

Permit Fact Sheet

General Information

Permit Number:	WI-0020141-10-0	
Permittee Name:	City of Kiel	
Mailing Address:	City of Kiel, PO Box 98, Kiel, WI 53042	
Facility Address:	Kiel Wastewater Treatment Facility, 100 East Park Avenue, Kiel, WI 53042	
Discharge Location:	Kiel Wastewater Treatment Facility, 100 East Park Avenue, Kiel, WI 53042 NE ¼, NE ¼, NW ¼ of Section 29, Township 17 North, Range 21 East, City of Kiel, Manitowoc County, WI	
Receiving Water:	Sheboygan River (Water Body Identification Code number 50700) at Rockville Flowage in the Sheboygan River Watershed (SH03) of the Sheboygan River Drainage Basin in Manitowoc County and groundwater via land application in Calumet and Manitowoc Counties.	
StreamFlow (Q _{7,10}):	0.93 cfs	
Stream Classification:	Warm water sport fish (WWSF) community and non-public water supply	
Discharge Type:	Existing continuous discharge	
Design Flow(s)	Daily Maximum	3.86 MGD
	Weekly Maximum	Not determined
	Monthly Maximum	2.29 MGD
	Annual Average	1.43 MGD
Significant Industrial Loading?	Yes, and includes the following: Ameriquip (metal fabrication and finishing), Household Utilities, Inc. (metal fabrication and finishing), Vollrath Company LLC (metal fabrication), Land O'Lakes Cheese Plant (cheese making), and Sargento Cheese (cheese processing).	
Operator at Proper Grade?	<p>Facility Subclasses & Classification: Facility is classified at the advanced level for the following subclasses: A1 (Suspended Growth Processes), B (Solids Separation), C (Biological Solids/Sludges), D (Disinfection), and P (Total Phosphorus); and at the basic level for L (Laboratory) and SS (Sanitary Sewage Collection System).</p> <p>OIC Subclasses & Grade: Kris August is certified at the advanced level for the following subclasses: A1 (Suspended Growth Processes), B (Solids Separation), C (Biological Solids/Sludges), D (Disinfection), L (Laboratory), and P (Total Phosphorus); and at the basic level for SS (Sanitary Sewage Collection System).</p>	
Approved Pretreatment Program?	N/A	

Facility Description

The City of Kiel owns and operates the Kiel Wastewater Treatment Facility that treats residential and commercial domestic wastewater, industrial wastewaters, and hauled waste from the hauled waste receiving stations. Class A sludge is generated from the treatment facility and either land applied or distributed as exceptional quality sludge to the public. The paragraphs below describe the liquid and solids treatment train of the Kiel Wastewater Treatment Facility.

Liquid Treatment Train: The facility provides preliminary, primary, secondary, and tertiary treatment to the influent. Preliminary treatment consists of influent pumping, fine screening and grit removal. Primary clarification is followed by the activated sludge process with aeration basins. Ferric sulfate is added prior to the secondary clarifiers for phosphorus removal. Secondary clarification then follows and removes the settled solids and then disk filters for tertiary filtration prior to disinfection. Disinfection consists of a chlorine contact tank using gaseous chlorine and liquid sulfur dioxide for dechlorination. The effluent then enters a post-aeration basin then flows by gravity through a submerged outfall structure to the Sheboygan River via Outfall 001.

Solids Treatment Train: The solids treatment includes anaerobic digestors, aerated sludge holding tank, screw presses, belt filter press, dryer and sludge storage structure. Primary settled sludge and scum from the primary clarifiers is sent to a two-stage anaerobic digester system. The process includes one primary anaerobic digester and one secondary anaerobic digester. The digester supernatant is returned to the tank prior to the primary clarifiers. The digested sludge then flows to an aerated sludge holding tank where it mixed with waste activated sludge from the secondary clarifiers. The aerated sludge is then pumped to a new screw press. A polymer is added to improve thickening. The pressate from the screw presses is returned to the tank prior to the primary clarifiers. The pressed sludge then is treated through a new dryer to meet Class A and exceptional quality (EQ) sludge requirements. The dried Class A EQ sludge is then placed a new conveyor system to the sludge storage building. The Class A EQ sludge is either immediately land applied or distributed to the public via Outfall 005 or if stored for a certain length of time retested for Class A pathogen requirements either land applied or distributed to the public via Outfall 006. The permittee has the ability to use an existing belt press to thicken the sludge prior to the dryer in case the screw press is not available. Additionally, the permittee has the ability to collect cake sludge from the belt filter press and serves as emergency backup in case Class A sludge cannot be produced. The pressed cake sludge can be land applied as Class B sludge on department approved sites via Outfall 007.

Recent facility Upgrades: The facility recently went through a large facility upgrade during the previous permit term. These facility upgrades included: new aeration basins, new blowers and aerators for existing aeration basins, two new secondary clarifiers, new mechanisms for existing clarifiers, replacing the existing sand filters with disk filters for phosphorus removal, new sludge pumps, new sludge screw presses, and sludge Class A dryer replacing the Class A sludge pasteurization process.

Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, compliance annual maintenance reports, land application reports, compliance schedule items, and a site visit on May 2, 2023, this facility has been found to be in substantial compliance with their current permit.

Compliance determination entered by Trevor Moen, Wastewater Engineer, on May 7, 2024.

Fact Sheet Organization

This fact sheet explains the rationale and assumptions used in deriving the conditions and requirements set forth in this permit. Additionally, this fact sheet highlights changes in permit conditions that the department proposes to make when reissuing the WPDES permit. This fact sheet compares conditions in the previous permit to those in the reissued permit. The tables that follow were taken from the permit and are numbered in this fact sheet as they are numbered in the permit. Bolded and highlighted text and cells within tables indicate permit conditions that are new or different from those found in the previous permit.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)
701	Daily Average: 1.28 MGD (April 2018 to February 2024)	INFLUENT - Total combined influent from the sanitary sewage collection system and hauled waste receiving station. At Sampling Point 701, the permittee shall collect representative samples of influent from the influent automatic sampler drawing 24-hour flow proportional composite samples from the open channel after screening and prior to the grit tank and primary clarifiers. The permittee shall measure the influent flow rate using a continuous flow recording device after the main lift station.
105	New sampling point only use if the facility will divert flow around the tertiary filters prior to disinfection.	At Sampling Point 105, the permittee shall report the diverted flow which bypasses the tertiary filtration system prior to disinfection.
001	Daily Average: 1.23 MGD (April 2018 to February 2024)	EFFLUENT - At Sampling Point 001, the permittee shall collect representative samples of effluent from the effluent automatic composite sampler drawing 24-hour flow proportional composite samples from the post aeration basin following disinfection, except that the permittee shall continuously measure for pH, DO, and temperature from the post aeration basin and collect grab samples of the effluent at the final weir of the post aeration basin for total residual chlorine, E. coli, PFOA, and PFOS prior to being discharged to the Sheboygan River via Outfall 001. The permittee shall measure the effluent flow rate using a continuous flow recording device prior to the tertiary filters.
005	Average Annual Sludge Generated: 3,428 cubic yards (2019 to 2023) Average Annual Sludge Land Applied or Distributed: 1,286 metric tons (2019 to 2023)	DRIED CLASS A EQ SLUDGE - Class A, exceptional quality cake sludge from treatment of primary sludge with anaerobic digestion mixed with waste activated sludge from final clarification in an aerated holding tank, then treated with a screw press (or belt press as emergency back-up) and a dryer. At Sampling Point 005, the permittee shall collect representative grab and/or composite samples of cake sludge immediately following the sludge dryer and be monitored quarterly for metals (List 1), nutrients (List 2), Class A pathogen density requirements (List 3), and vector attraction reduction (List 4) prior to immediately being bagged, distributed or land applied as exceptional quality sludge or being stored on-site in dried cake sludge piles in the storage building. All pathogen control samples shall be discrete samples. Each pathogen control sample shall meet the pathogen limit to prove effective pathogen treatment. Monitoring results for each sampling event shall be reported on a quarterly basis.

Sample Point Designation

Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)
006	New land application outfall used to track compliance with Class A pathogen control requirements if cake sludge will be land applied or distributed at a later time.	DRIED CLASS A EQ SLUDGE STORAGE - Class A, exceptional quality cake sludge from treatment of primary sludge with anaerobic digestion mixed with waste activated sludge from final clarification in an aerated holding tank, then treated with a screw press (or belt press as emergency back-up) and a dryer, then transported by a conveyor to an on-site storage building, and stored in piles. At Sampling Point 006, the permittee shall collect representative grab samples of cake sludge from the dried cake sludge piles in the on-site storage building and be monitored for pathogen control (List 3) prior to being distributed or land applied as exceptional quality sludge if the distribution or land application will occur at a later time as specified in the department approved sludge management plan. All pathogen control samples shall be discrete samples. Each pathogen control sample shall meet the pathogen limit to prove effective pathogen treatment. Monitoring results for each sampling event shall be reported on a quarterly basis.
007	New land application outfall used in case of emergency.	CLASS B CAKE SLUDGE - Class B cake sludge from treatment of primary sludge with anaerobic digestion mixed with waste activated sludge from final clarification in an aerated holding tank, then treated with a belt press and loaded onto trucks or stored in an on-site storage building. This outfall has been included for emergency use in case Class A sludge treatment is not available. At Sampling Point 007, the permittee shall collect representative composite samples of cake sludge from truck loadout or cake storage piles in the on-site storage building prior to being land applied on department approved sites via Outfall 007.

1 Influent – Monitoring Requirements

Sample Point Number: 701- INFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Continuous	Continuous	
BOD ₅ , Total		mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	2/Week	24-Hr Flow Prop Comp	
Phosphorus, Total		mg/L	2/Week	24-Hr Flow Prop Comp	

Changes from Previous Permit:

No changes from the previous permit.

Explanation of Limits and Monitoring Requirements

Flow Rate, BOD₅, and TSS Monitoring: Influent wastewater strengths and volumes shall be characterized at treatment facilities by monitoring for flow, BOD₅ and TSS pursuant to s. NR 210.04(2), Wis. Adm. Code. Influent monitoring for flow, BOD₅, and TSS remains unchanged from the previous permit.

Total Phosphorus Monitoring: Monitoring requirements may be adjusted on a case-by-case basis depending on wastewater characteristics and their potential to degrade water quality pursuant to s. NR 210.04(3), Wis. Adm. Code. The department has included influent total phosphorus monitoring to characterize the strength of the total phosphorus loadings to the treatment facility and to support operational changes for phosphorus removal process. Influent monitoring for total phosphorus remains unchanged from the previous permit.

Sample Frequency: The department shall determine on a case-by-case basis the monitoring frequency to be required for each parameter in a permit pursuant to s. NR 205.066, Wis. Adm. Code. The Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual WPDES permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term.

Permitted monitoring frequencies for influent BOD₅ and TSS fall below the standard monitoring frequencies outlined in the guidance document. The permittee demonstrates a history of consistent compliance with existing BOD₅, TSS, and total phosphorus effluent limits. Data submitted during the previous permit term continues to show consistent compliance with BOD₅ and TSS effluent limitations, and the set monitoring frequencies are consistent with requirements of state code. The current monitoring frequency for BOD₅ and TSS shall continue this permit term. If performance levels begin to vary during the permitted term, the department may re-evaluate current sampling frequency for BOD₅ and TSS and implement more frequent monitoring via permit modification or at permit reissuance. The sampling frequencies for influent flow, BOD₅, TSS, and total phosphorus remain unchanged from the previous permit.

Sample Type: The department shall require the use of 24-hour flow proportional samplers for monitoring influent wastewater quality except where the department determines through the permit issuance process that other sample types may adequately characterize the influent quality pursuant to s. NR 210.04(4), Wis. Adm. Code. The 24-hour flow

proportional sampling is the most representative method of collecting wastewater samples for wastewater coming into and being discharged from a wastewater treatment plant on a continuous basis. The sample type of BOD₅, TSS, and total phosphorus remains unchanged from the previous permit. For municipal waste at a treatment facility, methods of flow measurement shall include a continuous recording device pursuant to s. NR 218.05(1), Wis. Adm. Code. The sample frequency and sample type of influent flow rate remains unchanged from the previous permit.

2 Inplant - Monitoring and Limitations

Sample Point Number: 105- OTHER BYPASS

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Per Occurrence	Continuous	Start flow measurement at the commencement of bypass operations. Measure flow in daily increments until operation ends and report daily bypass flow on the eDMR. See the Other Bypass Requirements section below.
Time		hours	Per Occurrence	Calculated	Report the total duration of 'Other Bypass' within a given day (12:00 am -11:59 pm) in which the other bypass occurs. See the Other Bypass Requirements section below.

Changes from Previous Permit:

- This is a new sample point and was not included in the previous permit.

Explanation of Limits and Monitoring Requirements

Other Bypass Monitoring: The department has determined that an "other bypass" as defined in s. NR 205.07(1)(u)3., Wis. Adm. Code, may occur at the wastewater treatment facility. Furthermore, the department has previously approved plans in accordance with s. 281.41, Wis. Stats., for the partial bypassing around the tertiary treatment process prior to disinfection. Section NR 205.07(1)(u), Wis. Adm. Code, requires that the department approve all other bypasses. The department included to this sampling point to constitute permitting and approval of the other bypass provided the other bypass monitoring requirements and conditions are followed. The other bypass may only divert flow around the tertiary filtration system prior to disinfection. A bypass that is defined as a controlled diversion in s. NR 205.07(1)(v), Wis. Adm. Code, is not covered under this sample point. In no case shall this include flow diversion which would constitute blending, as defined in s. NR 210.03(2e), Wis. Adm. Code, unless otherwise approved in this permit.

3 Surface Water - Monitoring and Limitations

Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
BOD ₅ , Total	Weekly Avg	9.4 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies August each year.
BOD ₅ , Total	Monthly Avg	9.4 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies August each year.
BOD ₅ , Total	Weekly Avg	9.5 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies September each year.
BOD ₅ , Total	Monthly Avg	9.5 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies September each year.
BOD ₅ , Total	Weekly Avg	10 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies May through July and October each year.
BOD ₅ , Total	Monthly Avg	10 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies May through July and October each year
BOD ₅ , Total	Weekly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies November through April each year.
BOD ₅ , Total	Monthly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies November through April each year.
BOD ₅ , Total	Weekly Avg	108 lbs/day	2/Week	Calculated	Limit applies May through October each year.
BOD ₅ , Total	Weekly Avg	161 lbs/day	2/Week	Calculated	Limit applies November through April each year.
Suspended Solids, Total	Weekly Avg	10 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies May through October each year.
Suspended Solids, Total	Monthly Avg	10 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies May through October each year.
Suspended Solids, Total	Weekly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies November through April each year.
Suspended Solids, Total	Monthly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies November through April each year.
Suspended Solids, Total	Weekly Avg	340 lbs/day	2/Week	Calculated	See the TMDL Limitations in the permit.
Suspended Solids, Total	Monthly Avg	228 lbs/day	2/Week	Calculated	See the TMDL Limitations in the permit.
Suspended Solids, Total		lbs/month	Monthly	Calculated	Calculate and report the total monthly mass of TSS discharged in lbs/month on the last day of the month on the eDMR.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Suspended Solids, Total		lbs/yr	Monthly	Calculated	Calculate and report the 12-month rolling sum of the total monthly mass of TSS on the last day of the month on the eDMR.
pH (Minimum)	Daily Min	6.0 su	Daily	Continuous	
pH (Maximum)	Daily Max	9.0 su	Daily	Continuous	
Dissolved Oxygen	Daily Min	7.0 mg/L	Daily	Continuous	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Monitoring and Limit applies May through September each year.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Monitoring and Limit applies May through September each year. See the E. coli Percent Limit section in the permit. Enter the result in the DMR on the last day of the month.
Chlorine, Total Residual	Daily Max	25 ug/L	5/Week	Grab	Monitoring and Limit applies May through September each year.
Chlorine, Total Residual	Weekly Avg	8.0 ug/L	5/Week	Grab	Monitoring and Limit applies May through September each year.
Chlorine, Total Residual	Monthly Avg	8.0 ug/L	5/Week	Grab	Monitoring and Limit applies May through September each year.
Phosphorus, Total	Monthly Avg	1.0 mg/L	2/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	23 lbs/day	2/Week	Calculated	See the TMDL Limitations section in the permit.
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate and report the total monthly mass of TP discharged in lbs/month on the last day of the month on the eDMR.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate and report the 12-month rolling sum of the total monthly mass of TP on the last day of the month on the eDMR.
Nitrogen, Ammonia Variable Limit		mg/L	2/Week	See Table	See the Daily Maximum Ammonia Nitrogen Limits section in the permit.
Nitrogen, Ammonia (NH3-N) Total	Daily Max - Variable	mg/L	2/Week	24-Hr Flow Prop Comp	See the Daily Maximum Ammonia Nitrogen Limits section in the permit.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies January through February each year.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	19 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies March through April each year.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	5.2 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies May each year.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	3.7 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies June through September each year.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	9.4 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies October each year.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	13 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies November each year.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	12 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies December each year.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	5.3 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies October through March each year.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	2.2 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies April through May each year.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	1.7 mg/L	2/Week	24-Hr Flow Prop Comp	Limit applies June through September each year.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring only required from January 2027 to December 2027.
Temperature Maximum		deg F	Daily	Continuous	See Effluent Temperature Monitoring section in the permit.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nitrogen, Total Kjeldahl		mg/L	Quarterly	24-Hr Flow Prop Comp	See Nitrogen Series Monitoring section in the permit.
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hr Flow Prop Comp	See Nitrogen Series Monitoring section in the permit.
Nitrogen, Total		mg/L	Quarterly	Calculated	See Nitrogen Series Monitoring section in the permit. Total Nitrogen = Total Kjeldahl Nitrogen (mg/L) + Total (Nitrite + Nitrate)
PFOS		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Sampling and Reporting Requirements section in the permit and PFOS/PFOA Minimization Plan Determination of Need section in the permit and compliance schedule.
PFOA		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Sampling and Reporting Requirements section in the permit and PFOS/PFOA Minimization Plan Determination of Need section in the permit and compliance schedule.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Whole Effluent Toxicity Testing section in the permit.
Chronic WET	Monthly Avg	1.1 TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Whole Effluent Toxicity Testing section in the permit.

Changes from Previous Permit

- The BOD concentration limits have been changed for August and September.
- TMDL derived TSS mass effluent limitations and monitoring has been added to the permit.
- The daily minimum oxygen limit has been increased to 7.0 mg/L.
- Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits. E. coli limits during the recreation season (May to September).

- Total residual chlorine daily maximum, weekly average and monthly average limits have been lowered.
- The sample frequency for total phosphorus has been changed from “Monthly” to “Weekly”.
- TMDL derived total phosphorus mass effluent limitation and monitoring has been added to the permit.
- Daily continuous temperature monitoring is now required year-round.
- Monthly chloride monitoring is only required in 2027.
- Quarterly nitrogen series monitoring has been added to the permit.
- Bimonthly PFOA and PFOS monitoring has been added to the permit.
- A chronic WET monthly average limit of 1.1 TU_c has been added to the permit.

Explanation of Limits and Monitoring Requirements

More information and explanation about the proposed water quality-based effluent limits (WQBELs) is found in the “Water Quality-Based Effluent Limitations for Kiel Wastewater Treatment Facility (WI-0020141-10)” memo dated March 8, 2024.

Flow Rate Monitoring: For municipal waste at a treatment facility, methods of flow measurement shall include a continuous recording device pursuant to s. NR 218.05(1), Wis. Adm. Code. Effluent monitoring for flow remains unchanged from the previous permit.

Secondary Treatment Limits and WQBELs for BOD₅, TSS, pH, and DO: Publicly owned treatment works with a discharge to a surface water classified as a fish and aquatic life water shall meet the secondary treatment effluent concentration limits specified for BOD₅, TSS, pH, and DO in s. NR 210.05(1), Wis. Adm. Code. The permittee discharges to the Sheboygan River which is classified as a fish and aquatic life water. Therefore, effluent limitations in s. NR 210.05(1), Wis. Adm. Code apply. However, the department determined WQBELs for BOD₅, TSS, and DO that are more restrictive.

The department calculated monthly BOD₅ limits based on the 26-pound method using the new design flow rate of 1.43 MGD, monthly river low flows, and the DO limit of 7.0 mg/L. The monthly BOD concentration limits were calculated to be higher than the current BOD concentration limits except for the months of August and September. The BOD concentration limits were lowered to 9.4 mg/L for August and 9.5 mg/L for September. The DO daily minimum limit of 7.0 mg/L must be included in the permit to ensure the DO in the receiving water does not decrease below the standard of 5 mg/L. The BOD mass limits were determined using the design flow rate of 1.29 MGD in the previous permit. The BOD mass limits were calculated based on weekly BOD limits were determined to be higher than current limits when using the new design flow rate of 1.43 MGD. The BOD mass limits of 108 lbs/day (May through October) and 161 lbs/day (November through April) remain unchanged from the previous permit for antidegradation and antibacksliding purposes per ch. NR 207, Wis. Adm. Code.

The TSS concentration limits were then set equal to the BOD concentration limits based on best professional judgement in previous permits. The department finds these limits to appropriate for the reissued permit and TSS concentration limits remain unchanged.

Limitations for pH are contained in s. NR 210.05(1)(c), Wis. Adm. Code, which are equivalent to water quality standards in s. NR 102.04(3)(c), Wis. Adm. Code. The limits for pH remain unchanged from the previous permit.

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

solids waste load allocation (WLA) for the permittee is 52,306 lbs/year which results in calculated total suspended solids mass limits of 340 lbs/day as a weekly average and 228 lbs/day as a monthly average. Since the TSS WLA is expressed as an annual load (lbs/yr), the permittee must also calculate and report the rolling 12-month sums of total monthly loads for TSS. Rolling 12-month sums can be compared directly to the annual wasteload allocation. Based on the effluent TSS data submitted on eDMRs from April 2018 to February 2024, the permittee can currently meet the TSS mass limits, and a compliance schedule is not needed.

E. Coli: Fecal coliform monitoring and limits have been replaced with E. coli monitoring and limits. The final E. coli limits include 126 #/100 ml as a monthly geometric mean and 410 #/100 ml as a daily maximum may not be exceeded more than 10 percent of the time in any calendar month. Revisions to bacteria surface water quality criteria to protect recreational uses and accompanying E. coli WPDES permit implementation procedures became effective May 1, 2020. The new rule requires that WPDES permits for facilities with required disinfection include monitoring for E. coli while facilities are disinfecting during the recreation period and establish effluent limitations for E. coli established in s. NR 210.06(2), Wis. Adm. Code. The administrative code rule changes included the following actions: revised the bacteria water quality criteria from fecal coliform to E. coli to protect recreation in ch. NR 102, Wis. Adm. Code.; removed fecal coliform criteria for certain individual waters from ch. NR 104, Wis. Adm. Code; revised permit requirements for publicly owned sewage treatment works in ch. NR 210, Wis. Adm. Code; and, updated approved analytical methods for bacteria in ch. NR 219, Wis. Adm. Code.

The permittee discharges to the Sheboygan River which the permittee must ensure the Sheboygan River is suitable for supporting recreational use and protect humans from illness caused by fecal contamination due to recreational contact with surface water. The Sheboygan River is not classified as a public water supply. Therefore, the permittee is required to disinfect during the recreation season pursuant to s. NR 210.06(1)(a), Wis. Adm. Code. 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 in order to protect recreation season (May to September): The geometric mean of E. coli bacteria in effluent samples collected in any calendar month cannot exceed 126 counts/100 mL. No more than 10% of E. coli bacteria samples collected in any calendar month can exceed 410 counts/100 mL. Fecal coliform limits and monitoring are no longer required for recreational protection.

The permittee had monitored effluent E. coli weekly from 05/06/2022 – 09/28/2022 with a total of 20 results. The geometric mean monthly limit of 126 #/100 mL was not exceeded during this period with a maximum monthly geometric mean of 12 #/100 mL. Effluent data did not exceed the maximum limit of 410 #/100 mL. The maximum reported value was 71 #/100 mL. Based on the effluent E. coli monitoring data, the permittee has demonstrated that the final E. coli limits can be met immediately with the existing disinfection system.

Total Residual Chlorine: The permittee currently uses chlorine gas to disinfect the final effluent prior to discharge to Sheboygan River during the recreational season (May to September). Therefore, the department must evaluate effluent limitations to assure proper operation of the dechlorination system. Section NR 210.06(2)(b), Wis. Adm. Code, states that when chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L. However, the department must also evaluate WQBELs for total residual chlorine. Chlorine effluent limits were calculated using current acute and chronic chlorine toxicity criteria for the protection of aquatic life included in Tables 1 and 5 of ch. NR 105, Wis. Adm. Code. The WQBELs were determined to be more restrictive than the technology based effluent limitations in s. NR 210.06(2)(b), Wis. Adm. Code. The determined a daily maximum limit of 25 µg/L and a weekly average effluent limitation of 8.0 µg/L should also be included in the permit. These are more restrictive than the current daily maximum and weekly average limits. Sections NR 106.07(3) and NR 205.067(7), Wis. Adm. Code require WPDES permits contain weekly average and monthly average limitations for municipal dischargers whenever practicable and necessary to protect water quality. Therefore, a monthly average limit of 8.0 µg/L is required to meet expression of limits requirements, equal to the weekly average limit.

Total Phosphorus: Phosphorus requirements are based on the Phosphorus Rules as detailed in chs. NR 102 (water quality standards) and NR 217, Wis. Adm. Code (effluent standards and limitations for phosphorus). Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters. Currently, there are three types of limit

calculations used to determine if a phosphorus limit is needed: a technology based effluent limit (TBEL), a WQBEL determined by stream criteria and an effluent limit based on a TMDL allocation.

- A TBEL of 1.0 mg/L is needed if a facility discharges more than the threshold of 150 pounds per month (s. NR 217.04(1)(a)1., Wis. Adm. Code). The data demonstrates that the annual monthly average phosphorus loading is less than 150 lbs/month. However, the current permit has a monthly average limit of 1.0 mg/L that served as an interim limit. This limit remains applicable unless a more stringent WQBEL is given.
- Section NR 102.06(3)(a), Wis. Adm. Code, specifies river segments with a phosphorus criterion of 0.100 mg/L. The phosphorus criterion of 0.10 mg/L applies to the Sheboygan River. The department calculated final total phosphorus WQBELs based on the phosphorus criterion consistent with s. NR 217.13, Wis. Adm. Code, and final total phosphorus WQBELs were determined to be 0.30 mg/L as a monthly average, 0.10 mg/L as a six-month average, and 0.72 lbs/day as a six-month average. These limits have yet to take effect per the compliance schedule in the previous permit. The department has determined to include the total phosphorus TMDL derived limitations in lieu of the WQBELs calculated under s. NR 217.13, Wis. Adm. Code pursuant to s. NR 217.16, Wis. Adm. Code.
- The discharge to Sheboygan River is within the Northeast Lakeshore Basin TMDL area. The Northeast Lakeshore Basin TMDL for total phosphorus and total suspended solids was approved by the USEPA on October 30, 2023. If the department determines a WQBEL is necessary, limitations shall be consistent with a TMDL if a TMDL has been approved by the USEPA for the receiving waterbody consistent with s. NR 205.067(3)(a), Wis. Adm. Code. The department has determined that total phosphorus WQBELs are necessary. Therefore, the department must also calculate TMDL derived total phosphorus limits to be consistent with the Northeast Lakeshore Basin TMDL. The approved total phosphorus WLA for the permittee is 4,359 lbs/year. Since the equivalent concentration is greater than 0.3 mg/L, the WLA should be expressed as a monthly average mass limit for total phosphorus and no six-month average limit is required. The department calculated a total phosphorus mass limit of 23 lbs/day as a monthly average.

Ammonia: Ammonia limits were calculated using current acute and chronic ammonia toxicity criteria for the protection of aquatic life are included in Tables 2C and 4B of ch. NR 105, Wis. Adm. Code. Subchapter IV of ch. NR 106 establishes the procedure for calculating WQBELs for ammonia. The weekly average and monthly average limits have not changed from the previous permit. Section NR 106.33(2), Wis. Adm. Code, was updated effective on September 1, 2016. As a result, seasonal 20 and 40 mg/L thresholds for including ammonia limits in municipal discharge permits are no longer applicable under current rules. As such, the daily maximum variable limit table (see below) has been expanded from the table in the previous permit to include ammonia nitrogen limits throughout the pH range (6.0 to 9.0 s.u.).

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

Chloride: Effluent chloride concentrations are below the calculated WQBELs; therefore, limits are not required. However, monthly monitoring is required in 2027 to ensure that 11 sample results are available at the next permit reissuance to meet the reasonable potential data requirements of s. NR 106.85, Wis. Adm. Code.

Temperature: Kiel submitted a dissipative cooling (DC) study in 2017 pursuant to s. NR 106.59(4), Wis. Adm Code which was approved because the discharge allows for a zone of free passage for fish in the river. Instream temperatures did not exceed any sublethal criteria downstream of the outfall and did not increase the temperature in the stream to above 3 degrees from ambient conditions.

The permittee may request continued consideration of DC in accordance with s. NR 106.59(8), Wis. Adm. Code. The permittee's request must: 1) be submitted with the permit reissuance application; 2) certify that there has been no substantive change in operations or loadings since the previous permit application; 3) include any new information generated during the current permit term with certification that it is consistent with the previous permit application. The permittee submitted this continuation request of DC certifying that there has been no substantive change in operations or loadings since the previous permit application and it was included with the permit application received on October 5, 2022.

The department has granted approval of the continuation request of DC for this permit term. However, there is a large amount of industrial wastewater, it is recommended that the permittee identify changes in thermal loadings. Another DC study will be needed during the winter months if the heat loading appears to increase again above the conditions during the DC study. Therefore, the department has included year-round maximum temperature monitoring to capture any changes in thermal loadings. The facility has in-line temperature probe that can continuously monitor for temperature. Therefore, the sampling frequency and sample type was changed to "daily" and "continuous", respectively.

Nitrogen Series Monitoring (NO₂+NO₃, TKN and Total N): The department has included monthly effluent monitoring for total nitrogen since the permittee is a major discharge (>1 MGD) in the permit through the authority under s. 283.55(1)(e), Wis. Stats., which allows the department to require the permittee to submit information necessary to identify the type and quantity of any pollutants discharged from the point source. More information on the justification to include total nitrogen monitoring in wastewater permits can be found in the "Guidance for Total Nitrogen Monitoring in Wastewater Permits" dated October 1, 2019.

Arsenic: The sample that was collected for the permit reissuance application had a limit of detection (LOD) of 14 µg/L which is greater than 1/5 of the most stringent calculated limit of 3.6 µg/L based on the human cancer criteria. The facility collected another effluent arsenic sample on March 12, 2024, with a result of <0.70 µg/L. Because this result is less than 1/5 of the most stringent calculated limit, there is no reasonable potential to exceed calculated arsenic effluent limits and no monitoring is required in the permit.

PFOA and PFOS: 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.

Whole Effluent Toxicity Testing: Whole effluent toxicity (WET) testing requirements and limits are determined in accordance with ss. NR 106.08 and NR 106.09, Wis. Adm. Code, as revised August 2016. (See the current version of the Whole Effluent Toxicity Program Guidance Document and checklist and WET information, guidance and test methods at <http://dnr.wisconsin.gov/topic/wastewater/wet.html>) Additionally, major municipal discharger with a design flow greater than 1.0 MGD and/or with approved pretreatment program must at a minimum perform annual WET testing pursuant to 40 CFR Part 122.21(j)(5).

After consideration of the guidance provided in the Department's WET Program Guidance Document (2019) and other information described above, 1 x yearly acute and chronic WET tests were 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).

The department has determined that due to the available chronic WET testing data and requirements specified in ss. NR 106.08 and NR 106.09, Wis. Adm. Code, a chronic WET limit is required in the permit and shall be 1.1 TUc expressed as a monthly average. The chronic WET limit is calculated by taken 100 over the instream waste concentration (IWC). IWC means an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC was increased from 85% to 90% due to the increase in the design flow rate to 1.43 MGD so less available dilution.

Sample Type: The department shall require the use of 24-hour flow proportional samplers for monitoring effluent wastewater quality except where the department determines through the permit issuance process that other sample types may adequately characterize the effluent quality pursuant to s. NR 210.04(4), Wis. Adm. Code. The 24-hour flow-proportional sampling is the most representative method of collecting wastewater samples for wastewater coming into and being discharged from a wastewater treatment plant on a continuous basis. Grab samples for pH, TRC, and E. coli are required as compositing and holding such samples would change the test results and is noncompliant with maximum holding times specified in ch. NR 219, Wis. Adm. Code. The sample type for all parameters remains unchanged from the previous permit.

Sampling Frequency: The department shall determine on a case-by-case basis the monitoring frequency to be required for each parameter in a permit pursuant to s. NR 205.066, Wis. Adm. Code. The Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual WPDES permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term.

Previously permitted monitoring frequencies for all parameters, except for BOD₅, TSS, ammonia nitrogen, and total phosphorus, are consistent with the standard monitoring frequency outlined in the guidance. These sampling frequencies remain unchanged from the previous permit. If performance levels begin to vary during the permitted term, the department may re-evaluate current sampling frequencies and implement more frequent monitoring via permit modification or at permit reissuance.

Permitted monitoring frequencies for effluent BOD₅, TSS, and ammonia nitrogen fall below the standard monitoring frequencies outlined in the guidance document. The permittee demonstrates a history of consistent compliance with existing BOD₅, TSS, and ammonia nitrogen effluent limits. Data submitted during the previous permit term continues to show consistent compliance with BOD₅, TSS, and ammonia nitrogen effluent limitations, and the set monitoring frequencies are consistent with requirements of state code. The current monitoring frequency for BOD₅, TSS, ammonia nitrogen shall continue this permit term. If performance levels begin to vary during the permitted term, the department may re-evaluate current sampling frequency for BOD₅, TSS, and ammonia nitrogen and implement more frequent monitoring via permit modification or at permit reissuance. The sampling frequencies for BOD₅, TSS, and ammonia nitrogen remain unchanged from the previous permit.

The department has determined at this time that an increase in monitoring frequency is warranted for total phosphorus in order to better characterize effluent quality and variability. The monitoring frequency of 2/week is consistent with the Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges (June 1, 2020) specified for major municipal dischargers (> 1 MGD) which states setting the total phosphorus monitoring frequency consistent with monitoring frequency listed for BOD₅ (2/week) and TSS (2/week). If the permittee believes the facility should be eligible to return to the previously permitted monitoring frequency based on performance during the permitted term, they may request a reduction with their next permit application.

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
005	A	Cake	Fecal Coliform, and Heat Drying	Drying with primary solids	Land application or distributed as exceptional quality sludge	1,286 metric tons (2019 to 2023)
006	A	Cake	Fecal Coliform, and Heat Drying	Drying with primary solids	Land application or distributed as exceptional quality sludge	New Outfall
007	B	Cake	Fecal Coliform or Anaerobic Digestion	Incorporation	Land Application	New Outfall
Does sludge management demonstrate compliance? Yes						
Is additional sludge storage required? No						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No						
Is a priority pollutant scan required? No, the design flow rate 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.						

Sample Point Number: 005- DRIED CLASS A EQ SLUDGE

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Solids, Total		Percent	Quarterly	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Quarterly	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Quarterly	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Quarterly	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Quarterly	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Quarterly	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Quarterly	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Quarterly	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Quarterly	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Quarterly	Composite	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Mercury Dry Wt	High Quality	17 mg/kg	Quarterly	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Quarterly	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Quarterly	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Quarterly	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Quarterly	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Quarterly	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Quarterly	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Quarterly	Composite	
Nitrogen, Total Kjeldahl		Percent	Quarterly	Composite	
Nitrogen, Ammonium (NH ₄ -N) Total		Percent	Quarterly	Composite	
Phosphorus, Total		Percent	Quarterly	Composite	
Phosphorus, Water Extractable		% of Tot P	Quarterly	Composite	
Potassium, Total Recoverable		Percent	Quarterly	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Monitoring required once in 2026.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Monitoring required once in 2026.
PFOA + PFOS		µg/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.

Sample Point Number: 006- CLASS A EQ CAKE SLUDGE STORAGE

Sample Point Number: 007- CLASS B CAKE SLUDGE

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Solids, Total		Percent	Quarterly	Composite	Monitoring required only when cake sludge is land applied in any quarter.
Arsenic Dry Wt	Ceiling	75 mg/kg	Quarterly	Composite	Monitoring required and limits applicable only when cake sludge is land applied
Arsenic Dry Wt	High Quality	41 mg/kg	Quarterly	Composite	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Cadmium Dry Wt	Ceiling	85 mg/kg	Quarterly	Composite	in any quarter.
Cadmium Dry Wt	High Quality	39 mg/kg	Quarterly	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Quarterly	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Quarterly	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Quarterly	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Quarterly	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Quarterly	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Quarterly	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Quarterly	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Quarterly	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Quarterly	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Quarterly	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Quarterly	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Quarterly	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Quarterly	Composite	
Nitrogen, Total Kjeldahl		Percent	Quarterly	Composite	
Nitrogen, Ammonium (NH ₄ -N) Total		Percent	Quarterly	Composite	
Phosphorus, Total		Percent	Quarterly	Composite	
Phosphorus, Water Extractable		% of Tot P	Quarterly	Composite	
Potassium, Total Recoverable		Percent	Quarterly	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Monitoring required once only when cake sludge is land applied in any year.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	
PFOA + PFOS		µg/kg	Annual	Calculated	Monitoring required only when cake sludge is land applied in any year. Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
PFAS Dry Wt			Annual	Grab	Monitoring required only when cake sludge is land applied in any year. Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

Changes from Previous Permit:

- The department has removed the Outfall 004 from the previous permit as the facility longer uses the pasteurization process to produce Class A sludge.
- Outfall 005 was added to track the compliance and distribution of Class A, exceptional quality sludge produced from the new sludge dryer process.
- Outfall 006 was added to track the compliance of retesting for Class A pathogen control requirements if land application or distribution will occur at a later time.
- Outfall 007 was added as an emergency in case producing Class A sludge is not available.
- Annual PFAS monitoring has been added to the permit for each sludge outfall.

Explanation of Limits and Monitoring Requirements

Outfall 005: The department added Outfall 005 from the previous permit to track the compliance and distribution of Class A, exceptional quality sludge produced from the new sludge dryer process. If a permittee generates more than one type of sludge, each sludge type shall be sampled and analyzed in accordance with the WPDES permit pursuant to s. NR 204.06(2)(a), Wis. Adm. Code. Also, this sampling point was added to track meeting vector attraction requirements and Class A pathogen control requirements immediately following the sludge dryer. Section NR 204.07(6)(a)1., Wis. Adm. Code, requires for Class A sludge that fecal coliform density or salmonella density shall be satisfied immediately after the treatment process. Lastly, to be considered exceptional quality sludge, vector attraction reduction requirement must be met prior to or at the time of meeting the Class A pathogen control requirements.

Outfall 006: The department added Outfall 006 to track the compliance if the Class A cake sludge is distributed or land applied at a later time, the sludge shall be retested for Class A fecal coliform or salmonella requirements satisfied at that time also, to ensure that regrowth of the organisms has not occurred pursuant to s. NR 204.07(6)(a)1., Wis. Adm. Code.

Outfall 007: The department added Outfall 007 from the previous permit as an emergency in case the Class A heat drying treatment process is not available. The permittee will have the ability to land apply the cake sludge from the existing belt filter press to department approved sites under Class B sludge requirements. If a permittee generates more than one type of sludge, each sludge type shall be sampled and analyzed in accordance with the WPDES permit pursuant to s. NR 204.06(2)(a), Wis. Adm. Code.

Metals, Nutrients, Pathogen Control, Vector Attraction Reduction: The parameters to be analyzed in the sludge were determined pursuant to s. NR 204.06(2)(b), Wis. Adm. Code. The ceiling and high-quality limits for metals in sludge are specified in s. NR 204.07(5), Wis. Adm. Code. Requirements for pathogen control are specified in s. NR 204.07(6), Wis. Adm. Code and in s. NR 204.07(7), Wis. Adm. Code for vector attraction reduction requirements. Nutrients are required to be analyzed to track that nutrient recommendations for the crop are not exceeded. Specifically, the amount of available

nitrogen from sludge and other nitrogen sources applied per growing season may not exceed the nitrogen requirement of the crop pursuant to s. NR 204.07(8)(a), Wis. Adm. Code.

Exceptional Quality Sludge: The permittee will continue to produce exceptional quality sludge which is being tracked under Outfalls 005 and 006. The use of the exceptional quality sludge is exempt from many requirements of ch. NR 204, Wis. Adm. Code. See Section NR 204.04(3), Wis. Adm. Code for specific exemptions from code.

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

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

Sample Frequency: The frequency of monitoring for metals, nutrients, pathogen control, and vector attraction reduction requirements of the sludge is based on the amount of sludge land applied or distributed each year pursuant to s. NR 204.06(2)(c)3., Wis. Adm. Code. The facility distributed on annual average of 1,286 dry metric tons each year (2019 to 2023). This result is between 290 dry metric tons of sludge each year and 1500 dry metric tons of sludge each year based on Table A in s. NR 204.06(2)(c)3., Wis. Adm. Code which results in a sampling frequency of once per quarter. The sampling frequency for metals, nutrients, pathogen control, and vector attraction reduction requirements remains unchanged from the previous permit. Monitoring densities for pathogen control shall be based on discrete samples. A minimum of 7 samples shall be collected quarterly. The department suggests monitoring pathogen densities throughout the duration of the quarter to confirm that the treatment process is functioning properly.

5 Schedules

5.1 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
<p>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.</p> <p>This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.</p>	06/30/2025
<p>Report on Effluent Discharge and Evaluation of Need: Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan.</p> <p>This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.</p> <p>The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan.</p> <p>If the Department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for Department approval no later than 90 days after written notification was sent from the Department. The Department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued.</p> <p>If, however, the Department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.</p>	06/30/2026

5.2 Sludge Management Plan

A management plan is required for the sludge management program.

Required Action	Due Date
<p>Sludge Management Plan Submittal: Submit a sludge management plan to optimize the sludge management program performance and demonstrate compliance with ch. NR 204, Wis. Adm. Code, by the Due Date. This management plan shall include sufficient detail of the sludge management program for the facility. The plan shall include separate sections for each type of sewage sludge included in this permit.</p> <p>The SMP shall provide standardized information for communication to operators and the department including but not limited to the following:</p> <ol style="list-style-type: none"> 1) Specify information on sludge treatment processes for each sampling point and outfall; 2) Sample point and outfall monitoring locations shown on a schematic and with photos; 3) Monitoring requirements at each sampling point(s) and outfall location(s); 	12/31/2024

Required Action	Due Date
<p>4) Sampling protocols for each location and parameters at each location including treatment temperature, moisture content (total solids), fecal concentration as required;</p> <p>5) Monitoring frequencies at each sample point and outfalls;</p> <p>6) Analytical methods with appropriate hold times and chain of custody procedures;</p> <p>7) Provide documentation relating to temperature monitoring data recording, retrieval and printing out the data when requested;</p> <p>8) Storage, pickup and transportation details associated with all outfalls;</p> <p>9) Collection, storage, disposal information for cake sludge detailing pick-ups; and</p> <p>10) Collection, storage, and disposal processes of dried cake sludge when the cake sludge does not meet minimum requirements to meet Class A and EQ requirements.</p> <p>11) Identify land application sites;</p> <p>12) Describe site limitations;</p> <p>13) Address vegetative cover management and removal;</p> <p>14) Specify availability of storage;</p> <p>15) Describe the type of transporting and spreading vehicle(s);</p> <p>16) Track site loadings;</p> <p>17) Address contingency plans for adverse weather and odor/nuisance abatement; and</p> <p>18) Include any other pertinent information.</p> <p>Once approved, all sludge management activities shall be conducted in accordance with the plan. Any changes to the plan must be approved by the department prior to implementing the changes.</p>	

5.3 Capacity, Management, Operation, and Maintenance (CMOM) Program

The permittee shall have written documentation of the CMOM program components in accordance with s. NR 210.23(4), Wis. Adm. Code.

Required Action	Due Date
<p>Revised CMOM Program: Review and revise the Capacity, Management, Operation and Maintenance (CMOM) Program to meet the requirements of s. NR 210.23, Wis. Adm. Code. A revised copy of the program shall be submitted to the department by the due date.</p>	<p>09/30/2024</p>

Explanation of Schedules

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

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

Sludge Management Plan: Per s. NR 204.11(1), Wis. Adm. Code, the department may require the permittee to develop a sludge management plan, submit the plan to the department for approval and operate in compliance with the approved plan. The plan shall include a description of the facility's sludge management program and how the permittee plans to operate the facility in compliance with the requirements of the permit and ch. NR 204, Wis. Adm. Code. The sludge management plan shall be submitted to the department for approval by the due date in the permit.

Revised CMOM Program: The permittee shall have written documentation of the CMOM program components in accordance with s. NR 210.23(4), Wis. Adm. Code. The department reviewed the CMOM program as a part of inspection performed on May 2, 2024. As part of this inspection, the department identified some deficiencies in the CMOM Program and requested the facility revise the CMOM Program. This schedule serves as a reminder to submit a revised CMOM program to the department by the due date.

Standard Requirements Changes from Previous Permit

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

- Section 6.1.4: The limit of quantitation was updated for TSS for purposes of calculating NR 101 fees. A reminder was added about the reporting requirements when there is no discharge through a permitted outfall for flow related parameters.
- Section 6.4.7: The department has added a reminder about the expression of the E. coli limits and to enter a value of 1 for a result of 0 when calculating the geometric mean.
- Section 6.4.9: The department add the total residual chloride reporting requirements consistent with s. NR 106.07(6), Wis. Adm. Code.
- Section 6.4.12: The department has added the laboratory certification requirements for PFOA and PFOS testing.
- Section 6.5.6: The department has revised the monitoring and calculation requirements for PCB Concentrations in Sludge.
- Sections 6.5.12 to 6.5.22: The department has revised or added all applicable sludge treatment process and vector control requirements that may be applicable to the permittee. The department removed all sludge pasteurization process and pH adjustment requirements as these sludge treatment processes are no longer used by the permittee.

7 Summary of Reports Due

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

Other Comments/Changes from Previous Permit:

None.

Justification of Any Waivers from Permit Application Requirements

No waivers were requested from permit application requirements.

Attachments:

“Water Quality-Based Effluent Limitations for Manitowoc Wastewater Treatment Facility (WI-0024601-10)” memo dated March 8, 2024 and updated on March 22, 2024.

Expiration Date:

June 30, 2029

Prepared By:

**Trevor Moen
Wastewater Engineer**

Date: 04/26/2024

Post Fact Check Revision Date: 05/13/2024

Post Public Notice Revision Date:

CORRESPONDENCE/MEMORANDUM

DATE: 03/08/2024 updated 03/22/2024 for updated design flow

TO: Trevor Moen – NER

FROM: Nicole Krueger – SER *Nicole Krueger*

SUBJECT: Water Quality-Based Effluent Limitations for Kiel Wastewater Treatment Facility
WPDES Permit No. WI-0020141-10

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from Kiel Wastewater Treatment Facility in Manitowoc County. This municipal wastewater treatment facility (WWTF) discharges to the Sheboygan River, located in the Sheboygan River Watershed in the Sheboygan River Drainage Basin. This discharge is included in the Northeast Lakeshore Total Maximum Daily Load (TMDL) as approved by EPA. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1,2
BOD ₅					3
November – April			15 mg/L 161 lbs/day	15 mg/L	
May – July			10 mg/L 108 lbs/day	10 mg/L	
August			9.4 mg/L 108 lbs/day	9.4 mg/L	
September			9.5 mg/L 108 lbs/day	9.5 mg/L	
October			10 mg/L 108 lbs/day	10 mg/L	
TSS					3,4
May – October			10 mg/L	10 mg/L	
November – April			15 mg/L	15 mg/L	
TMDL			340 lbs/day	228 lbs/day	
pH	9.0 s.u.	6.0 s.u.			1
Dissolved Oxygen		6.0 mg/L			1
Bacteria					5
<i>E. coli</i>				126 #/100 mL geometric mean	
Total Residual Chlorine	25 µg/L		8.0 µg/L	8.0 µg/L	3
Total Phosphorus					4
TBEL				1.0 mg/L	
TMDL				23 lbs/day	
Ammonia Nitrogen					6
Jan – Feb	Variable		15 mg/L	5.3 mg/L	
March	Variable		19 mg/L	5.3 mg/L	

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
April	Variable		19 mg/L	2.2 mg/L	
May	Variable		5.2 mg/L	2.2 mg/L	
June – September	Variable		3.7 mg/L	1.7 mg/L	
October	Variable		9.4 mg/L	5.3 mg/L	
November	Variable		13 mg/L	5.3 mg/L	
December	Variable		12 mg/L	5.3 mg/L	
Chloride					7
Temperature					8
PFOS and PFOA					9
TKN, Nitrate+Nitrite, and Total Nitrogen					10
Acute WET					11,12
Chronic WET				1.1 TUc	11,12
Arsenic					13

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. Limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
4. The TSS and phosphorus mass limits are based on the TMDL for the Northeast Lakeshore Basin to address phosphorus water quality impairments within the TMDL area. The TMDL was approved by EPA on October 2023.
5. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
6. The pH – variable daily maximum ammonia limits are shown below:

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

7. Monitoring at a frequency to ensure that 11 samples are available at the next permit issuance.
8. Monitoring only year-round.
9. Monitoring is required in accordance with s. NR 106.98(2), Wis. Adm. Code once every two months.
10. 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 major municipal permittees. Total Nitrogen is the sum of nitrate (NO₃), nitrite (NO₂), and total kjeldahl nitrogen (TKN) (all expressed as N).

11. Annual acute and chronic WET testing is recommended. The Instream Waste Concentration (IWC) to assess chronic test results is 85%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 75%, 50%, 25% & 12.5% and the dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the Sheboygan River.
12. 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).
13. Monitor once with an LOD less than 3.6 µg/L.

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

Attachments (3) – Narrative, Outfall Map, & Thermal Table

PREPARED BY: Nicole Krueger, Water Resources Engineer – SER

E-cc: Heidi Schmitt Marquez, Regional Wastewater Supervisor – NER
Diane Figiel, Water Resources Engineer – WY/3
Kari Fleming, Environmental Toxicologist – WY/3
Michael Polkinghorn, Water Resources Engineer – NOR/Rhineland Service Center
Nate Willis, Wastewater Engineer – WY/3

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**Water Quality-Based Effluent Limitations for
 Kiel Wastewater Treatment Facility**

WPDES Permit No. WI-0020141-10

Prepared by: Nicole Krueger

PART 1 – BACKGROUND INFORMATION

Facility Description

Wastewater is collected throughout the city via a conventional gravity sewer system and lift stations. A magnetic flow meter at the main lift station monitors influent flow to the WWTF. Flow first passes through a mechanically-cleaned fine screen, or a stand-by comminutor, and then through an aerated grit chamber. Primary treatment is then accomplished via two clarifiers. Biological treatment is performed next, with an activated sludge system operating in the extended aeration mode. In the activated sludge system, phosphorus removal occurs by the addition of ferric sulfate. Sand filtration is then utilized, followed by chlorination via gaseous chlorine and dechlorination with gaseous sulfur dioxide. Sampling of the treated wastewater is performed, and flow then enters a post aeration basin prior to being discharged.

Sludge collected in the primary clarifiers is first stabilized in a conventional two-stage anaerobic digester system. A pair of aerated holding tanks are used to hold a combination of this primary sludge and waste activated sludge. This combined sludge is dewatered with a screw press and then further stabilized in a dryer. An on-site facility is used for storing this sludge, which usually meets the NR 204 Class A and “exceptional quality” sludge criteria.

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

Existing Permit Limitations

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD ₅ May – October			10 mg/L 108 lbs/day	10 mg/L		3
November – April			15 mg/L 161 lbs/day	15 mg/L		
TSS May – October			10 mg/L	10 mg/L		3
November – April			15 mg/L	15 mg/L		
pH	9.0 s.u.	6.0 s.u.				2
Dissolved Oxygen		6.0 mg/L				2
Fecal Coliform May – September			656#/100 mL geometric mean	400#/100 mL geometric mean		3
Residual Chlorine	38 µg/L		8.4 µg/L	8.4 µg/L		3

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Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Phosphorus Interim Final				1.0 mg/L 0.3 mg/L	0.1 mg/L 0.72 lbs/day	4
Ammonia Nitrogen Jan – Feb March April May June – September October November December	Variable Variable Variable Variable Variable Variable Variable Variable		15 mg/L 19 mg/L 19 mg/L 5.2 mg/L 3.7 mg/L 9.4 mg/L 13 mg/L 12 mg/L	5.3 mg/L 5.3 mg/L 2.2 mg/L 2.2 mg/L 1.7 mg/L 5.3 mg/L 5.3 mg/L 5.3 mg/L		5
Chloride						1
Temperature						1
Acute WET						6
Chronic WET						6

Footnotes:

1. Monitoring only.
2. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
3. Limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
4. A compliance schedule is in the current permit to meet the final WQBEL by April 1, 2025.
5. The daily maximum limits for ammonia are pH-based, shown below:

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
		8.2 < pH ≤ 8.3	9.4
pH ≤ 7.5	> 34	8.3 < pH ≤ 8.4	7.8
7.5 < pH ≤ 7.6	34	8.4 < pH ≤ 8.5	6.4
7.6 < pH ≤ 7.7	29	8.5 < pH ≤ 8.6	5.3
7.7 < pH ≤ 7.8	24	8.6 < pH ≤ 8.7	4.4
7.8 < pH ≤ 7.9	20	8.7 < pH ≤ 8.8	3.7
7.9 < pH ≤ 8.0	17	8.8 < pH ≤ 8.9	3.1
8.0 < pH ≤ 8.1	14	8.9 < pH ≤ 9.0	2.6
8.1 < pH ≤ 8.2	11	pH > 9.0	< 2.6

6. Acute WET testing is required once every other year and chronic WET testing is required once a year. The IWC for chronic WET was 85%.

Receiving Water Information

- Name: Sheboygan River
- Waterbody Identification Code (WBIC): 50700
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport

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Fish (WWSF) community, non-public water supply. Note: Cold Water and Public Water Supply criteria are used for bioaccumulating compounds of concern, because the discharge is within the Great Lakes basin.

- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q₁₀ and 7-Q₂ values are from USGS where Outfall 001 is located, updated 08/27/2008.

7-Q₁₀ = 0.93 cfs (cubic feet per second)
 7-Q₂ = 2.1 cfs

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7-Q ₁₀ (cfs)	1.7	1.7	3.4	11.6	3.9	2.1	2.1	1.5	1.1	1.4	2.2	1.9
7-Q ₂ (cfs)	4.7	5.1	13.3	24	10.1	5.4	5.4	3.2	2.8	4.1	6.4	6.1

- Hardness = 354 mg/L as CaCO₃. This value represents the geometric mean of data from chronic WET testing from 10/06/2020 – 03/23/2021.
- % 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 Sheboygan River at County Highway AA 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: There are several other dischargers to the Sheboygan River, however they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: The immediate receiving water is 303(d) listed as impaired for total phosphorus.

Effluent Information

- Design flow rate(s):
 Annual average = 1.43 MGD (Million Gallons per Day)
 For reference, the actual average flow from 02/01/2019 – 12/31/2023 was 1.24 MGD.
- Hardness = 331 mg/L as CaCO₃. This value represents the geometric mean of data from the permit reissuance application from 09/08/2022 – 09/20/2022.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water source: Domestic wastewater with water supply from wells with industrial wastewater from 5 contributors: Household Utilities, Land O Lakes, Sargento, Ameriquip, and Polarware.
- Additives: Chlorine is used for disinfection, sulfur dioxide is used for dechlorination, and ferric sulfate is used for phosphorus removal.
- Effluent characterization: This facility is categorized as a major municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus ammonia, chloride, hardness and phosphorus.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled “MEAN EFFL. CONC.”. Otherwise, substances with multiple effluent

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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
8/1/2022	17	8/18/2022	21	9/11/2022	21
8/5/2022	23	8/25/2022	26	9/15/2022	22
8/9/2022	22	8/29/2022	22	9/20/2022	20
8/14/2022	21	9/8/2022	21		
1-day P ₉₉ = 27 µg/L					
4-day P ₉₉ = 24 µg/L					

Effluent Chloride Data

	Chloride mg/L
1-day P ₉₉	479
4-day P ₉₉	401
30-day P ₉₉	357
Mean	333
Std	54.1
Sample size	59
Range	220 – 450

The following table presents the average concentrations and loadings at Outfall 001 from 02/01/2019 – 12/31/2023 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter Averages with Limits

	Average Measurement	Average Mass Discharged
BOD ₅	0.99 mg/L*	9.0 lbs/day
TSS	2.5 mg/L*	
pH min	7.73 s.u.	
pH max	7.88 s.u.	
Phosphorus	0.27 mg/L	
Ammonia Nitrogen	0.13 mg/L	
Fecal Coliform	22.7 #/100 mL	

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

PART 2 - BOD₅ and TSS

In establishing BOD₅ (Biochemical Oxygen Demand) limitations, the primary intent is to prevent a lowering of dissolved oxygen levels in the receiving water below water quality standards as specified in ss. NR 102.04(4)(a) and (b). The 26-lb method is the most frequently used approach for calculating BOD₅ limits when resources are not available to develop a detailed water quality model. This simplified model was developed in the 1970's by the Wisconsin Committee on Water Pollution on the Fox, Wisconsin, Oconto, and Flambeau Rivers. Further studies throughout the 1970's proved this model to be relatively accurate. The model has since then been used by the Department on many occasions when resources are

not available to perform a site-specific model. The "26" value stems from the following equation:

$$\frac{26 \text{ lbs/day}}{\text{ft}^3/\text{sec}} * \frac{1 \text{ day}}{86,400 \text{ sec}} * \frac{454,000 \text{ mg}}{\text{lbs}} * \frac{1 \text{ ft}^3}{28.32 \text{ L}} = 4.8 = 2.4 * 2 \text{ mg/L}$$

The 4.8 has been calculated by taking 2.4 which is the number one receives when converting 26 lbs of BOD/day/cfs into mg/L, multiplied by 2.0 which is the change in the DO level. A typical background DO level for Wisconsin waters is 7 mg/L, so a 2 mg/L decrease is allowed in order to meet the 5 mg/L standard for warm water streams. The above relationship is temperature dependent and an appropriate temperature correction factor is applied. The 26-lb method is based on a typical 24°C summer value for warm water streams. Adjustments for temperature are made using the following equation:

$$k_t = k_{24} (0.967^{(T-24)})$$

Where k_{24} = 26 lbs of BOD/day/cfs

Calculations based on Full Assimilative Capacity at 7Q10 Conditions:

$$Limitation(mg / L) = 2.4(DO_{stream} - DO_{std}) \left(\frac{({}_7Q_{10} + Q_{eff})}{Q_{eff}} \right) (0.967^{(T-24)})$$

Where:

Q_{eff} = effluent design flow = 1.43

DO_{stream} = background dissolved oxygen = 7 mg/L

DO_{std} = dissolved oxygen criteria from s. NR 102.04(4) = 5.0 mg/L

${}_7Q_{10}$ = 0.93 cfs

T = Receiving water temperature from s. NR 102.25

BOD₅ Effluent Limits

BOD Effluent Limitations (26 LB Method)		Jan	Feb	Mar	Apr	May	Jun
Background Information:	7-Q ₁₀ (cfs)	1.7	1.7	3.4	11.6	3.9	2.1
	River Temperature (°C)	0.6	1.1	3.3	8.9	14.4	18.9
Dissolved Oxygen mg/L:	Effluent	7	7	7	7	7	7
	Background	7	7	7	7	7	7
	Mix DO	7	7	7	7	7	7
	Criteria	5	5	5	5	5	5
Weekly Ave BOD Effluent Limitations	Concentration Limits (mg/L)	19	18	24	50	18	11
	Mass (lbs/d)	222	218	290	592	218	132

BOD Effluent Limitations (26 LB Method)		Jul	Aug	Sept	Oct	Nov	Dec
Background Information:	7-Q ₁₀ (cfs)	2.1	1.5	1.1	1.4	2.2	1.9
	River Temperature (°C)	20.6	19.4	15.6	10.0	4.4	1.7
Dissolved Oxygen	Effluent	7	7	7	7	7	7
	Background	7	7	7	7	7	7

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mg/L:	Mix DO	7	7	7	7	7	7
	Criteria	5	5	5	5	5	5
Weekly Ave BOD Effluent Limitations	Concentration Limits (mg/L)	10	9.4	9.5	13	18	19
	Mass (lbs/d)	125	112	114	149	220	225

The current weekly average BOD₅ limits are 10 mg/L and 108 lbs/day for May – October and 15 mg/L and 161 lbs/day for November – April. Calculated limits that are less stringent than the current limits are not recommended to increase. Some limits are less stringent due to the use of monthly low flows. The effluent DO minimum daily limit of 6.0 mg/L is recommended to increase to 7.0 mg/L.

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, monthly average limits equal to the weekly average limits are required** to meet expression of limits requirements and are shown in bold in the table below.

The TSS limitations are primarily given to maintain or improve water clarity and are not water quality based. However the Department typically does not require TSS limits lower than 10 mg/L, otherwise suspended solids limitations are established as the same concentration as the BOD₅ limitations.

The following table summarizes the BOD₅ and TSS limits recommendations.

BOD₅ and TSS Limits

		Weekly Average	Monthly Average
BOD ₅	November – April	15 mg/L 161 lbs/day	15 mg/L
	May – July	10 mg/L 108 lbs/day	10 mg/L
	August	9.4 mg/L 108 lbs/day	9.4 mg/L
	September	9.5 mg/L 108 lbs/day	9.5 mg/L
	October	10 mg/L 108 lbs/day	10 mg/L
	TSS	May – October November – April	10 mg/L 15 mg/L

PART 3 – 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 P₉₉) 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-Q₁₀

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-Q₁₀ receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

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

Where:

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

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

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

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

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q₁₀ method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is the case for Kiel.

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0.74 cfs, (1-Q₁₀ (estimated as 80% of 7-Q₁₀)), 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		25.4			27	
Arsenic		340	10	451	90.1	<14		
Cadmium	331	40.7	0.2	54.3	10.9	<0.3		
Chromium	301	4446	3	5940	1188	<1.3		
Copper	331	48.0	4.3	62.7			27	
Lead	331	340	3	453	90.6	<3.5		
Nickel	268	1080	20	1437	287	5.2		
Zinc	331	343	23	450	90.1	10		

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SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P ₉₉	1-day MAX. CONC.
Chloride (mg/L)		757	28	1002			479	450

* 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-Q₁₀ 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 = 0.23 cfs (¼ of the 7-Q₁₀), 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		8.04			8.8
Arsenic		152	10	167	33.4	<14	
Cadmium	175	3.82	0.2	4.20	0.84	<0.3	
Chromium	301	326	3.0	360	71.9	<1.3	
Copper	354	30.5	4.3	33.3			24
Lead	354	95.0	3.0	105	20.9	<3.5	
Nickel	268	120	20	131	26.1	5.2	
Zinc	333	345	23	378	75.7	10	
Chloride (mg/L)		395	28	434			401

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

Monthly Average Limits based on Wildlife Criteria (WC)

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

Monthly Average Limits based on Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 2.994 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	0.2	870	174	<0.3
Chromium (+3)	3818000	3.0	8984437	1796887	<1.3
Lead	140	3.0	325	65.1	<3.5
Nickel	43000	20	101160	20232	5.2

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 2.994 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3	10	17.8	3.55	<14

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

Conclusions and Recommendations

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

Total Residual Chlorine – Because chlorine is added as a disinfectant, effluent limitations are recommended to assure proper operation of the de-chlorination system. Section NR 210.06(2)(b), Wis. Adm. Code, states, “When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L.” Because the WQBELs are more restrictive, they are recommended instead. Specifically, **a daily maximum limit of 25 µg/L is required. The weekly average effluent limitation of 8.0 µg/L should also be included in the permit because it is more restrictive than the daily maximum limit.** These are more restrictive than the current daily maximum and weekly average limits.

Sections NR 106.07(3) and NR 205.067(7), Wis. Adm. Code require WPDES permits contain weekly average and monthly average limitations for municipal dischargers whenever practicable and necessary to protect water quality. **Therefore, a monthly average limit of 8.0 µg/L is required** to meet expression of limits requirements, equal to the weekly average limit.

Chloride – Considering available effluent data from the current permit term (02/26/2019 – 12/19/2023), the 1-day P₉₉ chloride concentration is 479 mg/L, and the 4-day P₉₉ of effluent data is 401 mg/L.

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

Arsenic – The sample that was collected for the permit reissuance application had a limit of detection (LOD) of 14 µg/L which is greater than 1/5th of the most stringent calculated limit of 18.3 µg/L based on the human cancer criteria. Because the LOD is greater than the most stringent calculated limit, reasonable potential cannot be determined. **It is recommended that the reissued permit include monitoring for one arsenic sample with an LOD of less than 3.6 µg/L.**

Mercury – The permit application did not require monitoring for mercury because the previous design flow was less than 1.0 MGD and the facility met the requirements in s. NR 200.02(8), Wis. Adm. Code. A review of the past five years of sludge characteristics data reveals that all the sample results are within expected analytical ranges and well below the 17 mg/kg level. The average concentration in the sludge

from 06/18/2019 – 12/06/2023 was 0.19 mg/kg, with a maximum reported concentration of 0.097 mg/kg. Therefore, no mercury monitoring is recommended at Outfall 001.

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the effluent flow rate, the available PFOS/PFOA monitoring data, and known levels of PFOS/PFOA in the source water PFOS and PFOA monitoring is recommended at a once every two months frequency.

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

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

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

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

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

Where:

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

The effluent pH data was examined as part of this evaluation. A total of 1795 sample results were reported from 02/02/2019 – 12/31/2023. The maximum reported value was 10.5 s.u. (Standard pH Units). The effluent pH was 8.72 s.u. or less 99% of the time. The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.62 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 8.59 s.u. Therefore, a value of 8.6 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 8.6 s.u. into the equation above yields an ATC = 2.65 mg/L.

Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method

In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are calculated using the the 1-Q₁₀ 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-Q₁₀ (estimated as 80 % of 7-Q₁₀) and the 2×ATC approach are shown below.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	5.3
1-Q ₁₀	3.5

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

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 – WWSF

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

Section NR 106.33(2), Wis. Adm. Code, was updated effective September 1, 2016. As a result, seasonal 20 and 40 mg/L thresholds for including ammonia limits in municipal discharge permits are no longer applicable under current rules. As such, the table has been expanded from the table in the current permit to include ammonia nitrogen limits throughout the pH range.

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 previous WQBEL memo are shown in Attachment #2.

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from 02/03/2019 – 12/26/2023, with those results being compared to the calculated limits to determine the need to include ammonia limits in Kiel’s permit for the respective month ranges. That need is determined by calculating 99th upper percentile (or P₉₉) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

Attachment #1

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	April - May	June - September	October - March
1-day P ₉₉	1.04	0.75	0.86
4-day P ₉₉	0.57	0.40	0.46
30-day P ₉₉	0.27	0.21	0.23
Mean	0.14	0.13	0.13
Std	23	0.15	0.18
Sample size	82	164	235
Range	0.03 – 1.56	0.02 – 1.01	0.01 – 1.6

Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits.

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

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

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
January – February	Variable	15	5.3
March	Variable	19	5.3
April	Variable	19	2.2
May	Variable	5.2	2.2
June – September	Variable	3.7	1.7
October	Variable	9.4	5.3
November	Variable	13	5.3
December	Variable	12	5.3

PART 5– WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

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

- 1. The geometric mean of *E. coli* bacteria in effluent samples collected in any calendar month may not exceed 126 counts/100 mL.

2. No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 counts/100 mL.

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

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

Effluent Data

Kiel has monitored effluent *E. coli* from 05/06/2022 – 09/28/2022 and a total of 20 results are available. A geometric mean of 126 counts/100 mL was not exceeded, with a maximum monthly geometric mean of 12 counts/100 mL. Effluent data did not 410 counts/100 mL. The maximum reported value was 71 counts/100 mL. Based on this effluent data it appears that the facility can meet new *E. coli* limits and a compliance schedule is not needed in the reissued permit.

PART 6 – PHOSPHORUS

Technology-Based Effluent Limit

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

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

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

Northeast Lakeshore TMDL

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

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

$$\text{TP Equivalent Effluent Concentration} = \text{WLA} \div (365 \text{ days/yr} * \text{Flow Rate} * \text{Conversion Factor})$$

$$\begin{aligned} & \text{Attachment \#1} \\ & = 4,359 \text{ lbs/yr} \div (365 \text{ days/yr} * 1.43 \text{ MGD} * 8.34) \\ & = 1.0 \text{ mg/L} \end{aligned}$$

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

$$\begin{aligned} \text{TP Monthly Average Permit Limit} &= \text{WLA} \div 365 \text{ days/yr} * \text{multiplier} \\ &= (4,359 \text{ lbs/yr} \div 365 \text{ days/yr}) * 1.90 \\ &= 23 \text{ lbs/day} \end{aligned}$$

The multiplier used in the six-month average calculation was determined according to the implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 1.3. This is the standard deviation divided by the mean of mass data. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by the facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as monthly. Because there is a phosphorus limit, the monitoring frequency shall be at least weekly. If a different monitoring frequency is used, the stated limits should be reevaluated.

Monthly average mass effluent limits are recommended for this discharge. The limits are equivalent to a concentration of 1.9 mg/L at the facility design flow of 1.43 MGD.

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

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

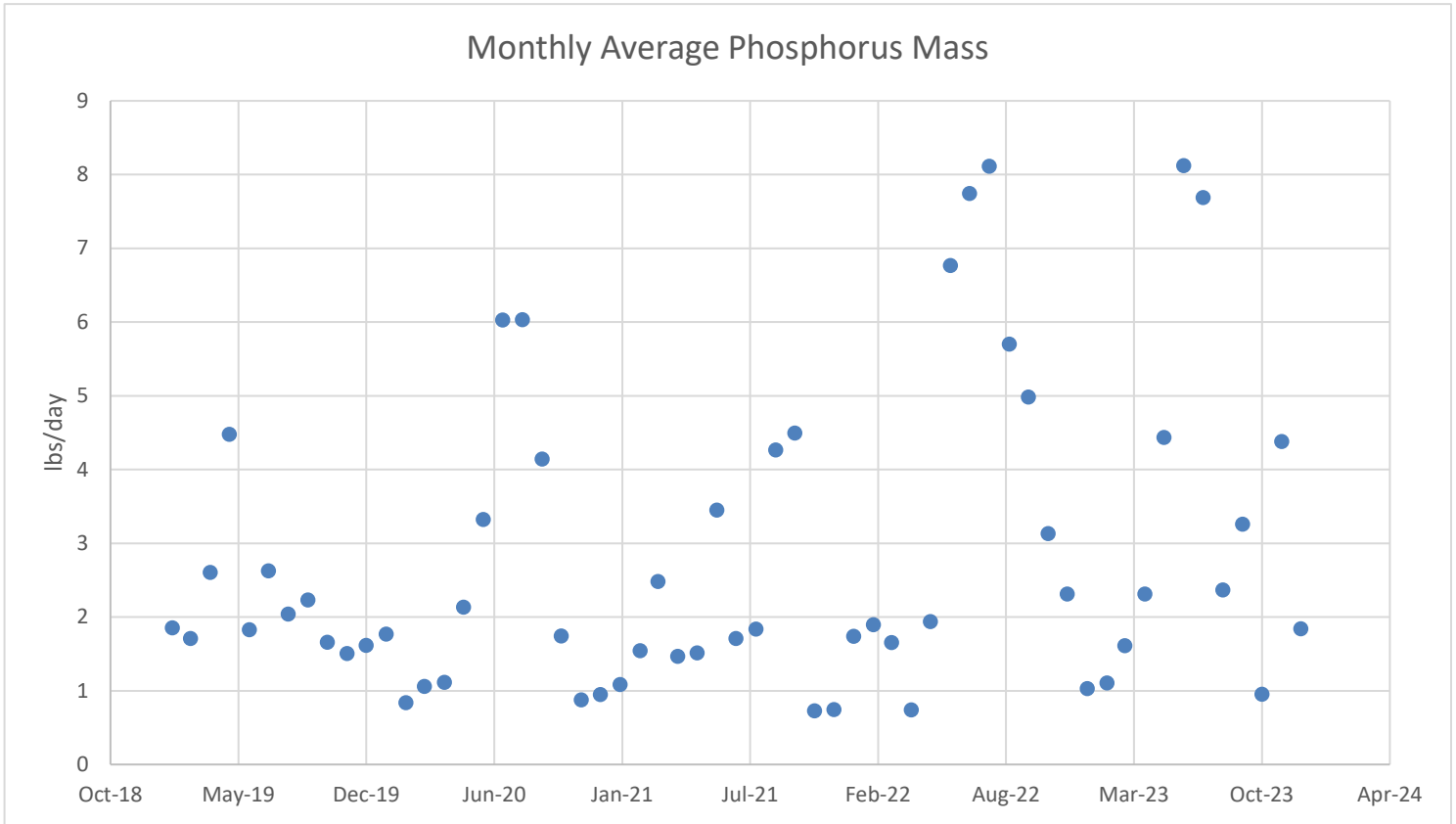
Effluent Data

The following table summarizes effluent total phosphorus monitoring data from 02/03/2019 – 12/26/2023. The mass data was calculated using the flow rates reported on the same days as the phosphorus concentrations.

Total Phosphorus Effluent Data

	Phosphorus mg/L	Phosphorus lbs/day
1-day P ₉₉	1.61	16.7
4-day P ₉₉	0.87	9.05
30-day P ₉₉	0.45	4.61
Mean	0.27	2.80
Std	0.34	3.51
Sample size	481	481
Range	0.032 – 2.96	0.289 – 32.2

The following graph shows the monthly average mass loading:



Kiel can currently meet the TMDL-based mass limit of 23 lbs/day as a monthly average. **No compliance schedule is recommended and the TMDL limits are recommended to become effective immediately upon permit reissuance along with the TBEL.**

PART 7 – TOTAL SUSPENDED SOLIDS

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

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

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

Attachment #1

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

$$\begin{aligned} \text{TSS Monthly Average Permit Limit} &= \text{WLA} \div 365 \text{ days/yr} * \text{multiplier} \\ &= (52,306 \text{ lbs/yr} \div 365 \text{ days/yr}) * 1.59 \\ &= 228 \text{ lbs/day} \end{aligned}$$

$$\begin{aligned} \text{TSS Weekly Average Permit Limit} &= \text{WLA} \div 365 \text{ days/yr} * \text{multiplier} \\ &= (52,306 \text{ lbs/yr} \div 365 \text{ days/yr}) * 2.37 \\ &= 340 \text{ lbs/day} \end{aligned}$$

The multiplier used in the weekly average and monthly average calculation was determined according to implementation guidance. A coefficient of variation was calculated, based on TSS mass monitoring data, to be 1.4. This is the standard deviation divided by the mean of mass data. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by the facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies TSS monitoring as 3/week; if a different monitoring frequency is used, the stated limits should be reevaluated.

Weekly average and monthly average mass effluent limits are recommended for this discharge. The limits are equivalent to a concentration of 28 mg/L and 19 mg/L, respectively, at the facility design flow of 1.43 MGD.

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

Effluent Data

The following table summarizes effluent total suspended solids monitoring data from 02/05/2019 – 12/17/2023.

Total Suspended Solids Effluent Data

	TSS mg/L	TSS lbs/day
1-day P ₉₉	14.2	155
4-day P ₉₉	8.16	87.7
30-day P ₉₉	4.20	44.2
Mean*	2.52	26.0
Std	3.23	35.8
Sample size	481	481
Range	<2 – 25.4	0 – 274

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

Kiel can currently meet the TSS mass limits and a compliance schedule is not needed.

**PART 8 – WATER QUALITY-BASED EFFLUENT LIMITATIONS
FOR THERMAL**

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in chs. NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. Daily maximum and weekly average temperature criteria are available for the 12 different months of the year depending on the receiving water classification.

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from 02/01/2019 – 12/31/2023.

A heat loss equation is used to adjust the calculated limit based upon the length of the storm sewer/storm water conveyance channel before discharge to waters of the state, because the discharge is to a storm sewer. The discharge from permit Outfall 001 travels through at least 900 feet of storm sewer/storm water conveyance channel before reaching the Sheboygan River. Under s. NR 106.55(5), Wis. Adm. Code, the default cooling rate is estimated as 1° F for every 400 feet of storm sewer/storm water conveyance channel. The adjusted limits are shown in the table.

The table below summarizes the maximum temperatures reported during monitoring from 02/01/2019 – 12/31/2023.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
JAN	74	75	54	85
FEB	74	77	55	84
MAR	75	76	58	89
APR	60	65	63	105
MAY	69	72	70	92
JUN	78	79	80	88
JUL	82	83	85	89
AUG	84	85	85	88
SEP	82	84	77	86
OCT			64	84
NOV	81	82	53	87
DEC	83	86	54	86

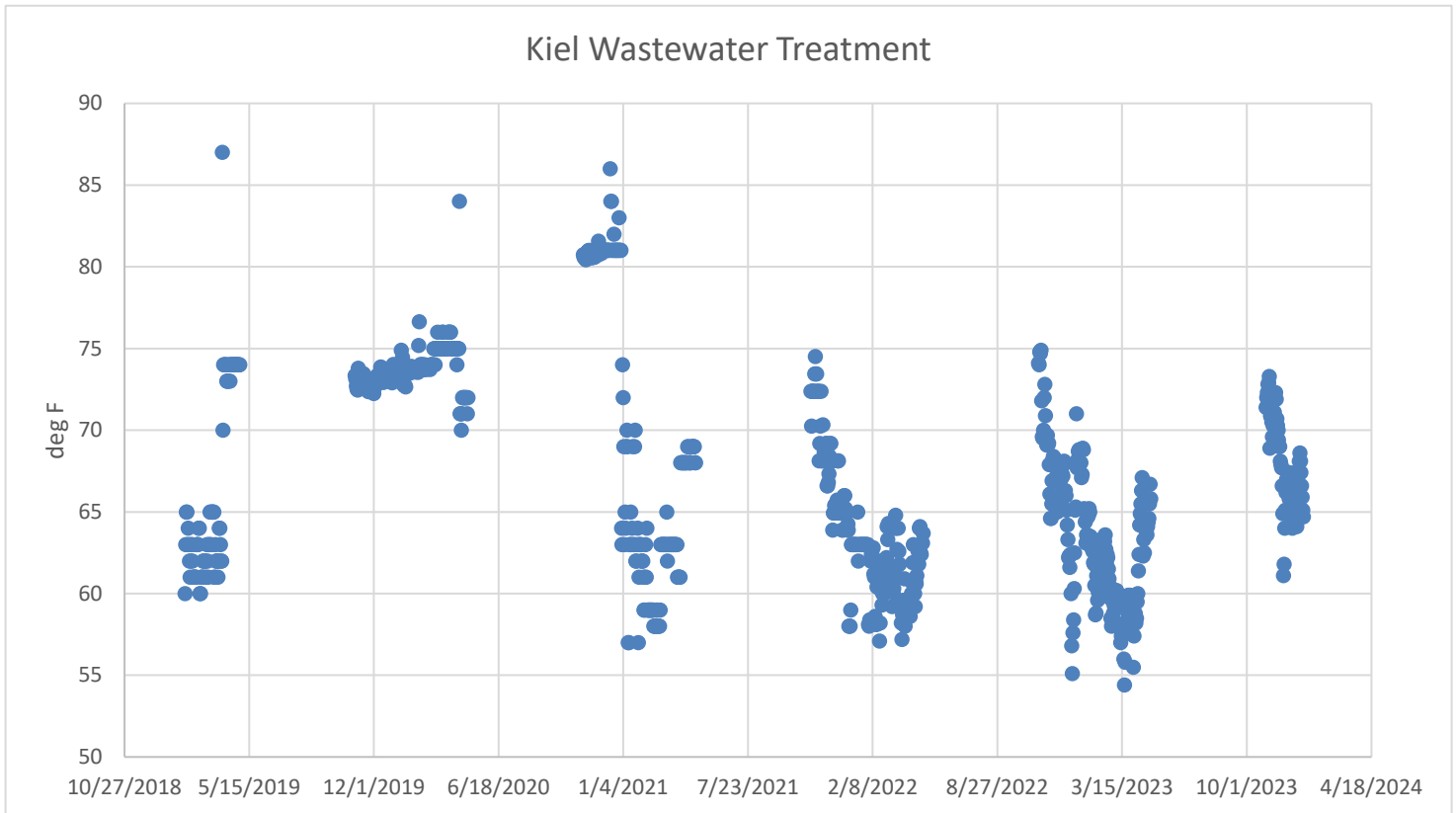
Reasonable Potential

Permit limits for temperature are recommended based on the procedures in s. NR 106.56, Wis. Adm. Code.

- An acute limit for temperature is recommended for each month in which the representative daily maximum effluent temperature for that month exceeds the acute WQBEL. The representative daily maximum effluent temperature is the greater of the following:
 - (a) The highest recorded representative daily maximum effluent temperature
 - (b) The projected 99th percentile of all representative daily maximum effluent temperatures
- A sub-lethal limitation for temperature is recommended for each month in which the representative weekly average effluent temperature for that month exceeds the weekly average WQBEL. The representative weekly average effluent temperature is the greater of the following:
 - (a) The highest weekly average effluent temperature for the month.
 - (b) The projected 99th percentile of all representative weekly average effluent temperatures for the month

Kiel submitted a dissipative cooling (DC) study in 2017 which was approved because the discharge allows for a zone of free passage for fish in the river. Instream temperatures did not exceed any sublethal criteria downstream of the outfall and did not increase the temperature in the stream to above 3 degrees from ambient conditions.

The temperature data from the current permit term is summarized below:



In 2019 and 2020, the temperature data reached temperatures of above 80 degrees in November and December which is greater than 30 degrees above the calculated weekly average limits. This data appears unusual compared to the seasonal variability of the other years. Since the beginning of 2021, the effluent temperatures appear to have decreased to be consistently below 75 degrees F in November and 70 degrees F in December.

The instream monitoring for the DC request was done in April – October 2014. There is not effluent temperature available during this time period. The DC request included effluent temperature data for 2015-2017 which showed the highest weekly average for November was 79 degrees F and the highest weekly average for December was 71 degrees F.

Because there is a large amount of industrial wastewater, it is recommended that Kiel identify changes in thermal loadings. Another DC study will be needed during the winter months if the heat loading appears to increase again above the conditions during the DC study.

Future WPDES Permit Reissuance

Dissipative cooling requests must be re-evaluated every permit reissuance. The permittee is responsible for submitting an updated DC request prior to permit reissuance. Such a request must either include:

- a) A statement by the permittee that there have been no substantial changes in operation of, or thermal loadings to, the treatment facility and the receiving water; or
- b) New information demonstrating DC to supplement the information used in the previous DC determination. If significant changes in operation or thermal loads have occurred, additional DC data must be submitted to the Department.

PART 9 – 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 LC₅₀ (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 IC₂₅ (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 **90%** shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Attachment #1

Where:

- Q_e = annual average flow = 1.43 MGD = 2.213 cfs
- f = fraction of the Q_e withdrawn from the receiving water = 0
- Q_s = $\frac{1}{4}$ of the $7-Q_{10}$ = 0.93 cfs \div 4 = 0.23 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 is not included in this evaluation.

WET Data History

Date Test Initiated	Acute Results LC ₅₀ %				Chronic Results IC ₂₅ %			
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	<i>C. dubia</i>	Fathead Minnow	Pass or Fail?	Use in RP?
	10/18/2005	>100	>100	Pass	Yes	>100	>100	Pass
09/12/2006	>100	>100	Pass	Yes	>100	>100	Pass	Yes
05/01/2007	>100	>100	Pass	Yes	82.4	>100	Fail	Yes
02/26/2008					78.7	>100	Fail	Yes
06/10/2008					>100	>100	Pass	Yes
07/29/2008					>100	>100	Pass	Yes
09/15/2009	>100	>100	Pass	Yes	>100	>100	Pass	Yes
05/18/2010					>100	>100	Pass	Yes
10/19/2010	>100	>100	Pass	Yes	>100	>100	Pass	Yes
03/15/2011					>100	>100	Pass	Yes
04/10/2012					>100	>100	Pass	Yes
03/19/2013	>100	>100	Pass	Yes	>100	>100	Pass	Yes
07/31/2018	>100	>100	Pass	Yes	>100	>100	Pass	Yes
04/02/2019					>100	>100	Pass	Yes
10/06/2020	>100	>100	Pass	Yes	>100	>100	Pass	Yes
01/05/2021					92	11.9	Fail	Yes
02/16/2021					>100	>100	Pass	Yes
03/23/2021					>100	>100	Pass	Yes
01/12/2022	>100	>100	Pass	Yes				
07/12/2022					>100	>100	Pass	Yes

04/25/2023					>100	>100	Pass	Yes
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- According to s. NR 106.08, Wis. Adm. Code, WET reasonable potential is determined by multiplying the highest toxicity value that has been measured in the effluent by a safety factor, to predict the likelihood (95% probability) of toxicity occurring in the effluent above the applicable WET limit. The safety factor used in the equation changes based on the number of toxicity detects in the dataset. The fewer detects present, the higher the safety factor, because there is more uncertainty surrounding the predicted value. **WET limits must be given, according to s. NR 106.08(6), Wis. Adm. Code, whenever the applicable Reasonable Potential equation results in a value greater than 1.0.**

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

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

According to s. NR 106.08(6)(d), Wis. Adm. Code, TU_a and TU_c 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 = $0 < 1.0$, reasonable potential is not shown, and a limit is not required.

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

Chronic WET Limit Parameters

TU _c (maximum) 100/IC ₂₅	B (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
100/11.9 = 8.4	3.0 Based on 3 detects	90%

$$[(TU_c \text{ effluent}) (B)(IWC)] = 23 > 1.0$$

Therefore, reasonable potential is shown for chronic WET limits using the procedures in s. NR 106.08(6) and representative data from 10/18/2005 – 04/25/2023.

Expression of WET limits

$$\text{Chronic WET limit} = [100/IWC] TU_c = 1.1 TU_c \text{ expressed as a monthly average}$$

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>.

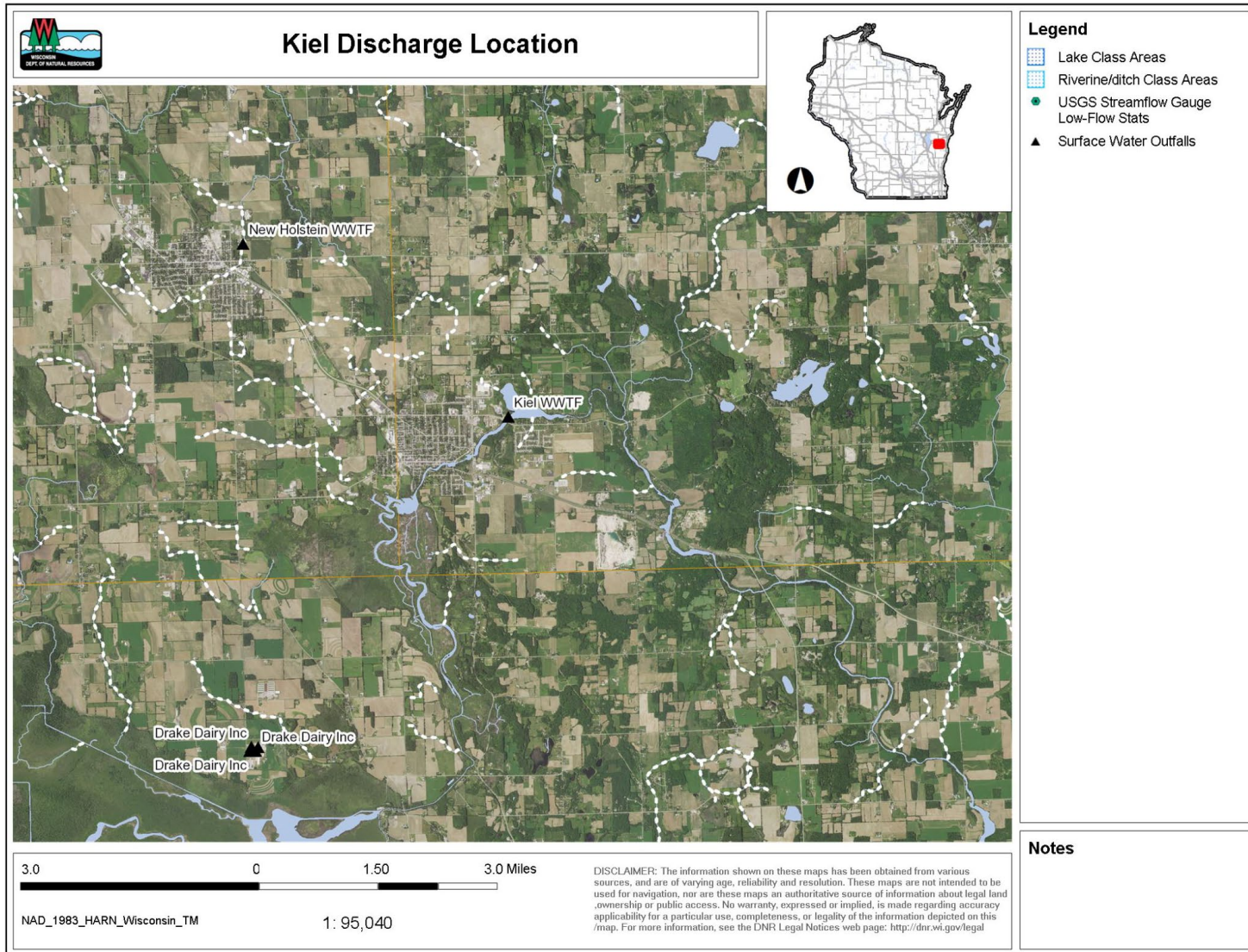
Attachment #1
WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. 0 Points	IWC = 90%. 15 Points
Historical Data	9 tests used to calculate RP. No tests failed. 0 Points	18 tests used to calculate RP. 3 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 community. 5 Points	Same as Acute. 5 Points
Chemical-Specific Data	Reasonable potential for limits for chlorine based on ATC; Ammonia nitrogen limit carried over from the current permit. Ammonia, copper, nickel, zinc, and chloride detected. Additional Compounds of Concern: None. 8 Points	Reasonable potential for limits for chlorine based on CTC; Ammonia nitrogen limit carried over from the current permit. Ammonia, copper, nickel, zinc, and chloride detected. Additional Compounds of Concern: None. 8 Points
Additives	1 Biocide and 2 Water Quality Conditioners added. Permittee has proper P chemical SOPs in place. 5 Points	All additives used more than once per 4 days. 5 Points
Discharge Category	5 Industrial Contributors. 9 Points	Same as Acute. 9 Points
Wastewater Treatment	Secondary or Better 0 Points	Same as Acute. 0 Points
Downstream Impacts	No impacts known. 0 Points	Same as Acute. 0 Points
Total Checklist Points:	27 Points	42 Points
Recommended Monitoring Frequency (from Checklist):	1x yearly	1x yearly
Limit Required?	No	Yes Limit = 1.1 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, annual 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).

Attachment #1

- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, a chronic WET limit is required. The chronic WET limit shall be expressed as 1.1 TUc as a monthly average in the effluent limits table of the permit.
- A minimum of annual chronic monitoring is required because a chronic WET limit is required. Federal regulations in 40 CFR Part 122.44(i) require that monitoring occur at least once per year when a limit is present.
- A minimum of annual acute and chronic monitoring is recommended because Kiel 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.



Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

Facility:	Kiel Wastewater Treatment	7-Q₁₀:	0.93 cfs	Temp Dates		Flow Dates	
Outfall(s):	001	Dilution:	25%	Start:	02/01/19	02/01/19	
Date Prepared:	03/13/2024	f:	0	End:	12/31/23	12/31/23	
Design Flow (Q_e):	1.43 MGD	Stream type:	Small warm water sport or forage fish co				
Storm Sewer Dist.	900 ft	Q_s:Q_e ratio:	0.1 :1				
		Calculation Needed?	YES				

Month	Water Quality Criteria			Receiving Water Flow Rate (Q _s) (cfs)	Representative Highest Effluent Flow Rate (Q _e)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit		Adjusted Thermal Limits	
	T _a (default) (°F)	Sub-Lethal WQC (°F)	Acute WQC (°F)		7-day Rolling Average (Q _{esl}) (MGD)	Daily Maximum Flow Rate (Q _{ea}) (MGD)		Weekly Average (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)	Weekly Average (°F)	Daily Maximum (°F)
JAN	33	49	76	1.70	1.738	1.809	0	74	75	52	83	54	85
FEB	34	50	76	1.70	1.405	2.000	0	74	77	53	82	55	84
MAR	38	52	77	3.40	1.859	2.192	0	75	76	56	87	58	89
APR	48	55	79	11.60	2.213	2.456	0	60	65	61	103	63	105
MAY	58	65	82	3.90	1.702	1.958	0	69	72	68	90	70	92
JUN	66	76	84	2.10	1.710	3.803	0	78	79	78	86	80	88
JUL	69	81	85	2.10	1.900	2.726	0	82	83	83	87	85	89
AUG	67	81	84	1.50	1.975	3.014	0	84	85	83	85	85	88
SEP	60	73	82	1.10	1.615	1.836	0	82	84	74	84	77	86
OCT	50	61	80	1.40	2.200	3.145	0			62	82	64	84
NOV	40	49	77	2.20	1.618	1.699	0	81	82	51	85	53	87
DEC	35	49	76	1.90	1.461	1.732	0	83	86	52	83	54	86