

Permit Fact Sheet

General Information

Permit Number	WI-0020354-11-0
Permittee Name and Address	City of Cumberland 950 1 st Avenue PO Box 726 Cumberland WI 54829
Permitted Facility Name and Address	City of Cumberland 1165 St. Anthony Street, Cumberland, Wisconsin
Permit Term	July 01, 2025 to June 30, 2030
Discharge Location	NW ¼ - NE ¼ of Section 18; T35N-R13W (Inside the SE corner of the WWTF fenced area. Approximately 0.24 miles from the Hwy P and St Anthony Street intersection)
Receiving Water	Hay River in the Hay River Watershed within the Lower Chippewa River Basin, Barron County
Stream Flow (Q _{7,10})	Zero
Stream Classification	Limited Forage Fish community at point of discharge, approximately 1 mile downstream the Hay River becomes a warm water sport fish community and non-public water supply. Approximately 0.5 mile further downstream the classification is a cold-water class II trout community.
Wild Rice Impacts <i>(no specific wild rice standards exist at this time)</i>	No impacts identified. No wild rice waters inventoried on the surface water. (Evaluation completed March 2017)
Discharge Type	Existing continuous discharger
Annual Average Design Flow (MGD)	0.4 MGD
Industrial or Commercial Contributors	There are three industries in town; Seneca (seasonal bean cannery), 3-M (abrasives), and DCA (electronics).
Plant Classification	A1 - Suspended Growth Processes; B - Solids Separation; C - Biological Solids/Sludges; P - Total Phosphorus; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The City of Cumberland owns and operates a wastewater treatment system that treats wastes generated from homes and businesses in the community. The plant designed to treat 400,000 gallons per day currently treats an average of 238,000 gallons per day (2020-2024 data). The facility consists of a headworks system (a screen and aerated grit chamber which remove sand and inorganic particles) followed by a Membrane Biological Reactor (MBR). A MBR is a combination of activated sludge treatment together with separation of the sludge by filtration to produce particle-free effluent.

Wastewater enters an aeration zone (air added) where it mixes with activated sludge which metabolizes and reduces organic matter. Activated sludge is composed of settled solids containing naturally occurring bacteria recycled from the treatment system. After the aeration zone the water flows through filtration membranes. The cleaned wastewater (effluent) is discharged to the Hay River. The solids (sludge) that can't pass through the membrane will be either returned to the aeration zone to re-seed the new wastewater entering the system while the rest of the sludge will be treated in an

aerobic digester. Aerobic digestion treats sludge with oxygen-loving bacteria and organisms; reducing harmful pathogens. The treated sludge is then land applied as a soil conditioner on land approved by the Department.

Substantial Compliance Determination

There have been some minor violations of effluent limits, missed samples, late reporting. However, in response to the onsite inspection report, the department is working with the facility to take the necessary steps to correct the noncompliance. Stepped enforcement will continue to be used to address those violations if necessary.

After a review of all Discharge Monitoring Reports, Land Application Reports, and a site visit on 07/19/2023, by Carson Johnson, WDNR, the City of Cumberland has been found to be in substantial compliance with their current permit.

Compliance determination made by Carson Johnson, Wastewater Compliance Engineer, WDNR on March 5, 2025.

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	INFLUENT – Flow is not a required parameter	Representative influent samples shall be collected at the aerated grit chamber.
001	EFFLUENT – An average of 0.238 MGD (2020-2024 data)	Representative samples shall be collected at the permeate pump discharge lines. Flow will be measured using the combined permeate pumps flows. The permittee is authorized to discharge to the Hay River (Hay River Watershed within the Lower Chippewa River Basin) in Barron County.
002	SLUDGE – An annual average of 66 dry US tons (Information provided in the application)	Multiple representative samples shall be collected and composited from the sludge storage prior to land application.

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
BOD5, Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Phosphorus, Total		mg/L	Weekly	24-Hr Flow Prop Comp	

1.1.1 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. See additional explanation of limits under “Explanation of Limits and Monitoring Requirements” below.

Influent **copper, zinc and hardness** monitoring are not needed this permit term.

1.1.2 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	Monthly Avg	15 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
pH Field	Daily Max	9.0 su	3/Week	Grab	
pH Field	Daily Min	6.0 su	3/Week	Grab	
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	6.5 mg/L	Weekly	24-Hr Flow Prop Comp	Limit applies May through October.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	10 mg/L	Weekly	24-Hr Flow Prop Comp	Limit applies November through April.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	2.6 mg/L	Weekly	24-Hr Flow Prop Comp	Limit applies May through October.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	4.1 mg/L	Weekly	24-Hr Flow Prop Comp	Limit applies November through April.
Dissolved Oxygen	Daily Min	4.0 mg/L	3/Week	Grab	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Temperature Maximum		deg F	3/Week	Multiple Grab	See the Effluent Temperature Monitoring and Limitations sections in the permit and the Temperature Limits schedule for more information.
E. coli		#/100 ml	Weekly	Grab	Monitoring and limit effective May through September annually per the Effluent Limitations for E. coli Schedule.
E. coli		Percent	Monthly	Calculated	Monitoring and limit effective May through September annually per the Effluent Limitations for E. coli Schedule. See the E. coli Percent Limit section in the permit. Enter the result in the DMR on the last day of the month.
Phosphorus, Total	6-Month Avg	0.075 mg/L	Weekly	24-Hr Flow Prop Comp	Compliance is measured each April and October.
Phosphorus, Total	Monthly Avg	0.225 mg/L	Weekly	24-Hr Flow Prop Comp	
Phosphorus, Total	6-Month Avg	0.25 lbs/day	Weekly	Calculated	Compliance is measured each April and October.
Phosphorus, Total	Monthly Avg	6.3 lbs/day	Weekly	Calculated	See the Total Maximum Daily Load (TMDL) Limitations section of the permit.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of phosphorus discharged and report on the last day of the month on the DMR. See the Total Maximum Daily Load (TMDL) Limitations section in the permit.
Chloride	Daily Max	757 mg/L	4/Month	24-Hr Flow Prop Comp	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Chloride	Monthly Avg	395 mg/L	4/Month	24-Hr Flow Prop Comp	
Chloride	Weekly Avg	395 mg/L	4/Month	24-Hr Flow Prop Comp	
Chloride	Daily Max	3.7 lbs/day	4/Month	Calculated	
Chloride	Weekly Avg - Variable	lbs/day	4/Month	Calculated	See the "Alternative Wet Weather Chloride Mass Limitation" section in the permit for more information.
Chloride, Variable Limit		lbs/day	Monthly	Calculated	Refer to the table in the "Alternative Wet Weather Chloride Mass Limitation" section of the permit for appropriate limit.
PFOS		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
PFOA		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Nitrogen Series Monitoring section of the permit for testing schedule.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Nitrogen Series Monitoring section of the permit for testing schedule.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Total Nitrogen = Total Nitrogen Kjeldahl (mg/L) + Nitrite + Nitrate Nitrogen (mg/L). See the Nitrogen Series Monitoring section of the permit for testing schedule.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	Two tests are required during the permit term. See the Whole Effluent Toxicity (WET) testing

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					section in the permit for monitoring schedule.
Chronic WET	Monthly Avg	1.0 TUC	See Listed Qtr(s)	24-Hr Flow Prop Comp	Three tests are required during the permit term. See the Whole Effluent Toxicity (WET) testing section in the permit for monitoring schedule.

2.1.1 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.

- **Flow-** The sample frequency for flow has been changed from “continuous” to “daily” for eDMR reporting purposes.
- **Temperature** limits for October through December will become effective at the end of the “Temperature Limits and Dissipative Cooling Evaluation” schedule.
- **Escherichia coli** (E. coli) monitoring and limits will become effective at the end of the “Effluent Limitations for E. coli” schedule.
- Daily maximum **chloride** concentration and mass limits and a variable weekly average mass limit have been added this term.
- **PFOS and PFOA** monitoring once every two months is included in the permit in accordance with s. NR 106.98(2)(c), Wis. Adm. Code.
- Annual **Total Nitrogen Monitoring** (TKN, N02+N03 and Total N) monitoring is required in specific quarters as outlined in the permit.
- Two **Acute** and three **Chronic WET** tests are required in specific quarters as outlined in the permit.

2.1.3 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 January 23, 2025.

Temperature Maximum – In the limit memo recommendation table found on the first page the thermal limits were inadvertently listed under the column for monthly average limits. The information should have been listed under the weekly average limit column instead.

PFOS and PFOA – NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for municipal dischargers with an average flow rate less than 1 MGD, to be evaluated on a case-by-case basis to determine if monitoring is required pursuant to s. NR 106.98(2)(c), 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, it was identified that the POTW has an indirect discharger(s) that may be a potential source of PFOS/PFOA.

Therefore, monitoring once every two months is included. A sample frequency of 1/2 months means one sample is taken during any two-month period. Examples of 1/2 month sample would be every other month (Jan, March, May, etc.) or back-to-back months with a break in between (February & March, May & June, Aug & Sept, etc.). DMR Short Forms will be generated for the following time periods: January-February, March-April, May-June, July-August, September-October, and November-December. At a minimum one sample result will be present on each form.

Sampling shall be conducted for up to two years in order to determine if the permitted discharge has the reasonable potential to cause or contribute to an exceedance of the PFOS or PFOA standards under s. NR 102.04(8)(d)1, Wis. Adm. Code.

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.

Previously permitted monitoring frequencies for pH, dissolved oxygen and ammonia nitrogen fall below the standard monitoring frequency outlined in guidance. Since data submitted during the previous permit term shows consistent compliance with permit limitations, and the set monitoring frequency is consistent with requirements of state code, the reduced monitoring frequency is continued in the proposed permit. If performance levels begin to vary during the permitted term, the department may re-evaluate current sampling frequencies and implement more frequent monitoring via permit modification or at permit reissuance.

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	Aerobic digestion	Incorporation	Land spreading	Approximately 66 dry US tons (Information provided in the application)
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, during the most recent round of sampling (2020), results were below the level of detection.						
Is a priority pollutant scan required? No						

3.1 Sample Point Number: 002- 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 (NH ₄ -N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	See the Sludge Analysis for PCBs section in the permit.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	See the Sludge Analysis for PCBs section in the permit.
PFOA + PFOS		ug/kg	Annual	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			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.

PFAS –Monitoring is required annually pursuant to 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). Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7) for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k).

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	09/30/2025

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.	
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4.1.1 Explanation of Schedule

Land Application Management Plan - 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.

4.2 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
<p>Report on Effluent Discharge: Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code.</p> <p>This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.</p>	06/30/2026
<p>Report on Effluent Discharge and Evaluation of Need: Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan.</p> <p>This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.</p> <p>The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan.</p> <p>If the Department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for Department approval no later than 90 days after written notification was sent from the Department. The Department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued.</p> <p>If, however, the Department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.</p>	06/30/2027

4.2.1 Explanation of Schedule

PFOS/PFOA Minimization Plan Determination of Need - As stated above, NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. S. NR 106.98, Wis. Adm. Code, specifies steps to generate data in order to determine the need for reducing PFOS and PFOA in the discharge. Data

generated per the effluent monitoring requirements will be used to determine the need for developing a PFOS/PFOA minimization plan. As part of the schedule, the permittee is required to submit two annual Reports on Effluent Discharge characteristics.

If the department determines that a minimization plan is needed, the permit will be modified or revoked/and reissued to include additional requirements.

4.3 Effluent Limitations for E. coli

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

Required Action	Due Date
Status Update: The permittee shall submit a progress report on development and submittal of a facility plan for upgrades to meet disinfection requirements and E. coli limits.	03/31/2026
Submit Facility Plan: The permittee shall submit a Facility Plan per s. NR 110.09, Wis. Adm. Code for meeting disinfection requirements and complying with E. coli surface water limitations. The permittee may submit an abbreviated facility plan if the Department determines that the modifications are minor.	01/31/2027
Final Plans and Specifications: The permittee shall submit final construction plans to the Department for approval pursuant to ch. NR 108, Wis. Adm. Code, specifying treatment plant upgrades that must be constructed to meet disinfection requirements per s. NR 210.06(1), Wis. Adm Code, achieve compliance with final E. coli limitations, and a schedule for completing construction of the upgrades by the complete construction date specified below.	01/31/2028
Treatment Plant Upgrade to Meet Limitations: The permittee shall initiate bidding, procurement, and/or construction of the project. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41, Stats., prior to initiating activities defined as construction under ch. NR 108, Wis. Adm. Code. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications.	07/31/2028
Construction Upgrade Progress Report: The permittee shall submit a progress report on construction upgrades.	07/31/2029
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades.	01/31/2030
Achieve Compliance: The permittee shall achieve compliance with final E. coli limitations.	04/30/2030

4.3.1 Explanation of Schedule

E. coli- A compliance schedule is included in the permit to provide time for the permittee to investigate options for meeting new effluent E. coli water quality-based effluent limits while coming into compliance with the limits as soon as reasonably possible.

4.4 Temperature Limits and Dissipative Cooling Evaluation

This compliance schedule requires the permittee to achieve compliance by the specified date

Required Action	Due Date
Report on Effluent Discharges: Submit a report on effluent temperature with conclusions regarding compliance. Informational Note: Refer to the Surface Water subsections regarding 'Determination of Need for Effluent Limits' and 'Dissipative Cooling Demonstration - Weekly Average Limits' concerning requests for a Department determination on the need for limits and follow-up procedures for demonstration of dissipative cooling per NR 106.59, as well as re-evaluation of the limits pursuant to NR 106 Subchapters V & VI or NR 102.26, Wis. Adm. Code.	06/30/2026
Action Plan: Submit an action plan for complying with all effluent temperature limits that remain following the Department's review for necessity.	06/30/2027
Construction Plans: Submit construction plans (if construction is required for complying with effluent temperature limits) and include plans and specifications with the submittal.	06/30/2028
Initiate Actions: Initiate actions identified in the plan.	06/30/2029
Complete Actions: Complete actions necessary to achieve compliance with effluent temperature limits.	06/30/2030

4.4.1 Explanation of Schedule

Temperature Limits and Dissipative Cooling Evaluation - A compliance schedule is included in the permit to provide time for the permittee to investigate options for meeting new effluent thermal limits.

Attachments

Water Flow Schematic updated May 2019

Water quality-based effluent limits (WQBEL) memo dated January 23, 2025.

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance.

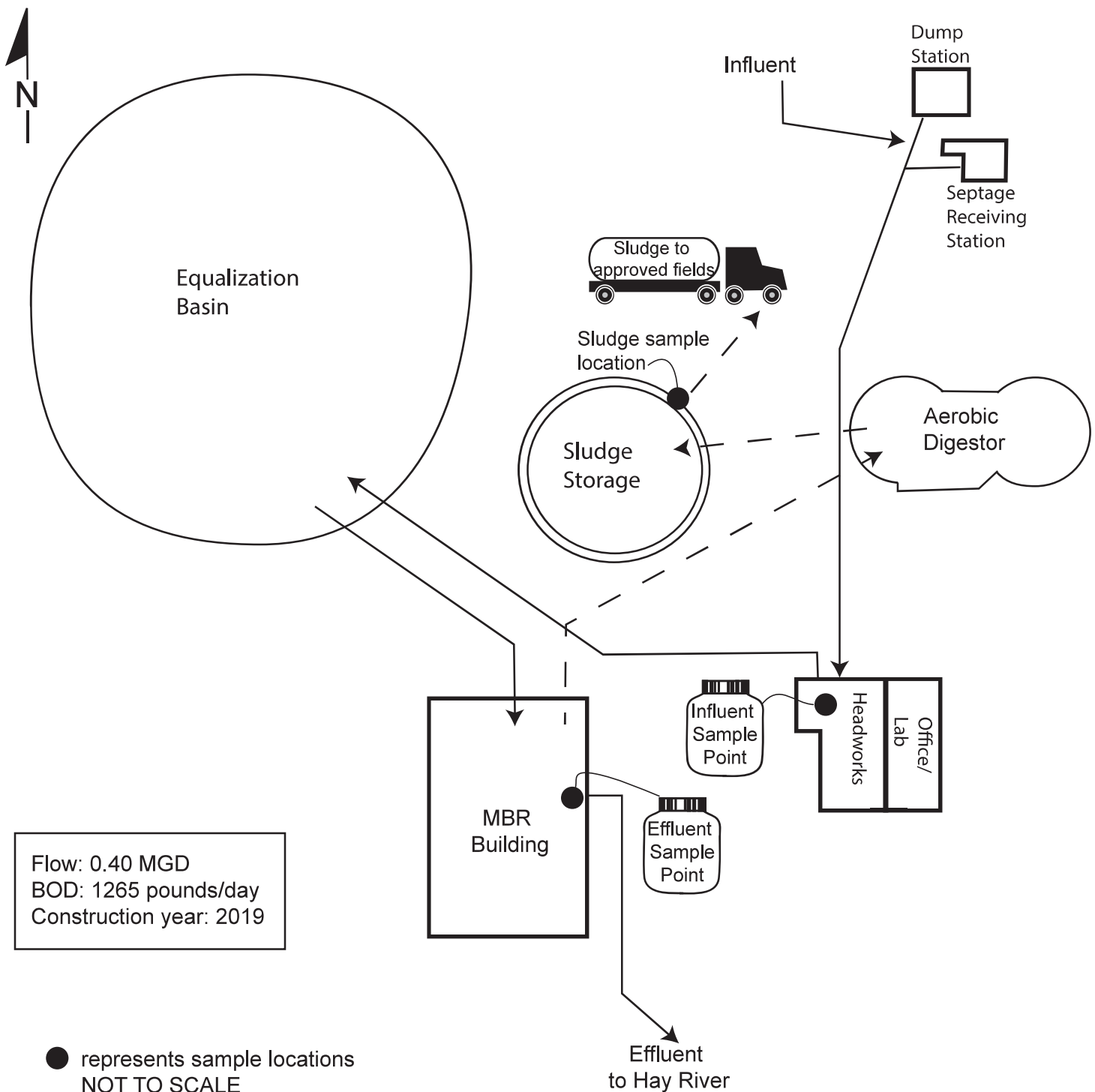
Prepared By: Sheri A. Snowbank

Wastewater Specialist

Date: February 28, 2025

City of Cumberland Wastewater Treatment Plant

The facility consists of a headworks system (a screen and aerated grit chamber) followed by a Membrane Biological Reactor (MBR). An MBR is a combination of activated sludge treatment together with separation of the sludge by filtration to produce particle-free effluent. Effluent is discharged to the Hay River. Sludge is either returned to re-seed the new wastewater entering the system while the rest of the sludge will be treated in an aerobic digester then land applied as a soil conditioner on land. The diagram below shows the treatment units and sampling locations.



CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: January 23, 2025

TO: Sheri Snowbank– Spooner/NOR

FROM: Zainah Masri– WY/3

SUBJECT: Water Quality-Based Effluent Limitations for the City of Cumberland
WPDES Permit No. WI-0020354-11-0

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 City of Cumberland in Barron County. This municipal wastewater treatment facility (WWTF) discharges to the Hay River located in the Hay River Watershed in the Lower Chippewa River Basin. This discharge is included in the Tainter Lake/Lake Menomin 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	Six-Month Average	Footnotes
Flow Rate						1,2
BOD ₅			30 mg/L	15 mg/L		1,7
TSS			30 mg/L	20 mg/L		1,7
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		4.0 mg/L				1
Ammonia Nitrogen			6.5 mg/L	2.6 mg/L		1
May – October			10 mg/L	4.1 mg/L		
November – April						
PFOS and PFOA						3
Bacteria						
Final Limit				126 #/100 mL		4
<i>E. coli</i>				geometric mean		
Chloride						5,6
Concentration Limits	757 mg/L		395 mg/L	395 mg/L		
Mass Limit	3.7 lbs/day		1.3 lbs/day			
Wet Weather Mass Limit			1.7 lbs/day			
Phosphorus						
Final				0.225 mg/L	0.075 mg/L	8
					0.25 lbs/day	
TKN, Nitrate+Nitrite, and Total Nitrogen						9
Temperature						10
October				63 F°		
November				54 F°		
December				54 F°		
Acute WET						11,12
Chronic WET				1.0 TUa		11, 13

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. Monitoring once every two months is required in accordance with s. NR 106.98(2), Wis. Adm. Code.
4. Bacteria limits apply during the disinfection season of May through September. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
5. A monitoring frequency of no less than once per week is recommended due to the variability of the effluent data.
6. 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.
7. These limits are based on the Limited Forage Fish (LFF) community of the immediate receiving water as described in s. NR 104.02(3)(a), Wis. Adm. Code.
8. **A monthly average mass effluent limit of 6.3 lbs/day is recommended for this discharge. The limits are equivalent to a concentration of 1.9 mg/L at the facility design flow of 0.4 MGD.** The existing permit limits are more restrictive and therefore more protective of the water quality at Tainter Lake and Lake Menomin.
9. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate (NO₃), nitrite (NO₂), and total kjeldahl nitrogen (TKN) (all expressed as N).
10. Weekly average temperature limits are necessary for the months of June, July, August, September, and October.
11. After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above three acute WET tests and three chronic WET tests are recommended during the permit term 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).
12. If a satisfactory phosphorus chemical SOP is established and implemented at the facility prior to permit reissuance, then acute WET testing can be reduced to 2x/permit term.
13. According to the requirements specified in s. NR 106.08, Wis. Adm. Code, a chronic WET limit is required. The chronic WET limit shall be expressed as 1.0 TUC = 100/100 as a monthly average in the effluent limits table of the permit.

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

Attachments (4) – Narrative, Ammonia Nitrogen Calculations, Thermal Table & Map

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Water Quality-Based Effluent Limitations for City of Cumberland

WPDES Permit No. WI-0020354-11-00

Prepared by: Zainah Masri

PART 1 – BACKGROUND INFORMATION

Facility Description

The City of Cumberland operates a 0.4 million-gallon capacity influent flow equalization basin, influent fine screens and grit removal, membrane bioreactor (MBR), and aerobic waste sludge digestion system.

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

Existing Permit Limitations

The current permit, which expired on September 30, 2024 and includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						
BOD ₅			30 mg/L	15 mg/L		1
TSS			30 mg/L	20 mg/L		1
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		4.0 mg/L				
Ammonia Nitrogen May – October November – April			6.5 mg/L 10 mg/L	2.6 mg/L 4.1 mg/L		
Chloride			395 mg/L	395 mg/L		4
Zinc						2
Copper						2
Hardness						2
Phosphorus Interim Final				1.0 mg/L 0.225 mg/L	0.075 mg/L 0.25 lbs/day	3
Temperature						2
Acute WET						5
Chronic WET						5

Footnotes:

- 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. The Tainter Lake and Lake Menomin TMDL was approved by the U.S. Environmental Protection Agency in September 2012. The TMDL specifies a phosphorus waste load allocation (WLA) of 1,218 pounds per year for the City of Cumberland. This equates to a monthly average limit of 6.3 pounds per day (including coefficient of variation).
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. Following the guidance provided in the Department's WET Program Guidance Document (revision #11, dated November 1, 2016), 2 acute and 3 chronic WET tests were recommended in the reissued permit. The Instream Waste Concentration to assess chronic test results is 100 %.

Receiving Water Information

- Name: Hay River
- Waterbody Identification Code (WBIC): 2068600
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Listed in ch. NR 104 as Limited Forage Fish community at point of discharge approximately 1 mile to Town Road. Downstream of Town Road, the Hay River becomes a warm water sport fish community and non-public water supply. This was determined by field surveys that indicate the river supports a more diverse aquatic community including trout. Approximately 0.5 mile further downstream the classification is a cold-water class II trout community.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q₁₀ and 7-Q₂ values are from USGS for Station at Cumberland, upstream of Outfall 001. where Outfall 001 is located.
 - 7-Q₁₀ = 0 cfs (cubic feet per second)
 - 7-Q₂ = 0 cfs
 - 90-Q₁₀ = 0 cfs
 - Harmonic Mean Flow = 0 cfs
- Hardness = 180 mg/L as CaCO₃. Effluent hardness is used in place of receiving water because there is no receiving water flow upstream of the discharge.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: Not applicable where the receiving water low flows are zero.
- Source of background concentration data: Background concentrations are not included because they don't impact the calculated WQBEL when the receiving water low flows are equal to zero.
- Multiple dischargers: There are several other dischargers to the Hay River however they are not in the immediately vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: The Hay River is listed as impaired for total phosphorus approximately 1.5 miles downstream of the discharge.

Effluent Information

- Design flow rate(s):
 - Annual average = 0.4 MGD (Million Gallons per Day)

For reference, the actual average flow from January 2019 to September 2024 was 0.22 MGD.

- Hardness = 180 mg/L as CaCO₃. This value represents the geometric mean of data from February 2022 to December 2022 which can be found in the DMR.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable –

Attachment #1

this facility does not have an approved Zone of Initial Dilution (ZID).

- Water source: Domestic wastewater with water supply from wells with industrial sources from Seneca Foods and 3M
- Additives: Alum for phosphorus removal, Glycerin for cleaning the MBR, Bleach and citric acid for cleaning.
- 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, though no tests have been done for lead or nickel, plus ammonia, chloride, hardness and phosphorus.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled "MEAN EFFL. CONC.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

Effluent Copper Data

Sample Date	Copper µg/L	Sample Date	Copper µg/L	Sample Date	Copper µg/L
2/9/2022	9.0	5/3/2022	8.0	9/6/2022	12
2/15/2022	8.0	6/7/2022	7.0	10/4/2022	10
3/1/2022	11	7/5/2022	6.0	11/1/2022	11
4/5/2022	8.0	8/2/2022	7.0	12/13/2022	8.0
1-day P ₉₉ = 14 µg/L					
4-day P ₉₉ = 11 µg/L					

Effluent Zinc Data

Sample Date	Zinc µg/L	Sample Date	Zinc µg/L	Sample Date	Zinc µg/L
2/9/2022	145	5/3/2022	60	9/6/2022	74
2/15/2022	106	6/7/2022	76	10/4/2022	56
3/1/2022	158	7/5/2022	47	11/1/2022	80
4/5/2022	64	8/2/2022	63	12/13/2022	62
1-day P ₉₉ = 198 µg/L					
4-day P ₉₉ = 132 µg/L					

Effluent Chloride Data

	Chloride mg/L
1-day P ₉₉	392
4-day P ₉₉	229
30-day P ₉₉	147
Mean	110
Std	77
Sample size	264
Range	19 - 817

The following table presents the average concentrations and loadings at Outfall 001 from January 2019 to 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	8.0 mg/L	
TSS	2.1 mg/L	
pH field	7.2 s.u.	
Phosphorus	0.20 mg/L	0.34 lbs/day
Ammonia Nitrogen	0.70 mg/L*	

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

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

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

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

Acute Limits based on 1-Q₁₀

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

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

Where:

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

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

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

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

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

Attachment #1

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q₁₀ method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is the case for the City of Cumberland.

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0 cfs, (1-Q₁₀ (estimated as 80% of 7-Q₁₀)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD. mg/L	ATC	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P ₉₉	1-day MAX. CONC.
Chlorine		19	19	3.8			
Arsenic		340	340	68	<1.0		
Cadmium	180	20	20	4.0	<2		
Chromium	180	2918	2918	584	<3		
Copper	180	27	27			14	12
Zinc	180	201	201			198	158
Chloride (mg/L)		757	757			392	817

* * Per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016 consideration of ambient concentrations and 1-Q₁₀ flow rates yields a more restrictive limit than the 2 × ATC method of limit calculation.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 0 cfs (¼ of the 7-Q₁₀), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P ₉₉
Chlorine		7.3	15	1.5		
Arsenic		152	152	30	<1.0	
Cadmium	175	3.8	3.8	0.8	<2.0	
Chromium	180	214	214	43	<3.0	
Copper	180	17	17			11
Zinc	180	201	201			132
Chloride (mg/L)		395	395		110	229

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

Monthly Average Limits based on Wildlife Criteria (WC)

The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

Monthly Average Limits based on Human Threshold Criteria (HTC)RECEIVING WATER FLOW = 0 cfs ($\frac{1}{4}$ 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	370	74	<2.0
Chromium (+3)	3,818,000	3,818,000	763,600	<3.0

Monthly Average Limits based on Human Cancer Criteria (HCC)RECEIVING WATER FLOW = 0 cfs ($\frac{1}{4}$ 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	13	3.0	<1.0

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

Conclusions and Recommendations

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

Copper – Considering available effluent data from February 2022 to December 2022 the 1-day P₉₉ concentration is 14 µg/L, with a maximum concentration of 12 µg/L. The maximum effluent concentration and the 1-day P₉₉ of the effluent data do not exceed the calculated daily maximum limit, **therefore concentration and mass limits, as well as monthly monitoring, are not required.**

Zinc – Considering available effluent data from February 2022 to December 2022 the 1-day P₉₉ concentration is 198 µg/L, with a maximum concentration of 158 µg/L. The maximum effluent concentration and the 1-day P₉₉ of the effluent data do not exceed the calculated daily maximum limit, **therefore concentration and mass limits, as well as monthly monitoring, are not required.**

Chloride – Considering available effluent data from August 2019 to September 2024 the 1-day P₉₉ chloride concentration is 392 mg/L, with a maximum concentration of 817 mg/L and the 4-day P₉₉ of effluent data is 229 mg/L.

Because the maximum concentration exceeds the calculated daily maximum WQBEL, a daily maximum effluent limit is needed in accordance with s. NR 106.05(3)(a), Wis. Adm. Code. and the currently weekly and monthly limits must be retained.

The acute mass limitation of 3.7 lbs/day is based on the concentration limit and the peak daily design flow rate of 0.58 MGD (757 mg/L * 0.58 MGD * 8.34/1000) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

The chronic mass limitation of 1.3 lbs/day is based on the concentration limit and the annual average design flow rate of 0.015 MGD ($395 \text{ mg/L} \times 0.4 \text{ MGD} \times 8.34/1000$) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

An alternative wet weather mass limit of 1.7 lbs/day ($395 \text{ mg/L} \times 0.53 \text{ MGD} \times 8.34/1000$) **should also be included** in accordance with s. NR 106.07(9), Wis. Adm. Code. The peak weekly design flow was used to calculate the wet weather mass limit. The wet weather mass limit applies when the dry weather mass limit is exceeded, and the facility demonstrates to the Department the exceedance occurred during a wet weather event.

Mercury – The permit application did not require monitoring for mercury because the City of Cumberland 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 April 2019 to April 2024 was 2.0 mg/kg, with a maximum reported concentration of 3.0 mg/kg. **Therefore, no mercury monitoring is recommended at Outfall 002.**

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 nondomestic contributions to the sewerage system, PFOS and PFOA monitoring is recommended at a frequency of once every other month.

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

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

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

Attachment #1

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

Where:

A = 0.411 and B = 58.4 for a Limited Forage Fishery and,
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 886 sample results were reported from January 2019 to September 2024. The maximum reported value was 8.0 s.u. (Standard pH Units). The effluent pH was 7.9 s.u. or less 99% of the time. The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.9 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 mg/L.

Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method

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

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

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	20
1-Q ₁₀	10

The 1-Q₁₀ method yields the most stringent limits for the City of Cumberland.

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

Daily Maximum Ammonia Nitrogen Limits – WWSF, WFFF & LFF

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
$6.0 \leq \text{pH} \leq 6.1$	54.17	$7.0 < \text{pH} \leq 7.1$	32.86	$8.0 < \text{pH} \leq 8.1$	6.95
$6.1 < \text{pH} \leq 6.2$	53.17	$7.1 < \text{pH} \leq 7.2$	29.54	$8.1 < \text{pH} \leq 8.2$	5.73
$6.2 < \text{pH} \leq 6.3$	51.97	$7.2 < \text{pH} \leq 7.3$	26.21	$8.2 < \text{pH} \leq 8.3$	4.71
$6.3 < \text{pH} \leq 6.4$	50.53	$7.3 < \text{pH} \leq 7.4$	22.97	$8.3 < \text{pH} \leq 8.4$	3.88
$6.4 < \text{pH} \leq 6.5$	48.83	$7.4 < \text{pH} \leq 7.5$	19.89	$8.4 < \text{pH} \leq 8.5$	3.20
$6.5 < \text{pH} \leq 6.6$	46.84	$7.5 < \text{pH} \leq 7.6$	17.03	$8.5 < \text{pH} \leq 8.6$	2.65
$6.6 < \text{pH} \leq 6.7$	44.57	$7.6 < \text{pH} \leq 7.7$	14.44	$8.6 < \text{pH} \leq 8.7$	2.20
$6.7 < \text{pH} \leq 6.8$	42.00	$7.7 < \text{pH} \leq 7.8$	12.14	$8.7 < \text{pH} \leq 8.8$	1.84
$6.8 < \text{pH} \leq 6.9$	39.16	$7.8 < \text{pH} \leq 7.9$	10.13	$8.8 < \text{pH} \leq 8.9$	1.56
$6.9 < \text{pH} \leq 7.0$	36.09	$7.9 < \text{pH} \leq 8.0$	8.41	$8.9 < \text{pH} \leq 9.0$	1.32

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

The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do **not change** because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous WQBEL memo are shown in attachment #2.

Effluent Data

Samples for ammonia nitrogen were taken from January 2019 to September 2024 and their results were as follows:

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	May- October	November - April
1-day P ₉₉	6.0	9.8
4-day P ₉₉	4.4	6.5
30-day P ₉₉	1.97	2.75
Mean*	0.47	0.86
Std	2.16	2.91
Sample size	150	149
Range	0.02 - 24.6	0.1 - 21.2

The permit currently has weekly and monthly limits from year round and no daily maximum limit. There is no reasonable potential for the daily maximum limit to be exceeded, and therefore a daily maximum limit is not needed. Where there are existing ammonia nitrogen limits in the permit, the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:

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

Conclusions and Recommendations

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

Final Ammonia Nitrogen Limits

	Weekly Average mg/L	Monthly Average mg/L
May – October	6.5 mg/L	2.6 mg/L
November – April	10 mg/L	4.1 mg/L

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

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

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.

These limits are required during May through September.

In accordance with s. NR 210.06(2)(a)2, Wis. Adm. Code, outside of the recreational season, bacteria limits may either be set equal to the previous fecal coliform limits or the listed *E. coli* limits. Therefore, the facility can select one of the two possible sets of permit limits:

- *E. coli* limits as listed above during the recreation period of May through September and a fecal coliform limit of 400 counts/100 mL as a monthly geometric mean in November through April. Any fecal coliform weekly geometric mean limit which was included in the previous permit for expression of limits purposes does not need to be included in the reissued permit.
- *E. coli* limits as listed above apply year-round.

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 City of Cumberland currently has a limit more restrictive than 1.0 mg/L, this limit should be included in the reissued permit.

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), which establish phosphorus standards for surface waters. Revisions to ch. NR 217 (s. NR 217, Subchapter III) establish procedures for determining water quality based effluent limits for phosphorus, based on the applicable standards in ch. NR 102.

Section NR 102.06(3)(a) specifically names reaches of rivers for which a phosphorus criterion of 0.1 mg/l applies. For other stream segments that are not specified in s. NR 102.06(3)(a), 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 Hay 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 Hay River.

Qs = 100% of the 7-Q₂ of 0 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 = 0.4 MGD = 0.619 cfs

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

Since the receiving water flow is equal to zero, the effluent limit is set equal to criteria.

TMDL Limit

Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* (April 2020) and are based on the annual phosphorus wasteload allocation (WLA) given in pounds per year. This WLA found in table 5 on page 15 of the *Tainter Lake, Lake Menomin TMDL Final Report* dated May 31, 2012 are expressed as maximum annual loads (lbs/year).

The TL/LM TMDL expresses WLAs for TP as maximum annual loads (pounds per year) and maximum daily loads (pounds per day), which equal the maximum annual loads divided by the number of days in the year. For the City of Cumberland, these phosphorus WLAs are 1,218 lbs/yr and 3.34 lbs/day.

For the reasons explained in the April 30, 2012 paper entitled *Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin*, WDNR has determined that the phosphorus WQBELs set equal to WLAs would not be consistent with the assumptions and requirements of the TMDL. Therefore, limits given to facilities included in the Tainter Lake and Lake Menomin TMDL are given monthly average mass limits and, if the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits are also included. The following equation shows the calculation of equivalent effluent concentration:

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$$\begin{aligned}\text{TP Equivalent Effluent Concentration} &= \text{WLA} \div (365 \text{ days/yr} * \text{Flow Rate} * \text{Conversion Factor}) \\ &= 1,218 \text{ lbs/yr} \div (365 \text{ days/yr} * 0.4 \text{ MGD} * 8.34) \\ &= 1.0 \text{ mg/L}\end{aligned}$$

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

$$\begin{aligned}\text{TP Monthly Average Permit Limit} &= \text{daily WLA} * \text{monthly average multiplier} \\ &= 3.34 \text{ lbs/day} * 1.9 \\ &= 6.3 \text{ lbs/day}\end{aligned}$$

The multiplier used in the six-month average calculation was determined according to the implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 1.4. This is the standard deviation divided by the mean of mass data. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by the facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as weekly; if a different monitoring frequency is used, the stated limits should be reevaluated.

A monthly average mass effluent limit of 6.3 lbs/day is recommended for this discharge. The limits are equivalent to a concentration of 1.9 mg/L at the facility design (maximum annual average for industries) flow of 0.4 MGD. The existing permit limits are more restrictive and therefore more protective of the water quality at Tainter Lake and Lake Menomin.

In this case, the TL/LM TMDL establishes TP wasteload allocations to reduce the loading in the entire watershed including WLAs to meet water quality standards for Tainter Lake and Lake Menomin alone and did not consider the tributaries. Therefore, WLA-based WQBELs are not protective of immediate receiving waters and TP WQBELs derived according to s. NR 217.13, Wis. Adm. Code are required.

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

Effluent Data

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

Total Phosphorus Effluent Data

	Phosphorus mg/L	Phosphorus lbs/day
1-day P ₉₉	1.5	2.9
4-day P ₉₉	0.9	1.6
30-day P ₉₉	0.38	0.72
Mean	0.18	0.34
Std	0.36	0.67
Sample size	303	301
Range	0.05 - 4.24	0.07 - 8.98

PART 5 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

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

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

The table below summarizes the maximum temperatures reported during monitoring from January 2019 to June 2024.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
JAN	51	52	54	78
FEB	50	51	54	79
MAR	50	50	57	80
APR	52	54	63	81
MAY	55	56	70	84
JUN	61	63	77	85
JUL	65	65	81	86
AUG	65	66	79	86
SEP	65	66	73	85
OCT	64	65	63	83
NOV	60	60	54	80
DEC	55	55	54	79

Reasonable Potential

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

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

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

Comparing the representative highest effluent temperature to the calculated effluent limits determines the reasonable potential of exceeding the effluent limits. The months in which limitations are recommended are shown in bold. Based on this analysis, **weekly average temperature limits are necessary for the months of October, November and December.**

The following general options are available for a facility to explore potential relief from the temperature limits:

- Effluent monitoring data: Verification or additional effluent monitoring (flow and/or temperature) may be appropriate if there were questions on the representativeness of the current effluent data.
- Monthly low receiving water flows: Contract with USGS to generate monthly low flow estimates for the receiving water to be used in place of the annual low flow.
- Mixing zone studies: A demonstration of rapid and complete mixing may allow for the use of a mixing zone other than the default 25%.
- Dissipative cooling demonstration: Effluent limitations based on sub-lethal criteria may be adjusted based on the potential for heat dissipation from municipal treatment plants as described in s. NR 106.59(4), Wis. Adm. Code.
- Collection of site-specific ambient temperature: default background temperatures for streams in Wisconsin, so actual data from the direct receiving water may provide for relaxed thermal limits but only if the site-specific temperatures are lower than the small stream defaults used in the above tables
- A variance to the water quality standard: This is typically considered to be the least preferable and most complex option as it requires the evaluation of the other alternatives.

These options are explained in additional detail in the August 15, 2013 Department *Guidance for Implementation of Wisconsin's Thermal Water Quality Standards*
<https://dnr.wisconsin.gov/topic/Wastewater/Thermal.html>

PART 6 – WHOLE EFFLUENT TOXICITY (WET)

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

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour

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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 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 IC₂₅ (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 100% shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

Q_e = annual average flow = 0.4 MGD = 0.619 cfs

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

Q_s = 1/4 of the 7-Q₁₀ = 0 cfs ÷ 4 = 0 cfs

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.
- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations.

WET Data History

Date Test Initiated	Acute Results LC ₅₀ %				Chronic Results IC ₂₅ %					Footnotes or Comments
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	<i>C. dubia</i>	Fathead Minnow	Algae (IC ₅₀)	Pass or Fail?	Use in RP?	
04/09/1996	>100	>100	Pass	No	>100	-	-	Fail	No	1
04/22/1997	>100	>100	Pass	No	>100	>100		Pass	No	1
08/10/1999	>100	>100	Pass	No	-	-	-	-	-	1
05/09/2000	>100	>100	Pass	No	>100	>100	-	Pass	No	1
06/06/2001	>100	>100	Pass	No	-	-	-	-	-	1
05/11/2005	-	-	-	-	>100	>100	-	Pass	No	1
11/01/2007	-	-	-	-	74	>100	-	Pass	Yes	
04/20/2010	-	-	-	-	>100	>100	-	Pass	Yes	
11/13/2012	-	-	-	-	>100	>100	-	Pass	Yes	
08/12/2014	>100	>100	Pass	Yes	>100	>100	-	Pass	Yes	
03/22/2016	>100	>100	Pass	Yes	>100	>100	-	Pass	Yes	
05/23/2017	>100	>100	Pass	Yes	>100	>100	-	Pass	Yes	
08/07/2018	>100	>100	Pass	Yes	>100	>100	-	Pass	Yes	

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12/14/2020	>100	>100	Pass	Yes	-	>100	-	Fail	Yes	
01/25/2021	-	-	-	-	>100	-	-	Pass	Yes	
06/14/2021	-	-	-	-	>100	>100	-	Pass	Yes	
08/01/2022	>100	>100	Pass	Yes	>100	>100	-	Pass	Yes	
08/12/2024	>100	>100	Pass	Yes	64.5	>100	-	Pass	Yes	

Footnotes:

1. *Data Not Representative.* Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005. It may be appropriate to exclude data collected before July 1, 2005, unless 1) it shows repeated toxicity that was never resolved or 2) older data is all that is available, and no significant changes have occurred which obviously make it unrepresentative. Ammonia limits were added to the permit in 2005 based on updated water quality criteria.
- 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.**

$$\text{Chronic Reasonable Potential} = [(TU_c \text{ effluent}) (B)(IWC)]$$

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

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

$$\text{Chronic Reasonable Potential} = [(TU_c \text{ effluent}) (B)(IWC)]$$

Chronic WET Limit Parameters

TU_c (maximum) $100/IC_{25}$	B (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
$100/64.5 =$ $1.6 TU_c$	3.8 Based on 2 detects	100%

$$[(TU_c \text{ effluent}) (B)(IWC)] = (1.6)(3.8)(1) = 6.1 > 1.0$$

Therefore, reasonable potential is shown for chronic WET limits using the procedures in s. NR 106.08(6) and representative data from April 1996 to August 2024.

Expression of WET limits

Chronic WET limit = $[100/IWC] TU_c = [100/100] = 1.0 TU_c$ expressed as a monthly average

The WET checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other related permit conditions. The checklist indicates whether acute and chronic WET limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code. The checklist steps the user through a series of questions, assesses points based on the potential for effluent toxicity, and

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suggests monitoring frequencies based on points accumulated during the checklist analysis. As toxicity potential increases, more points accumulate, and more monitoring is recommended to ensure that toxicity is not occurring. A summary of the WET checklist analysis completed for this permittee is shown in the table below. Staff recommendations based on best professional judgment are provided below the summary table. For guidance related to reasonable potential and the WET checklist, see Chapter 1.3 of the WET Guidance Document: <https://dnr.wisconsin.gov/topic/Wastewater/WET.html>.

WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. 0 Points	IWC = 100 %. 15 Points
Historical Data	0 tests used to calculate RP. No tests failed. 0 Points	1 tests used to calculate RP. No tests failed. 0 Points
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. 0 Points	Same as Acute. 0 Points
Receiving Water Classification	WWSF or < 4 mi to non-variance 5 Points	Same as Acute. 5 Points
Chemical-Specific Data	Ammonia nitrogen, Copper, Chloride and Zinc detected. 3 Points	Ammonia nitrogen, Copper, Chloride and Zinc detected. 3 Points
Additives	1 Biocide and 1 Water Quality Conditioner added. Permittee does not have proper P chemical SOPs in place 19 Points	All additives not used more than once per 4 days. 0 Points
Discharge Category	3 Industrial Contributors. 7 Points	Same as Acute. 7 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:	34 Points	30 Points
Recommended Monitoring Frequency (from Checklist):	3 tests during permit term	3 tests during permit term
Limit Required?	No	Yes Limit = 1.0 TU _c

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	Acute	Chronic
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 three acute and three chronic WET tests are recommended during the permit term 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). **If a satisfactory phosphorus chemical SOP is established and implemented at the facility prior to permit reissuance, then acute WET testing can be reduced to 2x/permit term.**
- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, a chronic WET limit is required. The chronic WET limit shall be expressed as 1.0 TUC as a monthly average in the effluent limits table of the permit.
- A minimum of annual chronic monitoring is required because a chronic WET limit is required. 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

Ammonia Nitrogen Calculations from WQBEL dated April 5, 2019

Weekly and Monthly Limits for Ammonia Nitrogen for a Limited Forage Fish Designation

		Spring	Summer	Winter
		May	June – Sept.	Oct. - April
Effluent Flow	Qe (MGD)	0.4	0.4	0.4
Background Information	7-Q ₁₀ (cfs)	0	0	0
	7-Q ₂ (cfs)	0	0	0
	Ammonia (mg/L)	0.07	0.04	0.08
	Average Temperature (°C)	15	19	7
	4-day P ₉₉ pH (s.u.)	7.43	7.43	7.43
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	0	0	0
	Reference Monthly Flow (cfs)	0	0	0
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	14.7	14.7	14.7
	Early Life Stages Absent	33.8	23.6	39.0
	30-day Chronic			
	Early Life Stages Present	5.87	5.87	5.87
	Early Life Stages Absent	13.5	9.44	15.6
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	14.7	14.7	14.7
	Early Life Stages Absent	33.8	23.6	39.0
	Monthly Average			
	Early Life Stages Present	5.87	5.87	5.87
	Early Life Stages Absent	13.5	9.44	15.6

Weekly and Monthly Limits for Ammonia Nitrogen for a Warm Water Sport Fish Designation

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
Effluent Flow	Qe (MGD)	0.4	0.4	0.4
Background Information	7-Q ₁₀ (cfs)	0	0	0
	7-Q ₂ (cfs)	0	0	0
	Ammonia (mg/L)	0.07	0.04	0.08
	Average Temperature (°C)	15	19	7
	pH (s.u.)	7.43	7.43	7.43
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	0	0	0
	Reference Monthly Flow (cfs)	0	0	0
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	11.6	7.83	11.6
	Early Life Stages Absent	11.6	7.83	15.5
	30-day Chronic			
	Early Life Stages Present	4.62	3.13	4.62
	Early Life Stages Absent	4.65	3.13	6.19
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	11.6	7.83	11.6
	Early Life Stages Absent	11.6	7.83	15.5
	Monthly Average			
	Early Life Stages Present	4.62	3.13	4.62
	Early Life Stages Absent	4.65	3.13	6.19

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Temperature Table:

Temperature limits for receiving waters with unidirectional flow													
(calculation using default ambient temperature data)													
Facility:	City of Cumberland				7-Q10:	0.00 cfs		Temp Dates	Flow Dates				
Outfall(s):	001				Dilution:	25%		Start:	01/02/19		07/01/19		
Date Prepared:					f:	0		End:	06/28/24		09/30/24		
Design Flow (Qe):	0.40 MGD				Stream type:	Limited forage fish community							
Storm Sewer Dist.	0 ft				Qs:Qe ratio:	0.0 :1							
					Calculation Needed?	YES							
Month	Water Quality Criteria			Receiving Water Flow Rate (Qs)	Representative Highest Effluent Flow Rate (Qe)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit		Adjusted Thermal Limits	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qea)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation	Weekly Average	Daily Maximum
	(°F)	(°F)	(°F)	(cfs)	(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
JAN	37	54	78	0.00	0.233	0.301	0	51	52	54	78	54.0	78.0
FEB	39	54	79	0.00	0.251	0.314	0	50	51	54	79	54.0	79.0
MAR	43	57	80	0.00	0.293	0.438	0	50	50	57	80	57.0	80.0
APR	50	63	81	0.00	0.532	0.546	0	52	54	63	81	63.0	81.0
MAY	59	70	84	0.00	0.302	0.393	0	55	56	70	84	70.0	84.0
JUN	64	77	85	0.00	0.347	0.525	0	61	63	77	85	77.0	85.0
JUL	69	81	86	0.00	0.321	0.575	0	65	65	81	86	81.0	86.0
AUG	68	79	86	0.00	0.288	0.330	0	65	66	79	86	79.0	86.0
SEP	63	73	85	0.00	0.298	0.363	0	65	66	73	85	73.0	85.0
OCT	55	63	83	0.00	0.301	0.379	0	64	65	63	83	63.0	83.0
NOV	46	54	80	0.00	0.290	0.467	0	60	60	54	80	54.0	80.0
DEC	40	54	79	0.00	0.269	0.367	0	55	55	54	79	54.0	79.0

Map:

