

Permit Fact Sheet for Modification

****Refer to the Fact Sheet for WPDES Permit No. WI-0020745-10-0 for complete permit information****

General Information

Permit Number:	WI-0020745-10-1	
Permittee Name:	City of Algoma	
Address:	179 N Sixth St	
City/State/Zip:	Algoma WI 54201	
Discharge Location:	179 N 6 th St, Algoma; Approx. 100 feet north of WWTF along West shore of Ahnapee River about 0.5 miles from river mouth at Lake Michigan. The SE ¼ of the NE ¼ of Section 27, T25N, R25E at approximately Lat: 44.61148° N / Lon: 87.43553° W.	
Receiving Water:	The Ahnapee River (Water Body Identification Code number 94800); in the Ahnapee River Watershed (TK04) in the Lakeshore Basin; in Kewaunee County	
Stream Flow (Q _{7,10}):	1.3 cfs	
Stream Classification:	Warm Water Sport Fish (WWSF) community, non-public water supply	
Design Flow:	Annual Average	0.75 MGD
Significant Industrial Loading?	No.	
Operator at Proper Grade?	Yes. This wastewater treatment facility's level of operations is Advanced and requires an operator certified at the Advanced Level in the following subclasses: A1 – Suspended Growth Processes; B – Solids Separation; C – Biological Solids/Sludge Handling, Processing, and Reuse; P – Total Phosphorus; D – Disinfection; and L – Laboratory. Subclass SS – Sanitary Sewage Collection System is a Basic Level subclass only. The operator in charge is fully certified at the proper level in all subclasses.	
Approved Pretreatment Program?	N/A	

Facility Description

The City of Algoma wastewater treatment facility has an annual average design flow of 0.75 million gallons per day (MGD) with actual average flow of 0.51 MGD during the current permit term. The treatment facility utilizes the conventional activated sludge treatment process with tertiary filtration. The treatment facility includes preliminary screening, grit removal, primary clarification, activated sludge aeration basins, secondary clarification, with chemical (alum) phosphorus removal, tertiary filtration and ultraviolet (UV) radiation disinfection. Treated effluent is discharged into the Ahnapee River approximately ½ mile from its mouth at Lake Michigan. Solids handling includes anaerobic digestion, gravity belt thickening, with onsite storage, followed by agricultural land application.

Permit Modification Description

On October 8, 2025, the permittee submitted a request to the department to modify the WPDES permit. The permittee requested removing all phosphorus multi-discharger variance (MDV) requirements. The permittee has agreed to comply with the final total maximum daily load derived (TMDL) limitations for total suspended solids and total phosphorus based on the Northeast Lakeshore Basin TMDL. Therefore, the MDV is no longer necessary.

The department may modify a permit upon request by the permittee for one of the causes listed in s. NR 203.136, Wis. Adm. Code. The department determined cause exists under s. NR 203.136(1)(b) and (f), Wis. Adm. Code for modifying the permit. As stated in s. NR 203.135(5)(b), Wis. Adm. Code, only those conditions to be modified shall be reopened when a draft permit is prepared. All other aspects of the existing permit shall remain in effect for the duration of the existing permit.

Fact Sheet Organization

This fact sheet highlights changes in permit conditions that the Department proposes to make when modifying the WPDES permit. This fact sheet compares conditions in the previous permit to those in the modified permit. The permit remains in effect until the permit is modified. The tables that follow were taken from the permit and are numbered in this fact sheet as they are numbered in the permit. Shaded text and cells within tables indicate permit conditions that are new or different from those found in the previous permit.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)
701	0.605 MGD (Avg. July 217 – September 2022)	Representative influent samples shall be collected from the Influent Pump Discharge Pipe in the Headworks Building. Flow measurements shall be reported from the influent flow meter.
001	0.565 MGD (Avg. July 217 – September 2022)	Representative effluent samples shall be collected from the effluent pump discharge just prior to the ultraviolet radiation (UV) disinfection process except that samples for E. coli shall be collected after UV disinfection. Flow measurements shall be reported from the effluent flow meter.
002	Outfall not used during the current permit term.	Anaerobic Sludge. Anaerobically digested liquid sludge either thickened by the gravity belt process unit or not thickened. Samples shall be composited from the primary and secondary anaerobic digestors.
003	75 dry US tons (Permit Application)	Stored Sludge. Anaerobically digested sludge from the on-site storage tank. Samples shall be collected from the storage tank after complete mixing.

1 Influent - Proposed Monitoring

Sample Point Number: 701- Influent

Proposed Monitoring Requirements					
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:

No changes were made to Sampling Point 701 for this permit modification.

Explanation of Limits and Monitoring Requirements

Refer to the Fact Sheet for WPDES Permit No. WI-0020745-10-0 for the explanation of influent monitoring requirements.

2 Surface Water - Proposed Monitoring and Limitations

Sample Point Number: 001- Effluent

Proposed Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	10 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	10 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	10 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	10 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	207 lbs/day	3/Week	Calculated	See the TMDL Limitations section in the permit.
Suspended Solids, Total	Monthly Avg	147 lbs/day	3/Week	Calculated	See the TMDL Limitations section in the permit.
Suspended Solids, Total		lbs/month	Monthly	Calculated	Calculate and report the total monthly mass of TSS discharged in lbs/month on the last day of the month on the eDMR.
Suspended Solids, Total		lbs/yr	Monthly	Calculated	Calculate and report the 12-month rolling sum of the total monthly mass of TSS on the last day of the month on the eDMR.
Dissolved Oxygen	Daily Min	7.0 mg/L	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	
pH Field	Daily Max	9.0 su	5/Week	Grab	
E. coli	Geometric Mean - Monthly	126 #/100 ml	2/Week	Grab	Limit effective May through September annually.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit effective May through September annually. See the E. coli Percent Limit section in the permit. Enter the result in

Proposed Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					the DMR on the last day of the month.
Nitrogen, Ammonia (NH3-N) Total	Daily Max	14 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective year-round.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	7.6 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through March annually.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	5.3 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective April and May annually.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	5.5 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective June through September annually
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	6.2 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective October annually.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	3.6 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through March annually.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	2.5 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective April and May annually.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	3.3 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective June through September annually.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	6.2 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective October annually.
Phosphorus, Total	Monthly Avg	0.8 mg/L	3/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	12 lbs/day	3/Week	Calculated	See the TMDL Limitations section in the permit.
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate and report the total monthly mass of TP discharged in lbs/month on the last day of the month on the eDMR.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate and report the 12-month rolling sum of the total monthly mass of TP on the last day of the month on the eDMR.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Monitoring only annually in rotating quarters. See

Proposed Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					Nitrogen Series Monitoring section of the permit.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Monitoring only annually in rotating quarters. See Nitrogen Series Monitoring section of the permit.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Monitoring only annually in rotating quarters. See Nitrogen Series Monitoring section of the permit. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Temperature Maximum		deg F	Weekly	Measure	Monitoring only in calendar year 2026. See Effluent Temperature Monitoring section of the permit for temperature monitoring requirements.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring only in calendar year 2026.

Changes from Previous Permit

- TMDL derived TSS and total phosphorus mass effluent limitations and monitoring has been added to the permit. An additional reporting requirement for lbs/month will be used to calculate the facility's 12-month rolling sum of total monthly discharge, which can be compared directly to the facility's designated WLAs for total phosphorus and TSS. The department modified the note language for reporting monthly and annual total phosphorus loadings.
- The department has removed all Multi-Discharger Variance (MDV) requirements for phosphorus.

Explanation of Limits and Monitoring Requirements

More information and explanation about the proposed water quality-based effluent limits (WQBELs) for this permit modification are found in the "Phosphorus and TSS Water Quality-Based Effluent Limitations for Algoma Wastewater Treatment Facility -WPDES Permit No. (WI-0020745) in Kewaunee County" memo dated October 16, 2025.

TMDL derived TSS Mass Effluent Limitations: If the department determines a limitation is necessary, effluent limitation shall be also consistent with a total maximum daily load (TMDL) if a TMDL has been approved by the U.S. Environmental Protection Agency (USEPA) for the receiving waterbody consistent with s. NR 205.067(3)(a), Wis. Adm. Code. The discharge to the Ahnapee River which is within the Northeast Lakeshore Basin TMDL area. The Northeast Lakeshore Basin TMDL for total phosphorus and total suspended solids was approved by the USEPA on October 30, 2023. The department has determined that TSS effluent limitations are necessary. Therefore, the department must

calculate TMDL derived TSS limits to be consistent with the Northeast Lakeshore Basin TMDL. The approved total suspended solids waste load allocation (WLA) for the permittee is 36,578 lbs/year which results in calculated total suspended solids mass limits of 207 lbs/day as a weekly average and 147 lbs/day as a monthly average. Since the TSS WLA is expressed as an annual load (lbs/yr), the permittee must also calculate and report the rolling 12-month sums of total monthly loads for TSS. Rolling 12-month sums can be compared directly to the annual wasteload allocation. Based on the effluent TSS data submitted on eDMRs from August 2020 to August 2025, the permittee can currently meet the TSS mass limits, and a compliance schedule is not needed.

TMDL derived Total Phosphorus Mass Effluent Limitations: Phosphorus requirements are based on the Phosphorus Rules as detailed in chs. NR 102 (water quality standards) and NR 217, Wis. Adm. Code (effluent standards and limitations for phosphorus). Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters. Currently, there are three types of limit calculations used to determine if a phosphorus limit is needed: a technology based effluent limit (TBEL), a WQBEL determined by stream criteria and an effluent limit based on a TMDL allocation.

- A TBEL of 1.0 mg/L is needed if a facility discharges more than the threshold of 150 pounds per month (s. NR 217.04(1)(a)1., Wis. Adm. Code). The data demonstrates that the annual monthly average phosphorus loading is less than 150 lbs/month. However, an interim limit of 0.8 mg/L went into effect per the MDV compliance schedules and will remain in effect pursuant to ch. NR 207, Wis. Adm. Code unless a more stringent limit is required at a future permit issuance by ss. NR 217.13 and NR 217.16(2), Wis. Adm. Code.
- The final total phosphorus WQBELs were determined to be 0.30 mg/L as a monthly average, 0.10 mg/L as a six-month average, and 0.62 lbs/day as a six-month average. These limits have yet to take effect per the multi-discharger variance in the previous permit. The department has determined to include the total phosphorus TMDL derived limitations in lieu of the WQBELs calculated under s. NR 217.13, Wis. Adm. Code pursuant to s. NR 217.16, Wis. Adm. Code.
- The discharge to Ahnapee River which is within the Northeast Lakeshore Basin TMDL area. The Northeast Lakeshore Basin TMDL for total phosphorus and total suspended solids was approved by the USEPA on October 30, 2023. If the department determines a WQBEL is necessary, limitations shall be consistent with a TMDL if a TMDL has been approved by the USEPA for the receiving waterbody consistent with s. NR 205.067(3)(a), Wis. Adm. Code. The department has determined that total phosphorus WQBELs are necessary. Therefore, the department must also calculate TMDL derived total phosphorus limits to be consistent with the Northeast Lakeshore Basin TMDL. The approved total phosphorus WLA for the permittee is 3,048 lbs/year. Since the equivalent concentration is greater than 0.3 mg/L, the WLA should be expressed as a monthly average mass limit for total phosphorus and no six-month average limit is required. The department calculated a total phosphorus mass limit of 12 lbs/day as a monthly average. Since the total phosphorus WLA is expressed as an annual load (lbs/yr), the permittee must also calculate and report the rolling 12-month sums of total monthly loads for total phosphorus. Rolling 12-month sums can be compared directly to the annual wasteload allocation. Based on the effluent total phosphorus data submitted on eDMRs from August 2020 to August 2025, the permittee can currently meet the total phosphorus mass limit, and a compliance schedule is not needed.

The permittee has stated that they can comply with the final TMDL WLA-based effluent limit of 12 lbs/day as a monthly average. This limit will become effective upon the permit modification effective date. Therefore, the facility does not need the MDV and the department has removed all MDV requirements and schedules for phosphorus.

Refer to the Fact Sheet for WPDES Permit No. WI-0020745-10-0 for the explanation of other limits and monitoring requirements.

3 Land Application - Proposed Monitoring and Limitations

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
002	B	Liquid	Anaerobic Digestion	Injection	Land Application	Outfall not used during previous permit term
003	B	Liquid	Anaerobic Digestion	Injection	Land Application	75 dry US tons
Does sludge management demonstrate compliance? Yes.						
Is additional sludge storage required? No.						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No.						
If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in land applying sludge from this facility						
Is a priority pollutant scan required? No.						
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: 002- Anaerobic Sludge

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Solids, Total		Percent	Per Application	Composite	Monitoring is required once in any year that liquid sludge is land applied.
Arsenic Dry Wt	Ceiling	75 mg/kg	Per Application	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Per Application	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Per Application	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Per Application	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Per Application	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Per Application	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Per Application	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Per Application	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Per Application	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Per Application	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Per Application	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Per Application	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Per Application	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Per Application	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Per Application	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Per Application	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Per Application	Composite	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nitrogen, Total Kjeldahl		Percent	Per Application	Composite	Monitoring is required once in any year that liquid sludge is land applied.
Nitrogen, Ammonium (NH ₄ -N) Total		Percent	Per Application	Composite	
Phosphorus, Total		Percent	Per Application	Composite	
Phosphorus, Water Extractable		% of Tot P	Per Application	Composite	
Potassium, Total Recoverable		Percent	Per Application	Composite	

Sample Point Number: 003- Stored 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	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	
Nitrogen, Ammonium (NH ₄ -N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Analysis required in 2024. See Sections 3.2.2.4 and 5.5.6 of the permit.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	

Changes from Previous Permit:

- Changed sampling frequency for Outfall 002 from “Per Occurrence” to “Per Application”.

Explanation of Limits and Monitoring Requirements

Outfall 002 is used as an emergency Outfall in case sludge storage is not available. The permittee will have the ability to land apply the liquid sludge from the anaerobic digester directly to department approved sites. The permittee required sludge monitoring once in any year that this outfall is used, and liquid sludge is land applied. However, “Per Occurrence” sampling frequency generates monthly reports while “Per Application” only generates one annual report to report annual sludge monitoring if this outfall will be used.

Refer to the Fact Sheet for WPDES Permit No. WI-0020745-10-0 for the explanation of other sludge monitoring requirements.

4 Schedules

4.1 Phosphorus Payment per Pound to County

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

Required Action	Due Date
Annual Verification of Payment #4: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties for 2025 when the MDV was still effective. The amount due is equal to the following: [(lbs of phosphorus discharged minus the permittee's target value) times (\$58.85 per pound)] or \$640,000, whichever is less. Note: The applicable Target Value is 0.2 mg/L as defined by s. 283.16(1)(h), Wis. Stats. The "per pound" value is \$50.00 adjusted for CPI.	03/01/2026

4.2 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
Land Application Management Plan Submittal: Submit a management plan to optimize the land application system performance and demonstrate compliance with ch. NR 204, Wis. Adm. Code, by the Due Date. This management plan shall 1) specify information on pretreatment processes (if any); 2) identify land application sites; 3) describe site limitations; 4) address vegetative cover management and removal; 5) specify availability of storage; 6) describe the type of transporting and spreading vehicle(s); 7) specify monitoring procedures; 8) track site loading; 9) address contingency plans for adverse weather and odor/nuisance abatement; and 10) include any other pertinent information. Once approved, all landspreading activities shall be conducted in accordance with the plan. Any changes to the plan must be approved by the Department prior to implementing the changes.	12/31/2024

Explanation of Compliance Schedule

Phosphorus Schedule - Continued Optimization: The department has removed this compliance schedule with this permit modification. The permittee has demonstrated that the wastewater treatment facility has been optimized to meet the final total phosphorus TMDL WLA-based effluent limit of 12 lbs/day as a monthly average.

Phosphorus Payment per Pound to County: Subsection 283.16(6)(b), Wis. Stats., requires permittees that have received approval for the 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 had previously 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) when the MDV was still effective in 2025. This schedule serves as a reminder to the permittee to submit Form 3200-151 to the department indicating the total amount remitted to the participating county(s).

Refer to the Fact Sheet for WPDES Permit No. WI-0020745-10-0 for the explanation of other schedule items.

5 Standard Requirements

The Standard Requirements section contains conditions and requirements that are, for the most part, applicable to all municipal permittees consistent with ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code. Other standard requirements may be added as reminders.

Changes from Previous Permit:

No changes were made to Standard Requirements for this permit modification.

6 Summary of Reports Due

A summary of reports due has been added for informational purposes for the permittee to keep track of the due dates of reports and schedule items.

Attachments:

“Phosphorus and TSS Water Quality-Based Effluent Limitations for Algoma Wastewater Treatment Facility -WPDES Permit No. (WI-0020745) in Kewaunee County” memo dated October 16, 2025.

Prepared By:

Trevor Moen
Wastewater Engineer
Bureau of Water Quality

Date: 10/22/2025

Post Fact Check Revision Date: 10/27/2025

Post Public Notice Revision Date:

DATE: 10/16/2025

TO: Trevor Moen – NER

FROM: Nicole Krueger – SER *Nicole Krueger*

SUBJECT: Phosphorus and TSS Water Quality-Based Effluent Limitations for Algoma Wastewater Treatment Facility -WPDES Permit No. (WI-0020745) in Kewaunee County.

This is in response to your request for an evaluation of the need for total phosphorus and total suspended solids (TSS) limitations for Algoma Wastewater Treatment Facility. The wastewater treatment plant discharges effluent at an annual average design flow rate of 0.75 MGD to the Ahnapee River in the Northeast Lakeshore Basin. This discharge is included in the Northeast Lakeshore Basin Total Maximum Daily Load (TMDL) as approved by US EPA on October 30, 2023.

The current permit has a multi-discharger variance (MDV) interim phosphorus limit of 0.8 mg/L as a monthly average and a TSS limit of 10 mg/L as a weekly and monthly average. The following review is based on the Northeast Lakeshore Basin TMDL which was developed by the Department and approved by the US EPA on October 30, 2023. This document can be found at [Northeast Lakeshore TMDL | A framework for water quality improvement | Wisconsin DNR](#). Recommendations are made in accordance with chapters NR 102, 104, 105, 106, 207, 212, and 217 of the Wisconsin Administrative Code, where applicable.

Receiving Water Information

- Name: Ahnapee River
- Classification: Warmwater Sportfish
- Low Flow: $7-Q_{10} = 1.3$ cfs (cubic feet per second)
- % of Flow used to calculate limits: 25%

Effluent Information

- Flow: Average Design Flow = 0.75 MGD, for reference, the actual average flow from 08/01/2020 – 08/31/2025 was 0.51 MGD.
- Effluent characterization: This facility is categorized as a minor municipality
- Monitoring data: Data submitted by the facility to the department from 08/01/2020 – 08/31/2025 was used in this evaluation
- Total Phosphorus Wasteload Allocation: 3,048 lbs/year (see Appendix K of the TMDL document)
- Total Suspended Solids Wasteload Allocation: 36,578 lbs/year (see Appendix L of the TMDL document)

TMDL Limits – Phosphorus

Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* (April 2020) and are based on the annual phosphorus wasteload allocation (WLA) given in pounds per year. This WLA found in Appendix K of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Northeast Lakeshore Region* report are expressed as maximum annual loads (lbs/year).

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

$$\begin{aligned}\text{TP Equivalent Effluent Concentration} &= \text{WLA} \div (365 \text{ days/yr} * \text{Flow Rate} * \text{Conversion Factor}) \\ &= 3,048 \text{ lbs/yr} \div (365 \text{ days/yr} * 0.75 \text{ MGD} * 8.34) \\ &= 1.33 \text{ mg/L}\end{aligned}$$

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

$$\begin{aligned}\text{TP Monthly Average Permit Limit} &= \text{WLA} \div 365 \text{ days/yr} * \text{multiplier} \\ &= (3,048 \text{ lbs/yr} \div 365 \text{ days/yr}) * 1.47 \\ &= 12 \text{ lbs/day}\end{aligned}$$

The multiplier used in the six-month average calculation was determined according to the implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 0.7. This is the standard deviation divided by the mean of mass data. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by the facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as 3/weekly; if a different monitoring frequency is used, the stated limits should be reevaluated.

A monthly average mass effluent limit is recommended for this discharge. The limits are equivalent to a concentration of 1.96 mg/L at the facility design flow of 0.75 MGD.

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

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

Effluent Data

The following table lists the statistics for effluent phosphorus levels from 08/01/2020 – 08/31/2025.

Phosphorus Effluent Data

	Concentration (mg/L)	Mass Discharge (lbs/day)
1-day P ₉₉	1.39	8.3
4-day P ₉₉	0.92	4.9

	Concentration (mg/L)	Mass Discharge (lbs/day)
30-day P ₉₉	0.68	3.09
Mean	0.56	2.31
Std	0.3	1.64
Sample Size	797	797
Range	<0.059 - 1.9	0 - 35.5

Algoma can currently meet the TMDL-based TP limits and **the limits are recommended to become effective immediately upon issuance of the modified permit. The current monthly average limit of 0.8 mg/L must be continued** due to antibacksliding purposes per s. NR 207.10, Wis. Adm. Code because Algoma is currently using treatment to meet this limit.

TMDL Limits – TSS

Total Suspended Solids (TSS) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* (April 2020). This WLAs found in Appendix I of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Northeast Lakeshore Region* report are expressed as maximum annual loads (lbs/year).

Revisions to chs. NR 106 and 205, Wis. Adm. Code align Wisconsin water quality-based effluent limits with 40 CFR 122.45(d), which requires WPDES permits to contain the following concentration limits, whenever practicable and necessary to protect water quality:

- Weekly average and monthly average limitations for continuous discharges subject to ch. NR 210.
- Daily maximum and monthly average limitations for all other discharges.

Algoma is a municipal treatment facility and is therefore subject to weekly average and monthly average TSS limits derived from TSS annual WLAs.

$$\begin{aligned}
 \text{TSS Monthly Average Permit Limit} &= \text{WLA} \div 365 \text{ days/yr} * \text{multiplier} \\
 &= (36,578 \text{ lbs/yr} \div 365 \text{ days/yr}) * 1.47 \\
 &= 147 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{TSS Weekly Average Permit Limit} &= \text{WLA} \div 365 \text{ days/yr} * \text{multiplier} \\
 &= (36,578 \text{ lbs/yr} \div 365 \text{ days/yr}) * 2.07 \\
 &= 207 \text{ lbs/day}
 \end{aligned}$$

The multiplier used in the weekly average and monthly average calculation was determined according to implementation guidance. A coefficient of variation was calculated, based on TSS mass monitoring data, to be 2.2. This is the standard deviation divided by the mean of mass data. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by the facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies TSS monitoring as 3/week; if a different monitoring frequency is used, the stated limits should be reevaluated.

Weekly average and monthly average mass effluent limits are recommended for this discharge. The limits are equivalent to concentrations of 33 mg/L and 26 mg/L, respectively, at the facility design flow of 0.75 MGD.

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

Effluent Data

The following table summarizes effluent total suspended solids monitoring data from 08/01/2020 – 08/31/2025.

Total Suspended Solids Effluent Data

	Concentration (mg/L)	Mass (lbs/day)
1-day P ₉₉	6.36	44.8
4-day P ₉₉	3.70	24.4
30-day P ₉₉	1.93	10.8
Mean*	1.18	5.20
Std	1.42	11.5
Sample size	815	815
Range	<1 - 14.6	0 – 203.6

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

Algoma can currently meet the TSS mass limits, and a compliance schedule is not needed. The concentrations limits of 10 mg/L as a weekly and monthly average is also recommended to continue.

Conclusions:

The following is a summary of limits recommended by this evaluation:

- Monthly average phosphorus concentration limit of 0.8 mg/L
- Monthly average phosphorus mass limit of 12 lbs/day
- Weekly and monthly average TSS concentration limit of 10 mg/L
- Weekly average TSS mass limit of 207 lbs/day
- Monthly average TSS mass limit of 147 lbs/day

If there are any questions or comments, please contact Nicole Krueger at Nicole.Krueger@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

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