperature limits are not required, but continued temperature monitoring throughout the permit term is recommended**. The complete thermal table used for this calculation is in Attachment #4.

Future WPDES Permit Reissuance

Dissipative cooling (DC) requests must be re-evaluated every permit reissuance. The permittee is responsible for submitting an updated DC request prior to permit reissuance. Such a request must either include:

a) A statement by the permittee that there have been no substantial changes in operation of, or thermal loadings to, the treatment facility and the receiving water; or
b) New information demonstrating DC to supplement the information used in the previous DC determination. If significant changes in operation or thermal loads have occurred, additional DC data must be submitted to the Department.

PART 7 – 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 78%**, shown in the WET Checklist summary below, was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

Q_e = annual average flow = 0.57 MGD = 0.884 cfs
f = fraction of the Q_e withdrawn from the receiving water = 0
Q_s = ¼ of the 7-Q_{10} = 1.0 cfs ÷ 4 = 0.25 cfs

- 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 July 1, 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. Data collected before July 1, 2005 does not show repeated toxicity that was never resolved and is not the only data that is available.

WET Data History

Date Test Initiated	Acute Results LC_{50} %				Chronic Results IC_{25} %				Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	*C. dubia*	Fathead Minnow	Pass or Fail?	Use in RP?	
08/07/2008	>100	>100	Pass	No	>100	>100	Pass	No	1
10/14/2014	-	-	-	-	>100	>100	Pass	Yes	
08/09/2016	-	-	-	-	>100	>100	Pass	Yes	
04/10/2018	-	-	-	-	>100	>100	Pass	Yes	
04/28/2020	-	-	-	-	89.2	22.7	Fail	Yes	
06/23/2020	-	-	-	-	84.0	>100	Pass	Yes	Retest
07/07/2020	-	-	-	-	>100	>100	Pass	Yes	Retest
07/19/2022	-	-	-	-	>100	>100	Pass	Yes	

Footnotes:

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

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

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

  Acute Reasonable Potential: No data representative data available to assess reasonable potential; **no acute WET limit is required.**

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

Chronic WET Limit Parameters

TUc (maximum) $100/IC_{25}$	**B** (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
100/22.7 = 4.4	3.8 Based on 2 detects	78%

[(TUc effluent) (B)(IWC)] = 13 > 1.0

Therefore, **reasonable potential is shown a chronic WET limit** using the procedures in s. NR 106.08(6) and representative data from 2014 through 2022.

Expression of WET limits

Chronic WET limit = [100/IWC] TU_c = [100/78] TU_c = **1.3 TU_c expressed as a monthly average**

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

Attachment #1

WET Checklist Summary

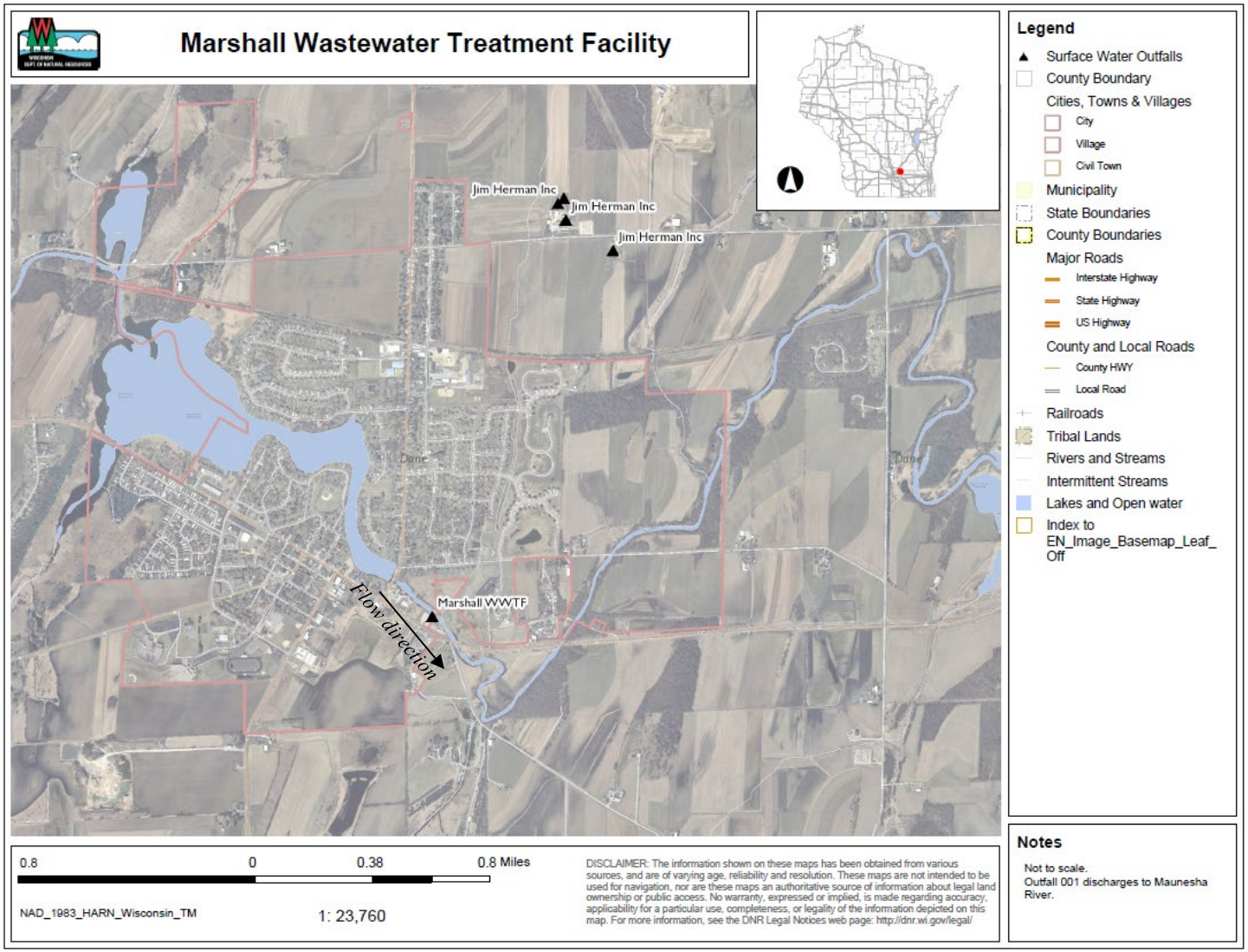
	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 78% **15 Points**
Historical Data	No tests available to calculate RP. **5 Points**	7 tests used to calculate RP. One test failed. **0 Points**
Effluent Variability	Little variability, no upsets or significant violations, consistent WWTF operations. **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. Chloride, copper, and zinc detected. Additional Compounds of Concern: None. **3 Points**	No reasonable potential for limits based on CTC. Ammonia nitrogen limit carried over from the current permit. Chloride, copper, 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**	All additives 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**	**24 Points**
Recommended Monitoring Frequency (from Checklist):	None.	1x yearly during the permit term.
Limit Required?	No	Limit = 1.3 TU_c
TRE Recommended? (from Checklist)	No	No

- After consideration of the guidance provided in the Department's *WET Program Guidance Document* (2022) and other information described above, **no acute WET and annual chronic WET tests are recommended** in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).

- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, a chronic WET limit is required. **The chronic WET limit shall be expressed as 1.3 TU_c as a monthly average** in the effluent limits table of the permit. **A minimum of annual chronic monitoring is required** because federal regulations in 40 CFR Part 122.44(i) require that monitoring occur at least once per year when a limit is present.

Attachment #2

Site Map



Attachment #3

Ammonia Nitrogen Calculations from the WQBEL Memo Dated July 27, 2004

AMMONIA (as N) LIMITS	**2004 APPROACH**						
CLASSIFICATION:	**WARMWATER SPORTFISH, WARMWATER FORAGE FISH COMMUNITY**						
EFFLUENT FLOW (mgd):	0.58						
EFFLUENT FLOW (cfs):	0.897						
MAX. EFFLUENT pH (s.u.):	7.90						
BACKGROUND INFORMATION:							
	summer	***winter***	***Jan***	***Feb***	***Mar***	***Apr***	***May***
7Q10 (cfs)	1.15	1.15	1.15	1.15	1.15	1.15	1.15
7Q2 (cfs)	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Ammonia (mg/L)	0.07	0.17	0.17	0.17	0.09	0.09	0.09
Temperature (deg C)	23	3	3	3	7	9	17
pH (std. Units)	8.21	7.97	7.97	7.97	7.97	7.97	8.21
% of river flow used:	100	25	25	25	25	25	100
Reference weekly flow:	1.15	0.2875	0.2875	0.2875	0.2875	0.2875	1.15
Reference monthly flow:	3.145	0.78625	0.78625	0.78625	0.78625	0.78625	3.145
CRITERIA (in mg/L):							
4-day Chronic (@ backgrd. pH):							
early life stages present	2.55	6.35	6.35	6.35	6.35	6.35	3.76
early life stages absent	2.55	10.31	10.31	10.31	10.31	9.06	3.76
30-day Chronic (@ backgrd. pH)							
early life stages present	1.02	2.54	2.54	2.54	2.54	2.54	1.50
early life stages absent	1.02	4.12	4.12	4.12	4.12	3.63	1.50
EFFLUENT LIMITS (in mg/L):							
Weekly average							
early life stages present	5.74	8.33				8.36	8.46
early life stages absent		13.56	13.56	13.56	13.59		
Monthly average							
early life stages present	4.36	4.62				4.69	6.46
early life stages absent		7.59	7.59	7.59	7.66		

AMMONIA (as N) LIMITS	Marshall Continued						
CLASSIFICATION:	**WARMWATER SPORTFISH, WARMWATER FORAGE FISH COMMUNITY**						
EFFLUENT FLOW (mgd):	0.58						
EFFLUENT FLOW (cfs):	0.897						
MAX. EFFLUENT pH (s.u.):	7.90						
BACKGROUND INFO.	***June***	***July***	***Aug***	***Sept***	***Oct***	***Nov***	***Dec***
7Q10 (cfs)	1.15	1.15	1.15	1.15	1.15	1.15	1.15
7Q2 (cfs)	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Ammonia (mg/L)	0.07	0.07	0.07	0.1	0.1	0.1	0.17
Temperature (deg C)	21	23	22	16	9	7	3
pH (std. Units)	8.21	8.21	8.21	8.21	8.21	7.97	7.97
% of river flow used:	100	100	100	100	25	25	25
Reference weekly flow:	1.15	1.15	1.15	1.15	0.2875	0.2875	0.2875
Reference monthly flow:	3.145	3.145	3.145	3.145	0.78625	0.78625	0.78625
CRITERIA (in mg/L):							
4-day Chronic (@ backgrd. pH):							
early life stages present	2.90	2.55	2.72	4.01	4.41	6.35	6.35
early life stages absent	2.90	2.55	2.72	4.01	6.30	10.31	10.31
30-day Chronic (@ backgrd. pH)							
early life stages present	1.16	1.02	1.09	1.60	1.76	2.54	2.54
early life stages absent	1.16	1.02	1.09	1.60	2.52	4.12	4.12
EFFLUENT LIMITS (in mg/L):							
Weekly average							
early life stages present	6.54	5.74	6.12	9.02			
early life stages absent					8.28	13.58	13.56
Monthly average							
early life stages present	4.99	4.36	4.66	6.87			
early life stages absent					4.64	7.65	7.59

Early life stages present limits apply during the months of April through September and the early life stages absent limits apply to October through March because burbot are not expected to be present in the receiving water.

Recommended Ammonia Nitrogen Effluent Limits (mg/L)		
Nov. – March	14 mg/L weekly avg.	7.6 mg/L monthly avg.
April	8.3 mg/L weekly avg.	4.7 mg/L monthly avg.
May	8.3 mg/L weekly avg.	6.5 mg/L monthly avg.
June – August	6 mg/L weekly avg.	4.7 mg/L monthly avg.
September	8.3 mg/L weekly avg.	6.9 mg/L monthly avg.
October	8.3 mg/L weekly avg.,	4.7 mg/L monthly avg.