

## Permit Fact Sheet

### General Information

Permit Number:	WI-0020231-10-0	
Permittee Name:	CITY OF HORICON	
Address:	404 East Lake Street	
City/State/Zip:	Horicon WI 53032	
Discharge Location:	110 Jackson Street, Horicon	
Receiving Water:	Rock River (Sinissippi Lake Watershed, UR08 – Upper Rock River Basin) in Dodge County	
StreamFlow (Q <sub>7,10</sub> ):	7-Q10 = 6.3 cfs	
Stream Classification:	Full Fish and Aquatic Life – Warm Water Sport Fishery	
Discharge Type:	Existing, Continuous	
Design Flow(s)	Annual Average	0.582 MGD
Significant Industrial Loading?	John Deere Horicon Works	
Operator at Proper Grade?	Yes. Advanced - A1, B, C, P, D, L Basic – SS	
Approved Pretreatment Program?	N/A	

### Facility Description

The City of Horicon Wastewater Treatment Facility (WWTF) operates an oxidation ditch activated sludge plant with an average annual design flow of 0.582 MGD. The facility's design organic capacity is 950 lbs/day. Preliminary Treatment consists of fine screening and grit removal. After preliminary treatment, wastewater flows to the single oxidation ditch for biologic treatment via extended aeration activated sludge. FX-300 is dosed to the end of the oxidation ditch for chemical phosphorus removal. A splitter structure distributes flow from the oxidation ditch evenly between the two final clarifiers. Clarified effluent is disinfected with chlorine gas, dechlorinated with sulfur dioxide and aerated before discharging to the Rock River. In addition, blending has been approved for this permit term. The City of Horicon's WWTF has the capacity to divert flow prior to the oxidation ditch and stored in a peak flow clarifier during high flow events. Wastewater flow bypasses the oxidation ditch and final clarifiers and then receives disinfection prior to discharge. Sludge is aerobically digested and dewatered by a filter press. Biosolids are removed by a local contract hauler and land applied.

### Substantial Compliance Determination

**Enforcement During Last Permit:** No formal enforcement was taken during the last permit term.

After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items

and a facility inspection on April 25, 2023, conducted by DNR Wastewater Engineer, Jacob Van Susteren-Wedesky, this facility has been found to be in substantial compliance with their current permit, WI-0020231-09-0.

<b>Sample Point Designation</b>		
<b>Sample Point Number</b>	<b>Discharge Flow, Units, and Averaging Period</b>	<b>Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)</b>
701	No flow data available.	INFLUENT: Representative influent samples shall be collected from the influent line after the parshall flume. Samples shall be 24-hour flow proportionate composite samples. Influent flow measurement is not required.
001	0.44 MGD (2022 Data)	EFFLUENT: Representative 24-hour flow proportionate effluent samples shall be collected prior to the disinfection facility for composite samples and after step aeration for grab samples, prior to discharge to the Rock River.
101	New Sample Point	BLENDING: Sample point for reporting diverted flow from prior to the oxidation ditch and stored in a peak flow clarifier during high flow events. Wastewater flow bypasses the oxidation ditch and final clarifiers and then receives disinfection prior to discharge. The permittee shall notify the Department when blending occurs. See "Blending" requirements in the Standard Requirements section of the permit.
004	110 dry tons generated annually (WPDES permit application submitted 7/23/2023)	Aerobically digested, Belt press cake, Class B. Representative sludge samples shall be collected after the belt press.
005		Class B: Liquid Sludge. This outfall has been included for emergency uses. The liquid sludge shall be sampled and analyzed for nutrients prior to landspreading. If Sampling Point 005 is not active in any given calendar year, no sampling is required. Prior notification to the Department is required if land application is proposed. All requirements of ch. NR 204, Wis. Adm. Code are applicable.
006	Inactivated for the reissuance. See sample point 101 for Blending.	Only active during blending events. Events must be for at least 24 consecutive hours for this sampling point to be active. Track effluent flow using capacity of pipe, and assuming full flow. All monitoring must be reported under and meet the requirements of Sampling Point 001. Composite samples may be time-proportionate when blending.

# 1 Influent – Monitoring Requirements

## Sample Point Number: 701- INFLUENT

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

### Changes from Previous Permit:

Changes highlighted in table above.

**Flow-** monitoring added.

**BOD5 and Total Suspended Solids-** Sample frequency increased to 3/week.

### Explanation of Limits and Monitoring Requirements

**Flow Rate** - Reporting of flow added because the permittee had an influent flow meter installed.

**BOD5 and Total Suspended Solids-** Tracking of BOD<sub>5</sub> and Total Suspended Solids are required for percent removal requirements found in s. NR 210.05, Wis. Adm. Code and in the ‘Standard Requirements’ section of the permit.

# 2 Inplant - Monitoring and Limitations

## Sample Point Number: 101- BLENDING

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Per Occurrence	Continuous	Calculate flow using pipe capacity and assuming full flow conditions.
Time		hours	Per Occurrence	Calculated	Report the total duration of blending within a given day (12:00am - 11:59pm) in which blending occurs. See "Blending Flow" permit section.

### Changes from Previous Permit:

Changes highlighted in table above.

This is a new sample point.

## Explanation of Limits and Monitoring Requirements

The Department previously determined that the facility is able to practice blending pursuant to s. NR 210.12, Wis. Adm. Code. This sample point was added to track the volume of wastewater that bypasses the oxidation ditch and final clarifiers and the duration of the blending event pursuant s. NR 210.12(6), Wis. Adm. Code. Additionally, the permittee is required to notify the department when blending occurs.

Blending was previously reported under Outfall 006, but since the entire blended flow recombines with the effluent stream prior to disinfection, all sampling requirements and discharge is captured under Outfall 001.

## 3 Surface Water - Monitoring and Limitations

### Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	21 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May - October.
BOD5, Total	Weekly Avg	35 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November - April.
BOD5, Total	Monthly Avg	21 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May - October.
BOD5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November - April.
BOD5, Total	Weekly Avg	102 lbs/day	3/Week	Calculated	Limit effective May - October.
BOD5, Total	Weekly Avg	170 lbs/day	3/Week	Calculated	Limit effective November - April.
Suspended Solids, Total	Weekly Avg	21 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May - October.
Suspended Solids, Total	Weekly Avg	35 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November - April.
Suspended Solids, Total	Monthly Avg	21 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May - October.
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November - April.
Suspended Solids, Total	Weekly Avg	142 lbs/day	3/Week	Calculated	Limit effective for April, May, June, October, November, December, January and March.
Suspended Solids, Total	Weekly Avg	153 lbs/day	3/Week	Calculated	Limit effective for February.

<b>Monitoring Requirements and Limitations</b>					
<b>Parameter</b>	<b>Limit Type</b>	<b>Limit and Units</b>	<b>Sample Frequency</b>	<b>Sample Type</b>	<b>Notes</b>
Suspended Solids, Total	Weekly Avg	95 lbs/day	3/Week	Calculated	Limit effective for July.
Suspended Solids, Total	Weekly Avg	59 lbs/day	3/Week	Calculated	Limit effective for August.
Suspended Solids, Total	Weekly Avg	94 lbs/day	3/Week	Calculated	Limit effective for September.
Suspended Solids, Total	Monthly Avg	101 lbs/day	3/Week	Calculated	Limit effective for April, May, June, October, November, December, January and March.
Suspended Solids, Total	Monthly Avg	109 lbs/day	3/Week	Calculated	Limit effective for February.
Suspended Solids, Total	Monthly Avg	67 lbs/day	3/Week	Calculated	Limit effective for July and September.
Suspended Solids, Total	Monthly Avg	42 lbs/day	3/Week	Calculated	Limit effective for August.
Nitrogen, Ammonia (NH3-N) Total	Daily Max	11 mg/L	3/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	11 mg/L	3/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	11 mg/L	3/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	0.6 mg/L	3/Week	24-Hr Flow Prop Comp	MDV interim limit effective upon reissuance and will remain in effect until January 1, 2028.
Phosphorus, Total	Monthly Avg	0.87 lbs/day	3/Week	Calculated	Limit effective beginning January 1, 2028. See Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus Schedule.
Phosphorus, Total	Monthly Avg	1.8 lbs/day	3/Week	Calculated	Limit effective beginning February 1, 2028. See Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus Schedule.
Phosphorus, Total	Monthly Avg	1.96 lbs/day	3/Week	Calculated	Limit effective beginning March 1, 2028. See Water Quality Based Effluent

<b>Monitoring Requirements and Limitations</b>					
<b>Parameter</b>	<b>Limit Type</b>	<b>Limit and Units</b>	<b>Sample Frequency</b>	<b>Sample Type</b>	<b>Notes</b>
					Limits (WQBELs) for Total Phosphorus Schedule.
Phosphorus, Total	Monthly Avg	1.92 lbs/day	3/Week	Calculated	Limit effective beginning April 1, 2028. See Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus Schedule.
Phosphorus, Total	Monthly Avg	1.71 lbs/day	3/Week	Calculated	Limit effective beginning May 1, 2028. See Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus Schedule.
Phosphorus, Total	Monthly Avg	1.31 lbs/day	3/Week	Calculated	Limit effective beginning June 1, 2028. See Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus Schedule.
Phosphorus, Total	Monthly Avg	0.86 lbs/day	3/Week	Calculated	Limit effective beginning July 1, 2028. See Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus Schedule.
Phosphorus, Total	Monthly Avg	0.3 lbs/day	3/Week	Calculated	Limit effective beginning August 1, 2028. See Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus Schedule.
Phosphorus, Total	Monthly Avg	0.41 lbs/day	3/Week	Calculated	Limit effective beginning September 1, 2028. See Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus Schedule.
Phosphorus, Total	Monthly Avg	0.67 lbs/day	3/Week	Calculated	Limit effective beginning October 1, 2028. See Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus Schedule.
Phosphorus, Total	Monthly Avg	0.84 lbs/day	3/Week	Calculated	Limit effective beginning November 1, 2028. See Water Quality Based Effluent Limits (WQBELs)

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					for Total Phosphorus Schedule.
Phosphorus, Total	Monthly Avg	0.76 lbs/day	3/Week	Calculated	Limit effective beginning December 1, 2028. See Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus Schedule.
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 Conditions for 'Appropriate Formulas' to calculate the total monthly discharged in lbs/month.
Phosphorus, Total		lbs/yr	Annual	Calculated	Report the sum of the total monthly discharges for the calendar year on the annual report form.
pH Field	Daily Min	6.0 su	5/Week	Grab	
pH Field	Daily Max	9.0 su	5/Week	Grab	
Dissolved Oxygen	Daily Min	6.0 mg/L	5/Week	Grab	
Chlorine, Total Residual	Daily Max	38 ug/L	5/Week	Grab	Limit effective May through September.
Chlorine, Total Residual	Weekly Avg	20 ug/L	5/Week	Grab	Limit effective May through September.
Chlorine, Total Residual	Monthly Avg	20 ug/L	5/Week	Grab	Limit effective May through September.
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit effective May through September.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit effective May through September. See the E. coli Percent Limit section. Enter the result in the DMR on the last day of the month.
Chloride		mg/L	4/Month	24-Hr Flow Prop Comp	Sample on four consecutive days each month during

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					calendar year 2027.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See 'Nitrogen Series Monitoring' section below.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See 'Nitrogen Series Monitoring' section below.
Nitrogen, Total		mg/L	See Listed Qtr(s)	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	3/Week	Grab	Monitoring only in 2027.
PFOS		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
PFOA		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	Two acute tests are required. See WET testing section for more information.
Chronic WET	Monthly Avg	2.8 TUC	See Listed Qtr(s)	24-Hr Flow Prop Comp	Yearly chronic tests are required. See WET testing section for more information.

### Changes from Previous Permit

Changes highlighted in table above.

**Flow Rate-** Sample frequency changed to daily from continuous for eDMR reporting purposes.

**Ammonia-Nitrogen-** Sample frequency increased to 3/week.

**Phosphorus -** Monitoring and limits associated with the Rock River TMDL have been added to the permit.

**pH, Chlorine, and Dissolved Oxygen -** Sampling frequency increased to 5/week.



**E. coli-** Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) limits. See additional explanation of limits under “Explanation of Limits and Monitoring Requirements” below.

**Chloride-** Sample frequency increased to 4/month and sampling year updated to 2027.

**Phosphorus MDV -** 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 has been added that goes into effect immediately upon reissuance. The permittee is 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 the TMDL derived limit.

**Total Nitrogen Monitoring (TKN, N02+N03 and Total N)-** Annual monitoring in rotating quarters throughout the permit term was added to the proposed permit.

**PFOS and PFOA –** Monthly monitoring is included in the permit in accordance with s. NR 106.98(2)(c), Wis. Adm. Code.

**WET-** Acute testing has decreased from three tests to two tests.

## Explanation of Limits and Monitoring Requirements

### Categorical Limits

**Total Suspended Solids, BOD5, pH:** Standard municipal wastewater requirements for total suspended solids and pH are included based on ch. NR 210, Wis. Adm. Code, ‘Sewage Treatment Works’ requirements for discharges to fish and aquatic life streams. Tracking of BOD5 and total suspended solids are required for percent removal requirements found in s. NR 210.05, Wis. Adm. Code and in the Standard Requirements section of the permit. Chapter NR 102, Wis. Adm. Code, ‘Water Quality Standards for Surface Waters’ also specifies requirements for pH for fish and aquatic life streams.

**Water Quality Based Limits:** Refer to the Water Quality-Based Effluent Limitations (WQBELs) memo for the Horicon Wastewater Treatment Facility, prepared by Nicole Krueger dated January 30, 2024 (updated on 2/12/24 with typographical error corrected), was used for this reissuance.

**Ammonia, Nitrogen:** Current acute and chronic ammonia toxicity criteria for the protection of aquatic life are included in Tables 2C and 4B of ch. NR 105. Subchapter III of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for ammonia.

**Total Maximum Daily Load (TMDL) Limitations:** The Rock River TMDL for Total Phosphorus (TP) and Total Suspended Solids (TSS) was approved by the Environmental Protection Agency (EPA) in September 2011. The TMDL-derived limits are expressed as weekly average and monthly average effluent limits.

**Total Suspended Solids:** The current permit includes a weekly average concentration limit of 21 mg/L (May – October) and 35 mg/L (November – April) and a monthly average concentration limit of 21 mg/L (May- October) and 30 mg/L (November – April). Monthly average and weekly average mass effluent limitations should be included in the permit according to the table below, along with the currently imposed concentration limits.

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)
Jan	101	142
Feb	109	153
March	101	142
April	101	142
May	101	142
June	101	142
July	67	95
Aug	42	59

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)
Sept	67	94
Oct	101	142
Nov	101	142
Dec	101	142

**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. 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.

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 \$64.75 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. Please see the phosphorus compliance schedule included in the Schedules section.

The approved total phosphorus TMDL limits for this permittee are included in the table below. The limits become effective January 1, 2028.

**Total Phosphorus TMDL Limits**

Month	Monthly Ave TP Effluent Limit (lbs/day)
Jan	0.87
Feb	1.80
March	1.96
April	1.92
May	1.71
June	1.31
July	0.86
Aug	0.30
Sept	0.41
Oct	0.67
Nov	0.84
Dec	0.76

**Dissolved Oxygen (DO)**- The DO limits in this permit are based on water quality standards from surface waters classified as fish and aquatic life as specified in s. NR 102.04(4)(a) and (b), Wis. Adm. Code.

**Total Residual Chlorine**- Because chlorine is added as a disinfectant, effluent limitations are recommended to assure proper operation of the de-chlorination system. Section NR 210.06(2)(b), Wis. Adm. Code, states, “When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L.” Because the WQBELs are more restrictive, they are recommended instead and included in this permit.

**E. Coli**- Revisions to bacteria surface water quality criteria to protect recreational uses and accompanying E. coli WPDES permit implementation procedures became effective May 1, 2020. The new rule requires that WPDES permits for facilities with required disinfection include monitoring for E. coli while facilities are disinfecting during the recreation period and establish effluent limitations for E. coli established in s. NR 210.06 (2), Wis. Adm Code. The administrative code rule changes included the following actions: revised the bacteria water quality criteria from fecal coliform to E. coli to protect recreation in ch. NR 102, Wis. Adm. Code.; removed fecal coliform criteria for certain individual waters from ch. NR 104, Wis. Adm. Code.; revised permit requirements for publicly and privately owned sewage treatment works in ch. NR 210, Wis. Adm. Code.; and, updated approved analytical methods for bacteria in ch. NR 219, Wis. Adm. Code

**Chloride** - 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 established the procedure for calculating water quality based effluent limitations (WQBELs) for chloride. Because effluent concentrations are below the calculated WQBELs for chloride no effluent limits are included in the proposed permit. Chloride monitoring frequency was increased from once per month during one calendar year of the permit term to 4 times per month on consecutive days during calendar year 2027 to provide additional data that is more characteristic of the effluent, and to meet requirements of s. NR 106.85, Wis. Adm. Code.

**Total Nitrogen Monitoring (NO<sub>2</sub>+NO<sub>3</sub>, TKN and Total N)**- The Department has included effluent monitoring for Total Nitrogen in the permit through the authority under ss. 283.55(1)(e), Wis. Stats., which allows the department to require the permittee to submit information necessary to identify the type and quantity of any pollutants discharged from the point source, and through s. NR 200.065(1)(h), Wis. Adm. Code, which allows for this monitoring to be collected during the permit term. More information on the justification to include total nitrogen monitoring in wastewater permits can be found in the “Guidance for Total Nitrogen Monitoring in Wastewater Permits” dated October 1, 2019.

**Temperature** - 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. One year of monitoring in year 2027 is recommended in the proposed permit because the temperature data for the month of November is close to the calculated limit. In addition, Horicon is anticipating increased effluent flow rates which may cause exceedances to this limit in the future.

**PFOS and PFOA** – NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for municipal dischargers with an average flow rate less than 1 MGD, to be evaluated on a case-by-case basis to determine if monitoring is required pursuant to s. NR 106.98(2)(c), Wis. Adm. Code. The department evaluated the need for PFOS and PFOA monitoring taking into consideration the presence of potential PFOS or PFOA industrial wastes, remediation sites and other potential sources of PFOS or PFOA. Based on information available at the time the proposed permit was drafted, it was identified that the POTW’s discharge and the types of indirect dischargers may be a potential source of PFOS/PFOA. Therefore, monitoring once every two months is included.

A sample frequency of 1/2 months means one sample is taken during any two-month period. Examples of 1/2 month sample would be every other month (Jan, March, May, etc.) or back-to-back months with a break in between (February & March, May & June, Aug & Sept, etc.). DMR Short Forms will be generated for the following time periods: January-

February, March-April, May-June, July-August, September-October, and November-December. At a minimum one sample result will be present on each form.

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

**Monitoring Frequencies-** Monitoring Frequency for a permitted sewage treatment work is evaluated on a case-by-case basis pursuant s. [NR 210.04, Wis. Adm. Code](#). Appropriate monitoring is evaluated based on the size and type of facility, the ability to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Monitoring frequency for flows, emerging contaminants, and pollutants with final effluent limits has been evaluated for this facility and will be reflected in the proposed permit. Additionally, there will be a need to demonstrate compliance with anticipated new equipment brought online through the facility upgrade. After evaluation, an increase in sampling frequency is warranted to capture changes in treatment due to facility upgrades and to align with sampling frequencies of similarly sized facilities with similar effluent quality throughout the state. The proposed permit will include an increased monitoring frequency for parameters with existing limits including pH, DO, Chlorine (Total Residual), Chloride and Ammonia-Nitrogen. In addition to this increase, monitoring will be required for PFOS/PFOA (pursuant s. [NR 106.98\(2\)\(c\), Wis. Adm. Code](#)).

**Whole Effluent Toxicity-** Whole effluent toxicity (WET) testing requirements are determined in accordance with ss. NR 106.08 and NR 106.09 Wis. Adm. Code, as revised August 2016. (See the current version of the Whole Effluent Toxicity Program Guidance Document and checklist and WET information, guidance and test methods at <http://dnr.wi.gov/topic/wastewater/wet.html>)

## Sample Point Number: 006 – Effluent Blending

### Changes from Previous Permit:

This outfall has been deleted.

### Explanation Monitoring Requirements

See explanation under InPlant Sample Point 101.

## 4 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
004	B	Cake	Fecal Coliform	Incorporation	Land Application	110 Dry Tons
005	B	Liquid	ND	ND	ND	NE
Does sludge management demonstrate compliance? Yes.						
Is additional sludge storage required? No.						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? Yes.						
If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility						
Is a priority pollutant scan required? No.						

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)
Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

### Sample Point Number: 004- Cake Biosolids

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, Ammonium (NH4-N) Total		Percent	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	

**Monitoring Requirements and Limitations**

<b>Parameter</b>	<b>Limit Type</b>	<b>Limit and Units</b>	<b>Sample Frequency</b>	<b>Sample Type</b>	<b>Notes</b>
Potassium, Total Recoverable		Percent	Annual	Composite	
Phosphorus, Water Extractable		Percent	Annual	Composite	
Radium 226 Dry Wt		pCi/g	Once	Composite	Once in 2025.
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2025.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2025.
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:**

Changes highlighted in table above.

**Radium** - Updated monitoring year to 2025.

**PCB** - Updated monitoring year to 2025.

**PFAS** – Annual monitoring is included in the permit pursuant 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), Wis. Adm. Code. Radium requirements are addressed in s. NR 204.07(3)(n), Wis. Adm. Code.

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

## Sample Point Number: 005- Liquid 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, Ammonium (NH <sub>4</sub> -N) Total		Percent	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	
Phosphorus, Water Extractable		Percent	Annual	Composite	
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
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:**

PFAS – Annual monitoring is included in the permit pursuant s. NR 204.06(2)(b)9, Wis. Adm. Code.

**Explanation of Limits and Monitoring Requirements**

Sample point 005 will be used only for emergencies only and is not used on a regular basis. If there is a need to use this outfall, the department must be notified. Complete monitoring of the sludge must be completed total solids and nutrients. All spreading restrictions found in ch. NR 204, Wis. Adm. Code are applicable.

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

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

**5 Schedules**

**5.1 PFOS/PFOA Minimization Plan Determination of Need**

Required Action	Due Date
Report on Effluent Discharge: Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code.  This report shall include all additional PFOS and PFOA data that may be collected including any	04/01/2025



influent, intake, in-plant, collection system sampling, and blank sample results.	
<p>Report on Effluent Discharge and Evaluation of Need: Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan.</p> <p>This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.</p> <p>The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan.</p> <p>If the Department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for Department approval no later than 90 days after written notification was sent from the Department. The Department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued.</p> <p>If, however, the Department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.</p>	04/01/2026

## 5.2 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
<p>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. 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.</p> <p>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.</p> <p>Note: The applicable Target Value is [CHOOSE ONE: the TMDL derived limit value OR 0.2 mg/L] as defined by s. 283.16(1)(h), Wis. Stats. The "per pound" value is \$50.00 adjusted for CPI.</p>	03/01/2025
Annual Verification of Payment #2: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2026
Annual Verification of Payment #3: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2027
Annual Verification of Payment #4: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2028

## 5.3 Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus

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

Required Action	Due Date
Progress Report on Plans & Specifications: Submit progress report regarding the progress of preparing final plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	01/01/2025
Final Plans and Specifications: Unless the permit has been modified, revoked and reissued, or reissued to include Adaptive Management or Water Quality Trading measures or to include a revised schedule based on factors in s. NR 217.17, Wis. Adm. Code, the permittee shall submit final construction plans to the Department for approval pursuant to s. 281.41, Stats., specifying treatment plant upgrades that must be constructed to achieve compliance with final phosphorus WQBELs, and a schedule for completing construction of the upgrades by the complete construction date specified below. (Note: Permit modification, revocation and reissuance, and reissuance are subject to s. 283.53(2), Stats.)  Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	01/01/2026
Treatment Plant Upgrade to Meet WQBELs: The permittee shall initiate construction of the upgrades. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41, Stats. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	01/01/2027
Construction Upgrade Progress Report #1: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	07/01/2027
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	12/31/2027
Achieve Compliance : The permittee shall achieve compliance with final phosphorus WQBELs. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	01/01/2028

## Explanation of Schedules

### PFOS/PFOA Minimization Plan Determination of Need

As stated above, NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. S. NR 106.98, Wis. Adm. Code, specifies steps to generate data in order to determine the need for reducing PFOS and PFOA in the discharge. Data generated per the effluent monitoring requirements will be used to determine the need for developing a PFOS/PFOA minimization plan. As part of the schedule, the permittee is required to submit two annual Reports on Effluent Discharge.

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

### **County Payment**

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).

### **Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus**

The Department has tentatively approved 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. The schedule above provides the permittee with three years and nine months to complete their next facility planning effort and associated major facility upgrade to comply with the final limits.

### **Special Reporting Requirements**

None.

### **Other Comments:**

None.

### **Attachments:**

- Water Quality-Based Effluent Limitations Memo dated January 30, 2024 (updated 2/12/24 with phosphorous limits typographical error corrected) and prepared by Nicole Krueger
- Multi-Discharger Variance Evaluation Checklist, dated 1/24/2024
- Multi-Discharger Variance Conditional Approval, dated 1/24/2024
- Blending Approval Memo, dated 1/31/2024

### **Expiration Date:**

March 31, 2029

### **Justification Of Any Waivers From Permit Application Requirements**

No waivers were requested or granted from permit application requirements.

**Prepared By:** Melanie Burns, Wastewater Specialist

**Date:** January 31, 2024

**Date Post Fact Check:** February 13, 2024 (Phosphorus limits corrected based on updated WQBEL on 2/12/24)

**Date Post Public Notice:**

# CORRESPONDENCE/MEMORANDUM

DATE: 01/30/2024 – updated 02/12/2024 with phosphorous limits typo corrected

TO: Melanie Burns – SER

FROM: Nicole Krueger – SER *Nicole Krueger*

SUBJECT: Water Quality-Based Effluent Limitations for Horicon Wastewater Treatment Facility  
WPDES Permit No. WI-0020231-10

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 Horicon Wastewater Treatment Facility in Dodge County. This municipal wastewater treatment facility (WWTF) discharges to the Rock River, located in the Sinissippi Lake Watershed in the Upper Rock River Basin. This discharge is included in the Rock River TMDL as approved by EPA. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1,2
BOD <sub>5</sub> May – October			21 mg/L 102 lbs/day	<b>21 mg/L</b>	1,3
Nov – April			35 mg/L 170 lbs/day	<b>30 mg/L</b>	
TSS May – October			21 mg/L	21 mg/L	1,4
Nov – April			35 mg/L	30 mg/L	
Ammonia Nitrogen	11 mg/L		<b>11 mg/L</b>	<b>11 mg/L</b>	3
Phosphorus LCA HAC Final				0.8 mg/L 0.6 mg/L TMDL	4,5
pH	9.0 s.u.	6.0 s.u.			1
Dissolved Oxygen		6.0 mg/L			1
Residual Chlorine	38 µg/L		20 mg/L	<b>20 mg/L</b>	1,3
Bacteria					6
Final Limit <i>E. coli</i>				126 #/100 mL geometric mean	
Chloride					1,7
Temperature					1,7
TKN, Nitrate+Nitrite, and Total Nitrogen					8
PFOS & PFOA					9
Acute WET					10,11

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Chronic WET				2.8 TUc	10,11

Footnotes:

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

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave TP Effluent Limit (lbs/day)
Jan	101	142	0.87
Feb	109	153	1.80
March	101	142	1.96
April	101	142	1.92
May	101	142	1.71
June	101	142	1.31
July	67	95	0.86
Aug	42	59	0.30
Sept	67	94	0.41
Oct	101	142	0.67
Nov	101	142	0.84
Dec	101	142	0.76

5. Under the phosphorus MDV, a level currently achievable (LCA) interim limit of 0.8 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 0.6 mg/L can be met. The final WQBELs remain at the TMDL-based mass limits.
6. 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.
7. Monitoring only for one year.
8. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate (NO<sub>3</sub>), nitrite (NO<sub>2</sub>), and total kjeldahl nitrogen (TKN) (all expressed as N).
9. Once every other month monitoring is required in accordance with s. NR 106.98(2), Wis. Adm. Code.
10. 2/permit term acute and annual chronic WET testing is recommended. The Instream Waste Concentration (IWC) to assess chronic test results is 36%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 75%, 50%, 25% & 12.5% and the dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the receiving water.
11. 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](mailto:Nicole.Krueger@wisconsin.gov) or Diane Figiel at [Diane.Figiel@wisconsin.gov](mailto:Diane.Figiel@wisconsin.gov).

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

PREPARED BY: Nicole Krueger, Water Resources Engineer – SER

E-cc: Jacob Wedesky, Wastewater Engineer – SER  
Bryan Hartsook, Regional Wastewater Supervisor – SER  
Diane Figiel, Water Resources Engineer – WY/3  
Kari Fleming, Environmental Toxicologist – WY/3  
Michael Polkinghorn, Water Resources Engineer – NOR/Rhineland Service Center  
Nate Willis, Wastewater Engineer – WY/3

Attachment #1  
**Water Quality-Based Effluent Limitations for  
Horicon Wastewater Treatment Facility**

**WPDES Permit No. WI-0020231-10**

Prepared by: Nicole Krueger

**PART 1 – BACKGROUND INFORMATION**

**Facility Description**

The City of Horicon operates an oxidation ditch-activated sludge treatment facility providing secondary treatment. Phosphorus is removed using NEO Water FX 300. Seasonal disinfection is accomplished through the use of chlorine gas. Biosolids are aerobically digested before being dewatered by a filter press. There is on-site storage for at least 180 days. Biosolids are removed by a local contractor and land applied to local farm fields at agronomic rates. The solids are analyzed on an annual basis. The current permit also allows land application of liquids on an emergency basis.

Attachment #4 is a map of the area showing the approximate location of Outfall 001.

**Existing Permit Limitations**

The current permit, expiring on 12/31/2023, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD <sub>5</sub> May – October			21 mg/L 102 lbs/day	<b>21 mg/L</b>	2,3
Nov – April			35 mg/L 170 lbs/day	<b>30 mg/L</b>	
TSS May – October			21 mg/L	21 mg/L	4
Nov – April			35 mg/L	30 mg/L	
Ammonia Nitrogen April	20 mg/L		12 mg/L	11 mg/L	
May – September	20 mg/L		11 mg/L	14 mg/L	
October – March	20 mg/L		19 mg/L	18 mg/L	
Phosphorus MDV Interim				0.8 mg/L	4
Final				TMDL	
pH	9.0 s.u.	6.0 s.u.			2
Dissolved Oxygen		6.0 mg/L			2
Residual Chlorine	38 µg/L		20 mg/L	<b>20 mg/L</b>	3
Fecal Coliform May – September			<b>656#/100 mL geometric mean</b>	400#/100 mL geometric mean	3
Chloride					1



Attachment #1

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Temperature					1
Acute WET					5
Chronic WET				2.8 TUc	5

Footnotes:

1. Monitoring only.
2. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
3. 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. TSS and phosphorus mass limitations from the Rock River TMDL are shown below. The TMDL-based phosphorus limits have not yet become effective.

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave TP Effluent Limit (lbs/day)
Jan	101	142	0.87
Feb	109	153	1.80
March	101	142	1.96
April	101	142	1.92
May	101	142	1.71
June	101	142	1.31
July	67	95	0.86
Aug	42	59	0.30
Sept	67	94	0.41
Oct	101	142	0.67
Nov	101	142	0.84
Dec	101	142	0.76

5. 3/permit term acute and annual chronic WET testing is required in the current permit. The IWC for chronic WET was 36%.

**Receiving Water Information**

- Name: Rock River
- Waterbody Identification Code (WBIC): 788800
- 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<sub>10</sub> and 7-Q<sub>2</sub> values are from USGS for Station 05424057, where Outfall 001 is located.  
 $7-Q_{10} = 6.3$  cfs (cubic feet per second)  
 $7-Q_2 = 29$  cfs
- Hardness = 262 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data from chronic WET testing from 11/12/2019 – 04/04/2023.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from the Rock River in Dodge County is used

Attachment #1

for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.

- Multiple dischargers: There are several other dischargers to the Rock River, however they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: The Rock River is 303(d) listed as impaired for phosphorus and TSS at the point of discharge. An approved TMDL addresses phosphorus and TSS impairments.

**Effluent Information**

- Design flow rate(s):  
Annual average = 0.582 MGD (Million Gallons per Day)  
For reference, the actual average flow from 01/01/2019 – 12/31/2023 was 0.49 MGD.
- Hardness = 335 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data from the permit reissuance application from 06/01/2023 – 06/10/2023.
- 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 with industrial sources from Iron and Steel Manufacturing and John Deere Manufacturing.
- Additives: Chlorine gas is used for disinfection, sulfur dioxide is used for dechlorination, and NEO Water FX 300 is used 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 and hardness.
- 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
06/01/2023	11	06/13/2023	10	06/25/2023	11
06/04/2023	15	06/16/2023	14	06/28/2023	12
06/07/2023	12	06/19/2023	12	07/01/2023	9.4
06/10/2023	10	06/22/2023	11		
1-day P <sub>99</sub> = 16 µg/L					
4-day P <sub>99</sub> = 14 µg/L					

**Effluent Chloride Data**

Sample Date	Chloride mg/L	Sample Date	Chloride mg/L	Sample Date	Chloride mg/L
01/20/2022	320	05/18/2022	320	09/20/2022	240
02/22/2022	270	06/30/2022	290	10/18/2022	260
03/23/2022	340	07/20/2022	270	11/15/2022	260
04/26/2022	280	08/24/2022	280	12/13/2022	290
1-day P <sub>99</sub> = 359 mg/L					
4-day P <sub>99</sub> = 320 mg/L					

Attachment #1

The following table presents the average concentrations and loadings at Outfall 001 from 01/01/2019 – 12/31/2023 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 <sub>5</sub>	3.6 mg/L*	14 lbs/day*
TSS	4.9 mg/L*	20 lbs/day*
pH field	7.7 s.u.	
Phosphorus	0.46 mg/L	2.0 lbs/day
Ammonia Nitrogen	0.083 mg/L*	
Fecal coliform	18 #/100 mL	

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

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

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

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99<sup>th</sup> percentile (or P<sub>99</sub>) 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<sub>10</sub>**

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<sub>10</sub> receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

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

Where:

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

Q<sub>s</sub> = average minimum 1-day flow which occurs once in 10 years (1-day Q<sub>10</sub>)  
if the 1-day Q<sub>10</sub> flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q<sub>10</sub>).

Q<sub>e</sub> = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

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

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

Attachment #1

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q<sub>10</sub> method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for Horicon and the limits are set based on two times the acute toxicity criteria.

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

**Daily Maximum Limits based on Acute Toxicity Criteria (ATC)**

RECEIVING WATER FLOW = 5.0 cfs, (1-Q<sub>10</sub> (estimated as 80% of 7-Q<sub>10</sub>)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P <sub>99</sub>	1-day MAX. CONC.
Chlorine		19.0		38.1			36	<b>54</b>
Arsenic		340		680	136	<1.1		
Cadmium	335	41.2	0.11	82.5	16.5	<0.19		
Chromium	301	4446	2.43	8892	1778	<1.1		
Copper	335	48.6	2.12	97.1			16	15
Lead	335	344		688	138	<4.3		
Nickel	268	1080	2.5	2161	432	3		
Zinc	333	345	1	689	138	19		
Chloride (mg/L)		757		1514			359	340

\* 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.

\*\* The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q<sub>10</sub> flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

**Weekly Average Limits based on Chronic Toxicity Criteria (CTC)**

RECEIVING WATER FLOW = 1.6 cfs (¼ of the 7-Q<sub>10</sub>), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P <sub>99</sub>
Chlorine		7.28		20.0			16
Arsenic		152		418	83.7	<1.1	
Cadmium	175	3.82	0.11	10.3	2.06	<0.19	
Chromium	262	291	2.43	795	159	<1.1	
Copper	262	23.6	2.12	61.2			14
Lead	262	71.0		195	39.1	<4.3	
Nickel	262	118	2.5	320	63.9	3	
Zinc	262	279	1	767	153	19	
Chloride (mg/L)		395		1086			320

Attachment #1

\* 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 = 13.4 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	0.11	5887	1177.4	<0.19
Chromium (+3)	3818000	2.43	60764084	12152817	<1.1
Lead	140		2228	446	<4.3
Nickel	43000	2.5	684315	136863	3

**Monthly Average Limits based on Human Cancer Criteria (HCC)**

RECEIVING WATER FLOW = 13.4 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3		212	42.3	<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 chlorine.**

Total Residual Chlorine – The 1-day P<sub>99</sub> of chlorine data exceeds the daily maximum limit of 38 µg/L which shows reasonable potential for a limit. Chlorine is added as a disinfectant, so effluent limitations are recommended to assure proper operation of the de-chlorination system. Section NR 210.06(2)(b), Wis. Adm. Code, states, “When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L.” Because the WQBELs are more restrictive, they are recommended instead. Specifically, **a daily maximum limit of 38 µg/L is required. The weekly average effluent limitation of 20 µg/L should also be continued.**

Sections NR 106.07(3) and NR 205.067(7), Wis. Adm. Code require WPDES permits contain weekly average and monthly average limitations for municipal dischargers whenever practicable and necessary to protect water quality. **Therefore, a monthly average limit of 20 µg/L is required** to meet expression of limits requirements in addition to the daily max and weekly average limits.

Chloride – Considering available effluent data from the current permit term (01/20/2022 – 12/13/2022), the 1-day P<sub>99</sub> chloride concentration is 359 mg/L, and the 4-day P<sub>99</sub> of effluent data is 320 mg/L.

These effluent concentrations are below the calculated WQBELs for chloride, therefore no effluent limits are needed. Chloride monitoring is recommended to ensure that 11 sample results are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code.

Mercury – The permit application did not require monitoring for mercury because Horicon 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 04/16/2019 – 03/09/2022 was 1.4 mg/kg, with a maximum reported concentration of 2.2 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. Previous monitoring produced a PFOS result of 0.781 ng/L and a PFOA result of 3.81 ng/L. Based on the type of discharge and the types of indirect dischargers contributing to the collection system, **PFOS and PFOA monitoring is recommended at a frequency of once every two months.**

### **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 757 sample results were reported from 01/03/2019 – 12/29/2023. The maximum reported value was 8.3 s.u. (Standard pH Units). The effluent pH was 8.2 s.u. or less 99% of the time. The 1-day P<sub>99</sub>, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.2 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 8.2 s.u. Therefore, a value of 8.2 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 8.2 s.u. into the equation above yields an ATC = 11 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<sub>10</sub> 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<sub>10</sub> (estimated as 80 % of 7-Q<sub>10</sub>) and the 2×ATC approach are shown below.

**Daily Maximum Ammonia Nitrogen Determination**

	Ammonia Nitrogen Limit mg/L
2×ATC	11
1-Q <sub>10</sub>	35

The 2×ATC method yields the most stringent limits for Horicon.

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

**Daily Maximum Ammonia Nitrogen Limits – WWSF**

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

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

Weekly and monthly average limits are not included in the current permit but are being evaluated here due to changes to ch. NR 106, Wis. Adm. Code. **The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do not change** because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous WQBEL memo are shown in Attachment #2.

**Effluent Data**

The following table evaluates the statistics based upon ammonia data reported from 01/01/2019 – 12/26/2023, with those results being compared to the calculated limits to determine the need to include ammonia limits in Horicon’s permit for the respective month ranges. That need is determined by calculating 99<sup>th</sup> upper percentile (or P<sub>99</sub>) 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 - March
1-day P <sub>99</sub>	0.74	0.12	0.41
4-day P <sub>99</sub>	0.42	0.078	0.23
30-day P <sub>99</sub>	0.18	0.051	0.11
Mean*	0.08	0.039	0.064
Std	0.18	0.022	0.093
Sample size	522	42	219
Range	<0.025 – 2.41	<0.025 – 0.142	<0.025 – 0.734

\*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.

**Expression of Limits**

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

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

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

If Horicon decides to continue with a single daily max limit, the **weekly average and monthly average limits year-round are recommended to be equal to 11 mg/L in the reissued permit, equivalent to the**



**calculated daily maximum limit of 11 mg/L.** All current weekly average and monthly average limits are either equal to or greater than 11 mg/L.

**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. Limits to meet the requirements in s. NR 106.07, Wis. Adm Code, are shown below in bold.

If Horicon decides to continue with a single daily maximum limit, the following limits would be recommended in the reissued permit.

**Final Ammonia Nitrogen Limits**

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
Year round	11	<b>11</b>	<b>11</b>

If Horicon decides to have variable daily maximum ammonia limits rather than a single daily maximum limit, the following ammonia limits would be recommended in the reissued permit.

**Final Ammonia Nitrogen Limits**

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
April	Variable	12	11
May – September	Variable	11	14
October – March	Variable	19	18

**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 Horicon’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**

Horicon has monitored effluent *E. coli* from 7/20/2022 – 09/26/2023 and a total of 36 results are available. A geometric mean of 126 counts/100 mL was not exceeded, with a maximum monthly geometric mean of 42 counts/100 mL. Effluent data has not exceeded 410 counts/100 mL. The maximum reported value was 95 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 Horicon currently has a limit of 0.8 mg/L, which is less than the TBEL, this limit should be included in the reissued permit. This limit remains applicable unless a more stringent WQBEL is given.

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

### **Water Quality Based Limit**

Revisions to the administrative rules for phosphorus discharges took effect on December 1, 2010. These rule revisions include additions to ch. NR 102 (s. NR 102.05), which establish phosphorus standards for surface waters. Revisions to ch. NR 217 (s. NR 217, Subchapter III) establish procedures for determining water quality based effluent limits for phosphorus, based on the applicable standards in ch. NR 102.

The Department has developed a TMDL for the Upper and Lower Rock River Basins. The US EPA approved the Rock River TMDL on September 28, 2011. The document, along with the referenced appendices can be found at:

[http://dnr.wi.gov/topic/TMDLs/RockRiver/Final\\_Rock\\_River\\_TMDL\\_Report\\_with\\_Tables.pdf](http://dnr.wi.gov/topic/TMDLs/RockRiver/Final_Rock_River_TMDL_Report_with_Tables.pdf)

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL-derived water quality based effluent limit (WQBEL) for phosphorus in addition to, or in lieu of, a s. NR 217.13 WQBEL in a WPDES permit. Because the Rock River Basin TMDL was developed to protect and improve the water quality of phosphorus impaired waters within the basin and the discharge from Horicon flows directly into the Rock River, which was listed as phosphorus impaired at the time of TMDL development, the TMDL-based limit can be included in the WPDES permit absent the s. NR 217.13 WQBEL. This limit should be expressed in a manner consistent with the wasteload allocation and assumptions of the TMDL. If after two permit terms, the Department determines the nonpoint source load allocation has not been substantially reduced, the Department may include the s. NR 217.13 WQBEL unless these reductions are likely to occur.

### **TMDL Limits – Phosphorus**

The monthly average total phosphorus (Total P) effluent limits in lbs/day are calculated based on the monthly phosphorus wasteload allocation (WLA) given in pounds per month as suggested in the *TMDL Implementation Guidance for Wastewater Permits* dated October 1, 2019. The WLA for this facility is found in the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin* report dated July 2011. The limits are equivalent to concentrations ranging from 0.061 – 0.40

mg/L at the facility design flow of 0.582 MGD. Monthly average mass effluent limits in accordance with the following table are recommended for this discharge.

**Total Phosphorus Effluent Limitations**

Month	Monthly Total P WLA <sup>1</sup> (lbs/month)	Days Per Month	Monthly Ave Total P Effluent Limit <sup>2</sup> (lbs/day)
Jan	26.98	31	<b>0.87</b>
Feb	50.26	28	<b>1.80</b>
March	60.70	31	<b>1.96</b>
April	57.49	30	<b>1.92</b>
May	53.05	31	<b>1.71</b>
June	39.29	30	<b>1.31</b>
July	26.59	31	<b>0.86</b>
Aug	9.21	31	<b>0.30</b>
Sept	12.30	30	<b>0.41</b>
Oct	20.88	31	<b>0.67</b>
Nov	25.10	30	<b>0.84</b>
Dec	23.61	31	<b>0.76</b>

Footnotes:

- 1- Rock River TMDL Appendix P. Monthly Total Phosphorus Allocations by Wastewater Treatment Facility (p. 147)
- 2- monthly average Total P effluent limit (lbs/day) = monthly Total P WLA (lbs/month) ÷ days per month

Horicon currently has an MDV interim limit and compliance schedule to meet the TMDL-based limits. These limits are not currently effective.

**Effluent Data**

The following table summarizes effluent total phosphorus monitoring data from 01/01/2019 – 12/28/2023.

**Total Phosphorus Effluent Data**

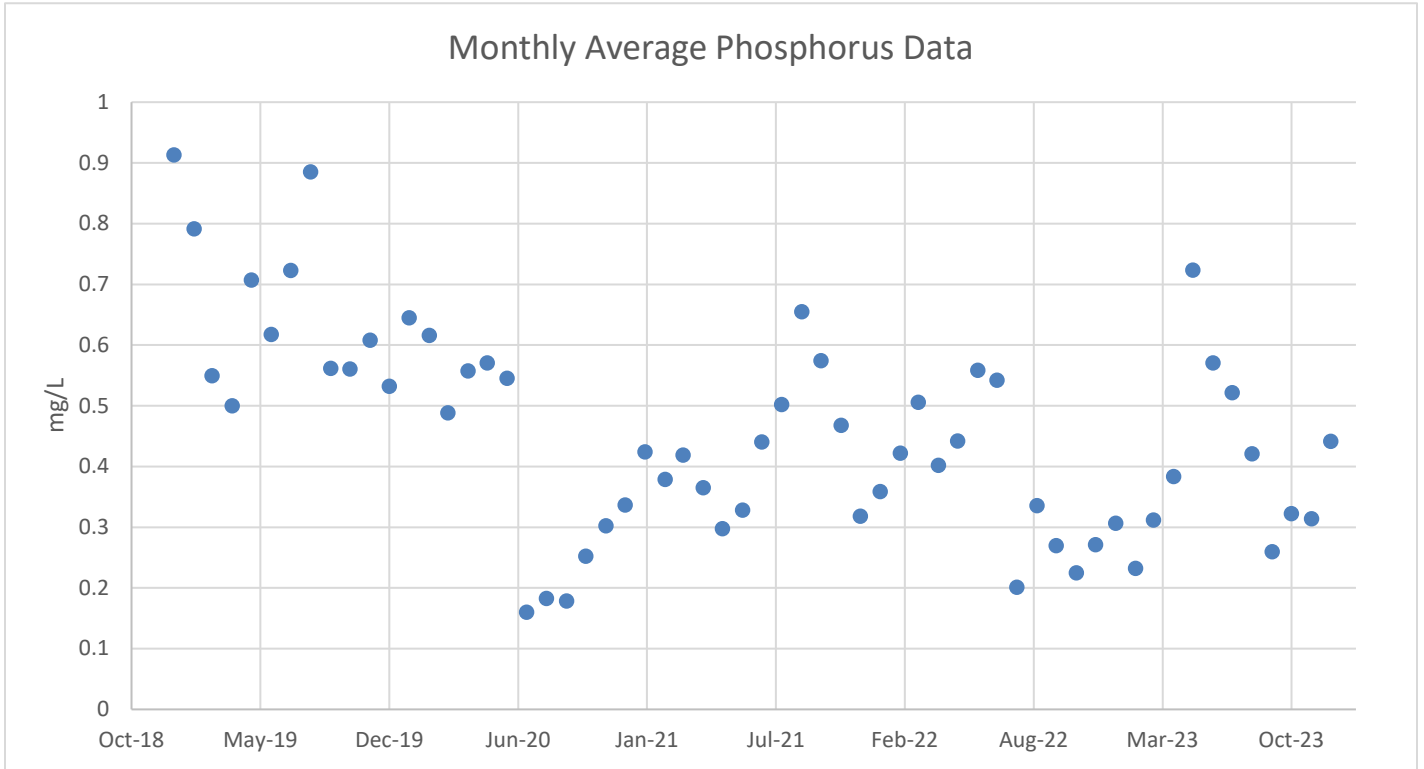
	Phosphorus mg/L	Phosphorus lbs/day
1-day P <sub>99</sub>	1.3	6.5
4-day P <sub>99</sub>	0.79	3.9
30-day P <sub>99</sub>	0.56	2.6
Mean	0.46	2.0
Std	0.23	1.3
Sample size	783	800
Range	0.095 – 2.365	0.393 – 11.3

**Multi-Discharge Variance Interim Limit**

With the permit application, Horicon 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 2<sup>nd</sup> 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 0.8 mg/L should not be exceeded during the compliance schedule.**

The graph below shows the monthly average phosphorus concentration data from the current permit term.



**PART 6 – TOTAL SUSPENDED SOLIDS**

The Rock River TMDL also has wasteload allocations (WLA) for total suspended solids (TSS). For a municipal facility the limits for TSS must be expressed as weekly and monthly averages. The current permit includes monthly average limits of 21 mg/L for May – October and 30 mg/L for November – April and weekly average limits of 21 mg/L for May – October and 35 mg/L for November – April.

**Monthly average and weekly average mass effluent limitations should be included in the permit according to the table below, along with the currently imposed concentration limits.**

**Total Suspended Solids Effluent Limitations**

Month	Monthly TSS WLA <sup>1</sup> (tons/month)	Days Per Month	Monthly Ave TSS Effluent Limit <sup>2</sup> (lbs/day)	Weekly Ave TSS Effluent Limit <sup>3</sup> (lbs/day)
Jan	1.56	31	101	142
Feb	1.52	28	109	153
March	1.56	31	101	142

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Month	Monthly TSS WLA <sup>1</sup> (tons/month)	Days Per Month	Monthly Ave TSS Effluent Limit <sup>2</sup> (lbs/day)	Weekly Ave TSS Effluent Limit <sup>3</sup> (lbs/day)
April	1.51	30	101	142
May	1.56	31	101	142
June	1.51	30	101	142
July	1.04	31	67	95
Aug	0.65	31	42	59
Sept	1.00	30	67	94
Oct	1.56	31	101	142
Nov	1.51	30	101	142
Dec	1.56	31	101	142

Footnotes:

1- Rock River TMDL Appendix Q. Monthly Total Suspended Solids Allocations by Wastewater Treatment Facility (p. 149)

2- Monthly average TSS effluent limit (lbs/day) = maximum monthly TSS WLA (tons/month) ÷ days per month x 2,000 lbs/ton

3- Weekly average effluent limit (lbs/day) = monthly average limit (lbs/day) x multiplier (1.41)

The multiplier used in the weekly average limit calculation was determined according to implementation guidance. A coefficient of variation was calculated, based on TSS mass monitoring data, to be 0.75. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived TSS and phosphorus permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by any facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies TSS monitoring as 3/week; if a different monitoring frequency is used, the stated limits should be reevaluated.

**Effluent Data**

Limits based on a WLA should be given in a permit regardless of reasonable potential. However, the table below summarizes the TSS data from 01/01/2019 – 12/31/2023 for informational purposes.

**TSS Effluent Data**

	TSS (mg/L)	TSS (lbs/day)
1-day P <sub>99</sub>	14.54	75.3
4-day P <sub>99</sub>	9.09	43.8
30-day P <sub>99</sub>	6.23	27.9
Mean*	4.91	20.8
Std	2.74	14.8
Sample Size	783	783
Range	<2 – 35.5	0 – 250

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

**PART 7 – 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 01/01/2019 – 12/31/2023.

The table below summarizes the maximum temperatures reported during monitoring from 01/04/2022 – 12/29/2022.

**Monthly Temperature Effluent Data & Limits**

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
JAN	47	48	75	120
FEB	46	55	79	120
MAR	49	50	68	114
APR	51	52	64	117
MAY	59	62	74	108
JUN	66	67	90	100
JUL	70	70	100	106
AUG	71	71	106	105
SEP	69	70	91	102
OCT	65	65	70	96
NOV	59	61	62	120
DEC	52	52	69	120

**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 can be found in Attachment #3. **Monitoring for one year is recommended to continue.** The temperature data for the month of November is close to the calculated limit and Horicon is anticipating increased effluent flow rates which may cause exceedances to this limit in the future. Should there be reasonable potential in the future, Horicon may demonstrate dissipative cooling as a compliance option.

### PART 8 – 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<sub>50</sub> (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<sub>25</sub> (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 **36%** 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 = 0.582 MGD = 0.901 cfs

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

$Q_s$  = ¼ of the 7- $Q_{10}$  = 6.3 cfs ÷ 4 = 1.6 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. The specific receiving water location must be specified in the WPDES permit.

Attachment #1

- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations.

**WET Data History**

Date Test Initiated	Acute Results LC <sub>50</sub> %				Chronic Results IC <sub>25</sub> %				Footnotes or Comments
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	<i>C. dubia</i>	Fathead Minnow	Pass or Fail?	Use in RP?	
04/13/2006	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
08/23/2007	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
10/16/2008					61.58	>100	Pass	No	1
06/03/2014	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
08/11/2015	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
12/06/2016					60.6	>100	Pass	Yes	
11/12/2019	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
06/16/2020					75.9	>100	Pass	Yes	
02/23/2021	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
07/12/2022					>100	>100	Pass	Yes	
04/04/2023	>100	>100	Pass	Yes	>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.**

$$\text{Acute Reasonable Potential} = [(TU_a \text{ effluent}) (B)(AMZ)]$$

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

According to s. NR 106.08(6)(d), Wis. Adm. Code, TU<sub>a</sub> and TU<sub>c</sub> effluent values are equal to zero whenever toxicity is not detected (i.e. when the LC<sub>50</sub>, IC<sub>25</sub> or IC<sub>50</sub> ≥ 100%).

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

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



**Chronic WET Limit Parameters**

<b>TU<sub>c</sub></b> (maximum) 100/IC <sub>25</sub>	<b>B</b> (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	<b>IWC</b>
100/60.6 = 1.65	3.8 Based on 2 detects	36%

$$[(TU_c \text{ effluent}) (B)(IWC)] = 2.3 > 1.0$$

Therefore, reasonable potential is shown for a chronic WET limit using the procedures in s. NR 106.08(6) and representative data from 04/13/2006 – 04/04/2023.

Expression of WET limits

Chronic WET limit =  $[100/IWC] TU_c = 2.8 TU_c$  expressed as a monthly average

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

**WET Checklist Summary**

	<b>Acute</b>	<b>Chronic</b>
<b>AMZ/IWC</b>	Not Applicable. <b>0 Points</b>	IWC = 36%. <b>10 Points</b>
<b>Historical Data</b>	7 tests used to calculate RP. No tests failed. <b>0 Points</b>	10 tests used to calculate RP. No tests failed. <b>0 Points</b>
<b>Effluent Variability</b>	Little variability, no violations or upsets, consistent WWTF operations. <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Receiving Water Classification</b>	Warmwater sport fish. <b>5 Points</b>	Same as Acute. <b>5 Points</b>
<b>Chemical-Specific Data</b>	Reasonable potential for chlorine limit based on ATC; Ammonia nitrogen limit carried over from the current permit. Ammonia, copper, nickel, zinc, and chloride detected. Additional Compounds of Concern: None.	Reasonable potential for limits for no substances based on CTC; Ammonia nitrogen limit carried over from the current permit. Ammonia, chlorine, copper, nickel, zinc, and chloride detected. Additional Compounds of Concern: None.

Attachment #1

	Acute	Chronic
	<b>8 Points</b>	<b>3 Points</b>
<b>Additives</b>	1 Biocides and 2 Water Quality Conditioners added. Permittee has proper P chemical SOPs in place: Yes. <b>5 Points</b>	All additives used more than once per 4 days. <b>5 Points</b>
<b>Discharge Category</b>	2 Industrial Contributors: Iron and Steel Manufacturing and John Deere Manufacturing. <b>6 Points</b>	Same as Acute. <b>6 Points</b>
<b>Wastewater Treatment</b>	Secondary or better. <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Downstream Impacts</b>	No impacts known. <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Total Checklist Points:</b>	<b>24 Points</b>	<b>29 Points</b>
<b>Recommended Monitoring Frequency (from Checklist):</b>	2 tests during permit term	1x yearly
<b>Limit Required?</b>	No	Yes Limit = 2.8 TU <sub>c</sub>
<b>TRE Recommended? (from Checklist)</b>	No	No

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, 2/permit term acute and 1x/yearly chronic WET tests are recommended in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).
- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, a WET limit is required. The chronic WET limit shall be expressed as 2.8 TU<sub>c</sub> as a monthly average in the effluent limits table of the permit.
- A minimum of annual chronic monitoring is required because a chronic WET limit is required. Federal regulations in 40 CFR Part 122.44(i) require that monitoring occur at least once per year when a limit is present.

Attachment #2  
2010 Ammonia Calculations

<b>AMMONIA (as N) LIMITS CLASSIFICATION:</b>		<b>Horicon WWSF</b>		
EFFLUENT FLOW (MGD):		0.582		
EFFLUENT FLOW (cfs):		0.900		
MAX. EFFLUENT pH (s.u.):		7.8		
<b>BACKGROUND INFORMATION:</b>		<i>May-Sept.</i>	<i>Oct.-March</i>	<i>April</i>
7-Q <sub>10</sub> (cfs)		3	3	3
7-Q <sub>2</sub> (cfs)		15	15	15
Ammonia (mg/L)		0.07	0.17	0.09
Temperature (deg C)		23	3	9
pH (std. units)		8.21	7.97	7.97
% of river flow used		100	25	25
Reference weekly flow		3	0.75	0.75
Reference monthly flow		12.75	3.1875	3.1875
<b>CRITERIA (in mg/L):</b>				
Acute (@ effl. pH):		12.14	12.14	12.14
4-day Chronic (@ backgrd. pH):				
early life stages present		2.55	6.35	6.35
early life stages absent		2.55	10.31	9.06
30-day Chronic (@ backgrd. pH)				
early life stages present		1.02	2.54	2.54
early life stages absent		1.02	4.12	3.63
<b>EFFLUENT LIMITS (in mg/L):</b>				
<b>Daily maximum</b>		24.28	24.28	24.28
<b>Weekly average</b>				
early life stages present		<b>10.83</b>	11.50	<b>11.56</b>
early life stages absent			<b>18.76</b>	16.54
<b>Monthly average</b>				
early life stages present		<b>14.49</b>	10.93	<b>11.21</b>
early life stages absent			<b>18.12</b>	16.14

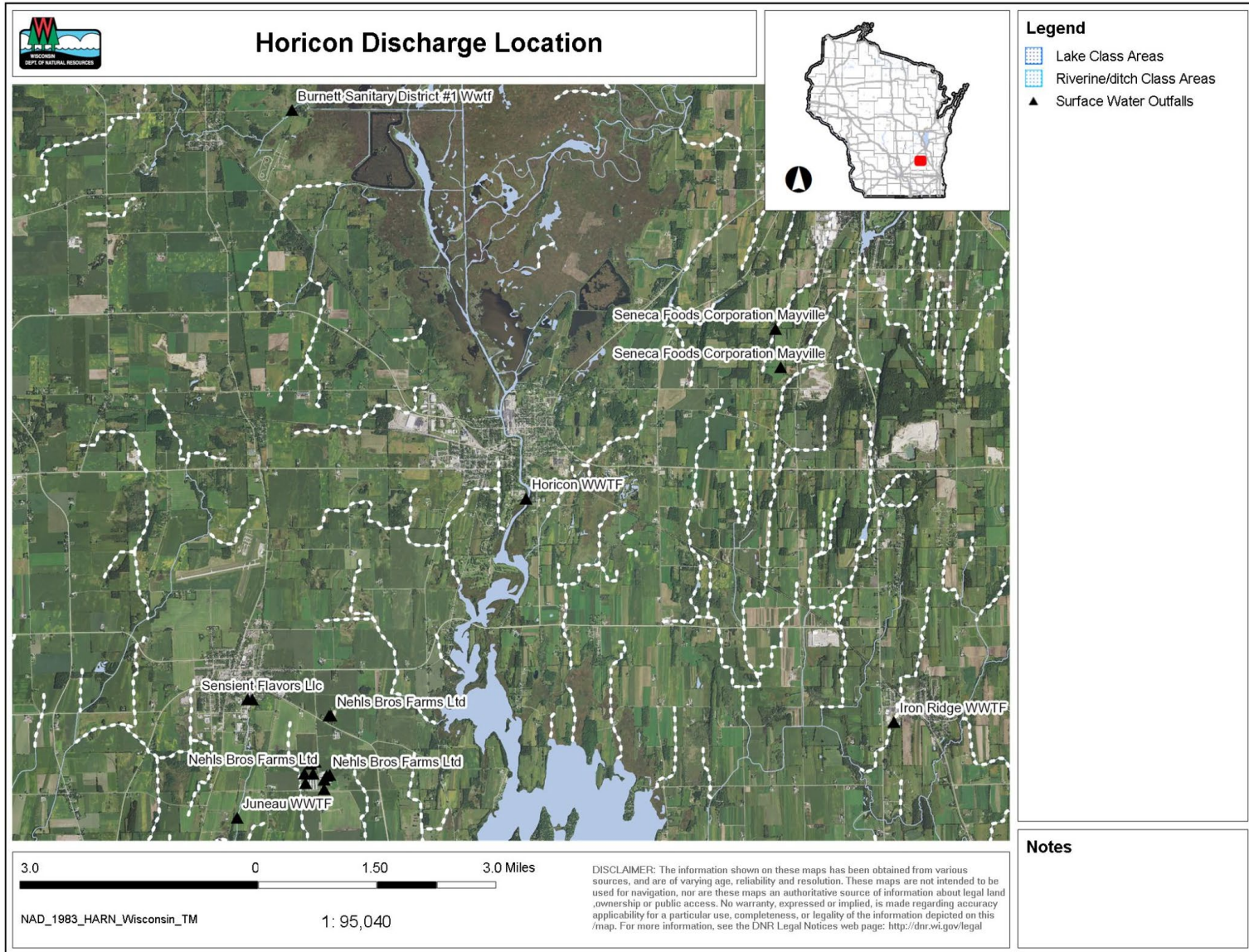
Early life stages present limits apply during the months of April through September and the early life stages absent limits apply to October through March because burbot are not expected to be present in the receiving water. Limits for the month of April are calculated separately because this is a transitional month. The temperatures are lower than later in the summer and early life stage criteria apply for April while it doesn't apply in the winter. At times, this may result in significant differences in the limits.

**Temperature limits for receiving waters with unidirectional flow**

(calculation using default ambient temperature data)

<b>Facility:</b>	Horicon WWTF	<b>7-Q<sub>10</sub>:</b>	6.30 cfs	<b>Temp Dates</b>	<b>Flow Dates</b>
<b>Outfall(s):</b>	001	<b>Dilution:</b>	25%	<b>Start:</b>	01/04/22 01/01/19
<b>Date Prepared:</b>	11/29/2023	<b>f:</b>	0	<b>End:</b>	12/29/22 12/31/23
<b>Design Flow (Q<sub>e</sub>):</b>	0.58 MGD	<b>Stream type:</b>	Small warm water sport or forage fish co ▼		
<b>Storm Sewer Dist.</b>	0 ft	<b>Qs:Qe ratio:</b>	1.7 :1		
		<b>Calculation Needed?</b>	YES		

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs) (cfs)	Representative Highest Effluent Flow Rate (Qe)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Qesl) (MGD)	Daily Maximum Flow Rate (Qea) (MGD)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)		(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	6.30	0.619	0.740	0	47	48	75	120
FEB	34	50	76	6.30	0.562	0.895	0	46	55	79	120
MAR	38	52	77	6.30	0.907	1.068	0	49	50	68	114
APR	48	55	79	6.30	0.772	0.832	0	51	52	64	117
MAY	58	65	82	6.30	0.773	0.940	0	59	62	74	108
JUN	66	76	84	6.30	0.729	1.134	0	66	67	90	100
JUL	69	81	85	6.30	0.630	0.758	0	70	70	100	106
AUG	67	81	84	6.30	0.576	0.828	0	71	71	106	105
SEP	60	73	82	6.30	0.720	1.094	0	69	70	91	102
OCT	50	61	80	6.30	1.307	1.912	0	65	65	70	96
NOV	40	49	77	6.30	0.693	0.773	0	59	61	62	120
DEC	35	49	76	6.30	0.709	0.763	0	52	52	69	120



**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 City of Horicon	
WPDES Permit Number <b>WI- 0   0   2   0   2   3   1</b>	County Dodge

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

7. What is the current effluent level achievable?

Outfall Number(s) 001	Conc. (mg/L) 0.48	Method for calculation: <input checked="" type="radio"/> 30-day P99 <input type="radio"/> Other, specify: _____	Does this concur with application? <input type="radio"/> Yes <input checked="" type="radio"/> No, why not: Application used older data subset	<i>DNR staff should verify the effluent concentration value(s) provided. See Q11 on municipal form &amp; Q12 on industrial form.</i>
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8. What is the appropriate interim limitation(s) for the permit term?  
 0.5 mg/L as a monthly average, pursuant to s. 283.16 (7), Wis. Stats.  
 Target value = Rock River TMDL Limitations  
 The interim limit reflective of highest attainable condition will be reevaluated if future variance terms are approved  
 Provide Rationale:  
 Effluent total phosphorus data from the past three years (7/1/2020 - 8/30/2023, n=496) yield a 30-day P99 value of 0.48 mg/L. Some recent months have returned higher monthly average values, though most months average below 0.5 mg/L. A schedule may be needed to address these infrequent periods of higher phosphorus concentrations. The WQBEL memo may recommend an interim limit different from that shown above.

*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.*

<p>9. <i>For Industries Only-</i> Where does the phosphorus in the effluent come from? (check all that apply)</p>	<p><input type="checkbox"/> Process  <input type="checkbox"/> Additive Usage  <input type="checkbox"/> Water supply</p> <p><i>Can intake credits be given or can the facility use an alternative water supply?</i></p> <p><input type="radio"/> Not feasible  <input type="radio"/> Possibly, but further analysis needed  <input type="radio"/> Not evaluated at this time</p>	<p><i>See Q14-15 &amp; 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.</i></p>
<p>10. Has this facility optimized?</p>	<p><input checked="" type="radio"/> Yes  <input type="radio"/> In progress  <input type="radio"/> No</p>	<p><i>See Q14 on municipal form &amp; Q16 &amp; 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.</i></p>
<p>11. Has a facility plan/compliance alternative plan been completed for the facility?</p>	<p><input checked="" type="radio"/> Yes  <input type="radio"/> In progress  <input type="radio"/> No</p>	<p><i>See Q15 on municipal form &amp; Q17 on industrial form.</i></p>
<p>12. What is the projected cost for complying with phosphorus?</p> <p style="text-align: right;">Source:</p>	<p>\$ <u>4,380,000.00</u></p> <p>October 30, 2017 Final Compliance Alternatives Plan (see note below about updated compliance costs)</p>	<p><i>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.</i></p>
<p>Comments on planning efforts:</p>		
<p>Horicon's Final Compliance Alternatives Plan, dated October 30th, 2017, included site specific cost estimates for treatment technologies to meet the low phosphorus WQBEL. Water quality trading and adaptive management were also evaluated. Adaptive management was ruled out due to uncertainty associated with phosphorus contributions from the Horicon Marsh, upstream from the point of compliance. Trading was deemed potentially viable, and the report identifies some specific point and non-point sources that may be able to generate credits for Horicon in the future. The MDV application states that trading is not viable due to difficulty in finding offsets, uncertainties about costs, and a lack of willing partners. Recent discussions between DNR and MSA (on behalf of Horicon) have indicated that trading is likely viable within the permit term. A facility upgrade is also being planned. The upgrade, in conjunction with phosphorus credits, will achieve final limits by 2028.</p>		
<p>13. Are adaptive management and water quality trading viable?</p>	<p><input checked="" type="radio"/> Yes  <input type="radio"/> Perhaps. Additional analysis required.  <input type="radio"/> No</p>	<p><i>See Q18-21 on municipal form &amp; Q22-25 on industrial form. If additional analyses required, the applicant may need to complete this analysis during the MDV permit term.</i></p>
<p>14. Has the point source met the appropriate primary screener?</p>	<p><input checked="" type="radio"/> Yes  <input type="radio"/> No. <i>STOP- facility not eligible.</i></p>	<p><i>See Q4 of this form in addition to the "eligibility" guidance in Section 2.01 of the MDV Implementation Guidance.</i></p>

Comments on economic demonstration:

The most economical treatment option for meeting phosphorus limits, a two stage reactive filtration system, was priced at \$4,380,000 (capital costs) and annual O&M cost increases were estimated at \$160,000 annually. The DOA determination listed an estimated capital cost of \$3,960,856 (capital) and \$155,196 (O&M) - generally consistent with the site-specific cost. The MDV application states the new compliance cost is \$7,200,000 (capital) and \$112,000 (O&M increase). Capital costs appear high (nearly \$2M for a building alone). Applying the Mortenson construction index from 2017 - 2023 indicates a 36% increase in costs is likely, which would put capital costs closer to \$5,956,800. Based on the lower capital cost, annual payments under a 2.1% CWF 20-year loan would be \$365,008. Adding \$112,000 O&M, total annual cost increases of \$477,008 occur. The residential portion of this cost (59%) is \$281,434.72. This cost, divided amongst 1609 user households result in an annual average sewer user rate increase of \$174.91. Current costs are \$433, and future rates would be \$607.91. This value is 1.25% of Horicon's \$48,616 median household income. In Dodge County with a secondary indicator score of 6, 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**

<p>16. MDV Plan Number:</p> <p><i>Note: This is for tracking purposes. Contact Statewide Phosphorus Implementation Coordinator for the plan number.</i></p>	<p>_____</p>
<p>17. Did the point source complete Form 3200-148?</p>	<p><input type="radio"/> Yes</p> <p><input type="radio"/> No</p>
<p>18. Is the project area in the same HUC 8 watershed as the point of discharge?</p>	<p><input type="radio"/> Yes</p> <p><input type="radio"/> No. <i>STOP- Watershed plan must be updated.</i></p>
<p>19. What is the annual offset required?</p> <p><i>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.</i></p>	<p>_____</p>
<p>20. Does the plan ensure that the annual load is offset annually?</p>	<p><input type="radio"/> Yes</p> <p><input type="radio"/> No. <i>STOP- Watershed plan must be updated.</i></p>
<p>21. Are projects occurring on land owned/operated by a CAFO or within a permitted MS4 boundary?</p>	<p><input type="radio"/> Yes. <i>Work with appropriate DNR staff to ensure projects are not working towards other permit compliance.</i></p> <p><input type="radio"/> No.</p>
<p>22. Are other funding sources being used as part of the MDV watershed project?</p>	<p><input type="radio"/> Yes. <i>Work with appropriate DNR staff to ensure that funding sources can be appropriately used in the plan area.</i></p> <p><input type="radio"/> No.</p>
<p>23. Do you have any concerns about the watershed project?</p> <p><i>Note: Coordinate with other DNR staff as appropriate.</i></p>	<p><input type="radio"/> Yes. <i>STOP- Watershed plan must be updated.</i></p> <p><input type="radio"/> No.</p>



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  
[http://central/water/WQWT\\_PROJECTS\WY\\_CW\\_Phosphorus\MDV](http://central/water/WQWT_PROJECTS\WY_CW_Phosphorus\MDV).

**Section 6. Determination**

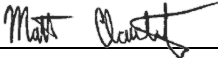
Based on the available information, the MDV application is:

- Approved
- Request for more information
- Denied

Additional Justification (if needed):

MDV coverage is being granted through 2027. In 2028, final TMDL-based effluent limits for phosphorus will take effect per a schedule included in the WPDES permit.

**Certification**

Preparer Name		Title	
Matt Claucherty		Water Resources Management Specialist	
Signature of Preparer	<input type="button" value="Sign"/> <input type="button" value="Clear"/>	Date	
		1/24/2024	

A copy of this completed checklist should be saved in SWAMP, and a notification of the decision should be sent to the Phosphorus Implementation Coordinator.

[Submit to Coordinator...](#)



1/24/2024

Kristen Jacobsen  
404 E Lake St  
Horicon, WI

Subject: Conditional partial-term approval of a multi-discharger phosphorus variance  
Receiving Stream: Rock River in Dodge County  
Permittee: City of Horicon, WPDES WI-0020231

Dear Ms. Jacobsen:

In accordance with s. 283.16 of the Wisconsin Statutes, you have requested coverage under Wisconsin's multi-discharger phosphorus variance for the Horicon Wastewater Treatment Facility in an application dated 7/10/2023. 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.

Please note: Coverage under the MDV is being granted through 2027. In 2028, final TMDL-based effluent limits for phosphorus will take effect per a schedule included in the WPDES permit.

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](mailto:matthew.claucherty@wisconsin.gov).

Sincerely,

Matt Claucherty, MDV Point Source Coordinator  
Bureau of Water Quality

e-cc: Steven Sell, MSA  
Joe Martirano, MSA  
Jacob Wedesky, WDNR  
Melanie Burns, WDNR  
Tim Elkins, EPA Region 5  
Micah Bennett, EPA Region 5



January 31, 2024

Memo to City of Horicon's WWTF File

Operational Contacts – Noah Oestreich, OIC and Matthew Rehse  
Contact - Travis Anderson, Professional Engineer, Strand Associates, Inc.

From: Jacob Van Susteren-Wedesky, WDNR Wastewater Engineer

Subject: Blending Approval Memo to Add Blending to WPDES Permit No. WI-0020231-10-0

### **Approval**

Blending is hereby approved, and conditions will be included in the City of Horicon's WPDES Permit WI-0020231-10-0, per Wis. Administrative Code s. NR 210.12 (2). The Department has determined that blending may be necessary during wet weather and other high flow conditions.

A condition for blending states that: Untreated or partially treated wastewater that is routed around a biological treatment process or a portion of a biological treatment process shall be recombined with the biologically treated wastewater, and the combined flow shall be disinfected, if required by the WPDES permit, prior to discharge. Additionally, wastewaters shall meet the effluent limitations established in the permit. These criteria shall be followed.

The City of Horicon is expected to conduct their next long-term facility planning effort during the next permit term. The need for blending may be reevaluated as part of that plan review process.

### **Blending Plant Settings**

The City of Horicon's wastewater treatment plant diverts flow prior to the oxidation ditch and stored in a peak flow clarifier during high flow events until inflow decreases. The peak flow clarifier is pumped back to the headworks. In the event the peak flow clarifier reaches capacity, overflow bypasses the oxidation ditch and final clarifiers and then receives disinfection prior to discharge.

The peak design flow is recorded at 3.545 million gallons per day (MGD) however the secondary treatment system was designed to treat up to 2.5 MGD under peak flow conditions. Blending at flows above 2.5 MGD may be necessary to maintain process stability and prevent hydraulic overloading of the secondary treatment facilities, which include one oxidation ditch and two final clarifiers.

### **Summary of Blending Events During Previous Permit Term**

There was one instance of blending which occurred during the City of Horicon's last permit term with WPDES Permit No. WI-0020231-09-0. This blending event occurred on 10/01/2019 at a flowrate of approximately 0.0748 MGD.

### **Efforts to Reduce I/I**

The City of Horicon's Capacity, Management, Operation and Maintenance Plan goals include continuous inspection and testing of the collection system to identify areas of wet weather inflow in the system.

The CMOM was reviewed as part of the compliance inspection on 04/25/2023 and is meeting the conditions of the CMOM program. These efforts support s. NR 210.12(2)(b), Wis. Adm. Code.

**Approval of Blending Design**

The department approved the City of Horicon's request for approval of a design for blending on November 12, 2018 (Project Number: S-2018-0610). This letter was provided after the Department reviewed the documentation titled "City of Horicon Wastewater Treatment Plant Blending Checklist" as submitted by Travis Anderson, Professional Engineer, Strand Associates, Inc., Madison, Wisconsin on the behalf of Horicon and received for approval on August 30, 2018. As stated in the approval letter, the submitted documentation satisfactorily demonstrates that the City of Horicon Wastewater Treatment Plant complies with the general provisions to justify blending under s. NR 210.12(1) and (2), Wis. Adm. Code, and has the physical capability and necessary equipment in place to practice blending.

**Additional Information:**

Additional information can be referenced from the August 31, 2018 plan review submittal.