

Permit Fact Sheet

General Information

Permit Number:	WI-0032069-08-0	
Permittee Name:	CLOVER SANITARY DISTRICT	
Address:	BOX 94	
City/State/Zip:	HERBSTER WI 54844	
Discharge Location:	NW¼, NW¼ of section 8; T50N-R7W	
Receiving Water:	An unnamed tributary to Lake Superior Within the Bayfield Peninsula Northwest Watershed in the Lake Superior Drainage Basin, Bayfield County	
StreamFlow (Q _{7,10}):	The unnamed tributary is 0 cfs Lake Superior, a 10:1 dilution ratio was used to calculate effluent limits (NR 106.06(4)(b)2 Wis. Adm. Code.	
Discharge Type:	Noncontinuous – seasonal process water (May-June and September-November)	
Stream Classification:	The unnamed tributary is a limited aquatic life (LAL) community, non-public water supply. Lake Superior approximately 0.5 mile downstream is a cold water (CW) community, public water supply, and outstanding resource water (ORW).	
Wild Rice Impacts: <i>(no specific wild rice standards exist at this time)</i>	No impacts identified. There are no wild rice waters inventoried near the outfall.	
Design Flow(s)	Annual Average	0.0195 MGD
Significant Industrial Loading?	No	
Operator at Proper Grade?	Yes	
Approved Pretreatment Program?	N/A	

Facility Description

The Bell Sanitary District owns and operates a domestic wastewater treatment system. The plant designed to treat 19,500 gallons per day, currently treats an average of 10,500 gallons per day (2018 – 2022 data). The facility discharges seasonally March through June and September through November annually. The treatment system consists of a two-cell stabilization pond system operated one after another (in series). Within these ponds naturally occurring bacteria and enzymes present in the wastewater metabolize the organic matter until the wastewater is able to meet discharge standards. The treated wastewater (effluent) is discharged to a wooded ravine that is approximately 3,500 feet from Lake Superior.

Substantial Compliance Determination

Enforcement During Last Permit:

- There have been several minor violations of effluent limits (TSS and phosphorous) and monitoring protocols (effluent flow and pH). However, the facility has taken (or is taking) the necessary steps to correct their actions and is working with the department to implement changes to address the violations.

- A malfunctioning valve may have contributed to limit violations seen between Oct 2020 through May 2022. Chemical addition was used to ensure limits were met during Fall 2022. Valve was replaced such that operations beginning in Spring of 2023 should be similar to operations before valve malfunction. If limits continue to be exceeded, then chemical addition may need to be evaluated further through a formal pilot study and permanent implementation through facility planning.

After a desk top review of all discharge monitoring reports, CMARs, and compliance schedule items, and a site visit on 10/18/2022 by Eric de Venecia, WDNR, the Clover Sanitary District has been found to be in substantial compliance with their current permit. The facility will continue to evaluate effluent data (phosphorous and TSS) following repair of the control valve and pursue options for continued compliance as needed.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)
701	INFLUENT An average of 0.011 MGD (2018-2022 data)	Representative influent samples shall be collected at the main lift station.
001	EFFLUENT An average of 0.112 MGD over an average of 32 days a year. (2018-2022 data)	Representative effluent samples shall be collected at the effluent control structure. The permittee is authorized to discharge during the months of March, April, May, June, September, October, and November.
002	SLUDGE Sludge was last removed in June 1986.	Representative samples shall be collected from the accumulated sludge in the ponds at various locations and depths that are composited for analysis.

1 Influent - Proposed Monitoring

Sample Point Number: 701- INFLUENT TO PLANT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Total Daily	
BOD5, Total		mg/L	2/Month	Grab	
Suspended Solids, Total		mg/L	2/Month	Grab	

Changes from Previous Permit:

Effluent limitations and monitoring requirements were re-evaluated for the proposed permit term and no changes were required in this permit section. Sampling requirements and frequencies are the same as the previous permit.

Explanation of Limits and Monitoring Requirements

The parameters are standard for minor municipalities, as are monitoring and frequency requirements for municipal wastewater treatment plant. Tracking of BOD5, and Suspended Solids are required for percent removal requirements found in s. NR 210.05, Wis. Adm. Code.

2 Surface Water - Proposed Monitoring and Limitations

Sample Point Number: 001- EFFLUENT FILL AND DRAW

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Total Daily	
BOD5, Total	Monthly Avg	20 mg/L	Weekly	Grab	
BOD5, Total	Weekly Avg	30 mg/L	Weekly	Grab	
Suspended Solids, Total	Monthly Avg	60 mg/L	Weekly	Grab	
pH Field	Daily Max	9.0 su	Weekly	Grab	
pH Field	Daily Min	6.0 su	Weekly	Grab	
Phosphorus, Total	Monthly Avg	3.9 mg/L	Weekly	Grab	
Dissolved Oxygen	Daily Min	4.0 mg/L	Weekly	Grab	
Nitrogen, Ammonia (NH ₃ -N) Total	Daily Max - Variable	0 mg/L	Monthly	Grab	Enter the daily ammonia result on the eDMR and compare to the Nitrogen, Ammonia Variable Limit to determine compliance.
Nitrogen, Ammonia Variable Limit		mg/L	Monthly	See Table	Using the daily pH result look up the applicable ammonia limit in the "Ammonia Limitation" subsection and report the variable limit on the eDMR.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	Grab	See the "Nitrogen Series Monitoring" subsection for testing schedule.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	Grab	See the "Nitrogen Series Monitoring" subsection for testing schedule.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Total Nitrogen = Total Nitrogen Kjeldahl (mg/L) +

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					Nitrite +Nitrate Nitrogen (mg/L). See the "Nitrogen Series Monitoring" subsection for testing schedule.

Changes from Previous Permit

Effluent limitations and monitoring requirements were re-evaluated for the proposed permit term and the following changes were made from the previous permit.

- **Flow** limit has been removed and discharges are now allowed into June.
- **BOD** limits have changed due to changes in the receiving water classification.
- A **TSS variance** limit has been included per NR 210.07(2), Wis. Adm. Code.
- A **Dissolved Oxygen** limit has been added due to changes in the receiving water classification.
- A variable daily **Ammonia** limit has been added.
- Annual monitoring for the **Nitrogen Series** (nitrate +nitrite, total Kjeldahl nitrogen and total nitrogen) has been added to the permit.

Explanation of Limits and Monitoring Requirements

Information on categorical and water quality-based limits (WQBEL) is found in the “Water Quality-Based Effluent Limitations for Clover Sanitary District (WI-0032069)” memo dated October 5, 2023.

Receiving Water Classification - To provide consistency in the application of limits across facilities and to appropriately protect aquatic life, the DNR is systematically reviewing stream classifications for waters that receive discharges from WPDES-permitted facilities. Reviews focus on sites where a permit is scheduled for reissuance and where questions have been identified regarding the appropriate receiving water’s classification. Based on the survey conducted on May 24, 2023, it was determined that calculating limits solely on Lake Superior is no longer protective of the existing or the attainable aquatic life community. The receiving water has been classified as a limited aquatic life (LAL) community and effluent limitations have been recalculated using this updated use designation. For more information on the methods used to review stream classifications and calculate limits see the “Clover Sanitary District Permit Reissuance, Tributary (no WBIC) to L. Superior, Bayfield Co” survey dated August 23, 2023, and the Water Quality-Based Effluent Limits memo.

Flow – A flow limit is not needed to protect water quality and has been removed. Ice out in the northern counties can occur later than April and May. Discharge is now allowed into June to ensure a long enough period of time for adequate discharge to occur.

BOD5 – Due to the change in designation the categorical limits found in NR 210.05 are no longer considered adequate to protect water quality. The previous limits were based on a variance as described in s. NR 104.02(4)(c) Wis. Adm. Code. Limits were reevaluated because the variance limits are no longer applicable. Limits as described in NR 104.02(3)(b) Wis. Adm. Code have been included in this issuance.

Total suspended solids (TSS) – Due to the receiving water use designation change TSS limits were re-evaluated. TSS limits are regulated by NR 102.04(1), Wis. Adm. Code and are included whenever BOD5 limits are needed. An alternate TSS limit of 60 mg/L as a monthly average has been included per s. NR 210.07(2), Wis. Adm. Code.

pH - Categorical limits for pH are required per ch. NR 210 (Subchapter II).

Dissolved Oxygen (DO) - Categorical limits for Dissolved Oxygen in a Limited Aquatic Life (marginal surface waters) are found in NR 104.02(3)(b) and 210.05(3) Wis. Adm. Code.

Ammonia – Due to the change in receiving water designation, ammonia limits were re-evaluated. Using current acute and chronic ammonia toxicity criteria found in Tables 2C and 4B of NR 105 Wis. Adm. Code and limit calculating procedures (Subchapter IV of 106, Wis. Adm. Code ammonia limitations were calculated for the facility. Based on a reasonable potential analysis it was found ammonia limits are needed to ensure toxic conditions in the receiving water do not occur. Daily maximum limits expressed as a single limit or as a variable limit based on effluent pH were calculated. Expression as a variable limit shall continue. Sample results for pH shall be used to calculate the daily variable limit. Total ammonia (NH₃-N) sampling shall occur on the same day pH levels are monitored. The applicable variable limit shall be recorded on the Electronic Discharge Monitoring Report (eDMR) in the Ammonia Variable Limit column. Report the effluent ammonia sample result in the ‘Nitrogen, Ammonia (NH₃-N) Total’ column. Compare the variable daily maximum ammonia limit to the reported ammonia result, record the number of exceedances in the box to the right of the ‘Limit in Effect’ ‘Daily Max’ row in the ‘Summary’ tables at the end of the eDMR.

Daily Maximum Ammonia Nitrogen Limits – LAL

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	83	7.0 < pH ≤ 7.1	51	8.0 < pH ≤ 8.1	11
6.1 < pH ≤ 6.2	82	7.1 < pH ≤ 7.2	46	8.1 < pH ≤ 8.2	8.8
6.2 < pH ≤ 6.3	80	7.2 < pH ≤ 7.3	40	8.2 < pH ≤ 8.3	7.3
6.3 < pH ≤ 6.4	78	7.3 < pH ≤ 7.4	35	8.3 < pH ≤ 8.4	6.0
6.4 < pH ≤ 6.5	75	7.4 < pH ≤ 7.5	31	8.4 < pH ≤ 8.5	5.0
6.5 < pH ≤ 6.6	72	7.5 < pH ≤ 7.6	26	8.5 < pH ≤ 8.6	4.1
6.6 < pH ≤ 6.7	69	7.6 < pH ≤ 7.7	22	8.6 < pH ≤ 8.7	3.4
6.7 < pH ≤ 6.8	65	7.7 < pH ≤ 7.8	19	8.7 < pH ≤ 8.8	2.8
6.8 < pH ≤ 6.9	60	7.8 < pH ≤ 7.9	16	8.8 < pH ≤ 8.9	2.4
6.9 < pH ≤ 7.0	56	7.9 < pH ≤ 8.0	13	8.9 < pH ≤ 9.0	2.0

Phosphorus – Phosphorus requirements are based on the Phosphorus Rules as detailed in 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 in NR 217 Wis. Adm. Code there are three types of limit calculations used to determine if a phosphorus limit is needed: a technology based effluent limit (TBEL), a water quality-based effluent limit (WQBEL) determined by stream criteria and a WQBEL based on a Total Daily Maximum Daily Load (TMDL) allocation.

In the case of the Clover Sanitary District:

- 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 limit memo determined that the facility discharges less than the threshold (approximately 101 lbs/month); therefore, a TBEL is not applicable this permit term.
- The unnamed tributary is considered a Limit Aquatic Life (LAL) water. Currently NR 217 Wis. Adm. Code doesn’t include criteria for LAL waters, therefore a WQBEL for the tributary is not applicable, but an evaluation for potential downstream impact to Lake Superior is required. NR 217.13(4) specifies interim limits be set for direct discharges to Great Lakes water bodies consistent with near shore /whole lake modeling. The studies to complete these models are not finished and it is currently unknown when they shall be final. Administrative code also allows for limits to be set equal to levels provided by the best readily available treatment technology (BAT). It is the Department’s policy to include interim limits for all direct discharges to Great Lake waters to serve as a benchmark for phosphorus control efforts. The Interim Phosphorus Limit in the previous permit was 3.9 mg/L (monthly ave.) but based on recent effluent data this limit will continue through this permit term.
- The facility does not lie within the boundaries of any approved total maximum daily load (TMDL) area, thus a phosphorus WQBEL based on a TMDL allocation is likewise not required during this permit term.

Nitrogen Series - (nitrate +nitrite, total Kjeldahl nitrogen and total nitrogen) – In 2011, the Upper Mississippi River Basin Association (UMRBA) completed the report “Upper Mississippi River Nutrient Monitoring, Occurrence, and Local Impacts: A Clean Water Act Perspective”. Among the many recommendations of this report was that the states should expand their NPDES discharge monitoring requirements to include both phosphorus and nitrogen as they have important impacts on the mainstem upper Mississippi River as well as in the Gulf of Mexico. Consequently, the department developed the “Guidance for Total Nitrogen Monitoring in WPDES Permits” document dated October 2019, where annual effluent monitoring for total nitrogen (total nitrogen = total Kjeldahl + (nitrite+nitrate)) is required for municipal and industrial facilities discharging to surface waters. Section 283.55(1)(e) Wis. Stats. 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 s. NR 200.065 (1)(h) Wis. Adm. Code allows for this monitoring to be collected during the permit term. The schedule for this facility is as follows:

- **2024** – second (*April – June*)
- **2025** – fourth (*October – November*)
- **2026** – second (*April – June*)
- **2027** – fourth (*October – November*)
- **2028** – second (*April – June*)

Nitrogen Series monitoring shall continue after the permit expiration date (until the permit is reissued) in accordance with the monitoring requirements specified in the last full calendar year of this permit. For example, the next test would be required April – June 2029.

Disinfection - The wastewater detention time is more than 180 days. In accordance with NR 210.06(h) disinfection is not required this permit term.

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

Sampling Frequencies - The “[Monitoring Frequencies for Individual Wastewater Permits](#)” guidance document (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. The department has determined at this time that the facility meets the guidance and no changes in the monitoring frequency is required this permit term.

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	Sludge is not scheduled to be removed this permit term.			
Does sludge management demonstrate compliance? Yes						

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)
Is additional sludge storage required?						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? The community water supply is provided by private wells. Radium-226 levels are unknown since private water wells are not required to be tested for radium, but Radium-226 is not considered to be an issue in Bayfield County. 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 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- Municipal Sludge

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Solids, Total		Percent	Once	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Once	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Once	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Once	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Once	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Once	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Once	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Once	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Once	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Once	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Once	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Once	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Once	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Once	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Once	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	Once	Composite	
Nitrogen, Total Kjeldahl		Percent	Per Occurrence	Composite	Monitoring is required when land application is planned. See the "List 2 Analysis" section for more information.
Nitrogen, Ammonium (NH4-N) Total		Percent	Per Occurrence	Composite	Monitoring is required when land application is planned. See the "List 2 Analysis" section for more information.
Phosphorus, Total		Percent	Per Occurrence	Composite	Monitoring is required when land application is planned. See the "List 2 Analysis" section for more information.
Phosphorus, Water Extractable		% of Tot P	Per Occurrence	Composite	Monitoring is required when land application is planned. See the "List 2 Analysis" section for more information.
Potassium, Total Recoverable		Percent	Per Occurrence	Composite	Monitoring is required when land application is planned. See the "List 2 Analysis" section for more information.
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	
PFOA + PFOS		ug/kg	Once	Calculated	Report the sum of PFOS and PFAS. See PFAS Permit Sections for more information.

Changes from Previous Permit:

Effluent limitations and monitoring requirements were re-evaluated for the proposed permit term and the following changes were made from the previous permit.

- List 1 (Metals) and PCB monitoring is required during the second year of the permit term (2025).
- It is recommended that List 2 (Nutrients) monitoring occur with the List 1 monitoring.
- PFAS monitoring is required during the second year of the permit term (2025) pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.

- Due to changes within the land application forms, the 3400-049 (“Characteristics Report”), 3400-052 (“Other Methods of Disposal”) and 3400-055 (Annual Land Application”) will need to be submitted each year.

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).

List 2 Nutrient monitoring – Monitoring for list 2 (nutrients) is highly recommended at the same time as the monitoring of List 1 (metals) in year 2 of the permit (2025). Results will assist in the determination of the acres needed for land application of sludge should it be necessary. The number of acres needed is also required for the Sludge Management Schedule (see schedules for more information).

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” available on the WDNR website.

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

Change in form submittal – In prior permit reissuances when it has been noted in the application that sludge would not be removed during the permit term, the department required sampling during the second year of the permit term and the sludge characteristic report (3400-049) would be generated only during that year. Due to moving to electronic submittal of forms via Switchboard, forms 3400-049 (“Characteristics Report”), 3400-052 (“Other Methods of Disposal”) and 3400-055 (“Annual Land Application”) will now be generated by the department and the permittee will be required to submit all three reports each year of the permit term. This change was adopted to provide the permittee flexibility because many lagoon desludging projects can be unexpected, are delayed or staggered over multiple years. Additionally, it is used to officially report that no land application of sludge has occurred, and annual submittal of the forms is required per the standard requirements section.

Sludge analysis during the second year of the permit term has been included. There are check boxes available on the electronic forms to identify if desludging didn’t occur.

- Sludge characteristics report (3400-049) – at the top of the form check “yes” or “no” in the box identifying if any land application occurred that year. Complete the form if required or identify the year samples will be or have been taken in the comments section.
- 3400-052 (“Other Methods of Disposal”) and 3400-055 (“Annual Land Application”) - The reports are technically 2 separate forms that are now combined in one location but separated onto two different tabs. If you answer “No” to both listed questions the forms are complete. If you need to answer “Yes” to either question the corresponding form tabs will go from gray to blue indicating information can be entered on the report.

4 Schedules

4.1 Effluent Phosphorus

No later than 30 days following each date, the permittee shall notify the Department in writing of its observance or non-observance with the action. If a submittal is part of the action then a timely submittal fulfills the written notification requirement.

Required Action	Due Date
Progress Report: Submit an update on the progress of any optimization projects occurring at the facility. (A Water Quality Based Effluent Limit (WQBEL) for Phosphorus may be established pending the completion of near shore model efforts before the end of the permit term.)	12/31/2024
Progress Report: Submit a progress report on optimizing removal of phosphorus.	12/31/2025
Progress Report: Submit a progress report on optimizing removal of phosphorus.	12/31/2026
Progress Report: Submit a progress report on optimizing removal of phosphorus.	12/31/2027
Progress Report: Submit a progress report on optimizing removal of phosphorus.	12/31/2028
Progress Report: Continue to submit an annual progress report on optimizing removal of phosphorus.	

4.2 Sludge Management Plan

Required Action	Due Date
<p>Submit a Sludge Management Plan: The permittee shall submit a management plan for approval <u>if removal of sludge will occur during this permit term</u>. The plan shall demonstrate compliance with ch. NR 204, Wis. Adm. Code and at minimum address 1) How and where is sludge sampled; 2) Available sludge storage details and location(s); 3) How will the sludge be removed with details on volume, characterization and how will the treatment plant continue to function during the drawdown; 4) Describe the type of transportation and spreading vehicles and loading and unloading practices; 5) Identify approved land application sites, apply for needed sites, site limitations, total acres needed and vegetative cover management; 6) Specify record keeping procedures including site loading; 7) Address contingency plans for adverse weather and odor/nuisance abatement; and 8) Include any other pertinent information such as other disposal options that may be used or specifications of any pretreatment processes</p> <p>Once approved, all sludge management 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. No desludging may occur unless approval from the Department is obtained. Daily logs shall be kept that record where the sludge has been disposed.</p> <p>The plan is due at least 60 days prior to desludging.</p>	

Explanation of Schedules

Effluent Phosphorus - Once the nearshore or whole lake model is complete and limits are calculated, it is unknown if the existing treatment plant can achieve the final water quality based effluent limits. If future modeling results calculate the loading allocations lower than the current discharges the facility will need to consider other control methods. This schedule continues the requirements from the previous reissuance; asking for continued optimization of phosphorus discharge reductions within the existing facilities.

Sludge Management Plan - If the lagoons are to be de-sludged during this permit term a management plan is needed to show compliance with ch NR 204, Wis. Adm. Code by clearly explaining how the sludge will be safely removed, what contingencies are in place, the type of equipment that will be used and how the sludge will be land applied to ensure the proper precautions are in place to prevent any negative impacts to surface water or groundwater. There are outlines available to assist in plan development.

Attachments:

Water Flow Schematic created December 2011

“Water Quality-Based Effluent Limitations for Clover Sanitary District (WI-0032069)” memo dated October 5, 2023

“Clover Sanitary District Permit Reissuance, Tributary (no WBIC) to L. Superior, Bayfield Co” survey dated August 23, 2023

Proposed Expiration Date:

December 31, 2028

Justification Of Any Waivers From Permit Application Requirements

A decision has been made not to require effluent monitoring for metals in the application because:

1. The low design flow (19,500 gallons per day) and low actual flow (10,500 gallons per day).
2. The wastewater is all domestic with no industrial contributors to the collection system.
3. The metals in the sludge are well below high quality sludge limits which correlates to low metal concentrations in the effluent.
4. Clover Sanitary District does not have a public water supply system and does not have any control over corrosivity in the influent wastewater.

Prepared By:

Sheri A. Snowbank Wastewater Specialist

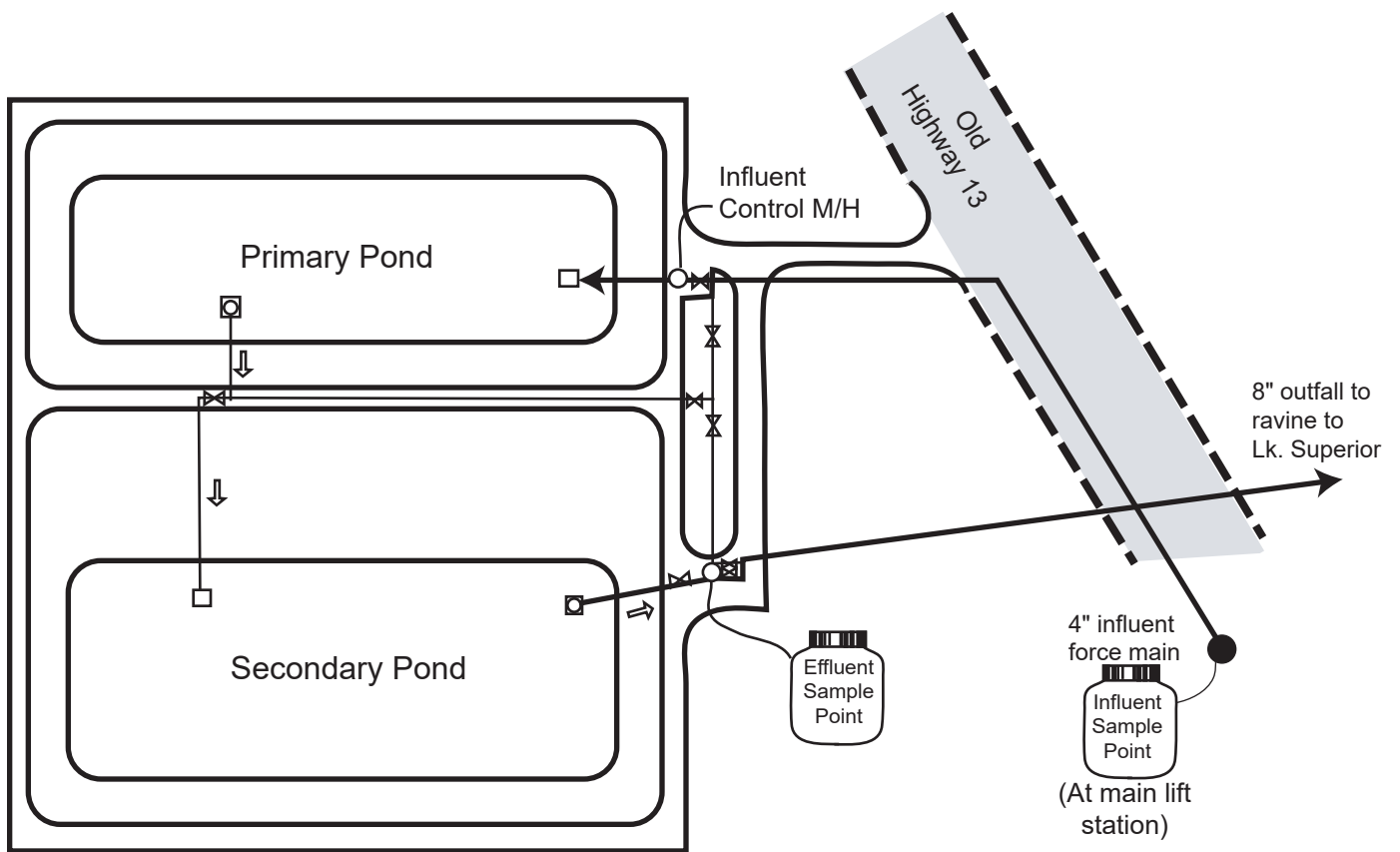
Date: October 13, 2023

Date updated based on Factcheck comments:

Date updated based on public notice comments:

Clover Sanitary District Wastewater Treatment Plant

The Clover Sanitary District wastewater treatment facility is designed to treat 0.0195 million gallons per day (MGD). It consists of two stabilization ponds operated in series. The ponds are operated on a fill and draw basis, with discharges performed annually each spring and fall. Effluent is discharged to a dry run ravine flowing approximately 1,300 feet NNW to Lake Superior.



NOT TO SCALE

Annual Average Flow: 0.0195 MGD
BOD: 35 pound/day

Construction year: 1987
Effluent outfall upgrade: 1996

Discharge: Dry run to Lake Superior
 (See 8/23/2023 memo re receiving water classification)

CORRESPONDENCE/MEMORANDUM

DATE: October 5, 2023

TO: Sheri Snowbank – NOR/Spooner Service Center

FROM: Michael Polkinghorn – NOR/Rhineland Service Center *Michael Polkinghorn*

SUBJECT: Water Quality-Based Effluent Limitations for the Clover Sanitary District
 WPDES Permit No. WI-0032069-08-0

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from the Clover Sanitary District in Bayfield County. This municipal wastewater treatment facility (WWTF) discharges to an unnamed tributary to Lake Superior, located in the Sand River – Frontal Lake Superior Watershed in the Lake Superior Basin. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD ₅			30 mg/L	20 mg/L	2
TSS				60 mg/L	3
pH	9.0 s.u.	6.0 s.u.			2, 4
Dissolved Oxygen		4.0 mg/L			2
Ammonia Nitrogen	2.0 mg/L				5
Phosphorus				3.9 mg/L	4, 6
TKN, Nitrate+Nitrite, and Total Nitrogen					7

Footnotes:

1. Monitoring only.
2. These limits are based on the Limited Aquatic Life (LAL) community of the immediate receiving water as described in s. NR 104.02(3)(b), Wis. Adm. Code.
3. This is a TSS effluent limit variance category limit as described in s. NR 210.07(2), Wis. Adm. Code, where aerated lagoons or waste stabilization ponds are the principal treatment processes. Significant improvements to treatment quality at the facility will prompt a re-evaluation of this variance. The need for TSS limits does not need to be demonstrated at subsequent permit reissuances if the present treatment quality is similar to when the variance was implemented in the permit.
4. No changes from the current permit.
5. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values may be included in the permit in place of the single limit of 2.0 mg/L as a daily maximum. Clover SD shall notify the Department if the single limit or the variable daily maximum limits based on effluent pH is preferred. These limits apply during all discharge seasons including June.

Daily Maximum Ammonia Nitrogen Limits

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
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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	83	7.0 < pH ≤ 7.1	51	8.0 < pH ≤ 8.1	11
6.1 < pH ≤ 6.2	82	7.1 < pH ≤ 7.2	46	8.1 < pH ≤ 8.2	8.8
6.2 < pH ≤ 6.3	80	7.2 < pH ≤ 7.3	40	8.2 < pH ≤ 8.3	7.3
6.3 < pH ≤ 6.4	78	7.3 < pH ≤ 7.4	35	8.3 < pH ≤ 8.4	6.0
6.4 < pH ≤ 6.5	75	7.4 < pH ≤ 7.5	31	8.4 < pH ≤ 8.5	5.0
6.5 < pH ≤ 6.6	72	7.5 < pH ≤ 7.6	26	8.5 < pH ≤ 8.6	4.1
6.6 < pH ≤ 6.7	69	7.6 < pH ≤ 7.7	22	8.6 < pH ≤ 8.7	3.4
6.7 < pH ≤ 6.8	65	7.7 < pH ≤ 7.8	19	8.7 < pH ≤ 8.8	2.8
6.8 < pH ≤ 6.9	60	7.8 < pH ≤ 7.9	16	8.8 < pH ≤ 8.9	2.4
6.9 < pH ≤ 7.0	56	7.9 < pH ≤ 8.0	13	8.9 < pH ≤ 9.0	2.0

6. This is an interim limit based on the 4-day P₉₉ of effluent phosphorus data (October 2013 – May 2017). The WQC of 5 ug/L is described in s. NR 102.06(5)(b), Wis. Adm. Code, for discharges into Lake Superior. This phosphorus WQC is not recommended due to incomplete near shore and/or whole lake modeling that is necessary for the limit.
7. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total nitrogen is the sum of nitrate (NO₃), nitrite (NO₂), and total Kjeldahl nitrogen (TKN) (all expressed as N).

No WET testing is required because information related to the discharge indicates low to no risk for toxicity. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are not required due to the non-continuous nature of the discharge.

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

Attachments (4) – Narrative, discharge area map, calculated weekly/monthly average ammonia nitrogen WQBELs, & thermal table.

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**Water Quality-Based Effluent Limitations for
Clover Sanitary District**

WPDES Permit No. WI-0032069-8-0

Prepared by: Michael A. Polkinghorn, E.I.T.

PART 1 – BACKGROUND INFORMATION

Facility Description

The Clover Sanitary District (Clover SD) owns and operates a domestic wastewater treatment system. Treatment consists of a two-cell stabilization pond system operated in series. Effluent is discharged on a noncontinuous basis via Outfall 001 to an unnamed tributary to Lake Superior. The facility discharges seasonally during March – May and September – November.

Clover SD has requested an extension to the spring discharge season to include June of each year. The facility observed ice on the ponds lasting later in the year than historically, as late as May, which limits the time discharge is authorized before the next authorized month (September). This evaluation will determine any additional permit requirements with continuing the discharge in June as there are multiple seasonal discharge facilities in the northern wastewater region that include June as a discharge month in their permits.

Attachment #2 is a discharge area and approximate flow path of Outfall 001.

Existing Permit Limitations

The current permit, expired on 06/30/2023, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate	0.117 MGD				1
BOD ₅			45 mg/L	30 mg/L	1
TSS			45 mg/L	30 mg/L	1
pH	9.0 s.u.	6.0 s.u.			1, 2
Phosphorus				3.9 mg/L	3
Ammonia Nitrogen					4

Footnotes:

1. These are variance limits as described in s. NR 104.02(4)(c), Wis. Adm. Code, applicable to fill and draw or domestic waste stabilization pond facilities discharging to a Limited Aquatic Life (LAL) or Limited Forage Fish (LFF) community receiving water. In absence of this variance, limits based on the LAL or LFF community of the receiving water as described in s. NR 104.02(3)(a) or (b), Wis. Adm. Code, shall apply.

Attachment #1

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. This is an interim limit based on the 4-day P₉₉ of effluent phosphorus data (October 2013 – May 2017). The WQC of 5 ug/L is described in s. NR 102.06(5)(b), Wis. Adm. Code, for discharges into Lake Superior. This phosphorus WQC is not recommended due to incomplete near shore and/or whole lake modeling that is necessary for the limit.
4. Monitoring only.

Receiving Water Information

- Name: Unnamed tributary (UT) to Lake Superior
- Waterbody Identification Code (WBIC): Unavailable for the UT. Lake Superior is 2751220.
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code:
 - o UT: Limited aquatic life (LAL) community, non-public water supply.
 - Information about the site visit for determining the biological potential of the three segments of the UT is discussed in greater detail in the Receiving Water Classification Memorandum (August 2023) and is available in the permit file for Clover SD. The site visit found that the LAL designated use is appropriate for these segments. The previous limit evaluation (November 2017) treated Outfall 001 as a direct discharge to Lake Superior and did not consider water quality standards for the UT. The updated fish and aquatic life classification of a LAL community for the UT based on the recent site visit will be applied instead for limit calculation.
 - o Lake Superior: Cold Water (CW) community, public water supply, and outstanding resource water (ORW). This waterbody is approximately 0.5 mi downstream of Outfall 001.
 - o Cold Water and Public Water Supply criteria are used for bioaccumulating compounds of concern, because the discharge is within the Great Lakes basin.
 - o Downstream impacts with respect to Lake Superior are considered in this evaluation for all applicable substances.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: Low flows for the UT are zero. A ten-to-one dilution ratio will be used for calculating effluent limitations for Lake Superior based on chronic or long-term impacts, in accordance with s. NR 106.06(4)(b)2, Wis. Adm. Code, because Lake Superior does not exhibit a unidirectional flow at the point where it confluences with the dry run tributary.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: Not applicable for UT where the receiving water low flows are zero. The mixing used for Lake Superior was stated previously.
- Multiple dischargers: There are several other dischargers to Lake Superior 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: There are no known impairments to the UT. Lake Superior is on the Clean Water Act Section 303(d) list for mercury, polychlorinated biphenols (PCBs), and perfluorooctane sulfonic acid (PFOS) contamination in fish tissue. These pollutants do not impact the WQBELs due to the concerned concentrations being limited to the fish tissue.

Effluent Information

- Flow rate(s):
Flow rate limit = 0.117 million gallons per day (MGD)

Annual average design = 0.0195 MGD

The flowrate limit of 0.117 MGD is used in place of the annual average design flow of 0.0195 MGD to account for the seasonal nature of the discharge. For reference, the actual average flow from July 2018 – July 2023 was 0.112 MGD not including days where discharge did not occur. This flow becomes 0.00958 MGD when days of no discharge are included in the average.

- 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 no industrial contributors. Water supply from private wells.
- Additives: None.
- Effluent characterization: This facility is categorized as a minor municipality and received instructions in the application notification letter that exempt it from standard monitoring requirements. Ammonia nitrogen monitoring was required during the current permit term.
- Additional effluent pH (n = 23, October 2013 – May 2018) and ammonia nitrogen data (n = 20, October 2013 – May 2018) are used in this evaluation to better determine the need for ammonia nitrogen limits in the reissued permit.

The following table presents the average concentrations and loadings at Outfall 001 from July 2018 – July 2023 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter	Average Measurement*
Flowrate	0.112 MGD
BOD ₅	9 mg/L
TSS	18 mg/L
pH field	8.0 s.u.
Phosphorus	3.39 mg/L

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

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

Mercury – The permit application did not require monitoring for mercury because Clover SD 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).” However, sludge sampling is not available because Clover SD produces such small amounts of sludge that it is expected sludge will not have to be removed for the life of the facility. It is not expected that there are exceedances of the high-quality mercury concentration based on similar municipal treatment plants and the lack of industries. **Therefore, mercury monitoring is not recommended during the reissued permit term.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the type of discharge and the effluent flow rate, **PFOS and PFOA**

monitoring is not recommended during the reissued permit term. The Department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

**PART 3 – WATER QUALITY-BASED EFFLUENT LIMITATIONS
FOR CONVENTIONAL POLLUTANTS**

The BOD₅, TSS, and flowrate limits in the current permit are variance limits as described in s. NR 104.02(4)(c), Wis. Adm. Code, applicable to fill and draw or domestic waste stabilization pond facilities discharging to a LAL or LFF community receiving water. These limits are being reevaluated at this time for 2 reasons. First, the current variance limits are not applicable to Clover SD because the UT has a 7-Q₁₀ low flow of zero and does not have a high flow to meet the receiving water condition as described in s. NR 104.02(4)(c)1, Wis. Adm. Code. Second, Clover SD may be applicable for an alternate TSS limit under the TSS effluent limit variance category as described in s. NR 210.07(2), Wis. Adm. Code.

The designated use of the immediate receiving water (UT) is an LAL community as detailed in the Receiving Water Classification Memorandum (August 2023). In absence of the current variance, **the following effluent limits are required to protect the LAL community water quality standards as described in s. NR 104.02(3)(b), Wis. Adm. Code:**

LAL Community Conventional Pollutant Limits

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average
BOD ₅			30 mg/L	20 mg/L
TSS			30 mg/L	20 mg/L
Dissolved Oxygen		4.0 mg/L		
pH	9.0 s.u.	6.0 s.u.		

BOD₅

The following table summarizes effluent BOD₅ monitoring data from October 2018 – May 2023.

BOD₅ Effluent Data

Sample Date	Weekly Avg. (mg/L)	Monthly Average (mg/L)
10/09/2018	11	9
10/16/2018	7	
05/07/2019	12	12
05/15/2019	11	
10/15/2019	2	8
10/22/2019	13	
05/06/2020	3	3
05/18/2020	2	
10/06/2020	2	2
10/14/2020	2	
10/04/2021	4	6
10/19/2021	7	

Attachment #1

05/10/2022	31	30
05/17/2022	29	
11/08/2022	2	3
11/15/2022	3	
05/02/2023	16	16

Clover SD has an effluent BOD₅ monitoring frequency of weekly in the current permit where each sample is equivalent to a representative weekly average. A review of this effluent data show Clover SD would have exceeded the 30 mg/L weekly average limit once. A review of monthly average effluent BOD₅ data show Clover SD also would have exceeded the 20 mg/L monthly average limit also once. This shows that Clover SD can meet the updated BOD₅ limits and a compliance schedule is not recommended during the reissued permit term.

Because the variance is no longer applicable to Clover SD, **the daily maximum flowrate of 0.117 MGD is recommended to be removed during the reissued permit term.** In addition, the applicability of a less stringent TSS limit will be evaluated further.

TSS

An alternate TSS limit of up to 60 mg/L as a monthly average may be implemented under the TSS effluent limit variance category as described in s. NR 210.07(2), Wis. Adm. Code, where aerated lagoons or waste stabilization ponds are the principal treatment processes. Clover SD is such a facility whose wastewater treatment does not contain other biological or physical/chemical treatment processes.

Effluent Data

The following table summarizes effluent TSS monitoring data from October 2018 – May 2023.

TSS Effluent Data

Sample Date	Weekly Avg. (mg/L)	Monthly Average (mg/L)
10/09/2018	21	17
10/16/2018	12	
05/07/2019	15	14
05/15/2019	13	
10/15/2019	4	9
10/22/2019	14	
05/06/2020	6	7
05/18/2020	7	
10/06/2020	8	7
10/14/2020	6	
10/12/2021	33	23
10/19/2021	13	
05/10/2022	51	49
05/17/2022	46	
11/08/2022	2	11
11/15/2022	19	
05/02/2023	41	41

Clover SD has an effluent TSS monitoring frequency of weekly in the current permit where each sample is equivalent to a representative weekly average. A review of this effluent data show Clover SD would have exceeded the 30 mg/L weekly average limit 4 times. A review of monthly average effluent TSS data show Clover SD also would have exceeded the 20 mg/L monthly average limit 3 times. This effluent quality justifies the use of the TSS effluent limit variance category. Because the effective TSS limits of 45 mg/L as a weekly average and 30 mg/L as a monthly average are proposed to be made less stringent to a monthly average limit of 60 mg/L, the applicable antidegradation and antibacksliding requirements in ch. NR 207, Wis. Adm. Code, must be evaluated.

Antidegradation

Outfall 001 is considered an “increased discharge” under chapter NR 207, Wis. Adm. Code, with respect to the UT. Antidegradation requirements as described in s. 207.03(7), Wis. Adm. Code, must be evaluated because the UT is an LAL community. The applicable downstream surface waterbody is Lake Superior and is a cold water community, ORW, and a Great Lakes system water. Therefore, if Outfall 001 is demonstrated to lower the water quality of Lake Superior with respect to TSS, then effluent limits shall be set to prevent that lowering of water quality as described in s. NR 207.03(7)(c), Wis. Adm. Code. In addition, the antidegradation requirements in s. NR 207.04, and NR 207.05, Wis. Adm. Codes, must also be evaluated if Outfall 001 is demonstrated to cause a “significant lowering of water quality” (SLOWQ) as defined in s. NR 207.05, Wis. Adm. Code, to Lake Superior with respect to TSS.

The applicable BOD₅ and TSS limits for Lake Superior are both 45 mg/L as a weekly average and 30 mg/L as a monthly average as described in s. NR 210.05(1), Wis. Adm. Code, because they are more stringent than the respective BOD₅ and TSS WQBELs needed to exceed the DO water quality standards for discharges to Lake Superior. Although the TSS limits in the reissued permit would increase to a monthly average limit of 60 mg/L via the TSS effluent limit variance category, the BOD₅ limits would become more stringent to the weekly and monthly average limits of 30 and 20 mg/L respectively. TSS limits are typically set equal to BOD₅ limits because the TSS in the effluent is expected to be organic in composition assuming all the inorganic SS are removed from the wastewater in the preliminary and primary steps in treatment. The TSS concentration is expected to be similar to the BOD₅ concentration assuming proper operation and maintenance of the facility is occurring, so Outfall 001 would not be expected to cause a SLOWQ or lowering of water quality to Lake Superior with respect to TSS given they are in compliance with the recommended BOD₅ limits during the reissued permit term. Given this information related to the facility with respect to BOD₅, Clover SD meets the antidegradation requirements of ch. NR 207, Wis. Adm. Code. In addition, antibacksliding must also be evaluated.

Antibacksliding

Subchapter II of NR. 207, Wis. Adm. Code, contains the requirements for increasing or relaxing (backsliding) any effective limit in a permit. In order to make an effective limit less stringent, the “safety clause” requirements as described in s. NR 207.12(1)(a) and (b), Wis. Adm. Codes, must be met. Also, an additional set of requirements must be met depending on the type of the limit in question.

For Clover SD, s. NR 207.12(1)(a), Wis. Adm. Code, is met as there is no applicable technology-based effluent limit available for TSS for municipal discharges. In addition, s. NR 207.12(1)(b), Wis. Adm. Code, is met as water quality standards and antidegradation relating to TSS are met as stated prior. Because the weekly and monthly average limits of 45 and 30 mg/L respectively were based on state technology treatment standards, s. NR 207.12(3), Wis. Adm. Code, is applicable for Clover SD. In this case, a specific exemption to the additional limit-specific antibacksliding requirements is applicable as described in s. NR 207.12(3)(b)3, Wis. Adm. Code, for Clover SD because ice out on the ponds is

observed to last later in the year than historically (May), which limits the time discharge is authorized before the next authorized month (September). Although this evaluation is evaluating any limits needed for expanding the discharge into June, effluent TSS concentrations have also occasionally caused the facility to cease their spring discharge early to be in compliance with the TSS limits in the current permit. **Therefore, Clover SD meets the antibacksliding requirements of ch. NR 207, Wis. Adm. Code, and the current monthly average TSS limit of 30 mg/L is recommended to increase to 60 mg/L during the reissued permit term. The current weekly average TSS limit of 45 mg/L is recommended to be removed during the reissued permit term.**

**PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS
FOR AMMONIA NITROGEN**

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

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

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

Where:

A = 0.633 and B = 90.0 for an LAL community, and
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 40 sample results were reported from October 2013 – May 2023. The maximum reported value was 9.9 s.u. (Standard pH Units). The effluent pH was 9.9 s.u. or less 97% of the time. The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 9.7 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 9.6 s.u. Clover SD can only discharge a maximum pH of 9.0 s.u. to be compliant with their permit. Therefore, a value of 9.0 s.u. is used to determine the daily maximum limitations for ammonia nitrogen. Substituting a value of 9.0 s.u. into the equation above yields an ATC = 2.04 mg/L.

Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method

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

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

Where:

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

Qs = average minimum 1-day flow which occurs once in 10 years (1-day Q₁₀)

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

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

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

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q₁₀ method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is the case for Clover SD and the limits are set based on the 1-Q₁₀ method. Because the receiving water flow is zero, the single daily maximum limit is set equal to the ATC of 2.0 mg/L, rounded to two significant figures.

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 – LAL

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	83	7.0 < pH ≤ 7.1	51	8.0 < pH ≤ 8.1	11
6.1 < pH ≤ 6.2	82	7.1 < pH ≤ 7.2	46	8.1 < pH ≤ 8.2	8.8
6.2 < pH ≤ 6.3	80	7.2 < pH ≤ 7.3	40	8.2 < pH ≤ 8.3	7.3
6.3 < pH ≤ 6.4	78	7.3 < pH ≤ 7.4	35	8.3 < pH ≤ 8.4	6.0
6.4 < pH ≤ 6.5	75	7.4 < pH ≤ 7.5	31	8.4 < pH ≤ 8.5	5.0
6.5 < pH ≤ 6.6	72	7.5 < pH ≤ 7.6	26	8.5 < pH ≤ 8.6	4.1
6.6 < pH ≤ 6.7	69	7.6 < pH ≤ 7.7	22	8.6 < pH ≤ 8.7	3.4
6.7 < pH ≤ 6.8	65	7.7 < pH ≤ 7.8	19	8.7 < pH ≤ 8.8	2.8
6.8 < pH ≤ 6.9	60	7.8 < pH ≤ 7.9	16	8.8 < pH ≤ 8.9	2.4
6.9 < pH ≤ 7.0	56	7.9 < pH ≤ 8.0	13	8.9 < pH ≤ 9.0	2.0

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

Weekly average and monthly average limits for ammonia nitrogen are based on chronic toxicity criteria (CTC) in ch. NR 105, Wis. Adm. Code, and warrant recalculation from the previous limit evaluation (November 2017) because only limits based on Lake Superior were considered and not the fish and aquatic life classification of the UT. Weekly average and monthly average ammonia nitrogen limits for Lake Superior are included as attachment #3 and do not change because the dilution factor and receiving water classification remain unchanged. The amount of ammonia decay over the 0.5 mi distance between Outfall 001 and Lake Superior is also expected to be negligible. Therefore, only limit based on the UT will be calculated.

The 30-day CTC for ammonia in waters classified as an LAL community is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

Attachment #1

$$CTC = E \times \{ [0.0676 \div (1 + 10^{(7.688 - pH)})] + [2.912 \div (1 + 10^{(pH - 7.688)})] \} \times C$$

Where:

pH = the pH (s.u.) of the receiving water,

E = 1.0,

C = $8.09 \times 10^{(0.028 \times (25 - T))}$

T = the temperature of the receiving (°C)

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q₁₀ (4-Q₃, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q₅ (estimated as 85% of the 7-Q₂ if the 30-Q₅ is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 °C, 25% of the flow is used if the Temperature < 11 °C, and 50% of the flow is used if the Temperature ≥ 11 °C but < 16 °C.

Background temperature values are taken from the “LFF” column of table 2 under s. NR 102.25(2), Wis. Adm. Code, for nonspecific waters as background temperature values for LAL community waters are unavailable. Background pH values are equal to the 4-day P₉₉ of effluent pH data from October 2018 – May 2023. These background parameters and the calculated limits are shown in the table below:

Weekly and Monthly Ammonia Nitrogen Limits – LAL

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. – March
Effluent Flow	Qe (MGD)	0.117	0.117	0.117
Background Information	7-Q ₁₀ (cfs)	0	0	0
	7-Q ₂ (cfs)	0	0	0
	Maximum Temperature (°C)	15	21	13
	pH (s.u.)	8.7	8.7	8.7
Criteria mg/L	4-day Chronic	12.06	8.43	13.92
	30-day Chronic	4.83	3.37	5.57
Effluent Limits mg/L	Weekly Average	12	8.4	14
	Monthly Average	4.8	3.4	5.6

In this case, the weekly and monthly average limits based on the UT are all more stringent than those based on Lake Superior. Therefore, they are applicable for Clover SD.

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from October 2013 – May 2023, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Clover SD permit for the respective month ranges. That need is determined by calculating 99th upper percentile (or P₉₉) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit. The effluent ammonia nitrogen sample of 24.8 mg/L (05/17/2022) is believed to be unrepresentative of the discharge due to a malfunctioning valve between the 2 lagoons. A portable pump was used to transfer wastewater from the 1st lagoon into the 2nd lagoon where the intake pipe withdrew wastewater and sediment from the bottom of the 1st lagoon instead of mostly wastewater near the surface with the value.

Attachment #1

Ammonia Nitrogen Effluent Data

Statistics	Conc. (mg/L)
1-day P ₉₉	8.2
4-day P ₉₉	4.4
30-day P ₉₉	2.2
Mean*	1.4
Std	1.7
Sample size	37
Range	<0.1 – 8.2

*Any values lower than the level of detection were substituted with a zero.

Based on this comparison, daily maximum limits are needed for all discharge seasons including June. Clover SD shall notify the Department if the single limit or the variable daily maximum limits based on effluent pH is preferred.

**PART 5 – 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.

Disinfection have not been historically required for Clover SD due to a satisfactory facility detention time. Because the immediate receiving water is being evaluated for applicable limits, the detention time disinfection exemption will be evaluated for the applicability of *E. coli* limits in the reissued permit.

It is recognized Clover SD potentially has a detention time of at least 180 days, in which the resulting discharged effluent is thought to not pose a risk to human and animal health, as described in s. NR 210.06(3)(h), Wis. Adm. Code. The maximum 180-day rolling average flowrate for the facility is 0.0206 MGD (July 2018 – July 2023) including days discharge did not occur. The volumetric capacity of the lagoons is approximately 4.5 MG, calculated based on dimensions provided by the facility and approximate dimensions from google maps. Therefore, the estimated shortest detention time for the facility is approximately 4.5 MG / 0.0206 MGD = 218 days and is significantly longer than the 180-day minimum. This detention time is essentially providing disinfection where additional disinfection treatment is not expected to be needed. **Therefore, bacteria limits or monitoring are not recommended during the reissued permit term.**

Attachment #1
PART 6 – 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.

An initial review of effluent phosphorus and flow data show the maximum monthly phosphorus loading during the current permit term was 101 lbs/month in October 2021. This loading was calculated using the effluent phosphorus monthly average of 5.2 mg/L, the total monthly flow of 2.33 MG/month, and a conversion factor of 8.34. Assuming this maximum monthly loading for the current permit term, the annual monthly average phosphorus loading is less than 150 lbs/month, in accordance with s. NR 217.04(1)(a)1, Wis. Adm. Code. **Therefore, a technology-based limit is not recommended during the reissued permit term.** In addition, the need for a WQBEL for phosphorus must be considered.

Water Quality-Based Effluent Limits (WQBEL)

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

Phosphorus criteria in s. NR 102.06, Wis. Adm. Code, do not apply to LAL community waters as described in s. NR 102.06(6)(d), Wis. Adm. Code. These waters were not included in the USGS/WDNR stream and river studies and, therefore, the Department lacked the technical basis to determine and propose applicable criteria. At some time in the future, the Department may adopt phosphorus criteria based on new studies focusing on LAL community waters. The Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges (June 2020) suggests that during the interim, WQBELs should be based on the criteria and flow conditions for the next stream segment downstream (or downstream lake or reservoir, if appropriate), because ss. 217.12 and 217.13, Wis. Adm. Code, state that the Department must set WQBELs to protect downstream waters. The UT is classified as an LAL community for approximately 0.5 mi until its confluence with Lake Superior.

Section NR 102.06(5)(a), Wis. Adm. Code, specifies a total phosphorus criterion of 5 µg/L (0.005 mg/L) for the open and nearshore waters of Lake Superior. For discharges directly to the Great Lakes, s. NR 217.13(4), Wis. Adm. Code, says that the Department shall set effluent limits consistent with nearshore or whole lake models approved by the Department. At this time, there is no model available. According to phosphorus implementation guidance, an interim limit should be set at a level that is achievable and that makes progress toward phosphorus reductions without the investment of temporary treatment or a compliance schedule to meet the interim limit. In the absence of an approved model, a WQBEL of 0.6 mg/L as a six-month average would be recommended. This limit is indicative of the best readily available phosphorus removal technology at the time this rule was promulgated in 12/01/2010.

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from October 2018 – May 2023.

Total Phosphorus Effluent Data

Statistics	Conc. (mg/L)
1-day P ₉₉	8.72
4-day P ₉₉	5.68
30-day P ₉₉	4.13
Mean	3.39
Std	1.60
Sample size	18
Range	1.04 – 5.7

Interim Limit

An interim limit is required per s. NR 217.17 when a compliance schedule is needed in the permit to meet the WQBEL. The interim limit should reflect a concentration that the facility is able to meet without investing in additional “temporary” treatment, but also should prevent backsliding from current conditions. **Therefore, it is recommended the current interim limit of 3.9 mg/L as a monthly average continue during the reissued permit term, along with requirements for optimization of phosphorus removal.** A review of monthly average effluent phosphorus data (October 2018 – May 2023) show Clover SD exceeded the current interim limit 4 times and currently cannot meet a more stringent limit. These values ranged from 4.4 – 5.5 mg/L during October 2020 – May 2023.

The *Guidance for Implementation of Wisconsin’s Phosphorus Water Quality Standards* states that facilities discharging to the Great Lakes will be required to optimize facility operations upon permit reissuance. During the permit term, the facility has carried out optimization efforts as part of the phosphorus compliance schedule. The facility should continue the measures in their optimization plan until a near-shore or whole lake model allows for the calculation of a WQBEL.

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 Chapters NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. The daily maximum effluent temperature limitation shall be 86 °F for discharges to surface waters classified as Limited Aquatic Life according to s. NR 104.02(3)(b)1, Wis. Adm. Code, except for those classified as wastewater effluent channels and wetlands regulated under ch. NR 103 and described in s. NR 106.55(2), Wis. Adm. Code, which has a daily maximum effluent temperature limitation of 120°F. The 86°F limit applies because the UT was determined to be an LAL community.

Downstream impacts are also considered for Lake Superior with weekly average temperature limits. 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. Without considering heat loss over the 0.5 mi of the UT, the lowest calculated limit based on Lake Superior is

Attachment #1

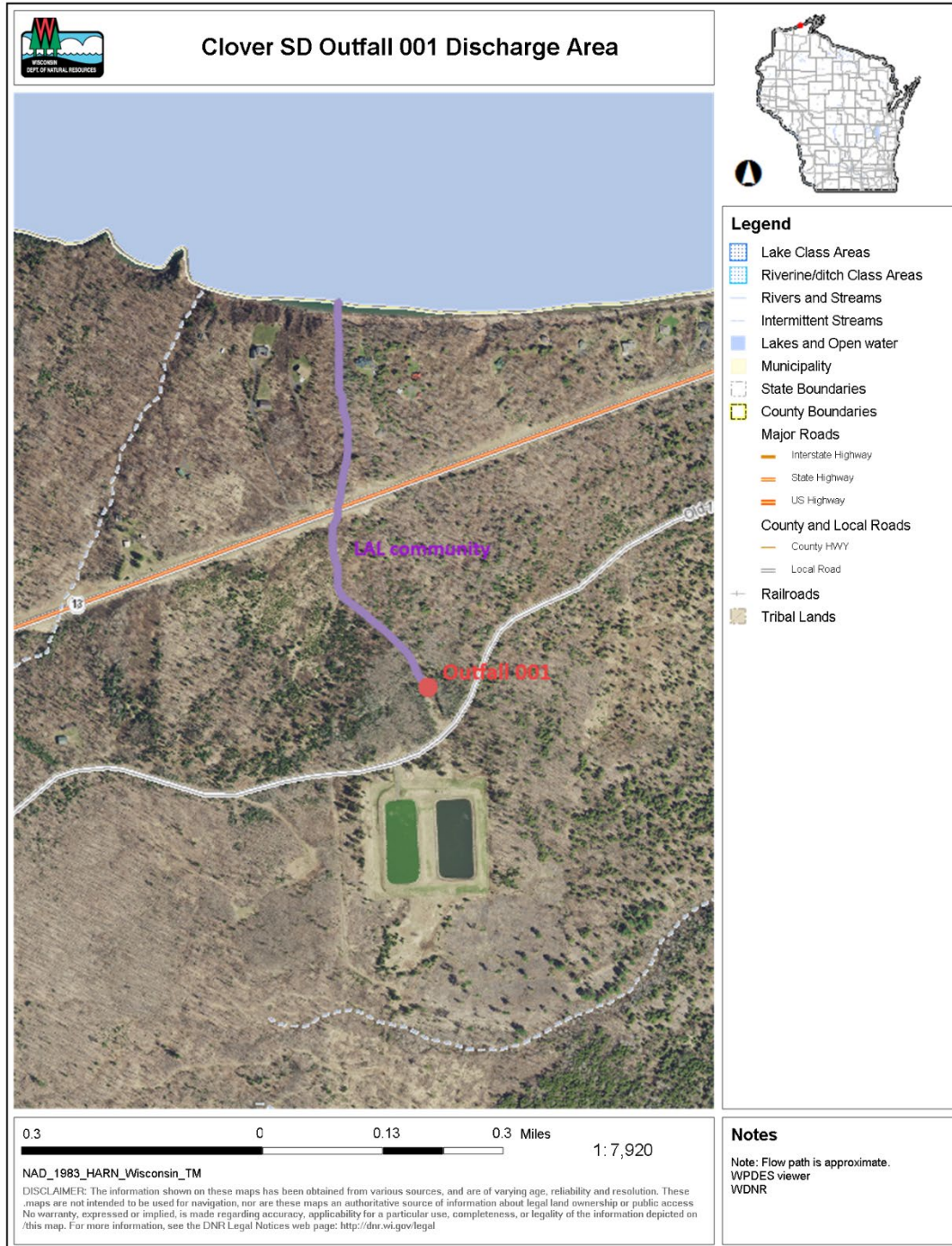
120°F as a daily maximum. Temperature limits based on the protection of the UT are more stringent; therefore, downstream impacts for temperature are no longer considered. The complete temperature limit calculations are included as attachment #4.

This facility provides hydraulic detention times of approximately 218 days as a worst case scenario, elevated effluent temperatures are unlikely, and discharge temperatures are expected to be similar to ambient conditions. The facility uses a fill and draw method of operation with effluent discharges occurring only during the cool weather periods in spring and fall when ambient temperatures are less than 86°F. **Therefore, temperature limit or monitoring are not recommended during the reissued permit term.**

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)*.

Guidance in Chapter 1.11 of the WET Guidance Document (WET Testing of Minor Municipal Discharges) was consulted. This is a minor municipal discharge (< 1.0 MGD) comprised solely of domestic wastewater with no history of WET failures. Toxic substances monitoring was exempted for Clover SD in the application notification letter because background information about Outfall 001 suggest toxic substances are not expected to be present at levels of concern. In addition, Lake Superior remains as the point of standards application for chronic WET because the UT only supports a macroinvertebrate natural community, so there are no changes in the concerned toxicity related to the Instream Waste Concentration. **Therefore, WET testing is not recommended at this time because of the low risk in effluent toxicity.**



Attachment #3

Calculated Weekly/Monthly Average Ammonia Nitrogen WQBELs for Lake Superior (November 2017 WQBEL Memo)

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
Background Information:	Dilution factor	10	10	10
	Ammonia (mg/L)	0.03	0.03	0.025
	Temperature (°C)	11	17	4
	pH (s.u.)	7.69	7.75	7.59
Criteria mg/L:	4-day Chronic	9.05	7.20	10.04
	30-day Chronic	3.62	2.88	4.01
Effluent Limits mg/L:	Weekly Average	99.2	79	110
	Monthly Average	39.5	31.4	43.9

Temperature Limits for Receiving Waters without Unidirectional Flow
(calculation using default ambient temperature data)

Facility: Clover SD

Outfall(s): 001

Date Prepared: 8/31/2023

Design Flow (Qe): 0.117 MGD

Lake Type: Lake Superior

Discharge Type: Great Lakes shore discharge

Temp Dates **Flow Dates**

Start: NA 10/01/18

End: NA 05/31/23

Maximum area of mixing zone allowed (coefficient "A"): 3,125,000 ft²

Month	Water Quality Criteria			Representative Highest Effluent Flow Rate (Qe)		e ^{-a}			Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default) (°F)	Sub-Lethal WQC (°F)	Acute WQC (°F)	7-day Rolling Average (Qesl) (MGD)	Daily Maximum Flow Rate (Qea) (MGD)	B	e ^{-a} (for SL-WQBEL)	e ^{-a} (for A-WQBEL)	Weekly Average (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
APR	35	57	69	0.12	0.12	0.405	0.000	0.000			NA	120
MAY	41	63	70	0.12	0.12	0.405	0.000	0.000			NA	120
OCT	50	55	72	0.12	0.12	0.405	0.000	0.000			NA	120
NOV	43	45	70	0.12	0.12	0.405	0.000	0.000			NA	120