Permit Fact Sheet

General Information

Permit Number	WI-0020150-11-0
Permittee Name and Mailing Address	City of Merrill, 1004 E First St, Merrill, WI 54452
Permitted Facility Name and Address	Merrill Wastewater Treatment Facility, 2606 Sturdevant St, Merrill, WI
Permit Term	April 1, 2025 – March 31, 2030
Discharge Location	NE¼, NW¼, of Section 18, T 31N, R 7E
Receiving Water	Wisconsin River within the Prairie River Watershed in the Upper Wisconsin River Basin in Lincoln County
Stream Flow (7-Q_{10})	846 cfs
Stream Classification	Warm Water Sport Fish (WWSF) community, non-public water supply, within Ceded Territory
Discharge Type	Existing; Continuous
Annual Average Design Flow	3.06 MGD
Industrial or Commercial Contributors	Three contributors are regulated under the DNR Pretreatment Program and Merrill City Ordinance: Northern Wire, Mitchell Metal, and Merrill Manufacturing
Plant Classification	WWTF is Classified as Advanced for the following subclasses: A1, B, C, P, D, L, and SS
Approved Pretreatment Program?	N/A

Facility Description

The City of Merrill Wastewater Treatment Facility is an activated sludge facility which consists of mechanical screening (removes debris) with bar screen backup and grit removal via an aerated grit chamber. It includes three primary clarifiers where solids are allowed to settle. Flow then enters two aeration tanks where it mixes with activated sludge which breaks down the organic matter. Activated sludge is composed of settled solids containing naturally occurring bacteria recycled from the treatment system. The water is then pumped into two final clarifiers where remaining solids are settled out. Alum is added following primary clarification to facilitate the precipitation of phosphorus. Some of the sludge is returned to the head of the aeration tanks to re-seed the new wastewater entering the tank while the rest of the sludge is sent to waste. The settled solids (sludge) from the system that are not used as activated sludge are removed, thickened, and treated by bacteria and organisms through anaerobic digestion; reducing harmful pathogens to safe levels. Water is removed from the sludge via a belt press before it is landspread on Department approved agricultural sites. The wastewater is seasonally disinfected (May – September) via chlorination and then dechlorinated via sodium bisulfite. Caustic soda is added for pH adjustment. Effluent is discharged on a continuous basis via Outfall 001 to the North bank of the Wisconsin River, approx. 1.1 miles downstream of Center Ave.

Substantial Compliance Determination

Enforcement During Last Permit: A Notice of Noncompliance (NON) was sent in February 2021 for failure to submit the 2019 CMAR. The facility has completed all previously required actions as part of the enforcement process.

After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items, and a site visit on 9/18/23, this facility has been found to be in substantial compliance with their current permit.

Compliance confirmed by Amy Garbe, Compliance Engineer, on 10/9/24.

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	1.20 MGD (Avg. 4/1/19-7/31/24)	INFLUENT: 24-hr flow proportional composite samples shall be collected from the aerated channel after screening and grit removal prior to the primary clarifiers.
101	N/A – no flow monitoring required	FIELD BLANK: At least one field blank shall be collected for each day a sample of mercury is collected from either influent or effluent. The field blank shall be taken at the same time and location as the mercury sample.
001	N/A – no flow monitoring required	EFFLUENT: 24-hr flow prop composite samples shall be collected downstream of final clarification prior to the chlorine contact tank. Grab samples shall be collected after the chlorine contact tank prior to discharge to the Wisconsin River.
002	1,109 cubic yards generated in 2023; 128 metric tons land applied in 2023	CAKE SLUDGE: Anaerobically, belt press thickened, Class B sludge samples shall be collected from the cake sludge storage building after mixing piles. Recommend at least 7 different locations at different depths and combined into one sample for testing.
003	N/A – Emergency outfall only	EMERGENCY LIQUID SLUDGE (Primary Digester): Anaerobically digested, Class B. All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test. This outfall is currently inactive and the facility must notify the Department if this outfall needs to be used.
004	N/A – Emergency outfall only	EMERGENCY LIQUID SLUDGE (Secondary Digester): Anaerobically digested, Class B. All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test. This outfall is currently inactive and the facility must notify the Department if this outfall needs to be used.

1 Influent – Monitoring Requirements

Sample Point Number: 701- INFLUENT

Monitoring Requirements					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	Monthly	24-Hr Flow Prop Comp	
CBOD5		mg/L	5/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	5/Week	24-Hr Flow Prop Comp	
Mercury, Total Recoverable		ng/L	Quarterly	Grab	See the Mercury Monitoring permit section.

Changes from Previous Permit:

Influent monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit.

- Changed flow rate sample type to Daily (instead of Continuous).
- Changed BOD_5 and $CBOD_5$ sample type to 24-Hr Flow Prop Comp (instead of 24-Hr Comp).
- Removed hexachlorobenzene monitoring.
- Reduced BOD_5 sample frequency to monthly. Percent removal requirements are demonstrated through the $CBOD_5$ sampling 5/Week.

Explanation of Monitoring Requirements

Flow, BOD_5, $CBOD_5$, and total suspended solids (TSS) – Influent monitoring 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.

Mercury – Mercury monitoring is included in the proposed permit pursuant to s. NR 106.145, Wis. Adm. Code. Field blanks for mercury monitoring are required per ss. NR 106.145(9) and (10), Wis. Adm. Code. The permittee shall collect a mercury field blank for each set of mercury samples (a set of samples may include a combination of influent, effluent or other samples all collected on the same day). The permittee shall report results of influent samples to the Department on Discharge Monitoring Reports.

2 In-plant – Monitoring Requirements

Sample Point Number: 101- FIELD BLANK

Monitoring Requirements					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Mercury, Total		ng/L	Quarterly	Blank	See the Mercury

Monitoring Requirements					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Recoverable					Monitoring permit section.

Changes from Previous Permit:

In-plant monitoring requirements were evaluated for this permit term and no changes have been made from the previous permit.

Explanation of Monitoring Requirements

Mercury – Field blanks for mercury monitoring are required per ss. NR 106.145(9) and (10), Wis. Adm. Code. The permittee shall collect a mercury field blank for each set of mercury samples (a set of samples may include a combination of influent, effluent or other samples all collected on the same day). The permittee shall report results of influent samples to the Department on Discharge Monitoring Reports.

3 Surface Water – Monitoring and Limitations

Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
CBOD5	Weekly Avg	40 mg/L	5/Week	24-Hr Flow Prop Comp	
CBOD5	Monthly Avg	25 mg/L	5/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	5/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	5/Week	24-Hr Flow Prop Comp	
pH Field	Daily Min	6.0 su	5/Week	Grab	
pH Field	Daily Max	9.0 su	5/Week	Grab	
Phosphorus, Total	Monthly Avg	1.0 mg/L	5/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	11 lbs/day	5/Week	Calculated	See TMDL permit section.
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of phosphorus and report on the last day of the month on the eDMR. See TMDL permit section.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					rolling sum of total monthly mass of phosphorus discharged and report on the last day of the month on the eDMR beginning April 1, 2026. See TMDL permit section.
Chlorine, Total Residual	Daily Max	38 ug/L	5/Week	Grab	Limit and monitoring effective May through September.
Chlorine, Total Residual	Weekly Avg	38 ug/L	5/Week	Grab	Limit and monitoring effective May through September.
Chlorine, Total Residual	Monthly Avg	38 ug/L	5/Week	Grab	Limit and monitoring effective May through September.
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit and monitoring effective May through September.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit and monitoring effective May through September. See the E. coli Percent Limit permit section. Enter the result in the eDMR on the last day of the month.
Nitrogen, Ammonia (NH3-N) Total		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring only January-December 2028.
Copper, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	Monitoring only January-December 2028.
Nitrogen, Total Kjeldahl		mg/L	Quarterly	24-Hr Flow Prop Comp	
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hr Flow Prop Comp	
Nitrogen, Total		mg/L	Quarterly	Calculated	Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Mercury, Total Recoverable	Daily Max	8.5 ng/L	Quarterly	Grab	Alternative Effluent Limitation. See the Mercury Monitoring permit section and the Mercury Pollutant Minimization Program Schedule.
Acute WET	Daily Max	1.0 TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Whole Effluent Toxicity (WET) Testing permit section.
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.

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.

- Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.
- Decreased the mercury variance alternative effluent limit to 8.5 ng/L as a daily maximum (from 9.85 ng/L) and updated pollutant minimization program (PMPs) throughout the permit term.
- Addition of TMDL-based effluent mass limits for total phosphorus.
- Addition of monthly effluent monitoring for one year (Jan-Dec 2028) for ammonia nitrogen and copper.
- Addition of PFOS/PFOA monitoring at a frequency of every other month in accordance with s. NR 106.98(2), Wis. Adm. Code.
- Updated the monitoring quarters for the acute whole effluent toxicity (WET) testing.
- Removed hexachlorobenzene monitoring.

Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the Water Quality-Based Effluent Limitations (WQBEL) Memo, by Michael Polkinghorn, Water Resources Engineer, dated September 27, 2024.

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

Expression of Limits – In accordance with the federal regulation 40 CFR 122.45(d) and s. NR 205.065, Wis. Adm. Code, limits in this permit are to be expressed as weekly average and monthly average limits whenever practicable. Minor changes have been made to the limits for total residual chlorine.

$CBOD_5$, TSS, and pH – Categorical limits and WQBELs are included in the permit as outlined in ch. NR 210, Wis. Adm. Code.

Mercury – Requirements for mercury are included in s. NR 106.145, Wis. Adm. Code. (See http://dnr.wi.gov/topic/Mercury/). The City of Merrill applied for a mercury variance, under the provisions of s. NR 106.145, Wis. Adm. Code, with its application for permit reissuance. The previous permit also included a mercury variance. The Department reviewed Merrill's application for a mercury variance. The information supplied in the application supports the request. The proposed permit requires the permittee to implement a Mercury Pollutant Minimization Program (PMP) and submit annual progress reports each year by January 31st.

The Department concludes that the City of Merrill is qualified for a variance from the water quality standard for mercury and proposes reissuance of this permit with the proposed variance.

Acute Whole Effluent Toxicity (WET) – Testing is required during the following quarters: October – December 2025; July – September 2026; April – June 2027; January – March 2028; and October – December 2029.

E. coli – E. coli effluent limits of 126 #/100 mL as a monthly geometric mean that may not be exceeded and 410 #/100 mL as a daily maximum that may not be exceeded more than 10 percent of the time in any calendar month are effective at permit reissuance. Section NR 102.04(5)(a), Wis. Adm. Code, states that all surface waters shall be suitable for recreational use and meet the E. coli criteria established to protect this use. As part of the reissuance process, the requirements for disinfection were reviewed under s. NR 210.06(3), Wis. Adm. Code.

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. Every other month monitoring is included in the permit in accordance with s. NR 106.98(2)(c), Wis. Adm. Code.

Chloride – The above-referenced WQBEL Memo contains a recommendation for one year (or 11 samples) of chloride monitoring on a monthly basis. The permit application required four samples for chloride and those results averaged 115 mg/L. Collecting 11 samples is only necessary in order to calculate a P_{99} but in this case, it is not necessary based on available data showing chloride concentrations well below the calculated limit.

4 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	Cake	Anaerobic Digestion (AD)	Volatile Solids Reduction (VSR)	Land Apply (LA)	128 metric tons land applied in 2023
003	B	Liquid	AD	VSR	LA	N/A – Emergency only
004	B	Liquid	AD	VSR	LA	N/A – Emergency only
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.						
Is a priority pollutant scan required? No.						

Sample Point Number: 002- CAKE SLUDGE; 003- EMERGENCY LIQUID SLUDGE (PD), and 004- EMERGENCY LIQUID SLUDGE (SD)

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	
Nitrogen, Ammonium (NH4-N) Total		Percent	Annual	Composite	
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. Monitoring and limits apply at Sampling Point 002 only.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	See the Sludge Analysis for PCBs section. Monitoring and limits apply at Sampling Point 002 only.
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information. Monitoring applies at Sampling Point 002 only.
PFAS Dry Wt			Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information. Monitoring applies at Sampling Point 002 only.

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.

- The year in which PCB monitoring is required has been updated to 2026. Monitoring and limits apply at Sampling Point (Outfall) 002 only. Sampling Points 003 and 004 are for emergency use; the permittee must contact the Department prior to landspreading via Outfalls 003 and/or 004.
- Addition of annual PFAS (PFOA + PFOS) monitoring pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code. Monitoring applies at Sampling Point (Outfall) 002 only. Sampling Points 003 and 004 are for emergency use; the permittee must contact the Department prior to landspreading via Outfalls 003 and/or 004.

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). Radium requirements are addressed in s. NR 204.07(3)(n), Wis. Adm. Code.

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

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

5 Schedules

5.1 Mercury Pollutant Minimization Program

As a condition of the variance to the water quality based effluent limitation(s) for mercury granted in accordance with s. NR 106.145(6), Wis. Adm. Code, the permittee shall perform the following actions.

Required Action	Due Date
Annual Mercury Progress Reports: Submit an annual mercury progress report related to the pollutant minimization activities for the previous year. The annual mercury progress report shall: Indicate which mercury pollutant minimization activities or activities outlined in the Pollutant Minimization Program Plan have been implemented and state which, if any, activities from the Pollutant Minimization Program Plan were not pursued and why; Include an assessment of whether each implemented pollutant minimization activity appears to be effective or ineffective at reducing pollutant discharge concentrations and identify actions planned for the upcoming year; Identification of barriers that have limited program effectiveness and adjustments to the program that will be implemented during the next year to help address these barriers; Include an analysis of trends in total effluent mercury concentrations based on mercury sampling; and Include an analysis of how influent and effluent mercury varies with time and with significant loading of mercury. The first annual mercury progress report is to be submitted by the Due Date.	01/31/2026
Annual Mercury Progress Report #2: Submit a mercury progress report, related to the pollutant minimization activities for the previous year, as defined above.	01/31/2027
Annual Mercury Progress Report #3: Submit a mercury progress report, related to the pollutant minimization activities for the previous year, as defined above.	01/31/2028
Annual Mercury Progress Report #4: Submit a mercury progress report, related to the pollutant minimization activities for the previous year, as defined above.	01/31/2029
Final Mercury Report: Submit a final report documenting the success in reducing mercury concentrations in the effluent, as well as the anticipated future reduction in mercury sources and mercury effluent concentrations. The report shall: Summarize mercury pollutant minimization activities that have been implemented during the current permit term and state which, if any, activities from the Pollutant Minimization Program Plan were not pursued and why; Include an assessment of which pollutant minimization activities appear to have been effective or ineffective. Evaluate any needed changes to the pollutant reduction strategy accordingly; Identification of barriers that have limited program effectiveness and adjustments to the program that will be implemented during the next variance term (if applicable) to help address these barriers; Include an analysis of trends in mercury concentrations based on sampling and data during the current permit term; and Include an analysis of how influent and effluent mercury varies with time and with significant	09/30/2029

loadings of mercury. If the permittee intends to reapply for a mercury variance per s. NR 106.145, Wis. Adm. Code, for the reissued permit, a detailed Pollutant Minimization Program Plan outlining the pollutant minimization activities proposed for the upcoming permit term shall be submitted along with the final report. An updated pollutant minimization plan shall: Include an explanation of why or how each pollutant minimization activity will result in reduced discharge of the target pollutant; Evaluate any new available information on pollutant sources, timing, and concentration to update the mass balance assumptions and expected sources of the pollutant; and Identify any information needs that would help to better determine pollutant sources and make plans to collect that information.	
Annual Mercury Reports After Permit Expiration: In the event that this permit is not reissued by the date the permit expires, the permittee shall continue to submit annual mercury reports for the previous year following the due date of Annual Mercury Progress Reports listed above. Annual Mercury Progress reports shall include the information as defined above.	

5.2 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
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. 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.	03/31/2026
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. 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. The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan. 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. 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.	03/31/2027

Explanation of Schedules

5.1 Mercury Pollutant Minimization Program – This schedule is included as a condition of the variance to the water quality-based effluent limitation(s) for mercury granted in accordance with s. NR 106.145(6), Wis. Adm. Code. The schedule requires annual reports be submitted each year by the due date.

5.2 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.

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

Attachments:

WQBEL Memo: Water Quality-Based Effluent Limitations for the City of Merrill WPDES Permit No. WI-0020150-11-0, by Michael Polkinghorn, EIT, Water Resources Engineer, dated September 27, 2024

Mercury PMP (Pollutant Minimization Program) Plan, dated 11/12/24

Mercury Variance EPA Data Sheet

Justification Of Any Waivers From Permit Application Requirements

No waivers from permit applications were requested or granted.

Prepared By: Sarah Donoughe, Wastewater Specialist-Adv **Date:** November 19, 2024

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: September 27, 2024

TO: Sarah Donoughe – NER/Green Bay Service Center

FROM: Michael Polkinghorn – NOR/Rhinelander Service Center Michael Polkinghorn

SUBJECT: Water Quality-Based Effluent Limitations for the City of Merrill
WPDES Permit No. WI-0020150-11-0

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 Merrill in Lincoln County. This municipal wastewater treatment facility (WWTF) discharges to the Wisconsin River, located in the Prairie Watershed in the Upper Wisconsin River Basin. This discharge is included in the Wisconsin River TMDL as approved by EPA on April 26, 2019 with site-specific criteria approved by EPA on July 9, 2020. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
$CBOD_5$			40 mg/L	25 mg/L	1, 2, 3
TSS			45 mg/L	30 mg/L	1, 2
pH	9.0 s.u.	6.0 s.u.			1, 2
Bacteria					4
Interim Limit Fecal Coliform				400 #/100 mL geometric mean	
Final Limit *E. coli*				126 #/100 mL geometric mean	
Chlorine (Total Residual) May – September	38 µg/L		**38 µg/L**	**38 µg/L**	1, 5
Mercury (Total Recoverable) Interim	8.5 ng/L				6
Phosphorus				1.0 mg/L 11 lbs/day	7
Ammonia Nitrogen					8
Copper (Total Recoverable)					8
Chloride					8
PFOS and PFOA					9
TKN, Nitrate+Nitrite, and Total Nitrogen					1, 10
Acute WET	1.0 TUa				1, 11

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Footnotes:

1. No changes from the current permit.
2. These limits are based on the Warm Water Sport Fish community of the immediate receiving water as described in s. NR 210.05(1), Wis. Adm. Code.
3. This facility meets the conditions as described in s. NR 210.07(4), Wis. Adm. Code. Significant improvements to treatment quality at the facility will prompt a re-evaluation of this variance. Otherwise the need for $CBOD_5$ limits does not need to be demonstrated at subsequent permit reissuances if the treatment quality is expected to be similar compared to when the limits were implemented in the permit.
4. Bacteria limits apply during the disinfection season of May – September. The fecal coliform interim limit will apply until the end of the compliance schedule when *E. coli* limits take effect. 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. 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.
6. An alternative effluent limitation of 8.5 ng/L, equal to the 1-day P_{99} of representative data, as a daily maximum may be included in the permit in place of the WQBELs if a mercury variance application is submitted and approved by EPA. In the absence of a mercury variance, the monthly average mercury WQBEL or 1.3 ng/L, mass limits, and additional concentration limits to meet the expression of limits requirements in s. NR 106.07, Wis. Adm. Code, would be required.
7. The concentration limit is a technology-based limit as described in subch. II of NR 217, Wis. Adm. Code. The mass limit is based on the WRB TMDL to address phosphorus water quality impairments within the TMDL area.
8. Monthly monitoring for 1 year is recommended during the reissued permit term.
9. Once every two months monitoring is required in accordance with s. NR 106.98(2), Wis. Adm. Code.
10. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, quarterly total nitrogen monitoring is recommended for all major municipal major permittees. Total nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total Kjeldahl nitrogen (TKN) (all expressed as N).
11. Annual acute whole effluent toxicity (WET) testing is recommended during the reissued permit term. According to the requirements specified in s. NR 106.08, Wis. Adm. Code, an acute WET limit is required. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Michael Polkinghorn at (715) 360-3379 or Michael.Polkinghorn@wisconsin.gov and Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (3) – Narrative, discharge area map, & weekly/monthly average ammonia nitrogen limit calculation.

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Attachment #1

Water Quality-Based Effluent Limitations for
City of Merrill

WPDES Permit No. WI-0020150-11-0

Prepared by: Michael A. Polkinghorn

PART 1 – BACKGROUND INFORMATION

Facility Description

The City of Merrill wastewater treatment facility is an activated sludge facility which consists of mechanical screening (removes debris) with bar screen backup and grit removal via an aerated grit chamber. It includes three primary clarifiers where solids are allowed to settle. Flow then enters two aeration tanks where it mixes with activated sludge which breaks down the organic matter. Activated sludge is composed of settled solids containing naturally occurring bacteria recycled from the treatment system. The water is then pumped into two final clarifiers where remaining solids are settled out. Alum is added following primary clarification to facilitate the precipitation of phosphorus. Some of the sludge is returned to the head of the aeration tanks to re-seed the new wastewater entering the tank while the rest of the sludge is sent to waste. The settled solids (sludge) from the system that is not used as activated sludge is removed, thickened, and treated by bacteria and organisms through anaerobic digestion; reducing harmful pathogens to safe levels. Water is removed from the sludge via a belt press before it is land spread on Department approved agricultural sites. The wastewater is seasonally disinfected (May – September) via chlorination and then dechlorinated via sodium bisulfite. Caustic soda is added for pH adjustment. Effluent is discharged on a continuous basis via Outfall 001 to the north bank of the Wisconsin River, approx. 1.1 miles downstream of Center Ave.

Attachment #2 is a discharge area map of Outfall 001.

Existing Permit Limitations

The current permit, expired on 03/31/2024, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
$CBOD_5$			40 mg/L	25 mg/L	2, 3, 4
TSS			45 mg/L	30 mg/L	2, 4
pH	9.0 s.u.	6.0 s.u.			2, 4
Fecal Coliform May – September			**656#/100 mL** **geometric mean**	400#/100 mL geometric mean	5
Chlorine (Total Residual) May – September	38 µg/L		**38 µg/L**	**38 µg/L**	5
Mercury Interim	9.85 ng/L				6

Attachment #1

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Phosphorus				1.0 mg/L	7
Hexachlorobenzene					1
TKN, Nitrate+Nitrite, and Total Nitrogen					1
Acute WET	1.0 TUa				8

Footnotes:

1. Monitoring only.
2. These limits are based on the Warm Water Sport Fish community of the immediate receiving water as described in s. NR 210.05(1), Wis. Adm. Code.
3. This facility meets the conditions as described in s. NR 210.07(4), Wis. Adm. Code. Significant improvements to treatment quality at the facility will prompt a re-evaluation of this variance. Otherwise the need for $CBOD_5$ limits does not need to be demonstrated at subsequent permit reissuances if the treatment quality is expected to be similar compared to when the limits were implemented in the permit.
4. **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.
5. 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.
6. This interim limit is an alternative mercury effluent limit based on the variance granted by EPA as described in s. NR 106.145(4), Wis. Adm. Code, for the current permit term. This limit is based on the 1-day P_{99} of effluent data and includes implementation of a pollutant minimization plan.
7. This is a technology-based limit as described in subch. II of NR 217, Wis. Adm. Code.
8. Annual acute whole effluent toxicity (WET) tests were required during the current permit term.

Receiving Water Information

- Name: Wisconsin River
- Waterbody Identification Code (WBIC): 1179900.
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q_{10} and 7-Q_2 values are from USGS for Station UW8 (SW ¼, SE ¼, Section 12, T31W – R6E), approx. 0.5 mi downstream of Prairie River confluence in Merrill WI, where Outfall 001 is located.
  7-Q_{10} = 846 cubic feet per second (cfs)
  7-Q_2 = 1,320 cfs
  90-Q_{10} = 1,122 cfs
  Harmonic Mean Flow = 1,950 cfs
- Hardness = 41 mg/L as $CaCO_3$. This value represents the geometric mean of data (n = 57) from multiple stations on the Wisconsin River between Tomahawk and Merrill WI.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%.

- Source of background concentration data: Metals data from multiple stations on the Wisconsin River between Tomahawk and Merrill WI, are used for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: There are several other dischargers to the Wisconsin River however they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: The Wisconsin River is on the Clean Water Act Section 303(d) list for mercury and PCBs contamination in fish tissue. Outfall 001 is included in the WRB TMDL which addresses phosphorus water quality impairments within the TMDL area.

Effluent Information

- Design flow rate(s):
  Annual average = 3.06 million gallons per day (MGD)
  Peak daily = 5.643 MGD
  Peak weekly = 4.710 MGD
  Peak monthly = 4.060 MGD
  The peak design flows were estimated from the annual average design flow and a peaking factor based on data from October 2013 – December 2017.

  For reference, the actual average flow from April 2019 – July 2024 was 1.20 MGD.
- Hardness = 115 mg/L as $CaCO_3$. This value represents the geometric mean of data (n = 4, April 2023 – May 2023) from the permit application.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water source: Domestic wastewater with 3 industrial contributors (Northern Wire, Merrill Manufacturing, and Mitchel Metals). Water supply from the City of Merrill.
- Total Phosphorus Wasteload Allocation: 3,413 lbs/yr, 9 lbs/day (*Appendix K of Total Maximum Daily Loads for Total Phosphorus in the Wisconsin River Basin, April 2019, page 23*).
- Additives: The facility has included 4 additives in the permit application that are used in the process waste stream to Outfall 001. These additives are listed below:
  - Chemtrade Liquid Alum – Chemical phosphorus removal.
  - Wausau Chemical Caustic Soda (50%) – pH adjustment.
  - Hydrite Chemical Sodium Bisulfite – Dechlorination.
  - Erco Worldwide Chlorine Gas – Disinfection.
- Effluent characterization: This facility is categorized as a major municipal, so the permit application required effluent sample analyses for all the "priority pollutants" except for the Dioxins and Furans as specified in s. NR 200.065, Table 1, Wis. Adm. Code. The current permit required monitoring for hexachlorobenzene.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the columns titled "MEAN EFFL. CONC.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.
- Mercury field blanks (Sample Point 101) indicated contamination was present from either sample transportation or environmental sources via 1 detect on the 07/10/2023 sample. Therefore, the effluent mercury sample associated with this blank is not used in this evaluation.
- The chromium (6+) sample of 2.2 µg/L provided in the permit application is greater than the provided total recoverable chromium sample of nondetectable at <1.1 µg/L. Because the analytical method for

the total recoverable chromium test is known to be more sensitive than the analytical method for the chromium (6+) test, this is most likely a sampling error. Therefore, this evaluation will treat the chromium (6+) sample as equal to the total recoverable chromium sample.

- Additional effluent ammonia nitrogen data (n = 3, October 2017) is utilized to better determine the need for ammonia nitrogen limits in the reissued permit.

Chloride & Copper Effluent Data

Sample Date	Copper (µg/L)	Chloride (mg/L)
04/09/2023	7.0	110
04/12/2023	5.7	100
04/16/2023	4.8	100
04/20/2023	5.9	150
04/23/2023	5.6	
04/26/2023	6.8	
04/30/2023	7.3	
05/23/2023	6.2	
05/29/2023	7.0	
06/01/2023	5.3	
06/05/2023	17	
Mean		115
1-day P_{99}	18	
4-day P_{99}	12	

Mercury Effluent Data

Statistics	Conc. (ng/L)
1-day P_{99}	8.54
4-day P_{99}	4.62
30-day P_{99}	2.33
Mean	1.39
Std	1.80
Sample size	21
Range	0.301 - 8.96

The following table presents the average concentrations and loadings at Outfall 001 from April 2019 – July 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*
$CBOD_5$	3 mg/L
TSS	7 mg/L
pH field	6.83 s.u.
Fecal Coliform	193 #/100 mL

Chlorine (Total Residual)	<100 µg/L
Mercury	1.39 ng/L
Phosphorus	0.69 mg/L

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

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

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

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

Acute Limits based on 1-Q_{10}

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Code, (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q_{10} receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

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

Where:

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

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

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

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

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q_{10} method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for the City of Merrill and the limits are set based on two times the ATC.

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/chloride (mg/L) and mercury (ng/L).

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)
RECEIVING WATER FLOW = 678 cfs, (1-Q_{10} (estimated as 80% of 7-Q_{10})), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD. mg/L	ATC	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Copper	115	17.7	35.3			18	17
Mercury (ng/L)		830	1,660			8.54	8.96
Zinc	115	136	271.4	54.3	41		41
Chloride (mg/L)		757	1,514	303	115		150
Phenols**		4,460.3	4,460.3	892.1	0.014		0.014

* 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.
** The limit for this substance is based on a secondary value. Acute limits are set equal to the secondary value rather than two times or using the 1-Q_{10} s. NR 106.06(3)(b)2 and s. NR 105.05(2)(f)6), Wis. Adm Code.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)
RECEIVING WATER FLOW = 212 cfs (¼ of the 7-Q_{10}), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Copper	41	4.83	0.738	187.6			12
Mercury (ng/L)		440	2.24	19,995			4.62
Zinc	41	55.2	1.98	2,433	487	41	
Chloride (mg/L)		395	5.1	17,812	3,562	115	
Phenols**		2,197.2		100,348	20,070	0.014	

* 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.
** The limit for this substance is based on a secondary value.

Monthly Average Limits based on Wildlife Criteria (WC)
RECEIVING WATER FLOW = 281 cfs (¼ of the 90-Q_{10}), as specified in s. NR 106.06(4), Wis. Adm. Code

SUBSTANCE	WC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	30-day P_{99}
Mercury (ng/L)	1.3	2.24	**1.3**	**2.33**

Monthly Average Limits based on Human Threshold Criteria (HTC)
RECEIVING WATER FLOW = 488 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Mercury (ng/L)	1.5	2.24	**1.5**			**2.33**
Cyanide, total	9,300		966,869	193,374	0.04	

Attachment #1

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 488 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Chloroform	1,960		203,770	40,754	0.18

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 required for mercury. Limits and monitoring recommendations are made in the paragraphs below:

Total Residual Chlorine – Because chlorine is added as a disinfectant, effluent limitations are recommended to assure proper operation of the de-chlorination system. Section NR 210.06(2)(b), Wis. Adm. Code, states, "When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L." Because the WQBELs are more restrictive, they are recommended instead. **Therefore, a daily maximum limit of 38 µg/L is required.** Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required. **The weekly and monthly average limits of 38 µg/L are required to continue during the reissued permit term to satisfy the expression of limits requirements as described in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes.**

Copper – Considering available effluent data from the current permit term (April 2023 – June 2023), the 1-day and 4-day P_{99} concentrations are 18 and 12 µg/L respectively. These are below the calculated copper WQBELs; **therefore, limits are not recommended during the reissued permit term.** However, copper would likely demonstrate reasonable potential for a daily maximum limit should the mean effluent concentration be compared to $1/5^{th}$ of the limit in the case less than 11 detectable samples are available. **Therefore, monthly monitoring for 1 year is recommended during the reissued permit term.**

Chloride – Considering available effluent data from the current permit term (April 2023), the mean effluent concentration is 115 mg/L. These are below the calculated chloride WQBELs; **therefore, limits are not recommended during the reissued permit term. Monitoring is recommended to ensure that 11 sample results are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code.**

Mercury – A review of data from April 2019 – July 2024 indicates the 30-day P_{99} is 2.33 ng/L, which is above the wildlife criterion of 1.3 ng/L. **Therefore, 1.3 ng/L as a monthly average is recommended during the reissued permit term.**

Section NR 106.145(4), Wis. Adm. Code, allows for eligibility for an alternative mercury effluent limitation if the permittee applies for an alternative mercury limit, which includes the submittal of a pollutant minimization plan. The City of Merrill has submitted this application. Section NR 106.145(5), Wis. Adm. Code, specifies that an alternative limitation shall equal the 1-day P_{99} of the effluent data and shall be expressed as a daily maximum concentration. The 1-day P_{99} of effluent mercury data is 8.54

ng/L. **Therefore, if a variance is granted and approved by US Environmental Protection Agency, then an alternative mercury limitation of 8.5 ng/L as a daily maximum would be recommended during the reissued permit term.** The current permit included an alternative mercury effluent limit of 9.85 ng/L as a daily maximum.

In the absence of a mercury variance, mass limits and additional concentration limits to meet the expression of limits requirements in s. NR 106.07, Wis. Adm. Code, would be required.

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the type of discharge and the effluent flow rate, **PFOS and PFOA monitoring is recommended at a once every two months frequency during the reissued permit term.**

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

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. Given the fact that the City of Merrill does not currently have ammonia nitrogen limits, the need for limits is evaluated at this time.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)
Daily maximum limitations are based on ATC in ch. NR 105, Wis. Adm. Code, which are a function of the effluent pH and the receiving water classification. The 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 WWSF community, and
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 1,414 sample results were reported from April 2019 – July 2024. The maximum reported value was 7.92 s.u. (Standard pH Units). The effluent pH was 7.42 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 7.60 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 7.57 s.u. Therefore, a value of 7.60 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 7.60 s.u. into the equation above yields an ATC = 16.99 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 either set equal to two times ATC or the mass balance equation based on the 1-Q_{10} low flow if it is determined that the prior stated method is not sufficiently protective of fish and aquatic life. The more restrictive calculated limits shall apply.

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

Daily Maximum Ammonia Nitrogen Determination

Method	Ammonia Nitrogen Limit (mg/L)
2×ATC	34
1-Q_{10}	2,435

The 2×ATC method yields the most stringent limits for the City of Merrill.

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 Community

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

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)
The weekly and monthly average ammonia nitrogen limits calculation from the previous limit evaluation (February 2013) do not change because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous limit evaluation are included as attachment #2.

Effluent Data
Four samples for ammonia nitrogen were taken April 2023 – May 2023, and their results were as follows:

Ammonia Nitrogen Effluent Data

Sample Date	Conc. (mg/L)
10/17/2017	2.4
10/20/2017	0.67
10/23/2017	2.7
04/09/2023	14
04/12/2023	11
04/16/2023	5.8
05/23/2023	7.4
Mean	6.3

Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits. **Therefore, ammonia nitrogen limits are not recommended during the reissued permit term.** Because historic effluent ammonia nitrogen data was utilized to determine reasonable potential, **monthly monitoring for 1 year is recommended during the reissued permit term.**

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

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

1. The geometric mean of *E. coli* bacteria in effluent samples collected in any calendar month may not exceed 126 counts/100 mL.
2. No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 counts/100 mL.

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

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

Effluent Data
The City of Merrill has monitored effluent *E. coli* from May 2023 – September 2023 and a total of 28 results are available. A geometric mean of 126 counts/100 mL was never exceeded, with a maximum monthly geometric mean of 125 counts/100 mL. Effluent data has exceeded 410 counts/100 mL 5 times (which is 18% of the total sample results). The maximum reported value was 7,000 counts/100 mL. Based on this effluent data it appears that the facility cannot meet new *E. coli* limits and a compliance schedule is needed in the reissued permit.

Interim Limit
During the compliance schedule, an interim limit applies to prevent back-sliding from the current level of disinfection during the compliance schedule period. **Therefore, the current fecal coliform limit shall be included in the reissued permit as an interim limit of 400 counts/100 mL as a monthly geometric mean**. **Any weekly geometric mean limit which was included in the current permit for expression of limits purposes does not need to be included in the permit as an interim limit.**

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 Merrill currently has a limit of 1.0 mg/L, **this limit should be included in the reissued permit.** This limit remains applicable unless a more stringent WQBEL is given. In addition, the need for a WQBEL for phosphorus must be considered.

TMDL Limits

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

For the reasons explained in the April 30, 2012 paper entitled *Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin*, WDNR has determined that the phosphorus WQBELs set equal to WLAs would not be consistent with the assumptions and requirements of the TMDL. Therefore, limits given to continuously discharging facilities covered by the WRB TMDL are given monthly average mass limits. If the equivalent effluent concentration is less than or equal to 0.3 mg/L, 6-month average mass limits are also included. The following equation shows the calculation of equivalent effluent concentration:

$$\text{TP Equivalent Effluent Concentration} = \text{Daily WLA} \div (\text{Flow Rate} * \text{Conversion Factor})$$
$$= 9.35 \text{ lbs/day} \div (3.06 \text{ MGD} * 8.34)$$
$$= 0.37 \text{ mg/L}$$

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 6-month average limit is required.

$$\text{TP Monthly Average Permit Limit} = \text{daily WLA} * \text{monthly average multiplier}$$
$$= 9.35 \text{ lbs/day} * 1.21$$
$$= 11 \text{ lbs/day}$$

The multiplier used in the monthly average calculation was used as recommended in TMDL implementation guidance. A coefficient of variation (CV) was calculated, based on phosphorus mass monitoring data, to be 0.39. Because the City of Merrill can meet the monthly mass limit based on their specific CV; this value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as 5x/wk; if a different monitoring frequency is used, the stated

limits should be reevaluated.

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

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

Effluent Data

The following table lists the statistics for effluent phosphorus concentrations from April 2019 – July 2024. In the cases where reporting the mass discharge is not required in the current permit, the mass is calculated using the reported phosphorus concentration and the effluent flow rate for that day.

Phosphorus Effluent Data

Statistics	Conc. (mg/L)	Mass Discharge (lbs/day)
1-day P_{99}	1.31	15.6
4-day P_{99}	0.96	10.7
30-day P_{99}	0.78	8.2
Mean	0.69	7.0
Std	0.21	2.7
Sample Size	1,403	1,403
Range	0.21 - 1.75	1.6 - 19.5

A review of the calculated monthly average mass phosphorus loadings (n = 64, April 2019 – July 2024) shows the facility would have been 98% compliant with the TMDL limit or only 1 monthly average would have exceeded the TMDL limit. **Therefore, the monthly average limit of 11 lbs/day is recommended to be effective upon permit reissuance.**

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 >20:1), the lowest calculated limitation is 120° F as a daily maximum (s. NR 106.55(6)(a), Wis. Adm. Code). At temperatures above approximately 103° F, conventional biological treatment systems do not function properly and experience upsets. There is no indication that this has ever occurred in this treatment system,

so there is no reasonable potential for the discharge to exceed this limit. **Therefore, temperature limits or monitoring are not recommended during the reissued permit term.**

PART 7 – WHOLE EFFLUENT TOXICITY (WET)

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

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

- Chronic testing is usually not recommended where the ratio of the 7-Q_{10} to the effluent flow exceeds 100:1. For the City of Merrill, that ratio is approximately 179:1. With this amount of dilution, there is believed to be little potential for chronic toxicity effects in the Wisconsin River associated with the discharge from the City of Merrill. **Therefore, 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.

- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations. Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005. Therefore, all WET data from June 2005 to present are included in the table below:

WET Data History

Date Test Initiated	Acute Results LC_{50} %				Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	
04/26/2006	>100	71.7	Fail	Yes	Retest
07/26/2006	>100	>100	Pass	Yes	Retest
08/16/2006	>100	>100	Pass	Yes	Retest
06/05/2007	66.8	>100	Fail	Yes	

07/18/2007	>100	>100	Pass	Yes	Retest
08/08/2007	17.7	50.7	Fail	Yes	Retest
11/28/2007	>100	>100	Pass	Yes	Retest
12/18/2007	>100	>100	Pass	Yes	Retest
08/06/2008	>100	>100	Pass	Yes	
10/14/2008	>100	>100	Pass	Yes	
06/23/2009	>100	>100	Pass	Yes	
06/30/2009	>100	>100	Pass	Yes	Retest
07/14/2009	>100	>100	Pass	Yes	Retest
02/17/2010	>100	>100	Pass	Yes	
07/21/2010	>100	>100	Pass	Yes	
06/01/2011	>100	>100	Pass	Yes	
07/19/2011	>100	>100	Pass	Yes	
02/08/2012	>100	>100	Pass	Yes	
12/19/2012	>100	>100	Pass	Yes	
08/26/2014	>100	69.5	Fail	Yes	
10/01/2014	>100	>100	Pass	Yes	Retest
11/18/2014	>100	>100	Pass	Yes	Retest
06/10/2015	>100	>100	Pass	Yes	
09/20/2016	>100	>100	Pass	Yes	
10/04/2017	>100	>100	Pass	Yes	
03/14/2018	>100	>100	Pass	Yes	
10/16/2019	>100	>100	Pass	Yes	
07/22/2020	>100	>100	Pass	Yes	
05/12/2021	>100	>100	Pass	Yes	
10/25/2023	>100	>100	Pass	Yes	
08/07/2024	>100	>100	Pass	Yes	

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

  Acute Reasonable Potential = [(TUa effluent) (B)]

Acute WET Limit Parameters

TUa (maximum) $100/LC_{50}$	**B** (multiplication factor from s. NR 106.08(5)(c), Wis. Adm. Code, Table 4)
100/17.7 = 5.65	2.6 Based on 4 detects

[(TUa effluent) (B)(AMZ)] = 15 > 1.0

Therefore, reasonable potential is shown for an acute WET limit using the procedures in s. NR 106.08(6), Wis. Adm. Code, and representative data from April 2006 – August 2024.

Expression of WET limits

Acute WET limit = 1.0 TU_a as a daily maximum.

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

WET Checklist Summary

	Acute
AMZ/IWC	Not applicable. **0 Points**
Historical Data	Thirty one tests used to calculate RP. Four tests failed. **0 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. **0 Points**
Receiving Water Classification	WWSF community. **5 Points**
Chemical-Specific Data	No reasonable potential for limits based on ATC; Chlorine limit carried over from the current permit. Ammonia nitrogen, mercury, copper, chloride, and cyanide detected. Additional Compounds of Concern: Chloroform. **5 Points**
Additives	One biocide and 3 water quality conditioners added. Permittee has proper P chemical SOPs in place: Yes. **6 Points**
Discharge Category	Three Industrial Contributors. **7 Points**
Wastewater Treatment	Secondary or better. **0 Points**
Downstream Impacts	No impacts known. **0 Points**
Total Checklist Points:	**23 Points**

Attachment #1

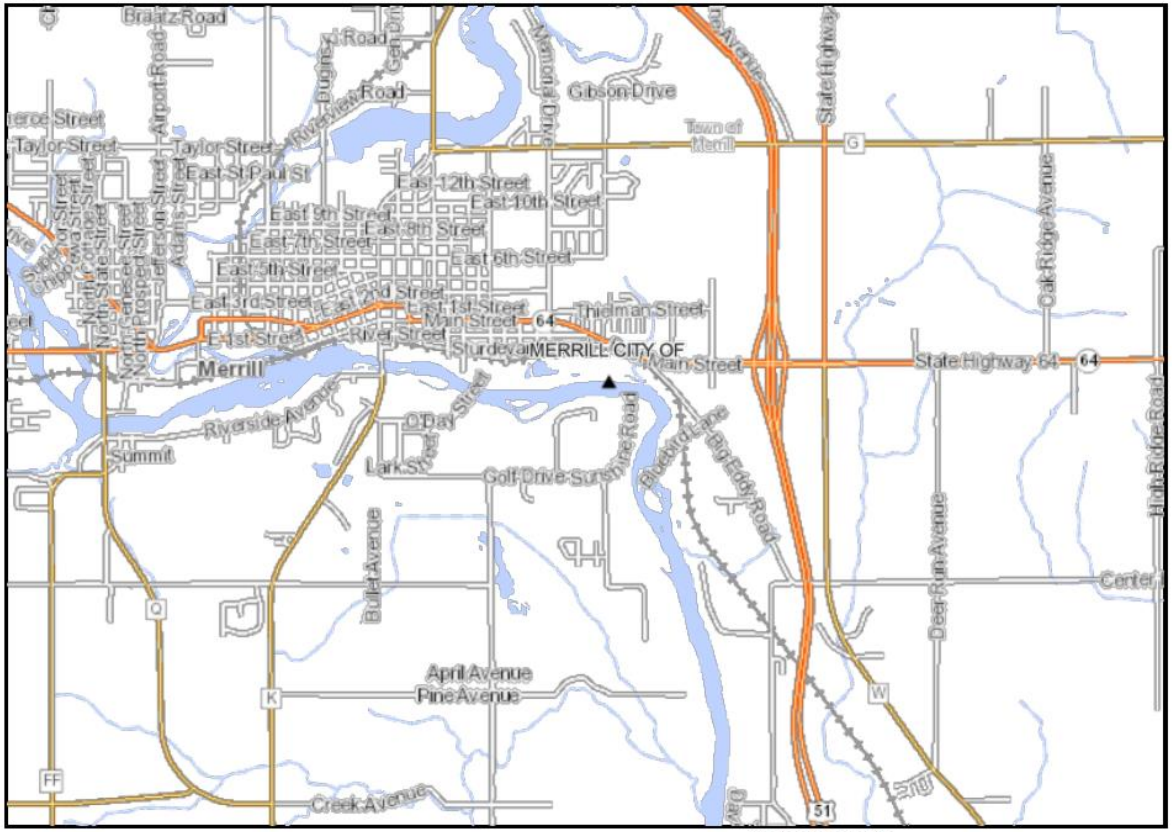
	Acute
Recommended Monitoring Frequency (from Checklist):	Annual acute tests recommended.
Limit Required?	Limit = 1.0 TU_a
TRE Recommended? (from Checklist)	No.

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, **annual acute WET tests are recommended in the reissued permit.** A minimum of annual acute monitoring is recommended because the City of Merrill is a major municipal discharger with a design flow greater than 1.0 MGD. Federal regulations at 40 CFR Part 122.21(j) require at least 4 acute and chronic WET tests with each permit application on samples collected since the previous reissuance. Therefore, annual monitoring is recommended in the permit term, so that data will be available for the next permit application. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).

- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, **an acute WET limit is required.** The acute WET limit shall be expressed as 1.0 TUa as a daily maximum in the effluent limits table of the permit. A minimum of annual acute monitoring is required because an acute 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.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

City of Merrill Outfall 001 Discharge Area



Legend

Permits

Surface Water Outfalls

Basemaps

Hydro

24K Hydro (Cached) Inland

Water Resources

Rivers and Streams

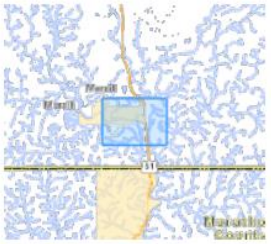
Intermittent Streams

Open Water

Great Lakes water

Notes

WPDES viewer, WDNR



Service layer credits:
WI DNR, Water Division | WI Dept. of Natural Resources, Division of Water

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Date Printed: 09/13/2024

Attachment #3

Weekly/Monthly Average Ammonia Nitrogen WQBEL Calculations – February 2013

Ammonia Limit Calculations Summary – City of Merrill (2013 Update)		
Classification:	FAL	(Wisconsin River)
EFFLUENT FLOW (MGD):	3.06	(2008-12 ave. Qe = 1.02 MGD)
MAX. EFFLUENT pH (s.u.):	7.50	(99th %tile)
BACKGROUND INFO**:**	Summer	Winter
Ammonia (mg/L, default)	0.04	0.08
Temp. (deg C, default)	25	3
pH (std. units, default)	7.79	7.38
% of river flow used:	100	25
Ref. weekly flow (cfs): 7Q10 = 846 cfs	846	211.5
Ref. monthly flow (cfs): 7Q2 = 1,320 cfs	1,122	280.5
CRITERIA (in mg/L):	Summer	Winter
Acute (w/eff. pH @ 7.5 s.u.)	19.98	19.89
4-day Chronic (ELS present)	4.10	12.01
30-day Chronic (ELS present)	1.64	4.80
EFFLUENT LIMITATIONS:	Summer	Winter
Daily maximum	40 mg/L	40 mg/L
Weekly average	730 mg/L	545 mg/L
Monthly average	380 mg/L	285 mg/L

Mercury Pollutant Minimization Program

Merrill Water Utility

11/12/2024

The Merrill Water Utility Mercury PMP was initially developed in 2007 to reduce the amount of mercury discharged to the environment. In 2013 a mercury variance limit was set at 15ng/L along with PMP reports annually. In 2019 a mercury variance limit was set at 9.85ng/L with PMP reports annually.

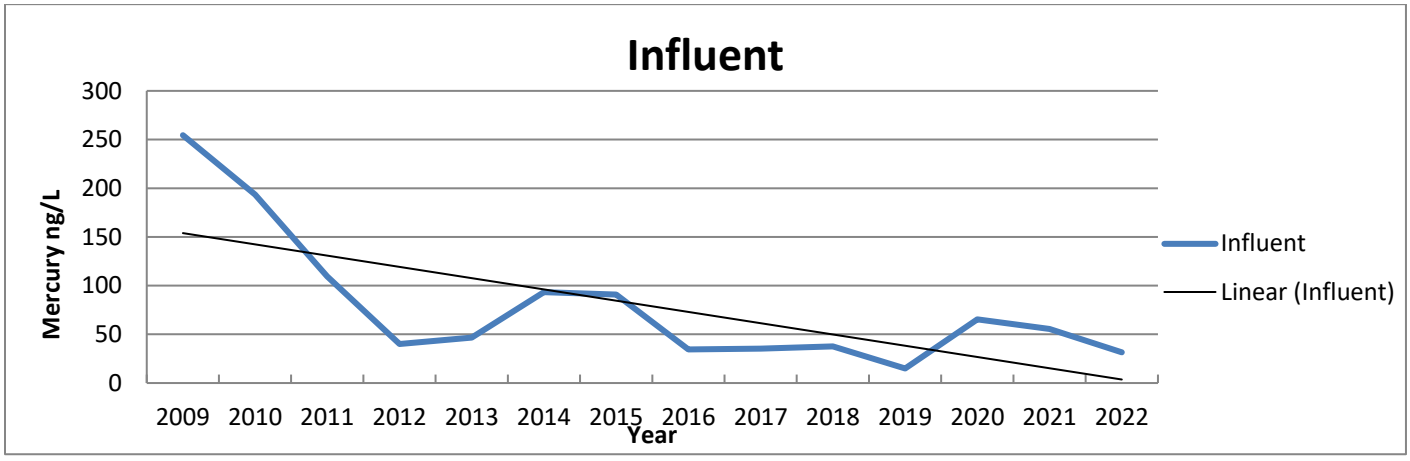
Dental providers have been identified as a primary potential source for mercury due to the use of amalgam. The City of Merrill passed a Mercury Control Ordinance in 2005 requiring dental offices to implement Best Management Practices and install separators for amalgam which decreased both the influent and effluent mercury levels. Dental offices are contacted on an annual basis to determine that amalgam separators are installed and that the mercury is being properly recycled.

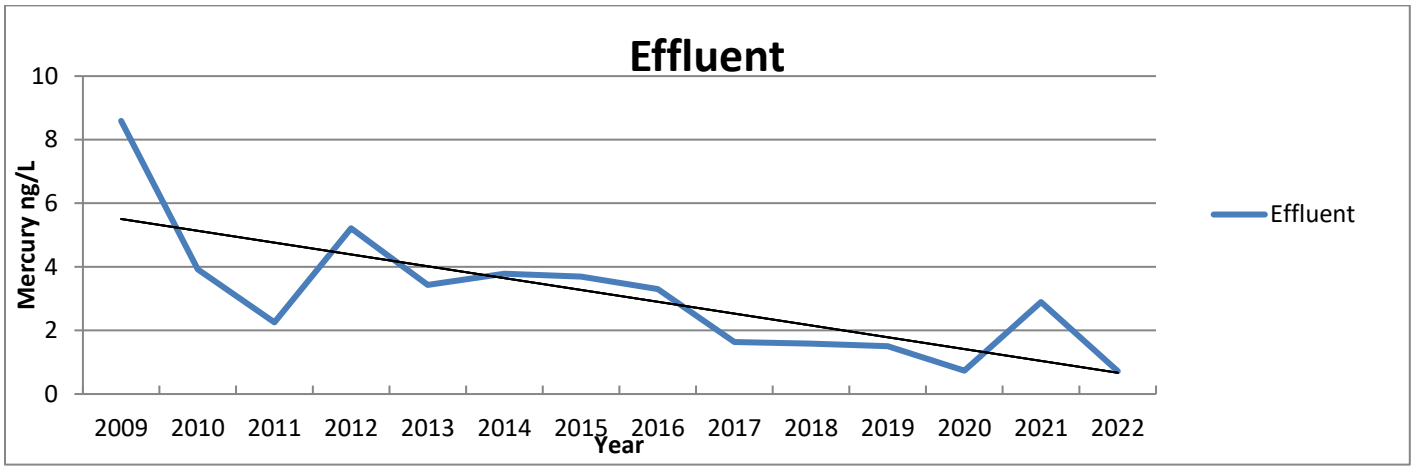
Both medical & veterinary facilities are also contacted on an annual basis with a letter requesting that they complete a Best Management Practice form. The list of facilities contacted is included in the annual report.

Additionally schools and industries are also monitored and contacted on an annual basis as these have also been identified as potential sources of mercury.

Ongoing Efforts and Plans to Reduce Mercury

Merrill Water Utility will continue to document the effectiveness of PMP efforts with respect to mercury. Quarterly sampling and testing of influent and effluent wastewater will be continued. Data will be reviewed annually to evaluate trends in mercury concentrations. Annual testing of mercury concentrations in bio solids will also continue. In 2019 the Utility started testing at key locations such as lift stations and river crossings. We had one location with a high result and we will continue to monitor that area and attempt to pinpoint a potential source. Where there are any other high results located in the collection system, the Utility will take steps to pinpoint any potential sources of mercury. When a source is identified, the Utility will take the necessary steps to add this to the Mercury PMP plan and address the issue utilizing the most current mercury BMP's. Below is a graph of our influent and effluent historical mercury data.





Plan for 2024 to 2029

1. Update the BMP forms for medical facilities. Contact all medical facilities in the wastewater service area regarding programs in place for the disposal of mercury waste and spill management annually.
2. Contact all dental facilities in the wastewater service area regarding disposal of mercury wastes and programs in place for disposal of mercury wastes. The survey will include a request for documentation regarding maintenance performed on amalgam separators.
3. Contact all schools and industries in the wastewater service area regarding programs in place for disposal of mercury waste, spill management, and mercury elimination efforts.
4. Review BMP's, mercury use, disposal and possibly spill issues with our industries as part of the annual pretreatment program inspections.
5. We will be implementing various sampling locations to determine if there are any potential sources of mercury that could be pinpointed.
6. Any point sources that could be determined/discovered would be worked with to eliminate or reduce mercury.

Maintenance of effluent quality will be facilitated by:

1. Repeated contacts with customers that represent potential sources of mercury to confirm that BMP's have been implemented and remain in place.
2. Continued operation of the WWTP to optimize treatment for conventional pollutants.

An annual PMP status report will also be prepared and submitted to the WDNR. The annual status report will include a list of the potential mercury sources, a summary of actions taken as part of the PMP, and the wastewater influent, effluent, and biosolids mercury monitoring results.

Facilities List

Name of Facility	Address	Type of Facility	Amalgam Separator	Contact	Phone
Aspirus Clinic Merrill	3333 E Main street	Medical	N/A	Michelle Hoffman	715-539-5600
Bone & Joint Clinic	100 Eagle Dr	Medical	N/A		715-536-7181
Marshfield Clinic Merrill	1205 O'day street	Medical	N/A	Karrie Bohman	715-389-3763
Advanced Foot & Ankle	410 E 2nd street	Medical	N/A	Jeff Chism	715-536-7444
Aspirus Hospital Merrill	601 South Center Ave	Medical	N/A		715-536-5511
Pine Crest Nursing Home	2100 E 6th street	Medical	N/A	John Hanson	715-218-3636
Bell Tower Residence	1500 O'day street	Medical	N/A	Arick Bushar	715-536-5575
Woodland Court Elderly Service	1102 S Center Ave	Medical	N/A	Darrel Dengel	715-539-9700
Rockwood Hospital for Pets	900 S Center Ave	Veterinary	N/A	Heidi Hoock	715-539-8811
Merrill Veterinary Clinic	1301 E Main	Veterinary	N/A	Cassey Krueger	715-536-9177
Oak Park Dental	2402 E Main street	Dental	Yes	Andy Olson	715-833-8755
Merrill Smiles LLC	3424 E Main street	Dental	Yes	Kelly Packard-Grey	715-536-7104
Quirt Dental	2812 E Main street	Dental	Yes	Katy Bruski	715-536-9628
Merrill Area Public Schools	1201 N Sales street	School	N/A	Dale Bergman	715-536-7383
St John's Lutheran School	1104 E 3rd street	School	N/A	Daren Catlin	715-536-7264
Trinity Lutheran School	611 W Main street	School	N/A		715-536-7501
St Francis Catholic School	1708 E 10th street	School	N/A	Katy Bruski	715-536-9628
Merrill MFG	236 S Genesee street	Industrial Metal Finishing	N/A	Pat Taylor	715-536-5533
Mitchel Metal Products	905 S State street	Industrial Metal Finishing	N/A	Darin Lucas	715-536-0141
Northern Wire Inc	1100 W Taylor st	Industrial Metal Finishing	N/A	Dean	715-539-5347

Action Item	Detail	Timing/duration
Update the BMP forms on the facilities list. Including schools, dentist, medical, and industrial facilities.	Identify new facilities that need to be added to the list. Identify facilities that no longer a potential source of mercury and remove from the list. Update any changes with contacts and information.	Ongoing (Years 1-5)
Contact dental facilities in the wastewater service area regarding disposal of mercury wastes and programs in place for disposal of mercury wastes.	The survey will include a request for documentation regarding maintenance performed on amalgam separators and change forms if needed. There will be annual site visits to all dental facilities to discuss mercury management and disposal.	Ongoing (Years 1-5)
Contact schools in the wastewater service area regarding programs in place for disposal of mercury waste, spill management, and mercury elimination efforts.	The schools in the service area claim to be mercury free. Continue to visit and review with them and discuss mercury disposal and education for disposal in the schools.	Ongoing (Years 1-5)
Contact industrial contributors regarding proper disposal of mercury waste and spill management	Meet with the metal finishing facilities to discuss their pretreatment program and annually inspect and review BMP's. If necessary, perform follow-up inspections and random sampling.	Ongoing (Years 1-5)
Monitoring of influent and effluent and sludge	Include data on discharge monitoring reports (DMR's) and annual mercury report to WDNR. Review mercury results with inflow to the plant and sewer cleaning records. Perform random sampling of hauled waste from landfill leachate and outside industries.	Quarterly (Years 1-5)
Continue to sample the collection system and develop a monitoring program.	Investigate areas of concern and document any high sample locations. If an area is located, determine potential sources and investigate trends and sewer users in the area. Take additional samples to gather more information.	Ongoing (Years 1-5)
Community Education and Outreach	Promote the Lincoln County's hazardous waste program. Send out information to residents annually and post information on social media and the city's website annually.	(Years 1-5)
Mercury Progress Report to the DNR	Review data collected and submit annual reports that are required by the WPDES permit	Annually

Facility Specific Mercury Variance Data Sheet

Directions: Please complete this form electronically. Record information in the space provided. Select checkboxes by double clicking on them. Do not delete or alter any fields. For citations, include page number and section if applicable. Please ensure that all data requested are included and as complete as possible. Attach additional sheets if needed.

Section I: General Information

A. Name of Permittee: City of Merrill

B. Facility Name: Merrill Wastewater Treatment Facility (WWTF)

C. Submitted by: Wisconsin Department of Natural Resources

D. State: Wisconsin **Substance:** Mercury **Date completed:** December 5, 2024

E. Permit #: WI-0020150-11-0 **WQSTS #:** (EPA USE ONLY)

F. Duration of Variance **Start Date:** April 1, 2025 **End Date:** March 31, 2030

G. Date of Variance Application: September 20, 2023

H. Is this permit a:
☐ **First time submittal for variance**
☒ **Renewal of a previous submittal for variance** *(Complete Section X)*

I. Description of proposed variance:

The City of Merrill seeks a variance to the water quality standards for mercury for its WWTF. The proposed variance for mercury, from the chronic water quality-based effluent limit of 1.3 ng/L, to an alternative mercury effluent limit (AMEL) of 9.0 ng/L, is expressed as a daily maximum limit.

The Department concludes that the City of Merrill has met the requirements of s. NR 106.145, Wisconsin Administrative Code, and s. 283.15, Wisconsin Statutes. The Department further concludes that requiring the City of Merrill to meet the water quality standard for mercury would result in substantial and widespread adverse social and economic impacts in its service area. Furthermore, the Department concludes that there is no feasible pollutant control technology that can be applied to achieve compliance with the mercury effluent limits that are equal to the mercury criteria. The Department therefore proposes that this permit include a discharger-specific variance to the mercury water quality standards for wildlife and human health.

The Department concludes that the AMEL reflects the greatest pollutant reduction achievable by the permittee with the pollutant control technologies currently applied in the permittee's WWTF. The permit requires the permittee to implement its Mercury Pollutant Minimization Program (PMP). The Department considers the highest attainable condition (HAC) of the receiving water to be the AMEL – applied as an interim effluent limit for the term of the variance – combined with the permittee's implementation of its Mercury PMP. The term of the proposed variance is five years, concurrent with the term of the proposed WPDES permit. The underlying designated uses and criteria of Wisconsin's mercury water quality standards (WQS) will be retained, and all other applicable WQS will remain in effect with adoption of the proposed variance.

Citation: An alternative mercury effluent limitation under s. NR 106.145, Wis. Adm. Code represents a variance to water quality standards authorized by s. 283.15, Wis. Stats.

J. List of all who assisted in the compilation of data for this form

Name	Email	Phone	Contribution
Sarah Donoughe	Sarah.Donoughe@Wisconsin.gov	(920) 366-6076	Permit Drafter
Amy Garbe	Amy.Garbe@Wisconsin.gov	(608) 716-9968	Compliance Engineer
Michael Polkinghorn	Michael.Polkinghorn@Wisconsin.gov	(715) 360-3379	Parts II D-H and J

Section II: Criteria and Variance Information

A. Water Quality Standard from which variance is sought: 1.3 ng/L Wildlife Criterion

B. List other criteria likely to be affected by variance: 1.5 ng/L Human Threshold Criterion

C. Source of Substance: The Department assumes that among current sources of mercury to the WWTF's collection system, dental facilities are the most significant source, with additional contributions from medical facilities, industries, schools and domestic sources. Legacy contamination in the collection system may represent an additional source of mercury to the WWTF.

It is widely recognized that the primary source of the mercury contaminating Wisconsin's surface waters is from atmospheric deposition.

D. Ambient Substance Concentration: 2.24 ng/L ☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

E. If measured or estimated, what was the basis? Include citation.
Measurement from multiple sites in Wisconsin River between Tomahawk and Merrill WI.

F. Average effluent discharge rate: 1.20 MGD (April 2019 – July 2024) **Maximum effluent discharge rate:** 3.49 MGD (04/18/2019)

G. Effluent Substance Concentration: 1.39 ng/L (average), 2.33 ng/L (30-day P_{99}), (April 2019 – July 2024) ☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

H. If measured or estimated, what was the basis? Include Citation. Effluent monitoring as required in the current permit. P_{99} calculation as described in s. NR 106.05(5), Wis. Adm. Code.

I. Type of HAC:
☐ **Type 1: HAC reflects waterbody/receiving water conditions**
☐ **Type 2: HAC reflects achievable effluent conditions**
☒ **Type 3: HAC reflects current effluent conditions**

J. Statement of HAC: The Department has determined the highest attainable condition of the receiving water is achieved through the application of the variance limit in the permit, combined with a permit requirement that the permittee implement its Mercury PMP. Thus, the HAC at commencement of this variance is 9.0 ng/L, which reflects the greatest mercury reduction achievable with the current treatment processes, in conjunction with the implementation of the permittee's Mercury PMP. The current effluent condition is reflective of on-site optimization measure that have already occurred. This HAC determination is based on the economic feasibility of available compliance options for the Merrill WWTF at this time (see Economic Section below). The permittee may seek to renew this variance in the subsequent reissuance of this permit; the Department will reevaluate the HAC in its review of such a request. A subsequent HAC cannot be defined as less stringent than this HAC.

K. Variance Limit : 9.0 ng/L

L. Level currently achievable (LCA): 9.0 ng/L

M. What data were used to calculate the LCA, and how was the LCA derived? (*Immediate compliance with LCA is required.)*
Effluent monitoring during April 2019 – July 2024. LCA = 1-day P_{99} calculation as described in s. NR 106.05(5), Wis. Adm. Code.

Citation: s. NR 106.145(5), Wis. Adm. Code.

N. Explain the basis used to determine the variance limit (which must be ≤ LCA). Include citation.
The variance limit = 1 Day P99. The limit is established in accordance with s. NR 106.145(5), Wis. Adm. Code.

O. Select all factors applicable as the basis for the variance provided under 40 CFR 131.10(g). Summarize justification below: ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☒ **6**
Section NR 106.145(1), Wis. Adm. Code, outlines several findings that justify variances for mercury. The Department intended that this provision be generally applicable to all dischargers of mercury, which produce large volumes of effluent with already extremely low mercury concentrations. The Department considers treating to produce effluent at concentrations to meet the limit to be technically and economically infeasible.

Citation: Assessing the Economic Impacts of the Proposed Ohio EPA Water Rules on the Ohio Economy, April 24, 1997, Ohio Environmental Protection Agency, Division of Surface Water and Foster Wheeler Environmental Corporation and DRI/McGraw-Hill in support of Amended and New Rules in OAC Chapters 3745-1, -2, and -33.

Section III: Location Information

A. Counties in which water quality is potentially impacted: Lincoln

B. Receiving waterbody at discharge point: Wisconsin River within the Prairie Watershed in the Upper Wisconsin River Basin

C. Flows into which stream/river? Mississippi River **How many miles downstream?** 275 mi.

D. Coordinates of discharge point (UTM or Lat/Long): Outfall 001: Lat 45.17694° N ; Long 89.66266° W

E. What are the designated uses associated with this waterbody?
Full fish and aquatic life biological use (warm water sport fish community), recreation, non-public water supply and within the ceded territory (Wild rice has been confirmed downstream of Merrill, but distribution of wild rice beds is difficult to characterize).

F. What is the distance from the point of discharge to the point downstream where the concentration of the substance falls to less than or equal to the chronic criterion of the substance for aquatic life protection?
Ambient mercury concentrations in surface water resulting from the variance will be substantially less than levels that result in direct toxicity to aquatic organisms. EPA's current chronic aquatic life criterion for mercury is 0.9081 µg/L, which is approximately three orders of magnitude greater than the wildlife criteria (0.0013 µg/L). Wisconsin's criteria are 0.44 µg/L and 0.83 µg/L for chronic and acute toxicity, respectively. Therefore, instream concentrations are assumed to be well below the chronic criterion immediately at the point of effluent discharge.

G. **Provide the equation used to calculate that distance** See above.

H. **Identify all other variance permittees for the same substance which discharge to the same stream, river, or waterbody in a location where the effects of the combined variances would have an additive effect on the waterbody:** There is one facility within 30 miles upstream of the City of Merrill.
(see attached map, Current Outfall Variances October 2024)

Permit Number	Facility Name	Facility Location	Variance Limit [µg/L]
WI-0002810	Packaging Corporation of America (PCA)	Tomahawk, WI	26 ng/L (daily max.)

Please attach a map, photographs, or a simple schematic showing the location of the discharge point as well as all variances for the substance currently draining to this waterbody on a separate sheet
(see attached map, Current Outfall Variances October 2024)

I. Is the receiving waterbody on the CWA 303(d) list? If yes, please list the impairments below. ☒ **Yes** ☐ **No** ☐ **Unknown**

River Mile	Pollutant	Impairment
Wisconsin River 268 – 289.17	Mercury and PCBs	Fish tissue consumption advisory

Section IV: Pretreatment (complete this section only for POTWs with DNR-Approved Pretreatment Programs. See w:\Variances\Templates and Guidance\Pretreatment Programs.docx)

A. Are there any industrial users contributing mercury to the POTW? If so, please list.
N/A

B. Are all industrial users in compliance with local pretreatment limits for mercury? If not, please include a list of industrial users that are not complying with local limits and include any relevant correspondence between the POTW and the industry (NOVs, industrial SRM updates and timeframe, etc)
N/A

C. When were local pretreatment limits for mercury last calculated?
N/A

D. Please provide information on specific SRM activities that will be implemented during the permit term to reduce the industry's discharge of the variance pollutant to the POTW
N/A

Section V: Public Notice

A. Has a public notice been given for this proposed variance? ☒ **Yes** ☐ **No**

B. If yes, was a public hearing held as well? ☒ **Yes** ☐ **No** ☐ **N/A**

C. What type of notice was given?
☒ **Notice of variance included in notice for permit** ☐ **Separate notice of variance**

D. Date of public notice: December 13, 2024 **Date of hearing:** January 28, 2025

E. Were comments received from the public in regards to this notice or hearing? *(If yes, please attach on a separate sheet)* ☐ **Yes** ☐ **No**

Section VI: Human Health

A. Is the receiving water designated as a Public Water Supply? ☐ **Yes** ☒ **No**

B. Applicable criteria affected by variance: 1.5 ng/L Human Threshold Criterion

C. Identify any expected impacts that the variance may have upon human health, and include any citations:

- The proposed variance will not adversely affect human health directly through the drinking water.
- Wisconsin's fish consumption advisory program is designed to mitigate the effect of any ambient mercury concentration above the 1.5 ng/L water quality criterion for the protection of the fish-consuming human population by providing advice to the public to guide them on the amount of fish that may be consumed safely.
- Given the lack of wastewater treatment technologies capable of reducing mercury concentrations to achieve a 1.3 ng/L effluent limit, granting a variance in this situation is consistent with protecting the public health, safety and welfare because of the substantial public health and safety benefits of providing wastewater treatment, the continued commitment towards further mercury pollutant minimization, the Wisconsin fish advisory program, and the limited impact of the elevated effluent concentrations given the background mercury concentrations.
- DNR's findings suggest that Hg in walleye from Wisconsin lakes changed in the range of 0.5 to 0.8% per year depending on geographical position in the state during the period of 1982–2005. These trends may reflect geographically differing temporal trends in the amount of Hg deposited to Wisconsin lakes. However, long-term changes in other factors, such as water chemistry, fish growth rates, and lake levels, known to impact Hg bioavailability and accumulation may also be important. (Temporal trends of mercury concentrations in Wisconsin walleye (Sander vitreus), 1982–2005, Paul W. Rasmussen, Candy S. Schrank, Patrick A. Campfield. Ecotoxicology (2007) 16:541–550)

Section VII: Aquatic Life and Environmental Impact

A. Aquatic life use designation of receiving water: Warm Water Sport Fish (WWSF)

B. Applicable criteria affected by variance: 1.3 ng/L Wildlife Criterion

C. Identify any environmental impacts to aquatic life expected to occur with this variance, and include any citations:

<u>Not Likely to Adversely Affect</u>

- Ambient mercury concentrations resulting from the variance will be substantially less than levels that result in direct toxicity to aquatic organisms. EPA's current chronic aquatic life criterion for mercury is 0.9081 µg/L, which is approximately three orders of magnitude greater than the wildlife criteria (0.0013 µg/L). Wisconsin's criteria are 0.44 µg/L and 0.83 µg/L for chronic and acute toxicity, respectively.
    - Hine's emerald dragonfly (Somatochlora hineana, endangered)
    - Higgins' Eye mussel (Lampsilis higgnsii, endangered)
    - Winged Mapleleaf mussel (Quadrula fragosa, endangered)
    - Spectaclecase (Cumberlandia monodonta, candidate)
    - Sheepnose (Plethobasus cyphyus, candidate)

- Low trophic level prey where mercury in prey is unlikely to accumulate to toxic levels in the organism.
    - Piping plover (Charadrius melodus, endangered)
    - Eastern massasauga rattlesnake (Sistrurus catenatus catenatus, candidate)

<u>May Affect, Not Likely to Adversely Affect</u>

- Bald eagle (Haliaeetus leucocephalus, Delisted due to Recovery)

Bald eagles consume fish and waterfowl from surface waters, which puts them at risk of exposure to toxic levels of mercury due to bioaccumulation of mercury in their prey organisms. However, despite the potential for exposure, ambient surface water data show that in recent decades, mercury levels have not increased and bald eagle populations have continued to grow. This indicates that current ambient concentrations of mercury and mercury concentrations in prey organisms do not appear to be limiting recovery of bald eagle populations in Wisconsin. Although this variance will allow permitted dischargers additional time to identify and control sources of mercury in their discharges, the pollutant minimization component of the variances should result in a net reduction in the

amount of mercury discharged to Wisconsin surface waters from permitted point sources, further reducing any risk to bald eagles. In addition, the pollutant minimization programs encourage other pollution prevention efforts, which has a beneficial indirect effect of reducing the use and production of products and processes that use or contribute mercury to the environment. These efforts will also benefit bald eagles.

D. List any Endangered or Threatened species known or likely to occur within the affected area, and include any citations:

Because mercury is pervasive, persistent and bio accumulating in the environment we considered all species listed for the entire state of Wisconsin. The following is Federally Endangered, Threatened, Proposed, and Candidate Species in Wisconsin From U.S. Fish and Wildlife Service, Region 3, April 2015

MAMMALS
Canada lynx (T)
Gray wolf (E)
Northern long-eared bat (T)
BIRDS
Kirtland's warbler (E)
Piping plover (E and CH)
Red Knot (T)
Whooping crane - (NEP)
REPTILE
Eastern massasauga rattlesnake (C)
INSECTS
Hine's emerald dragonfly (E)
Karner blue butterfly (E)
Poweshiek skipperling (E and PCH)
CLAMS (Freshwater mussels, Unionids)
Higgins' eye pearlymussel (E)
Sheepnose mussel (E)
Snuffbox (E)
Spectaclecase mussel (E)
Winged mapleleaf mussel (E)

Citation: U.S. Fish & Wildlife Service – Environmental Conservation Online System (http://www.fws.gov/endangered/) and National Heritage Index (http://dnr.wi.gov/topic/nhi/)

Section VIII: Economic Impact and Feasibility

A. Describe the permittee's current pollutant control technologies in the treatment process:

The City of Merrill Wastewater Treatment Facility is an activated sludge facility which consists of mechanical screening aerated grit removal. It includes three primary clarifiers, two activated sludge basins, and two final clarifiers. Alum is added for phosphorus removal. Solids are sent to anaerobic digesters and thickened via a belt press before it is landspread on Department approved agricultural sites. The wastewater is seasonally disinfected (May – September) via chlorination and then dechlorinated via sodium bisulfite. Caustic soda is added for pH adjustment.

B. What modifications would be necessary to comply with the current limits? Include any citations.

The Department did not evaluate what actions or modifications or other changes would be needed to meet limits based on the water quality standard. As discussed below, the Department considers treating to produce effluent at concentrations to meet the limit to be technically and economically infeasible.

Citation: Assessing the Economic Impacts of the Proposed Ohio EPA Water Rules on the Ohio Economy, April 24, 1997, Ohio Environmental Protection Agency, Division of Surface Water and Foster Wheeler Environmental Corporation and DRI/McGraw-Hill in support of Amended and New Rules in OAC Chapters 3745-1, -2, and -33.

C. Identify any expected environmental impacts that would result from further treatment, and include any citations:

See above.

D. Is it technically and economically feasible for this permittee to modify the treatment process to reduce the level of the substance in the ☐ **Yes** ☒ **No** ☐ **Unknown**

discharge?

The Department considers treating to produce effluent at concentrations to meet the limit to be technically and economically infeasible.

Citation: Assessing the Economic Impacts of the Proposed Ohio EPA Water Rules on the Ohio Economy, April 24, 1997, Ohio Environmental Protection Agency, Division of Surface Water and Foster Wheeler Environmental Corporation and DRI/McGraw-Hill in support of Amended and New Rules in OAC Chapters 3745-1, -2, and -33.

E. If treatment is possible, is it possible to comply with the limits on the substance? ☐ **Yes** ☒ **No** ☐ **Unknown**

F. If yes, what prevents this from being done? Include any citations.

See above.

G. List any alternatives to current practices that have been considered, and why they have been rejected as a course of action, including any citations:

The Department did not evaluate alternative treatment processes to comply with the mercury WQBELs, since the Department considers wastewater treatment to produce effluent at concentrations equal to the mercury criteria to be technically and economically infeasible. The Department considers mercury pollutant minimization to be a viable alternative to wastewater treatment for purposes of reducing the discharge of mercury from WWTFs. Successful implementation of Mercury PMPs has been demonstrated to result in reductions in the amount of mercury discharged to WWTFs (in the influent), leading to reductions in the amount of mercury discharged by WWTFs (in the effluent). Implementation of Mercury PMPs has been shown to be a cost-effective means for permittees to reduce the discharge of mercury from their WWTFs. In this case, the Department considers implementation of a Mercury PMP to be the best alternative for the permittee to reduce its discharge of mercury. Thus, the permit requires the permittee to implement its Mercury PMP and submit annual reports to the Department documenting activities conducted each year and progress made toward achieving compliance with the mercury WQBELs. It is noted that the HAC is partially fulfilled through the permittee's implementation of its Mercury PMP.

Section IX: Compliance with Water Quality Standards

A. Describe all activities that have been, and are being, conducted to reduce the discharge of the substance into the receiving stream. This may include existing treatments and controls, consumer education, promising centralized or remote treatment technologies, planned research, etc. Include any citations.

A condition of the current variance is that the City of Merrill is to continue operation of its mercury pollutant minimization program (PMP). The PMP was initiated in 2007 and is required to be implemented during the current permit term, as a condition of the mercury variance.

Annual Requirements:

- Update BMP forms for all medical facilities and contact all medial facilities regarding programs in place for mercury disposal and spill management.
- Contact all dental facilities regarding programs in place for mercury disposal and spill management and request documentation regarding maintenance on amalgam separators.
- Contact all other industrial facilities regarding programs in place for mercury disposal and spill management.
- Contact industries that represent potential sources of mercury to promote implementation and retention of BMPs
- Monitor influent, effluent, and sludge
- Submit annual progress reports
- Implement sampling at various locations throughout sewer service area to help identify potential sources of mercury.

Every Two Year Requirement:

- Contact all schools regarding programs in place for mercury disposal and spill management.

B. Describe all actions that the permit requires the permittee to complete during the variance period to ensure reasonable progress towards attainment of the water quality standard. Include any citations.

The permit contains a variance to the wildlife water quality-based criterion for mercury granted in accordance with s. 283.15, Stats. As conditions of this variance the permittee shall (a) maintain effluent quality at or below the interim effluent limitation specified in the permit, (b) implement the mercury pollutant minimization measures specified below, (c) follow the Pollutant Minimization Program Plan dated 11/12/24, and (d) perform the actions listed in the schedule (See the Schedules section of the proposed permit):

1. Update the BMP forms for the facilities list, including schools, dentists, medical, and industrial facilities. Contact all of these facilities in the wastewater service area regarding programs in place for the disposal of mercury waste and spill management annually.
2. Contact all dental facilities in the wastewater service area regarding disposal of mercury wastes and programs in place for disposal of mercury wastes. The survey will include a request for documentation regarding maintenance performed on amalgam separators and change forms if needed. Additionally, conduct annual site visits to all dental facilities to discuss mercury management and disposal.
3. Contact all schools and industries in the wastewater service area regarding programs in place for disposal of mercury waste, spill management, and mercury elimination efforts. Conduct site visits, as needed.
4. Contact industrial contributors regarding proper disposal of mercury waste and spill management. Review BMP's, mercury use, disposal and possibly spill issues with industries as part of the annual pretreatment program inspections. Meet with metal finishing facilities to discuss their pretreatment program and annually inspect/review BMPs. When necessary, perform follow-up inspections and random sampling.
5. Monitor influent, effluent and sludge mercury data. Review all mercury results along with inflow to the plant and sewer cleaning records. Perform random sampling of hauled waste from landfill leachate and outside industries.
6. Continue sample collection and develop a monitoring program. Sample for mercury at various sampling locations to determine if there are any potential sources of mercury that may be pinpointed. Investigate areas of concern and document any sample locations with high concentrations. If an area is located, determine potential sources and investigate trends and sewer users in that area. Take additional samples to gather more information, whenever areas of concern are identified.
7. Continue community education and outreach. Repeat contacts with customers that represent potential sources of mercury to confirm that BMP's have been implemented and remain in place. Promote Lincoln County's hazardous waste program. Send out information to residents annually and post information on social media and the City's website annually.

Section X: Compliance with Previous Permit *(Variance Reissuances Only)*

A. Date of previous submittal: March 4, 2019 **Date of EPA Approval:** March 7, 2019

B. Previous Permit #: WI-0020150-10-0 **Previous WQSTS #:** (EPA USE ONLY)

C. Effluent substance concentration: 2.33 ng/L (30-day P99) **Variance Limit:** 9.85 ng/L

D. Target Value(s): N/A **Achieved?** ☒ **Yes** ☐ **No** ☐ **Partial**

E. For renewals, list previous steps that were to be completed. Show whether these steps have been completed in compliance with the terms of the previous variance permit. Attach additional sheets if necessary.

Condition of Previous Variance	Compliance
Contact medical facilities annually	☒ **Yes** ☐ **No**
Contact dental facilities annually	☒ **Yes** ☐ **No**
Contact industries annually	☒ **Yes** ☐ **No**
Collection system sampling	☒ **Yes** ☐ **No**
Monitor influent, effluent, and sludge	☒ **Yes** ☐ **No**
Submit progress reports	☒ **Yes** ☐ **No**