Permit Fact Sheet

General Information

Permit Number:	WI-0025062-11-0
Permittee Name:	Village of Paddock Lake
Address:	6969 236th Ave
City/State/Zip:	Salem, WI 53168
Discharge Location:	West bank of the Brighton Creek, approximately 30 feet upstream of Hwy K bridge
Receiving Water:	Brighton Creek, Des Plaines River Watershed
StreamFlow ($Q_{7,10}$):	0 cfs
Stream Classification:	Warm Water Sport Fish (WWSF) community, non-public water supply
Discharge Type:	Existing, Continuous
Annual Average Design Flow	0.8 MGD
Industrial or commercial contributors	None
Plant Classification	Paddock Lake is an advanced plant with subclasses A1, B, C, D, P, and SS
Approved Pretreatment Program?	N/A

Facility Description

The Village of Paddock Lake operates an extended aeration activated sludge wastewater treatment facility with an annual average design flow of 0.8 MGD. The plant serves approximately 3,000 residents with no significant industrial loading. Treatment consists of fine screening, a two-ring oxidation ditch, clarification, post-aeration and UV disinfection. The treated effluent is pumped to Brighton Creek via force main, approximately 1.2 miles east of the WWTF. Sludge produced by the treatment process is digested aerobically, stored on drying beds for dewatering, and then landfilled by an independent contractor.

Substantial Compliance Determination

Enforcement During Last Permit: No formal enforcement occurred during the last permit term.

After a desk top review of all discharge monitoring reports, CMARs, compliance schedule items, and a site visit on April 17, 2024 conducted by Nick Lent, DNR Wastewater Engineer, this facility has been found to be in substantial compliance with their current permit.

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
701	0.56 MGD (October 2019 – July 2024)	INFLUENT: 24 hour flow proportional composite samples shall be collected prior to the fine screen. Sample point includes plant recycle flows from the sludge holding tank and drying beds.
001	0.45 MGD (October 2019 – July 2024)	EFFLUENT: 24-hr flow proportional composite samples shall be collected at the effluent pump wet well. Grab samples shall be collected at the post-aeration tank effluent channel immediately after UV disinfection.
004	0 US dry tons generated in 2023	LIQUID SLUDGE: Class B, aerobically digested, liquid sludge. Representative sludge samples shall be collected prior to hauling and test results shall be reported on Form 3400-49 'Waste Characteristics'. Hauled sludge reports shall be submitted on Form 3400-52 'Other Methods of Disposal'.
005	185 dry tons in 2023	CAKE SLUDGE: Class B, aerobically digested, bed dried cake sludge. Representative samples shall be collected prior to landfill disposal.

1 Influent – Monitoring Requirements

Sample Point Number: 701- INFLUENT TO PLANT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	

Changes from Previous Permit:

Influent limitations and monitoring requirements were evaluated for this permit term and the sample frequency was changed from continuous to daily.

Explanation of Limits and Monitoring Requirements

Monitoring of influent flow, BOD_5 and total suspended solids is required by s. NR 210.04(2), Wis. Adm. Code, to assess wastewater strengths and volumes and to demonstrate the percent removal requirements in s. NR 210.05, Wis. Adm. Code, and in the Standard Requirements section of the permit.

2 Surface Water - Monitoring and Limitations

Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	5.0 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May - October.
BOD5, Total	Weekly Avg	10 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November - April.
BOD5, Total	Monthly Avg	5.0 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May - October.
BOD5, Total	Monthly Avg	10 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November - April.
Suspended Solids, Total	Monthly Avg	10 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	10 mg/L	3/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	
Dissolved Oxygen	Daily Min	7.0 mg/L	Daily	Grab	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit effective May - September.
E. coli	% Exceedance	Percent	Monthly	Calculated	Limit effective May - September.
Nitrogen, Ammonia Variable Limit		mg/L	3/Week	Calculated	
Nitrogen, Ammonia (NH3-N) Total	Daily Max - Variable	mg/L	3/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	9.9 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November - March.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	5.2 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective April - May.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	3.5 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective June - September.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	8.7 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective October.
Nitrogen, Ammonia	Monthly Avg	4.0 mg/L	3/Week	24-Hr Flow	Limit effective November -

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
(NH3-N) Total				Prop Comp	March.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	2.1 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective April - May.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	1.4 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective June - September.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	3.5 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective October.
Phosphorus, Total	Monthly Avg	0.6 mg/L	3/Week	24-Hr Flow Prop Comp	This is an interim MDV limit. See the MDV/Phosphorus permit subsections and phosphorus schedules.
Phosphorus, Total		lbs/month	Monthly	Calculated	Report the total monthly phosphorus discharged in lbs/month on the last day of the month on the DMR. See Standard Requirements for 'Appropriate Formulas' to calculate the Total Monthly Discharge in lbs/month.
Phosphorus, Total		lbs/yr	Annual	Calculated	Report the sum of the total monthly discharges (for the months that the MDV is in effect) for the calendar year on the Annual report form.
Chloride	Weekly Avg	450 mg/L	4/Month	24-Hr Flow Prop Comp	This is an interim limit. Sampling shall be done on four consecutive days one week per month. See Chloride Variance and Schedules sections for applicable target value.
Chloride		lbs/day	4/Month	Calculated	Chloride mass = daily concentration (mg/L) x daily flow (MGD) x 8.34
Nitrogen, Total Kjeldahl		mg/L	Quarterly	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring permit section.
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring permit section.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
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.
Temperature Maximum		deg F	Weekly	Continuous	Monitoring required in calendar year 2028 (January 1, 2028 - December 31, 2028)
Chronic WET		rTUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	Three tests during permit. See WET permit section.

Changes from Previous Permit

Flow: The sample frequency for flow has been changed from "continuous" to "daily" for eDMR reporting purposes.

E. coli: Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.

Phosphorus: The permittee has applied for a multi-discharger variance (MDV) for phosphorus for this permit term and the application has been approved by the Department. An MDV interim limit of 0.6 mg/L. The permittee is now required to report the total amount of phosphorus discharged in lbs/month and lbs/year. By March 1 of each year the permittee shall make a payment(s) to participating county(s) of $64.75 per pound of phosphorus discharged during the previous year in excess of the target value of 0.2 mg/L.

Total Nitrogen Monitoring (TKN, N02+N03 and Total N): Annual monitoring is required in specific quarters as outlined in the permit.

WET: Three chronic WET tests are included.

Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo dated September 16, 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.

BOD_5, Total Suspended Solids and pH: Categorical limits and WQBELs are included in the permit as outlined in ch. NR 210, Wis. Adm. Code. The effluent limitations for BOD5, Total Suspended Solids, and pH are carried over from the previous permit and are not subject to change at this time because the receiving water characteristics have not changed.

Phosphorus: Phosphorus rules became effective December 1, 2010 per NR 217, Wis. Adm. Code, that required the permittee to comply with water quality based effluent limits (WQBELs) for total phosphorous. The final phosphorus WQBELs are 0.225 mg/L as a monthly average, 0.075 mg/L and 0.50 lbs/day as six-month averages and were to become effective as scheduled unless a variance was granted. For this permit term, the permittee has applied for the Multi-Discharger Variance (MDV) for phosphorus as provided for in s. 283.16, Wis. Stats., and approved by USEPA on February 6, 2017 for a 10-year duration. The permittee qualifies for the MDV because it is an existing source and a major facility upgrade is needed to comply with the applicable phosphorus WQBELs, thereby creating a financial burden. The interim effluent limit for total phosphorus is 0.6 mg/L as an average monthly limit. The limit was derived using DMR data from 9/1/2021 to 8/31/2024.

Conditions of the MDV require the permittee to optimize phosphorus removal throughout the proposed permit term, comply with interim limits and make annual payments to participating county(s) by March 1 of each year based on the pounds of phosphorus discharged during the previous year in excess of the specified target value. A reopener clause is included in the permit to address the current MDV's expiration date, as a permit action may be required to update or remove variance provisions if the MDV is altered or unavailable after February 6, 2027.

The "price per pound" value is $50.00 adjusted for CPI annually during the first quarter as defined by s. 283.16(8)(a)2, Wis. Stats and takes effect for reissued permits with effective dates starting April 1. This may differ from the "price per pound" that is public noticed; however, the "price per pound" is set upon reissuance and is applicable for the entire permit term. The participating county(s) uses these payments to implement non-point source phosphorus control strategies at the watershed level.

Chloride: The calculated 4-day P99 is above the applicable chronic limitation of 400 mg/L, so a chronic (weekly average) limit needs to be continued for the reissued permit. However, the permittee has re-applied for a variance from the chronic chloride water quality criterion, which requires EPA approval. An interim limit of 450 mg/L is included. As a condition of this variance a target value of 400 mg/L and the implementation of chloride source reduction measures, intended to lead to compliance with the target value by the end of the permit term, are also included in the proposed permit. See the schedules section for the chloride compliance schedule. Acute and chronic chloride toxicity criteria for the protection of aquatic life are included in Tables 1 and 5 of ch. NR 105, Wis. Adm. Code; Subchapter IV of ch. NR 106 establishes the procedure for calculating water quality-based effluent limitations (WQBELs) for chloride.

Total Nitrogen Monitoring (NO2+NO3, TKN and Total N): The Department has included effluent monitoring for Total Nitrogen in the permit through the authority under s. 283.55(1)(e), Wis. Stats. Testing is required during the following quarters: October – December 2025, July – September 2026; April – June 2027; January – March 2028; and October – December 2029.

Chronic WET: Testing is required during the following quarters: July – September 2026; January – March 2028; and October – December 2029

PFOS and PFOA: NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Pursuant to s. NR 106.98(3)(b), Wis. Adm. Code, the department evaluated the need for PFOS and PFOA monitoring taking into consideration the presence of potential PFOS or PFOA industrial wastes, remediation sites and other potential sources of PFOS or PFOA. Based on information available at the time the proposed permit was drafted, the department has determined the permittee does not need to sample for PFOS or PFOA in the effluent as part of this permit reissuance. The department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

3 Land Application - Monitoring and Limitations

Municipal Sludge Description

Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
004	Class B	Liquid	Do not land apply. Sludge is hauled to another permitted facility.			0 in 2023
005	Class B	Cake	Do not land apply. Sludge is landfill.			185 in 2023
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**; facility with design flow less than 5 MGD.						

Sample Point Number: 004- Liquid sludge and 005- Cake sludge

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total		Percent	Annual	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Kjeldahl					
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	Sample once in 2026. See PCB permit section.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Sample once in 2026. See PCB permit section.
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

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.

PCB: the year in which PCB monitoring is required has been updated to 2026.

PFAS: Addition of annual PFAS (PFOA + PFOS) monitoring pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.

Explanation of Limits and Monitoring Requirements

Requirements for land application of municipal sludge are determined in accordance with ch. NR 204 Wis. Adm. Code. Ceiling and high-quality limits for metals in sludge are specified in s. NR 204.07(5). 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).

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

Collecting sludge data on PFAS concentrations from a wide range of wastewater treatment facilities will help protect public health from exposure to elevated levels of PFAS and determine the department's implementation of EPA's

recommendations. To quantitate this risk, PFAS sampling has been included in the proposed WPDES permit pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9., Wis. Adm. Code.

Water Extractable Phosphorus: Water extractable phosphorus (WEP) is the coefficient for determining plant available phosphorus from measured total phosphorus. In Wisconsin, the Penn State Method is utilized and is expressed in percent. While a total P may be significant, the WEP may show that only a small percentage of the P is available to plants because of factors such as treatment processes and chemical addition that "tie-up" phosphorus limiting the amount of phosphorus that is plant available. As part of the Wisconsin's nutrient management plan (NMP) requirements, the accounting of all fertilizers must be included over the NMP cycle. The fertilizer value of the waste needs to be communicated to the farmer and accounted for in the NMP.

4 Schedules

4.1 Chloride Source Reduction Measures (Target Value)

As a condition of the variance to the water quality-based effluent limitation(s) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code, the permittee shall perform the following actions.

Required Action	Due Date
Annual Chloride Progress Report: Submit an annual chloride progress report related to the source reduction activities for the previous year. The annual chloride progress report shall: Indicate which chloride source reduction measures or activities in the Source Reduction Plan have been implemented and state which, if any, source reduction measures from the Source Reduction Plan were not pursued and why. Include an assessment of whether each implemented source reduction measure appears to be effective or ineffective at reducing pollutant discharge concentrations and identify actions planned for the upcoming year; Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data; and Include an analysis of how effluent chloride varies with time and with significant loadings of chloride. Note that the interim limitation listed in the Surface Water section of this permit remains enforceable until new enforceable limits are established in the next permit issuance. The first annual chloride progress report is to be submitted by the Date Due.	09/30/2025
Annual Chloride Progress Report #2: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.	09/30/2026
Annual Chloride Progress Report #3: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.	09/30/2027
Annual Chloride Progress Report #4: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.	09/30/2028
Final Chloride Report: Submit the final chloride report documenting the success in meeting the chloride target value of 400 mg/L, as well as the anticipated future reduction in chloride sources and chloride effluent concentrations. The report shall: Summarize chloride source reduction measures that have been implemented during the current permit term and state which, if any, source reduction measures from the Source Reduction Plan were not pursued and why; Include an assessment of which source reduction measures appear to have been effective or	09/30/2029

ineffective. Evaluate any needed changes to the pollutant reduction strategy accordingly; Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data during the current permit term; and Include an analysis of how influent and effluent chloride varies with time and with significant loadings of chloride as identified in the source reduction plan. If the permittee intends to reapply for a chloride variance, for the reissued permit, proposed target limits and a detailed source reduction measures plan, outlining the source reduction activities proposed for the upcoming permit term, shall also be included per ss. NR 106.90 (5) and NR 106.83 (4), Wis. Adm. Code. An updated source reduction measures plan shall: Include an explanation of why or how each source reduction measure will result in reduced discharge of the target pollutant; and Evaluate any 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. Note that the target value is the benchmark for evaluating the effectiveness of the chloride source reduction measures but is not an enforceable limitation under the terms of this permit.	
Annual Chloride 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 chloride reports for the previous year following the due date of Annual Chloride Progress Reports listed above. Annual Chloride Progress Reports shall include the information as defined above.	

4.2 Phosphorus Schedule - Continued Optimization

The permittee is required to optimize performance to control phosphorus discharges per the following schedule.

Required Action	Due Date
Optimization: The permittee shall continue to implement the optimization plan as previously approved to optimize performance to control phosphorus discharges. Submit a progress report on optimizing removal of phosphorus by the Due Date.	03/31/2026
Progress Report #2: Submit a progress report on optimizing removal of phosphorus.	03/31/2027
Progress Report #3: Submit a progress report on optimizing removal of phosphorus.	03/31/2028
Progress Report #4: Submit a progress report on optimizing removal of phosphorus.	03/31/2029
Progress Report #5: Submit a progress report on optimizing removal of phosphorus.	03/03/2030

4.3 Phosphorus Payment per Pound to County

The permittee is required to make annual payments for phosphorus reductions to the participating county or counties in accordance with s. 283.16(8), Wis. Stats, and the following schedule. The price per pound will be set at the time of permit reissuance and will apply for the duration of the permit.

Required Action	Due Date
Annual Verification of Phosphorus Payment to County: The permittee shall make a total payment to the participating county or counties approved by the Department by March 1 of each calendar year.	03/01/2026

The amount due is equal to the following: [(lbs of phosphorus discharged minus the permittee's target value) times ($64.75 per pound)] or $640,000, whichever is less. See the payment calculation steps in the Surface Water section. The permittee shall submit Form 3200-151 to the Department by March 1 of each calendar year indicating total amount remitted to the participating counties to verify that the correct payment was made. The first payment verification form is due by the specified Due Date. Note: The applicable Target Value is 0.2 mg/L as defined by s. 283.16(1)(h), Wis. Stats. The "per pound" value is $50.00 adjusted for CPI.	
Annual Verification of Payment #2: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2027
Annual Verification of Payment #3: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2028
Annual Verification of Payment #4: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2029
Annual Verification of Payment #5: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2030
Continued Coverage: If the permittee intends to seek a renewed variance, an application for the MDV (Multi Discharger Variance) shall be submitted as part of the application for permit reissuance in accordance with s. 283.16(4)(b), Wis. Stats.	
Annual Verification of Payment After Permit Expiration: In the event that this permit is not reissued prior to the expiration date, the permittee shall continue to submit Form 3200-151 to the Department indicating total amount remitted to the participating counties by March 1 each year.	

Explanation of Schedules

4.1: Chloride Source Reduction Measures (Target Value)

This compliance schedule is a condition of receiving a variance from the weekly average water quality-based chloride limit of 450 mg/L. The schedule requires that annual reports shall indicate which source reduction measures Paddock Lake has implemented during each calendar year, and an analysis of chloride concentration and mass discharge data based on chloride sampling and flow data. The annual reports shall document progress made towards meeting the chloride target value of 400 mg/L by the end of the permit term.

4.2: Phosphorus Schedule: Continued Optimization

Per s. 283.16(6)(a), Wis. Stats. the Department may include a requirement that the permittee optimize the performance of a point source in controlling phosphorus discharges, which may be necessary to achieve compliance with multi-discharger variance interim limits. This compliance schedule requires the permittee to continue to implement the optimization plan that was approved during the previous permit term.

4.3: Phosphorus Payment per Pound to County

Subsection 283.16(6)(b), Wis. Stats., requires permittees that have received approval for the multi-discharger variance (MDV) to implement a watershed project that is designed to reduce non-point sources of phosphorus within the HUC 8 watershed in which the permittee is located. The permittee has selected the "Payment to Counties" watershed option described in s. 283.16(8), Wis. Stats. Under this option the permittee shall make annual payment(s) to participating county(s) that are calculated based on the amount of phosphorus actually discharged during a calendar year in pounds per year less the amount of phosphorus that would have been discharged had the permittee discharged phosphorus at a target value concentration of 0.2 mg/L. The pounds of phosphorus discharged in excess of the target value is multiplied by a per

pound phosphorus charge that will equal $64.75 per pound. This schedule requires the permittee to submit Form 3200-151 to the Department indicating the total amount remitted to the participating county(s).

Special Reporting Requirements

NA

Other Comments:

NA

Attachments:

Water Quality-Based Effluent Limitations for Paddock Lake Wastewater Treatment Facility WPDES Permit No. WI-0025061-11-0, dated September 16, 2024

Chloride Variance Documents

Chloride SRM dated November 12, 2024

EPA Data Sheet

MDV Conditional Approval Letter

MDV Evaluation Checklist

Expiration Date:

March 31, 2030

Justification Of Any Waivers From Permit Application Requirements

No waivers were requested or granted.

Prepared By: Victoria ZieglerWastewater Specialist **Date:** October 3, 2024

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 09/16/2024

TO: Victoria Ziegler – SER

FROM: Nicole Krueger – SER Nicole Krueger

SUBJECT: Water Quality-Based Effluent Limitations for Paddock Lake Wastewater Treatment Facility WPDES Permit No. WI-0025062-11

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 Paddock Lake Wastewater Treatment Facility in Kenosha County. This municipal wastewater treatment facility (WWTF) discharges to the Brighton Creek, located in the Des Plaines River Watershed in the Fox (IL) River Basin. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD_5 November – April May – October			 10 mg/L 5.0 mg/L	 **10 mg/L** **5.0 mg/L**		1,3
TSS			10 mg/L	**10 mg/L**		1,3,4
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		7.0 mg/L				1
Bacteria						5
E. coli				126 #/100 mL geometric mean		
Ammonia Nitrogen November – March April – May June – September October	 Variable Variable Variable Variable		 9.9 mg/L 5.2 mg/L 3.5 mg/L 8.7 mg/L	 4.0 mg/L 2.1 mg/L 1.4 mg/L 3.5 mg/L		1,6
Phosphorus LCA Interim Limit HAC Interim Limit Final				 0.7 mg/L 0.6 mg/L 0.225 mg/L	 0.075 mg/L 0.50 lbs/day	4,7
Chloride Dry weather Wet weather			400 mg/L 3,600 lbs/day 4,000 lbs/day			8
TKN, Nitrate+Nitrite, and Total Nitrogen						9
Temperature						10
Chronic WET						11

Footnotes:

1. No changes from the current permit.

2. Monitoring only.
3. 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.
4. A Total Maximum Daily Load (TMDL) is being developed for the Fox (IL) River Basin to address phosphorus water quality impairments within the TMDL area. This TMDL will likely result in limitations for TSS and phosphorus that must be included in WPDES permits, which may be different than those calculated for this reissuance. TMDL-derived limits may be included in lieu of or in addition to the calculated limits upon permit reissuance or modification once the TMDL has been approved by U.S. EPA, according to s. NR 217.16, Wis. Adm. Code.
5. Bacteria limits apply during the disinfection season of May through September. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
6. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values are shown below. These limits apply year-round.

Effluent pH s.u.	**Limit mg/L**	**Effluent pH s.u.**	**Limit mg/L**	**Effluent pH s.u.**	**Limit mg/L**
$6.0 \leq pH \leq 6.1$	54	$7.0 < pH \leq 7.1$	33	$8.0 < pH \leq 8.1$	6.9
$6.1 < pH \leq 6.2$	53	$7.1 < pH \leq 7.2$	30	$8.1 < pH \leq 8.2$	5.7
$6.2 < pH \leq 6.3$	52	$7.2 < pH \leq 7.3$	26	$8.2 < pH \leq 8.3$	4.7
$6.3 < pH \leq 6.4$	51	$7.3 < pH \leq 7.4$	23	$8.3 < pH \leq 8.4$	3.9
$6.4 < pH \leq 6.5$	49	$7.4 < pH \leq 7.5$	20	$8.4 < pH \leq 8.5$	3.2
$6.5 < pH \leq 6.6$	47	$7.5 < pH \leq 7.6$	17	$8.5 < pH \leq 8.6$	2.7
$6.6 < pH \leq 6.7$	45	$7.6 < pH \leq 7.7$	14	$8.6 < pH \leq 8.7$	2.2
$6.7 < pH \leq 6.8$	42	$7.7 < pH \leq 7.8$	12	$8.7 < pH \leq 8.8$	1.8
$6.8 < pH \leq 6.9$	39	$7.8 < pH \leq 7.9$	10	$8.8 < pH \leq 8.9$	1.6
$6.9 < pH \leq 7.0$	36	$7.9 < pH \leq 8.0$	8.4	$8.9 < pH \leq 9.0$	1.3

7. Under the phosphorus MDV, a level currently achievable (LCA) interim limit of 0.70 mg/L should be effective upon permit reissuance. A compliance schedule may be included in the permit until the highest attainable condition (HAC) limit of 0.60 mg/L can be met. The final WQBELs remain at 0.225 mg/L as a monthly average and 0.075 mg/L as a six-month average, as well as a respective mass limit of 0.50 lbs/day.
8. This is the WQBEL for chloride. An alternative effluent limitation of 450 mg/L as a weekly average may be included in the permit in place of this limit if the chloride variance application that was submitted is approved by EPA. If the variance is not approved, a wet weather mass limit would also be required.
9. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total kjeldahl nitrogen (TKN) (all expressed as N).
10. Monitoring only for one year.
11. 3/permit term chronic WET testing is recommended. The Instream Waste Concentration (IWC) to assess chronic test results is 100%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 75%, 50%, 25% & 12.5% and the dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from Brighton Creek. 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 Nicole Krueger at Nicole.Krueger@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (4) – Narrative, Outfall Map, 2013 Ammonia Calculations, & Thermal Table

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Attachment #1

Water Quality-Based Effluent Limitations for
Paddock Lake Wastewater Treatment Facility

WPDES Permit No. WI-0025062-11

Prepared by: Nicole Krueger

PART 1 – BACKGROUND INFORMATION

Facility Description

The Village of Paddock Lake operates an extended aeration activated sludge wastewater treatment facility with an annual average design flow of 0.8 MGD. The plant serves approximately 3000 residents with no significant industrial loading. Treatment consists of fine screening, a two-ring oxidation ditch, clarification, post-aeration and UV disinfection. The treated effluent is pumped to Brighton Creek via force main, approximately 1.2 miles east of the WWTF. Sludge produced by the treatment process is digested aerobically, stored on drying beds for dewatering, and then landfilled by an independent contractor.

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

Existing Permit Limitations

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD_5 November – April May – October			 10 mg/L 5.0 mg/L	 **10 mg/L** **5.0 mg/L**		2,3
TSS			10 mg/L	**10 mg/L**		2,3
pH	9.0 s.u.	6.0 s.u.				2
Dissolved Oxygen		7.0 mg/L				2
Fecal Coliform May – September			**656#/100 mL** **geometric mean**	400#/100 mL geometric mean		3
Ammonia Nitrogen November – March April – May June – September October	 Variable Variable Variable Variable		 9.9 mg/L 5.2 mg/L 3.5 mg/L 8.7 mg/L	 4.0 mg/L 2.1 mg/L 1.4 mg/L 3.5 mg/L		4
Phosphorus MDV Interim Final				 0.7 mg/L 0.225 mg/L	 0.075 mg/L 0.5 lbs/day	5
Chloride			510 mg/L			6
Temperature						1

Footnotes:

1. Monitoring only.
2. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
3. Additional 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.
4. The variable daily maximum ammonia limits are shown in the table below and apply year-round.

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	54	7.0 < pH ≤ 7.1	33	8.0 < pH ≤ 8.1	6.9
6.1 < pH ≤ 6.2	53	7.1 < pH ≤ 7.2	30	8.1 < pH ≤ 8.2	5.7
6.2 < pH ≤ 6.3	52	7.2 < pH ≤ 7.3	26	8.2 < pH ≤ 8.3	4.7
6.3 < pH ≤ 6.4	51	7.3 < pH ≤ 7.4	23	8.3 < pH ≤ 8.4	3.9
6.4 < pH ≤ 6.5	49	7.4 < pH ≤ 7.5	20	8.4 < pH ≤ 8.5	3.2
6.5 < pH ≤ 6.6	47	7.5 < pH ≤ 7.6	17	8.5 < pH ≤ 8.6	2.7
6.6 < pH ≤ 6.7	45	7.6 < pH ≤ 7.7	14	8.6 < pH ≤ 8.7	2.2
6.7 < pH ≤ 6.8	42	7.7 < pH ≤ 7.8	12	8.7 < pH ≤ 8.8	1.8
6.8 < pH ≤ 6.9	39	7.8 < pH ≤ 7.9	10	8.8 < pH ≤ 8.9	1.6
6.9 < pH ≤ 7.0	36	7.9 < pH ≤ 8.0	8.4	8.9 < pH ≤ 9.0	1.3

5. The MDV interim limit for phosphorus shall remain effective until the final phosphorus limits based on s. NR 217.13, Wis. Adm. Code become effective.
6. This is an interim variance limit for the weekly average WQBEL of 400 mg/L.

Receiving Water Information

- Name: Brighton Creek
- Waterbody Identification Code (WBIC): 3000234
- 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 #5527662, where Outfall 001 is located. These flows were updated 07/26/2018.

  7-Q_{10} = 0 cfs (cubic feet per second)
  7-Q_2 = 0.01 cfs
  90-Q_{10} = 0.0085 cfs
  Harmonic Mean Flow = 0 cfs

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7-Q_{10} (cfs)	0.03	0.03	0.12	0.29	0.09	0.02	0.00	0.00	0.00	0.00	0.02	0.03
7-Q_2 (cfs)	0.17	0.22	0.94	1.0	0.44	0.16	0.05	0.02	0.02	0.05	0.13	0.20

- Hardness = 461 mg/L as $CaCO_3$. This value represents the geometric mean of data from chronic WET tests from 11/18/2014 – 02/13/2021.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: Not applicable where the 7-Q_{10} is zero.
- Source of background concentration data: Background metal concentrations are not included because

they don't impact the calculated WQBEL when the receiving water low flows are equal to zero. Background phosphorus data is explained in the phosphorus section of the memo.

- Multiple dischargers: None.
- Impaired water status: The immediate receiving water is not impaired. The Des Plaines River approximately 5 miles downstream is 303(d) listed as impaired for total phosphorus.

Effluent Information

- Design flow rate(s):
  Annual average = 0.8 MGD (Million Gallons per Day)
  Peak daily = 3.0 MGD
  Peak weekly = 1.2 MGD
  The peak design flows were estimated from the annual average design flow and a peaking factor based on data from 10/01/2019 – 07/31/2024.

  For reference, the actual average flow from 10/01/2019 – 07/31/2024 was 0.43 MGD.

- Hardness = 412 mg/L as $CaCO_3$. This value represents the geometric mean of data from the permit reissuance application from 02/06/2024 – 02/15/2024.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water source: Domestic wastewater with water supply from wells.
- Additives: Alum is added for phosphorus removal.
- Effluent characterization: This facility is categorized as a minor municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus ammonia, chloride, hardness and phosphorus.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled "MEAN EFFL. CONC.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

Effluent Copper Data

Sample Date	Copper µg/L	Sample Date	Copper µg/L	Sample Date	Copper µg/L
02/06/2024	6.0	02/19/2024	4.1	03/04/2024	4.3
02/09/2024	4.6	02/22/2024	4.7	03/07/2024	3.4
02/12/2024	5.3	02/26/2024	4.3	03/10/2024	3.9
02/15/2024	3.9	02/29/2024	4.0		
1-day P_{99} = 6.4 µg/L					
4-day P_{99} = 5.3 µg/L					

Effluent Chloride Data

	Chloride mg/L
1-day P_{99}	483
4-day P_{99}	412
30-day P_{99}	371
Mean	350
Std	50.2

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	Chloride mg/L
Sample size	232
Range	210 - 480

The following table presents the average concentrations and loadings at Outfall 001 from 10/01/2019 – 07/31/2024 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter Averages with Limits

	Average Measurement	Average Mass Discharged
BOD_5	1.2 mg/L*	
TSS	2.0 mg/L*	
pH field	7.68 s.u.	
Phosphorus	0.30 mg/L	
Ammonia Nitrogen	0.22 mg/L*	
Chloride	350 mg/L	910 lbs/day
Fecal Coliform	21.2 #/100 mL	
Dissolved Oxygen	12.7 mg/L	

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

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

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

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or 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 the case for Paddock Lake.

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Arsenic		340		340	68.0	<1.1		
Cadmium	412	52.3		52.3	10.5	<1.1		
Chromium	301	4446		4446	889	<1.1		
Copper	412	59.0		59.0			6.4	6.0
Lead	356	365		365	72.9	<4.3		
Nickel	268	1080		1080	216	<1.2		
Zinc	333	345		345	68.9	22		
Chloride (mg/L)		757		757			483	480

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

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

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}	4-day MAX. CONC.
Arsenic		152		152	30.4	<1.1		
Cadmium	175	3.82		3.82	0.76	<1.1		
Chromium	301	326		326	65.2	<1.1		
Copper	463	38.4		38.4			5.3	
Lead	356	95.5		95.5	19.1	<4.3		
Nickel	268	120		120	24.0	<1.2		
Zinc	333	345		345	68.9	22		

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SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}	4-day MAX. CONC.
Chloride (mg/L)		395		395			**412**	**468**

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

Monthly Average Limits based on Wildlife Criteria (WC)
The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

Monthly Average Limits based on Human Threshold Criteria (HTC)
RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370		370	74.0	<1.1
Chromium (+3)	3818000		3818000	763600	<1.1
Lead	140		140	28.0	<4.3
Nickel	43000		43000	8600	<1.2

Monthly Average Limits based on Human Cancer Criteria (HCC)
RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3		13.3	2.66	<1.1

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

Conclusions and Recommendations
Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are required for chloride.

Chloride – Considering available effluent data from the current permit term (10/07/2019 – 07/11/2024), the 1-day P_{99} chloride concentration is 483 mg/L, and the 4-day P_{99} of effluent data is 412 mg/L.

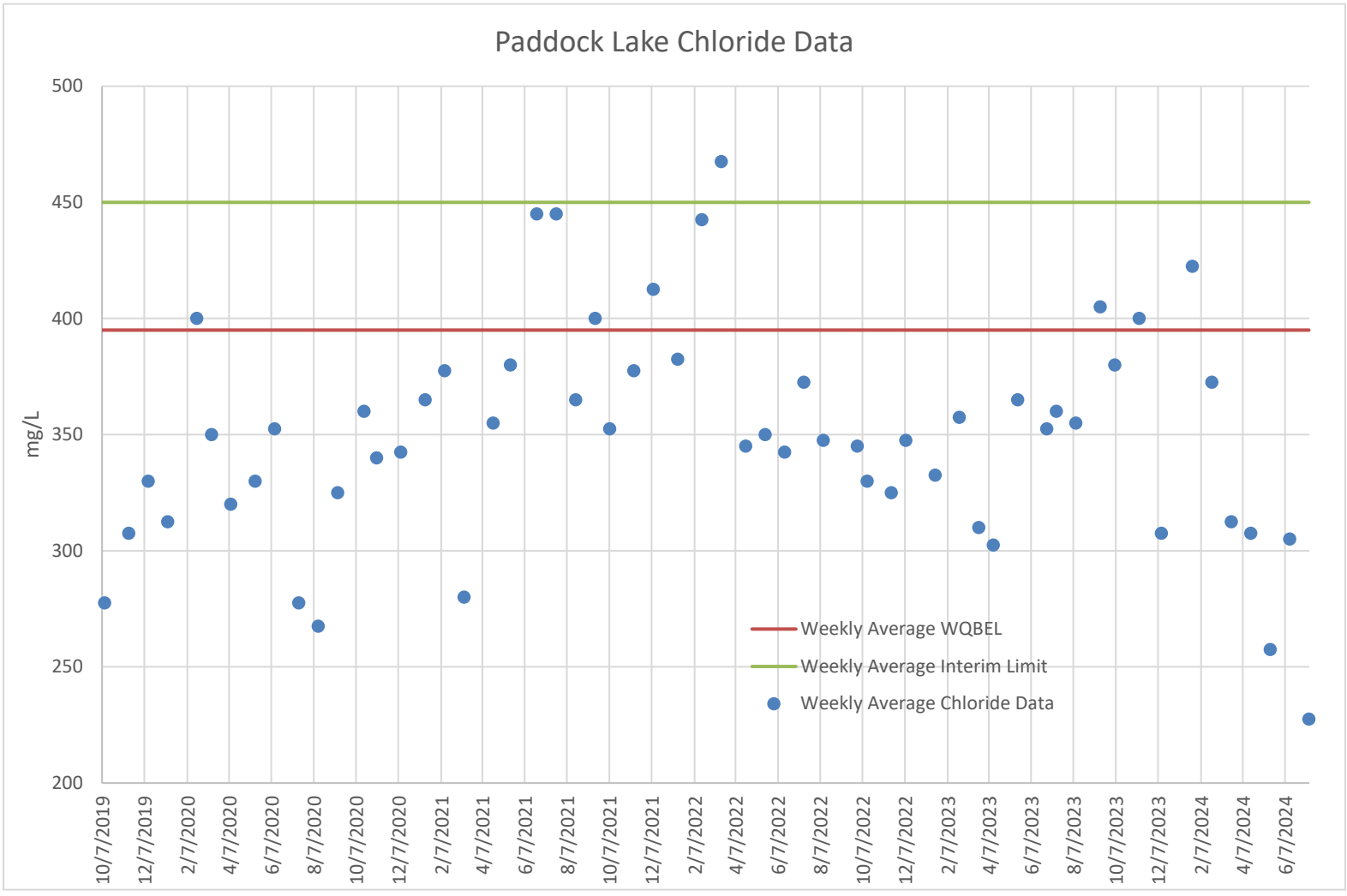
Because the 4-day P_{99} exceeds the calculated weekly average WQBEL, an effluent limit is needed in accordance with s. NR 106.05(4)(b), Wis. Adm. Code.

However, Subchapter VII of ch. NR 106, Wis. Adm. Code, provides for a variance from water quality standards for this substance, and Paddock Lake has requested such a variance. That variance may be granted subject to the following conditions:

1) The permit shall include an "Interim" limitation intended to prevent an increase in the discharge of Chloride;
2) The permit shall specify "Source Reduction Measures" to be implemented during the permit term, with periodic progress reports; and
3) The permit shall include a "Target Limit" or "Target Value" to gage the effectiveness of the Source Reduction Measures, and progress toward the WQBELs.

Interim Limit for Chloride

Section NR 106.82(9), Wis. Adm. Code, defines a "Weekly average interim limitation" as either the 4-day P_{99} concentration or a value no greater than 105% of the highest weekly average concentration of the representative data. **It's recommended that the interim limit be set equal to 450 mg/L,** shown in the graph below. This weekly average limit was exceeded once during the permit term. The 4-day P_{99} is not recommended at this time due to several exceedances of it during the permit term and to account for expected future variability in concentration due to variability in weather.



A target limit and permit language for Source Reduction Measures are not recommended as part of this evaluation. These should follow contact with Paddock Lake. Though if the Department and Paddock Lake are unable to reach agreement on all the terms of a Chloride Variance, the calculated limits described earlier should be included in the permit, in accordance with s. NR 106.83(3), Wis. Adm. Code.

Chloride Monitoring Recommendations
Four samples per month (on consecutive days) are recommended. This allows for averaging of the results to compare with the interim limit and allows the use of the average in determining future interim limits, and degree of success with chloride reduction measures.

In the absence of a variance, Paddock Lake would be subject to the WQBEL of 400 mg/L as a weekly average; the weekly average mass limit of 3,600 lbs/day (395 mg/L × 0.8 MGD × 8.34); and an alternative wet weather mass limit of 4,000 lbs/day (395 × 1.2 MGD × 8.34) based on the estimated peak weekly design flow.

Mercury – The permit application did not require monitoring for mercury because Paddock Lake is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code. In accordance with s. NR 106.145(3)(a)3, Wis. Adm. Code, a minor municipal discharger shall monitor, and report results of influent and effluent mercury monitoring once every three months if, "there are two or more exceedances in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5), Wis. Adm. Code." A review of the past five years of sludge characteristics data reveals that all the sample results are within expected analytical ranges and well below the 17 mg/kg level. The average concentration in the sludge from 05/15/2020 – 06/07/2023 was 0.30 mg/kg, with a maximum reported concentration of 1.2 mg/kg. Therefore, **no mercury monitoring is recommended at Outfall 001.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the type of discharge, the effluent flow rate, and known levels of PFOS/PFOA in the source water, **PFOS and PFOA monitoring is not recommended.** The Department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

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

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. The current permit has daily maximum, weekly average and monthly average limits. These limits are re-evaluated at this time due to the following changes:

- Subchapter IV of ch. NR 106, Wis. Adm. Code allows limits based on available dilution instead of limits set to twice the acute criteria.
- The maximum expected effluent pH has changed

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

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

Where:

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

The effluent pH data was examined as part of this evaluation. A total of 1262 sample results were reported from 10/02/2019 – 07/31/2024. The maximum reported value was 8.1 s.u. (Standard pH Units). The effluent pH was 8.0 s.u. or less 99% of the time. The 1-day P_{99}, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.0 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 8.0 s.u. Therefore, a value of 8.0 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 8.0 s.u. into the equation above yields an ATC = 8.4 mg/L.

Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method

In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are calculated using the the 1-Q_{10} receiving water low flow if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits shall apply.

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

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	17
1-Q_{10}	8.4

The 1-Q_{10} method yields the most stringent limits for Paddock Lake.

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

Daily Maximum Ammonia Nitrogen Limits – WWSF

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	54	7.0 < pH ≤ 7.1	33	8.0 < pH ≤ 8.1	6.9
6.1 < pH ≤ 6.2	53	7.1 < pH ≤ 7.2	30	8.1 < pH ≤ 8.2	5.7
6.2 < pH ≤ 6.3	52	7.2 < pH ≤ 7.3	26	8.2 < pH ≤ 8.3	4.7
6.3 < pH ≤ 6.4	51	7.3 < pH ≤ 7.4	23	8.3 < pH ≤ 8.4	3.9
6.4 < pH ≤ 6.5	49	7.4 < pH ≤ 7.5	20	8.4 < pH ≤ 8.5	3.2
6.5 < pH ≤ 6.6	47	7.5 < pH ≤ 7.6	17	8.5 < pH ≤ 8.6	2.7
6.6 < pH ≤ 6.7	45	7.6 < pH ≤ 7.7	14	8.6 < pH ≤ 8.7	2.2
6.7 < pH ≤ 6.8	42	7.7 < pH ≤ 7.8	12	8.7 < pH ≤ 8.8	1.8
6.8 < pH ≤ 6.9	39	7.8 < pH ≤ 7.9	10	8.8 < pH ≤ 8.9	1.6
6.9 < pH ≤ 7.0	36	7.9 < pH ≤ 8.0	8.4	8.9 < pH ≤ 9.0	1.3

Attachment #1

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

The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do not change because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous WQBEL memo are shown in Attachment #3.

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from 10/08/2019 – 07/31/2024, with those results being compared to the calculated limits to determine the need to include ammonia limits in Paddock Lake's permit for the respective month ranges. That need is determined by calculating 99th upper percentile (or P_{99}) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	April - May	June - September	October	November – March
1-day P_{99}	0.79	0.76	0.84	1.50
4-day P_{99}	0.44	0.45	0.49	0.82
30-day P_{99}	0.26	0.27	0.29	0.42
Mean*	0.17	0.19	0.21	0.25
Std	0.16	0.15	0.17	0.32
Sample size	129	237	61	325
Range	<0.072 - 0.95	<0.072 - 0.91	<0.072 - 0.79	<0.072 - 2.8

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

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

The permit currently has daily maximum, weekly average, and monthly average limits year-round. Where there are existing ammonia nitrogen limits in the permit, the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:

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

Conclusions and Recommendations

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

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
April & May	Variable	5.2	2.1
June – September	Variable	3.5	1.4
October	Variable	8.7	3.5
November – March	Variable	9.9	4.0

Attachment #1

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 Paddock Lake's permit requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit.

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

Effluent Data
Paddock Lake has monitored effluent *E. coli* from 05/02/2024 – 09/03/2024 and a total of 15 results are available. The geometric mean limit of 126 counts/100 mL was not exceeded. Effluent data did not exceed 410 counts/100 mL. The maximum reported value was 4 counts/100 mL. Based on this effluent data, it appears that the facility can meet new *E. coli* limits and **a compliance schedule is not needed in the reissued permit.**

PART 5 – PHOSPHORUS

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

Because Paddock Lake currently has a limit of 0.7 mg/L, which is more stringent than the TBEL 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. The need for a WQBEL for phosphorus must be considered.

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

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

The phosphorus criterion of 0.075 mg/L applies for Brighton Creek.

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

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

Where:

WQC = 0.075 mg/L for Brighton Creek
Qs = 100% of the 7-Q_2 of 0.01 cfs
Cs = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code
Qe = effluent flow rate = 0.80 MGD = 1.24 cfs
f = the fraction of effluent withdrawn from the receiving water = 0

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

A previous evaluation resulted in a WQBEL of 0.075 mg/L using a background concentration of 0.104 mg/L. Section NR 217.13(2)(d), Wis. Adm. Code, states that the determination of upstream concentrations shall be evaluated at each permit reissuance. Additional data were considered in estimating the background phosphorus concentration.

A review of all available in stream total phosphorus data from 10/30/2007 – 10/18/2015 stored in the Surface Water Integrated Monitoring System database indicates the median background total phosphorus concentration in Brighton Creek at 45th St (SWIMS station ID 10008154) is 0.104 mg/L.

Substituting a background concentration above criteria into the limit calculation equation above would result in a calculated limit that is less than the applicable criterion of 0.075 mg/L. However, s. NR 217.13(7), Wis. Adm. Code, specifies that "if the WQBEL calculated pursuant to the procedures in this section is less than the phosphorus criterion specified in s. NR 102.06, Wis. Adm. Code, for the water body, the effluent limit shall be set equal to the criterion."

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from 10/08/2019 – 07/31/2024.

Total Phosphorus Effluent Data

	Phosphorus mg/L
1-day P_{99}	0.86
4-day P_{99}	0.57
30-day P_{99}	0.39
Mean*	0.30
Std	0.16

Attachment #1

	Phosphorus mg/L
Sample size	750
Range	<0.115 – 1.16

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

Reasonable Potential Determination
The calculated WQBEL of 0.075 mg/L is less than the current limit of 0.70 mg/L, so the WQBEL must be included in the permit per s. NR 217.15(2), Wis. Adm. Code.

In accordance with s. NR 217.15(1), Wis. Adm. Code, there is reasonable potential for the discharge to cause or contribute to an exceedance of the water quality criteria. The data suggest that a compliance schedule will be necessary for the facility to meet the given phosphorus limits.

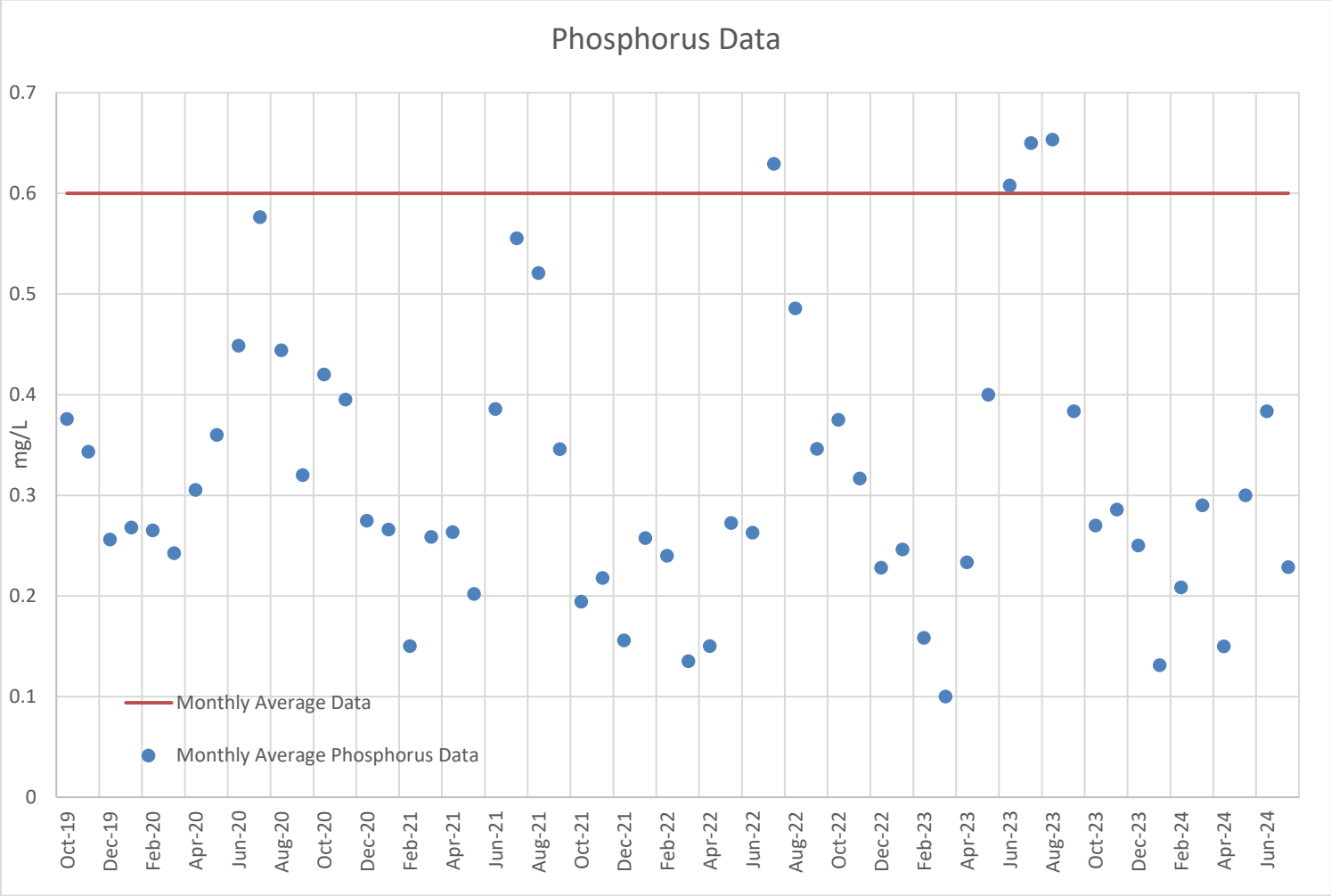
Limit Expression
According to s. NR 217.14(2), Wis. Adm. Code, because the calculated WQBEL is less than or equal to 0.3 mg/L, the effluent limit of 0.075 mg/L may be expressed as a six-month average. If a concentration limitation expressed as a six-month average is included in the permit, a monthly average concentration limitation of 0.225 mg/L, equal to three times the WQBEL calculated under s. NR 217.13, Wis. Adm. Code shall also be included in the permit. The six-month average should be averaged during the months of May – October and November – April.

Mass Limits
A mass limit is also required, pursuant to s. NR 217.14(1)(a), Wis. Adm. Code, because the discharge is to a surface water that is to or upstream of a phosphorus impaired water. **This final mass limit shall be 0.075 mg/L × 8.34 × 0.80 MGD = 0.5 lbs/day expressed as a six-month average.**

Multi-Discharge Variance Interim Limit
With the permit application, Paddock Lake has re-applied for the phosphorus multi-discharger variance (MDV). Conditions of the phosphorus MDV require the facility to comply with an interim phosphorus limit in lieu of meeting the final WQBEL. The recommended interim limit during the 2nd permit under MDV approval, pursuant to s. 283.16 (6) (a), Wis. Stats., is 0.6 mg/L as a monthly average. A compliance schedule may be appropriate to meet this interim limit but compliance with 0.6 mg/L shall be no later than the end of the reissued permit. The previous interim limit of 0.7 mg/L should not be exceeded during the compliance schedule.

The monthly average data compared to the 0.6 mg/L is shown in the graph below.

Attachment #1



TMDL Under Development

A Total Maximum Daily Load (TMDL) is being developed for the Fox Illinois River Basin for phosphorus. The TMDL will address phosphorus water quality impairments within the basins and provide waste load allocations (WLA) required to meet water quality standards. This TMDL will likely result in phosphorus limitations that must be included in WPDES permits, which may be different than those calculated in this WQBEL memo. TMDL-derived phosphorus limits may be included in lieu of or in addition to the calculated limits upon permit reissuance or modification once the TMDL has been approved by U.S. EPA, according to s. NR 217.16, Wis. Adm. Code.

PART 6 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

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

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from 10/01/2019 – 07/31/2024.

A heat loss equation is used to adjust the calculated limit based upon the length of the storm sewer/storm water conveyance channel before discharge to waters of the state, because the discharge is to a storm sewer. The discharge from permit Outfall 001 travels through at least 5808 feet of storm sewer/storm water conveyance channel before reaching Brighton Creek. Under s. NR 106.55(5), Wis. Adm. Code, the default cooling rate is estimated as 1º F for every 400 feet of storm sewer/storm water conveyance channel. The adjusted limits are shown in the table.

The table below summarizes the maximum temperatures reported during monitoring form 01/01/2023 – 12/31/2023. The full temperature table is in Appendix #4.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	51	52	64	91
FEB	50	51	65	91
MAR	47	49	67	92
APR	54	56	70	94
MAY	59	64	80	97
JUN	65	67	91	99
JUL	70	71	96	100
AUG	73	75	96	99
SEP	72	73	88	97
OCT	69	70	76	95
NOV	59	62	64	92
DEC	56	57	64	91

Reasonable Potential

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

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

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

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

Based on the available effluent data no effluent limits are recommended for temperature. The complete thermal table used for the limit calculation is attached.

Paddock Lake has submitted a request for consideration of dissipative cooling, referencing a previous dissipative cooling (DC) study completed in 2015 and a statement that there have not been substantial changes to the facility. Instream data was collected downstream of the discharge and it was determined that thermal criteria is met within 90 feet downstream of Outfall 001. **Temperature monitoring is recommended per the requirements of s. NR 106.59(7), Wis. Adm. Code.**

PART 7 – WHOLE EFFLUENT TOXICITY (WET)

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

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC_{50} (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC_{25} (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of **100%** shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

Q_e = annual average flow = 0.8 MGD = 1.2 cfs
f = fraction of the Q_e withdrawn from the receiving water = 0
Q_s = ¼ of the 7-Q_{10} = 0 cfs ÷ 4 = 0 cfs

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water

and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge or lab data. The specific receiving water location must be specified in the WPDES permit.
- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations. 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. Data collected prior to July 1, 2005 was excluded in this evaluation.

WET Data History

Date Test Initiated	Acute Results LC_{50} %				Chronic Results IC_{25} %				Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	*C. dubia*	Fathead Minnow	Pass or Fail?	Use in RP?	
10/09/2007					>100	>100	Pass	Yes	
04/14/2009					>100	>100	Pass	No	1
12/11/2013	>100	>100	Pass	Yes					
11/18/2014					>100	>100	Pass	Yes	
12/02/2014					>100	>100	Pass	Yes	
10/18/2016					>100	>100	Pass	Yes	
02/13/2018					>100	>100	Pass	Yes	

Footnotes:

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

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

  Acute Reasonable Potential = [(TUa effluent) (B)(AMZ)]
  Chronic Reasonable Potential = [(TUc effluent) (B)(IWC)]

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

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

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

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

WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 100%. **15 Points**
Historical Data	1 test used to calculate RP, over 5 years old. No tests failed. **5 Points**	5 tests used to calculate RP, over 5 years old. No tests failed. **5 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. **0 Points**	Same as Acute. **0 Points**
Receiving Water Classification	Warmwater sport fish. **5 Points**	Same as Acute. **5 Points**
Chemical-Specific Data	No reasonable potential for limits based on ATC; Ammonia nitrogen limit carried over from the current permit. Copper, zinc, and chloride detected. Additional Compounds of Concern: None. **3 Points**	Reasonable potential for limits for chloride based on CTC; Ammonia nitrogen limit carried over from the current permit. Copper, zinc, and chloride detected. Additional Compounds of Concern: None. **8 Points**
Additives	1 Water Quality Conditioners added: alum for phosphorus removal. Permittee has proper P chemical SOPs in place. **1 Points**	All additives used more than once per 4 days. **1 Points**
Discharge Category	0 Industrial Contributors. **0 Points**	Same as Acute. **0 Points**
Wastewater Treatment	Secondary treatment or better. **0 Points**	Same as Acute. **0 Points**
Downstream Impacts	No impacts known **0 Points**	Same as Acute. **0 Points**

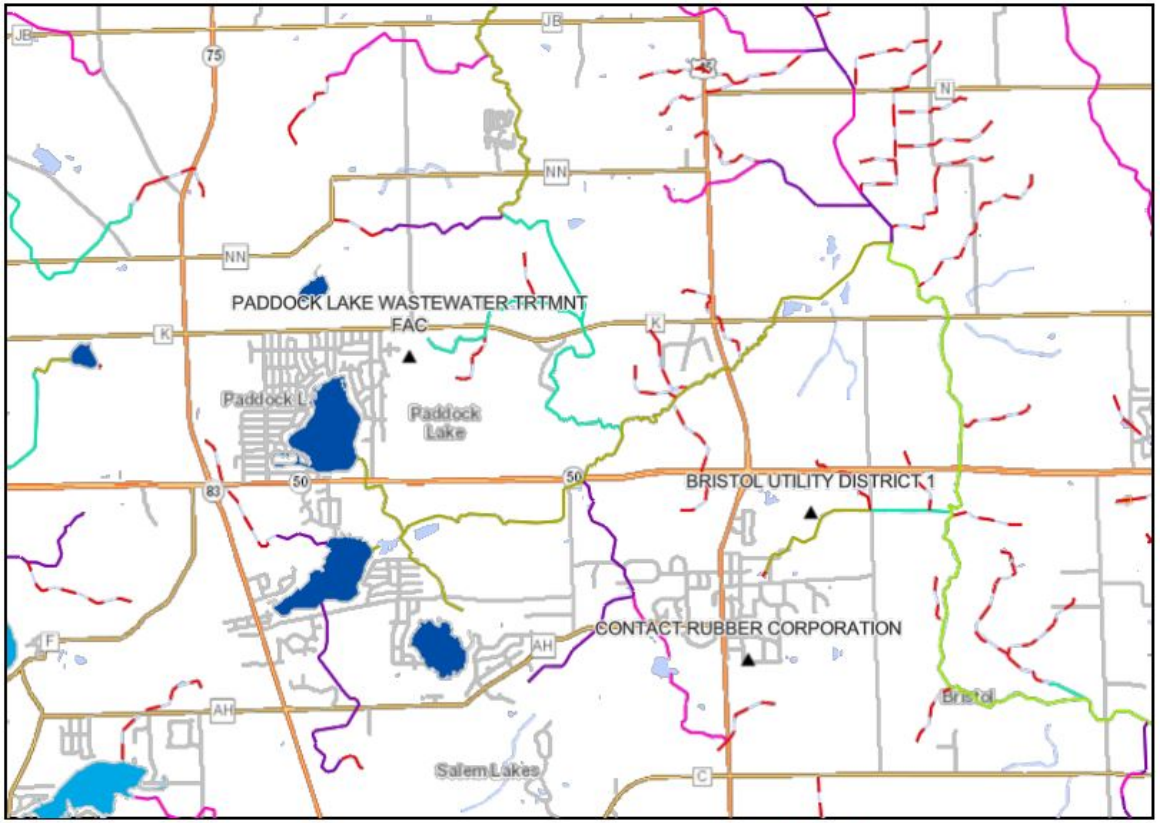
Attachment #1

	Acute	Chronic
Total Checklist Points:	**14 Points**	**34 Points**
Recommended Monitoring Frequency (from Checklist):	No tests recommended.	3 tests during permit term.
Limit Required?	No	No
TRE Recommended? (from Checklist)	No	No

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, 3 chronic WET tests/permit term are recommended in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).
- 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).

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Paddock Lake Outfall Location



Legend

Permits

Surface Water Outfalls

Surface Water

Streams Natural Communities

- Coldwater
- Cool-Cold Headwater
- Cool-Cold Mainstem
- Cool-Warm Headwater
- Cool-Warm Mainstem
- Large River
- Macroinvertebrate
- No Classification
- Warm Headwater
- Warm Mainstem
- All other values

Lake Natural Communities

- No Classification

Notes

1:57,359

0 1 2 mi

Service layer credits:
WI DNR, Water Division | Wisconsin Department of Natural Resources, Bureau of Water Quality | WI Dept. of Natural Resources, Division of Water

Date Printed: 08/27/2024

Attachment #3

2013 Ammonia Limits

Changes for effluent limitations for ammonia are proposed to conform to changes to NR 105 and 106 of the Wisconsin Administrative Code, which includes updated ammonia criteria and procedures for determining effluent limitations. These changes were effective on March 1st, 2004.

Overview of Ammonia Rule Changes: The changes to NR 105 establish acute (daily) and chronic (weekly and monthly) criteria for ammonia in-stream, based on updated information on ammonia toxicity. Acute criteria are dependent on the classification of the receiving water and on the pH of the discharge. Chronic criteria are dependent on the classification, temperature and pH of the receiving water. In addition, the chronic criteria for most classifications of receiving water are dependent on the presence or absence of early life stages of fish. For fish species other than burbot, the presence of early life stages in assumed in April and when the average temperature is equal to or greater than 14.6 degrees Celsius. Burbot are known to reproduce in colder water beginning in January of the year. There have been a large number of surveys in the Southeastern Wisconsin river basins over the years, and no burbot have been found (communication with Sue Beyler, SER Fisheries Biologist). In addition, the Department's Master Fish file and Becker's Fishes of Wisconsin have no record of burbot in rivers in the Southeast Region outside of the waters of Lake Michigan. Therefore the criteria will not be determined to protect the early life stages of burbot.

The changes to NR 106 establish procedures for determining effluent limitations. For acute (daily maximum) limits, the limit equals twice the acute criterion established in conformance with NR 105, unless a zone of initial dilution has been approved for a discharger. For chronic (weekly average) limits, the limit is a mass balance based on the average annual design flow of the plant and a percentage of the average minimum 7-day flow that occurs once every ten years (7Q10). The percentage of stream flow used is related to the temperature of the stream. When the geometric average of the stream temperature is less than 11 degrees C., 25% of the stream flow is used. When the geometric average stream temperature is equal to or less than 16 degrees C., 50% of the stream flow is used. When the geometric average stream temperature is greater than 16 degrees C., 100% of the stream flow is used. Since the rate of breakdown of ammonia increases with increasing temperature, a greater percentage of the stream flow can be used.

In addition to the receiving water information given above, the following additional data was used to determine limitations for ammonia:

Receiving Water Temperature:

June-September =23 degrees C.
October = 9 degrees C.
November -March = 3 degrees C.
April-May =17 degrees C.

Receiving Water pH:
Year Round: = 8.0 std. units; this pH level is consistent with pH levels in the Des Plaines River, collected in various months in 1992 and 1998.

Background Ammonia Levels:
June-September =0.07 mg/l
October = 0.09 mg/l
November -March = 0.25 mg/l
April-May =0.09 mg/l

(based on typical background data for SE Wisconsin streams)

Limitations for Ammonia:

Based on the criteria in NR 105, the procedures for limit determinations in NR 106 and the effluent and stream data noted above, the limitations for ammonia (rounded to two significant figures) were calculated for Paddock Lake:

Calculated Ammonia Limitations (mg/l)				
Duration of averaging	**June-Sept**	**Oct**	**Nov-March**	**April-May**
Daily Maximum	17	17	17	17
Weekly Average	3.5	8.7	9.9	5.2
Monthly Average	1.4	3.5	4.0	2.1

Attachment #4

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

						Temp Dates	Flow Dates
Facility:	Paddock Lake		**7-Q10:**	0.00	cfs		
Outfall(s):	001		**Dilution:**	25%		**Start:** 01/01/23	10/01/19
Date Prepared:	8/23/2024		**f:**	0		**End:** 12/31/23	07/31/24
Design Flow (Qe):	0.80	MGD	**Stream type:**	Small warm water sport or forage fis			
Storm Sewer Dist.	5808	ft	**Qs:Qe ratio:**	0.0	:1		
			Calculation Needed?	YES			

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs)	Representative Highest Effluent Flow Rate (Qe)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit		**Adjusted Thermal Limits**	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qea)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation	**Weekly Average**	**Daily Maximum**
	(°F)	(°F)	(°F)	(cfs)	(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	0.03	0.993	1.455	0	51	52	**49**	76	64	91
FEB	34	50	76	0.03	1.066	1.922	0	50	51	**50**	76	65	91
MAR	38	52	77	0.12	0.910	1.647	0	47	49	52	77	67	92
APR	48	55	79	0.29	1.141	2.116	0	54	56	55	80	70	94
MAY	58	65	82	0.02	1.046	1.941	0	59	64	65	82	80	97
JUN	66	76	84	0.00	0.542	0.776	0	65	67	76	84	91	99
JUL	69	81	85	0.00	0.914	1.804	0	70	71	81	85	96	100
AUG	67	81	84	0.00	0.495	0.995	0	73	75	81	84	96	99
SEP	60	73	82	0.00	0.673	1.621	0	72	73	73	82	88	97
OCT	50	61	80	0.00	1.024	1.761	0	69	70	**61**	80	76	95
NOV	40	49	77	0.02	0.673	0.801	0	59	62	**49**	77	64	92
DEC	35	49	76	0.03	0.629	1.116	0	56	57	**49**	76	64	91

~ 2025-2029 Paddock Lake Chloride Source Reduction Plan, WPDES Permit No.WI-0025062-11-0, November 11, 2024									
Status	**#**	**SRM Action**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Audience**	**Anticipated Outcome**
Existing	**1**	**Continue to distribute public education materials.** - information on website - information in newsletter	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Residents and Business	Explain the effect of excessive chloride use to users
Existing	**2**	**Continue to gather collection system samples to pinpoint concentrated chloride sources**	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Staff	Continue with source identification
New	**3**	**In cooperation with Wisconsin Salt-Wise, organize a symposium in our area to educate private and public parking lot maintenance contractors**	Organize	Hold One Event by Either Year 2 or 3 of Permit Term		-	-	Maintenance Contractors	Bring awareness to citizens
Existing	**4**	**Continue to impress upon existing residents and business owners the need to optimize water treatment devices on the Village website and newsletter.**	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Residents and Business	Explain the effect of excessive chloride use to users
Existing	**5**	**Continue to require new developments to prepare and present for approval site specific chloride Best Management Practice (BMP) plans. An example BMP may be designs with less impervious surfaces compared to traditional designs in new residential and commercial developments.**	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Developers/ All	Reduce the salt used/needed for winter maintenance on a per capita basis
New	**6**	**Create a guidance document that helps developers, etc. incorporate BMP's to help align their proposals and designs with the Village's goal of being salt wise.**	Begin	Complete	Circulate	Circulate	Circulate	Developers/ All	Smooth submittal and review processes
New	**7**	**Work with the district's largest chloride contributor (Regional High School) to develop and implement a Water Softener Brine Recycling Program. Specific elements are specified below:**	Timeline Detailed Below					Village and Regional High School Admin.	Recycle a significant portion of spent water softener brine currently discharged to sanitary sewer starting in 2025-26 winter season
		Develop an Intergovernmental Agreement or Memorandum of Understanding that assigns member responsibility between the Village and High School.	Develop	-	-	-	-		
		Install within the school's water treatment mechanical room two stacked 275-gallon tanks that will capture and store water softener regenerated brine. Once the storage tanks are filled, Village staff will transfer concentrated brine to Village tanks, the concentrated brine solution will be brought back to the Village public works facilities, where the brine will be processed by dehydration with fans to reduce the brine to a concentrated liquid chloride level of 25 to 40%.	-	Install Equipment and Begin Operation	-	-	-		
		The utility intends to deliver the repurposed brine back to the school's facility plant as liquid calcium chloride that can be used to treat walks, parking lots, and access drives.	-	-	Start	Continue	Continue		
		Repurposed brine will also be used by Village public works as a pre-wetting agent applied to winter de-icing agents for public road winter treatment.	-	-	Start	Continue	Continue		
New	**8**	**Estimate the mass of chloride removed from the sanitary sewer via the above recycling initiative and report findings in annual SRM reports.**	-	-	Start	Continue	Continue	Staff / DNR	Determine the approximate chloride reduction achieved

Facility Specific Chloride 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: Village of Paddock Lake

B. Facility Name: Paddock Lake Wastewater Treatment Facility

C. Submitted by: Wisconsin Department of Natural Resources

D. State: Wisconsin **Substance:** Chloride **Date completed:** October 16, 2024

E. Permit #: WI-0025062-11-0 **WQSTS #:** (EPA USE ONLY)

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

G. Date of Variance Application: April 11, 2024

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

I. Description of proposed variance:

The Paddock Lake Wastewater Treatment Facility discharges to the Brighton Creek in Kenosha County. The Paddock Wastewater Treatment Facility seeks a variance to the water quality standard for chloride.

The Department concludes that the Paddock Lake Wastewater Treatment Facility has met the requirements of s. NR 106.83(2), Wisconsin Administrative Code, and s. 283.15, Wisconsin Statutes. The Department further concludes that requiring the Paddock Wastewater Treatment Facility to meet the water quality standard for chloride 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 chloride water quality-based effluent limit (WQBEL). The Department therefore proposes that this permit include a discharger-specific variance to the chloride water quality standard for aquatic life.

Variance for chloride from the water quality-based effluent limits of 400 mg/L, expressed as a weekly average limit, to an interim limit of 450 mg/L year-round. The permit will include requirements to implement source reduction measures and a target value of 400 mg/L year-round.

Citation: An interim chloride effluent limitation under s. NR 106.83(2), Wis. Adm. Code, represents a variance to water quality standards authorized by s. 283.15, Wis. Stats., and 40 CFR §131.14.

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

Name	Email	Phone	Contribution
Victoria Ziegler	Victoria.Ziegler@wisconsin.gov	414-391-8946	**Permit Drafter**
Nick Lent	Nicholas.Lent@wisconsin.gov	414-239-1938	Compliance Engineer
Nicole Krueger	Nicole.Krueger@wisconsin.gov	414-882-1019	Parts II D-H and J; Limits Calculator
Others?			

Section II: Criteria and Variance Information

A. Water Quality Standard from which variance is sought: Chloride

B. List other criteria likely to be affected by variance: None

C. Source of Substance: Residential water softeners, commercial water softeners, and winter road salt applications

D. Ambient Substance Concentration: 0 mg/L ☐ **Measured** ☒ **Estimated** ☐ **Default** ☐ **Unknown**

E. If measured or estimated, what was the basis? Include citation. There is no background data available and the 7-Q_{10} is zero.

F. Average effluent discharge rate: 0.8 MGD (annual average design flow) **Maximum effluent discharge rate:** 3.0 MGD (estimated peak daily)

G. Effluent Substance Concentration: 1-day P99 = 483 mg/L; 4-day P99 = 412 mg/L; 30-day P99 = 371 mg/L; Average = 350 mg/L ☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

H. If measured or estimated, what was the basis? Include Citation. Permit-required monitoring from 10/01/2019 – 07/31/2024.

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 (HAC) 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 chloride SRM plan. Thus, the HAC at commencement of this variance is 450 mg/L, which reflects the greatest chloride reduction achievable with the current treatment processes, in conjunction with the implementation of the permittee's chloride SRM plan. The current effluent condition is reflective of on-site optimization measures that have already occurred.

K. Variance Limit: 450 mg/L as a weekly average

L. Level currently achievable (LCA): 450 mg/L

M. What data were used to calculate the LCA, and how was the LCA derived? (*Immediate compliance with LCA is required.)*
450 mg/L represents the highest weekly average, rounded, during the current permit term, excluding one week that exceeded this.

N. Explain the basis used to determine the variance limit (which must be ≤ LCA). Include citation.
Chapter NR 106, Subchapter VII, Wis. Adm. Code, allows for a variance; the imposition of a less restrictive interim limit; a compliance schedule that stresses source reduction and public education; and allowance for a target value or limit to be a goal for reduction.

The limit is established in accordance with s. 283.15 (5), Wis. Stats. and ch. NR 106 Subchapter II, Wis. Adm. Code. The proposed interim limit is more stringent than the current interim limit of 510 mg/L.

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**
The use of a reverse osmosis system was evaluated. The cost of the reverse osmosis treatment system was estimated to result in an average that would be about 3.77% of the MHI. Installing centralized lime softening on the current municipal water supply system was also evaluated, and the estimated cost of doing so would be about 5.43% of the MHI. The cost estimates are in the range in which the application of either treatment would be expected to result in substantial and widespread economic and social impacts to the community. Without a variance, meeting the water quality standard of 400 mg/L would result in substantial and widespread economic and social impacts.

Section III: Location Information

A. Counties in which water quality is potentially impacted: Kenosha County

B. Receiving waterbody at discharge point: Brighton Creek

C. Flows into which stream/river? Des Plaines River **How many miles downstream?** ~4 miles

D. Coordinates of discharge point (UTM or Lat/Long): 42.58915°N, 88.03145°W

E. 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?

Approximately 1.5 miles downstream in Brighton Creek.

F. Provide the equation used to calculate that distance:
((interim limit mg/L x effluent design flow in cfs) + background concentration mg/L x background stream flow in cfs)) / (effluent design flow in cfs + background stream flow in cfs) ≤ 395 mg/L

The background stream flow is 0.21 cfs at a location approximately 1.5 miles downstream of Outfall 001 which results in a calculated instream chloride concentration of 385 mg/L which is less than the criterion.

G. What are the designated uses associated with the direct receiving waterbody, and the designated uses for any downstream waterbodies until the water quality standard is met?
Brighton Creek is a warm water sprot fish and non-public water supply.

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: None

Permit Number	Facility Name	Facility Location	Variance Limit [mg/L]
NA	NA	NA	NA

I. 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

J. Is the receiving waterbody on the CWA 303(d) list? If yes, please list the impairments below. ☐ Yes ☒ No ☐ Unknown
Brighton Creek is not listed on the CWA 303(d) list; but Des Plaines River is listed on the CWA 303(d) list for total phosphorus.

River Mile	Pollutant	Impairment
NA	NA	NA

***K.* Please list any contributors to the POTW in the following categories:**

Food processors (cheese, vegetables, meat, pickles, soy sauce, etc.)	**None**
Metal Plating/Metal Finishing	**None**
Car Washes	**Kwik Trip, BP, Mobil**
Municipal Maintenance Sheds (salt storage, truck washing, etc.)	**One municipal salt storage shed and truck barn**
Laundromats	**Holiday Laundry**
Other presumed commercial or industrial chloride contributors to the POTW	**None**

L. If the POTW does not have a DNR-approved pretreatment program, is a sewer use ordinance enacted to address the chloride contributions from the industrial and commercial users? If so, please describe.
Per municipal ordinance, all new or replacement ion exchange water softeners must be demand initiated regeneration type units with a water meter or sensor and having a hardness exchange rating of at least 4,000 grains of hardness exchange per pound of salt. Additionally,

Chapter 7 Section II – 7.55 ***Use of the Public Sewers*** lists prohibited and limited discharges of wastes to the public sewer system. Specifically, 7.55(c)(5)(h) of the ordinance limits discharges which contain "substances which are not amenable to treatment or reduction by the wastewater treatment processes employed, or are amenable to treatment only to such degree that the wastewater treatment facility effluent cannot meet the requirements of other agencies having jurisdiction over discharge to the receiving waters." Chloride would be one of these substances. There are other sections of the ordinance that are applicable and can be used to levy additional source controls from

the discharger and/or increase the "User Charge Equivalents" (UCE) user fee based on the volume and pollutant loadings found during a biennial audit of its users (7.62(a)(1))

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 chloride to the POTW? If so, please list.
NA

B. Are all industrial users in compliance with local pretreatment limits for chloride? 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)
NA

C. When were local pretreatment limits for chloride last calculated?
NA

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
NA

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: _____ **Date of hearing:** _____

E. Were comments received from the public in regards to this notice or hearing? *(If yes, see notice of final determination)* ☐ 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: No human health criteria for chloride

C. Identify any expected impacts that the variance may have upon human health, and include any citations:
None

Section VII: Aquatic Life and Environmental Impact

A. Aquatic life use designation of receiving water: Warm water sport fish

B. Applicable criteria affected by variance: The chronic toxicity criterion is 395 mg/L per ch. NR 105, Wis. Adm. Code.

C. Identify any environmental impacts to aquatic life expected to occur with this variance, and include any citations:
Due to the zero-flow stream, it is assumed that the instream concentrations would be equal to the proposed interim limit of 450 mg/L. This value exceeds the genus mean chronic value for one of the 13 species used to determine the criteria (Water flea - Ceriodaphnia dubia; 417 mg/L).

D. List any Endangered or Threatened species known or likely to occur within the affected area, and include any citations: There are no federally listed endangered or threatened species known within the affected area.

County	Species	Status
NA	NA	NA

Citation: National Heritage Index (http://dnr.wi.gov/topic/nhi/)

Section VIII: Economic Impact and Feasibility

A. Describe the permittee's current pollutant control technology in the treatment process:
The Paddock Lake Wastewater Treatment Facility (WWTF) includes fine screening, a two-ring oxidation ditch, clarification, post-aeration and UV disinfection. The facility was expanded in 2011-2012 to provide treatment for an annual average design flow of 0.8 million gallons per day (MGD). Effluent is pumped to Brighton Creek via force main, approximately 1.2 miles east of the WWTF.

B. What modifications would be necessary to comply with the current limits? Include any citations.
Upgrading Paddock Lake's treatment plant to include a reverse osmosis (RO) treatment system for removing chloride from the wastewater effluent would allow the permittee to comply with the chloride WQBELs.

Expanding and upgrading the public water supply with a centralized lime softening treatment system would eliminate the need for residential and commercial water softeners and potentially eliminate the major source of chlorides to the wastewater treatment facility (water softener regeneration brine).

C. How long would it take to implement these changes? As noted above in Section II-O, the cost of providing reverse osmosis at the wastewater treatment facility or centralized lime softening for the drinking water system were evaluated and determined to be prohibitively expensive.

D. Estimate the capital cost *(Citation)*: $913,000 (Source DNR Form 3400-193, Chloride Variance dated April 11, 2024 from permittee)

E. Estimate additional O & M cost *(Citation)*: $296,380 (Source DNR Form 3400-193, Chloride Variance dated April 11, 2024 from permittee)

F. Estimate the impact of treatment on the effluent substance concentration, and include any citations:
Treatment for chlorides at the plant without a RO system would have little impact. Proper implementation of SRMs is anticipated to reduce the current effluent chloride concentrations by approximately 5-8 % from current levels over the next five years. To consistently meet the final water quality-based effluent of 400 mg/L the current peak effluent concentrations would need to be reduced by at least 11 %. A centralized lime softening system for drinking water would eliminate the need for point of use softeners and the associated chloride brine generated during the regeneration/backwash cycle that is ultimately discharged to the wastewater treatment system. Neither option is considered economically feasible.

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

End of pipe RO wastewater treatment technology for chloride produces concentrated brine that can be as much or more of environmental liability than the untreated effluent. Since the concentrated brine cannot be further treated, the only recourse for the disposal of the brine is transfer to another community, which is often not feasible. Appropriate chloride source reduction activities are preferable environmentally to effluent end of pipe treatment in most cases, since the end product of treatment does not remove the load of chloride from the environment. There would be some impacts based on disposal of brine from RO. These include air pollution impacts from trucking brine and increased chloride impacts where brine is discharged.

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

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

J. If yes, what prevents this from being done? Include any citations.
End of pipe Reverse Osmosis (RO) treatment or regional lime softening could reduce effluent chloride concentrations to chronic toxicity criterion. However, attaining the applicable water quality standards specified in chs. NR 102 to 105, Wis. Adm. Code, may cause substantial and widespread adverse social and economic impacts in the community where the discharger is located.

K. List any alternatives to current practices that have been considered, and why they have been rejected as a course of action, including any citations:
Reverse Osmosis (RO)-not economically feasible (3.77% of MHI)
Regional Lime Softening Treatment- not economically feasible (5.43% of MHI)

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.
Adherence to the SRM plan for the current permit is described in Section X part E below. Cornerstones of the approach are education, regulations, and housekeeping.

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.

1. Continue to distribute public education materials.
2. Continue to gather collection system samples to pinpoint concentrated chloride sources
3. In cooperation with Wisconsin Salt-Wise, organize a symposium in our area to educate private and public parking lot maintenance contractors
4. Continue to impress upon existing residents and business owners the need to optimize water treatment devices on the Village website and newsletter.
5. Continue to require new developments to prepare and present for approval site specific chloride Best Management Practice (BMP) plans. An example BMP may be designs with less impervious surfaces compared to traditional designs in new residential and commercial developments.
6. Create a guidance document that helps developers, etc. incorporate BMP's to help align their proposals and designs with the Village's goal of being salt wise.
7. Work with the district's largest chloride contributor (Regional High School) to develop and implement a Water Softener Brine Recycling Program. Specific elements are specified below:
   - Develop an Intergovernmental Agreement or Memorandum of Understanding that assigns member responsibility between the Village and High School.
   - Install within the school's water treatment mechanical room two stacked 275-gallon tanks that will capture and store water softener regenerated brine. Once the storage tanks are filled, Village staff will transfer concentrated brine to Village tanks, the concentrated brine solution will be brought back to the Village public works facilities, where the brine will be processed by dehydration with fans to reduce the brine to a concentrated liquid chloride level of 25 to 40%.
   - The utility intends to deliver the repurposed brine back to the school's facility plant as liquid calcium chloride that can be used to treat walks, parking lots, and access drives.
   - Repurposed brine will also be used by Village public works as a pre-wetting agent applied to winter de-icing agents for public road winter treatment.
8. Estimate the mass of chloride removed from the sanitary sewer via the above recycling initiative and report findings in annual SRM reports.

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

A. Date of previous submittal: August 5, 2019 **Date of EPA Approval:** September 18, 2019

B. Previous Permit #: WI-002062-10-0 **Previous WQSTS #:** (EPA USE ONLY)

C. Effluent substance concentration: **Variance Limit:** 510 mg/L

1-day P_{99}: 483mg/L

4-day P_{99}: 412mg/L

30-day P_{99}: 371mg/L

D. Target Value(s): 460 mg/L **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
INIATIVE EDUCATION	
Water softener use and info on Village website	☒ **Yes** ☐ **No**
Water softener use and info in newsletter	☒ **Yes** ☐ **No**

Presentation at annual Lake District meeting	☒ **Yes** ☐ **No**
Open house at WWTP	☐ **Yes** ☒ **No** This was planned for 2020 but canceled due to Covid-19
Newsletter and website info on reduced road salt	☒ **Yes** ☐ **No**
REGULATIONS	
Require DIR softeners in new SFH'S and replace	☒ **Yes** ☐ **No**
Ord. requiring hose bibs not be softened water	☒ **Yes** ☐ **No**
Require new Business to provide chloride reduction plans	☒ **Yes** ☐ **No**
MONITORING	
Survey residents of softener use	☒ **Yes** ☐ **No**
Random collection system samples	☒ **Yes** ☐ **No**
Visits to Business and School	☒ **Yes** ☐ **No**
HOUSE KEEPING	
CMOM practices- specific to finding and correcting I&I	☒ **Yes** ☐ **No**
Reduction of road salt: reduce salt use by 10-15%	☒ **Yes** ☐ **No**
Proper storage of salt: Keep salt piles from draining to system	☒ **Yes** ☐ **No**
Placement of snow piles: Keep snow piles from draining to system	☒ **Yes** ☐ **No**

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
101 S. Webster Street
Box 7921
Madison WI 53707-7921

Tony Evers, Governor

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WISCONSIN DEPT. OF NATURAL RESOURCES

10/9/2024

Tim Popanda
6969 236th Ave
Paddock Lake, WI 53168

Subject: Conditional approval of a multi-discharger phosphorus variance
Receiving Stream: Brighton Creek in Kenosha County
Permittee: Village of Paddock Lake, WPDES WI-0025062

Dear Mr. Popanda:

In accordance with s. 283.16 of the Wisconsin Statutes, you have requested coverage under Wisconsin's multi-discharger phosphorus variance for the Paddock Lake Wastewater Treatment Facility in an application dated 4/15/2024. Wisconsin's multi-discharger phosphorus variance was approved by EPA on February 6, 2017. Coverage under the multi-discharger phosphorus variance may only be granted to an existing source that demonstrates a major facility upgrade is necessary to achieve phosphorus compliance and the upgrade will result in economic hardship as defined in the federally approved variance. The water quality criterion for which you are seeking a variance is contained in s. NR 102.06, Wis. Adm. Code.

After review of the application materials, the Department is tentatively approving coverage under the phosphorus multi discharger variance because the applicant has demonstrated that a major facility upgrade would be required to comply with the phosphorus water quality based effluent limitation, and the applicant meets the economic hardship eligibility criteria delineated in the federally approved variance. In addition, the permitted facility has agreed to comply with the interim limitations that will be included in the WPDES permit, and has agreed to reduce the amount of phosphorus entering surface waters by making payments to the counties pursuant to s. 283.16(6)(b)1., Wis. Stats.

Public comment on this decision will be solicited at the time of permit reissuance after which a final decision will be made. The Department appreciates your attention and interest in Wisconsin's multi-discharger phosphorus variance. Should you have further questions regarding this matter, please contact me at (608) 400 – 5596 or by email at matthew.claucherty@wisconsin.gov.

Sincerely,

Matt Claucherty, MDV Point Source Coordinator
Bureau of Water Quality

e-cc Gary Meyers, Village of Paddock Lake
Nick Lent, WDNR
Victoria Ziegler, WDNR
Tim Elkins, EPA Region 5
Micah Bennett, EPA Region 5

State of Wisconsin
Department of Natural Resources
Bureau of Water Quality
Permits Section - WQ/3

Multi-Discharger Variance Application Evaluation Checklist

Form 3200-145 (R 5/16)

Notice: This checklist is meant to be a tool to help Department of Natural Resources (DNR) staff review municipal and industrial multi-discharger variance (MDV) applications (Forms 3200-149 and 3200-150). Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31-19.39, Wis. Stats.).

Permittee Name

Village of Paddock Lake

WPDES Permit Number	County
WI- 0 | 0 | 2 | 5 | 0 | 6 | 2	Kenosha

1. Did the point source apply for the MDV at the appropriate time?	(•) Yes ( ) No. *STOP- facility not eligible at this time.*	*See Questions 1-3.*
2. This operation is (check one):	( ) New or relocated outfall. *STOP- facility not eligible.* (•) Existing outfall	*See Questions 5-6.*
3. Is the point source is located in an MDV eligible area?	(•) Yes ( ) No. *STOP- facility not eligible.*	*Apply County information to Appendix H. Additional information provided in Q7 on municipal form & Q7-8 on industrial form.*
4. The secondary indicator score for the county (counties) the discharge is located is:	4	*See Appendices A-F. If the score is less than 2, stop; the facility is not eligible. See Q23 on municipal form & Q28 on industrial form.*
5. Is a major facility upgrade required to comply with phosphorus limits?	(•) Yes ( ) No. *STOP- facility not eligible.*	*See Q8 on municipal form/Q9 on industrial form.*
6. List the months where phosphorus limits cannot be achieved during the permit term:	☒ All ☒ Jan ☒ Apr ☒ Jul ☒ Oct ☒ Feb ☒ May ☒ Aug ☒ Nov ☒ Mar ☒ Jun ☒ Sep ☒ Dec	*Consider checking with limit calculator. If this does not match information in application, the application should be updated prior to approval.*

7. What is the current effluent level achievable?

Outfall Number(s)	Conc. (mg/L)	Method for calculation:	Does this concur with application?	
001	0.41	(•) 30-day P99 ( ) Other, specify:	( ) Yes (•) No, why not: Application used 2023 data only	*DNR staff should verify the effluent concentration value(s) provided. See Q11 on municipal form & Q12 on industrial form.*

Save

8. What is the appropriate interim limitation(s) for the permit term?
0.6 mg/L as a monthly average pursuant to s. 283.16(7), Wis. Stats.
Target Value = 0.2 mg/L

Provide Rationale:
Effluent total phosphorus data from the past three years (9/1/2021 - 8/31/2024, n=466) yield a 30-day P99 value of 0.41 mg/L. An interim limit of 0.4 mg/L represents the current highest attainable condition for this facility. Historic performance over the past year shows 0.4 being except during summer 2022 and 2023 where treatment diminishes - in the neighborhood of 0.65 mg/L. Further optimization of treatment may be required to meet 0.6 mg/L during all months.

Note: See description in Section 2.02 of the MDV implementation guidance. Interim limitations should reflect the "highest attainable condition" for the permittee in question pursuant to s. 283.16(7), Wis. Stat.

9. *For Industries Only-* Where does the phosphorus in the effluent come from? (check all that apply)	☐ Process ☐ Additive Usage ☐ Water supply *Can intake credits be given or can the facility use an alternative water supply?* ◯ Not feasible ◯ Possibly, but further analysis needed ◯ Not evaluated at this time	*See Q14-15 & 19 on industrial form. If the answer is "possibly" or "not evaluated", the schedule section of the MDV permit should contain a requirement to perform this analysis.*
10. Has this facility optimized?	◯ Yes ◉ In progress ◯ No	*See Q14 on municipal form & Q16 & 20 on industrial form. Facility must optimize and operate at an optimize treatment level (s. 283.16(6)(a), Wis. Stat.)If no will need compliance schedule.*
11. Has a facility plan/compliance alternative plan been completed for the facility?	◉ Yes ◯ In progress ◯ No	*See Q15 on municipal form & Q17 on industrial form.*
12. What is the projected cost for complying with phosphorus? Source:	$ 4,379,720.00 Vendor quotes; summary attached to MDV application	*Facility must submit site-specific compliance costs. If cost projections are used from EIA, the permittee must certify that these costs are reasonable for the facility in question. See "projected compliance costs" in Section 2.02 of the MDV Implementation Guidance for details.*

Comments on planning efforts:
A preliminary compliance alternatives plan was submitted by Baxter and Woodman on behalf of Paddock Lake. Water quality trading was evaluated by identifying the quantity of phosphorus credits needed to comply with the WQBEL. Adaptive management was deemed infeasible due to the receiving water being point source dominated based on estimated flows of stream and effluent. (PRESTO model incorrectly showed nps domination). Regionalization and land application were also evaluated but deem infeasible due to land area constraints. Vendor quotes were provided for a number of technologies to treat effluent to meet the WQBEL. The lowest cost option, cloth disc filtration, was used in the economic demonstration.

13. Are adaptive management and water quality trading viable?	◯ Yes ◉ Perhaps. Additional analysis required. ◯ No	*See Q18-21 on municipal form & Q22-25 on industrial form. If additional analyses required, the applicant may need to complete this analysis during the MDV permit term.*
14. Has the point source met the appropriate primary screener?	◉ Yes ◯ No. *STOP- facility not eligible.*	*See Q4 of this form in addition to the "eligibility" guidance in Section 2.01 of the MDV Implementation Guidance.*

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Comments on economic demonstration:
Capital costs for cloth disc filtration were estimated at $4,377,934.00. This value is lower than the 2015 EIA addendum value of $4.8 M for Paddock Lake, so is therefore considered a conservative estimate. Additional O&M costs are estimated at $65,833.00 annually. Assuming a 20-year CWFP loan at 2.1% interest, annual payments would total to $270,330.79. With O&M costs, the total annual pollution control cost increase is $336,163.79. Residential use rate is 95%, resulting in $319,355.60 as annual pass-through to households. There are 1339 in the sewer service area, so the per-user cost increase is estimated at $238.50 as an annual average. Current sewer rates are $841.68 as an annual average, and future rates would be $1080.18 as an annual average. This value is 1.34% of Paddock Lake's $80,625 median household income. In Kenosha County with a secondary indicator score of 4, sewer rates at 1% of MHI meet the primary screener. The applicant meets the primary screener.

15. What watershed option was selected?

- (•) County project option. *Complete Section 5.*
- ( ) Binding, written agreement with the DNR to construct a project or implement a watershed plan. *Complete Section 4.*
- ( ) Binding, written agreement with another person that is approved by the DNR to construct a project or implement a watershed plan. *Complete Section 4.*

Section 4. Watershed Plan Review

16. MDV Plan Number: *Note: This is for tracking purposes. Contact Statewide Phosphorus Implementation Coordinator for the plan number.*	_____
17. Did the point source complete Form 3200-148?	( ) Yes ( ) No
18. Is the project area in the same HUC 8 watershed as the point of discharge?	( ) Yes ( ) No. *STOP- Watershed plan must be updated.*
19. What is the annual offset required? *See Section 2.03 of the MDV implementation guidance. If this value is different from the offset target provided in form 3200-148, the watershed plan should be amended.*	_____
20. Does the plan ensure that the annual load is offset annually?	( ) Yes ( ) No. *STOP- Watershed plan must be updated.*

21. Are projects occurring on land owned/operated by a CAFO or within a permitted MS4 boundary?

- ( ) Yes. *Work with appropriate DNR staff to ensure projects are not working towards other permit compliance.*
- ( ) No.

22. Are other funding sources being used as part of the MDV watershed project?

- ( ) Yes. *Work with appropriate DNR staff to ensure that funding sources can be appropriately used in the plan area.*
- ( ) No.

23. Do you have any concerns about the watershed project? *Note: Coordinate with other DNR staff as appropriate.*	( ) Yes. *STOP- Watershed plan must be updated.* ( ) No.

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Comments:

Section 5. Payment to the County(ies)

24. At this time, the appropriate per pound payment is: $ 64.75

See "Payment Calculator" document at *\\central\water\WQWT_PROJECTS\WY_CW_Phosphorus\MDV*.

Section 6. Determination

Based on the available information, the MDV application is:

- (•) Approved
- ( ) Request for more information
- ( ) Denied

Additional Justification (if needed):

Certification

Preparer Name	Title
Matt Claucherty	Water Resources Management Specialist

Signature of Preparer	Date
Matt Claucherty	10/9/2024

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