Permit Fact Sheet

General Information

Permit Number	WI-0061301-07-0
Permittee Name and Address	Silver Lake Sanitary District Mail01 Wautoma WI 54982-0357
Permitted Facility Name and Address	Silver Lake Sanitary District SEQ NEQ Sec 24 T18N R10E
Permit Term	April 01, 2025 to March 31, 2030
Discharge Location	N1702 19th Avenue, Wautoma, WI
Receiving Water	White River in White River of Fox River (upper) in Waushara county
Stream Flow ($Q_{7,10}$)	51 cfs
Stream Classification	Warm Water Sport Fish community, non-public water supply.
Discharge Type	Existing, continuous
Annual Average Design Flow (MGD)	Annual Average: 1.025 MGD Peak daily: 3.214 MGD Peak weekly: 2.678 MGD Peak monthly: 2.140 MGD
Industrial or Commercial Contributors	One industrial contributor (Milk Specialties)
Plant Classification	A1 - Suspended Growth Processes; B - Solids Separation; C - Biological Solids/Sludges; P - Total Phosphorus; D - Disinfection; L - Laboratory; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	No; N/A

Facility Description

Silver Lake Sanitary District owns an oxidation ditch-type treatment facility (WWTF) in Waushara County, providing service to the Silver Lake Sanitary District and the City of Wautoma. The wastewater facility has an annual average design flow of 1.025 MGD. The WWTF includes fine screening, grit removal, a four-ring oxidation ditch, four secondary clarifiers, aerobic digester, gravity belt thickener, sludge storage and a septage receiving station. Seasonal disinfection is accomplished with ultraviolet lights. Ammonia and phosphorous are removed with biological treatment. The final effluent is discharged to the White River. Sludge is aerobically digested and stored on-site until it is land applied on WDNR approved agricultural sites. The facility generates approximately 79 dry US tons of sludge annually.

Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, CMARs, land app reports, compliance schedule items, and a site visit on July 11, 2024, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Barti Oumarou on July 25, 2024.

Sample Point Descriptions

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
701	0.11 MGD (January-October 2024)	Influent: Silver Lake: Representative samples of the influent from Silver Lake Sanitary District shall be collected from the influent channel in the degritter room, after the degritter and prior to the Parshall flume.
702	0.21 MGD (January-October 2024)	Influent: Wautoma: Representative samples of the influent from Wautoma shall be collected from the 16-inch force main as it passes through the influent structure.
703	0.32 MGD (January-October 2024)	Influent - Total: The total influent to the facility shall be calculated by combining sample points 701 and 702. Results of chemical analyses shall be determined on a flow-weighted basis.
001	0.32 MGD (January-October 2024)	Effluent: 24 hour flow proportional composite samples shall be collected after UV disinfection and prior to the Parshall flume in the effluent building.
002	79 dry U.S. tons/year	Liquid Sludge: Representative samples of the aerobically digested, gravity belt thickened, liquid sludge shall be collected from the holding tank after complete mixing.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 701- Influent - Silver Lake; 702- Influent - Wautoma

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

1.1.1 Changes from Previous Permit:

Influent limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section.

1.1.2 Explanation of Limits and Monitoring Requirements

Monitoring of influent flow, BOD5 and total suspended solids is required by s. NR 210.04(2), Wis. Adm. Code, to assess wastewater strengths and volumes and to demonstrate the percent removal requirements in s. NR 210.05, Wis. Adm. Code, and in the Standard Requirements section of the permit

1.2 Sample Point Number: 703- Influent - Total

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Calculated	
BOD5, Total		mg/L	3/Week	Calculated	
Suspended Solids, Total		mg/L	3/Week	Calculated	

1.2.1 Changes from Previous Permit:

Influent limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section.

1.2.2 Explanation of Limits and Monitoring Requirements

Monitoring of influent flow, BOD5 and total suspended solids is required by s. NR 210.04(2), Wis. Adm. Code, to assess wastewater strengths and volumes and to demonstrate the percent removal requirements in s. NR 210.05, Wis. Adm. Code, and in the Standard Requirements section of the permit.

2 Surface Water - Monitoring and Limitations

2.1 Sample Point Number: 001- Effluent

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	Existing concentration limits that are already in

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					effect will be maintained to prevent backsliding.
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	Existing concentration limits that are already in effect will be maintained to prevent backsliding.
Suspended Solids, Total	Weekly Avg	280 lbs/day	3/Week	Calculated	
Suspended Solids, Total	Monthly Avg	209 lbs/day	3/Week	Calculated	
Suspended Solids, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of TSS and report on the last day of the month on the DMR. See TMDL Calculations section.
Suspended Solids, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of TSS discharged and report on the last day of the month on the DMR. See TMDL Calculations section.
pH Field	Daily Max	9.0 su	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Applies May - September
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Applies May - September
Phosphorus, Total	Monthly Avg	1.0 mg/L	3/Week	24-Hr Flow Prop Comp	Existing concentration limits that are already in effect will be maintained to prevent backsliding.
Phosphorus, Total	6-Month Avg	1.9 lbs/day	3/Week	Calculated	See Phosphorus TMDL section.
Phosphorus, Total	Monthly Avg	5.7 lbs/day	3/Week	Calculated	See Phosphorus TMDL section.
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of phosphorus and report on

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					the last day of the month on the DMR. See TMDL Calculations section.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of phosphorus discharged and report on the last day of the month on the DMR. See TMDL Calculations section.
Nitrogen, Ammonia (NH3-N) Total	Daily Max	24 mg/L	3/Week	24-Hr Flow Prop Comp	Applies June - April.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	24 mg/L	3/Week	24-Hr Flow Prop Comp	Applies June - March.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	Applies April.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	19 mg/L	3/Week	24-Hr Flow Prop Comp	Applies May.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	24 mg/L	3/Week	24-Hr Flow Prop Comp	Applies June - March.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	12 mg/L	3/Week	24-Hr Flow Prop Comp	Applies April – May.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Monitoring section.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Monitoring section.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. See Nitrogen Monitoring permit section. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
PFOS		mg/L	1/ 2 Months	Grab	Bimonthly monitoring only. See PFOS/PFOA Minimization Plan Determination of Need

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					schedule.
PFOA		mg/L	1/ 2 Months	Grab	Bimonthly monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Whole Effluent Toxicity (WET) Testing section.

2.1.1 Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under "Explanation of Limits and Monitoring Requirements" below.

- **Total Suspended Solids TMDL Limits-** Mass based TSS limits of 280 lbs/day as a weekly average and 209 lbs/day as a monthly average have been added to the permit to comply with requirements of the Upper Fox Wolf River TMDL. Effluent concentration (mg/L) shall be monitored and reported 3 times per week upon permit reissuance and will be used to calculate amounts reported for mass-based limits. 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 WLA.
- **E. coli:** Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.
- **Phosphorus TMDL Limits-** Mass based phosphorus limits of 1.9 lbs/day as a six-month average and 5.7 lbs/day as a monthly average have been added to the permit to comply with requirements of the Upper Fox Wolf River TMDL. Effluent concentration (mg/L) shall be monitored and reported 3 times per week upon permit reissuance and will be used to calculate amounts reported for mass-based limits. 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 WLA.
- **PFOS and PFOA** – Monitoring once every two months is included in the permit in accordance with s. NR 106.98(2)(b), Wis. Adm. Code.
- **Ammonia Nitrogen**: Daily maximum limits are added and changes are made to weekly and monthly average limits.
- **Acute WET:** Testing requirement is added.
- **Total Nitrogen Monitoring (TKN, N02+N03 and Total N)-** Annual monitoring is required in specific quarters as outlined in the permit.

2.1.3 Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo dated **August 26, 2024.**

Monitoring Frequencies- The Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure

consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. The department has determined at this time that an increase in monitoring frequency for phosphorus and ammonia is warranted because previous monitoring frequencies were less than what is recommended in the Monitoring Frequencies for Individual Wastewater Permits guidance.

Total Nitrogen Monitoring (NO2+NO3, TKN and Total N) - The Department has included effluent monitoring for Total Nitrogen in the permit through the authority under §§ 283.55(1)(e), Wis. Stats., which allows the department to require the permittee to submit information necessary to identify the type and quantity of any pollutants discharged from the point source, and through s. NR 200.065(1)(h), Wis. Adm. Code, which allows for this monitoring to be collected during the permit term. More information on the justification to include total nitrogen monitoring in wastewater permits can be found in the "Guidance for Total Nitrogen Monitoring in Wastewater Permits" dated October 1, 2019. Annual tests are scheduled in rotating quarters.

PFOS and PFOA – NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for major municipal dischargers with an average flow rate greater than 1 MGD but less than 5 MGD, at a minimum sample effluent once every two-months for PFOS and PFOA pursuant s. NR 106.98(2)(b), Wis. Adm. Code.

A sample frequency of 1/2 months means one sample is taken during any two-month period. Examples of 1/2 month sample would be every other month (Jan, March, May, etc.) or back-to-back months with a break in between (February & March, May & June, Aug & Sept, etc.). DMR Short Forms will be generated for the following time periods: January-February, March-April, May-June, July-August, September-October, and November-December. At a minimum one sample result will be present on each form.

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

3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	**Sludge Class (A or B)**	**Sludge Type (Liquid or Cake)**	**Pathogen Reduction Method**	**Vector Attraction Method**	**Reuse Option**	**Amount Reused/Disposed (Dry Tons/Year)**
002	**B**	**Liquid**	**Fecal Coliform**	**Incorporation**	**Land Application**	**59**

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 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.

3.1 Sample Point Number: 002- Liquid Sludge

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	
Nitrogen, Ammonium (NH4-N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	

PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Analysis required in 2026. See the "Sludge Analysis for PCBs" section and the Standard Requirements for more information.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Analysis required in 2026. See the "Sludge Analysis for PCBs" section and the Standard Requirements for more information.
PFOA + PFOS		ug/kg	Annual	Composite	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

3.1.1 Changes from Previous Permit:

Sludge limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under “Explanation of Limits and Monitoring Requirements” below.

PCB – Sampling year updated for PCB.

PFAS –Monitoring is required annually pursuant to s. NR 204.06(2)(b)9, Wis. Adm. Code.

3.1.2 Explanation of Limits and Monitoring Requirements

Requirements for disposal, including land application of municipal sludge, are determined in accordance with ch. NR 204, Wis. Adm. Code. Ceiling and high-quality limits for metals in sludge are specified in s. NR 204.07(5), Wis. Adm. Code. Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7), Wis. Adm. Code for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k), Wis. Adm. Code.

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

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

4 Schedules

4.1 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.	04/01/2026

4.1.1 Explanation of Schedule

An up-to-date Land Application Management Plan is required that documents how the permittee will manage the land application of biosolids consistent with ch. NR 204, Wis. Adm. Code

4.2 Operator Certification

Required Action	Due Date
Operator In Charge Identification: The permittee shall notify the department of the designated operator in charge with required certification in the sub-class SS.	10/01/2025

4.3 Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus

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

Required Action	Due Date
Operational Evaluation Report: The permittee shall prepare an operational evaluation study report and submit it for Department approval. The report shall evaluate collected effluent data, possible source reduction measures, operational improvements or other minor facility modifications that would enable compliance with the final phosphorus WQBEL (water quality based effluent limit) or some improved level of effluent quality using the existing treatment system. Also, the operational evaluation report shall include a phosphorus discharge optimization plan for the current operation. If the Operational Evaluation Report concludes that the permittee cannot achieve final phosphorus WQBELs with source reduction measures, operational improvements and other minor facility modifications, the permittee shall initiate a study of feasible alternatives for meeting final phosphorus WQBELs and comply with the remaining required actions of this schedule of compliance. If the Department disagrees with the conclusion of the report, and determines that the permittee can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the Department may reopen and modify the permit to include an implementation schedule for achieving the final phosphorus WQBELs	12/31/2025

sooner than April 1, 2032.	
Compliance Alternatives, Source Reduction, Improvements and Modifications Status: The permittee shall submit a 'Compliance Alternatives, Source Reduction, Operational Improvements and Minor Facility Modification' status report to the Department. The report shall provide an update on the permittee's: (1) progress implementing source reduction measures, operational improvements, and minor facility modifications to optimize reductions in phosphorus discharges and, to the extent that such measures, improvements, and modifications will not enable compliance with the WQBELs, (2) status evaluating feasible alternatives for meeting phosphorus WQBELs.	3/31/2026
Preliminary Compliance Alternatives Plan: The permittee shall submit a compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee's wastewater treatment facility is necessary to achieve final phosphorus WQBELs, the submittal shall include a preliminary engineering design report. If the plan concludes Adaptive Management will be used, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 without the Adaptive Management Plan. If water quality trading will be undertaken, the plan must state that trading will be pursued.	3/31/2027
Facility Plan: Submit a Facility Plan that evaluates feasible alternatives for meeting the final phosphorus WQBEL (water quality based effluent limit) which may include: facility upgrading, consolidation with other sewerage systems, alternative effluent discharge locations, the Watershed Adaptive Management Option, Water Quality Trading Plan or a water quality standards variance.	3/31/2028
Construction Plan: Submit construction plans and specifications for approval if the approved Facility Plan calls for upgrading the treatment facility.	3/31/2029
Progress Report: Submit a progress report on meeting the final WQBEL for phosphorus.	3/31/2030
Progress Report: Submit a progress report on meeting the final WQBEL for phosphorus.	3/31/2031
Complete Actions: Complete actions to meet the final WQBEL for phosphorus. Comply with the new phosphorus final limits.	3/1/2032
Achieve Compliance: The permittee shall achieve compliance with final phosphorus WQBELs. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	4/1/2032

4.3.1 Explanation of Schedule

Subsection NR 217.17, Wis. Adm. Code, allows the department to provide a schedule of compliance for water quality based phosphorus limits where the permittee cannot immediately achieve compliance. This compliance schedule requires the permittee to comply with the final water quality based phosphorus limits within approximately 7 years. The permittee may be required to meet the final phosphorus WQBEL sooner than April 1, 2032 (less than seven years) if the required "Operational Evaluation Report" concludes that the phosphorus WQBEL can be met using the existing treatment system with only source reduction measures, operational improvements and minor facility modifications. Also, as part of the "Facility Plan" the permittee may determine whether Water Quality Trading or Adaptive Management, either alone or in combination with plant upgrades will allow the plant to meet the phosphorus WQBELs. The Department believes that the compliance schedule suggested in the draft permit (7 years) provides the appropriate length of time for the permittee to evaluate these options, implement the chosen option and meet the final phosphorus limits (WQBELs).

Other Comments

None

Attachments

Water Quality Based Effluent Limits dated August 26, 2024, prepared by Nicole Krueger, WDNR Effluent Limits Calculator

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance

Prepared By: Ashley Clark, Wastewater Specialist

Date: January 30, 2025

Revision date post fact check:
Revision date post public notice:

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 08/26/2024

TO: Ashley Clark – NER

FROM: Nicole Krueger – SER Nicole Krueger

SUBJECT: Water Quality-Based Effluent Limitations for Silver Lake Sanitary District
WPDES Permit No. WI-0061301-07

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 Silver Lake Sanitary District in Waushara County. This municipal wastewater treatment facility (WWTF) discharges to the White River, located in the White River Watershed in the Upper Fox River Basin. This discharge is included in the Upper Fox and Wolf Rivers TMDL as approved by EPA in February 2020. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD_5			45 mg/L	30 mg/L		1
TSS TMDL			45 mg/L 280 lbs/day	30 mg/L 209 lbs/day		3
pH	9.0 s.u.	6.0 s.u.				1
Bacteria						4
E. coli				126 #/100 mL geometric mean		
Phosphorus TMDL				1.0 mg/L 5.7 lbs/day	1.9 lbs/day	3,5
PFOA and PFOS						6
Ammonia Nitrogen November – March April May June – September October	 24 mg/L 24 mg/L 24 mg/L 24 mg/L		 24 mg/L 20 mg/L 19 mg/L **24 mg/L** **24 mg/L**	 24 mg/L 12 mg/L 12 mg/L **24 mg/L** **24 mg/L**		7
TKN, Nitrate+Nitrite, and Total Nitrogen						8
Acute WET						9,10

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. The TSS and phosphorus mass limits are based on the Total Maximum Daily Load (TMDL) for the Upper Fox and Wolf River Basins to address phosphorus water quality impairments within the TMDL area.

4. Bacteria limits apply during the disinfection season of May through September. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
5. The monthly average phosphorus limit is a technology-based limit which also functions as an interim limit for the phosphorus compliance schedule.
6. Monitoring of PFOA and PFOS is recommended at an every-other-month frequency.
7. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
8. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total kjeldahl nitrogen (TKN) (all expressed as N).
9. Acute WET testing is recommended 2/permit term.
10. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Nicole Krueger at Nicole.Krueger@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (2) – Narrative & Outfall Map

PREPARED BY: Nicole Krueger – Water Resources Engineer – SER

E-cc: Barti Oumarou, Wastewater Engineer – NER
Heidi Schmitt Marquez, Regional Wastewater Supervisor – NER
Diane Figiel, Water Resources Engineer – WY/3
Nate Willis, Wastewater Engineer – WY/3

Attachment #1

Water Quality-Based Effluent Limitations for
Silver Lake Sanitary District

WPDES Permit No. WI-0061301-07

Prepared by: Nicole Krueger

PART 1 – BACKGROUND INFORMATION

Facility Description

Silver Lake Sanitary District owns an oxidation ditch-type treatment facility (WWTF) in Waushara County, providing service to the Silver Lake Sanitary District and the City of Wautoma. The wastewater facility has an annual average design flow of 1.025 MGD. The WWTF includes fine screening, grit removal, a four-ring oxidation ditch, four secondary clarifiers, aerobic digester, gravity belt thickener, sludge storage and a septage receiving station. Seasonal disinfection is accomplished with ultraviolet lights. Ammonia and phosphorous are removed with biological treatment. Changes were made to the oxidation ditch to achieve biological phosphorous removal. The final effluent is discharged to the White River. Sludge is aerobically digested and stored on-site until it is land applied on WDNR approved agricultural sites. The facility generates approximately 78 dry US tons of sludge annually.

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

Existing Permit Limitations

The current permit, which expired on 03/31/2023, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD_5			45 mg/L	30 mg/L		2
TSS			45 mg/L	30 mg/L		2
pH	9.0 s.u.	6.0 s.u.				2
Fecal Coliform May – September			**656#/100 mL** **geometric mean**	400#/100 mL geometric mean		3
Phosphorus				1.0 mg/L		
Ammonia Nitrogen November – March April May	 25 mg/L 25 mg/L		 **25 mg/L** 20 mg/L 19 mg/L	 **25 mg/L** 12 mg/L 12 mg/L		3

Footnotes:

1. Monitoring only.
2. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
3. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.

Receiving Water Information

- Name: White River
- Waterbody Identification Code (WBIC): 148500
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply. Note: Cold Water and Public Water Supply criteria are used for bioaccumulating compounds of concern, because the discharge is within the Great Lakes basin.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q_{10} and 7-Q_2 values are from USGS where Outfall 001 is located.
  7-Q_{10} = 51 cfs (cubic feet per second)
  7-Q_2 = 60 cfs
  Harmonic Mean Flow = 60 cfs using a drainage area of 70 mi^2
  The Harmonic Mean has been estimated based on average flow and the 7-Q_{10} using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).
- Hardness = 177 mg/L as $CaCO_3$. This value represents the geometric mean of data from 02/24/1997 – 10/30/1997 from the White River at 22 Ave Southeast of Neshkoro (stored in SWIMS).
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%.
- Source of background concentration data: Chloride data is from the White River approximately 1 mile downstream of Outfall 001. Metals data from the Fox River at De Pere is used for this evaluation because there is no data available for the White River. The Fox River is within the same ecological landscape so ambient water quality characteristics are expected to be similar. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: None.
- Impaired water status: Over 20 miles downstream Lake Butte de Morts is listed as impaired due to phosphorus and TSS.

Effluent Information

- Design flow rates:
  Annual average = 1.025 MGD (Million Gallons per Day)
  Peak daily = 3.214 MGD
  Peak weekly = 2.678 MGD
  Peak monthly = 2.140 MGD
  For reference, the actual average flow from 04/01/2018 – 06/30/2024 was 0.39 MGD.
- Hardness = 186 mg/L as $CaCO_3$. This value represents the geometric mean of data from the permit reissuance application from 01/12/2023 – 01/22/2023.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water source: Domestic wastewater with water supply from wells and one industrial contributer (Milk Specialties).
- Additives: None.
- Effluent characterization: This facility is categorized as a minor municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus ammonia, chloride,

hardness and phosphorus.

- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled "MEAN EFFL. CONC.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

Effluent Copper Data

Sample Date	Copper µg/L	Sample Date	Copper µg/L	Sample Date	Copper µg/L
01/12/2023	12	01/26/2023	14	02/09/2023	17
01/15/2023	10	01/29/2023	14	02/12/2023	16
01/19/2023	14	02/02/2023	15	02/15/2023	15
01/22/2023	13	02/05/2023	15		
1-day P_{99} = 19 µg/L					
4-day P_{99} = 16 µg/L					

Effluent Chloride Data

Sample Date	Chloride mg/L
01/12/2023	162
01/15/2023	166
01/19/2023	154
01/22/2023	165
Average	162

The following table presents the average concentrations and loadings at Outfall 001 from 04/01/2018 – 06/30/2024 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter Averages with Limits

	Average Measurement
BOD_5	9.3 mg/L
TSS	6.9 mg/L*
pH field	7.4 s.u.
Phosphorus	0.44 mg/L
Ammonia Nitrogen	2.7 mg/L*
Fecal Coliform	60.8 #/100 mL

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

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

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

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

calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q_{10}

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

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

Where:

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

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

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

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

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

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

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 40.8 cfs, (1-Q_{10} (estimated as 80% of 7-Q_{10})), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Arsenic		340		680	136	<14		
Cadmium	186	21.0	0.02	42.0	8.40	<0.3		
Chromium	186	2997	0.78	5995	1199	<1.3		
Copper	186	27.9	1.67	55.7			19	17
Lead	186	195	0.93	390	77.9	6		
Nickel	186	793		1586	317	2.7		
Zinc	186	207	5.49	414	82.8	29		

SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Chloride (mg/L)		757	5	1514	303	162		

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

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 12.75 cfs (¼ of the 7-Q_{10}), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Arsenic		152		1376	275	<14	
Cadmium	175	3.82	0.02	34.4	6.87	<0.3	
Chromium	177	211	0.78	1900	380	<1.3	
Copper	177	16.9	1.67	139			16
Lead	177	48.6	0.93	432	86.4	6	
Nickel	177	84.6		765	153	2.7	
Zinc	177	198	5.49	1749	350	29	
Chloride (mg/L)		395	5	3530	706	162	

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

Monthly Average Limits based on Wildlife Criteria (WC)

The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

Monthly Average Limits based on Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 15.0 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	0.02	3859	772	<0.3
Chromium (+3)	3818000	0.78	39818299	7963660	<1.3
Lead	140	0.93	1451	290	6
Nickel	43000		448451	89690	2.7

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 15.0 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3		139	27.7	<14

In addition to evaluating the need for limits for each individual substance for which HCC exist, s. NR 106.06(8), Wis. Adm. Code, requires the evaluation of the cumulative cancer risk. Because no effluent

limits are needed based on HCC, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

Conclusions and Recommendations
Based on a comparison of the effluent data and calculated effluent limitations, **effluent limitations are not required** for toxic substances in this section.

Mercury – The permit application did not require monitoring for mercury because Silver Lake is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code. In accordance with s. NR 106.145(3)(a)3, Wis. Adm. Code, a minor municipal discharger shall monitor, and report results of influent and effluent mercury monitoring once every three months if, "there are two or more exceedances in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5), Wis. Adm. Code." A review of the past five years of sludge characteristics data reveals that all the sample results are within expected analytical ranges and well below the 17 mg/kg level. The average concentration in the sludge from 10/24/2019 – 03/29/2023 was 0.19 mg/kg, with a maximum reported concentration of 0.554 mg/kg. Therefore, no mercury monitoring is recommended at Outfall 001.

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the indirect dischargers contributing to the collection system, **PFOS and PFOA monitoring is recommended at an every other month frequency**. The Department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

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

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

- Subchapter IV of ch. NR 106, Wis. Adm. Code allows limits based on available dilution instead of limits set to twice the acute criteria.
- Section NR 106.07(3), Wis. Adm. Code requires weekly and monthly average limits for municipal treatment plants.
- The maximum expected effluent pH has changed.

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

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

Where:

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

The effluent pH data was examined as part of this evaluation. A total of 1618 sample results were reported from 04/03/2018 – 06/28/2024. The maximum reported value was 7.9 s.u. (Standard pH Units).

The effluent pH was 7.8 s.u. or less 99% of the time. The 1-day P_{99}, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.8 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 7.8 s.u. Therefore, a value of 7.8 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 7.8 s.u. into the equation above yields an ATC = 12 mg/L.

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

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

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	24
1-Q_{10}	324

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

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 in ch. NR 105, Wis. Adm. Code.

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as a Warm Water Sport Fish Community is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

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

Where:

pH = the pH (s.u.) of the receiving water,
E = 0.854,
C = the minimum of 2.85 or $1.45 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Present), or
C = $1.45 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Absent), and
T = the temperature (ºC) of the receiving water – (Early Life Stages Present), or
T = the maximum of the actual temperature (ºC) and 7 - (Early Life Stages Absent)

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-Q_{10} (4-Q_3, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q_5 (estimated as 85% of the 7-Q_2 if the 30-Q_5 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 ºC, 25% of the flow is used if the Temperature < 11 ºC, and 50% of the flow is used if the Temperature ≥ 11 ºC but < 16 ºC.

Section NR 106.32 (3), Wis. Adm. Code, provides a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 ºC, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the White River, based on conversations with local fisheries biologists. So "ELS Absent" criteria apply from October through March, and "ELS Present" criteria will apply from April through September for a warmwater sport fish classification.

The "default" basin assumed values are used for Temperature, pH and background ammonia concentrations, because minimum ambient data is available. These values are shown in the table below, with the resulting criteria and effluent limitations.

Weekly and Monthly Ammonia Nitrogen Limits – WWSF

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
Effluent Flow	Qe (MGD)	1.025	1.025	1.025
Background Information	7-Q_{10} (cfs)	51	51	51
	7-Q_2 (cfs)	60	60	60
	Ammonia (mg/L)	0.02	0.03	0.05
	Average Temperature (°C)	12	19	4
	Maximum Temperature (°C)	14	21	10
	pH (s.u.)	8.21	8.21	7.97
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	26	51	13
	Reference Monthly Flow (cfs)	26	51	13
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	4.4	3.0	
	Early Life Stages Absent			8.5
	30-day Chronic			
	Early Life Stages Present	1.8	1.2	
	Early Life Stages Absent			3.4
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	75	98	
	Early Life Stages Absent			76
	Monthly Average			
	Early Life Stages Present	30	39	
	Early Life Stages Absent			30

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from 04/01/2018 – 06/25/2024, with those results being compared to the calculated limits to determine the need to include ammonia limits in Silver Lake's permit for the respective month ranges. That need is determined by calculating 99th upper percentile (or P_{99}) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

Attachment #1

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	April	May	June - September	October	November - March
1-day P_{99}	14.6	3.65	35.6	22.8	27.5
4-day P_{99}	8.75	2.09	21.3	15.2	16.6
30-day P_{99}	3.69	0.91	9.00	6.37	6.99
Mean*	1.53	0.43	3.75	2.01	2.83
Std	3.66	0.86	8.87	6.74	6.95
Sample size	57	58	212	53	235
Range	<0.022 - 26.4	<0.022 - 4.6	<0.022 - 38.5	0.04 – 30.5	0.03 - 32.2

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

Based on this comparison, daily limits are required for April and June – March. The daily maximum limit for April and October is required due to data exceeding the calculated daily maximum limit although the 1-day P_{99} does not exceed the limit.

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

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

Expression of Limits

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

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

Whenever a daily maximum limitation is determined necessary to protect water quality, a weekly and monthly average limitation shall also be included in the permit and set equal to the daily maximum limit unless a more restrictive limit is already determined necessary to protect water quality. **Therefore, the weekly and monthly average limits for June – March are recommended to be set equal to the calculated daily maximum limit of 24 mg/L** because the current weekly and monthly limits are less restrictive.

Conclusions and Recommendations

In summary, after rounding to two significant figures, the following ammonia nitrogen limitations are recommended. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code. Additional limits to meet the requirements in s. NR 106.07, Wis. Adm Code, are shown below in bold.

Attachment #1

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
November – March	24	**24**	**24**
April	24	20	12
May		19	12
June – September	24	**24**	**24**
October	24	**24**	**24**

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

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

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

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

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

Effluent Data

Silver Lake has monitored effluent *E. coli* from 07/27/2022 – 06/26/2024 and a total of 31 results are available. A geometric mean of 126 counts/100 mL was exceeded in 2 out of the 8 months that have data, with a maximum monthly geometric mean of 144 counts/100 mL. Effluent data did not exceed 410 counts/100 mL. The maximum reported value was 272 counts/100 mL. Based on this effluent data it appears that the facility can meet new *E. coli* limits and a compliance schedule is not needed in the reissued permit.

PART 5 – PHOSPHORUS

Technology-Based Effluent Limit

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

Because Silver Lake currently has a limit of 1.0 mg/L, this limit should be included in the reissued permit. This limit remains applicable unless a more stringent WQBEL is given.

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

Total Maximum Daily Load (TMDL)
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 H of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Upper Fox and Wolf River Basins (UFW TMDL)* report dated February 2020 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 Upper Fox and Wolf River Basins 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:

TP Equivalent Effluent Concentration = WLA ÷ (365 days/yr * Flow Rate * Conversion Factor)
= 532 lbs/yr ÷ (365 days/yr * 1.025 MGD * 8.34)
= 0.17 mg/L

Since this value is less than 0.3 mg/L, both a six-month average mass limit and a monthly average mass limit are applicable for total phosphorus. The monthly average limit is set equal to three times the six-month average limit.

TP 6-Month Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (532 lbs/yr ÷ 365 days/yr) * 1.30
= 1.9 lbs/day

TP Monthly Average Permit Limit = TP 6-Month Average Permit Limit * 3
= 1.9 lbs/day * 3
= 5.7 lbs/day

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 0.8. 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 weekly; if a different monitoring frequency is used, the stated limits should be reevaluated.

Six-month average and monthly average mass effluent limits are recommended for this discharge. The limits are equivalent to a concentration of 0.22 mg/L and 0.66 mg/L, respectively, at the facility design flow of 1.025 MGD.

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

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

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from 04/01/2018 – 06/25/2024.

Total Phosphorus Effluent Data

	Phosphorus mg/L	Phosphorus lbs/day
1-day P_{99}	1.52	5.59
4-day P_{99}	0.90	3.20
30-day P_{99}	0.58	1.97
Mean	0.44	1.44
Std	0.30	1.11
Sample size	796	796
Range	0.11 - 2.71	0.30 – 8.7

An interim limit is needed when a compliance schedule is included in the permit to meet the TMDL limits. This limit should reflect a value which the facility is able to currently meet; however, it should also consider the receiving water quality, keeping the water from further impairment. **It's recommended that the current monthly average TBEL of 1.0 mg/L be continued as the interim limit and should be continued beyond the date the TMDL limits become effective.**

PART 6 – TOTAL SUSPENDED SOLIDS

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 Upper Fox and Wolf Basins (UFW TMDL)* report dated February 2020 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.

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

TSS Monthly Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (55,179 lbs/yr ÷ 365 days/yr) * 1.38
= 209 lbs/day

TSS Weekly Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (55,179 lbs/yr ÷ 365 days/yr) * 1.86
= 280 lbs/day

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 0.5. This is the standard deviation divided by the mean of mass data. 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 a concentration of 33 mg/L and 24 mg/L, respectively, at the facility design flow of 1.025 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 TSS monitoring data from 04/01/2018 – 06/25/2024.

TSS Effluent Data

	TSS mg/L	**TSS lbs/day**
1-day P_{99}	19.3	61.9
4-day P_{99}	12.2	38.7
30-day P_{99}	8.56	27.0
Mean*	6.86	21.5
Std	3.65	11.7
Sample size	979	979
Range	<2 – 28	0 – 89

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

Silver Lake can currently meet the TMDL-based TSS limits so a compliance schedule is not needed.

PART 7 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in chs. NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. Daily

maximum and weekly average temperature criteria are available for the 12 different months of the year depending on the receiving water classification.

Due to the amount of upstream flow available for dilution in the limit calculation (Qs:Qe >20:1), the lowest calculated limitation is 120° F (s. NR 106.55(6)(a), Wis. Adm. Code).

At temperatures above approximately 103° F, conventional biological treatment systems do not function properly and experience upsets. There is no indication that this has ever occurred in this treatment system. Therefore, there is no reasonable potential for the discharge to exceed this limit. No monitoring or effluent limits are recommended for temperature.

PART 8 – WHOLE EFFLUENT TOXICITY (WET)

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

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC_{50} (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC_{25} (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of **11%** shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

Q_e = annual average flow = 1.025 MGD = 1.586 cfs
f = fraction of the Q_e withdrawn from the receiving water = 0
Q_s = ¼ of the 7-Q_{10} = 51 cfs ÷ 4 = 13 cfs

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.
- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known

discharge. The specific receiving water location must be specified in the WPDES permit.

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

WET Data History

Date Test Initiated	Acute Results LC_{50} %				Chronic Results IC_{25} %				Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	*C. dubia*	Fathead Minnow	Pass or Fail?	Use in RP?	
05/13/1999	>100	>100	Pass	No	43		Pass	No	1
06/20/2000	>100	>100	Pass	No	>100	64.5	Pass	No	2

Footnotes:

1. *Qualified or Inconclusive Data.* Data quality concerns were noted during testing which calls into question the reliability of the test results.
2. *Data Not Representative.* Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005.

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

WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 11%. **0 Points**
Historical Data	0 tests used to calculate RP. **5 Points**	0 tests used to calculate RP. **5 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. **0 Points**	Same as Acute. **0 Points**
Receiving Water Classification	Warmwater sport fish. **5 Points**	Same as Acute. **5 Points**
Chemical-Specific Data	Reasonable potential for limits for ammonia based on ATC; Copper, lead, nickel, zinc, and	No reasonable potential for limits based on CTC; Ammonia nitrogen limit carried over from the current permit. Ammonia, copper, lead, nickel,

	Acute	Chronic
	chloride detected. Additional Compounds of Concern: None. **8 Points**	zinc, and chloride detected. Additional Compounds of Concern: None. **3 Points**
Additives	No additives used. **0 Points**	No additives used. **0 Points**
Discharge Category	1 Industrial Contributor. **0 Points**	Same as Acute. **0 Points**
Wastewater Treatment	Secondary treatment. **5 Points**	Same as Acute. **5 Points**
Downstream Impacts	No impacts known **0 Points**	Same as Acute. **0 Points**
Total Checklist Points:	**23 Points**	**18 Points**
Recommended Monitoring Frequency (from Checklist):	2 tests during permit term	No tests recommended.
Limit Required?	No	No
TRE Recommended? (from Checklist)	No	No

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, 2/permit term acute WET tests are recommended in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).

Attachment #2