Village of Star Prairie Public Noticed Permit Fact Sheet

General Information

Permit Number	WI-0060984-11-0
Permittee	Village of Star Prairie, Village Hall PO Box 13, Star Prairie, WI 54026
Permitted Facility	Star Prairie Wastewater Treatment Facility, 603 Hill Ave., Star Prairie, WI
Permit Term	September 01, 2026 to June 30, 2031
Discharge Location	NE ¼ of the SW ¼, Section 12, T31N, R18W, Township of Star Prairie, St. Croix County, WI
Receiving Water	the surface waters of the Apple River, in the Lower Apple River Watershed, St. Croix River Basin, in St. Croix County
Stream Flow ($Q_{7,10}$)	53 cfs
Stream Classification	Cold water community, non-public water suppl
Discharge Type	Existing, Continuous
Annual Average Design Flow (MGD)	0.116 MGD
Industrial or Commercial Contributors	None
Plant Classification	A4 - Ponds, Lagoons and Natural Systems; D - Disinfection; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The Village of Star Prairie operates a wastewater treatment plant with an annual average daily design flow of 0.116 million gallons per day (MGD). The actual annual average flow in 2025 was 0.067 MGD. Wastewater is treated with three aerated ponds and a polishing pond, followed by seasonal disinfection via ultraviolet light May-September prior to discharge to the Apple River. No significant operational changes occurred during the last term.

Substantial Compliance Determination

Enforcement During Last Permit: While there were no enforcement actions this permit term, Star Prairie WWTF had some missing data, exceedance, and late report issues that have been addressed. After a desk top review of all discharge monitoring reports, land application reports, compliance schedules, and a compliance inspection on August 27, 2025, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Adebowale Adesanwo on 05/14/2026.

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)**
702	0.077 MGD (2025)	Representative influent samples shall be collected at the influent manhole at the aerated ponds. Influent flow shall be monitored at the influent manhole at the WWTF.
003	0.067 MGD (2025)	Representative effluent samples shall be collected at the effluent discharge structure prior to discharge to the Apple River. Flow monitoring shall occur in the disinfection building.
002	Sludge has not been removed from the ponds and landspread since 2002.	Representative composited lagoon sludge samples shall be collected in 2027 and monitored for the parameters as listed in the table below. If the permittee plans to remove sludge, they shall monitor sludge for Lists 1, 2, 3 & 4, PFAS and Radium-226 prior to land application. The Department shall be notified at least 30 days in advance of sludge removal so that appropriate monitoring forms can be provided. Approval of land application sites must be completed prior to sludge removal.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 702- 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	2/Week	24-Hr Comp	
Suspended Solids, Total		mg/L	2/Week	24-Hr Comp	

Changes from Previous Permit:

Influent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit: the sample frequency for flow has been changed from “continuous” to “daily” for eDMR reporting purposes,

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: 003- EFFLUENT TO APPLE RIVER

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

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
	Mean - Monthly				May - Sept
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit & monitoring apply May - Sept. See the E. coli Percent Limit section in permit. Enter the result in the DMR on the last day of the month.
Phosphorus, Total		mg/L	2/Week	Grab	See Lake St. Croix TMDL section below & in permit.
Phosphorus, Total		lbs/month	Monthly	Calculated	
Phosphorus, Total		lbs/yr	Annual	Total Annual	
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	Grab	Monitoring required annually in specific quarters. See Nitrogen Series Monitoring section in permit.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	Grab	
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Monitoring required annually in specific quarters. See Nitrogen Series Monitoring section in permit. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Acute WET		TUa	See Listed Qtr(s)	Grab	See WET testing section in permit for specific quarters monitoring is required

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: 1) the sample frequency for flow has been changed from "continuous" to "daily" for eDMR reporting purposes, 2) Acute WET testing added twice during the permit term, 3) an increase in the pH monitoring frequency from weekly to 5/week, and 4) the sample type for the total nitrogen series has been changed from 24 hour flow proportional composite to grab.

Explanation of Limits and Monitoring Requirements

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. At this time, using the criteria mentioned, the only frequency change is an increase in pH monitoring from weekly to 5/week.

Limits were determined for Star Prairie's existing discharge to the Apple River using chs. NR 102, 104, 105, 106, 207, 210, 212 and 217 of the Wisconsin Administrative Code (where applicable). For additional information on any of the limits see the April 6, 2026 memo from Ben Hartenbower to Holly Heldstab titled "Water Quality-Based Effluent Limitations for the Star Prairie Wastewater Treatment Facility WPDES Permit No. WI-0060984".

MUNICIPAL EFFLUENT LIMITS – In accordance with the federal regulation 40 CFR 122.45(d), and to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, limits in this permit are to be expressed as weekly average and monthly average limits whenever practicable.

Ammonia: Water quality-based effluent limitations were evaluated for Ammonia Nitrogen based upon water quality criteria in ch. NR 105 (as revised March 2004), including acute toxicity criteria (ATC) and chronic toxicity criteria (CTC). Effluent limitations for ammonia are calculated using the procedures in s. NR 106.32, Wis. Adm. Code and are shown in the WQBEL memo dated 10/27/2025 referenced above. In addition to weekly and monthly average ammonia, daily maximum ammonia limits that vary with effluent pH apply year-round. See table below for more information. Monitoring for pH shall occur on the same day total ammonia (NH3-N) sampling occurs.

VARIABLE DAILY MAXIMUM AMMONIA LIMITS

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

Phosphorus Requirements and the Lake St. Croix Total Maximum Daily Load (TMDL): Phosphorus requirements are based on the Phosphorus Rules that became effective 12/1/2010 as detailed in NR 102 Water Quality Standards and NR 217 Effluent Standards and Limitations for Phosphorus. The discharge is below the 150 lb/month threshold of NR 217. 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 phosphorus mass limit in the permit is based on the Total Maximum Daily Load (TMDL) that was developed to address phosphorus water quality impairments for Lake St. Croix and approved by the EPA on August 8, 2012. For the reasons explained in the April 30, 2012 paper entitled 'Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin', WDNR has determined that it is impracticable to express the phosphorus WQBEL for the permittee as daily maximum or weekly average values

TMDLs establish Waste Load Allocations (WLAs) for point source dischargers and determines the maximum amounts of phosphorus that can be discharged and still protect water quality. The Village of Star Prairie is included in a group of permitted facilities subject to an aggregate phosphorus wasteload allocation of 6,932 pounds per year (3151 kg/year) under the Lake St. Croix Total Maximum Daily Load (TMDL) report. The Village will be considered in compliance with its Lake St. Croix TMDL allocation if the phosphorus discharged from the facility is less than the permittee's individual

allocation of 1,640 pounds per year (745 kg/year) OR the total annual loading from all permittees in the aggregate category is less than the aggregate allocation. For example, if the Village exceeds its individual allocation but the aggregate allocation is not exceeded, the Village is still in compliance with this permit.

- Cumulative phosphorus loads from eligible dischargers will be evaluated for compliance with the aggregate loading caps.
- Trends indicating probability of future exceedance of the aggregate loading cap (i.e. aggregate load ≥ 85% of the aggregate WLA) will trigger a data evaluation process to identify the cause for the increasing phosphorus loading trend.
- When trends indicate the aggregate loading is approaching the aggregate allocation, permits for the individual discharger (or dischargers) exceeding their individual share of the aggregate loading cap will be evaluated for development of water quality-based effluent limits consistent with the individual wasteload allocations established by the TMDL.
- Any annual phosphorus loads incorporated into individual or general permits as WQBELs will be subtracted from the aggregate loading cap. The remaining dischargers will continue to share in the remaining portion of the aggregate loading cap.
- Calculations needed to determine compliance with the wasteload allocation are as follows:

  Total Monthly Discharge = monthly average concentration (mg/L) x total flow for the month (MG/month) x 8.34.

  Total Annual Discharge = sum of total monthly discharges for the calendar year.

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 permit was drafted, the department has determined the permittee does not need to sample for PFOS or PFOA as part of this permit reissuance. The department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	**Sludge Class (A or B)**	**Sludge Type (Liquid or Cake)**	**Pathogen Reduction Method**	**Vector Attraction Method**	**Reuse Option**	**Amount Reused/Disposed (Dry Tons/Year)**
002	B	Liquid	Sludge was not removed from the pond last permit term and is not anticipated this permit term.			
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, therefore, special monitoring and recycling conditions are included in the permit to track any potential problems in land application sludge from this facility						
Is a priority pollutant scan required? No						

3.1 Sample Point Number: 002- STABILIZATION POND SLUDGE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Once	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Once	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Once	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Once	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Once	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Once	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Once	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Once	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Once	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Once	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Once	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Once	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Once	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Once	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Once	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Once	Composite	
Nitrogen, Total Kjeldahl		Percent	Per Application	Composite	
Nitrogen, Ammonium (NH4-N) Total		Percent	Per Application	Composite	
Phosphorus, Total		Percent	Per Application	Composite	
Phosphorus, Water Extractable		% of Tot P	Per Application	Composite	
Potassium, Total Recoverable		Percent	Per Application	Composite	
Radium 226 Dry Wt		pCi/g	Once	Composite	
PFOA + PFOS		ug/kg	Once	Calculated	Report the sum of PFOA and PFOS. See PFAS

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					Permit Sections for more information.
PFAS Dry Wt			Once	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

Changes from Previous Permit

Sludge limitations and monitoring requirements were evaluated for this permit term and the following changes described below were made from the previous permit:

List 2 Nutrient monitoring – Monitoring for list 2 (nutrients) is highly recommended at the same time as the monitoring of List 1 (metals) in year 2 of the permit. Results will assist in the determination of the acres needed for land application of sludge should it be necessary.

Change in form submittal – In prior permit reissuances when it has been noted in the application that sludge would not be removed during the permit term, the department required sampling during the second year of the permit term and the sludge characteristic report (3400-049) would be generated only during that year. Due to moving to electronic submittal of forms via Switchboard, forms 3400-049 ("Characteristics Report"), 3400-052 ("Other Methods of Disposal") and 3400-055 ("Annual Land Application") will now be generated by the department and the permittee will be required to submit all three reports each year of the permit term. This change was adopted to provide the permittee flexibility because many lagoon desludging projects can be unexpected, are delayed or staggered over multiple years. Additionally, it is used to officially report that no land application of sludge has occurred, and annual submittal of the forms is required per the standard requirements section.

PFAS – Monitoring for PFAS has been added once during the permit term pursuant s. NR 204.06(2)(b)9., Wis. Adm. Code.

Radium 226 - Addition of radium 226 monitoring because there was a sample result from the public drinking water supply monitoring conducted on 01/24/2021 of 2.44 piC/L

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). Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7) for vector attraction requirements. Radium requirements are addressed in s. NR 204.07(3)(n).

PFAS- The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA has developed a draft risk assessment to determine future land application rates and released this risk assessment in January of 2025. The department is evaluating this new information. Until a decision is made, the "Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS" should be followed

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 Lagoon Sludge Management Plan

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

Explanation of Schedule: If the lagoons are to be de-sludged during this permit term, a management plan is needed to show compliance with ch NR 204, Wis. Adm. Code that clearly explains how the sludge will be safely removed, what contingencies are in place, the type of equipment that will be used and how the sludge will be land applied to ensure the proper precautions are in place to prevent any negative impacts to surface water or groundwater.

Other Comments

None

Attachments

- April 6, 2026 memo from Ben Hartenbower to Holly Heldstab titled “Water Quality-Based Effluent Limitations for the Star Prairie Wastewater Treatment Facility WPDES Permit No. WI-0060984”.

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance

Prepared By: Holly Heldstab, Wastewater Specialist **Date:** 07/02/2026

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: April 6, 2026

TO: Holly Heldstab – WCR/Eau Claire

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Water Quality-Based Effluent Limitations for the Star Prairie Wastewater Treatment Facility WPDES Permit No. WI-0060984

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 Star Prairie Wastewater Treatment Facility in St. Croix County. This municipal wastewater treatment facility (WWTF) discharges to the Apple River, located in the Lower Apple River Watershed in the St. Croix River Basin. This discharge is included in the Lake St. Croix Basin (LSCB) Total Maximum Daily Load (TMDL) as approved by EPA on 08/08/2012. 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 003:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Annual Total	Footnotes
Flow Rate						1,2
BOD_5			45 mg/L	30 mg/L		1,3
TSS			45 mg/L	30 mg/L		1,3
pH	9.0 s.u.	6.0 s.u.				1
Ammonia	Variable		**108 mg/L**	**108 mg/L**		4,5
E. coli May - September				126 #/100 mL geometric mean		6
Phosphorus TMDL Limit					1640 lbs/year	7
TKN, Nitrate+Nitrite, and Total Nitrogen						8
Acute WET						9,10

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. These limits are based on the Cold Water (CW) community of the immediate receiving water as described in s. NR 210.05(1), 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. The variable daily maximum ammonia nitrogen limit table corresponding to effluent pH values.

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
$6.0 \leq pH \leq 6.1$	108	$7.0 < pH \leq 7.1$	66	$8.0 < pH \leq 8.1$	14
$6.1 < pH \leq 6.2$	106	$7.1 < pH \leq 7.2$	59	$8.1 < pH \leq 8.2$	11
$6.2 < pH \leq 6.3$	104	$7.2 < pH \leq 7.3$	52	$8.2 < pH \leq 8.3$	9.4
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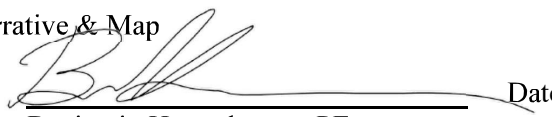
$6.6 < pH \leq 6.7$	89	$7.6 < pH \leq 7.7$	29	$8.6 < pH \leq 8.7$	4.4
$6.7 < pH \leq 6.8$	84	$7.7 < pH \leq 7.8$	24	$8.7 < pH \leq 8.8$	3.7
$6.8 < pH \leq 6.9$	78	$7.8 < pH \leq 7.9$	20	$8.8 < pH \leq 8.9$	3.1
$6.9 < pH \leq 7.0$	72	$7.9 < pH \leq 8.0$	17	$8.9 < pH \leq 9.0$	2.6

6. Additional Limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
7. The phosphorus mass limit is based on the Total Maximum Daily Load (TMDL) for Lake St. Croix to address phosphorus water quality impairments for Lake St. Croix. The TMDL was approved by EPA on August 8, 2012. The Star Prairie Wastewater Treatment Facility is included in a group of permitted facilities subject to an aggregate phosphorus wasteload allocation of 6,932 pounds per year (3151 kg/year) under the Lake St. Croix TMDL report. The discharger will be considered in compliance with its Lake St. Croix TMDL allocation if the phosphorus discharged from the facility is less than the permittee's individual allocation of 1,640 pounds per year (745 kg/year) OR the total annual loading from all permittees in the aggregate category is less than the aggregate allocation.
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. Sections 283.37(5) and 283.55(1)(e), Wis. Stats, and ss. NR 200.065(1)(g) and NR 200.065(1)(h), Wis. Adm. Codes, provide the authority to request this monitoring during the permit term. Total Nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total Kjeldahl nitrogen (TKN) (all expressed as N).
9. Two Acute WET tests are recommended. 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.
10. 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.

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

Attachments (2) – Narrative & Map

PREPARED BY:  Date: 4/6/26

Benjamin Hartenbower, PE
Water Resources Engineer

E-cc: Adebowale Adesanwo, Wastewater Engineer – WCR/Eau Claire
Geisa Bittencourt, Regional Wastewater Supervisor – WCR/Eau Claire
Diane Figiel, Water Resources Engineer – WY/3
Nate Willis, Wastewater Engineer – WY/3
Chris Willger, Water Quality Biologist – WCR/Eau Claire

Attachment #1

Water Quality-Based Effluent Limitations for
The Star Prairie Wastewater Treatment Facility

WPDES Permit No. WI-0060984

Prepared by: Benjamin P. Hartenbower

PART 1 – BACKGROUND INFORMATION

Facility Description

The wastewater treatment plant utilizes a series of aerated ponds and a polishing pond that promote the biological breakdown of the organic constituents of the wastewater. Deactivation of pathogenic organisms in the wastewater is accomplished by the use of a disinfection system using ultraviolet light. After treatment, the effluent from the plant is discharged via a 2,979-foot outfall sewer pipe to the Apple River.

Attachment #2 is a map of the area showing the approximate location of Outfall 003.

Existing Permit Limitations

The current permit, expiring on June 30, 2026, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Annual Total	Footnotes
Flow Rate						1,2
BOD_5			45 mg/L	30 mg/L		1,3
TSS			45 mg/L	30 mg/L		1,3
pH	9.0 s.u.	6.0 s.u.				1
Ammonia Nitrogen	Variable		**108 mg/L**	**108 mg/L**		4,5
Fecal Coliform May - September				400 #/100 mL geometric mean		6
E. coli May - September				126 #/100 mL geometric mean		7
Phosphorus					1640 lbs/year	8
TKN, Nitrate+Nitrite, and Total Nitrogen						2

Footnotes:

1. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
2. Monitoring only.
3. These limits are based on the Cold Water (CW) community of the immediate receiving water as described in s. NR 210.05(1), 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. The variable daily maximum ammonia nitrogen limit table corresponding to effluent pH values.

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

6. A compliance schedule is in the current permit for the *E. coli* limit to replace the Fecal Coliform limit by May 1, 2024.
7. No more than 10 percent of bacteria samples collected in any calendar month may exceed 410 count/100 mL.
8. The phosphorus mass limit is based on the Total Maximum Daily Load (TMDL) for Lake St. Croix to address phosphorus water quality impairments for Lake St. Croix. The TMDL was approved by EPA on August 8, 2012. The Star Prairie Wastewater Treatment Facility is included in a group of permitted facilities subject to an aggregate phosphorus wasteload allocation of 6,932 pounds per year (3151 kg/year) under the Lake St. Croix TMDL report. The discharger will be considered in compliance with its Lake St. Croix TMDL allocation if the phosphorus discharged from the facility is less than the permittee's individual allocation of 1,640 pounds per year (745 kg/year) OR the total annual loading from all permittees in the aggregate category is less than the aggregate allocation.

Receiving Water Information

- Name: Apple River
- Waterbody Identification Code (WBIC): 2614000
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Cold Water, 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 05341437, at the bridge on Cty HH, in the Apple River, where Outfall 003 is located.

  7-Q_{10} = 53 cubic feet per second (cfs)

  7-Q_2 = 100 cfs

  Harmonic Mean Flow = 150 cfs using a drainage area of 422 mi^2

  The Harmonic Mean has been estimated based on average flow and the 7-Q_{10} using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).
- Hardness = 111 mg/L as $CaCO_3$. This value represents the geometric mean of hardness from the Lower Apple River Watershed from 10/23/1990 to 04/03/2012 (n = 33).
- % 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: Chloride data is from Lower Apple River Watershed. Metals data from the Tamarack River (MN) at Cloverton are used in this evaluation because there is no data available for the Apple River. The Tamarack River (MN) 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: Amery WWTF and Somerset WWTF also discharge to the Apple River, however they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: This discharge is located within the Lake St. Croix TMDL for phosphorus.

Effluent Information

- Flow Rate(s):
  Annual Average = 0.116 MGD (Million Gallons per Day)
  For reference, the actual average flow from July 2021 to January 2026 was 0.067 MGD.
- Hardness = 190 mg/L as $CaCO_3$. This value represents the geometric mean of four samples collected in July to November 2025 which were reported in 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).
- Wastewater source: Domestic wastewater.
- Water supply: Star Prairie Waterworks
- Additives: None.
- 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 chloride and hardness. The permit-required monitoring for Ammonia Nitrogen and Phosphorus from July 2021 to January 2026 is used in this evaluation.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2, in the column titled "MEAN EFFL. CONC.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

Effluent Data for Outfall 003

Sample Date	Copper µg/L	Sample Date	Chloride mg/L
07/23/2025	5	07/30/2025	63
07/30/2025	4	08/06/2025	68
08/06/2025	4	08/20/2025	67
08/20/2025	4	08/27/2025	69
08/27/2025	3		
09/03/2025	5		
09/08/2025	4		
09/11/2025	4		
11/12/2025	4		
11/19/2025	4		
11/26/2025	5		

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Sample Date	Copper µg/L	Sample Date	Chloride mg/L
1-day P_{99}	6	mean	67
4-day P_{99}	5		

The following table presents the average concentrations and loadings at Outfall 003 from July 2021 to January 2026 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameters with Effluent Limits

	Average Measurement
BOD_5	6 mg/L*
TSS	5 mg/L*
pH	7.80 s.u.
Fecal Coliform	2 #/100 mL**
E. coli	2 #/100 mL**
Ammonia Nitrogen	4.6 mg/L*

*Results below the limit of detection (LOD) were included as zeros in calculation of average.
** The average measurement for bacteria is calculated as a geometric mean. Values reported below the LOD are replaced with a value of 1 for the calculation of the geometric mean.

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.

Attachment #1

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

Where:

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

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

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

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

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q_{10} method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for the Star Prairie 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 (µg/L), except for hardness and chloride (mg/L).

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 42 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		339.8		680	136	2.4		
Cadmium	190	9.08	0.011	18	4	<1		
Chromium (+3)	190	3045.69	0.511	6091	1218	<2		
Copper	190	28.38	0.958	57			6	5
Lead	190	198.46	0.173	397	79	<1		
Nickel	190	806.34		1613	323	<9		
Zinc	190	210.69	1.976	421	84	7		
Chloride (mg/L)		757	8	1514	303	67		69

**The 2 × 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 = 13 cfs, (¼ of 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		148		11074	2215	2.4	
Cadmium	111	2.66	0.011	198	40	<1	
Chromium (+3)	111	93.58	0.511	6964	1393	<2	
Copper	111	11.28	0.958	773			5
Lead	111	30.85	0.173	2296	459	<1	
Nickel	111	56.81		4251	850	<9	
Zinc	111	131.4	1.976	9686	1937	7	
Chloride (mg/L)		395	8	28965	5793	67	

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 = 38 cfs, (¼ of Harmonic Mean), as specified in s. NR 106.06(4)(c), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Cadmium	370	0.011	77750	15550	<1	
Chromium (+3)	3818000	0.511	802320845	160464169	<2	
Lead	140	0.173	29384	5877	<1	
Nickel	43000		9036092	1807218	<9	

Monthly Average Limits based on Human Cancer Criteria (HCC)
RECEIVING WATER FLOW = 38 cfs, (¼ of Harmonic Mean), as specified in s. NR 106.06(4)(c), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Arsenic	13.3		2794.9	559.0	2.4	

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 calculated limitations and effluent data, effluent limitations are not required for toxic substances.

Mercury – The permit application did not require monitoring for mercury because the Star Prairie 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 sample results are within expected analytical ranges and well below the 17 mg/kg level. The concentration in the sludge from 2022 was 1.100 mg/kg. **Therefore, no mercury monitoring is recommended at Outfall 003.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code.

Available monitoring sample data from the Star Prairie Waterworks (PWS ID: 65601415) is provided in the table below:

Water Supply PFAS Data

Sample Date	Sample ID	Well #	PFOS (ng/L)	PFOA (ng/L)
08/17/2022	637895001	BG864	<0.916	<1.83
06/14/2023	CB06645-01	BG864	<0.31	<0.49
		Average =	ND	ND

The limited data above shows the municipal water supply is below 1/5th of the applicable PFOS and PFOA criteria.

Based on the annual design flow and lack of nondomestic contributions, it is unlikely that the effluent will contain PFOS or PFOA. Therefore, **PFOS and PFOA monitoring is not recommended.**

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 variable daily maximum, weekly and monthly average limits. These limits are re-evaluated at this time due to the following changes:

- Subchapter IV of ch. NR 106, Wis. Adm. Code allows limits based on available dilution instead of limits set to twice the acute criteria.
- Section NR 106.07(3), Wis. Adm. Code requires weekly and monthly average limits for municipal treatment plants.
- The Maximum expected 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:

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

Where:

A = 0.411 and B = 58.4 for a Cold Water Category 5 fishery, and

pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 478 samples were reported from July 2021 to January 2026. The maximum reported value was 8.80 s.u. (Standard pH Units). The effluent pH was 8.50 s.u. or less 99% of the time. The 1-day P_{99}, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.40 s.u. The mean plus the standard deviation multiplied by a factor of 2.326, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 8.38 s.u. Therefore, a value of 8.50 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 8.50 s.u. into the equation above yields an ATC = 3.20 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.

Attachment #1

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	6.41
1-Q_{10}	745

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

The current permit has variable daily maximum effluent limits based on effluent pH.
Presented below is a table of daily maximum limitations corresponding to various effluent pH values.

Daily Maximum Ammonia Nitrogen Limits – CW5

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

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)
The ammonia limit calculation also warrants evaluation of weekly and monthly average limits based on chronic toxicity criteria for ammonia, because those limits relate to the assimilative capacity of the receiving water.

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

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

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

Where:

pH = the pH (s.u.) of the receiving water,
E = 0.854,
C = the minimum of 2.85 or $1.45 \times 10^{(0.028 \times (25 - T))}$,
T = the temperature (°C) of the receiving water

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q_{10} (4-Q_3, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q_5 (estimated as 85% of the 7-Q_2 if the 30-Q_5 is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 °C, 25% of the flow is used if the Temperature < 11°C, and 50% of the flow is used if the Temperature ≥ 11 °C but < 16 °C.

The default basin assumed values are used for temperature and background ammonia. The pH values are from the Apple River. These values are shown in the table below, with the resulting criteria and effluent limitations.

Weekly and Monthly Average Ammonia Nitrogen Limits – CW5

		April & May	June - September	October - March
Effluent Flow	Qe (MGD)	0.116	0.116	0.116
Background Information	7-Q_{10} (cfs)	53	53	53
	7-Q_2 (cfs)	100	100	100
	Ammonia (mg/L)	0.06	0.04	0.06
	Average Temperature (°C)	11	16	4.2
	Maximum Temperature (°C)	13	18	9.4
	pH (s.u.)	8.08	7.94	8.05
	% of Flow used	25	100	25
	Reference Weekly Flow (cfs)	13.25	53.00	13.25
	Reference Monthly Flow (cfs)	21.25	85.00	21.25
Criteria mg/L	4-day Chronic	5.40	5.37	5.65
	30-day Chronic	2.16	2.15	2.26
Effluent Limits mg/L	Weekly Average	400	1578	419
	Monthly Average	252	999	263

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from July 2021 to January 2026.

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	April & May	June - September	October - March
1-day P_{99}	23.5	1.9	32.5
4-day P_{99}	13.6	1.1	17.9
30-day P_{99}	8.5	0.6	10.3
Mean*	6.3	0.4	7.1
Std	4.6	0.4	6.6
Sample size	71	164	241
Range	0.3 - 16.9	<0.1 - 1.9	0.06 - 21.2

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

Reasonable Potential
The need to include ammonia limits in the Star Prairie Wastewater Treatment Facility permit is determined by calculating 99th upper percentile (or P_{99}) values for ammonia during the month ranges and comparing those to the calculated limits. Based on this comparison, daily limits are required April & May, October - March. However, since the permit currently has variable daily maximum, weekly and monthly average limits, **the limits must be retained regardless of reasonable potential**, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:

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

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

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

> Whenever a daily maximum limitation is determined necessary to protect water quality, a weekly and monthly average limitation shall also be included in the permit and set equal to the daily maximum limit unless a more restrictive limit is already determined necessary to protect water quality.

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

Conclusions and Recommendations
In summary, after rounding to two significant figures, a variable daily maximum ammonia nitrogen limitation is recommended year-round. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
Variable	108	108

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.

Because the Star Prairie Wastewater Treatment Facility 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 May through September. No changes are recommended to the current recreational period and the required disinfection season.

Effluent Data
The Star Prairie Wastewater Treatment Facility has monitored effluent *E. coli* from July 2021 to September 2025 and a total of 121 results are available. A geometric mean of 126 counts/100 mL was never exceeded in the 23 months of disinfection, with a maximum monthly geometric mean of 22 counts/100 mL. Effluent data never exceeded 410 counts/100 mL. The maximum reported value was 120 counts/100 mL.

PART 5 – PHOSPHORUS

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

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

Annual Average Mass Total Phosphorus Loading

Month	Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
February 2025	2.73	1.80724	41.15
March 2025	2.29	2.02388	38.72
April 2025	2.16	1.82633	32.95
May 2025	2.75	2.21057	50.61
June 2025	2.87	2.45155	58.71
July 2025	1.92	2.585668	41.43
August 2025	1.86	1.98642	30.81
September 2025	3.29	2.20279	60.38
October 2025	3.14	1.84781	48.46
November 2025	2.69	1.6741	37.58
December 2025	2.59	1.925276	41.64
January 2026	2.54	2.06202	43.72
		Average =	43.84

Total P (lbs/month) = monthly average (mg/L) × total flow (MG/month) × 8.34 (lbs/gallon)
Where total flow is the sum of the actual flow (Million Gallons) for that month.

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

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

The Lake St. Croix TMDL report was written to ensure that phosphorus water quality criteria are attained in Lake St. Croix and are not necessarily protective of phosphorus water quality criteria of other surface waterbodies in the TMDL area. Therefore, the need for a phosphorus WQBEL as described in s. NR 217.13, Wis. Adm. Code, must be considered in addition to any limits required by the TMDL report.

Section NR 102.06(3)(a), Wis. Adm. Code, specifically names river segments for which a phosphorus criterion of 0.100 mg/L applies. For other stream segments that are not specified in s. NR 102.06(3)(a), Wis. Adm. Code, s. NR 102.06(3)(b), Wis. Adm. Code, specifies a phosphorus criterion of 0.075 mg/L. The phosphorus criterion of 0.075 mg/L applies for the Apple River.

The conservation of mass equation is described in s. NR 217.13 (2)(a), Wis. Adm. Code, for phosphorus WQBELs and includes variables of water quality criterion (WQC), receiving water flow rate (Qs), effluent flow rate (Qe), and upstream phosphorus concentrations (Cs):

$$\text{Limitation} = [(WQC)(Qs+(1-f)\ Qe) - (Qs-f\ Qe)\ (Cs)]/Qe$$

Where:

WQC = 0.075 mg/L for the Apple River
Qs = 100% of the 7-Q_2 of 100 cfs
Cs = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code
Qe = effluent flow rate = 0.116 MGD = 0.179 cfs
f = the fraction of effluent withdrawn from the receiving water = 0

Section NR 217.13(2)(d), Wis. Adm. Code, specifies that the background phosphorus concentration used in the limit calculation formula shall be calculated as a median using the procedures specified in s. NR 102.07(1)(b) to (c), Wis. Code. All representative data from the most recent 5 years shall be used, but data from the most recent 10 years may be used if representative of current conditions.

Substituting a median value of 0.059 into the limit calculation equation above, the calculated limit is 9.0 mg/L.

The following data were considered in estimating the background phosphorus concentration:

In Stream Total Phosphorus Data

SWIMS ID	10031902
Station Name	Apple River at Church Road
Waterbody	Apple River
Sample Count	6
First Sample	10/19/2010
Last Sample	09/13/2011
Mean	0.068
Median	0.059

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from July 2021 to January 2026.

Total Phosphorus Effluent Data

	Concentration (mg/L)	Mass Discharge (lbs/day)
1-day P_{99}	4.43	2.917
4-day P_{99}	3.45	2.130
30-day P_{99}	2.92	1.712
Mean	2.64	1.502
Std	0.63	0.469
Sample size	476	476
Range	0.24 - 5.8	0.12 - 4.56

Reasonable Potential Determination
Since the 30-day P_{99} of reported effluent total phosphorus data is less than the calculated WQBEL, **the discharge has reasonable potential to cause or contribute to an exceedance of the water quality criterion.** Therefore, **a WQBEL based on s. NR 217.13, Wis. Adm. Code is not required.**

TMDL Limits – Phosphorus
The phosphorus mass limit is based on the Total Maximum Daily Load (TMDL) for Lake St. Croix to address phosphorus water quality impairments for Lake St. Croix. The TMDL was approved by EPA on August 8, 2012. Star Prairie is included in a group of permitted facilities subject to an aggregate phosphorus wasteload allocation of 6,932 pounds per year (3151 kg/year) under the Lake St. Croix TMDL report. The Village will be considered in compliance with its Lake St. Croix TMDL allocation if the phosphorus discharged from the facility is less than the permittee's individual allocation of 1,640 pounds per year (745 kg/year) OR the total annual loading from all permittees in the aggregate category is less than the aggregate allocation.

The following table presents the reported annual phosphorus loadings at Outfall 003 from 2021 to 2025 for the Star Prairie Wastewater Treatment Facility.

Year	Total Phosphorus lb./year
2021	551
2022	541
2023	543
2024	527
2025	531

PART 6 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

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

Due to the amount of upstream flow available for dilution in the limit calculation (Qs:Qe >30:1), the lowest calculated limitation is 120° F (s. NR 106.55(6)(a), Wis. Adm. Code). For treatment systems of domestic waste, there is no reasonable potential for the discharge to exceed this limit.
No monitoring or effluent limits are recommended for temperature.

Attachment #1

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 LC50 (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.

- Chronic testing is usually not recommended where the ratio of the 7-Q_{10} to the effluent flow exceeds 100:1. For the Star Prairie Wastewater Treatment Facility, that ratio is approximately 295:1. With this amount of dilution, there is believed to be little potential for chronic toxicity effects in the Apple River associated with the discharge from the Star Prairie Wastewater Treatment Facility, so the need for chronic WET testing will not be considered further.

- 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.

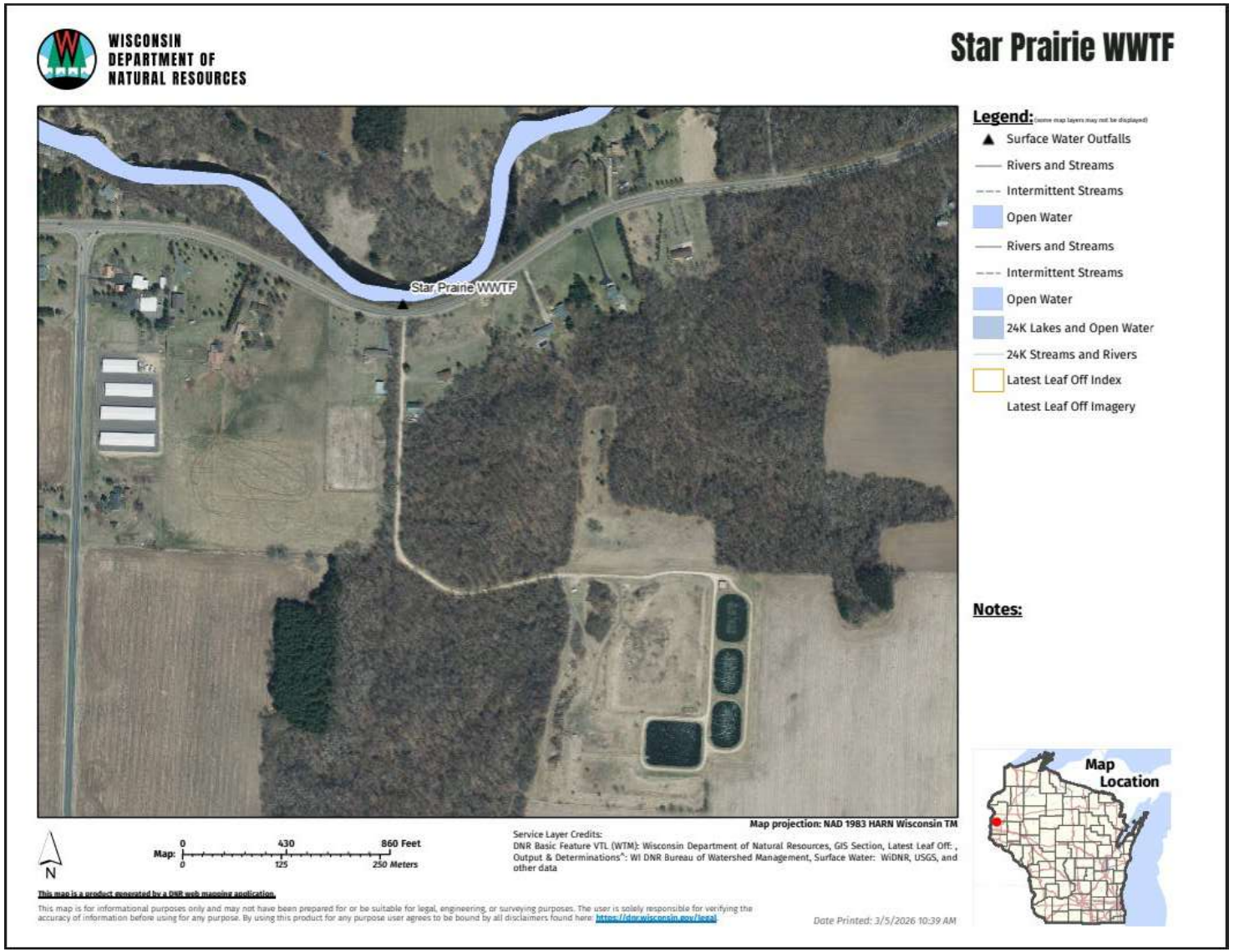
The WET checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other related permit conditions. The checklist indicates whether acute and chronic WET limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code. The checklist steps the 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**	Chronic not evaluated.
Historical Data	No testing available. **5 Points**	
Effluent Variability	Little variability, consistent WWTF operations. **0 Points**	
Receiving Water Classification	Cold Water (5 pts) **5 Points**	
Chemical-Specific Data	Reasonable potential for Ammonia limits based on ATC. (5 pts) Ammonia nitrogen limit carried over from the current permit. Arsenic, Chloride, Copper, and Zinc detected. (3 pts) Additional Compounds of Concern: None. **8 Points**	
Additives	No additives in use. **0 Points**	
Discharge Category	No Industrial Contributors. **0 Points**	
Wastewater Treatment	Secondary or Better **0 Points**	
Downstream Impacts	No impacts known. **0 Points**	
Total Checklist Points:	**18 Points**	
Recommended Monitoring Frequency (from Checklist):	2 tests in permit term (rotating quarters)	
Limit Required?	No	
TRE Recommended? (from Checklist)	No	

- After consideration of the guidance provided in the Department's *WET Program Guidance Document* (2022) and other information described above, two acute WET tests are recommended in the reissued permit. 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.


WISCONSIN
DEPARTMENT OF
NATURAL RESOURCES
Star Prairie WWTF
Star Prairie WWTF
Legend: (some map layers may not be displayed)
Surface Water Outfalls
Rivers and Streams
Intermittent Streams
Open Water
Rivers and Streams
Intermittent Streams
Open Water
24K Lakes and Open Water
24K Streams and Rivers
Latest Leaf Off Index
Latest Leaf Off Imagery
Notes:
Map projection: NAD 1983 HARN Wisconsin TM
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Map: 0 430 860 Feet
0 125 250 Meters
Service Layer Credits:
DNR Basic Feature VTL (WTM): Wisconsin Department of Natural Resources, GIS Section, Latest Leaf Off: , Output & Determinations*: WI DNR Bureau of Watershed Management, Surface Water: WiDNR, USGS, and other data
Map Location
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