Permit Fact Sheet

General Information

Permit Number	WI-0028291-11-0
Permittee Name and Address	Village of Union Grove 1015 State Street, Union Grove, WI 53182-1109
Permitted Facility Name and Address	Village of Union Grove 3710 67th Drive
Permit Term	October 01, 2026 to September 30, 2031
Discharge Location	West bank of the West Branch Root River Canal, approximately ¼ mile north of Mill Avenue. NE1/4, SE1/4, Section 29, T3N, R21E
Receiving Water	Root River Canal, West Branch in Root River Watershed of Southeast River Basin in Racine County
Stream Flow ($Q_{7,10}$)	0.03 cfs
Stream Classification	Limited Aquatic Life (LAL) from the outfall to Highway C. Limited Forage Fish (LFF) from Highway C for 2 miles to the Fonk Tributary. Warm Water Sport Fish (WWSF) downstream of Fonk Tributary.
Discharge Type	Existing, Continuous
Annual Average Design Flow (MGD)	2.0 MGD
Industrial or Commercial Contributors	Two Creek Farms LLC, Brothers Car Wash, The Laundry Station LLC, Southern Wisconsin Center
Plant Classification	A1 - Suspended Growth Processes; B - Solids Separation; C - Biological Solids/Sludges; P - Total Phosphorus; L - Laboratory; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The Village of Union Grove Wastewater Treatment Facility (WWTF) operates an extended aeration activated sludge plant, serving the residents of the Village of Union Grove and the Southern Wisconsin Center. Preliminary treatment consists of fine screening and grit removal. After preliminary treatment, wastewater flows to one of two oxidation ditches for biological treatment via extended aeration activated sludge. Poly Aluminum Chloride is dosed at the splitter structure before wastewater flows to one of two secondary clarifiers. Clarified effluent receives post-aeration before being discharged to the West Branch Root River Canal. There is a synthetically lined storm water holding area equipped for aeration and sampling, if necessary. Influent flows are diverted to the offline basin when flows are extremely high to avoid bypassing and/or plant upsets. This water is then routed to the headworks of the plant. Sludge generated from the treatment process is aerobically digested and thickened and stored in a holding tank onsite. Sludge is typically hauled to a permitted facility.

Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items, a site visit on July 31, 2024, and a desktop review on April 7, 2026, this facility has been found to be in substantial compliance with their current permit.

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	0.98 MGD (January 2020 – December 2025 Average)	Influent: 24-hr flow proportional composite samples shall be collected from the raw influent pipe after the influent pumps converge. Flow is monitored at the Parshall flume located in the screening building.
110	N/A	Field Blank: Collect total recoverable mercury field blanks at the same time and location as the mercury effluent sample using standard sample handling procedures.
001	0.96 MGD (January 2020 – December 2025 Average)	Effluent: 24-hr flow proportional composite samples shall be collected prior to the Parshall flume. Grab samples shall be collected post-aeration. Flow is monitored at the Parshall flume located prior to final aeration.
002	140 Dry U.S. tons (2024 Permit Application)	Aerobically digested, Gravity belt thickened, Liquid, Class B. Representative sludge samples shall be collected from the sludge storage tank after digestion and thickening.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 701- INFLUENT TO PLANT

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

Changes from Previous Permit:

Influent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit.

Flow: The sample frequency has changed from "Continuous" to "Daily" for eDMR reporting purposes.

BOD and TSS: The sample frequency for these parameters has changed to align with effluent monitoring.

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 Inplant - Monitoring and Limitations

2.1 Sample Point Number: 110- Effluent Mercury blank

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Mercury, Total Recoverable		ng/L	Quarterly	Blank	See Mercury Monitoring Permit section.

Changes from Previous Permit:

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

Explanation of Limits and Monitoring Requirements

Mercury Field Blank: Monitoring is included in the permit pursuant to s. NR 106.145, Wis. Adm. Code. Field blanks must meet the requirements under s. NR 106.145(9) and (10), Wis. Adm. Code. The permittee shall collect a mercury field blank for each set of mercury samples (a set of samples may include a combination of influent, effluent or other samples all collected on the same day). Field blanks are required to verify a sample has not been contaminated during collection, transportation or analysis.

3 Surface Water - Monitoring and Limitations

3.1 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	30 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	15 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids,	Weekly Avg	30 mg/L	3/Week	24-Hr Flow	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Total				Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
pH Field	Daily Min	6.0 su	Daily	Grab	
pH Field	Daily Max	9.0 su	Daily	Grab	
Dissolved Oxygen	Daily Min	4.0 mg/L	Daily	Grab	
E. coli	Geometric Mean - Monthly	126 #/100 ml	2/Week	Grab	Monitoring and limit effective May through September annually per the Effluent Limitations for E. coli Schedule.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Monitoring and limit effective May through September annually per the Effluent Limitations for E. coli Schedule. See the E. coli Percent Limit permit section. Enter the result in the DMR on the last day of the month.
Nitrogen, Ammonia Variable Limit		mg/L	3/Week	See Table	Look up the variable ammonia limit from the 'Variable Ammonia Limitation' permit table and report the variable limit in the Ammonia Variable Limit column on the eDMR.
Nitrogen, Ammonia (NH3-N) Total	Daily Max - Variable	mg/L	3/Week	24-Hr Flow Prop Comp	Report the daily maximum Ammonia result in the Nitrogen, Ammonia (NH3-N) Total column of the eDMR. See Ammonia Limitation Permit Section.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	31 mg/L	3/Week	24-Hr Flow Prop Comp	November - April
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	5.6 mg/L	3/Week	24-Hr Flow Prop Comp	May - October
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	12.5 mg/L	3/Week	24-Hr Flow Prop Comp	November - April

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	2.3 mg/L	3/Week	24-Hr Flow Prop Comp	May - October
Phosphorus, Total	Monthly Avg	0.66 mg/L	3/Week	24-Hr Flow Prop Comp	This is an interim limit. The final effluent limits will be 0.225 mg/L as a monthly average & 0.075 mg/L and 1.25 lbs/day as six-month averages per the phosphorus compliance schedule.
Nitrogen, Total Kjeldahl		mg/L	Quarterly	24-Hr Flow Prop Comp	
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hr Flow Prop Comp	
Nitrogen, Total		mg/L	Quarterly	Calculated	Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Chloride	Weekly Avg	560 mg/L	4/Month	24-Hr Flow Prop Comp	This is an interim limit. Sampling shall be conducted on four consecutive days one week per month. See the Chloride Variance - Implement Source Reduction Measures permit section and the Chloride SRM (Target Value) Schedule.
Chloride		lbs/day	4/Month	Calculated	Calculate the daily mass discharge of chloride in lbs/day on the same days chloride sampling occurs. Mass (lbs/day) = Concentration (mg/L) x Flow (MGD) x 8.34
Acute WET	Daily Max	1.0 TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Whole Effluent Toxicity (WET) Testing permit section.
Chronic WET	Monthly Avg	1.0 TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Whole Effluent Toxicity (WET) Testing

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					permit section.
Mercury, Total Recoverable		ng/L	Quarterly	Grab	Monitoring only. PMP efforts shall continue during the permit term to maintain effluent quality at or below current levels. See Mercury permit sections and schedule.
PFOS		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
PFOA		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.

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.

Disinfection & E. coli: At the end of the compliance schedule, disinfection requirements and E. coli limits of 126 #/100 ml as a monthly geometric mean that may not be exceeded and 410 #/100 ml as a daily maximum that may not be exceeded more than 10 percent of the time in any calendar month will apply. Monitoring is not required until the limit becomes effective at the end of the compliance schedule.

Ammonia: The daily maximum variable limit table in the permit section Variable Daily Maximum Ammonia Limitations has changed.

Mercury: The daily maximum limit has been removed from the permit.

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.

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 for Union Grove Village dated March 28, 2025, and updated October 22, 2025, prepared by Nicole Krueger, and used for this reissuance.

Disinfection & E. coli: Revisions to bacteria surface water quality criteria to protect recreational uses and accompanying E. coli WPDES permit implementation procedures became effective May 1, 2020.

Section NR 102.04(5)(a), Wis. Adm. Code, states that all surface waters shall be suitable for recreational use and meet the E. coli criteria established to protect this use. Section NR 102.04(5)(b), Wis. Adm. Code, states that exceptions to the disinfection requirement can be made if the department determines, in accordance with the procedures specified in s. NR 210.06(3), Wis. Adm. Code, that disinfection is not required to meet water quality criteria. As part of the reissuance process, the requirements for disinfection were reviewed under s. NR 210.06(3), Wis. Adm. Code.

It was determined that the permittee is required to disinfect, during the months of May – September. See WQBEL for further explanation.

Chlorine: If Union Grove Wastewater Treatment Facility decides to upgrade to use chlorination for disinfection, effluent limitation would be recommended to ensure proper operation of the de-chlorination system and would become effective May 01, 2031 with the E. coli limitations. See the WQBEL for limits and more information.

Ammonia: The previous permit included a variable daily maximum ammonia limit table based on the 2xATC method using LFF criteria. The WQBEL memo updated the calculation method to use dilution, rather than the 2xATC method, and the permit includes a variable daily maximum ammonia limit table based on LAL criteria for protection of the immediate receiving water. See the WQBEL for more information.

Mercury: The 30-day P_{99} of available data (0.90 ng/L) is less than the most stringent WQBEL of 1.3 ng/L, therefore no WQBEL for mercury is required in the permit. Quarterly monitoring for mercury is required in the permit. The permittee shall continue to implement mercury pollutant minimization measures to ensure effluent is maintained at or below current levels.

Chloride: The permittee has applied for a chloride variance, under the provisions of s. NR 106.83, Wis. Adm. Code, with its application for permit reissuance. The Department reviewed Union Grove's application for a chloride variance and the information supplied in the application supports the establishment of an interim effluent limit. The permittee and the Department have reached agreement on an interim chloride limit of 560 mg/L (expressed as a weekly average), a target value of 500 mg/L (weekly average), implementation of the chloride source reduction measures (SRMs) plan dated 5/27/2026, and submittal of annual progress reports each year by January 31st. The Department concludes that Union Grove is qualified for a variance from the water quality standard for chloride and proposes reissuance of this permit with the proposed variance.

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.

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 Village of Union Grove's sample frequencies were evaluated based on actual average flow of approximately 1 MGD. The WWTP was designed at 2 MGD, with plans to serve large areas of a nearby town, with a change in political boundaries, the WWTP will not see the loadings that were planned for within the permit term. The Village of Union Grove has good compliance history with little variability in the effluent. There were no effluent limit violations for BOD, TSS, Ammonia, and Phosphorus during the prior permit term. There have been no changes to the sample frequencies. Sample frequencies will be evaluated at each permit reissuance.

4 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	**Sludge Class (A or B)**	**Sludge Type (Liquid or Cake)**	**Pathogen Reduction Method**	**Vector Attraction Method**	**Reuse Option**	**Amount Reused/Disposed (Dry Tons/Year)**
002	B	Liquid	Aerobic Digestion	Injection	Hauled to Permitted Facility	140
Does sludge management demonstrate compliance? **Yes.**						
Is additional sludge storage required? **No.**						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? **Yes.** If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility						
Is a priority pollutant scan required? **No, design flow is less than 5 MGD.** 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.						

4.1 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	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
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	
Radium 226 Dry Wt		pCi/g	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2027.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2027.
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

Changes from Previous Permit:

Sludge limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit.

PCB: Limits have been included in the permit. The year in which PCB monitoring is required has been updated to 2027.

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

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). Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7) for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k). Radium requirements are addressed in s. NR 204.07(3)(n).

PFAS: The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA has developed a draft risk assessment to determine future land application rates and released this risk assessment in January of

2025. The department is evaluating this new information. Until a decision is made, the "Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS" should be followed.

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.

5 Schedules

5.1 Disinfection and Effluent Limitations for E. coli

The permittee shall install disinfection treatment and comply with surface water limitations for E. coli as specified. No later than 14 days following each compliance date, the permittee shall notify the Department in writing of its compliance or noncompliance.

Required Action	Due Date
Progress Report: The permittee shall submit a progress report on development and submittal of a facility plan for upgrades to meet disinfection requirements and E. coli limits.	06/30/2027
Submit Facility Plan: The permittee shall submit a Facility Plan per s. NR 110.09, Wis. Adm. Code for meeting disinfection requirements and complying with E. coli surface water limitations. The permittee may submit an abbreviated facility plan if the Department determines that the modifications are minor.	04/30/2028
Final Plans and Specifications: The permittee shall submit final construction plans to the Department for approval pursuant to ch. NR 108, Wis. Adm. Code, specifying treatment plant upgrades that must be constructed to meet disinfection requirements per s. NR 210.06(1), Wis. Adm Code, achieve compliance with final E. coli limitations, and a schedule for completing construction of the upgrades by the complete construction date specified below.	03/31/2029
Treatment Plant Upgrade to Meet Limitations: The permittee shall initiate bidding, procurement, and/or construction of the project. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41. Stats., prior to initiating activities defined as construction under ch. NR 108, Wis. Adm. Code. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications.	09/30/2029
Construction Upgrade Progress Report: The permittee shall submit a progress report on construction upgrades.	09/30/2030
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades.	03/31/2031
Achieve Compliance: The permittee shall achieve compliance with final E. coli limitations.	04/30/2031

Explanation of Schedule

A compliance schedule is included in the permit to provide time for the permittee to submit plans and specs and install disinfection treatment for meeting E. coli water quality-based effluent limits and disinfection requirements pursuant s. NR 210.06, Wis. Adm. Code.

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

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

Required Action	Due Date
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.	06/30/2027
Final Compliance Alternatives Plan: The permittee shall submit an updated final compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee's wastewater treatment is necessary to meet final phosphorus WQBELs, the submittal shall include a final engineering design report addressing the treatment plant upgrades, and a facility plan if required pursuant to ch. NR 110, Wis. Adm. Code. If the plan concludes Adaptive Management will be implemented, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 and an engineering report addressing any treatment system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the plan concludes water quality trading will be used, the submittal shall identify potential trading partners. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	04/30/2028
Final Plans and Specifications: Unless the permit has been modified, revoked and reissued, or reissued to include Adaptive Management or Water Quality Trading measures or to include a revised schedule based on factors in s. NR 217.17, Wis. Adm. Code, the permittee shall submit final construction plans to the Department for approval pursuant to s. 281.41, Stats., specifying treatment plant upgrades that must be constructed to achieve compliance with final phosphorus WQBELs, and a schedule for completing construction of the upgrades by the complete construction date specified below. (Note: Permit modification, revocation and reissuance, and reissuance are subject to s. 283.53(2), Stats.) Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	03/31/2029
Treatment Plant Upgrade to Meet WQBELs: The permittee shall initiate construction of the upgrades. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41. Stats. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	09/30/2029
Construction Upgrade Progress Report: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	09/30/2030
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface	09/30/2031

Water section of this permit.	
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.	10/01/2031

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 limit within the permit term. As part of the compliance schedule the permittee is required to submit a Final Compliance Alternatives Plan to select a preferred compliance option for meeting final phosphorus WQBELs.

Assuming that facility upgrades will be made to comply with the final phosphorus WQBELs, the last steps of the phosphorus compliance schedule are to: submit final plans and specifications for construction, initiate construction, submit construction progress reports, and, finally, complete construction and comply with final phosphorus WQBELs. If an alternative compliance option is selected such as water quality trading or adaptive management, the compliance schedule will be amended to reflect these compliance options through either permit reissuance or permit modification.

It is probable that, in order to consistently comply with the water quality based effluent limits, Union Grove will need to evaluate and implement any number of the following approaches:

- Plant optimization;
- Phosphorus source reduction;
- Pilot testing of new or additional treatment processes;
- Additional treatment processes;
- Multiple treatment processes;
- Obtaining financing for construction; or
- Potential for adaptive management and/or pollutant trading with upstream contributors, and implementation of such trades.

The Department believes that the compliance schedule suggested in the permit provides the appropriate length of time for the permittee to evaluate these options, implement the chosen option, and meet the final phosphorus limits (WQBELs).

5.3 Chloride Source Reduction Measures (Target Value)

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

Required Action	Due Date
Annual Chloride Progress Report: Submit an annual chloride progress report related to the source reduction activities for the previous year. The annual chloride progress report shall: Indicate which chloride source reduction measures or activities in the Source Reduction Plan have been implemented and state which, if any, source reduction measures from the Source Reduction Plan were not pursued and why. Include an assessment of whether each implemented source reduction measure appears to be effective or ineffective at reducing pollutant discharge concentrations and identify actions planned for the upcoming year;	01/31/2027

Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data; and Include an analysis of how effluent chloride varies with time and with significant loadings of chloride. Note that the interim limitation listed in the Surface Water section of this permit remains enforceable until new enforceable limits are established in the next permit issuance. The first annual chloride progress report is to be submitted by the Date Due.	
Annual Chloride Progress Report #2: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.	01/31/2028
Annual Chloride Progress Report #3: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.	01/31/2029
Annual Chloride Progress Report #4: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.	01/31/2030
Final Chloride Report: Submit the final chloride report documenting the success in meeting the chloride target value of 500 mg/L (weekly average), as well as the anticipated future reduction in chloride sources and chloride effluent concentrations. The report shall: Summarize chloride source reduction measures that have been implemented during the current permit term and state which, if any, source reduction measures from the Source Reduction Plan were not pursued and why; Include an assessment of which source reduction measures appear to have been effective or ineffective. Evaluate any needed changes to the pollutant reduction strategy accordingly; Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data during the current permit term; and Include an analysis of how influent and effluent chloride varies with time and with significant loadings of chloride as identified in the source reduction plan. If the permittee intends to reapply for a chloride variance, for the reissued permit, proposed target limits and a detailed source reduction measures plan, outlining the source reduction activities proposed for the upcoming permit term, shall also be included per ss. NR 106.90 (5) and NR 106.83 (4), Wis. Adm. Code. An updated source reduction measures plan shall: Include an explanation of why or how each source reduction measure will result in reduced discharge of the target pollutant; and Evaluate any available information on pollutant sources, timing, and concentration to update the mass balance assumptions and expected sources of the pollutant, and Identify any information needs that would help to better determine pollutant sources and make plans to collect that information. Note that the target value is the benchmark for evaluating the effectiveness of the chloride source reduction measures but is not an enforceable limitation under the terms of this permit.	01/31/2031
Annual Chloride Reports After Permit Expiration: In the event that this permit is not reissued by the date the permit expires the permittee shall continue to submit annual chloride reports for the previous year following the due date of Annual Chloride Progress Reports listed above. Annual Chloride Progress Reports shall include the information as defined above.	

Explanation of Schedule

This schedule is required to ensure that the permittee maintains compliance with the conditions and requirements of receiving a variance from the water quality-based chloride effluent limits. Since a compliance schedule is being granted, an interim limit is required, and that limit is established as 560 mg/L (as a weekly average). The schedule requires that annual reports shall indicate which source reduction measures have been implemented during each calendar year, and an analysis of chloride concentration and mass discharge data based on chloride sampling and flow data. The annual reports shall document progress made towards meeting the chloride target value of 500 mg/L (weekly average) by the end of the permit term.

5.4 Mercury Pollutant Minimization Program

Required Action	Due Date
Mercury Report: Submit a report summarizing the mercury pollutant minimization measures implemented during the current permit term and the success in maintaining effluent quality at or below the current concentrations. The report shall include an analysis of trends in quarterly and annual average mercury concentrations and total mass discharge of mercury based on mercury sampling and flow data covering the current permit term. The report shall also include analysis of how influent and effluent mercury varies with time and with significant loadings of mercury such as loads from industries or collection system maintenance.	03/31/2031

Explanation of Schedule

The permittee shall continue to maintain effluent quality at or below the current effluent concentrations, continue to implement the mercury pollutant minimization program, and perform the actions listed in the schedule.

5.5 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
Report on Effluent Discharge: Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.	09/30/2027
Report on Effluent Discharge and Evaluation of Need: Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results. The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan. If the department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for department approval no later than 90 days after written notification was sent from the department. The department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan	09/30/2028

reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued. If, however, the department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.	

Explanation of Schedule

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

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

5.6 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. 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. The plan is due sixty (60) days prior to land applying.	

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.

Attachments

Water Quality Based Effluent Limits dated March 28, 2025, updated October 22, 2025

Village of Union Grove Chloride Source Reduction Measures (SRM) Plan dated May 27, 2026

Chloride Variance EPA Data Sheet

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance.

Prepared By: BetsyJo Howe, Wastewater Specialist **Date:** 6/1/2026

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 03/28/2025 – updated 10/22/2025 for phosphorus interim limit

TO: Sarah Donoughe – SER

FROM: Nicole Krueger – SER Nicole Krueger

SUBJECT: Water Quality-Based Effluent Limitations for Union Grove Village
WPDES Permit No. WI-0028291-11

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from Union Grove Village in Racine County. This municipal wastewater treatment facility (WWTF) discharges to the West Branch Root River Canal, located in the Root River Watershed in the Root-Pike River Basin. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD_5			30 mg/L	15 mg/L		1
TSS			30 mg/L	20 mg/L		1
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		4.0 mg/L				1
Bacteria						3
Final Limit *E. coli*				126 #/100 mL geometric mean		
Ammonia Nitrogen May – October November – April	 Variable Variable		 5.6 mg/L 31 mg/L	 2.3 mg/L 12.5 mg/L		4
Phosphorus Interim Final				 0.66 mg/L 0.225 mg/L	 0.075 mg/L 1.25 lbs/day	5
TKN, Nitrate+Nitrite, and Total Nitrogen						6
Chloride			400 mg/L			7
Acute WET	1.0 TUa					8,9
Chronic WET				1.0 TUc		8,9
Mercury						10
PFOS and PFOA						11
Chlorine	19 µg/L		7.3 µg/L	**7.3 µg/L**		12,13

Footnotes:

1. No changes from the current permit.
2. Monitoring only.

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3. Bacteria limits apply during the disinfection season of May through September. Additional limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
4. 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. These limits apply year-round.

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
6.0 ≤ pH ≤ 6.1	84	7.0 < pH ≤ 7.1	51	8.0 < pH ≤ 8.1	11
6.1 < pH ≤ 6.2	83	7.1 < pH ≤ 7.2	46	8.1 < pH ≤ 8.2	8.9
6.2 < pH ≤ 6.3	81	7.2 < pH ≤ 7.3	41	8.2 < pH ≤ 8.3	7.3
6.3 < pH ≤ 6.4	78	7.3 < pH ≤ 7.4	36	8.3 < pH ≤ 8.4	6.0
6.4 < pH ≤ 6.5	76	7.4 < pH ≤ 7.5	31	8.4 < pH ≤ 8.5	5.0
6.5 < pH ≤ 6.6	73	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	2.9
6.8 < pH ≤ 6.9	61	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	2.1

5. The end of pipe phosphorus limit of 0.66 mg/L shall continue in the reissued permit as an interim limit.
6. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, quarterly total nitrogen monitoring is recommended for all municipal major permittees. Total Nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total kjeldahl nitrogen (TKN) (all expressed as N).
7. This is the WQBEL for chloride. An alternative effluent limitation of 560 mg/L (equal to the current interim limit) as a weekly average may be included in the permit in place of this limit if the chloride variance application that was submitted is approved by EPA. If the variance is not approved, a wet weather mass limit would also be required.
8. Annual acute and chronic WET testing is recommended. The Instream Waste Concentration (IWC) to assess chronic test results is 100%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 75%, 50%, 25% & 12.5% and the dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from West Branch Root River, upstream of the discharge.
9. 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).
10. Quarterly monitoring and PMP efforts are recommended to continue during the reissued permit term to maintain effluent quality at or below current levels.
11. Monitoring is required in accordance with s. NR 106.98(2), Wis. Adm. Code at a frequency of once/every two-months.
12. 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.
13. Chlorine limits shall only be effective if/when Union Grove chlorinates.

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

Attachments (3) – Narrative, Map & 2004 Ammonia Limits Calculations

PREPARED BY: Nicole Krueger, Water Resources Engineer – SER

E-cc: Jacob Van Susteren – Wedesky, Wastewater Engineer – SER
Bryan Hartsook, Regional Wastewater Supervisor – SER
Diane Figiel, Water Resources Engineer – WY/3
Nate Willis, Wastewater Engineer – WY/3

Attachment #1

Water Quality-Based Effluent Limitations for
Union Grove Village

WPDES Permit No. WI-0028291-11

Prepared by: Nicole Krueger

PART 1 – BACKGROUND INFORMATION

Facility Description

The Village of Union Grove owns and operates a 2.0 million gallons per day (MGD) extended aeration activated sludge wastewater treatment facility located within the village. The plant serves approximately 5,100 people, including residents of the Village of Union Grove and the Southern Wisconsin Center.

The treatment process begins with preliminary treatment, including fine screening and grit removal. This is followed by two oxidation ditches and two secondary clarifiers. Poly Aluminum chloride (PAC) is added in the mixed liquor suspended solids diverter box—just before secondary clarification—for phosphorus removal. The treated effluent is then discharged into the West Branch Root River Canal.

The facility also includes a synthetically lined stormwater holding area, which is equipped for aeration and sampling when needed. During periods of extremely high flow, influent is diverted to this offline basin to prevent bypassing or upsetting the treatment process.

Waste activated sludge is digested and further processed using gravity belt thickeners, reaching an average solids content of 3.7%. The resulting sludge is presently taken off site via a contracted hauler to another permitted facility, Pats Services, Inc. Approximately 140 dry US tons of sludge are generated annually.

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

Existing Permit Limitations

The current permit, expiring on June 30, 2025, 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			30 mg/L	15 mg/L		2,3
TSS			30 mg/L	20 mg/L		2,3
pH	9.0 s.u.	6.0 s.u.				2
Dissolved Oxygen		4.0 mg/L				2,3
Ammonia Nitrogen May – October November – April	 Variable Variable		 5.6 mg/L 31 mg/L	 2.3 mg/L 12.5 mg/L		4
Phosphorus MDV Interim s. 217.13 WQBEL				 0.66 mg/L 0.225 mg/L	 0.075 mg/L 1.25 lbs/day	

Attachment #1

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
TKN, Nitrate+Nitrite, and Total Nitrogen						1
Chloride			560 mg/L			5
Acute WET	1.0 TUa					6
Chronic WET				1.0 TUc		6
Mercury	5.7 ng/L					5

Footnotes:

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

Effluent pH (s.u.)	NH_3-N Limit (mg/L)	Effluent pH (s.u.)	NH_3-N Limit (mg/L)	Effluent pH (s.u.)	NH_3-N Limit (mg/L)
$6.0 < pH \leq 6.1$	108	$7.0 < pH \leq 7.1$	66	$8.0 < pH \leq 8.1$	14
$6.1 < pH \leq 6.2$	106	$7.1 < pH \leq 7.2$	59	$8.1 < pH \leq 8.2$	11
$6.2 < pH \leq 6.3$	104	$7.2 < pH \leq 7.3$	52	$8.2 < pH \leq 8.3$	9.4
$6.3 < pH \leq 6.4$	101	$7.3 < pH \leq 7.4$	46	$8.3 < pH \leq 8.4$	7.8
$6.4 < pH \leq 6.5$	98	$7.4 < pH \leq 7.5$	40	$8.4 < pH \leq 8.5$	6.4
$6.5 < pH \leq 6.6$	94	$7.5 < pH \leq 7.6$	34	$8.5 < pH \leq 8.6$	5.3
$6.6 < pH \leq 6.7$	89	$7.6 < pH \leq 7.7$	29	$8.6 < pH \leq 8.7$	4.4
$6.7 < pH \leq 6.8$	84	$7.7 < pH \leq 7.8$	24	$8.7 < pH \leq 8.8$	3.7
$6.8 < pH \leq 6.9$	78	$7.8 < pH \leq 7.9$	20	$8.8 < pH \leq 8.9$	3.1
$6.9 < pH \leq 7.0$	72	$7.9 < pH \leq 8.0$	17	$8.9 < pH \leq 9.0$	2.6

5. This is an interim variance limit.
6. Acute and chronic WET tests are required annually.

Receiving Water Information

- Name: West Branch Root River Canal
- Waterbody Identification Code (WBIC): 4500
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Limited aquatic life (LAL) from the outfall to Highway C (approximately 3 miles). At this point, the receiving water is classified as limited forage fish (LFF) for 2 miles to the Fonk Tributary. At this point, the water is classified as a warm water sport fish (WWSF) community. These are all non-public water supply waters. 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 for Station RT22 at Two Mile Road, where Outfall 001 is located.
  LAL classification
  7-Q_{10} = 0.03 cfs (cubic feet per second)

7-Q_2 = 0.08 cfs
90-Q_{10} = 0.07 cfs
Harmonic Mean Flow = 0.35 cfs

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).

LFF (at County Highway C, approximately 3 miles downstream of Outfall 001)
7-Q_{10} = 0.04 cfs
7-Q_2 = 0.16 cfs

WWSF (at State Highway 20, approximately 5 miles downstream of Outfall 001)
7-Q_{10} = 0.09 cfs
7-Q_2 = 0.32 cfs

- Hardness = 409 mg/L as $CaCO_3$. This value represents the geometric mean of data from chronic WET testing from 07/25/2017 – 05/17/2022.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from the West Branch Root River Canal, upstream of Union Grove's outfall (Station ID #523135) is used for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: None.
- Impaired water status: The West Branch Root River Canal approximately 5 miles downstream is 303(d) listed as impaired for total phosphorus and total suspended solids.

Effluent Information

- Design flow rate(s):
  Annual average = 2.0 MGD (Million Gallons per Day)
  Peak daily = 5.5 MGD
  Peak weekly = 4.1 MGD
  Peak monthly = 3.0 MGD

  For reference, the actual average flow from 01/01/2020 – 12/31/2024 was 1.0 MGD.

- Hardness = 347 mg/L as $CaCO_3$. This value represents the geometric mean of data from the permit application from 08/19/2024 – 12/27/2024.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Wastewater source: Domestic wastewater with zero industrial contributors.
- Water supply: Municipality waterworks and private wells.
- Additives: Poly aluminum chloride (PAC)
- Effluent characterization: This facility is categorized as a major municipal, so the permit application required effluent sample analyses for all the "priority pollutants" except for the Dioxins and Furans as specified in s. NR 200.065, Table 1, Wis. Adm. Code. The permit-required monitoring for chloride,

phosphorus, ammonia, and mercury is used in this evaluation.

- 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
08/16/2024	<1.9	12/30/2024	2.9	01/10/2025	3.4
12/21/2024	2.3	01/01/2025	3.2	01/13/2025	2.6
12/24/2024	2.1	01/04/2025	2.3	01/16/2025	2.3
12/27/2024	2.3	01/07/2025	2.4		
Average = 2.58 µg/L					

"<" means that the pollutant was not detected at the indicated level of detection. The mean concentration was calculated using zero in place of the non-detected results.

Effluent Data

	Chloride mg/L	Mercury ng/L
1-day P_{99}	755	1.90
4-day P_{99}	574	1.23
30-day P_{99}	477	0.89
Mean	426	0.73
Std	113	0.35
Sample size	246	21
Range	133 – 680	0.28 – 1.8

The following table presents the average concentrations and loadings at Outfall 001 from 01/01/2020 – 01/31/2025 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter Averages with Limits

	Average Measurement	Average Mass Discharged
BOD_5	1.6 mg/L*	
TSS	3.1 mg/L*	
Dissolved Oxygen	11 mg/L	
pH field	7.6 s.u.	
Phosphorus	0.23 mg/L	
Ammonia Nitrogen	0.16 mg/L*	
Chloride	426 mg/L	3587 lbs/day
Mercury	0.73 ng/L	

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

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

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

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P_{99}) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q_{10}

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

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

Where:

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

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

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

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

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q_{10} method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is the case for Union Grove.

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0.02 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.
Chlorine		19.0		19.2	3.84			
Arsenic		340		342	68.5	<0.28		
Cadmium	374	131		121	24.2	<0.15		

Attachment #1

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.
Chromium	301	4446	2	4480	896	<1.0		
Copper	374	53.9	3	50.6	10.1	2.58		
Lead	356	365	1.5	358	71.7	<0.24		
Mercury (ng/L)		830		830			1.9	1.8
Nickel	268	1080		1089	218	1.8		
Zinc	333	345		347	69.5	<10.3		
Chloride (mg/L)		757	79.3	762			757	680

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

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

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 0.0075 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}
Chlorine		7.28		7.30			
Arsenic		152		153	30.5	<0.28	
Cadmium	175	3.82		3.83	0.77	<0.15	
Chromium	301	326	2	327	65.3	<1.0	
Copper	409	34.6	3	34.6	6.93	2.58	
Lead	356	95.5	1.5	95.7	19.1	<0.24	
Mercury (ng/L)		440		440			1.2
Nickel	268	169		169	33.9	1.80	
Zinc	333	345		346	69.1	<10.3	
Chloride (mg/L)		395	79.3	396			574

* 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)

RECEIVING WATER FLOW = 0.02 cfs (¼ of the 90-Q_{10}), as specified in s. NR 106.06(4), Wis. Adm. Code

SUBSTANCE	WC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Mercury (ng/L)	1.3		1.3			0.89

Monthly Average Limits based on Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 0.0875 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

Attachment #1

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Cadmium	880		905	181	<0.15	
Chromium (+3)	8400000	2	8637515	1727503	<1.0	
Lead	2240	1.5	2303	461	<0.24	
Mercury (ng/L)	1.5		1.5			0.89
Nickel	110000		113110	22622	1.8	

Monthly Average Limits based on Human Cancer Criteria (HCC)
RECEIVING WATER FLOW = 0.0875 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	40		41.1	8.23	<0.28

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

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

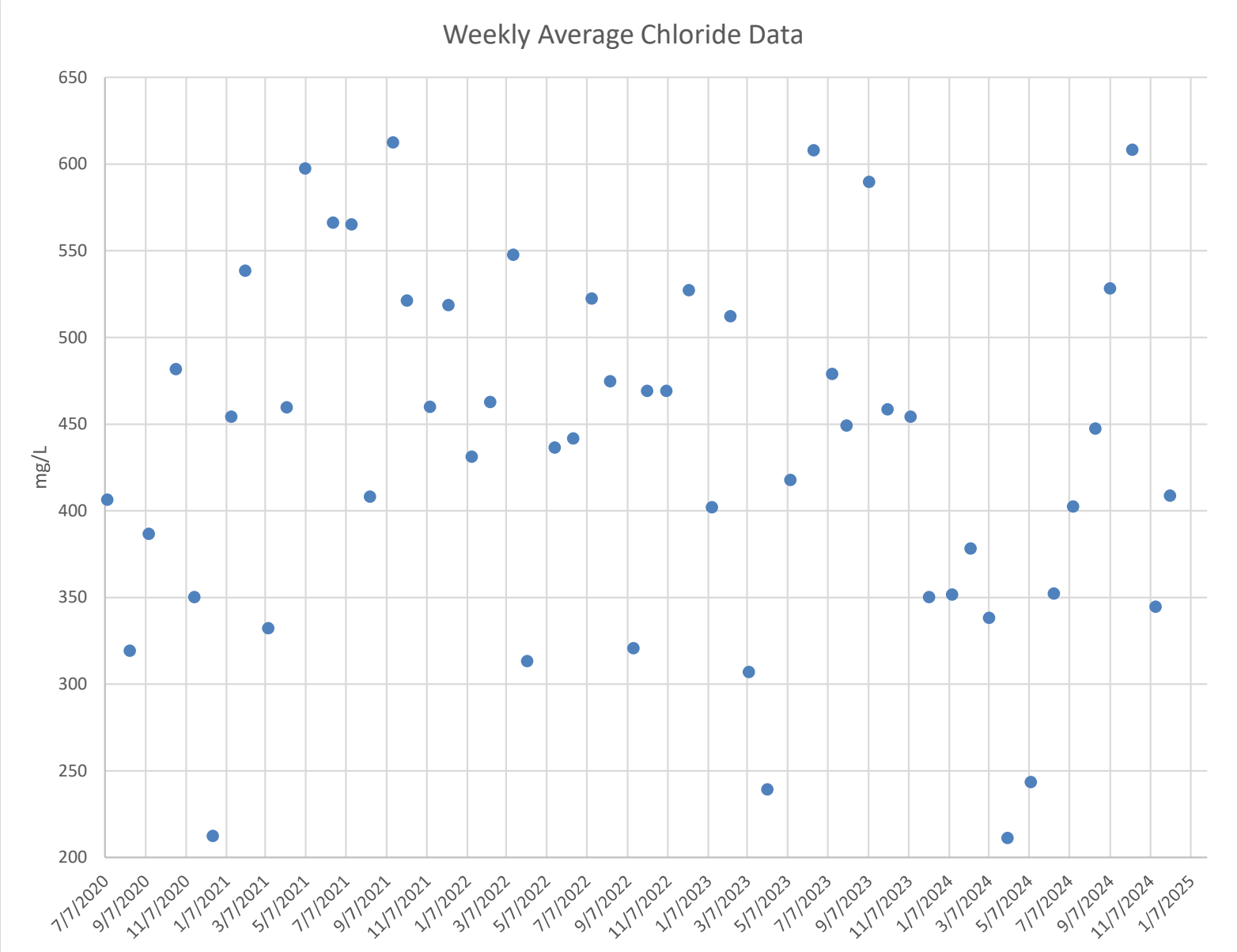
Chloride – Considering available effluent data from the current permit term (01/07/2020 – 12/06/2024), the 1-day P_{99} chloride concentration is 757 mg/L, and the 4-day P_{99} of effluent data is 574 mg/L.

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

However, Subchapter VII of ch. NR 106, Wis. Adm. Code, provides for a variance from water quality standards for this substance, and Union Grove has requested such a variance. That variance may be granted subject to the following conditions:
1) The permit shall include an "Interim" limitation intended to prevent an increase in the discharge of Chloride;
2) The permit shall specify "Source Reduction Measures" to be implemented during the permit term, with periodic progress reports; and
3) The permit shall include a "Target Limit" or "Target Value" to gage the effectiveness of the Source Reduction Measures, and progress toward the WQBELs.

Interim Limit for Chloride
Section NR 106.82(9), Wis. Adm. Code, defines a "Weekly average interim limitation" as either the 4-day P_{99} concentration or 105% of the highest weekly average concentration of the representative data.

Ideally, the effluent chloride concentration at facilities with variances will trend downward as time goes on as a result of source reduction measures, and the recalculated interim limit will decline until the plant can meet the WQBEL. Unfortunately, effluent concentrations at Union Grove have increased in the past few years (the 4-day P_{99} from 01/07/2020 – 01/29/2025 is higher than the current interim limit). The following graph shows the weekly average effluent data from the current permit term:



Although the 4-day P_{99} effluent chloride concentrations at Union Grove are higher than the current interim limit of 560 mg/L, the Department does not find it appropriate to increase the interim concentration limit in the reissued permit because it would be counterproductive to meeting the final WQBEL. **Therefore, the current weekly average interim chloride limit of 560 mg/L is recommended for permit reissuance per NR 106.82(9), Wis. Adm. Code** if a variance is approved.

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

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

In the absence of a variance, Union Grove would be subject to the WQBEL of 400 mg/L as a weekly average (rounded); the weekly average mass limit of 6,600 lbs/day (396 mg/L × 2.0 MGD × 8.34); and an alternative wet weather mass limit.

Mercury – The WQBEL for total recoverable mercury is set equal to the most stringent criterion of 1.3 ng/L, according to s. NR 106.06(6), Wis. Adm. Code, because the background concentration in the receiving water and similar inland streams is known to exceed 1.3 ng/L.

The current permit requires monthly monitoring of the influent and effluent for total recoverable mercury. A total of 20 effluent sampling results are available from 01/09/2020 – 11/12/2024 for total recoverable mercury. The average concentration was 0.73 ng/L, and the maximum was 1.8 ng/L. Because the 30-day P_{99} of available data (0.90 ng/L) is less than the most stringent WQBEL of 1.3 ng/L, **no WQBEL for mercury is required for permit reissuance. Mercury monitoring is recommended for permit reissuance.**

Antidegradation and Antibacksliding
Since current treatment capability and PMP/SRM measures are expected to remain in place, the removal of the daily maximum mercury variance limit will not increase the concentration, level, or loading of mercury to the West Branch Root River Canal. Therefore, antidegradation would not be applicable. To be consistent with antibacksliding requirements, the current limit may be removed in accordance with s. NR 207.12(4)(b), Wis. Adm. Code.

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 effluent flow rate, **PFOS and PFOA monitoring is recommended at a once every two months frequency.**

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

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

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

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

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

Where:

A = 0.633 and B = 90.0 for Limited Aquatic Life, and
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 1827 sample results were reported from 01/01/2020 – 12/31/2024. The maximum reported value was 8.1 s.u. (Standard pH Units). The effluent pH was 7.9 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 7.9 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 7.9 s.u. Therefore, a value of 7.9 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 7.9 s.u. into the equation above yields an ATC = 16 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 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	31
1-Q_{10}	16

The 1-Q_{10} method yields the most stringent limits Union Grove. The current permit has variable daily maximum effluent limits based on effluent pH. Presented below is a table of daily maximum limitations corresponding to various effluent pH values.

Daily Maximum Ammonia Nitrogen Limits – LAL

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
$6.0 \leq pH \leq 6.1$	84	$7.0 < pH \leq 7.1$	51	$8.0 < pH \leq 8.1$	11
$6.1 < pH \leq 6.2$	83	$7.1 < pH \leq 7.2$	46	$8.1 < pH \leq 8.2$	8.9
$6.2 < pH \leq 6.3$	81	$7.2 < pH \leq 7.3$	41	$8.2 < pH \leq 8.3$	7.3
$6.3 < pH \leq 6.4$	78	$7.3 < pH \leq 7.4$	36	$8.3 < pH \leq 8.4$	6.0
$6.4 < pH \leq 6.5$	76	$7.4 < pH \leq 7.5$	31	$8.4 < pH \leq 8.5$	5.0
$6.5 < pH \leq 6.6$	73	$7.5 < pH \leq 7.6$	26	$8.5 < pH \leq 8.6$	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	2.9
6.8 < pH ≤ 6.9	61	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	2.1

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)
The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do not change because there have been no changes in the effluent and receiving water flow rates. The calculations from the 2004 WQBEL memo (current limits) are shown in Attachment #3.

Effluent Data
The following table evaluates the statistics based upon ammonia data reported from 01/01/2020 – 12/31/2024, with those results being compared to the calculated limits to determine the need to include ammonia limits in Union Grove's permit for the respective month ranges. That need is determined by calculating 99th upper percentile (or P_{99}) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	May – October	November – April
1-day P_{99}	0.97	4.33
4-day P_{99}	0.48	2.08
30-day P_{99}	0.16	0.88
Mean*	0.03	0.28
Std	0.68	1.65
Sample size	543	534
Range	<0.271 - 3.27	<0.271 - 6.59

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

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

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

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

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
May – October	Variable	5.6	2.3
November – April	Variable	31	12.5

Attachment #1

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

Section NR 102.04(5), Wis. Adm. Code, states that all surface waters shall be suitable for supporting recreational use and shall meet *E. coli* criteria during the recreation season. Section NR 102.04(5)(b), Wis. Adm. Code, allows the Department to make exceptions when it determines, in accordance with s. NR 210.06(3), Wis. Adm. Code, that wastewater disinfection is not required to meet E. coli limits and protect the recreational use. Section NR 210.06(3), Wis. Adm. Code, tasks the Department with determining the need for disinfection using a site-specific analysis based on potential risk to human or animal health. It sets out the factors that must be considered in determining the necessity to disinfect municipal wastewater or to change the length of the disinfection season.

Union Grove had previously been exempted from disinfection based on the limited aquatic life or limited forage fish community of the receiving water. Section NR 210.06(3)(g), Wis. Adm. Code, states that disinfection decisions may be made based on the hydrologic classifications listed in s. NR 104.02(1), Wis. Adm. Code (**not** on the water quality classifications - i.e., limited forage fish, limited aquatic life - that are defined in s. NR 104.02(3), Wis. Adm. Code). The West Branch Root River Canal is considered noncontinuous.

Discharges to noncontinuous streams with $Q_{7,10}$ values < 0.1 cfs usually result in effluent-dominated situations. As noted above, the risk of illness is related to the concentration of *E. coli* and therefore dilution is an important consideration when considering risk to human health. Since little to no dilution is present in these situations, disinfection should not be exempted based solely on this hydrological classification.

The Department has considered the information required by s. NR 210.06(3), Wis. Adm. Code, and has determined that the discharge cannot meet bacteria limits without disinfection. 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.

These limits are required during May through September. The permit will include a compliance schedule to meet these limits.

Total Residual Chlorine – **If Union Grove decides to upgrade to use chlorination for disinfection, effluent limitations would be recommended to assure proper operation of the de-chlorination system.** Section NR 210.06(2)(b), Wis. Adm. Code, states, "When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L." Because the WQBELs are more restrictive, they are recommended instead. Specifically, **a daily maximum limit of 19 µg/L would be required if Union Grove decides to use chlorination for disinfection.** Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required. The calculated **weekly average effluent limitation of 7.3 µg/L would also be included in the permit because it is more restrictive than the daily maximum limit.**

Sections NR 106.07(3) and NR 205.067(7), Wis. Adm. Code require WPDES permits contain weekly average and monthly average limitations for municipal dischargers whenever practicable and necessary to protect water quality. **Therefore, a weekly average and monthly average limit of 7.3 µg/L would also be required** to meet expression of limits requirements in addition to the daily max limit.

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 Union Grove currently has a limit of 0.66 mg/L, **this limit should be included in the reissued permit.** This limit remains applicable unless a more stringent WQBEL is given.

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 limited aquatic life 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 limited aquatic life waters. The Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges (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 discharge location of the wastewater from the outfall is classified as limited aquatic life downstream from the point of discharge downstream to County Highway C. The West Branch Root River Canal at this location is classified for limited forage fish (LFF) uses.

At the LFF classification at County Highway C, it's assumed that the phosphorus loading from Union Grove is approximately 22% of the total annual load from point and nonpoint sources based on the Pollutant Load Ratio Estimation Tool (PRESTO) which is a statewide GIS-based tool. Therefore, phosphorus limits are needed to be protective of the downstream LFF classification.

Section NR 102.06(3)(a), Wis. Adm. Code, specifically names river segments for which a phosphorus criterion of 0.100 mg/L applies. For other stream segments that are not specified in s. NR 102.06(3)(a), Wis. Adm. Code, s. NR 102.06(3)(b), Wis. Adm. Code, specifies a phosphorus criterion of 0.075 mg/L. The phosphorus criterion of 0.075 mg/L applies for the West Branch Root River Canal at County Highway C.

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

Limitation = [(WQC)(Qs+(1-f) Qe) – (Qs-f Qe) (Cs)]/Qe

Where:

WQC = 0.075 mg/L for the West Branch Root River Canal
Qs = 100% of the 7-Q_2 of 0.16 cfs
Cs = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code
Qe = effluent flow rate = 2.0 MGD = 3.09 cfs
f = the fraction of effluent withdrawn from the receiving water = 0

Section NR 217.13(2)(d), Wis. Adm. Code, specifies that the background phosphorus concentration used in the limit calculation formula shall be calculated as a median using the procedures specified in s. NR 102.07(1)(b) to (c), Wis. Code. A previous evaluation resulted in a WQBEL of 0.075 mg/L using a background concentration of greater than 0.075 mg/L. Section NR 217.13(2)(d), Wis. Adm. Code, states that the determination of upstream concentrations shall be evaluated at each permit reissuance. Additional data were considered in estimating the background phosphorus concentration.

A review of all available in stream total phosphorus data from 07/31/1996 – 10/30/1996 (n=5) stored in the Surface Water Integrated Monitoring System database indicates the median background total phosphorus concentration in the West Branch Root River Canal upstream of Union Grove's outfall (SWIMS Station ID 523135) is 0.175 mg/L.

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

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from 01/03/2020 – 01/27/2025.

Total Phosphorus Effluent Data

	Phosphorus mg/L
1-day P_{99}	0.60
4-day P_{99}	0.39
30-day P_{99}	0.28
Mean	0.23
Std	0.11
Sample size	814
Range	0.01 - 0.889

Reasonable Potential Determination

The calculated WQBEL of 0.075 mg/L is less than the current monthly average limit of 0.66 mg/L, so the WQBEL must be included in the permit per s. NR 217.15(2), Wis. Adm. Code.

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

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

Mass Limits
A mass limit is also required, pursuant to s. NR 217.14(1)(a), Wis. Adm. Code, because the discharge is to a surface water that is to or upstream of a phosphorus-impaired water. **This final mass limit shall be 0.075 mg/L × 8.34 × 2.0 MGD = 1.25 lbs/day expressed as a six-month average.**

Interim Limit
An interim limit is required per s. NR 217.17, Wis. Adm. Code, 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 that the interim limit be set equal to 0.66 mg/L for permit reissuance along with requirements for optimization of phosphorus removal.** This is equal to the current interim limit.

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

PART 6 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in 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 hydrologic classification is not listed as wetland or wastewater effluent channel in ch. NR 104, Wis. Adm. Code.

Reasonable Potential

Based on the available discharge temperature data from 01/01/2011 – 12/31/2011 shown below, the maximum daily effluent temperature reported was 73 °F; therefore, no reasonable potential for exceeding the daily maximum limit exists, and **no limits or monitoring are recommended**.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	50	51	-	86
FEB	49	51	-	86
MAR	50	51	-	86
APR	54	55	-	86
MAY	59	61	-	86
JUN	65	67	-	86
JUL	70	72	-	86
AUG	71	72	-	86
SEP	69	73	-	86
OCT	67	68	-	86
NOV	62	63	-	86
DEC	57	59	-	86

PART 7 – WHOLE EFFLUENT TOXICITY (WET)

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

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

following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

Q_e = annual average flow = 2.0 MGD = 3.1 cfs
f = fraction of the Q_e withdrawn from the receiving water = 0
Q_s = ¼ of the 7-Q_{10} = 0.03 cfs ÷ 4 = 0.0075 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. Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005. Data collected before July 1, 2005 has been excluded from this evaluation.

WET Data History

Date Test Initiated	Acute Results LC_{50} %				Chronic Results IC_{25} %					Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	*C. dubia*	Fathead Minnow	Algae (IC_{50})	Pass or Fail?	Use in RP?	
04/25/2006	>100	>100	Pass	Yes	>100	>100		Pass	Yes	
07/26/2007	>100	>100	Pass	Yes	>100	>100		Pass	Yes	
11/11/2008	>100	>100	Pass	No	>100	>100		Pass	No	1
02/10/2009	>100	>100	Pass	No	>100	>100		Pass	No	1
08/13/2013	>100	>100	Pass	Yes	85.6	>100		Fail	Yes	
09/24/2013					>100	>100		Pass	Yes	
09/16/2014					>100	>100		Pass	Yes	
11/04/2014	>100	>100	Pass	Yes	52.9	>100		Fail	Yes	
06/23/2015	>100	74.1	Fail	Yes	>100	74.8		Fail	Yes	
04/12/2016	>100	>100	Pass	Yes	>100	>100		Pass	Yes	
07/25/2017	>100	>100	Pass	Yes	>100	>100		Pass	Yes	
11/17/2020	>100	>100	Pass	Yes	>100	>100		Pass	Yes	
02/02/2021	>100	>100	Pass	Yes	>100	>100		Pass	Yes	
05/17/2022	>100	>100	Pass	Yes	98.9	>100		Pass	Yes	
08/01/2023	>100	>100	Pass	Yes	>100	>100		Pass	Yes	
12/03/2024	>100	>100	Pass	Yes	81.0	>100		Fail	Yes	
01/28/2025					>100	>100		Pass	Yes	

Attachment #1

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	Algae (IC_{50})	Pass or Fail?	Use in RP?	
02/18/2025					>100	>100		Pass	Yes	

Footnotes:

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

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

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

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

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

Acute WET Limit Parameters

TUa (maximum) $100/LC_{50}$	**B** (multiplication factor from s. NR 106.08(5)(c), Wis. Adm. Code, Table 4)
100/74.1= 1.35	6.2 Based on 1 detect

[(TUa effluent) (B)] = 8.37 > 1.0

Chronic Reasonable Potential = [(TU_c effluent) (B)(IWC)]

Chronic WET Limit Parameters

TUc (maximum) $100/IC_{25}$	**B** (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
100/52.9 = 1.89	2.3 Based on 5 detects	100%

[(TUc effluent) (B)(IWC)] = 4.3 > 1.0

Therefore, reasonable potential is shown for acute and chronic WET limits using the procedures in s. NR 106.08(6) and representative data from 04/25/2006 – 02/18/2025.

Expression of WET limits

Acute WET limit = 1.0 TU_a expressed as a daily maximum

Chronic WET limit = [100/IWC] TU_c = 1.0 TU_c expressed as a monthly average

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

WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 100%. **15 Points**
Historical Data	12 tests used to calculate RP. 1 test failed. **0 Points**	16 tests used to calculate RP. 4 tests failed. **0 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. **0 Points**	Same as Acute. **0 Points**
Receiving Water Classification	Warmwater sport fish. **5 Points**	Same as Acute. **5 Points**
Chemical-Specific Data	No reasonable potential for limits based on ATC; Ammonia nitrogen limit carried over from the current permit. Ammonia, copper, mercury, nickel, and chloride detected. Additional Compounds of Concern: None. **3 Points**	Reasonable potential for limits for chloride based on CTC; Ammonia nitrogen limit carried over from the current permit. Ammonia, copper, mercury, and nickel detected. Additional Compounds of Concern: None. **8 Points**
Additives	0 Biocides and 1 Water Quality Conditioner added. Permittee has proper P chemical SOPs in place: Yes **1 Point**	All additives used more than once per 4 days. **1 Point**
Discharge Category	0 Industrial Contributors. **0 Points**	Same as Acute. **0 Points**
Wastewater	Secondary or Better	Same as Acute.

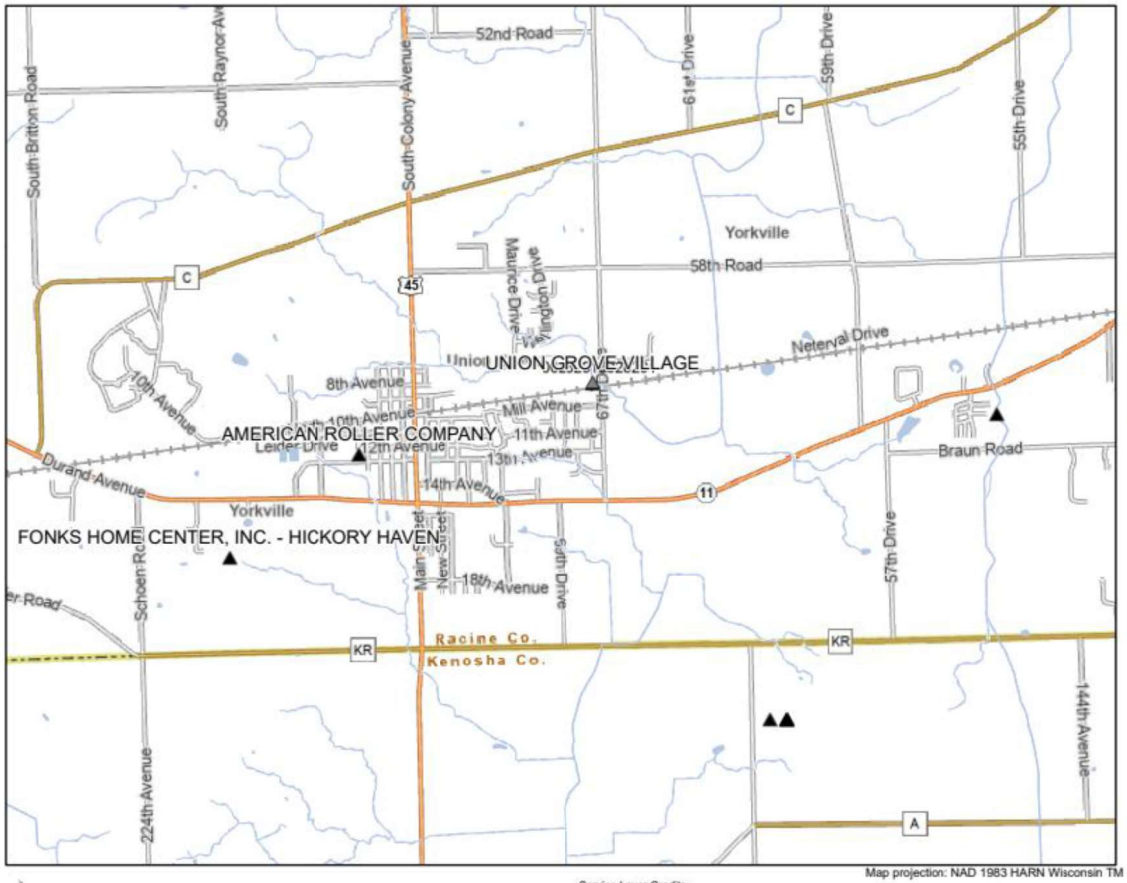
Attachment #1

	Acute	Chronic
Treatment	**0 Points**	**0 Points**
Downstream Impacts	No impacts known **0 Points**	Same as Acute. **0 Points**
Total Checklist Points:	**9 Points**	**29 Points**
Recommended Monitoring Frequency (from Checklist):	1x yearly	1x yearly
Limit Required?	Yes Limit = 1.0 TU_a	Yes Limit = 1.0 TU_c
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, 1x annually acute and chronic WET tests are recommended in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).
- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, acute and chronic WET limits are required. The acute WET limit shall be expressed as 1.0 TUa as a daily maximum in the effluent limits table of the permit. The chronic WET limit shall be expressed as 1.0 TUc as a monthly average in the effluent limits table of the permit.
- A minimum of annual acute and chronic monitoring is required because acute and chronic WET limits are required. Federal regulations in 40 CFR Part 122.44(i) require that monitoring occur at least once per year when a limit is present.
- A minimum of annual acute and chronic monitoring is recommended because Union Grove is a major municipal discharger with a design flow greater than 1.0 MGD. Federal regulations at 40 CFR Part 122.21(j) require at least 4 acute and chronic WET tests with each permit application on samples collected since the previous reissuance. Therefore, annual monitoring is recommended in the permit term, so that data will be available for the next permit application.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Union Grove WWTF Discharge Location



Legend: (some map layers may not be displayed)

Current Variances

- CI
- Surface Water Outfalls
- 24K Streams and Rivers
- 24K Lakes and Open Water
- Intermittent Streams
- Rivers and Streams
- Intermittent Streams
- Open Water

Latest Leaf Off Imagery

- Red: Band_1
- Green: Band_2
- Blue: Band_3

Notes:

Not to scale

Service Layer Credits:
Latest Leaf Off Imagery: , Basic Basemap (Cached): , WPDES Outfall Variances: WDNR, Water Division, Lynn Singletary

This map is a product generated by a DNR web mapping application.

This map is for informational purposes only and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. The user is solely responsible for verifying the accuracy of information before using for any purpose. By using this product for any purpose user agrees to be bound by all disclaimers found here: https://dnr.wisconsin.gov/legal.

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Attachment #3

2004 Ammonia Limits Calculations

Ammonia: Changes for effluent limitations for ammonia are proposed to conform to changes to NR 105 and 106 of the Wisconsin Administrative Code, which updated ammonia criteria and procedures for determining effluent limitations. These changes became effective on March 1st, 2004. The proposed effluent limitations were also evaluated to consider the increased design flow of the Union Grove wastewater plant (from 1.0 MGD to 2.0 MGD, annual average).

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

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

Receiving Water Temperature:
April-October = 23 degrees C.
November-March = 3 degrees C.

Receiving Water pH:
April-October = 8.21 std. units
November-March = 7.97 std. units

Background Ammonia Levels:
April-October = 0.07 mg/L
November-March = 0.25 mg/L

(based on typical data for SE Wisconsin streams.)

CHLORIDE SOURCE REDUCTION ACTION PLAN

FACILITY NAME: VILLAGE OF UNION GROVE
WPDES PERMIT NUMBER: WI-0028291-10-0

Background and Summary

This report includes specific chloride reduction measures for the upcoming WPDES Permit reissuance. The intent of this report is to outline yearly goals in education, monitoring, and data collection to reduce chloride discharge at the permitted site and to formulate a plan to correct existing conditions if the Village observes higher chloride concentrations (or salt usage) at an individual site as compared to the effluent at the permitted site. Each site may have a different corrective action plan; each site should be included in the yearly report to the WDNR. The yearly report by the Village will help the WDNR determine if the yearly goals are being met. The report also provides a target limit based on historical trends and source reduction recommendations for the permit term.

Specific Source Reduction Measures

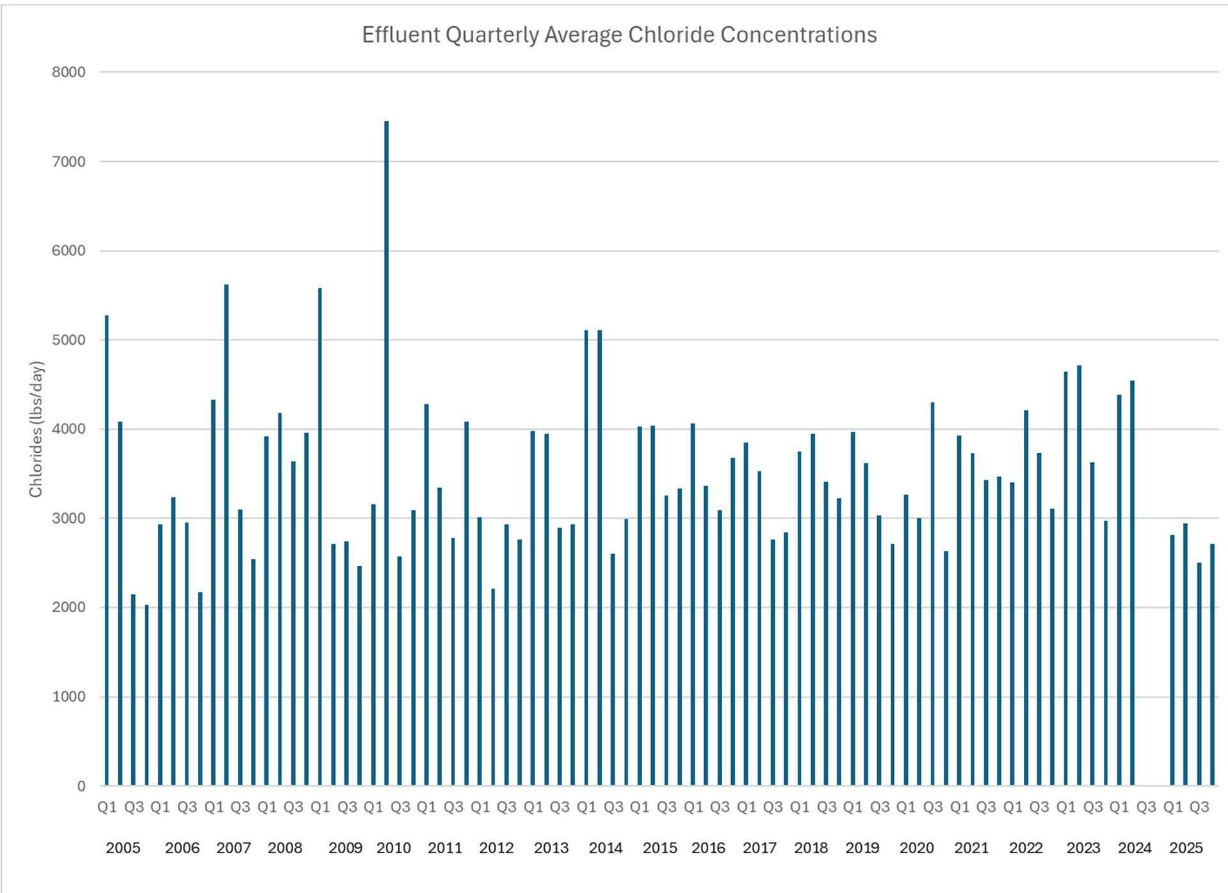
The Village plans on doing the following activities; see the timeline in Table 1.

- Develop public education materials (website, newsletter, utility bill) about chloride reduction from residential and commercial softeners and during winter operations.
- Conduct yearly visits at the Southern Wisconsin Center (SWC), Merideth Culligan, and the two schools to observe, review, and document operations.
- Survey the softeners of individual commercial and residential customers during meter and sump pump inspections to determine the number of water softeners that remain and evaluate whether the contribution from this source is significant and review it with the sewer committee.
- Develop a list of possible high chloride contributors, determine if each is a significant source (as compared to the effluent of the permitted site) of chloride, and assist these customers in lowering chloride with public education efforts.
- Evaluate the performance of the drinking water plants serving the SWC and the Village. The collected data should include the number of units that are being regenerated at each facility and how many pounds of salt are used. Provide a yearly report summarizing the collected data.
- Collect samples for chloride at the discharge of the Southern Wisconsin Center during the 4-day sampling at the WWTP. Also collect samples for chloride from the Maple Grove Sewage Lift Station during the 4-day event at least once per year; this drainage basin does not have a water plant discharge and was constructed after 2005; this should provide an estimate for a minimum threshold level for chloride and a possible future goal.

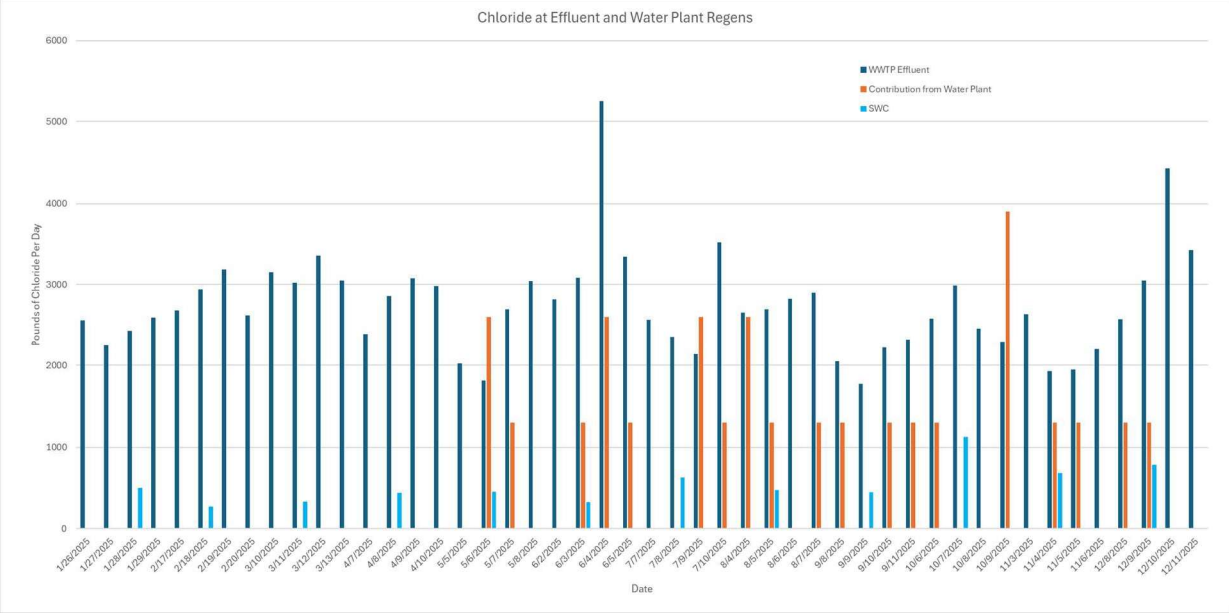
- Replace manholes frames with each street replacement project. The planned projects include more than 70 manholes in the next 5 years and include segments of 13th Avenue, 15th Avenue, and High Street.

Trend Analysis

- See the snip below showing the effluent chloride loading at the permit location in pounds per day over the period between 2005 and 2025. The municipal softening facilities went online before 2010 at the time that residential softeners were common in every house in the Village.
- Since 2010 the Village has been educating the homeowners about disconnecting the softeners; the current loading appears to be reduced from the period prior to year 2010 by about 1000 pounds per day.



- The snip below is for year 2025 and includes estimated contributions from both the Village water plants and the measured loading from the sewage from Southern Wisconsin Center (SWC). The data shows that the SWC is typically 20-30 percent of the total loading and the Village softening plants account for about 40 percent of the total loading. Weekly averages from the permitted location ranged from 298 mg/L to 600 mg/L with only three weekly averages over the target value of 500mg/L and only one over the limit of 560 mg/L



Source Reduction For Permit Term

- The Village should continue the effort of converting home water conditioning to non-chloride discharges in addition to minimizing winter salt operations. They should work with Culligan, who also works with the schools to offer technologies to prevent chloride discharges.

Chloride Target Limit

- The recommended target limit is 500 mg/L.
- The 560 mg/L limit is already an issue during dry weather.

Table 1 - Village of Union Grove Chloride SRM Action Plan

for 2026-2030 WPDES permit reissuance

SRM Initiative	Permit Year 1	Permit Year 2	Permit Year 3	Permit Year 4	Permit Year 5
Education					
Develop and Review Eduction Materials and Maintain Website, including winter salting	Research and Develop Materials	Research and Develop Materials	Review Materials with Governing Body and Make Availalble	Review Options to Eliminate Chloride Softeners	Determine Feasibility of Elimination of Chloride Softeners
Southern Wisconsin Center - Annual	Visit, Educate, and Review with Governing Body	Visit, Educate, and Review with Governing Body	Visit, Educate, and Review with Governing Body	Visit, Educate, and Review with Governing Body	Visit, Educate, and Review with Governing Body
Schools - Annual	Visit, Educate, and Review with Governing Body	Visit, Educate, and Review with Governing Body	Visit, Educate, and Review with Governing Body	Visit, Educate, and Review with Governing Body	Visit, Educate, and Review with Governing Body
Water Softener Survey	Collect Data	Collect Data	Evaluate Reduction	Review with Governing Body	Review with Governing Body
Water Bill - Annual	Refer to Education Materials	Refer to Education Materials	Refer to Education Materials	Refer to Education Materials	Refer to Education Materials
High Chloride Loading Customers	Develop a List of Suspected High Chloride Companies	Meet with Each to Collect Data	Provide Alternate Solutions to Chloride	Review Material with Governing Body	Assist Companies as Needed
Monitoring					
Maple Grove Lift Station Service Area	Annual Samples during WWTP Sampling	Annual Samples during WWTP Sampling	Annual Samples during WWTP Sampling	Annual Samples during WWTP Sampling	Annual Samples during WWTP Sampling
Village Drinking Water Plants	Monthly Salt Usage	Monthly Salt Usage	Monthly Salt Usage	Monthly Salt Usage	Monthly Salt Usage
Southern Wisconsin Center (SWC)	Quarterly WW Samples and Yearly Salt Use	Quarterly WW Samples and Yearly Salt Use	Quarterly WW Samples and Yearly Salt Use	Quarterly WW Samples and Yearly Salt Use	Quarterly WW Samples and Yearly Salt Use
Village Wastewater Plant	Quarterly Samples with SWC	Quarterly Samples with SWC	Quarterly Samples with SWC	Quarterly Samples with SWC	Quarterly Samples with SWC
Inflow & Infiltration					
Rehabilitate approximately 70 manholes on identified street rehabilitation projects	Project design and permitting	High Street and 8th and 9th, west of High Street	15th Avenue	15th Avenue	13th Ave--York to High Street
Road Salt/De-icing Activities	Evaluate Saltwise and other organizations	Attend Training	Attend Training and Become Member	Develop BMPs and Review with Governing Body	Evaluate BMP Performance
Data Collection					
Evaluate Chloride Reduction and WTP Optimization	Yearly Report	Yearly Report	Yearly Report	Yearly Report	Yearly Report
Refine mass balance based on the collected samples and information.	Yearly Report	Yearly Report	Yearly Report	Yearly Report	Yearly Report

Facility Specific Chloride Variance Data Sheet

Directions: Please complete this form electronically. Record information in the space provided. Select checkboxes by double clicking on them. Do not delete or alter any fields. For citations, include page number and section if applicable. Please ensure that all data requested are included and as complete as possible. Attach additional sheets if needed.

Section I: General Information

A. Name of Permittee: Village of Union Grove

B. Facility Name: Village of Union Grove WWTF

C. Submitted by: Wisconsin Department of Natural Resources

D. State: Wisconsin **Substance:** Chloride **Date completed:** June 1, 2026

E. Permit #: WI-0028291-11-0 **WQSTS #:** (EPA USE ONLY)

F. Duration of Variance **Start Date:** October 1, 2026 **End Date:** September 30, 2031

G. Date of Variance Application: September 26, 2024

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

I. Description of proposed variance:
The Village of Union Grove WWTF (Union Grove) discharges to the Root River Canal, in the West Branch of the Root River Watershed in the Southeast River Basin, in Racine County. The proposed variance for chloride is from the water quality-based effluent limit (WQBEL) of 400 mg/L expressed as a weekly average. The proposed permit includes an interim limit of 560 mg/L expressed as a weekly average, a target value of 500 mg/L (weekly average), and the requirement to implement source reduction measures (SRMs). The term of the proposed variance is five years, concurrent with the term of the proposed WPDES permit. The underlying designated uses and criteria of Wisconsin's chloride water quality standards (WQS) will be retained, and all other applicable WQS will remain in effect with adoption of the proposed variance.

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

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

Name	Email	Phone	Contribution
Betsyjo Howe	Betsyjo.howe@wisconsin.gov	608-419-4155	Permit Drafter/Variance Coordinator
Jacob Van Susteren-Wedesky	jacob.vansusterenwedesky@wisconsin.gov	414-239-1480	Compliance Staff
Nicole Krueger	Nicole.Krueger@wisconsin.gov	414-897-5750	Limit Calculator
Others?			

Section II: Criteria and Variance Information

A. Water Quality Standard from which variance is sought: 400 mg/L (chloride-chronic toxicity criteria)

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

C. Source of Substance: Primarily from winter road salt application, home water softeners and village water supply softening.

D. Ambient Substance Concentration: 79.3 mg/L ☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

E. **If measured or estimated, what was the basis? Include citation.** Background chloride data was collected from the West Branch Root River Canal upstream of Union Grove from 07/31/1996 – 10/30/1996.

F. Average effluent discharge rate: 2.0 MGD (annual average design flow) **Maximum effluent discharge rate:** 5.5 MGD (peak daily design flow)

G. Effluent Substance Concentration: 1-day P99 = 755 mg/L
4-day P99 = 574 mg/L
☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

30-day P99 = 477 mg/L

H. If measured or estimated, what was the basis? Include Citation. Permit-required monitoring and effluent data from 1/1/2020 to 1/31/2025.

I. Type of HAC:
- ☐ **Type 1: HAC reflects waterbody/receiving water conditions**
- ☐ **Type 2: HAC reflects achievable effluent conditions**
- ☒ **Type 3: HAC reflects current effluent conditions**

J. Statement of HAC: The Department has determined the highest attainable condition of the receiving water is achieved through the application of the variance limit in the permit, combined with a permit requirement that the permittee implement its Chloride SRM plan. Thus, the HAC at commencement of this variance is 560 mg/L, which reflects the greatest chloride reduction achievable with the current treatment processes, in conjunction with the implementation of the permittee's Chloride SRM plan. The current effluent condition is reflective of on-site optimization measures that have already occurred. This HAC determination is based on the economic feasibility of available compliance options for the Union Grove WWTF at this time (see Economic Section below). The permittee may seek to renew this variance in the subsequent reissuance of this permit; the Department will reevaluate the HAC in its review of such a request. A subsequent HAC cannot be defined as less stringent than this HAC.

K. Variance Limit: 560 mg/L as a weekly average

L. Level currently achievable (LCA): 560 mg/L as a weekly average

M. What data were used to calculate the LCA, and how was the LCA derived? (*Immediate compliance with LCA is required.)*

Ideally, the effluent chloride concentration at facilities with variances will trend downward as time goes on as a result of source reduction measures, and the recalculated interim limit will decline until the facility can meet the WQBEL. However, the 4-day P99 effluent chloride concentration from January 2020 through January 2025 (574 mg/L) is higher than the current interim limit of 560 mg/L. The Department does not find it appropriate to increase the interim concentration limit in the reissued permit because it would be counterproductive to meeting the final WQBEL. Therefore, the current weekly average interim chloride limit of 560 mg/L represents the LCA.

N. Explain the basis used to determine the variance limit (which must be ≤ LCA). Include citation.

As stated above, the 4-day P99 effluent chloride concentration from January 2020 through January 2025 (574 mg/L) is higher than the current interim limit of 560 mg/L. Therefore, the HAC should be set equal to the LCA.

Chapter NR 106, Subchapter VII, Wis. Adm. Code, allows for a variance, the imposition of a less restrictive interim limit, a compliance schedule that stresses source reduction and public education, and allowance for a target value or limit to be a goal for reduction.

O. Select all factors applicable as the basis for the variance provided under 40 CFR 131.10(g). Summarize justification below: ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☒ **6**

The use of a reverse osmosis system was evaluated. The cost of the system was estimated to an average cost per household that would result in a MHI of 7.82%. Installing centralized lime softening on the current municipal water supply system was also evaluated, and the estimated cost of doing so would be about 4.34% of the MHI. Without a variance, meeting the water quality standard of 400 mg/L would result in substantial and widespread economic and social impacts.

Section III: Location Information

A. Counties in which water quality is potentially impacted: Racine

B. Receiving waterbody at discharge point: West Branch Root River Canal

C. Flows into which stream/river? Root River Canal **How many miles downstream?** 9

D. Coordinates of discharge point (UTM or Lat/Long): 42.68984°N, 88.03326°W

E. What is the distance from the point of discharge to the point downstream where the concentration of the substance falls to less than or equal to the chronic criterion of the substance for aquatic life protection?
16 miles

F. Provide the equation used to calculate that distance *(Include definitions of all variables, identify the values used for the clarification, and include citation):*
(interim limit in mg/L x effluent design flow in cfs) + (background concentration mg/L x background stream flow in cfs)) / (effluent design flow in cfs + background stream flow in cfs) = ≤ 395 mg/L.

The West Branch Root River Canal flows about ten miles before meeting the East Branch, which then flows approximately six miles before reaching the Root River just north of the Milwaukee/Racine County line. The annual 7-Q10 of the Root River at the mouth of the Canal is 2.4 cfs. After mixing with 100% of the Root River flow at 7-Q10 conditions, and assuming the chloride concentration is 79.3 mg/L (background concentration for the immediate receiving water), the estimated instream mixed chloride concentration would be 350 mg/L.

G. What are the designated uses associated with the direct receiving waterbody, and the designated uses for any downstream waterbodies until the water quality standard is met?
Limited Aquatic Life (LAL) community from the outfall for approximately 3 miles downstream where the classification is Limited Forage Fish (LFF) community for 2 miles to the Fonk Tributary. At the Fonk Tributary the classification is Warm Water Sport Fish (WWSF) community. These are all non-public water supply waters and recreational use.

H. Identify all other variance permittees for the same substance which discharge to the same stream, river, or waterbody in a location where the effects of the combined variances would have an additive effect on the waterbody: None.

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

I. Please attach a map, photographs, or a simple schematic showing the location of the discharge point as well as all variances for the substance currently draining to this waterbody on a separate sheet
See the "Union Grove – Variance Outfall(s)" map.

J. Is the receiving waterbody on the CWA 303(d) list? If yes, please list the impairments below. ☒ **Yes** ☐ **No** ☐ **Unknown**

River Mile	Pollutant	Impairment
0-4.43	Sediment/Total Suspended Solids	Low DO
0-4.43	Total Phosphorus	Low DO

***K.* Please list any contributors to the POTW in the following categories:**
May need to contact facility for this information

Food processors (cheese, vegetables, meat, pickles, soy sauce, etc.)	**Two Creek Farms LLC**
Metal Plating/Metal Finishing	**N/A**
Car Washes	**Brothers Car Wash**
Municipal Maintenance Sheds (salt storage, truck washing, etc.)	**Village of Union Grove Public Works Department**
Laundromats	**The Laundry Station LLC**
Other presumed commercial or industrial chloride contributors to the POTW	**Southern Wisconsin Center;** **Union Grove Waterworks**

L. If the POTW does not have a DNR-approved pretreatment program, is a sewer use ordinance enacted to address the chloride contributions from the industrial and commercial users? If so, please describe.

The facility is too small to have a local pretreatment authority, as the design flow is less than 5 MGD. There are currently no significant industrial users discharging to the treatment plant.

Section 106-166 Use of Public Sewers lists prohibited and limited discharges of wastes to the public sewer system. Specifically, 106-166(c)(6)(j) of the ordinance limits discharges which contain "incompatible pollutants containing substances which are not amendable to treatment or reduction by the wastewater treatment processes employed or are amendable to treatment only to such degree that the wastewater treatment plant effluent cannot meet the requirements of other agencies having jurisdiction over the discharge to the receiving waters".

Section IV: Pretreatment (complete this section only for POTWs with DNR-Approved Pretreatment Programs. See w:\Variances\Templates and Guidance\Pretreatment Programs.docx)

A. Are there any industrial users contributing chloride to the POTW? If so, please list.
N/A

B. Are all industrial users in compliance with local pretreatment limits for chloride? If not, please include a list of industrial users that are not complying with local limits and include any relevant correspondence between the POTW and the industry (NOVs, industrial SRM updates and timeframe, etc)
N/A

C. When were local pretreatment limits for chloride last calculated?
N/A

D. Please provide information on specific SRM activities that will be implemented during the permit term to reduce the industry's discharge of the variance pollutant to the POTW
N/A

Section V: Public Notice

A. Has a public notice been given for this proposed variance? ☒ Yes ☐ No

B. If yes, was a public hearing held as well? ☒ Yes ☐ No ☐ N/A

C. What type of notice was given?
☒ Notice of variance included in notice for permit ☐ Separate notice of variance

D. Date of public notice: June 9, 2026 **Date of hearing:** July 28, 2026

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

Section VI: Human Health

A. Is the receiving water designated as a Public Water Supply? ☐ Yes ☒ No

B. Applicable criteria affected by variance: No human health criteria for chloride

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

Section VII: Aquatic Life and Environmental Impact

A. Aquatic life use designation of receiving water: Limited Aquatic Life 3 miles, Limited Forage Fish 2 miles, Warm Water Sport Fish

B. Applicable criteria affected by variance: Chronic toxicity criteria for chloride = 395 mg/L from NR 105, Wis. Adm. Code, applicable in all Wisconsin waters.

C. Identify any environmental impacts to aquatic life expected to occur with this variance, and include any citations:
After 100% mixing, the instream chloride concentration is 555 mg/L which is greater than the genus mean chronic value for Ceriodaphnia (417 mg/L).

D. List any Endangered or Threatened species known or likely to occur within the affected area, and include any citations:

There are no Endangered or Threatened species known that would affect the water quality criterion, as the chronic toxicity criterion for chloride is more stringent than all genus mean chronic values for organisms with chloride toxicity data. As a result, no endangered species with data would need more protection than already provided by the existing criterion.

Citation: U.S. Fish & Wildlife Service – Environmental Conservation Online System (http://www.fws.gov/endangered/) and National Heritage Index (http://dnr.wi.gov/topic/nhi/)

Section VIII: Economic Impact and Feasibility

A. Describe the permittee's current pollutant control technology in the treatment process: The Village of Union Grove Wastewater Treatment Facility (WWTF) operates an extended aeration activated sludge plant, serving the residents of the Village of Union Grove and the Southern Wisconsin Center. Preliminary treatment consists of fine screening and grit removal. After preliminary treatment, wastewater flows to one of two oxidation ditches for biological treatment via extended aeration activated sludge. Poly Aluminum Chloride is dosed at the splitter structure before wastewater flows to one of two secondary clarifiers. Clarified effluent receives post-aeration before being discharged to the West Branch Root River Canal. There is a synthetically lined storm water holding area equipped for aeration and sampling, if necessary. Influent flows are diverted to the offline basin when flows are extremely high to avoid bypassing and/or plant upsets. This water is then routed to the headworks of the plant. Sludge generated from the treatment process is aerobically digested and thickened and stored in a holding tank onsite. Sludge is typically hauled to a permitted facility.

B. What modifications would be necessary to comply with the current limits? Include any citations.

Upgrades to the WWTF to install reverse osmosis (RO) would be needed to comply with the WQBEL of 400 mg/L.

Another option would be to upgrade the drinking water treatment plants by switching to salt free softening, RO, or adding brine reclamation to the softener backwash. Adding brine reclamation to the softener backwash has been determined to not be economically feasible for the Village. Department drinking water staff have indicated the current softeners are not designed to reuse or accept backwash and would therefore require new water softeners and a system to accommodate backwash reuse. The Village is currently making loan payments for the installation of the current softeners. Based on the current loan repayment schedule and the projected life cycle of the current softeners, replacement of the current municipal softeners would likely not be feasible for 8 to 20 years.

C. How long would it take to implement these changes?

A time determination was not completed due to the infeasibility of treatment for chlorides.

D. Estimate the capital cost *(Citation)***:** $2,250,000 for RO treatment *(WDNR Form 3400-193 Chloride Variance Application from permittee)*

E. Estimate additional O & M cost *(Citation)***:** $730,000 for RO treatment *(WDNR Form 3400-193 Chloride Variance Application from permittee)*

F. Estimate the impact of treatment on the effluent substance concentration, and include any citations:

Reverse osmosis can remove up to 95% of chlorides from water (statement from Axeon Water Technologies). This level of removal would help the facility to consistently meet the WQBEL of 400 mg/L. Treatment for chlorides at the plant without a RO system would have little impact. Proper implementation of SRMs is anticipated to reduce the current effluent chloride concentrations by 10%. In order to meet the final water quality-based effluent limit of 400 mg/L the current effluent concentration would need to be reduced by 42%.

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

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

from RO. These include air pollution impacts from trucking brine and increased chloride impacts at the point where brine is discharged.

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

Reverse Osmosis treatment of the Village of Union Grove effluent to meet the WQBEL is not economically feasible. See WDNR Variance Application and Municipal RO Screening Tool for costs of reverse osmosis. Use of reverse osmosis at the WWTF was evaluated; the resulting total cost for sewer user rates was estimated to result in an average cost to households that would be 7.82% of the MHI. An increase of this magnitude would cause substantial and widespread adverse social and economic impacts in the area where the discharge is located.

Union Grove distributes municipal water supply to 1,825 households. There are 76 households that are on private well water. The cost of providing service hookups for the remaining customers and installing regional lime softening was evaluated using the lime softening screener for public water supply systems. The total cost of hookup and infrastructure would be $4,109 per household, which is 4.34% of the MHI.

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

J. If yes, what prevents this from being done? Include any citations.

See Section VIII:H. The costs associated with RO and lime softening treatment are prohibitively expensive.

K. List any alternatives to current practices that have been considered, and why they have been rejected as a course of action, including any citations:

Reverse Osmosis (RO) Treatment – not economically feasible (7.82% of the MHI)
Centralized Lime Softening Treatment – not economically feasible (4.34% of the MHI)

Section IX: Compliance with Water Quality Standards

A. Describe all activities that have been, and are being, conducted to reduce the discharge of the substance into the receiving stream. This may include existing treatments and controls, consumer education, promising centralized or remote treatment technologies, planned research, etc. Include any citations.

1. Education to residents and businesses served by municipal water supply on the effects of excessive chloride use and the role of water softeners by providing information on the Village Website, in the Village newsletter, and by providing information in utility bills. Emphasize that municipal water is already being softened, and additional softening may not be necessary.
2. Provide education to residents and businesses served by private wells on the effects of excessive chloride use and the role of water softeners by providing information on the Village website, in the Village newsletter, and by providing information in utility bills. Emphasize the benefits of high efficiency softeners, and the importance of proper maintenance and tune-ups for existing water softeners.
3. Initiate annual discussions with local water treatment suppliers, Southern Wisconsin Center, and Union Grove schools regarding water softening and chloride reduction.
4. Implement a systematic approach to chloride source identification. Collect samples from a targeted subsewershed in the system each year after heavy snowmelt or rain events.
5. Coordinate with water supply plant to optimize operation of the municipal ion-exchange softener. Ensure optimum operational factors (including regeneration interval, salt dosage, and other factors) are maintained to optimize municipal softener operation.
6. Develop and implement management practices to reduce or eliminate the simultaneous backwash of softener brine discharged to the WWTF from the water supply plant and Southern Wisconsin Center through annual monitoring and adjustments to SCADA settings as needed.
7. Address road salt and de-icing contributions by evaluating salt storage best management practices and providing information and training to Village staff.
8. Reduced salt usage on roadways.
9. Ongoing discussions with Southern Wisconsin Center to optimize their softener settings.

10. Rehabilitation of sewer lines and manholes to decrease inflow and infiltration into the system.

B. Describe all actions that the permit requires the permittee to complete during the variance period to ensure reasonable progress towards attainment of the water quality standard. Include any citations.

The permit requires the permittee to submit annual reports, implement the SRM Plan (dated 05/27/2026), and conduct the following activities:

1. Conduct yearly visits at the Southern Wisconsin Center, Merideth Culligan, and the two schools to observe and review operations. The SWC reportedly has two wells. One well has three softeners, and the other has four softeners.
2. Obtain monthly operational records from the SWC, the two schools, and the village drinking water plants quantifying the chloride discharged from each facility on individual days. The collected data should include the number of units being regenerated at each facility and how many pounds of salt are used. Provide a yearly report summarizing the chloride data collected and an estimate of the percentage of chlorides from softeners.
3. Continue to collect samples for chloride at the discharge of the Southern Wisconsin Center during the 4-day sampling at the WWTF.
4. Compare the monthly drinking water sold to the monthly wastewater flow to determine an appropriate estimate of clearwater at the time of the 4-day sampling at the WWTF.
5. Sample from the Maple Grove Sewage Lift Station during the 4-day sampling at least once per year. This sewage basin does not have a water plant discharge and was constructed after 2005 which would provide an estimate for a minimum threshold level for chloride and a possible future ordinance goal.
6. Continue to provide public education (website, newsletter, utility bill) for residential and commercial softeners, including modification of softener settings.
7. Replace manhole frames with each street replacement project.
8. Continue inspections and quantification of residential water softeners during meter change out and discuss the option of removing the softener.
9. Target road salting/deicing activities by evaluating BMPs and staff training.
10. Refine a better mass balance based on collected samples and information.

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

A. Date of previous submittal: 03/16/2020 **Date of EPA Approval:** 05/11/2020

B. Previous Permit #: WI-0028921-10-0 **Previous WQSTS #:** (EPA USE ONLY)

C. Effluent substance concentration: 574 mg/L (4-day P99) **Variance Limit:** 560 mg/L (weekly average)

D. Target Value(s): 500 mg/L (weekly average) **Achieved?** ☐ **Yes** ☒ **No** ☐ **Partial**

E. For renewals, list previous steps that were to be completed. Show whether these steps have been completed in compliance with the terms of the previous variance permit. Attach additional sheets if necessary.

Condition of Previous Variance	Compliance
Develop outreach and education materials specific to residents with private wells, and residents connected to municipal/softened water supply	☒ **Yes** ☐ **No**
Update/maintain website with targeted information regarding water hardness and residential water softener efficiency	☒ **Yes** ☐ **No**
Distribute printed newsletters to residents that includes chloride reduction information	☒ **Yes** ☐ **No**
Distribute digital newsletter to residents that includes chloride reduction information	☒ **Yes** ☐ **No**
Targeted water bills – including references to educational material/website on bills	☒ **Yes** ☐ **No**
Work with local water treatment suppliers regarding chloride reductions	☒ **Yes** ☐ **No**

Discussion with Southern Colony Wisconsin regarding water softening	☒ **Yes** ☐ **No**
Chloride testing of targeted subsewershed after heavy snow melt; follow-up investigation as needed	☒ **Yes** ☐ **No**
Chloride testing of targeted subsewershed after heavy rain event; follow-up investigation as needed	☒ **Yes** ☐ **No**
Coordinate Village water supply treatment plant operations to avoid simultaneous backwash	☒ **Yes** ☐ **No**
Optimize blending valves at Village water supply treatment plants	☒ **Yes** ☐ **No**
Rehabilitate sanitary manholes or sewer lines with significant I&I	☒ **Yes** ☐ **No**
Road Salt/De-icing activities	☒ **Yes** ☐ **No**