WPDES PERMIT

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

City of Kiel

is permitted, under the authority of Chapter 283, Wisconsin Statutes, to discharge from a facility located at
100 E. Park Avenue, Kiel, Wisconsin
to
the 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

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By _____
Kelley O'Connor
Wastewater Supervisor, Northeast Region

_____
Date Permit Signed/Issued

PERMIT TERM: EFFECTIVE DATE - April 01, 2018 **EXPIRATION DATE - March 31, 2023**

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1 Influent Requirements

1.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
701	Influent - Representative influent samples shall be collected from the composite sampling device drawing samples from the open channel following screening or comminution.

1.2 Monitoring Requirements

The permittee shall comply with the following monitoring requirements.

1.2.1 Sampling Point 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	

2 Surface Water Requirements

2.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
001	Effluent - Representative effluent samples shall be collected from the composite sampling device drawing samples from the acid mix basin following disinfection except that samples for pH, fecal coliform, total residual chlorine, and Whole Effluent Toxicity shall be collected from the post aeration basin.

2.2 Monitoring Requirements and Effluent Limitations

The permittee shall comply with the following monitoring requirements and limitations.

2.2.1 Sampling Point (Outfall) 001 - Effluent

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD_5, Total	Weekly Avg	10 mg/L	2/Week	24-Hr Flow Prop Comp	Applies May 1 through October 31, each year.
BOD_5, Total	Monthly Avg	10 mg/L	2/Week	24-Hr Flow Prop Comp	Applies May 1 through October 31, each year.
BOD_5, Total	Weekly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Applies November 1 through April 30, each year.
BOD_5, Total	Monthly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Applies November 1 through April 30, each year.
BOD_5, Total	Weekly Avg	108 lbs/day	2/Week	Calculated	Applies May 1 through October 31, each year.
BOD_5, Total	Weekly Avg	161 lbs/day	2/Week	Calculated	Applies November 1 through April 30, each year.
Suspended Solids, Total	Weekly Avg	10 mg/L	2/Week	24-Hr Flow Prop Comp	Applies May 1 through October 31, each year.
Suspended Solids, Total	Monthly Avg	10 mg/L	2/Week	24-Hr Flow Prop Comp	Applies May 1 through October 31, each year.
Suspended Solids, Total	Weekly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Applies November 1 through April 30, each year.
Suspended Solids, Total	Monthly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Applies November 1 through April 30, each year.
pH Field	Daily Min	6.0 su	Daily	Continuous	
pH Field	Daily Max	9.0 su	Daily	Continuous	
Dissolved Oxygen	Daily Min	6.0 mg/L	Daily	Continuous	
Fecal Coliform	Geometric Mean - Wkly	656 #/100 ml	Weekly	Grab	Applies May 1 through September 30, each year.

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Fecal Coliform	Geometric Mean - Monthly	400 #/100 ml	Weekly	Grab	Applies May 1 through September 30, each year.
Chlorine, Total Residual	Daily Max	38 µg/L	5/Week	Grab	Applies whenever chlorine is used.
Chlorine, Total Residual	Weekly Avg	8.4 µg/L	5/Week	Grab	Applies whenever chlorine is used.
Chlorine, Total Residual	Monthly Avg	8.4 µg/L	5/Week	Grab	Applies whenever chlorine is used.
Phosphorus, Total	Monthly Avg	1.0 mg/L	Monthly	24-Hr Flow Prop Comp	This is an interim limit. The final effluent limits will be 0.3 mg/L as a monthly average and 0.1 mg/L and 0.72 lbs/day as 6-month averages. See Sections 2.2.1.2, 2.2.1.3, 2.2.1.4 below and 4.1 for the compliance schedule.
Nitrogen, Ammonia Variable Limit		mg/L	2/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH_3-N) Total	Daily Max - Variable	mg/L	2/Week	24-Hr Flow Prop Comp	Limit based on effluent pH; See Section 2.2.1.5
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Applies January through February.
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	19 mg/L	2/Week	24-Hr Flow Prop Comp	Applies March through April.
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	5.2 mg/L	2/Week	24-Hr Flow Prop Comp	Applies in May only.
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	3.7 mg/L	2/Week	24-Hr Flow Prop Comp	Applies June through September.
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	9.4 mg/L	2/Week	24-Hr Flow Prop Comp	Applies in October only.
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	13 mg/L	2/Week	24-Hr Flow Prop Comp	Applies in November only.
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	12 mg/L	2/Week	24-Hr Flow Prop Comp	Applies in December only.
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	5.3 mg/L	2/Week	24-Hr Flow Prop Comp	Applies October through March.
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	2.2 mg/L	2/Week	24-Hr Flow Prop Comp	Applies April through May.
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	1.7 mg/L	2/Week	24-Hr Flow Prop Comp	Applies June through September.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	
Temperature		deg F	3/Week	Measure	Monitoring only November through April, each year.

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Acute WET		TU_a	See Listed Qtr(s)	24-Hr Flow Prop Comp	See Section 2.2.1.6 for WET testing schedule and requirements.
Chronic WET		TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See Section 2.2.1.6 for WET testing schedule and requirements.

2.2.1.1 Average Annual Design Flow

The average annual design flow of the permittee's wastewater treatment facility is 1.29 MGD.

2.2.1.2 Phosphorus Water Quality Based Effluent Limitation(s)

The final water quality based effluent limits for phosphorus are 0.3 mg/L as a monthly average and 0.1 mg/L & 0.72 lbs/day as six-month averages and will take effect per the Compliance Schedule unless:

(A) As part of the application for the next reissuance, or prior to filing the application, the permittee submits either: 1.) a watershed adaptive management plan and a completed Watershed Adaptive Management Request Form 3200-139; or 2.) an application for water quality trading; or 3.) an application for a variance; or 4.) new information or additional data that supports a recalculation of the numeric limitation; and

(B) The Department modifies, revokes and reissues, or reissues the permit to incorporate a revised limitation before the expiration of the compliance schedule*.

Note: The permittee may also submit an application for a variance within 60 days of this permit reissuance, as noted in the permit cover letter, in accordance with s. 283.15, Stats.

If Adaptive Management or Water Quality Trading is approved as part of the permit application for the next reissuance or as part of an application for a modification or revocation and reissuance, the plan and specifications submittal, construction, and final effective dates for compliance with the total phosphorus WQBEL may change in the reissued or modified permit. In addition, the numeric value of the water quality based effluent limit may change based on new information (e.g. a TMDL) or additional data. If a variance is approved for the next reissuance, interim limits and conditions will be imposed in the reissued permit in accordance with s. 283.15, Stats., and applicable regulations. A permittee may apply for a variance to the phosphorus WQBEL at the next reissuance even if the permittee did not apply for a phosphorus variance as part of this permit reissuance.

Additional Requirements: If a water quality based effluent limit has taken effect in a permit, any increase in the limit is subject to s. NR 102.05(1) and ch. NR 207, Wis. Adm. Code. When a six-month average effluent limit is specified for Total Phosphorus the applicable averaging periods are May through October and November through April.

*Note: The Department will prioritize reissuances and revocations, modifications, and reissuances of permits to allow permittees the opportunity to implement adaptive management or nutrient trading in a timely and effective manner.

2.2.1.3 Alternative Approaches to Phosphorus WQBEL Compliance

Rather than upgrading its wastewater treatment facility to comply with WQBELs for total phosphorus, the permittee may use Water Quality Trading or the Watershed Adaptive Management Option, to achieve compliance under ch. NR 217, Wis. Adm. Code, provided that the permit is modified, revoked and reissued, or reissued to incorporate any such alternative approach. The permittee may also implement an upgrade to its wastewater treatment facility in combination with Water Quality Trading or the Watershed Adaptive Management Option to achieve compliance, provided that the permit is modified, revoked and reissued, or reissued to incorporate any such alternative approach.

If the Final Compliance Alternatives Plan concludes that a variance will be pursued, the Plan shall provide information regarding the basis for the variance.

2.2.1.4 Submittal of Permit Application for Next Reissuance and Adaptive Management or Pollutant Trading Plan or Variance Application

The permittee shall submit the permit application for the next reissuance at least 6 months prior to expiration of this permit. If the permittee intends to pursue adaptive management to achieve compliance with the phosphorus water quality based effluent limitation, the permittee shall submit with the application for the next reissuance: a completed Watershed Adaptive Management Request Form 3200-139, the completed Adaptive Management Plan and final plans for any system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the permittee intends to pursue pollutant trading to achieve compliance, the permittee shall submit an application for water quality trading with the application for the next reissuance. If system upgrades will be used in combination with pollutant trading to achieve compliance with the final water quality-based limit, the reissued permit will specify a schedule for the necessary upgrades. If the permittee intends to seek a variance, the permittee shall submit an application for a variance with the application for the next reissuance.

2.2.1.5 Daily Maximum Ammonia Nitrogen (NH3-N) Limits

The daily maximum ammonia nitrogen effluent limit is a variable limit, dependent upon the effluent pH. Presented below is a table of the daily maximum ammonia nitrogen effluent limits corresponding to various effluent pH values. Measurement of effluent pH is required on the same days as the collection of samples for ammonia analysis.

Effluent pH – s.u.	Daily Max. Ammonia Limit – mg/L	Effluent pH – s.u.	Daily Max. Ammonia 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

For each day that the effluent is monitored for ammonia, report the measured ammonia concentration in the Ammonia column of the Discharge Monitoring Report (DMR) and the applicable variable limit (from the table above) in the Ammonia Variable Limit column of the DMR, specifically:

- If the pH is less than or equal to 7.5, report the Ammonia Variable Limit as > 34 mg/L
- If the pH is greater than 9.0, report the Ammonia Variable Limit as < 2.6 mg/L

2.2.1.6 Whole Effluent Toxicity (WET) Testing

Primary Control Water: Grab sample collected from the Sheboygan River, upstream and out of the influence of the permittee's discharge and any other known discharge – unless the use of a different control water source is approved by the Department prior to use.

Instream Waste Concentration (IWC): 85%

Dilution series: At least five effluent concentrations and dual controls must be included in each test.

- **Acute:** 100, 50, 25, 12.5, 6.25% and any additional selected by the permittee.
- **Chronic:** 100, 75, 50, 25, 12.5% and any additional selected by the permittee.

WET Testing Frequency:

Acute tests shall be conducted once every other year, in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

Acute:

- July 1, 2018 – September 30, 2018
- October 1, 2020 – December 31, 2020
- January 1, 2022 – March 31, 2022

Acute WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the last full calendar year of this permit. For example, the next test would be required in 2nd Quarter of 2024.

Chronic tests shall be conducted once each year, in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

Chronic:

- July 1, 2018 – September 30, 2018
- April 1, 2019 – June 30, 2019
- October 1, 2020 – December 31, 2020
- January 1, 2021 – March 31, 2021
- July 1, 2022 – September 30, 2022

Chronic WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the last full calendar year of this permit. For example, the next test would be required in 2nd Quarter of 2023.

Testing: WET testing shall be performed during normal operating conditions. Permittees are not allowed to turn off or otherwise modify treatment systems, production processes, or change other operating or treatment conditions during WET tests.

Reporting: The permittee shall report test results on the Discharge Monitoring Report form, and also complete the "Whole Effluent Toxicity Test Report Form" (Section 6, "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition*"), for each test. The original, complete, signed version of the Whole Effluent Toxicity Test Report Form shall be sent to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921, within 45 days of test completion. The Discharge Monitoring Report (DMR) form shall be submitted electronically by the required deadline.

Determination of Positive Results: An acute toxicity test shall be considered positive if the Toxic Unit - Acute (TU_a) is greater than 1.0 for either species. The TU_a shall be calculated as follows: $TU_a = 100 \div LC_{50}$. A chronic toxicity test shall be considered positive if the Toxic Unit - Chronic (TU_c) is greater than 1.0 for either species. The TU_c shall be calculated as follows: $TU_c = 100 \div IC_{25}$.

Additional Testing Requirements: Within 90 days of a test which showed positive results, the permittee shall submit the results of at least 2 retests to the Biomonitoring Coordinator on "Whole Effluent Toxicity Test Report Forms". The 90-day reporting period shall begin the day after the test which showed a positive result. The retests shall be completed using the same species and test methods specified for the original test (see the Standard Requirements section herein).

3 Land Application Requirements

3.1 Sampling Point(s)

The discharge(s) shall be limited to land application of the waste type(s) designated for the listed sampling point(s) on Department approved land spreading sites or by hauling to another facility.

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
004	Cake Sludge - Representative samples of the cake sludge shall be collected. Compliance with Class A fecal coliform or salmonella requirements shall be demonstrated immediately after the treatment process and again prior to land application if that is more than 3 weeks later. See also the Standard Requirements section for "Class A Fecal Coliform". Cake sludge is produced through the following process. Primary sludge is anaerobically digested then combined with waste activated secondary sludge in an aerated holding tank. The combined liquid sludge was the former sample point 003. The liquid sludge from 003 is dewatered in a belt press then lime is added and the mixture is pasteurized in an RDP process. The resulting cake sludge (sample point/outfall 004) is then stored on-site until land application.

3.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

3.2.1 Sampling Point (Outfall) 004 - Cake 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	
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	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
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	See Sections 3.2.1.4 and 5.5.6 for monitoring requirements.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	See Sections 3.2.1.4 and 5.5.6 for monitoring requirements.

Other Sludge Requirements	
Sludge Requirements	**Sample Frequency**
List 3 Requirements – Pathogen Control: The requirements in List 3 shall be met prior to land application of sludge.	**Quarterly**
List 4 Requirements – Vector Attraction Reduction: The vector attraction reduction shall be satisfied prior to, or at the time of land application as specified in List 4.	**Quarterly**

3.2.1.1 List 2 Analysis

If the monitoring frequency for List 2 parameters is more frequent than "Annual" then the sludge may be analyzed for the List 2 parameters just prior to each land application season rather than at the more frequent interval specified.

3.2.1.2 Changes in Feed Sludge Characteristics

If a change in feed sludge characteristics, treatment process, or operational procedures occurs which may result in a significant shift in sludge characteristics, the permittee shall reanalyze the sludge for List 1, 2, 3 and 4 parameters each time such change occurs.

3.2.1.3 Sludge Which Exceeds the High Quality Limit

Cumulative pollutant loading records shall be kept for all bulk land application of sludge which does not meet the high quality limit for any parameter. This requirement applies for the entire calendar year in which any exceedance of Table 3 of s. NR 204.07(5)(c), is experienced. Such loading records shall be kept for all List 1 parameters for each site land applied in that calendar year. The formula to be used for calculating cumulative loading is as follows:

[(Pollutant concentration (mg/kg) x dry tons applied/ac) ÷ 500] + previous loading (lbs/acre) = cumulative lbs pollutant per acre

When a site reaches 90% of the allowable cumulative loading for any metal established in Table 2 of s. NR 204.07(5)(b), the Department shall be so notified through letter or in the comment section of the annual land application report (3400-55).

3.2.1.4 Sludge Analysis for PCBs

The permittee shall analyze the sludge for Total PCBs one time during **2019**. The results shall be reported as "PCB Total Dry Wt". Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with Table EM in s. NR 219.04, Wis. Adm. Code and the conditions specified in Standard Requirements of this permit. PCB results shall be submitted by January 31, following the specified year of analysis.

3.2.1.5 Lists 1, 2, 3, and 4

List 1 **TOTAL SOLIDS AND METALS** See the Monitoring Requirements and Limitations table above for monitoring frequency and limitations for the List 1 parameters
Solids, Total (percent)
Arsenic, mg/kg (dry weight)
Cadmium, mg/kg (dry weight)
Copper, mg/kg (dry weight)
Lead, mg/kg (dry weight)
Mercury, mg/kg (dry weight)
Molybdenum, mg/kg (dry weight)
Nickel, mg/kg (dry weight)
Selenium, mg/kg (dry weight)
Zinc, mg/kg (dry weight)

List 2 **NUTRIENTS** See the Monitoring Requirements and Limitations table above for monitoring frequency for the List 2 parameters
Solids, Total (percent)
Nitrogen Total Kjeldahl (percent)
Nitrogen Ammonium (NH4-N) Total (percent)
Phosphorus Total as P (percent)
Phosphorus, Water Extractable (as percent of Total P)
Potassium Total Recoverable (percent)

List 3
PATHOGEN CONTROL FOR CLASS A SLUDGE

The permittee shall implement pathogen control as listed in List 3. The Department shall be notified of the pathogen control utilized and shall be notified when the permittee decides to utilize alternative pathogen control.

The following requirements shall be met prior to land application of sludge.

Parameter	Unit	Limit
Fecal Coliform*	MPN/gTS	1000
OR		
Salmonella	MPN/4gTS	3
AND, ONE OF THE FOLLOWING PROCESS OPTIONS		
Temp/Time based on % Solids	Alkaline Treatment	
Prior test for Enteric Virus/Viable Helminth Ova	Post test for Enteric Virus/Viable Helminth Ova	
Composting	Heat Drying	
Heat Treatment	Thermophilic Aerobic Digestion	
Beta Ray Irradiation	Gamma Ray Irradiation	
Pasteurization	PFRP Equivalent Process	

* The Fecal Coliform limit shall be reported as the geometric mean of 7 discrete samples on a dry weight basis.

List 4
VECTOR ATTRACTION REDUCTION

The permittee shall implement any one of the vector attraction reduction options specified in List 4. The Department shall be notified of the option utilized and shall be notified when the permittee decides to utilize an alternative option.

One of the following shall be satisfied prior to, or at the time of land application as specified in List 4.

Option	Limit	Where/When it Shall be Met
Volatile Solids Reduction	≥38%	Across the process
Specific Oxygen Uptake Rate	≤1.5 mg O_2/hr/g TS	On aerobic stabilized sludge
Anaerobic bench-scale test	<17 % VS reduction	On anaerobic digested sludge
Aerobic bench-scale test	<15 % VS reduction	On aerobic digested sludge
Aerobic Process	>14 days, Temp >40°C and Avg. Temp > 45°C	On composted sludge
pH adjustment	>12 S.U. (for 2 hours) and >11.5 (for an additional 22 hours)	During the process
Drying without primary solids	>75 % TS	When applied or bagged
Drying with primary solids	>90 % TS	When applied or bagged
Equivalent Process	Approved by the Department	Varies with process
Injection	-	When applied
Incorporation	-	Within 6 hours of application

3.2.1.6 Daily Land Application Log

Daily Land Application Log		
Discharge Monitoring Requirements and Limitations The permittee shall maintain a daily land application log for biosolids land applied each day when land application occurs. The following minimum records must be kept, in addition to all analytical results for the biosolids land applied. The log book records shall form the basis for the annual land application report requirements**.**		
Parameters	**Units**	**Sample Frequency**
DNR Site Number(s)	Number	Daily as used
Outfall number applied	Number	Daily as used
Acres applied	Acres	Daily as used
Amount applied	As appropriate * /day	Daily as used
Application rate per acre	unit */acre	Daily as used
Nitrogen applied per acre	lb/acre	Daily as used
Method of Application	Injection, Incorporation, or surface applied	Daily as used

*gallons, cubic yards, dry US Tons or dry Metric Tons

4 Schedules

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

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

Required Action	Due Date
Operational Evaluation Report: The permittee shall prepare and submit to the Department for approval an operational evaluation report. The report shall include an evaluation of collected effluent data, possible source reduction measures, operational improvements or other minor facility modifications that will optimize reductions in phosphorus discharges from the treatment plant during the period prior to complying with final phosphorus WQBELs and, where possible, enable compliance with final phosphorus WQBELs by April 1, 2021. The report shall provide a plan and schedule for implementation of the measures, improvements, and modifications as soon as possible, but not later than April 1, 2021 and state whether the measures, improvements, and modifications will enable compliance with final phosphorus WQBELs. Regardless of whether they are expected to result in compliance, the permittee shall implement the measures, improvements, and modifications in accordance with the plan and schedule specified in the operational evaluation report. If the operational evaluation report concludes that the facility can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the permittee shall comply with the final phosphorus WQBEL by April 1, 2021 and is not required to comply with the milestones identified below for years 3 through 7 of this compliance schedule ('Preliminary Compliance Alternatives Plan', 'Final Compliance Alternatives Plan', 'Final Plans and Specifications', 'Treatment Plant Upgrade to Meet WQBELs', 'Complete Construction', 'Achieve Compliance'). STUDY OF FEASIBLE ALTERNATIVES - If the Operational Evaluation Report concludes that the permittee cannot achieve final phosphorus WQBELs with source reduction measures, operational improvements and other minor facility modifications, the permittee shall initiate a study of feasible alternatives for meeting final phosphorus WQBELs and comply with the remaining required actions of this schedule of compliance. If the Department disagrees with the conclusion of the report, and determines that the permittee can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the Department may reopen and modify the permit to include an implementation schedule for achieving the final phosphorus WQBELs sooner than April 1, 2025.	03/31/2019
Compliance Alternatives, Source Reduction, Improvements and Modifications Status: The permittee shall submit a 'Compliance Alternatives, Source Reduction, Operational Improvements and Minor Facility Modification' status report to the Department. The report shall provide an update on the permittee's: (1) progress implementing source reduction measures, operational improvements, and minor facility modifications to optimize reductions in phosphorus discharges and, to the extent that such measures, improvements, and modifications will not enable compliance with the WQBELs, (2) status evaluating feasible alternatives for meeting phosphorus WQBELs.	03/31/2020
Preliminary Compliance Alternatives Plan: The permittee shall submit a preliminary compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee’s wastewater treatment facility is necessary to achieve final phosphorus WQBELs, the submittal shall include a preliminary engineering design	03/31/2021

report. If the plan concludes Adaptive Management will be used, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 without the Adaptive Management Plan. If water quality trading will be undertaken, the plan must state that trading will be pursued.	
Final Compliance Alternatives Plan: The permittee shall submit a final compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee's wastewater treatment is necessary to meet final phosphorus WQBELs, the submittal shall include a final engineering design report addressing the treatment plant upgrades, and a facility plan if required pursuant to ch. NR 110, Wis. Adm. Code. If the plan concludes Adaptive Management will be implemented, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 and an engineering report addressing any treatment system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the plan concludes water quality trading will be used, the submittal shall identify potential trading partners. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	03/31/2022
Final Plans and Specifications: Unless the permit has been modified, revoked and reissued, or reissued to include Adaptive Management or Water Quality Trading measures or to include a revised schedule based on factors in s. NR 217.17, Wis. Adm. Code, the permittee shall submit final construction plans to the Department for approval pursuant to s. 281.41, Stats., specifying treatment plant upgrades that must be constructed to achieve compliance with final phosphorus WQBELs, and a schedule for completing construction of the upgrades by the complete construction date specified below. (Note: Permit modification, revocation and reissuance, and reissuance are subject to s. 283.53(2), Stats.) Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	03/31/2023
Treatment Plant Upgrade to Meet WQBELs: The permittee shall initiate construction of the upgrades. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41. Stats. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	06/30/2023
Construction Upgrade Progress Report: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	06/30/2024
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	03/31/2024
Achieve Compliance: The permittee shall achieve compliance with final phosphorus WQBELs. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	04/01/2025

4.2 Sanitary Sewer System Rehabilitation

Required Action	Due Date
Complete Construction: Complete construction of the proposed sewer system repairs up through 2022 as identified in the "2015 Kiel Wastewater Utility Ten Year Plan".	12/31/2022

4.3 Facility Upgrade

Required Action	Due Date
Facility Plan Amendment: Submit a facility plan amendment.	04/01/2018
Plans and Specifications: Submit plans and specifications for treatment plant modifications.	12/31/2018
Begin Construction: The permittee shall initiate construction of the upgrades.	06/30/2019
Construction Upgrade Progress Report #1: The permittee shall submit a progress report on construction upgrades.	12/31/2019
Complete Construction - Liquid Treatment Train Upgrade: The permittee shall complete construction of the liquid treatment train upgrade.	06/30/2020
Construction Upgrade Progress Report #2: The permittee shall submit a progress report on construction upgrades.	12/31/2020
Complete Construction - Solids Treatment Train Upgrade: The permittee shall complete construction of the solids treatment train upgrade.	06/30/2021

5 Standard Requirements

NR 205, Wisconsin Administrative Code: The conditions in ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(2).

5.1 Reporting and Monitoring Requirements

5.1.1 Monitoring Results

Monitoring results obtained during the previous month shall be summarized and reported on a Department Wastewater Discharge Monitoring Report. The report may require reporting of any or all of the information specified below under 'Recording of Results'. This report is to be returned to the Department no later than the date indicated on the form. A copy of the Wastewater Discharge Monitoring Report Form or an electronic file of the report shall be retained by the permittee.

Monitoring results shall be reported on an electronic discharge monitoring report (eDMR). The eDMR shall be certified electronically by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included on the Wastewater Discharge Monitoring Report.

The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

5.1.2 Sampling and Testing Procedures

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

5.1.3 Recording of Results

The permittee shall maintain records which provide the following information for each effluent measurement or sample taken:

- the date, exact place, method and time of sampling or measurements;
- the individual who performed the sampling or measurements;
- the date the analysis was performed;
- the individual who performed the analysis;
- the analytical techniques or methods used; and
- the results of the analysis.

5.1.4 Reporting of Monitoring Results

The permittee shall use the following conventions when reporting effluent monitoring results:

- Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 0.1 mg/L, report the pollutant concentration as < 0.1 mg/L.

- Pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified.

- For purposes of calculating NR 101 fees, the 2 mg/l lower reporting limits for BOD_5 and Total Suspended Solids shall be considered to be limits of quantitation

- For the purposes of reporting a calculated result, average or a mass discharge value, the permittee may substitute a 0 (zero) for any pollutant concentration that is less than the limit of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

5.1.5 Compliance Maintenance Annual Reports

Compliance Maintenance Annual Reports (CMAR) shall be completed using information obtained over each calendar year regarding the wastewater conveyance and treatment system. The CMAR shall be submitted and certified by the permittee in accordance with ch. NR 208, Wis. Adm. Code, by June 30, each year on an electronic report form provided by the Department.

In the case of a publicly owned treatment works, a resolution shall be passed by the governing body and submitted as part of the CMAR, verifying its review of the report and providing responses as required. Private owners of wastewater treatment works are not required to pass a resolution; but they must provide an Owner Statement and responses as required, as part of the CMAR submittal.

The CMAR shall be certified electronically by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The certification verifies that the electronic report is true, accurate and complete.

5.1.6 Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings or electronic data records for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application. All pertinent sludge information, including permit application information and other documents specified in this permit or s. NR 204.06(9), Wis. Adm. Code shall be retained for a minimum of 5 years.

5.1.7 Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or correct information to the Department.

5.1.8 Reporting Requirements – Alterations or Additions

The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is only required when:

- The alteration or addition to the permitted facility may meet one of the criteria for determining whether a facility is a new source.
- The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification requirement applies to pollutants which are not subject to effluent limitations in the existing permit.
- The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use of disposal sites not reported during the permit application process nor reported pursuant to an approved land application plan. Additional sites may not be used for the land application of sludge until department approval is received.

5.2 System Operating Requirements

5.2.1 Noncompliance Reporting

Sanitary sewer overflows and sewage treatment facility overflows shall be reported according to the 'Sanitary Sewer Overflows and Sewage Treatment Facility Overflows' section of this permit.

The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance:

- any noncompliance which may endanger health or the environment;
- any violation of an effluent limitation resulting from a bypass;
- any violation of an effluent limitation resulting from an upset; and
- any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the permit, either for effluent or sludge.

A written report describing the noncompliance shall also be submitted to the Department's regional office within 5 days after the permittee becomes aware of the noncompliance. On a case-by-case basis, the Department may waive the requirement for submittal of a written report within 5 days and instruct the permittee to submit the written report with the next regularly scheduled monitoring report. In either case, the written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

A scheduled bypass approved by the Department under the 'Scheduled Bypass' section of this permit shall not be subject to the reporting required under this section.

NOTE: Section 292.11(2)(a), Wisconsin Statutes, requires any person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance to notify the Department of Natural Resources **immediately** of any discharge not authorized by the permit. **The discharge of a hazardous substance that is not authorized by this permit or that violates this permit may be a hazardous substance spill**. **To report a hazardous substance spill, call DNR's 24-hour HOTLINE at 1-800-943-0003.**

5.2.2 Flow Meters

Flow meters shall be calibrated annually, as per s. NR 218.06, Wis. Adm. Code.

5.2.3 Raw Grit and Screenings

All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they shall be licensed under chs. NR 500-555, Wis. Adm. Code.

5.2.4 Sludge Management

All sludge management activities shall be conducted in compliance with ch. NR 204 "Domestic Sewage Sludge Management", Wis. Adm. Code.

5.2.5 Prohibited Wastes

Under no circumstances may the introduction of wastes prohibited by s. NR 211.10, Wis. Adm. Code, be allowed into the waste treatment system. Prohibited wastes include those:

- which create a fire or explosion hazard in the treatment work;
- which will cause corrosive structural damage to the treatment work;
- solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;
- wastewaters at a flow rate or pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; and
- changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.

5.2.6 Bypass

This condition applies only to bypassing at a sewage treatment facility that is not a scheduled bypass, approved blending as a specific condition of this permit, a sewage treatment facility overflow or a controlled diversion as provided in the sections titled ‘Scheduled Bypass’, ‘Blending’ (if approved), ‘SSO’s and Sewage Treatment Facility Overflows’ and ‘Controlled Diversions’ of this permit. Any other bypass at the sewage treatment facility is prohibited and the Department may take enforcement action against a permittee for such occurrences under s. 283.89, Wis. Stats. The Department may approve a bypass if the permittee demonstrates all the following conditions apply:

- The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance. When evaluating feasibility of alternatives, the department may consider factors such as technical achievability, costs and affordability of implementation and risks to public health, the environment and, where the permittee is a municipality, the welfare of the community served; and
- The bypass was reported in accordance with the Noncompliance Reporting section of this permit.

5.2.7 Scheduled Bypass

Whenever the permittee anticipates the need to bypass for purposes of efficient operations and maintenance and the permittee may not meet the conditions for controlled diversions in the ‘Controlled Diversions’ section of this permit,

the permittee shall obtain prior written approval from the Department for the scheduled bypass. A permittee's written request for Department approval of a scheduled bypass shall demonstrate that the conditions for bypassing specified in the above section titled 'Bypass' are met and include the proposed date and reason for the bypass, estimated volume and duration of the bypass, alternatives to bypassing and measures to mitigate environmental harm caused by the bypass. The department may require the permittee to provide public notification for a scheduled bypass if it is determined there is significant public interest in the proposed action and may recommend mitigation measures to minimize the impact of such bypass.

5.2.8 Controlled Diversions

Controlled diversions are allowed only when necessary for essential maintenance to assure efficient operation. Sewage treatment facilities that have multiple treatment units to treat variable or seasonal loading conditions may shut down redundant treatment units when necessary for efficient operation. The following requirements shall be met during controlled diversions:

- Effluent from the sewage treatment facility shall meet the effluent limitations established in the permit. Wastewater that is diverted around a treatment unit or treatment process during a controlled diversion shall be recombined with wastewater that is not diverted prior to the effluent sampling location and prior to effluent discharge;
- A controlled diversion does not include blending as defined in s. NR 210.03(2e), Wis. Adm. Code, and as may only be approved under s. NR 210.12. A controlled diversion may not occur during periods of excessive flow or other abnormal wastewater characteristics;
- A controlled diversion may not result in a wastewater treatment facility overflow; and
- All instances of controlled diversions shall be documented in sewage treatment facility records and such records shall be available to the department on request.

5.2.9 Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114, Wis. Adm. Code, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

5.2.10 Operator Certification

The wastewater treatment facility shall be under the direct supervision of a state certified operator. In accordance with s. NR 114.53, Wis. Adm. Code, every WPDES permitted treatment plant shall have a designated operator-in-charge holding a current and valid certificate. The designated operator-in-charge shall be certified at the level and in all subclasses of the treatment plant, except laboratory. Treatment plant owners shall notify the department of any changes in the operator-in-charge within 30 days. Note that s. NR 114.52(22), Wis. Adm. Code, lists types of facilities that are excluded from operator certification requirements (i.e. private sewage systems, pretreatment facilities discharging to public sewers, industrial wastewater treatment that consists solely of land disposal, agricultural digesters and concentrated aquatic production facilities with no biological treatment).

5.3 Sewage Collection Systems

5.3.1 Sanitary Sewage Overflows and Sewage Treatment Facility Overflows

5.3.1.1 Overflows Prohibited

Any overflow or discharge of wastewater from the sewage collection system or at the sewage treatment facility, other than from permitted outfalls, is prohibited. The permittee shall provide information on whether any of the following conditions existed when an overflow occurred:

- The sanitary sewer overflow or sewage treatment facility overflow was unavoidable to prevent loss of life, personal injury or severe property damage;
- There were no feasible alternatives to the sanitary sewer overflow or sewage treatment facility overflow such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or preventative maintenance activities;
- The sanitary sewer overflow or the sewage treatment facility overflow was caused by unusual or severe weather related conditions such as large or successive precipitation events, snowmelt, saturated soil conditions, or severe weather occurring in the area served by the sewage collection system or sewage treatment facility; and
- The sanitary sewer overflow or the sewage treatment facility overflow was unintentional, temporary, and caused by an accident or other factors beyond the reasonable control of the permittee.

5.3.1.2 Permittee Response to Overflows

Whenever a sanitary sewer overflow or sewage treatment facility overflow occurs, the permittee shall take all feasible steps to control or limit the volume of untreated or partially treated wastewater discharged, and terminate the discharge as soon as practicable. Remedial actions, including those in NR 210.21 (3), Wis. Adm. Code, shall be implemented consistent with an emergency response plan developed under the CMOM program.

5.3.1.3 Permittee Reporting

Permittees shall report all sanitary sewer overflows and sewage treatment overflows as follows:

- The permittee shall notify the department by telephone, fax or email as soon as practicable, but no later than 24 hours from the time the permittee becomes aware of the overflow;
- The permittee shall, no later than five days from the time the permittee becomes aware of the overflow, provide to the department the information identified in this paragraph using department form number 3400-184. If an overflow lasts for more than five days, an initial report shall be submitted within 5 days as required in this paragraph and an updated report submitted following cessation of the overflow. At a minimum, the following information shall be included in the report:

  ◦The date and location of the overflow;
  ◦The surface water to which the discharge occurred, if any;
  ◦The duration of the overflow and an estimate of the volume of the overflow;
  ◦A description of the sewer system or treatment facility component from which the discharge occurred such as manhole, lift station, constructed overflow pipe, or crack or other opening in a pipe;
  ◦The estimated date and time when the overflow began and stopped or will be stopped;
  ◦The cause or suspected cause of the overflow including, if appropriate, precipitation, runoff conditions, areas of flooding, soil moisture and other relevant information;
  ◦Steps taken or planned to reduce, eliminate and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
  ◦A description of the actual or potential for human exposure and contact with the wastewater from the overflow;
  ◦Steps taken or planned to mitigate the impacts of the overflow and a schedule of major milestones for those steps;
  ◦To the extent known at the time of reporting, the number and location of building backups caused by excessive flow or other hydraulic constraints in the sewage collection system that occurred

concurrently with the sanitary sewer overflow and that were within the same area of the sewage collection system as the sanitary sewer overflow; and
◦The reason the overflow occurred or explanation of other contributing circumstances that resulted in the overflow event. This includes any information available including whether the overflow was unavoidable to prevent loss of life, personal injury, or severe property damage and whether there were feasible alternatives to the overflow.

NOTE: A copy of form 3400-184 for reporting sanitary sewer overflows and sewage treatment facility overflows may be obtained from the department or accessed on the department's web site at http://dnr.wi.gov/topic/wastewater/SSOreport.html. As indicated on the form, additional information may be submitted to supplement the information required by the form.

- The permittee shall identify each specific location and each day on which a sanitary sewer overflow or sewage treatment facility overflow occurs as a discrete sanitary sewer overflow or sewage treatment facility overflow occurrence. An occurrence may be more than one day if the circumstances causing the sanitary sewer overflow or sewage treatment facility overflow results in a discharge duration of greater than 24 hours. If there is a stop and restart of the overflow at the same location within 24 hours and the overflow is caused by the same circumstance, it may be reported as one occurrence. Sanitary sewer overflow occurrences at a specific location that are separated by more than 24 hours shall be reported as separate occurrences; and
- A permittee that is required to submit wastewater discharge monitoring reports under NR 205.07 (1) (r) shall also report all sanitary sewer overflows and sewage treatment facility overflows on that report.

5.3.1.4 Public Notification

The permittee shall notify the public of any sanitary sewer and sewage treatment facility overflows consistent with its emergency response plan required under the CMOM (Capacity, Management, Operation and Maintenance) section of this permit and s. NR 210.23 (4) (f), Wis. Adm. Code. Such public notification shall occur promptly following any overflow event using the most effective and efficient communications available in the community. At minimum, a daily newspaper of general circulation in the county(s) and municipality whose waters may be affected by the overflow shall be notified by written or electronic communication.

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

- The permittee shall have written documentation of the Capacity, Management, Operation and Maintenance (CMOM) program components in accordance with s. NR 210.23(4), Wis. Adm. Code. Such documentation shall be available for Department review upon request. The Department may request that the permittee provide this documentation or prepare a summary of the permittee's CMOM program at the time of application for reissuance of the WPDES permit.
- The permittee shall implement a CMOM program in accordance with s. NR 210.23, Wis. Adm. Code.
- The permittee shall at least annually conduct a self-audit of activities conducted under the permittee's CMOM program to ensure CMOM components are being implemented as necessary to meet the general standards of s. NR 210.23(3), Wis. Adm. Code.

5.3.3 Sewer Cleaning Debris and Materials

All debris and material removed from cleaning sanitary sewers shall be managed to prevent nuisances, run-off, ground infiltration or prohibited discharges.

- Debris and solid waste shall be dewatered, dried and then disposed of at a licensed solid waste facility.
- Liquid waste from the cleaning and dewatering operations shall be collected and disposed of at a permitted wastewater treatment facility.

- Combination waste including liquid waste along with debris and solid waste may be disposed of at a licensed solid waste facility or wastewater treatment facility willing to accept the waste.

5.4 Surface Water Requirements

5.4.1 Permittee-Determined Limit of Quantitation Incorporated into this Permit

For pollutants with water quality-based effluent limits below the Limit of Quantitation (LOQ) in this permit, the LOQ calculated by the permittee and reported on the Discharge Monitoring Reports (DMRs) is incorporated by reference into this permit. The LOQ shall be reported on the DMRs, shall be the lowest quantifiable level practicable, and shall be no greater than the minimum level (ML) specified in or approved under 40 CFR Part 136 for the pollutant at the time this permit was issued, unless this permit specifies a higher LOQ.

5.4.2 Appropriate Formulas for Effluent Calculations

The permittee shall use the following formulas for calculating effluent results to determine compliance with average concentration limits and mass limits and total load limits:

Weekly/Monthly/Six-Month/Annual Average Concentration = the sum of all daily results for that week/month/six-month/year, divided by the number of results during that time period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Weekly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the week.

Monthly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the month.

Six-Month Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the six-month period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Annual Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the entire year.

Total Monthly Discharge: = monthly average concentration (mg/L) x total flow for the month (MG/month) x 8.34.

Total Annual Discharge: = sum of total monthly discharges for the calendar year.

12-Month Rolling Sum of Total Monthly Discharge: = the sum of the most recent 12 consecutive months of Total Monthly Discharges.

5.4.3 Effluent Temperature Requirements

Weekly Average Temperature – The permittee shall use the following formula for calculating effluent results to determine compliance with the weekly average temperature limit (as applicable): Weekly Average Temperature = the sum of all daily maximum results for that week divided by the number of daily maximum results during that time period.

Cold Shock Standard – Water temperatures of the discharge shall be controlled in a manner as to protect fish and aquatic life uses from the deleterious effects of cold shock. 'Cold Shock' means exposure of aquatic organisms to a rapid decrease in temperature and a sustained exposure to low temperature that induces abnormal behavior or physiological performance and may lead to death.

Rate of Temperature Change Standard – Temperature of a water of the state or discharge to a water of the state may not be artificially raised or lowered at such a rate that it causes detrimental health or reproductive effects to fish or aquatic life of the water of the state.

5.4.4 Visible Foam or Floating Solids

There shall be no discharge of floating solids or visible foam in other than trace amounts.

5.4.5 Surface Water Uses and Criteria

In accordance with NR 102.04, Wis. Adm. Code, surface water uses and criteria are established to govern water management decisions. Practices attributable to municipal, industrial, commercial, domestic, agricultural, land development or other activities shall be controlled so that all surface waters including the mixing zone meet the following conditions at all times and under all flow and water level conditions:

a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state.

b) Floating or submerged debris, oil, scum or other material shall not be present in such amounts as to interfere with public rights in waters of the state.

c) Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state.

d) Substances in concentrations or in combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts which are acutely harmful to animal, plant or aquatic life.

5.4.6 Percent Removal

During any 30 consecutive days, the average effluent concentrations of BOD_5 and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively. This requirement does not apply to removal of total suspended solids if the permittee operates a lagoon system and has received a variance for suspended solids granted under NR 210.07(2), Wis. Adm. Code.

5.4.7 Fecal Coliforms

The weekly and monthly limit(s) for fecal coliforms shall be expressed as a geometric mean.

5.4.8 Seasonal Disinfection

Disinfection shall be provided from May 1 through September 30 of each year. Monitoring requirements and the limitation for fecal coliforms apply only during the period in which disinfection is required. Whenever chlorine is used for disinfection or other uses, the limitations and monitoring requirements for residual chlorine shall apply. A dechlorination process shall be in operation whenever chlorine is used.

5.4.9 Whole Effluent Toxicity (WET) Monitoring Requirements

In order to determine the potential impact of the discharge on aquatic organisms, static-renewal toxicity tests shall be performed on the effluent in accordance with the procedures specified in the *"State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition" (PUB-WT-797*, November 2004) as required by NR 219.04, Table A, Wis. Adm. Code). All of the WET tests required in this permit, including any required retests, shall be conducted on the *Ceriodaphnia dubia* and fathead minnow species. Receiving water samples shall not be collected from any point in contact with the permittee's mixing zone and every attempt shall be made to avoid contact with any other discharge's mixing zone.

5.4.10 Whole Effluent Toxicity (WET) Identification and Reduction

Within 60 days of a retest which showed positive results, the permittee shall submit a written report to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., PO Box 7921, Madison, WI 53707-7921, which details the following:

- A description of actions the permittee has taken or will take to remove toxicity and to prevent the recurrence of toxicity;

- A description of toxicity reduction evaluation (TRE) investigations that have been or will be done to identify potential sources of toxicity, including some or all of the following actions:

  (a) Evaluate the performance of the treatment system to identify deficiencies contributing to effluent toxicity (e.g., operational problems, chemical additives, incomplete treatment)
  (b) Identify the compound(s) causing toxicity
  (c) Trace the compound(s) causing toxicity to their sources (e.g., industrial, commercial, domestic)
  (d) Evaluate, select, and implement methods or technologies to control effluent toxicity (e.g., in-plant or pretreatment controls, source reduction or removal)

- Where corrective actions including a TRE have not been completed, an expeditious schedule under which corrective actions will be implemented;

- If no actions have been taken, the reason for not taking action.

The permittee may also request approval from the Department to postpone additional retests in order to investigate the source(s) of toxicity. Postponed retests must be completed after toxicity is believed to have been removed.

5.5 Land Application Requirements

5.5.1 Sludge Management Program Standards And Requirements Based Upon Federally Promulgated Regulations

In the event that new federal sludge standards or regulations are promulgated, the permittee shall comply with the new sludge requirements by the dates established in the regulations, if required by federal law, even if the permit has not yet been modified to incorporate the new federal regulations.

5.5.2 General Sludge Management Information

The General Sludge Management Form 3400-48 shall be completed and submitted prior to any significant sludge management changes.

5.5.3 Sludge Samples

All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test.

5.5.4 Land Application Characteristic Report

Each report shall consist of a Characteristic Form 3400-49 and Lab Report. The Characteristic Report Form 3400-49 shall be submitted electronically by January 31 following each year of analysis.

Following submittal of the electronic Characteristic Report Form 3400-49, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report is true, accurate and complete. The Lab Report must be sent directly to the facility's DNR sludge representative or basin engineer unless approval for not submitting the lab reports has been given.

The permittee shall use the following convention when reporting sludge monitoring results: Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 1.0 mg/kg, report the pollutant concentration as < 1.0 mg/kg .

All results shall be reported on a dry weight basis.

5.5.5 Calculation of Water Extractable Phosphorus

When sludge analysis for Water Extractable Phosphorus is required by this permit, the permittee shall use the following formula to calculate and report Water Extractable Phosphorus:
Water Extractable Phosphorus (% of Total P) =
[Water Extractable Phosphorus (mg/kg, dry wt) ÷ Total Phosphorus (mg/kg, dry wt)] x 100

5.5.6 Monitoring and Calculating PCB Concentrations in Sludge

When sludge analysis for "PCB, Total Dry Wt" is required by this permit, the PCB concentration in the sludge shall be determined as follows.

Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with the following provisions and Table EM in s. NR 219.04, Wis. Adm. Code.

- EPA Method 1668 may be used to test for all PCB congeners. If this method is employed, all PCB congeners shall be delineated. Non-detects shall be treated as zero. The values that are between the limit of detection and the limit of quantitation shall be used when calculating the total value of all congeners. All results shall be added together and the total PCB concentration by dry weight reported. **Note**: It is recognized that a number of the congeners will co-elute with others, so there will not be 209 results to sum.
- EPA Method 8082A shall be used for PCB-Aroclor analysis and may be used for congener specific analysis as well. If congener specific analysis is performed using Method 8082A, the list of congeners tested shall include at least congener numbers 5, 18, 31, 44, 52, 66, 87, 101, 110, 138, 141, 151, 153, 170, 180, 183, 187, and 206 plus any other additional congeners which might be reasonably expected to occur in the particular sample. For either type of analysis, the sample shall be extracted using the Soxhlet extraction (EPA Method 3540C) (or the Soxhlet Dean-Stark modification) or the pressurized fluid extraction (EPA Method 3545A). If Aroclor analysis is performed using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.11 mg/kg as possible. Reporting protocol, consistent with s. NR 106.07(6)(e), should be as follows: If all Aroclors are less than the LOD, then the Total PCB Dry Wt result should be reported as less than the highest LOD. If a single Aroclor is detected then that is what should be reported for the Total PCB result. If multiple Aroclors are detected, they should be summed and reported as Total PCBs. If congener specific analysis is done using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.003 mg/kg as possible for each congener. If the aforementioned limits of detection cannot be achieved after using the appropriate clean up techniques, a reporting limit that is achievable for the Aroclors or each congener for the sample shall be determined. This reporting limit shall be reported and qualified

indicating the presence of an interference. The lab conducting the analysis shall perform as many of the following methods as necessary to remove interference:

3620C – Florisil	3611B - Alumina
3640A - Gel Permeation	3660B - Sulfur Clean Up (using copper shot instead of powder)
3630C - Silica Gel	3665A - Sulfuric Acid Clean Up

5.5.7 Annual Land Application Report

Land Application Report Form 3400-55 shall be submitted electronically by January 31, each year whether or not non-exceptional quality sludge is land applied. Non-exceptional quality sludge is defined in s. NR 204.07(4), Wis. Adm. Code. Following submittal of the electronic Annual Land Application Report Form 3400-55, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

5.5.8 Other Methods of Disposal or Distribution Report

The permittee shall submit electronically the Other Methods of Disposal or Distribution Report Form 3400-52 by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied. Following submittal of the electronic Report Form 3400-52, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

5.5.9 Approval to Land Apply

Bulk non-exceptional quality sludge as defined in s. NR 204.07(4), Wis. Adm. Code, may not be applied to land without a written approval letter or Form 3400-122 from the Department unless the Permittee has obtained permission from the Department to self approve sites in accordance with s. NR 204.06 (6), Wis. Adm. Code. Analysis of sludge characteristics is required prior to land application. Application on frozen or snow covered ground is restricted to the extent specified in s. NR 204.07(3) (l), Wis. Adm. Code.

5.5.10 Soil Analysis Requirements

Each site requested for approval for land application must have the soil tested prior to use. Each approved site used for land application must subsequently be soil tested such that there is at least one valid soil test in the four years prior to land application. All soil sampling and submittal of information to the testing laboratory shall be done in accordance with UW Extension Bulletin A-2100. The testing shall be done by the UW Soils Lab in Madison or Marshfield, WI or at a lab approved by UW. The test results including the crop recommendations shall be submitted to the DNR contact listed for this permit, as they are available. Application rates shall be determined based on the crop nitrogen recommendations and with consideration for other sources of nitrogen applied to the site.

5.5.11 Land Application Site Evaluation

For non-exceptional quality sludge, as defined in s. NR 204.07(4), Wis. Adm. Code, a Land Application Site Request Form 3400-053 shall be submitted to the Department for the proposed land application site. The Department will evaluate the proposed site for acceptability and will either approve or deny use of the proposed site. The permittee may obtain permission to approve their own sites in accordance with s. NR 204.06(6), Wis. Adm. Code.

5.5.12 Class A Sludge: Fecal Coliform Density Requirement

The fecal coliform density which must be < 1000 MPN/g TS as required in s. NR 204.07, Wis. Adm. Code, shall be satisfied immediately after the treatment process is completed. If the material is bagged or distributed at that time, no re-testing is required. If the material is bagged, distributed or land applied at a later time, the sludge shall be re-tested and this requirement satisfied at that time also, to ensure that regrowth of bacteria has not occurred. See Municipal Wastewater Sludge Guidance Memo #3 (Fecal Coliform Monitoring - Sampling and Analytical Procedures).

5.5.13 Class A Sludge: Pasteurization Process

Maintain the temperature of the sludge at 70^{o} Celsius or higher for 30 minutes or longer.

5.5.14 Class A Sludge: Alkaline Treatment Process

The pH of the sewage sludge shall be raised to greater than 12 for at least 72 hours. During this time, the temperature of the sewage sludge shall be greater than 52° C for at least 12 hours. In addition, after the 72 hour period, the sewage sludge shall be air dried to at least 50% total solids.

5.5.15 Vector Control: pH Adjustment

The pH of the sewage sludge shall be raised to 12 or higher by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for 2 hours and then at 11.5 or higher for an additional 22 hours.

6 Summary of Reports Due

FOR INFORMATIONAL PURPOSES ONLY

Description	Date	Page
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Operational Evaluation Report	March 31, 2019	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Compliance Alternatives, Source Reduction, Improvements and Modifications Status	March 31, 2020	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Preliminary Compliance Alternatives Plan	March 31, 2021	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Final Compliance Alternatives Plan	March 31, 2022	13
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Final Plans and Specifications	March 31, 2023	13
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Treatment Plant Upgrade to Meet WQBELs	June 30, 2023	13
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Construction Upgrade Progress Report	June 30, 2024	13
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Complete Construction	March 31, 2024	13
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Achieve Compliance	April 1, 2025	13
Sanitary Sewer System Rehabilitation -Complete Construction	December 31, 2022	14
Facility Upgrade -Facility Plan Amendment	April 1, 2018	14
Facility Upgrade -Plans and Specifications	December 31, 2018	14
Facility Upgrade -Begin Construction	June 30, 2019	14
Facility Upgrade -Construction Upgrade Progress Report #1	December 31, 2019	14
Facility Upgrade -Complete Construction - Liquid Treatment Train Upgrade	June 30, 2020	14
Facility Upgrade -Construction Upgrade Progress Report #2	December 31, 2020	14
Facility Upgrade -Complete Construction - Solids Treatment Train Upgrade	June 30, 2021	14
Compliance Maintenance Annual Reports (CMAR)	by June 30, each year	16
General Sludge Management Form 3400-48	prior to any significant sludge management changes	24
Characteristic Form 3400-49 and Lab Report	by January 31 following each year of analysis	24
Land Application Report Form 3400-55	by January 31, each	26

	year whether or not non-exceptional quality sludge is land applied	
Other Methods of Disposal or Distribution Report Form 3400-52	by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied	26
Wastewater Discharge Monitoring Report	no later than the date indicated on the form	15

Report forms shall be submitted electronically in accordance with the reporting requirements herein. Any facility plans or plans and specifications for municipal, industrial, industrial pretreatment and non industrial wastewater systems shall be submitted to the Bureau of Water Quality, P.O. Box 7921, Madison, WI 53707-7921. All other submittals required by this permit shall be submitted to:
Northeast Region, 2984 Shawano Avenue, Green Bay, WI 54313-6727

Permit Fact Sheet

1 General Information

Permit Number:	WI-0020141-09-0	
Permittee Name:	City of Kiel	
Address:	P O Box 98	
City/State/Zip:	Kiel WI 53042	
Discharge Location:	50’ North of the Rockville Rd Bridge (County Hwy AA) in Manitowoc County	
Receiving Water:	Sheboygan River (WBIC 50700)	
StreamFlow ($Q_{7,10}$):	0.93 cfs	
Stream Classification:	Warmwater sport fish community, non-public water supply	
Design Flow(s)	Daily Maximum	3.115 MGD
	Weekly Maximum	2.645 MGD
	Monthly Maximum	2.016 MGD
	Annual Average	0.862 MGD
Significant Industrial Loading?	2 industries contribute high organic loadings: Land O’ Lakes and Sargento Foods 3 metal finishing industries are regulated by pretreatment standards: HUI, Polar Ware, and Amerequip	
Operator at Proper Grade?	OIC Kris August has Advanced Level certification for subclasses A1, B, C, D, L, and P.	
Approved Pretreatment Program?	N/A	

2 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 ferrous chloride. 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 sludge and waste activated sludge. This combined sludge is dewatered with a belt filter press and then further stabilized in an RDP process, in which lime is first added and blended and the mixture is pasteurized. An on-site facility is used for storing this sludge, which usually meets the NR 204 “exceptional quality” criteria.

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/sample Contents and Treatment Description (as applicable)**
701	0.9713 MGD from January 1, 2012 through December 31, 2016	Influent - Representative influent samples shall be collected from the composite sampling device drawing samples from the open channel following screening or comminution.
001	Not measured	Effluent - Representative effluent samples shall be collected from the composite sampling device drawing samples from the acid mix basin following disinfection except that samples for pH, fecal coliform, total residual chlorine, and Whole Effluent Toxicity shall be collected from the post aeration basin.
004	3426 yd^3 from January 1, 2012 through December 31, 2016	Cake Sludge - Representative samples of the cake sludge shall be collected. Compliance with Class A fecal coliform or salmonella requirements shall be demonstrated immediately after the treatment process and again prior to land application if that is more than 3 weeks later. See also the Standard Requirements section for "Class A Fecal Coliform". Cake sludge is produced through the following process. Primary sludge is anaerobically digested then combined with waste activated secondary sludge in an aerated holding tank. The combined liquid sludge was the former sample point 003. The liquid sludge from 003 is dewatered in a belt press then lime is added and the mixture is pasteurized in an RDP process. The resulting cake sludge (sample point/outfall 004) is then stored on-site until land application.

3 Influent - Proposed Monitoring

3.1 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	
BOD5, 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	

3.1.1 Changes from Previous Permit:

None.

3.1.2 Explanation of Limits and Monitoring Requirements

Influent monitoring is needed to assess loading to the facility and treatment performance. Requirements for flow, BOD, TSS, and Phosphorus are established in accordance with ch. NR 210.04(2), Wis. Adm. Code.

4 Surface Water - Proposed Monitoring and Limitations

4.1 Sample Point Number: 001- Effluent

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Continuous	Continuous	
BOD5, Total	Weekly Avg	10 mg/L	2/Week	24-Hr Flow Prop Comp	Applies May 1 through October 31, each year.
BOD5, Total	Monthly Avg	10 mg/L	2/Week	24-Hr Flow Prop Comp	Applies May 1 through October 31, each year.
BOD5, Total	Weekly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Applies November 1 through April 30, each year.
BOD5, Total	Monthly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Applies November 1 through April 30, each year.
BOD5, Total	Weekly Avg	72 lbs/day	2/Week	Calculated	Applies May 1 through October 31, each year.
BOD5, Total	Weekly Avg	108 lbs/day	2/Week	Calculated	Applies November 1 through April 30, each year.
Suspended Solids, Total	Weekly Avg	10 mg/L	2/Week	24-Hr Flow Prop Comp	Applies May 1 through October 31, each year.
Suspended Solids, Total	Monthly Avg	10 mg/L	2/Week	24-Hr Flow Prop Comp	Applies May 1 through October 31, each year.
Suspended Solids, Total	Weekly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Applies November 1 through April 30, each year.
Suspended Solids, Total	Monthly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Applies November 1 through April 30, each year.
pH Field	Daily Min	6.0 su	Daily	Continuous	
pH Field	Daily Max	9.0 su	Daily	Continuous	
Dissolved Oxygen	Daily Min	6.0 mg/L	Daily	Continuous	
Fecal Coliform	Geometric Mean - Wkly	656 #/100 ml	Weekly	Grab	Applies May 1 through September 30, each year.
Fecal Coliform	Geometric Mean - Monthly	400 #/100 ml	Weekly	Grab	Applies May 1 through September 30, each year.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Continuous	Continuous	
Chlorine, Total Residual	Daily Max	38 ug/L	5/Week	Grab	Applies whenever chlorine is used. See Section 2.2.1.2 for applicable mass limits.
Chlorine, Total Residual	Weekly Avg	8.4 ug/L	5/Week	Grab	Applies whenever chlorine is used. See Section 2.2.1.2 for applicable mass limits.
Chlorine, Total Residual	Monthly Avg	8.4 ug/L	5/Week	Grab	Applies whenever chlorine is used. See Section 2.2.1.2 for applicable mass limits.
Phosphorus, Total	Monthly Avg	1.0 mg/L	Monthly	24-Hr Flow Prop Comp	This is an interim limit. The final effluent limits will be 0.3 mg/L as a monthly average and 0.1 mg/L and 0.72 lbs/day as 6-month averages. See Sections 2.2.1.3, 2.2.1.4, 2.2.1.5 below and 4.1 for the compliance schedule.
Nitrogen, Ammonia Variable Limit		mg/L	2/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Daily Max - Variable	mg/L	2/Week	24-Hr Flow Prop Comp	Limit based on effluent pH; See Section 2.2.1.6
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	Applies January through February.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	19 mg/L	2/Week	24-Hr Flow Prop Comp	Applies March through April.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	5.2 mg/L	2/Week	24-Hr Flow Prop Comp	Applies in May only.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	3.7 mg/L	2/Week	24-Hr Flow Prop Comp	Applies June through September.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	9.4 mg/L	2/Week	24-Hr Flow Prop Comp	Applies in October only.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	13 mg/L	2/Week	24-Hr Flow Prop Comp	Applies in November only.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	12 mg/L	2/Week	24-Hr Flow Prop Comp	Applies in December only.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	5.3 mg/L	2/Week	24-Hr Flow Prop Comp	Applies October through March.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Continuous	Continuous	
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	2.2 mg/L	2/Week	24-Hr Flow Prop Comp	Applies April through May.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	1.7 mg/L	2/Week	24-Hr Flow Prop Comp	Applies June through September.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	
Temperature		deg F	Weekly	Measure	Monitoring only November through April, each year.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See Section 2.2.1.7 for WET testing schedule and requirements.
Chronic WET		TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See Section 2.2.1.7 for WET testing schedule and requirements.

4.1.1 Changes from Previous Permit:

- For total residual chlorine, addition of a monthly average limit.
- For fecal coliform, addition of a weekly average geometric mean limit.
- Phosphorus limits and monitoring are imposed, along with an interim limit.
- Addition of temperature monitoring.

4.1.2 Explanation of Limits and Monitoring Requirements

Categorical Limits

Categorical limits are required per NR 210, Wis. Adm. Code, (sewage treatment works).

BOD_5, Total Suspended Solids (TSS) and pH

The effluent limits for BOD_5, TSS and pH are carried over into this permit. These limits are not subject to change at this time because the receiving water characteristics have not changed.

Water Quality Based Limits and WET Requirements and Disinfection

The permit application required monitoring for forms of nitrogen, common metals and hardness. These data were evaluated by Department staff and recommendations for water quality-based effluent limitations and Whole Effluent Toxicity (WET) testing are presented in the September 30, 2013 memo "Water Quality-Based Effluent Limitations for the Kiel Wastewater Treatment Facility (WPDES Permit # WI-0020141)", and the May 9, 2017 memo "Additional Water Quality-Based Limitations Compliant with 40 CFR 122.45(d) for the Kiel Wastewater Treatment Facility (WPDES Permit # WI-0020141).

Phosphorus

Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters and was revised on December 1, 2010, with the addition of Subchapter III, which includes WQBELs for phosphorus, based upon criteria contained in Chapter NR 102. The September 30, 2013 memo presents recommendations for phosphorus WQBELs derived according to the procedure specified under s. NR 217.13, Wis. Adm. Code. In accordance with ch. NR 217.13(2), Wis. Adm. Code, the applicable WQBEL is 0.1 mg/L, in order to be protective of the receiving water.

Ch. 217.14(2), Wis. Adm. Code, requires phosphorus concentration WQBELs to be expressed as monthly average limits, except if that concentration is less than 0.3 mg/L, in which case the WQBEL may be expressed as an annual average. As described in the April 30, 2012 paper, "Justification for Use of Monthly, Growing Season and Annual Averaging Periods for Expression of WPDES Permit Limits for Phosphorus in Wisconsin", and under the terms of the July 12, 2012, "Addendum to the National Pollutant Discharge Elimination System Memorandum of Agreement between the U.S. Environmental Protection Agency, Region 5 and the Wisconsin Department of Natural Resources", a 6 month averaging period (May 1 to October 31 and November 1 to April 30) is appropriate for the expression of the concentration WQBEL, and a monthly average limit three times the 6-month average concentration WQBEL is to also to be included in the permit. A mass limit must also be included in the permit in accordance with ch. NR 217.14(1)(a)1, Wis. Adm. Code, and that applicable mass limit has been calculated as 0.72 lbs/day, as a 6-month average (with averaging periods of May 1 to October 31 and November 1 to April 30). In summary, the applicable phosphorus WQBELs for this permit are 0.1 mg/L and 0.72 lbs/day as 6-month averages, and a monthly average of 0.3 mg/L.

These final phosphorus WQBELs – at such low levels – present challenges for wastewater treatment facilities to consistently meet – even with the current best available treatment technology. Activated sludge process treatment technology, as used at the Kiel WWTF, is insufficient to meet these final phosphorus WQBELs. Therefore, the Department believes that a compliance schedule is necessary for the Kiel WWTF to comply with those limits, and consequently the permit contains a compliance schedule to meet the phosphorus WQBELs in accordance with ch. NR 217.17, Wis. Adm. Code. It is also likely that, in order to consistently comply with the 0.1 mg/L limit, the City of Kiel will need to evaluate and implement any number of the following approaches:

- Optimization of current treatment processes
- Phosphorus source reduction
- Additional treatment processes, replacement, retrofitting or upgrades of the wastewater treatment facility
- Adaptive management and/or pollutant trading with upstream contributors

The Department believes filtration or a similar phosphorus removal process – likely applied in conjunction with other measures – is required in this situation to meet the final phosphorus WQBELs. Furthermore, the permittee will need to spend considerable time to plan, implement and finance those phosphorus removal processes. Therefore, a 7-year compliance schedule is incorporated in the permit, as provided under ch. NR 217.17(2), Wis. Adm. Code. The Department may revise that schedule at permit reissuance or pursuant to a permit modification.

The final phosphorus WQBELs are included in this permit and are scheduled to take effect on January 1, 2027, unless the Department modifies, revokes and reissues, or reissues the permit to incorporate a revised limit prior to that time. Such revision may occur to implement a TMDL, or if the permittee submits either: a Watershed Adaptive Management Request Form with a watershed adaptive management plan; an application for water quality trading; an application for a variance; or new information or additional data that supports a recalculation of the WQBELs.

Consistent with s. NR 217.17(3)(c), Wis. Adm. Code, and the "Implementation Guidance for Wisconsin's Phosphorus Water Quality Standards", an interim effluent limit must be applied until the final phosphorus limits become effective. The Department has determined that the TBL limit of 1.0 mg/L is appropriate for application as the interim limit in this situation, and it is applied for the duration of this permit term.

Ammonia

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 (effective March 1, 2004). Subchapter III of ch. NR 106 establishes the procedure for

calculating water quality based effluent limitations (WQBELs) for ammonia (effective March 1, 2004). Effluent limits are necessary in accordance with the reasonable potential analysis presented in the September 30, 2013 WQBEL memo, and reviewed in the May 9, 2017 memo.

Chloride
Acute and chronic chloride toxicity criteria for the protection of aquatic life are included in Tables 1 and 5 of ch. NR 105, Wis. Adm. Code. Subchapter IV of ch. NR 106 establishes the procedure for calculating (WQBELs) for chloride (effective February 1, 2000). Effluent limits are necessary in accordance with the reasonable potential analysis presenting in the September 30, 2013 WQBEL memo, and reviewed in the May 9, 2017 memo.

Thermal
Requirements for Temperature are included in NR 102 Subchapter II Water Quality Standards for Temperature and NR 106 Subchapter V Effluent Limitations for Temperature. These regulations became effective 10/1/2010. Thermal discharges must meet the Public Health criterion of 120 degrees F and the Fish & Aquatic Life criteria which are established to protect aquatic communities from lethal and sub-lethal thermal effects. Thermal monitoring is included for the months of November through April at a frequency of once per week during the most critical cold-weather months in terms of ambient temperatures and water quality criteria. This will provide the Department with a sufficiently large database of current conditions.

Whole Effluent Toxicity
The results of Whole Effluent Toxicity (WET) testing were evaluated by Department staff and recommendations for monitoring are made in the September 30, 2013 WQBEL memo. Acute and Chronic WET tests are required, in accordance with 40 CFR Part 122.21(j) and the Department's November 1, 2016 "Whole Effluent Toxicity Program Guidance Document – Revision #11."

Municipal Effluent Limits
There has been a change in the expression of limits per the 2016 revisions to NR 205.065. In accordance with the federal regulation 40 CFR 122.45(d), limits in this permit are to be expressed as weekly average and monthly average limits whenever practicable. Minor changes have been made to fecal coliform and chlorine limits.

5 Land Application - Proposed Monitoring and Limitations

Municipal Sludge Description						
Sample Point	**Sludge Class (A or B)**	**Sludge Type (Liquid or Cake)**	**Pathogen Reduction Method**	**Vector Attraction Method**	**Reuse Option**	**Amount Reused/Disposed (Dry Tons/Year)**
004	A	Cake	Fecal coliform, alkaline treatment, and pasteurization with an RDP unit	pH adjustment	Exceptional Quality Product (landspreading on multiple sites)	3426 yd^3 (2012-2016)
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? N/A						

5.1 Sample Point Number: 004- Cake 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	
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 (NH4-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	See Sections 3.2.1.4 and 5.5.6 for monitoring

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					requirements.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	See Sections 3.2.1.4 and 5.5.6 for monitoring requirements.

5.1.1 Changes from Previous Permit:

None.

5.1.2 Explanation of Limits and Monitoring Requirements

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

6 Compliance Schedules

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

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

Required Action	Due Date
Operational Evaluation Report: The permittee shall prepare and submit to the Department for approval an operational evaluation report. The report shall include an evaluation of collected effluent data, possible source reduction measures, operational improvements or other minor facility modifications that will optimize reductions in phosphorus discharges from the treatment plant during the period prior to complying with final phosphorus WQBELs and, where possible, enable compliance with final phosphorus WQBELs by January 1, 2021. The report shall provide a plan and schedule for implementation of the measures, improvements, and modifications as soon as possible, but not later than January 1, 2021 and state whether the measures, improvements, and modifications will enable compliance with final phosphorus WQBELs. Regardless of whether they are expected to result in compliance, the permittee shall implement the measures, improvements, and modifications in accordance with the plan and schedule specified in the operational evaluation report. If the operational evaluation report concludes that the facility can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the permittee shall comply with the final phosphorus WQBEL by January 1, 2021 and is not required to comply with the milestones identified below for years 3 through 9 of this compliance schedule ('Preliminary Compliance Alternatives Plan', 'Final Compliance Alternatives Plan', 'Final Plans and Specifications', 'Treatment Plant Upgrade to Meet WQBELs', 'Complete Construction', 'Achieve Compliance'). STUDY OF FEASIBLE ALTERNATIVES - If the Operational Evaluation Report concludes that the permittee cannot achieve final phosphorus WQBELs with source reduction measures, operational improvements and other minor facility modifications, the permittee shall initiate a study of feasible alternatives for meeting final phosphorus WQBELs and comply with the remaining required actions	12/31/2018

of this schedule of compliance. If the Department disagrees with the conclusion of the report, and determines that the permittee can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the Department may reopen and modify the permit to include an implementation schedule for achieving the final phosphorus WQBELs sooner than January 1, 2027.	
Compliance Alternatives, Source Reduction, Improvements and Modifications Status: The permittee shall submit a 'Compliance Alternatives, Source Reduction, Operational Improvements and Minor Facility Modification' status report to the Department. The report shall provide an update on the permittee's: (1) progress implementing source reduction measures, operational improvements, and minor facility modifications to optimize reductions in phosphorus discharges and, to the extent that such measures, improvements, and modifications will not enable compliance with the WQBELs, (2) status evaluating feasible alternatives for meeting phosphorus WQBELs.	12/31/2019
Preliminary Compliance Alternatives Plan: The permittee shall submit a preliminary compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee's wastewater treatment facility is necessary to achieve final phosphorus WQBELs, the submittal shall include a preliminary engineering design report. If the plan concludes Adaptive Management will be used, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 without the Adaptive Management Plan. If water quality trading will be undertaken, the plan must state that trading will be pursued.	12/31/2020
Final Compliance Alternatives Plan: The permittee shall submit a final compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee's wastewater treatment is necessary to meet final phosphorus WQBELs, the submittal shall include a final engineering design report addressing the treatment plant upgrades, and a facility plan if required pursuant to ch. NR 110, Wis. Adm. Code. If the plan concludes Adaptive Management will be implemented, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 and an engineering report addressing any treatment system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the plan concludes water quality trading will be used, the submittal shall identify potential trading partners. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	12/31/2021
Progress Report on Plans & Specifications: Submit progress report regarding the progress of preparing final plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	12/31/2022
Final Plans and Specifications: Unless the permit has been modified, revoked and reissued, or reissued to include Adaptive Management or Water Quality Trading measures or to include a revised schedule based on factors in s. NR 217.17, Wis. Adm. Code, the permittee shall submit final construction plans to the Department for approval pursuant to s. 281.41, Stats., specifying treatment plant upgrades that must be constructed to achieve compliance with final phosphorus WQBELs, and a schedule for completing construction of the upgrades by the complete construction date specified below. (Note: Permit modification, revocation and reissuance, and reissuance are subject to s. 283.53(2), Stats.)	12/31/2023

Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance’ in the Surface Water section of this permit.	
Treatment Plant Upgrade to Meet WQBELs: The permittee shall initiate construction of the upgrades. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41. Stats. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance’ in the Surface Water section of this permit.	03/31/2024
Construction Upgrade Progress Report #1: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance’ in the Surface Water section of this permit.	03/31/2025
Construction Upgrade Progress Report #2: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	03/31/2026
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance’ in the Surface Water section of this permit.	12/31/2026
Achieve Compliance: The permittee shall achieve compliance with final phosphorus WQBELs. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance’ in the Surface Water section of this permit.	01/01/2027

6.2 Sanitary Sewer System Rehabilitation

Required Action	Due Date
Complete Construction: Complete construction of the proposed sewer system repairs up through 2022 as identified in the "2015 Kiel Wastewater Utility Ten Year Plan".	12/31/2022

6.3 Explanation of Compliance Schedules

The compliance schedule for phosphorus WQBELs provides a schedule for conducting the actions necessary to comply with those limits.

The compliance schedule for sanitary sewer system rehabilitation provides a schedule for conducting the actions necessary to complete construction of sewer system repairs.

7 Special Reporting Requirements:

None.

8 Other Comments:

None.

9 Attachments:

Water Quality-Based Effluent Limits Memo: “Water Quality-Based Effluent Limitations for the Kiel Wastewater Treatment Facility (WPDES Permit # WI-0020141)”, from Jim Schmidt to Dick Sachs – September 30, 2013

Water Quality Based Effluent Limits Memo Amendment: “Additional Water Quality-Based Limitations Compliant with 40 CFR 122.45(d) for the Kiel Wastewater Treatment Facility (WPDES Permit # WI-0020141)”, from Jim Schmidt to Sarah Donoughe – May 9, 2017

Map, City of Kiel Wastewater Treatment Facility

Substantial Compliance Determination, by Dave Haas, Wastewater Engineer – May 16, 2017

Municipal Permit Drafting Information Sheet, by David Gerdman, Wastewater Engineer – June 30, 2017

10 Proposed Expiration Date:

December 31, 2022

Prepared By:

Sarah Donoughe
Wastewater Specialist

Date: September 6, 2017

CORRESPONDENCE / MEMORANDUM **State of Wisconsin**

DATE: September 30, 2013 FILE REF: 3200

TO: Dick Sachs – East District / Green Bay

FROM: Jim Schmidt – WQ/3

SUBJECT: Water Quality-Based Effluent Limitations for the Kiel Wastewater Treatment Facility (WPDES Permit # WI-0020141)

This is in response to your request for an evaluation of water quality-based effluent limitations using chs. NR 102, 105, 106, 207, and 217 of the Wisconsin Administrative Code (where applicable), for Kiel's discharge to the Sheboygan River in Manitowoc County. This facility is located in the Sheboygan River Watershed (SH03) of the Sheboygan River basin. The evaluation of the permit recommendations is discussed in more detail in the attached report.

The attached evaluation was developed in consideration of new monthly low flows (7Q10 and 7Q2) which were estimated by USGS. Since those flows would allow increased discharges for some parameters above the limits included in Kiel's current WPDES permit, antidegradation must be considered. **The following recommendations are made for parameters that do not need an antidegradation evaluation because either the limits are equal to or more stringent than limits in the current permit, do not involve lowering of water quality, or are the initial imposition of limits which are exempt from antidegradation review:**

Substance	Effluent Limitations
pH	6.0 – 9.0 s.u. daily range (1)
Dissolved Oxygen:	
July – September	7.0 mg/L daily minimum
October – March	6.0 mg/L daily minimum
May – June	6.0 mg/L daily minimum
Fecal Coliforms	400 counts / 100 mL monthly geometric mean, May – September (1)
Total Residual Chlorine	38 ug/L daily maximum, 8.4 ug/L weekly average (1)
Total Phosphorus:	
Water Quality-based	0.72 lbs/day annual average, 0.1 mg/L six-month average (May – October, November – April), 0.3 mg/L monthly average (3)
Interim	1.0 mg/L monthly average (2)
Chlorides	460 mg/L and 3,300 lbs/day weekly average (1)(5)
Temperature (3):	
September	75°F weekly average
October	64°F weekly average
November	52°F weekly average
December	53°F weekly average
January	53°F weekly average
February	55°F weekly average
March	57°F weekly average
April	60°F weekly average

(continued on next page)

Ammonia:

Year-round	6.7 mg/L daily maximum (6)
April	2.2 mg/L monthly average (4)
May	5.2 mg/L weekly average, 2.2 mg/L monthly average (4)
June – September	3.7 mg/L weekly average, 1.7 mg/L monthly average (4)
October	9.4 mg/L weekly average (3), 5.3 mg/L monthly average (4)
November	13 mg/L weekly average (3), 5.3 mg/L monthly average (4)
December	12 mg/L weekly average (3), 5.3 mg/L monthly average (4)
January - February	15 mg/L weekly average (3), 5.3 mg/L monthly average (4)
March	19 mg/L weekly average (3), 5.3 mg/L monthly average (4)

Footnotes:

(1) – No change to existing permit limits because the applicable water quality standards do not change.

(2) – Recommended limits are equal to or more stringent than those in the current permit.

(3) – Initial imposition of limits, exempt from antidegradation under s. NR 207.02(6)(b).

(4) – No change from existing permit limits because the need for increased limits cannot be shown under ss. NR 207.04(1)(a) and (2)(a).

(5) – If Kiel wishes to pursue a chloride variance, the recommended interim limit would be 630 mg/L weekly average, which is 105% of the highest reported weekly concentration.

(6) - A variable daily maximum ammonia limit table based on effluent pH is available to Kiel if desired, to replace the new year-round limit of 6.7 mg/L. These alternative daily maximum limits are not subject to antidegradation because weekly and monthly average limits are not changing (also see (4)).

Daily Maximum Ammonia Nitrogen (NH_3-N) Limits

Effluent pH - s.u.	NH_3-N Limit – mg/L	Effluent pH - s.u.	NH_3-N Limit – mg/L
$pH \leq 7.5$	No Limit	$8.2 < pH \leq 8.3$	9.4
$7.5 < pH \leq 7.6$	34*	$8.3 < pH \leq 8.4$	7.8
$7.6 < pH \leq 7.7$	29*	$8.4 < pH \leq 8.5$	6.4
$7.7 < pH \leq 7.8$	24*	$8.5 < pH \leq 8.6$	5.3
$7.8 < pH \leq 7.9$	20*	$8.6 < pH \leq 8.7$	4.4
$7.9 < pH \leq 8.0$	17	$8.7 < pH \leq 8.8$	3.7
$8.0 < pH \leq 8.1$	14	$8.8 < pH \leq 8.9$	3.1
$8.1 < pH \leq 8.2$	11	$8.9 < pH \leq 9.0$	2.6

* During the months of May through October if the pH is less than or equal to 7.9 there is no daily maximum limit for NH_3-N for municipal WWTF's treating primarily domestic wastewater. Limits shown in the table above with an asterisk* apply from November through April only.

As noted earlier, some parameters have increased effluent limits available compared to those in the existing WPDES permit. Increased limits are available for the following parameters and averaging periods based on a showing of need under s. NR 207.04(1)(a) using data reported during the current permit term:

BOD5 = Weekly average limits for every month of the year

Total Suspended Solids = Weekly average limits for every month of the year

Ammonia = Weekly average limit in April

As such, several alternative sets of limits are available in terms of recommended limits based on options available to the permittee. These alternatives are available because the antidegradation rule (ch. NR 207) requires certain steps or evaluations to be done by the permittee before increased effluent limitations can be determined by the Department. When the need for increased limitations has been demonstrated, the

permittee is required to perform an evaluation of whether or not the increased discharge will accommodate important social or economic development, pursuant to s. NR 207.04(1)(c)1. If the demonstration is not made, or if it is made and there is a showing that the increased discharge would not accommodate important social or economic development, no change from the current permit limits would be allowed under s. NR 207.04(2):

Limits based on inability to show accommodation of important social or economic development:

Substance	Effluent Limitations
BOD5:	
May - October	10 mg/L and 72 lbs/day weekly average, 10 mg/L monthly average
November - April	15 mg/L and 108 lbs/day weekly average, 15 mg/L monthly average
Total Suspended Solids:	
May - October	10 mg/L weekly average, 10 mg/L monthly average
November - April	15 mg/L weekly average, 15 mg/L monthly average
Ammonia (in addition to limits shown earlier in this cover document):	
April	5.2 mg/L weekly average

If Kiel as able to show that the increased discharge would accommodate important social or economic development, effluent limits would be recommended based on the prevention of significant lowering of water quality, as defined in s. NR 207.05. If the increased discharge exceeds the levels which represent significant lowering of water quality, Kiel has the opportunity to demonstrate whether there are cost-effective alternatives available under s. NR 207.04(1)(d) which prevent the significant lowering of water quality. Based on this evaluation, two additional alternative sets of effluent limits are available.

Limits based on prevention of significant lowering of water quality, applicable if either the discharge is below these levels or if the significant lowering of water quality can be prevented in a cost-effective manner:

Substance	Effluent Limitations
Ammonia (in addition to limits shown earlier in this cover document):	
April	9.0 mg/L weekly average

BOD5 & Total Suspended Solids (TSS):

Month:	BOD5	TSS	Month:	BOD5	TSS
January	16 mg/L and 117 lbs/day weekly average	19 mg/L weekly average	July	10 mg/L, and 75 lbs/day weekly average	11 mg/L weekly average
February	16 mg/L and 116 lbs/day weekly average	18 mg/L weekly average	August	10 mg/L and 72 lbs/day weekly average	10 mg/L weekly average
March	20 mg/L and 142 lbs/day weekly average	29 mg/L weekly average	September	11 mg/L and 76 lbs/day weekly average	12 mg/L weekly average
April	30 mg/L monthly ave., 36 mg/L and 117 lbs/day weekly average	30 mg/L monthly average, 45 mg/L weekly average	October	11 mg/L, and 76 lbs/day weekly average	12 mg/L weekly average
May	14 mg/L and 102 lbs/day weekly average	23 mg/L weekly average	November	17 mg/L and 120 lbs/day weekly average	20 mg/L weekly average
June	11 mg/L and 76 lbs/day weekly ave.	12 mg/L weekly average	December	17 mg/L and 139 lbs/day weekly ave.	20 mg/L weekly average

Limits based on full assimilative capacity of receiving water, applicable if the discharge exceeds levels which represent significant lowering of water quality and the significant lowering of water quality cannot be prevented in a cost-effective manner under s. NR 207.04(1)(d):

Substance Effluent Limitations

Ammonia (in addition to limits shown earlier in this cover document):

April 17 mg/L weekly average

BOD5 & Total Suspended Solids (TSS):

Month:	BOD5	TSS	Month:	BOD5	TSS
January	19 mg/L and 134 lbs/day weekly average	19 mg/L weekly average	July	11 mg/L and 82 lbs/day weekly average	11 mg/L weekly average
February	18 mg/L, and132 lbs/day weekly average	18 mg/L weekly average	August	10 mg/L, and73 lbs/day weekly average	10 mg/L weekly average
March	29 mg/L and 210 lbs/day weekly average	29 mg/L weekly average	September	12 mg/L and 84 lbs/day weekly average	12 mg/L weekly average
April	30 mg/L monthly average, 45 mg/L weekly average	30 mg/L monthly average, 45 mg/L weekly average	October	12 mg/L and 85 lbs/day weekly average	12 mg/L weekly average
May	23 mg/L, and 163 lbs/day weekly average	23 mg/L weekly average	November	20 mg/L and 143 lbs/day weekly average	20 mg/L weekly average
June	12 mg/L and 85 lbs/day weekly average	12 mg/L weekly average	December	20 mg/L and 140 lbs/day weekly average	20 mg/L weekly average

NOTE: Since there are no water quality standards available for total suspended solids, there is no level at which significant lowering of water quality can be defined under NR 207. As a result, the total suspended solids limits in the previous two tables are the same, since the need for increased limits was able to be demonstrated.

Along with the chemical-specific recommendations mentioned above, acute and chronic whole effluent toxicity testing is recommended for this permittee. Accordingly, following the guidance provided in the most recent version of the Department's Whole Effluent Toxicity Program Guidance Document, three acute whole effluent toxicity test batteries are recommended during the permit term, and twice per year chronic whole effluent toxicity test batteries are also recommended. Please consult the attached report regarding relevant monitoring conditions that relate to this discharge.

If there are any questions or comments, please contact Jim Schmidt at (608) 267-7658 or via e-mail at jamesw.schmidt@wisconsin.gov.

Attachment

cc: David Gerdman – Water District East / Green Bay

Water Quality-Based Effluent Limitations for
Kiel WWTF
WPDES Permit # WI-0020141
Prepared by:
Jim Schmidt - WQ/3

Existing Permit Limitations (WPDES Permit # WI-0020141, effective April 1, 2009 and expiring September 30, 2013):

Outfall 001 - Activated sludge system (extended aeration) followed by clarification, phosphorus removal by chemical precipitation, tertiary filtration and disinfection with chlorine gas followed by dechlorination with sulfur dioxide gas.

Substance	Effluent Limitations
BOD5:	
May - October	10 mg/L and 72 lbs/day weekly average, 10 mg/L monthly average
November - April	15 mg/L and 108 lbs/day weekly average, 15 mg/L monthly average
Total Suspended Solids:	
May - October	10 mg/L weekly average, 10 mg/L monthly average
November - April	15 mg/L weekly average, 15 mg/L monthly average
pH	6.0 – 9.0 s.u. daily range
Dissolved Oxygen	6.0 mg/L daily minimum
Fecal Coliforms	400 counts / 100 mL monthly geometric mean, May – September
Total Residual Chlorine	38 ug/L daily maximum, 8.4 ug/L weekly average
Total Phosphorus	1.0 mg/L monthly average
Total Recoverable Copper	39 ug/L and 0.28 lbs/day weekly average, 0.46 lbs/day wet weather weekly average
Ammonia:	
Year-round	11 mg/L daily maximum
April – May	5.2 mg/L weekly average, 2.2 mg/L monthly average
June – September	3.7 mg/L weekly average, 1.7 mg/L monthly average
October – March	5.3 mg/L monthly average

Since monthly low flows are now available for the receiving water, all of the above limits are being re-evaluated in this report along with anything else tested and detected in Kiel's effluent.

Information for Permit Reissuance Evaluation:

Receiving Water Information

Name: Sheboygan River (WBIC = 50700)

Classification: Warmwater sport fish community, not used as a public water supply

NOTES: (1) For bioaccumulative chemicals of concern (BCCs), criteria are based on a classification as a coldwater community and public water supply since this permittee is located in the Great Lakes basin. However, no BCCs were detected in the discharge.

(2) Sheboygan River is listed as an Impaired Water for PCBs over the first 33.9 miles upstream of its mouth. At this time, this designation does not affect Kiel since Kiel is not required to test PCBs in its effluent.

Year-round flows (updated by USGS in August of 2008):

7Q10 = 0.93 cfs 7Q2 = 2.1 cfs

30Q5 or 90Q10 = 1.6 cfs Estimated Harmonic Mean Flow = 11.4 cfs

% of Flow used to calculate limits = 25 (default)

Monthly low flows:

Month	30Q5 (cfs)	7Q2 (cfs)	7Q10 (cfs)	Month	30Q5 (cfs)	7Q2 (cfs)	7Q10 (cfs)
January	3.4	4.7	1.7	July	2.9	3.2	1.5
February	4.4	5.1	1.7	August	2.3	2.8	1.1
March	26	13.3	3.4	September	2.2	2.8	1.1
April	32	24	11.6	October	2.9	4.1	1.4
May	10.9	10.1	3.9	November	4.6	6.4	2.2
June	5.1	5.4	2.1	December	4.3	6.1	1.9

Monthly 4Q3 flows are also available, but are not listed here because those flows are not used for limit calculations due to the fact they do not represent "biologically-based" design low flows.

Source of background concentration data = Sheboygan River near Sheboygan for everything except chlorides and hardness. Chloride data came from the Mullet River above Plymouth and hardness data came from ambient water samples in Kiel's whole effluent tests. Although the Sheboygan River site is downstream of Kiel, dilution and results (compared to other locations) suggest Kiel has little impact on downstream metals levels.

Background results used in limit calculations:

Substance	Result	Substance	Result
Chloride	22.0 mg/L	Hardness	288 PPM
Cadmium	0.061 ug/L	Chromium	0.519 ug/L
Copper	2.46 ug/L	Lead	0.555 ug/L
Nickel	2.94 ug/L	Zinc	3 ug/L

Effluent Information

Actual Flow (4/1/2009 – 9/30/2013):

Peak daily = 3.115 MGD (4/10/2013)
Peak 7-day average = 2.645 MGD (4/8 – 4/14/2013)
Peak 30-day average = 2.016 MGD (3/31 – 4/29/2013)
Peak 365-day average = 1.066 MGD (latest = 6/12/2010 – 6/11/2011)

Design Flow:

Annual average = 0.862 MGD (from permit reissuance application)

For the peak daily, weekly, and monthly flows, the peak actual flows are used because the peak actual 365-day flow exceeded the annual average design flow. Only the peak annual average is used to calculate water quality-based concentration limits, while the other peak flows are used to calculate mass limits.

NOTE: The high flows, in particular the reported flows, may warrant Kiel being treated as a major municipality for the next permit reissuance and warranting testing of the entire EPA priority pollutant list.

Acute dilution factor used = Not applicable

Effluent concentration data)

Substances tested:

During permit term = Ammonia, chloride, copper, phosphorus, residual chlorine, hardness (during WET tests)

As part of permit reissuance application = Arsenic, cadmium, chromium, lead, nickel, zinc, hardness

Results:

Single test results are available for arsenic, cadmium, lead, chromium, nickel and zinc. Of those, only the

last three were detected, so those results are summarized below alongside the calculated limits. For the remaining substances, multiple test results are available and summarized here.

Hardness)
Daily average results from effluent WET tests in current permit term:

9/15/2009	397 PPM
5/18/2010	396 PPM
3/15/2011	364 PPM
4/10/2012	378 PPM
3/19/2013	412 PPM

From permit application:

1/13/2013	332 PPM
1/16/2013	346 PPM
1/20/2013	359 PPM
1/28/2013	299 PPM
Mean of all results	365 PPM

Chloride)

Date	Chloride (mg/L)	Date	Chloride (mg/L)	Date	Chloride (mg/L)
10/19/2011	600	2/1/2012	450	6/5/2012	400
11/17/2011	390	3/13/2012	350	7/17/2012	450
12/1/2011	420	4/25/2012	360	8/1/2012	460
1/4/2012	390	5/8/2012	270	9/4/2012	440

Statistics}

Mean =	415 mg/L
1-day P99 =	633.2 mg/L
4-day P99 =	515.6 mg/L
30-day P99 =	449.8 mg/L

Because of the large number of results available for ammonia, phosphorus, copper and chlorine, only the statistics are presented here.

	Phosphorus	Ammonia	Copper	Chlorine
# of Results	434	437	28	478
# of Detects	434	431	28	0
Mean	0.849 mg/L	0.238 mg/L	13.86 ug/L	0
Maximum	16.542 mg/L (4/20/2011)	10.92 mg/L (12/28/2010)	27 ug/L (4/13/2011)	0 (all results were less than 100 ug/L)
1-day P99	7.57 mg/L	2.65 mg/L	29.30 ug/L	
4-day P99	5.41 mg/L	1.73 mg/L	20.63 ug/L	
30-day P99	1.89 mg/L	0.72 mg/L	16.10 ug/L	

"P99" values are the 99th upper percentile values calculated using the procedure in s. NR 106.05(5) when 11 or more detected results are available.

Mean results are calculated using zeroes in place of non-detected results, the reason why the mean chlorine concentration is zero.

NOTE: Because some of the copper values were excluded due to high levels of detection, the copper data are summarized in this report. That information is on the following page.

Effluent Copper Data reported since 3/10/2011, results in ug/L

Date	Cu result	Date	Cu result
03/10/2011	15	06/05/2012	9.4
04/13/2011	27	07/17/2012	15
05/02/2011	22	08/01/2012	14
06/02/2011	18	09/04/2012	14
07/07/2011	19	10/09/2012	11
08/04/2011	19	11/15/2012	8.1
09/12/2011	18	12/03/2012	7
10/10/2011	19	01/02/2013	8
11/01/2011	16	02/03/2013	9.6
12/01/2011	15	03/06/2013	7.4
01/04/2012	18	05/06/2013	8.7
02/01/2012	16 #	05/21/2013	12
03/01/2012	11	6/12/2013	8.9
04/17/2012	12		
05/01/2012	10		

NOTES:

< - Copper was not detected at the indicated level of detection.

* - Data were actually available throughout the entire permit term back to April of 2009. However, as requested by the permittee, only the copper data reported on or after March 10, 2011 were considered here due to a change in laboratories which was in part due to issues with high levels of detection.

- Result was corrected from the submitted discharge monitoring reports, as documented within Kiel's April 1, 2013 Dissipative Cooling request submittal.

Out of the 72 total results submitted between the effective date of the current permit and the end of June, 2013, 16 results were excluded. That left 56 accepted results, 45 of which were detected.

Effluent Limit Summary

Limits are calculated only for the substances detected in Kiel's effluent that have water quality criteria, as well as the chlorine limit since chlorine was limited in the current WPDES permit. Results are in units of ug/L unless noted otherwise.

DAILY MAXIMUM LIMITS based on ACUTE TOXICITY CRITERIA

	Crit-	Effl.	1/5 of	Effluent Concentrations		
Substance	erion	Limit	Limit	Mean	P99	Max.
Chlorine	**19.03**	**38.06**		**Limited in current permit**		
Chromium (total or +3)	4445.84 *	8891.68	1778.34	1.1		
Copper	52.64 *	105.28			29.30	27
Nickel	1048.88 *	2097.76	419.55	2.1		
Zinc	344.68 *	689.36	137.87	20		
Chlorides (mg/L)	757	1514			633.2	600

* - Criteria are calculated using an effluent hardness of 365 PPM except for nickel (268 PPM) and zinc (333 PPM) where the values represent the maximum endpoint of the range over which criteria are applied in Table 2A of ch. NR 105.

NOTE: The NR 105 criteria are not considered to be seasonal in that they don't vary by pH or temperature, meaning parameters that vary by season. As a result, the chronic toxicity criteria-based limits are calculated using 25% of the year-round 7Q10 low flow of 0.93 cfs, rather than limits that vary from month to month based on monthly 7Q10 values. This won't be the case for the evaluation of other parameters such as BOD5, ammonia, and temperature.

WEEKLY AVERAGE LIMITS based on CHRONIC TOXICITY CRITERIA

Substance	Crit-erion	Effl. Limit	1/5 of Limit	Effluent Concentrations Mean	P99
Chlorine	**7.28**	**8.55**	**1.71**	**Limited in current permit**	
Chromium (total or +3)	314.18 *	368.86	73.77	1.1	
Copper	25.59 *	29.62			20.63
Nickel	120.18 *	140.62	28.12	2.1	
Zinc	303.58 *	355.98	71.20	20	
Chlorides (mg/L)	**395**	**460.02**			**515.60**

* - Criteria are calculated using a receiving water hardness of 288 PPM except for nickel (268 PPM) where the value represents the maximum endpoint of the range over which criteria are applied in Table 2A of ch. NR 105.

MONTHLY AVERAGE LIMITS based on HUMAN THRESHOLD CRITERIA

Substance	Crit-erion	Effl. Limit	1/5 of Limit	Effluent Concentrations Mean	P99
Chromium (total or +3)	3.82E+06	1.20E+07	2.40E+06	1.1	
Nickel	4.30E+04	1.35E+05	2.70E+04	2.1	

Limits were not calculated based on wildlife or human cancer criteria since none of the substances with those criteria were required to be tested in Kiel's effluent.

Permit Recommendations:

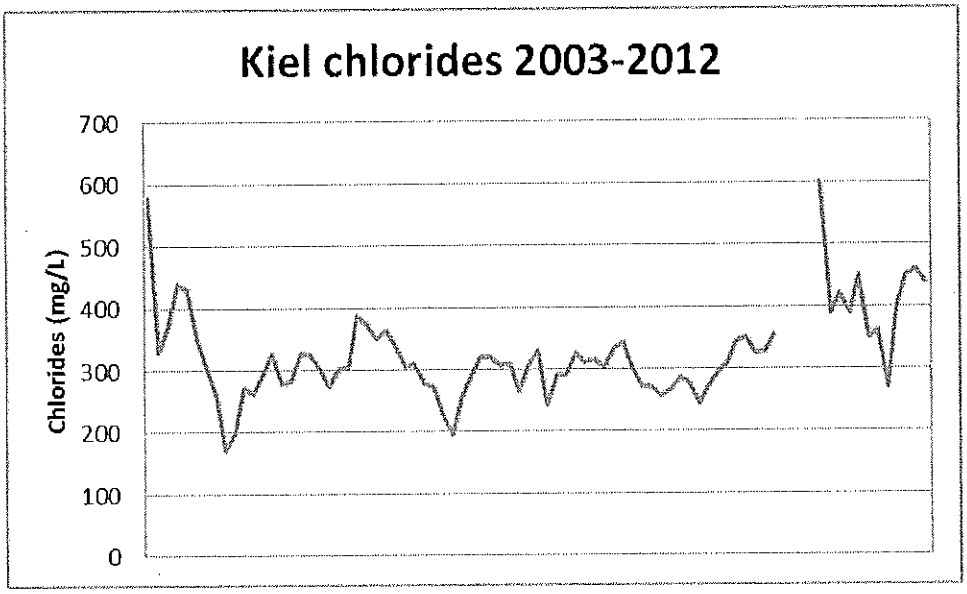
Chlorine) Since chlorine was limited in the current WPDES permit and Kiel adds sulfur dioxide for dechlorination purposes, chlorine limits must be included in the reissued permit. The daily maximum limit of 38 ug/L stays the same, but the weekly average limit increases slightly due to the new low flows estimated by USGS. The limit would increase from 8.4 ug/L to 8.6 ug/L (rounded from 8.55). However, since the previous limit was not exceeded during the permit term, Kiel is therefore unable to demonstrate the need for increased limits, no matter how slight the increase is. Pursuant to antidegradation rule language in s. NR 207.04(2), since the permittee has shown its ability to meet the 8.4 ug/L limit, that limit shall remain in the permit. Mass limits are no longer necessary for residual chlorine pursuant to s. NR 106.07(2).

Chlorides) A weekly average limit is recommended because the 4-day P99 value of 515.6 mg/L exceeds the effluent limit of 460.02 mg/L. The calculated and recommended water quality-based limit is 460 mg/L (rounded) and 3,300 lbs/day (0.862 MGD at 460.02 mg/L, rounded). Since Kiel does not have chloride limits in its current WPDES permit, Kiel may wish to pursue a variance to water quality standards under Subchapter VII of ch. NR 106. Under current guidance from 2010, the suggested variance (or interim) limit is equal to the greater of the 4-day P99 or 105% of the highest weekly average effluent concentration. At Kiel, the highest concentration was 600 mg/L in October of 2011. Since that exceeds the P99 of 515.6 mg/L, the proposed variance limit would be 630 mg/L weekly average (600 mg/L X 1.05).

It is noted that a fairly large chloride database is available from the previous permit term, covering 2003 through 2009. The overall chloride results from 2003 through 2012 are presented in a separate attachment to this report. Although more than 11 detected results are already available during the current permit term, it is possible to use this older information to either support or revise the permit recommendations. In fact, another 67 results are available over this period, so the following table summarizes the statistics from those 67 results when combined with the 12 results from 2011 to 2012, alongside the statistics for only the 12 results from 2011-2012 which were presented earlier in this report:

	Chloride – all data	Chloride (2011-2012)
# of Results	79	12
# of Detects	79	12
Mean	323.87 mg/L	415 mg/L
Maximum	600 mg/L (10/19/2011)	600 mg/L (10/19/2011)
1-day P99	528.29 mg/L	633.2 mg/L
4-day P99	417.10 mg/L	515.6 mg/L
30-day P99	355.82 mg/L	449.8 mg/L

It is noted that none of the results in the previous database exceeded the maximum value of 600 mg/L from 2011. From this table, it appears that the overall P99 values are much lower than that calculated from the 2011-2012 data, and the 4-day P99 of 417.10 mg/L from the overall database is now less than the calculated weekly average limit of 460.02 mg/L. This suggests the chloride limits could be removed from the permit recommendations. However, the fact that the recent data has higher P99 values suggests a potential upward trend in Kiel's chloride results. The following graph was developed from the overall database.



Although many of the results are below the 460 mg/L limit, there appears to be a trend towards higher values near the end of this period, covering the 2011 – 2013 data although, as summarized earlier, theonly result that exceeds 460 mg/L was the peak result of 600 mg/L from October 19, 2011. Results since then have been below the limit, but several results are closer to the limit compared to the results from 2009 and earlier. With a fairly long break containing no results between March of 2009 and October of 2011 (as noted by the break in the graph, also see data in the attachment), it isn't clear whether these recent high values were part of a trend that extended over this 2-1/2 year break. Because there was only a single day exceedance of the weekly average limit in 2011 along with another single day exceedance back in 2003 (the first result of the database), these exceedances do not constitute the trigger of a weekly average permit limit under s. NR 106.05(3)(b). There aren't exceedances of a weekly average limits based on 4 consecutive days of data because chloride wasn't sampled on 4 consecutive days at any time during the 2003 – 2012 database.

Because the 4-day P99 of the 2011 – 2012 exceeds the 460 mg/L limit and because there's a long break within the database, the permit recommendation shall be based only on the most recent information under the asusmption that the pre-2009 data are not representative of current discharge conditions. Therefore, no change is made to the permit limits recommended above. As data are collected during the upcoming permit term, it may be appropriate to revise these recommendations again in the future especially if the upward trend is no longer apparent.

EVALUATIONS OF OTHER PARAMETERS:
Not only has the year-round 7Q10 and 7Q2 changed, but we now have monthly 7Q10 and 7Q2 estimates. Because of this, effluent limits for BOD5, TSS, and ammonia shall be re-evaluated in this report to determine if there are any significant changes from the current and previous permit terms.

BOD5 and TSS: BOD5 limits have been in-place for several terms of Kiel's WPDES permit, calculated based on the annual average design flow of 0.862 MGD and a 7Q10 of 0.80 cfs. TSS limits are typically set equal to the BOD5 limits based on the expected achievability of municipal sewage treatment plants. Although the effluent design flow has not changed, limits are re-calculated due to the availability of monthly 7Q10 flow estimates on the Sheboygan River as provided by USGS. Several exceedances of the current permit limits for both parameters during the current permit term warrants re-examining the limits at this time. The weekly average limit exceedances are summarized below (monthly average limit exceedances aren't summarized here because they would essentially be double-counting many of the weekly exceedances given that the concentration limits are the same):

BOD5 – Weekly average limit of 10 mg/L, May – October = Three exceedances during May of 2010, maximum calculated weekly average was 93.0 mg/L over May 2 – 4.

BOD5 – Weekly average limit of 72 lbs/day, May – October = Three exceedances during May of 2010, maximum calculated weekly average was 828 lbs/day over May 2 – 4.

BOD5 – Weekly average limit of 15 mg/L, November – April = Six exceedances during March and April of 2010, two more during December of 2010, and two more during April of 2011, maximum calculated average was 304.4 mg/L over March 28 – 30, 2010.

BOD5 – Weekly average limit of 108 lbs/day, November – April = Six exceedances during March and April of 2010, two more during December of 2010, three more during April of 2011 and three more during April of 2013, maximum calculated average was 2,537 lbs/day over March 28 – 30, 2010.

TSS – Weekly average limit of 10 mg/L, May – October = One exceedance during June of 2009, one during October of 2009, and two during May of 2010, maximum calculated weekly average was 136 mg/L over May 2 – 4, 2010.

TSS – Weekly average limit of 15 mg/L, November – April = Five exceedances during March and April of 2010, three more over December 2010 and January 2011, and two more in April of 2011, highest calculated average = 470 mg/L over April 20 – 25, 2011. Although some of these exceedances are extreme, the results will be used as part of the antidegradation process if increased limits are calculated based on the new monthly stream low flows.

As before, BOD5 limits are calculated based on a factor of 26 pounds per day of BOD5 discharged per cfs of total (effluent plus stream) flow in order to reduce instream DO levels by 2 mg/L and meet a DO criterion of 5 mg/L. This factor is adjustable based on the temperature of the receiving water as well as

the instream DO concentrations after mixing. Background temperatures for the Sheboygan River are taken from Table 2 of ch. NR 102, which provides new ambient levels for small warmwater streams as part of the new thermal standards that became effective in late 2010. Using the monthly ambient temperatures and the new 7Q10 flows, the following table summarizes the updated weekly average BOD5 limits for Kiel's discharge at an annual average design flow of 0.862 MGD and the 6 mg/L daily minimum DO limit from the current WPDES permit.

	Jan.	Feb.	March	April	May	June
7Q10 (cfs)	1.7	1.7	3.4	11.6	3.9	2.1
BOD5 Limit:						
mg/L	19	18	29	> 45	23	12
lbs/day	134	132	210	No limit	163	85
	July	Aug.	Sept.	Oct.	Nov.	Dec.
7Q10 (cfs)	1.5	1.1	1.1	1.4	2.2	1.9
BOD5 Limit:						
mg/L	11 *	10 *	12 *	12	20	20
lbs/day	82	73	84	85	143	140

* - Daily minimum DO limit would be raised from 6 mg/L to 7 mg/L because mix DO conditions based on 6 mg/L effluent would result in a BOD5 limit below 10 mg/L that would be representative of an effluent-dominated situation that normally warrants a 7 mg/L DO limit.

The current permit limits are 10 mg/L and 72 lbs/day in May – October, with 15 mg/L and 108 lbs/day in November – April. Basically, this means the limits increase in every month of the year for both concentration and mass except for August, where the 1 lb/day mass difference is basically no change after rounding. Because of the high BOD5 concentration and mass values reported during the current permit term and the fact those high values have occurred during all seasons, the need for increased discharge limits would be justified under s. NR 207.04(1)(a). However, the difficult part comes in the next demonstration, which is the social/economic justification for an increased discharge under s. NR 207.04(1)(c)1. In that part of the code, if the increased discharge limits result in any lowering of water quality, the permittee would be required to demonstrate that the proposed increased discharge that is allowed with the new flows would accommodate important social or economic development in any of seven available factors (subd. 1.a. through g.) Several of those factors are industry-related and would not apply to a municipal discharge such as Kiel (increased employment, increased production, avoiding a reduction in employment, or increased efficiency). The other three would relate to municipal as well as industrial discharges, namely s. NR 207.04(1)(c)1.e. through g, these are the demonstrations which a municipal discharge would be expected to make, any of which would satisfy the social/economic requirement of the code:

e. There will be industrial, commercial, or residential growth in the community.
f. The discharger will be providing economic or social benefit to the community, or
g. The discharger will be correcting an environmental or public health problem.

Although BOD5 levels have exceeded current permit limits on several occasions during the term of the permit, there is no proposed change to the design discharge rate. Kiel would need to satisfy any of the conditions in subds. 1.e. through g. in order to qualify for the increased limits. The information is not currently available to satisfy any of those three situations since the proposed increase in limits is due to stream conditions rather than anything originating from the discharger. Under ss. NR 207.04(2)(b)2 or 3, discharges that are unable to demonstrate the social/economic need for an increased discharges would have limits set equal to the existing levels of the affected substances adjacent to the discharge site, meaning no change in the limits.

In a situation like this, the typical Department response is to note the issue regarding the social/economic demonstration in the formal limit recommendations, but also to indicate what the limits would be if a social/economic demonstration could be made. If Kiel was able to show that an increased discharge of BOD5 would satisfy any of the three issues listed above, the Department response would be to provide limits to cover either of two situations under ch. NR 207. That response involves the determination of the levels associated with the "significant lowering of water quality" (or SLOWQ) as defined in s. NR 207.05. SLOWQ represents the level (concentration or mass) that would essentially use up one-third of the available assimilative capacity associated with the increased streamflows. In other words, SLOWQ represents one-third of the difference between the current permit limits and the limits based on the new monthly low flows.

If a permittee's increased discharge exceeds the level associated with SLOWQ, under s. NR 207.04(1)(d) the permittee would have to demonstrate whether or not SLOWQ could be prevented in a cost-effective manner by the use of pollution control alternatives such as conservation measures, recycling measures, other applicable process or operational changes, source reduction, or other pollution minimization alternatives. With these available options, an increased limit scenario such as that which is available for BOD5 would be addressed by the Department providing the limits based on SLOWQ as well as those based on full assimilative capacity. If the proposed increase in discharge does not exceed SLOWQ, or if SLOWQ could be prevented in a cost-effective manner under s. NR 207.04(I)(d), then the SLOWQ limits would apply. If the proposed discharge exceeded SLOWQ and the exceedance could not be prevented in a cost-effective manner under s. NR 207.04(I)(d), then the full assimilative capacity-based limits would apply. The full assimilative capacity-based limits are those listed in the previous table (19 mg/L and 134 lbs/day for January, etc.).

NOTE: For August, there is essentially no increase in limits so August is exempt from these demonstrations; the SLOWQ limit rounds off to be equal to the current permit limit. For April, the new BOD5 limit is not water quality-based because the 45 mg/L weekly average is based on ch. NR 210, so SLOWQ for April is based on the difference between the existing limit of 10 mg/L and the actual calculated water quality-based limit, with that result also being compared to the NR 210 limit.

Based on the above discussions, the recommended limits for BOD5 (after rounding) are as follows, only if the social/economic justification in s. NR 207.04(1)(b) can be made by Kiel:

Weekly average BOD5 limits based on prevention of SLOWQ pursuant to s. NR 207.05)

	Jan.	Feb.	March	April	May	June
mg/L	16	16	20	36 #	14	11
lbs/day	117	116	142	257	102	76
	July	Aug.	Sept.	Oct.	Nov.	Dec.
mg/L	10	10	11	11	17	17
lbs/day	75	72	76	76	120	139

Weekly average BOD5 limits based on full assimilative capacity)

	Jan.	Feb.	March	April	May	June
mg/L	19	18	29	45 #	23	12
lbs/day	134	132	210	No limit	163	85
	July	Aug.	Sept.	Oct.	Nov.	Dec.
mg/L	11	10	12	12	20	20
lbs/day	82	73	84	85	143	140

- Since the weekly average limit exceeds 30 mg/L, a monthly average limit of 30 mg/L would also apply during the indicated month pursuant to s. NR 210.05(1)(b). No mass limit is associated with the monthly average limit, and the monthly average limit is not subject to NR 207 since the initial imposition of a monthly average BOD5 limit is exempt from antidegradation under s. NR 207.02(6)(b).

Dissolved oxygen limits would be 7.0 mg/L daily minimum in July – September when the receiving water is effluent-dominated, 6.0 mg/L in October – March and May - June , and no limit would apply during April.

It is noted that the only months in which there appears to be a significant difference between SLOWQ and full assimilative capacity limits are March through May. During the other months, the mass and concentration limits are fairly close to each other, so March through May would be the suggested months of focus in a cost-effective SLOWQ prevention evaluation.

For TSS, the process is noticeably simpler. Although as noted earlier, TSS limits are normally set equal to BOD5, the SLOWQ determination doesn't really apply because there are no water quality criteria for TSS. As a result, Kiel would still have to make the determination of need for increased limits, and that has been satisfied with the finding of multiple exceedances of the current permit limits. The social/economic demonstration and therefore the SLOWQ determination would not apply because with no criteria, there cannot be a showing or even an assumption that increased TSS levels represent a lowering of water quality. It may be true that increased TSS lowers water quality, but without a benchmark representing a standard or criterion, the degree of lowering cannot be assessed under the existing rules. Therefore, Kiel would get TSS limits equal to the full assimilative capacity-based BOD5 limits. Because there are no water quality standards for TSS, TSS limits are expressed only as concentrations.

Weekly average TSS limits)

	Jan.	Feb.	March	April	May	June
mg/L	19	18	29	45 #	23	12
	July	Aug.	Sept.	Oct.	Nov.	Dec.
mg/L	11	10	12	12	20	20

- Since the weekly average limit exceeds 30 mg/L in April, a monthly average limit of 30 mg/L would also apply during April pursuant to s. NR 210.05(1)(b).

Phosphorus – Technology Based: Wisconsin Administrative Code, ch. NR 217, requires municipal wastewater dischargers 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 – unless a more restrictive WQBEL is applicable. The current permit for Kiel contains a technology-based phosphorus limit of 1.0 mg/L monthly average. The effluent flow and concentration data reported during the previous permit term are summarized in the table on the following page.

Calendar Year	Mean Annual Effluent Flow (MGD)	Annual Average P Concentration (mg/L)	Estimated Annual Total P Loading (lbs/year)
2009	0.924	0.52	1463
2010	1.01	1.58	4858
2011	0.975	0.85	2523
2012	0.851	0.57	1481

Since the previous permit contained the 1.0 mg/L technology-based limit, it is recommended that this limit be retained in the reissued permit pending the evaluation of water quality-based limits. It is also noted that Kiel's discharge exceeded 150 pounds per month or 1,800 pounds per year twice in the last four years anyway, another reason the 1.0 mg/L limit is still applicable.

Phosphorus – Water Quality Based: Revisions to the administrative rules for phosphorus discharges took effect on December 1, 2010. These revisions require an evaluation of the need for water quality based effluent limits. For the Sheboygan River, the new rules specify a water quality criterion (WQC) for phosphorus of 100 ug/L pursuant to s. NR 102.06(3)(a)38, Wis. Adm. Code, since the Kiel outfall is downstream of the Sheboygan Marsh outlet.

Ambient stream data are available from the Sheboygan River in Fond du Lac County, upstream of Kiel. Ten results were available over the period of May 20, 2002 through July 11, 2012 with all ten values being collected during the months of May through October. This potentially qualifies all ten results for calculation of background concentrations under s. NR 217.13(2)(d) since only three of the results were collected during the last four years. Of the ten results, seven of them exceed 0.1 mg/L with an eight result exactly equal to 0.100 mg/L, meaning the median calculated under NR 217.13(2)(d) will also exceed 0.1 mg/L. In fact, the criterion in Fond du Lac County is only 0.075 mg/L since the data collection sites are above Sheboygan Marsh, so the median will exceed that criterion as well. Based on the high ambient concentrations, the recommended phosphorus limits for Kiel are 0.1 mg/L as a six-month average (May – October and November – April) and three times that, or 0.3 mg/L, as a monthly average limit. A mass limit of 0.72 lbs/day annual average is also recommended based on the 0.1 mg/L concentration limit and the 0.862 MGD annual average design flow.

However, it is noted that the ambient concentrations could be affected one way or the other by the presence of Sheboygan Marsh, so it may be prudent (but not required) for Kiel to collect ambient phosphorus data during May – October as part of its future compliance schedule activities. This could also be added to future Department ambient monitoring plans.

Compliance with an effluent phosphorus concentration limit as stringent as 100 ug/L may not be technically or economically feasible; but the new rules allow alternatives for achieving comparable reductions in phosphorus loading. Options for the company to consider may include requesting an alternate phosphorus limitation (APL) with compliance schedule, pollutant trading with other phosphorus discharges (point and/or nonpoint sources) that may be controlled more effectively, stream monitoring above and below the outfall to document actual instream changes related to the effluent discharge, and development of an adaptive management strategy that combine a broader range of efforts to reduce phosphorus loading. According to the PRESTO Estimation Tool, Kiel is likely to be eligible for the Adaptive Management option presented in s. NR 217.18, Wis. Adm. Code, since the point source loading from the permittee is far less than 50% of the estimated phosphorus load contribution in the watershed due to its location far from the headwaters of the Sheboygan River. During the phosphorus compliance schedule period, the current 1.0 mg/L monthly average limit shall serve as an Interim Limit.

Ammonia: The State of Wisconsin promulgated revised water quality standards for this substance during the term of the current permit. Those revisions became effective March 1, 2004, and include criteria based on both acute and chronic toxicity to aquatic life. The current WPDES permit for Kiel contains a daily maximum limit of 11 mg/L based on effluent pH data evaluated in 2008, so the typical approach taken would be to evaluate current effluent pH data to determine if the limit changes. The current permit also contains seasonal weekly average and monthly average limits calculated based on default background conditions (pH, temperature, ammonia) as well as the old year-round 7Q10 estimate of 0.80 cfs. At this time, the background values have changed based on new default data, but the more important change relates to the fact that not only has the year-round 7Q10 increased from 0.80 to 0.93 cfs, but monthly 7Q10 (and 7Q2) estimates have now been generated by USGS which may provide additional relief from the existing permit limits. Therefore, all of the current permit limits for ammonia shall be re-evaluated. Where increased limits are available, antidegradation provisions of ch. NR 207 shall be incorporated as well.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC): Daily maximum limitations are based on acute toxicity criteria, which are a function of the effluent pH and the receiving water classification. A 99th upper percentile pH value of 8.2 s.u. was used to establish the current daily maximum permit limit of 11 mg/L. During the current permit term, a total of 1,552 sample results were reported from April 1, 2009 through June 30, 2013. Generally the department has only grab sampling data and the ATC is based upon a maximum reasonably expected pH. However, the Kiel WWTF is equipped with continuous pH monitoring, and the daily maximum and daily minimum are reported on the monthly Discharge Monitoring Reports. The highest reported daily maximum pH value was 9.29 s.u. on January 31, 2012. More importantly, the new 99th upper percentile value, as represented by the 16th highest result out of a database of 1,552 values, was estimated at 8.48 s.u., which is significantly above the 8.2 s.u. value used in 2008. This results in a lower daily maximum pH limit. At pH 8.48, the acute toxicity criterion for ammonia in warmwater sportfish streams is 3.33 mg/L, resulting in a daily maximum limit of 6.7 mg/L after rounding.

However, it is also noted that over this period, the daily maximum pH has ranged from the above-mentioned high of 9.29 down to a reported value of 7.1 s.u. on March 25, 2010. For that reason, an alternative is available which would provide a table of daily maximum pH limits based on a range of daily maximum pH values. This alternative may be included in the permit in place of the 6.7 mg/L daily maximum limit.

Daily Maximum Ammonia Nitrogen (NH_3-N) Limits

Effluent pH - s.u.	NH_3-N Limit – mg/L	Effluent pH - s.u.	NH_3-N Limit – mg/L
$pH \leq 7.5$	No Limit	$8.2 < pH \leq 8.3$	9.4
$7.5 < pH \leq 7.6$	34*	$8.3 < pH \leq 8.4$	7.8
$7.6 < pH \leq 7.7$	29*	$8.4 < pH \leq 8.5$	6.4
$7.7 < pH \leq 7.8$	24*	$8.5 < pH \leq 8.6$	5.3
$7.8 < pH \leq 7.9$	20*	$8.6 < pH \leq 8.7$	4.4
$7.9 < pH \leq 8.0$	17	$8.7 < pH \leq 8.8$	3.7
$8.0 < pH \leq 8.1$	14	$8.8 < pH \leq 8.9$	3.1
$8.1 < pH \leq 8.2$	11	$8.9 < pH \leq 9.0$	2.6

* During the months of May through October if the pH is less than or equal to 7.9 there is no daily maximum limit for NH_3-N for municipal WWTF's treating primarily domestic wastewater. Limits shown in the table above with an asterisk* apply from November through April only.

Weekly Average & Monthly Average Limits based on Chronic Toxicity Criteria (CTC): Weekly average and monthly average limits for Ammonia Nitrogen are based on chronic toxicity criteria, both of which are a function of background pH and temperature. Criteria updates are available based on updated ambient information. Ambient pH data have been updated for hardwater streams such as the Sheboygan River, while ambient temperature have been updated as part of the Department's development of thermal water quality standards (updated ambient values for small warmwater streams are now listed in Table 2 of ch. NR 102).

The 4-Day criterion is simply equal to the 30-Day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7Q10 low flow to derive weekly average limitations. The 30-day criteria are used with the 30Q5 low flow to derive monthly average limitations. The stream flow value is further adjusted to temperature, with variable percentages of streamflow available for dilution based on seasonal temperature. The rules provide a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 °C, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the Sheboygan River system. So "ELS Absent" criteria apply from October through March, and "ELS Present" criteria will apply from April through September. The following table summarizes the ambient values and criteria for each month of the year.

Month:	Jan. *	Feb. *	March *	April	May	June
Ambient Values:						
pH (s.u.)	7.90	7.90	7.90	8.09	8.09	8.09
Ammonia (mg/L)	0.16	0.16	0.16	0.16	0.16	0.1
Temp. (°F)	33	34	38	48	58	66
Temp. (°C)	<7	<7	<7	8.9	14.4	18.9
Updated Chronic Criteria:						
4-d (mg/L)	11.36	11.36	11.36	5.32	5.32	4.02
30-d (mg/L)	4.54	4.54	4.54	2.13	2.13	1.61
Criteria Used to Calculate Current Permit Limits:						
4-d (mg/L)	10.31	10.31	10.31	4.41	4.41	2.10
30-d (mg/L)	4.12	4.12	4.12	1.76	1.76	0.84

Month:	July	Aug.	Sept.	Oct. *	Nov. *	Dec.*
Ambient Values:						
pH (s.u.)	8.08	8.08	8.08	8.06	8.06	8.06
Ammonia (mg/L)	0.1	0.1	0.1	0.16	0.16	0.16
Temp. (°F)	69	67	60	50	40	35
Temp. (°C)	20.6	19.4	15.5	10	<7	<7
Updated Chronic Criteria:						
4-d (mg/L)	3.66	3.93	5.06	7.45	9.04	9.04
30-d (mg/L)	1.46	1.57	2.02	2.98	3.62	3.62
Criteria Used to Calculate Current Permit Limits:						
4-d (mg/L)	2.10	2.10	2.10	10.31	10.31	10.31
30-d (mg/L)	0.84	0.84	0.84	4.12	4.12	4.12

* - ELS absent criteria applied
"< 7" is listed for temperature because chronic ammonia criteria are constant below 7°C.
Ambient ammonia values are used to calculate limits, not criteria. Those values do not change from the previous effluent limit calculation in 2008.
Source of information used to calculate current permit limits = May 5, 2008 effluent limits memo from Susan Sylvester (prepared by Jeff Haack) to Dick Sachs.

It is noted that there are some limited ambient pH data available, but it's from late summer and from 1994 and earlier. The ambient pH data aren't used here because it's not certain whether this is representative of current conditions, so default data were used. Although there is an impoundment downstream of Kiel, the default data represent statewide information on pH values in non-impounded conditions. Default ambient pH results for impounded waters are a little bit higher than those for non-impounded waters, which in turn would result in slightly higher criteria and lower effluent limits because ammonia is more toxic in higher pH waters. However, in the Kiel situation it is felt that the lower pH values based on non-impounded waters is more representative of the situation in the river because the residence time in the impoundment below Kiel is less than the 14-day threshold used to define reservoirs for phosphorus criteria implementation purposes in s. NR 102.06(2)(f). For that reason, the lower default ambient pH values are used.

The net effects of the updated default pH and temperature data are:

1. Increased or relaxed 4-day and 30-day chronic criteria in the months of January – March and June – September.
2. No change in criteria in the months of April – May.
3. Decreased or tightened 4-day and 30-day chronic criteria in the months of October – December.

The following table lists the calculated limits based on the updated criteria and the new streamflows. Antidegradation shall be assessed based on the comparison of these limits with the limits in the existing WPDES permit.

April – May	5.2 mg/L weekly average, 2.2 mg/L monthly average
June – September	3.7 mg/L weekly average, 1.7 mg/L monthly average
October – March	5.3 mg/L monthly average

Month:	Jan.	Feb.	March	April	May	June
Current Permit Limits:						
Weekly Ave. (mg/L)	No limit	No limit	No limit	5.2	5.2	3.7
Monthly Ave. (mg/L)	5.3	5.3	5.3	2.2	2.2	1.7
Revised Limits Based on Updated Criteria and New Streamflows:						
Weekly Ave. (mg/L)	**14.94**	**14.94**	**18.51**	**16.68**	**12.96**	**10.18**
Monthly Ave. (mg/L)	**7.37**	**8.21**	**26.19**	**14.30**	**10.42**	**7.37**

Month:	July	Aug.	Sept.	Oct.	Nov.	Dec.
Current Permit Limits:						
Weekly Ave. (mg/L)	3.7	3.7	3.7	No limit	No limit	No limit
Monthly Ave. (mg/L)	1.7	1.7	1.7	5.3	5.3	5.3
Revised Limits Based on Updated Criteria and New Streamflows:						
Weekly Ave. (mg/L)	**7.67**	**7.10**	**7.10**	**9.38**	**12.73**	**12.23**
Monthly Ave. (mg/L)	**4.43**	**4.12**	**3.61**	**4.55**	**6.65**	**6.45**

Based on the above calculations, all of the revised limits based on updated monthly low flows exceed the corresponding limits in the existing permit, with the exception of the October monthly average limit which decreases from 5.3 to 4.55 mg/L. In addition the October – March weekly average limits do not represent increases as defined in NR 207 because there were no corresponding weekly average limits for those months in the current permit. As a result, the only limits subject to the antidegradation provisions in NR 207 are the weekly average limits in April – September and the monthly average limits in every month except October. The evaluation process is basically the same as that discussed earlier for BOD5.

First, though, it is noted that some of these limits are more restrictive than the new daily maximum limit of 6.7 mg/L based on the effluent pH of 8.48 s.u. If only the single daily maximum limit is included in the reissued permit, only the monthly average limits less than 6.7 mg/L (meaning July – December) would need to be included in the permit because in the other cases the daily maximum limit would be protective of chronic toxicity concerns as well as acute. If the variable daily maximum limit table is included in the permit, then all of the average limits should be included as well because of the pH conditions in which the daily maximum limit would be less restrictive and therefore may not be protective of chronic toxicity considerations. Since the option of the table is still available, antidegradation is assessed where applicable without consideration of the daily maximum limit(s) at this point.

Returning to the antidegradation evaluation, the first evaluation is of the need for increased permit limits. Comparing past effluent test results to the current permit limits, it was determined that the only exceedance of weekly or monthly average limits in Kiel's current permit was the 5.2 mg/L weekly average limit during April, when the reported weekly average concentration of 5.48 mg/L on April 11 – 14, 2010 exceeded that 5.2 mg/L limit. In all the remaining months for both weekly and monthly limits where available, the existing discharge from Kiel was in compliance with the existing permit limits. This situation is definitely different than the BOD5 situation discussed earlier in this report because for ammonia, s. NR 207.04(2)(a) concludes that based on the treatment plant's ability to meet existing permit limits except for the weekly average April limit, no increases are allowed from the current permit limits. For the weekly average April limit, relaxed limits may be calculated under NR 207.

As with BOD5, a limit may be calculated based on significant lowering of water quality (SLOWQ) in April. The SLOWQ limit for April represents 1/3 of the difference between the current weekly average limit of 5.2 mg/L and the new or revised weekly average limit of 16.68 mg/L. The weekly average SLOWQ limit for April is 9.03 mg/L, or 9.0 mg/L after rounding. Since the April 2010 value of 5.48 mg/L is less than 9.0, the SLOWQ limit of 9.0 mg/L weekly average is recommended for the reissued permit for the month of April because the 4-day P99 in April is less than the SLOWQ limit, but that limit is also subject to the same social/economic justification mentioned earlier for BOD5 since the increased limit would represent lowering of water quality.

Where antidegradation does not apply, the limits based on new criteria and streamflows are automatically recommended for the new permit. Those include the weekly average limits for October through March and the monthly average limit in October.

Based on the above discussions, the recommended limits for ammonia are as follows (after rounding to two significant digits), with the new April weekly average limit of 9.0 mg/L being applicable only if the social/economic justification in s. NR 207.04(1)(b) can be made by Kiel. If the social/economic justification cannot be made, the April weekly average limit would revert to the existing limit of 5.2 mg/L.

	Jan.	Feb.	March	April	May	June
Weekly ave.	15	15	19	9.0	5.2	3.7
Monthly ave.	5.3	5.3	5.3	2.2	2.2	1.7
	July	Aug.	Sept.	Oct.	Nov.	Dec.
Weekly ave.	3.7	3.7	3.7	9.4	13	12
Monthly ave.	1.7	1.7	1.7	4.6	5.3	5.3

It is recommended that all of these limits be included in the permit if the pH vs. daily maximum limit table is also included in the permit. If the single daily maximum limit of 6.7 mg/L is included in the permit, the limits in the previous table that exceed 6.7 mg/L may be removed from the permit. Given the variability of effluent pH and ammonia values, the daily maximum limit table is recommended, but not required, for inclusion in the reissued permit for Kiel.

Temperature) New surface water quality standards for temperature took effect on October 1, 2010. These new regulations are detailed in Chapter NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. The following table is used to screen the need to calculate limitations for temperature:

Warm Water and Limited Forage Fish designated Waters	**Cold Water Designated Waters**	**Effluent Temperature Limitation**
$Q_s:Q_e \geq 20:1$	$Q_s:Q_e \geq 30:1$	120°F (no calculation needed)
$20:1 > Q_s:Q_e > 2:1$	$30:1 > Q_s:Q_e > 2.5:1$	120°F or the sub-lethal WQBEL (calculation needed), whichever is lower
$Q_s:Q_e \leq 2:1$	$Q_s:Q_e \leq 2.5:1$	Sub-Lethal and Acute WQBELs (calculation needed)

For unilateral (stream) flow Q_s is determined by using 25% of the $_7Q_{10}$. Q_e is the design effluent flow.

Determination of $Q_s:Q_e$ for Kiel:

$_7Q_{10}$ (cfs)	**Q_s (25% of $_7Q_{10}$) (cfs)**	**Q_e (0.862 MGD conv. to cfs)**	**$Q_s:Q_e$**
Year-round			
0.93	0.233	1.33	0.2 : 1

Limits are calculated for each month of the year, using the effluent flows reported since April 1, 2009. The next two tables (on the following page) summarize the applicable criteria under the new thermal rules as well as the calculated limits based on those criteria. The limit calculation table (second table on the following page) summarizes the effluent flows used to calculate limits, the limits themselves, and the temperatures used to determine the need for permit limits. The "Representative Highest Effluent Flow Rate" values are the peak daily and 7-day average (Sunday through Saturday) flows calculated for each month of the year based on data submitted by the permittee over the period of June 14, 2011 through January 31, 2013. The "Representative Highest Monthly Effluent Temperature" values are the peak daily and 7-day average temperatures reported by Kiel over the same period. Where those representative temperatures exceed the calculated limits, the limits are bold-faced and have shaded backgrounds.

Warmwater Sport Fish Community Thermal Criteria for Sheboygan River (Table 2, ch. NR 102):

	Water Quality Criteria						
Month	Ta (default)	Sub-Lethal WQC	Acute WQC		Ta (default)	Sub-Lethal WQC	Acute WQC
	(°F)	(°F)	(°F)		(°F)	(°F)	(°F)
JAN	33	49	76	JUL	69	81	85
FEB	34	50	76	AUG	67	81	84
MAR	38	52	77	SEP	60	73	82
APR	48	55	79	OCT	50	61	80
MAY	58	65	82	NOV	40	49	77
JUN	66	76	84	DEC	35	49	76

Effluent Flow, Temperature, and Calculated Thermal Limits for Kiel:

Month	Representative Highest Effluent Flow Rate (Qe)			Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit as per s. NR 106.55(7)	
	7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qea)	f	Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(mgd)	(mgd)		(°F)	(°F)	(°F)	(°F)
JAN	1.118	1.297	0	64	66	**53**	85
FEB	0.946	1.071	0	65	65	**55**	87
MAR	1.683	1.786	0	65	65	**57**	89
APR	2.645	3.115	0	65	65	**60**	98
MAY	1.788	2.333	0	65	72	67	88
JUN	1.819	2.619	0	76	82	78	86
JUL	1.984	2.635	0	78	79	82	86
AUG	1.260	1.329	0	78	79	83	86
SEP	1.049	1.768	0	77	80	**75**	84
OCT	0.920	1.488	0	75	76	**64**	85
NOV	1.015	1.445	0	67	69	**52**	86
DEC	1.139	1.523	0	67	68	**53**	84

Two sets of comments are appropriate based on the above data:
First, some of the effluent results are highly questionable. Over three extended periods, the exact same daily maximum temperature to three decimal places was reported on every single day.

December 14, 2011 – May 29, 2012 = 65.359
June 5, 2012 – October 8, 2012 = 75.898
November 2, 2012 – November 28, 2012 = 66.344

This seems like a very unusual occurrence to have it happen three times within a year for periods over 3 weeks at a time.

Second, Kiel submitted a Dissipative Cooling Request form on April 1, 2013, apparently in an attempt to avoid the need for sub-lethal effluent limits in its permit. This was done despite the fact that the limits were not known until this report was developed. Several of the items required in s. NR 106.59(4) for reporting with that request were either not provided to the Department or were insufficient to enable the Department to reach a conclusion regarding the applicability of the sub-lethal (or weekly average) limits. The following items are required under s. NR 106.59(4); after each item is the Department's response based on the April 1, 2013 submittal.

s. NR 106.59(4)(a) – Information needed to allow the Department to determine whether or not sub-lethal criteria are exceeded outside a small area of mixing and cooling:

1. A written description of the physical characteristics of the receiving water or outfall that encourage rapid dilution, diffusion, dispersion, or dissipation of heat.

   Response: The only documentation was a set of pictures taken from a dye study, almost five years earlier in 2008. There is no indication that this had any relationship to the temperature results reported in June 14, 2011 – January 31, 2013.

2. A written description of the presence or absence of other thermal loads to the receiving stream.

   Response: This was apparently satisfied by a statement of the absence of other thermal loads.

3. Minimum and maximum effluent temperatures for each calendar week for each permitted outfall over the past two years.

   Response: The above-mentioned thermal data submittal covered only about 18-1/2 months, from mid-January 2011 through January of 2013. During that period, there were questions raised above regarding three extended periods of data.

s. NR 106.59(4)(b) – Information the permittee has collected, generated, reviewed, or received regarding the following site-specific conditions:

1. Information regarding the biological quality of the animal and plant community of the receiving water including, but not limited to, species composition, richness, diversity, density, distribution, age structure, spawning incidence, and presence of any state or federally listed threatened or endangered species.

   Response: No documentation was submitted related to any of this.

2. Data concerning the physical characteristics of the receiving water or permitted outfalls that encourage rapid dilution, diffusion, dispersion, and/or dissipation of heat.

   Response: The existence of photos of a dye study was mentioned above in response to sub. (4)(a)1. No relevant "data" accompanied those photos.

3. Minimum and maximum temperature of the receiving water upstream of all permitted outfalls for each calendar month over the past two years.

   Response: No receiving water temperature data were provided.

Based on the lack of sufficient information provided so far in response to the above items, the Department cannot reach any conclusions at this time regarding the existence of dissipative cooling. Based on the effluent temperature and flow data reported to the Department, weekly average permit limits are recommended for the months of September through April.

Recommended Weekly Average Thermal Limits for Kiel:

Month	Weekly Average Limit (°F)	Month	Weekly Average Limit (°F)
September	75	January	53
October	64	February	55
November	52	March	57
December	53	April	60

Whole Effluent Toxicity Evaluation: 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. Acute tests predict the concentration that causes lethality of aquatic organisms during a 48-96 hour exposure. Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven day exposure.

Acute WET: In order to assure that the discharge from outfall 001 is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC_{50} greater than 100% effluent.

Chronic WET: In order to assure that the discharge from outfall 001 is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC_{25} greater than the instream waste concentration (IWC). The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 85% shown in the WET Checklist summary below was calculated according to the following equation:

$$IWC\ (as\ \%) = \quad 100\ X \quad [Qe\ /\ ((1\text{-}f)\ Qe + Qs)$$

Where:
Qe = annual average design flow = 0.862 MGD = 1.33 cfs
f = fraction of the Q_e withdrawn from the receiving water = 0
Q_s = 1/4 of the 7-Q_{10} = 0.93 cfs / 4 = 0.233 cfs

Dilution Series: According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Wis. Adm. Code), the default acute dilution series is: 6.25, 12.5, 25, 50, 100%, and the default chronic dilution series is 100, 75, 50, 25, 12.5%. Other dilution series may be chosen by the permittee or Department staff, but alternate dilution series must be specified in the WPDES permit. For guidance on selecting an alternate dilution series, see Chapter 2.11 of the WET Guidance Document.

Receiving water: According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Wis. Adm. Code) receiving water must be used as the dilution water and primary control in WET tests, unless the use of another 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 Sheboygan River, upstream/out of the influence of the mixing zone and any other known discharge. The receiving water location must be specified in the WPDES permit.

Historical WET Data: Below is a tabulation of all available WET data for outfall 001.

Date Initiated	Acute Results LC_{50} (% survival in 100% effluent)				Chronic Results IC_{25}					Footnotes
	C. dubia	Fathead minnow	Pass or Fail ?	Use in RPF ?	*C. dubia*	Fathead Minnow	Algae	Pass or Fail ?	Use in RPF ?	
9/15/09	100	100	Pass	Yes	100	100		Pass	Yes	
5/18/10					100	100		Pass	Yes	
10/19/10	100	100	Pass	Yes	100	100		Pass	Yes	
3/15/11					100	100		Pass	Yes	
4/10/12					100	100		Pass	Yes	
3/19/13	100	100	Pass	Yes	100	100		Pass	Yes	

RPF = Reasonable Potential Factor

WET Checklist. Department staff use the WET Checklist when deciding whether WET limits and monitoring are needed. As toxicity potential increases, more points accumulate and more monitoring is needed to insure that toxicity is not occurring. The Checklist recommends acute and chronic WET limits (as needed) based on the Reasonable Potential Factor (RPF), as required by s. NR 106.08, Wis. Adm. Code, and monitoring frequencies based on points accumulated during the Checklist analysis. The completed WET Checklist and monitoring recommendations are summarized in the table below. (For more on the RPF and WET Checklist, see Chapter 1.3 of the WET Guidance Document, at: http://www.dnr.state.wi.us/org/water/wm/ww/biomon/biomon.htm).

WHOLE EFFLUENT TOXICITY (WET) CHECKLIST SUMMARY

	ACUTE	CHRONIC
1. INSTREAM WASTE CONC.	1A. Not Applicable **TOTAL POINTS = 0**	1B. IWC = 85% **TOTAL POINTS** = 15
2. HISTORICAL DATA	2A. 3 tests used in RPF, all passed; RPF = 0 **TOTAL POINTS** = 0	2B. 6 tests used in RPF, all passed; RPF = 0 **TOTAL POINTS** = 0
3. EFFLUENT VARIABILITY	3A. Little variability, a history of violations for BOD5 and TSS, consistent WWTF operations **TOTAL POINTS** = 5	3B. Same as Acute **TOTAL POINTS** = 5
4. STREAM CLASSIFICATION	4A. Warmwater sportfish community **TOTAL POINTS** = 5	4B. Same as Acute **TOTAL POINTS** = 5
5. CHEMICAL SPECIFIC DATA	5A. No acute toxicity criteria-based limits triggered due to high effluent results. Detected substances that did not trigger limits due to the detected results include ammonia, chromium, copper, nickel, zinc, chloride (3 pts). **TOTAL POINTS = 3**	5B. Chronic toxicity criteria-based limits triggered due to high effluent results for chloride and ammonia (6 pts). Detected substances that did not trigger limits due to the detected results include chromium, copper, nickel, and zinc (3 pts). **TOTAL POINTS** = 9
6. ADDITIVES	6A. Chlorine added for disinfection, sulfur dioxide added for dechlorination. Ferric sulfate currently used for phosphorus removal. **TOTAL POINTS** = 5	6B. Additives used more than once per 4 days, same points as acute. **TOTAL POINTS** = 5
7. DISCHARGE CATEGORY	7A. 5 industrial contributors = Two for food processing/dairy and three for metal finishing. **TOTAL POINTS** = 9	7B. Same as Acute **TOTAL POINTS** = 9
8. WASTEWATER TREATMENT	8A. Secondary Treatment **TOTAL POINTS** = 0	8B. Same as Acute **TOTAL POINTS** = 0

Continued from previous page	ACUTE	CHRONIC
9. DOWNSTREAM IMPACTS	9A. None attributable to discharge. **TOTAL POINTS** = 0	9B. Same as Acute **TOTAL POINTS** = 0
TOTAL POINTS	27	48

WET Monitoring and Limit Recommendations: Based on historical WET data and RPF calculations (as required in s. NR 106.08, Wis. Adm. Code), neither acute nor chronic WET limits are required. Based upon the point totals generated by the WET Checklist, other information given above, and Chapter 1.3 of the WET Guidance Document, three acute WET tests are recommended and twice per year chronic WET testing is recommended in the reissued permit. Tests should be done in rotating quarters, in order to collect seasonal information about this discharge. When including recommended monitoring frequencies in the WPDES permit, staff should specify required quarters (e.g., Jan-Mar, Apr-Jun, Jul-Sep, or Oct-Dec).

ATTACHMENT – SUMMARY OF KIEL CHLORIDE DATA, 2003 - 2012

Date	Chloride (mg/L)	Date	Chloride (mg/L)	Date	Chloride (mg/L)
10/30/03	580	2/1/06	310	6/1/08	287.5
11/30/03	330	3/22/06	278	7/9/08	277.5
12/3/03	370	4/5/06	273	8/6/08	245
1/13/04	440	5/17/06	228	9/3/08	272.5
2/15/04	430	6/1/06	195	10/2/08	292
3/2/04	350	7/4/06	255	11/10/08	310
4/2/04	310	8/2/06	293	12/8/08	345
5/4/04	262	9/13/06	320	1/5/09	350
6/2/04	172	10/13/06	320	1/18/09	325
7/6/04	200	11/15/06	307.5	2/11/09	328
8/4/04	272.5	12/13/06	310	3/1/09	355
9/8/04	262.5	1/3/07	265		
10/13/04	293	2/7/07	305	(break)	
11/7/04	325	3/7/07	330		
12/1/04	277.5	4/4/07	242.5	10/19/11	600
1/13/05	283	5/16/07	290	11/17/11	390
2/2/05	325	6/27/07	290	12/1/11	420
3/2/05	325	7/4/07	325	1/4/12	390
4/2/05	300	8/1/07	312	2/1/12	450
5/5/05	275	9/6/07	315	3/13/12	350
6/1/05	300	10/24/07	302.5	4/25/12	360
7/6/05	305	11/14/07	335	5/8/12	270
8/24/05	388	12/6/07	342.5	6/5/12	400
9/1/05	372.5	1/9/08	302.5	7/17/12	450
10/13/05	350	2/5/08	273	8/1/12	460
11/9/05	362.5	3/5/08	272.5	9/4/12	440
12/7/05	338	4/9/08	258		
1/4/06	305	5/6/08	265		

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: May 9, 2017

TO: Sarah Donoughe – East Water District / Green Bay

FROM: Jim Schmidt – WY/3

SUBJECT: Additional Water Quality-Based Effluent Limitations Compliant with 40 CFR 122.45(d) for the Kiel Wastewater Treatment Facility (WPDES Permit # WI-0020141)

This memo is prepared for three reasons.
1. Additional effluent data are considered in order to determine if the interim phosphorus limit in the September 30, 2013 evaluation is still appropriate.
2. Effluent data over the past five years are used to determine if the antidegradation evaluation and resulting alternative recommendations in the September 30, 2013 evaluation are still appropriate for BOD5, total suspended solids, and ammonia.
3. An evaluation is needed to determine if weekly and/or monthly average limitations are necessary based on revisions to ch. NR 106 that became effective on September 1, 2016.

Phosphorus) The September 30, 2013 evaluation recommended an interim phosphorus limit of 1.0 mg/L monthly average to be applied in the reissued permit(s) until such time in the future when the water quality-based limitations are appropriate. The 1.0 mg/L limit is equal to the limit that is in the current WPDES permit for Kiel because the discharge exceeds 150 pounds per month, pursuant to s. NR 217.04(1)(a)1. This limit was included in past permits because the 150 pound per month threshold was exceeded. The 150 pound per month average discharge was exceeded in calendar years 2010 and 2011. Although the discharge has been below 150 pounds per month in other years, **the 1.0 mg/L limit shall remain in the permit** recommendations based on the 2010 and 2011 results. Effluent concentrations in the past five years have been below 1.0 mg/L, but consistent with other municipal discharges in northeastern Wisconsin subject to a 1.0 mg/L limit, limits below 1.0 mg/L are not needed because the concentration represents an interim limit representing the first permit term implementing the 2010 water quality standards for phosphorus and the associated extended compliance schedule. After the next permit expires, it may be appropriate to re-examine the interim limit, but at this time this concentration satisfactorily represents an appropriate interim condition. NOTE: The September 30, 2013 memo recommends an annual mass limit of 0.72 lbs/day. Based on changes to ch. NR 217, that mass limit is changed to a six-month average, consistent with the 0.1 mg/L limit.

Antidegradation evaluations for BOD5, total suspended solids (TSS), and ammonia) In the September 30, 2013 evaluation, several alternative limit scenarios were provided under ch. NR 207 because the calculated limits for these parameters represented increases above existing permit limits. The increases resulted from the availability of new low flow estimates by USGS for each month of the year as well as an increased set of year-round low flow estimates for the Sheboygan River at Kiel. Under s. NR 207.04(1), it is appropriate to determine if any increased limits are first needed based on effluent values that exceed or approach existing permit limits pursuant to s. NR 207.04(1)(a). If the increases are shown to be needed for the discharge and if those increases result in the lowering of water quality, it is then necessary to determine if the increases will accommodate important social or economic development under s. NR 207.04(1)(c). This resulted in a set of different effluent limit options for BOD5, TSS, or ammonia pending the results of the determinations discussed above.

Evaluating data reported over the past five years (April 2012 through March 2017), it does not appear that the need for increased effluent limits can be demonstrated for any of the three parameters. The comparisons based on recent data are summarized in the table on the following page. Since the need for increased limits cannot be shown, no changes to existing permit limits are allowable under s. NR 207.04(2)(a). There is additional discussion of these comparisons following the table.

Parameter	Current Permit Limit	Highest Daily Result (4/2012 – 3/2017)	Highest Weekly Average Result (4/2012 – 3/2017)	Highest Monthly Average Result (4/2012 – 3/2017)
BOD5, May – Oct.	Weekly Average: 10 mg/L 72 lbs/day Monthly Average: 10 mg/L		7.6 mg/L (6/2012) 90 lbs/day (6/2014)	4.5 mg/L (6/2014 & 7/2015)
BOD5, Nov. – Apr.	Weekly Average: 15 mg/L 108 lbs/day Monthly Average: 15 mg/L		14.2 mg/L (4/2015 200 lbs/day (4/2013), 143 lbs/day (4/2013), 110 lbs/day (4/2015), 125 lbs/day (4/2016)	9.4 mg/L (4/2015)
TSS, May – Oct.	Weekly Average: 10 mg/L Monthly Average: 10 mg/L		6.1 mg/L (10/2013)	4.1 mg/L (10/2013)
TSS, Nov. – Apr.	Weekly Average: 15 mg/L Monthly Average: 15 mg/L		10.1 mg/L (4/2016)	7.0 mg/L (1/2015)
Ammonia, Year-round	Daily Maximum: 11 mg/L (no increase proposed)	4.68 mg/L (1/2013)		
Ammonia, Apr. – May	Weekly Average: 5.2 mg/L Monthly Average: 2.2 mg/L		1.36 mg/L (4/2013)	0.49 mg/L (4/2015)
Ammonia, June – Sept.	Weekly Average: 3.7 mg/L Monthly Average: 1.7 mg/L		2.65 mg/L (8/2014)	0.87 mg/L (8/2014)
Ammonia, Oct. - March	Monthly Average: 5.3 mg/L			1.94 mg/L (11/2014)

In the above summary, it is noted that the weekly average mass limits for BOD5 were exceeded on four occasions. None of the concentration limits were exceeded, so the mass limit exceedances were due to high average flows over the weeks in those high loading months. During the weeks in which the weekly average mass limits were exceeded, the flows were 1.65 MGD (first week of June 2014), 2.65 MGD and 2.16 MGD (second and third weeks of April 2013), 1.50 MGD (second week of April 2015), and 1.95 MGD (first week of April 2016). The mass limits for BOD5 are calculated by taking the average annual design flow which is 0.862 MGD times the concentration limits and converting the results into pounds per day. In those cases, the high mass concentrations resulted from flows which were well in excess of the design flow.

Since the concentration limits were not exceeded or approached, those limits will not change because the need for increases cannot be demonstrated under s. NR 207.04(1)(a). As a result, the mass limits won't change either; they are still based on the 0.862 MGD flow times the 10 and 15 mg/L seasonal concentration limits. Essentially, the need for increased mass limits can be demonstrated for BOD5, but there is no change in the mass limits because there was no change in the design flow or concentration limits. **As a result of the above summary, no changes are recommended in the current permit limits for BOD5, TSS, and ammonia based on the NR 207 need demonstrations for concentrations.**

Weekly and monthly limits) The following review is based on new regulations that became effective throughout the state of Wisconsin on September 1, 2016 affecting chapters NR 106 and 205 of the Wisconsin Administrative Code. These new regulations align Wisconsin's water quality-based effluent limitations with 40 CFR 122.45(d), which requires WPDES permits contain the following limits, whenever practicable and necessary to protect water quality:

- Weekly average and monthly average limitations for publically owned treatment works (POTWs), and
- Daily maximum and monthly average limitations for all other discharges.

Kiel is considered to be a POTW and is therefore subject to weekly average and monthly average limitations whenever limitations are determined to be necessary.

Because WPDES Permit No. WI-0020141-09 will become effective after September 1, 2016, limitations in the permit must conform with the aforementioned requirements. This evaluation provides additional limitations necessary to comply with 40 CFR 122.45(d). Pollutants already compliant with 40 CFR 122.45(d), or that have an approved impracticability demonstration, are excluded from this evaluation including water-quality based effluent limitations for phosphorus, temperature, and pH. Limits associated with variances are also exempt from 40 CFR 122.45(d).

Proposed permit limitations in WQBEL memo [September 30, 2013 as well as the above evaluations]:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Monthly Geometric Mean	Monitoring Only
BOD5:						
May – October			10 mg/L, 72 lbs/day	10 mg/L		
November – April			15 mg/L, 108 lbs/day	15 mg/L		

(continued on next page)

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Monthly Geometric Mean	Six-Month Average
Total Susp. Solids: May – October November – April			 10 mg/L 15 mg/L	 10 mg/L 15 mg/L		
pH	9.0 s.u.	6.0 s.u.				
Dissolved Oxygen		6.0 mg/L				
Fecal Coliforms May – Sept.					 400 co. / 100 mL	
Total Res. Chlorine	38 ug/L		8.4 ug/L			
Total Phosphorus: WQ-based Interim				 0.3 mg/L 1.0 mg/L		 0.1 mg/L, 0.72 lbs.day
Chloride			460 mg/L, 3300 lbs/day			
Ammonia *: April May June – September October November December Jan. – Feb. March	 6.7 mg/L 6.7 mg/L 6.7 mg/L 6.7 mg/L 6.7 mg/L 6.7 mg/L 6.7 mg/L 6.7 mg/L		 5.2 mg/L 3.7 mg/L 9.4 mg/L 13 mg/L 12 mg/L 15 mg/L 19 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 5.3 mg/L 5.3 mg/L		

NOTES: A variable daily maximum limit table is available for Kiel based on effluent pH. As indicated in the September 30, 2013 evaluation, that table is as follows:

Daily Maximum Ammonia Nitrogen (NH_3-N) Limits

Effluent pH - s.u.	**NH_3-N Limit – mg/L**	**Effluent pH - s.u.**	**NH_3-N Limit – mg/L**
$pH \leq 7.5$	> 34	$8.2 < pH \leq 8.3$	9.4
$7.5 < pH \leq 7.6$	34	$8.3 < pH \leq 8.4$	7.8
$7.6 < pH \leq 7.7$	29	$8.4 < pH \leq 8.5$	6.4
$7.7 < pH \leq 7.8$	24	$8.5 < pH \leq 8.6$	5.3
$7.8 < pH \leq 7.9$	20	$8.6 < pH \leq 8.7$	4.4
$7.9 < pH \leq 8.0$	17	$8.7 < pH \leq 8.8$	3.7
$8.0 < pH \leq 8.1$	14	$8.8 < pH \leq 8.9$	3.1
$8.1 < pH \leq 8.2$	11	$8.9 < pH \leq 9.0$	2.6

The table listed in the 2013 evaluation contained seasonal application of the limits based on the lower pH values. That seasonal consideration was removed from s. NR 106.33(2) when the code was revised on September 1, 2016. The ammonia limit table is now applicable on a year-round basis.

Finally, it is noted that the September 30, 2013 evaluation coutained temperature limits that are subject to drop for the months of September through April. Kiel has submitted a dissipative cooling study to the Department to justify removal of those limits under s. NR 106.59(6). The Department is still in the process of reviewing the contents of that study. The September – April limits are as follows (neither limits nor monitoring are recommended for May – August):

September	75°F weekly average
October	64°F weekly average
November	52°F weekly average
December	53°F weekly average
January	53°F weekly average
February	55°F weekly average
March	57°F weekly average
April	60°F weekly average

Additional limitations needed to comply with 40 CFR 122.45(d):

Parameter	Daily Maximum	Weekly Average	Monthly Average	Mult. Factor (MF)	Assumed Monitoring Frequency (n)
Fecal Coliforms: May – Sept.		656 co. / 100 mL (geo. mean)		1.64	Once per week (four times per month)
Ammonia: April		17 mg/L			
Chloride			460 mg/L		
Tot. Res. Chlorine			8.4 ug/L		

Method for calenlation - POTW:

The methods for calculating limitations for municipal POTWs to conform with 40 CFR 122.45(d) are specified in NR 106.07(3), and are as follows:

- Whenever a daily maximum limitation is determined necessary to protect water quality, a weekly and monthly average limitation shall also be included in the permit and set equal to the daily maximum limit unless a more restrictive limit is already determined necessary to protect water quality.
  The April ammonia limit is based on this language. The April weekly average could be set at 6.7 mg/L to be equal to the daily maximum. However, since a variable limit table is available at Kiel, the weekly average limit is set at 17 mg/L to represent the actual water quality-based limit as calculated in the September 30, 2013 evaluation.
- Whenever a weekly average limitation is determined necessary to protect water quality, a monthly average limitation shall also be included in the permit and set equal to the weekly average limit unless a more restrictive limit is already determined necessary to protect water quality.
  This is the basis for the monthly average limits for chlorine and chloride.
- Whenever a monthly average limitation is determined necessary to protect water quality, a weekly average limit shall be calculated using the following procedure and included in the permit unless a more restrictive limit is already determined necessary to protect water quality:
  Weekly Average Limitation = (Monthly Average Limitation x MF)

Where:

MF= Multiplication factor as defined in Table 1
CV= 0.6
n= the number of samples per month required in the permit

NR 106.07 (3) (e) 4. **Table 1 — Multiplication Factor**

n=1	n=2	n=3	**n=4**	n=8	n=12	n=16	n=20	n=24	n=30
1.00	1.31	1.51	**1.64**	1.95	2.12	2.23	2.30	2.36	2.43

This methodology is based on the *Technical Support Document for Water Quality-based Toxics Control* (March 1991). PB91-127415.

The multiplication factor is the basis for the weekly average fecal coliform limit.

e-cc: David Haas – East Water District / Green Bay
Kelley O'Connor - East Water District / Green Bay

Substantial Compliance Determination

Permittee Name: City of Kiel		Permit Number: 0020141-09-0
	Compliance?	Comments
Discharge Limits	Yes	Discharge limits have been met from January 1, 2014 through December 31, 2016.
Sampling/testing requirements	Yes	Sampling/testing requirements have been met from January 1, 2014 through December 31, 2016.
Groundwater standards	NA	
Reporting requirements	Yes	There has been no major reporting issues from January 1, 2014 through December 31, 2016
Compliance schedules	Yes	See Event Tracker entry, 9/30/2013, allowing extension for completing construction of the proposed sewer system rehabilitation.
Management plan	Yes	Kiel WWTF has a CMOM in place and received a CMAR grade A from 2014 through 2016.
Other:	NA	
Enforcement Considerations	Kiel WWTF is in substantial compliance	
In substantial compliance?	Yes Comments: Recommend moving forward with permit reissuance. Signature: David Haas Date: 5/16/2017 Concurrence: Date:	

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: August 3, 2017

TO: Sarah Donoughe – East Water District / Green Bay

FROM: Jim Schmidt – WY/3

SUBJECT: Updated Water Quality-based Effluent Limitations for Temperature and Chloride at the Kiel Wastewater Treatment Facility (WPDES Permit # WI-0020141)

This memo is prepared for two reasons.
1. Temperature recommendations are revised following Department review and approval of a Dissipative Cooling evaluation pursuant to s. NR 106.59.
2. The need for chloride limitations was re-evaluated based on new effluent data which reflect a change in industrial contributions.

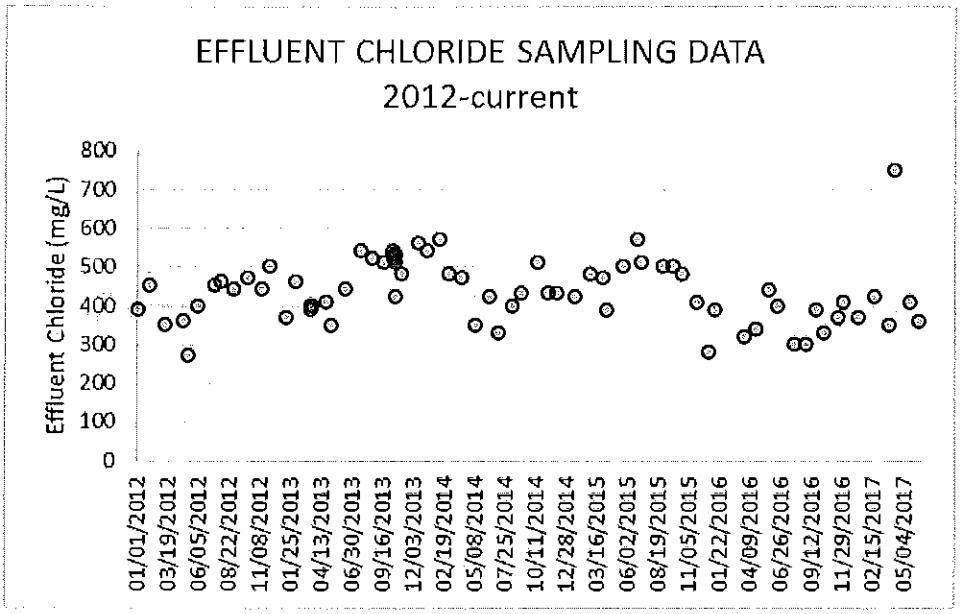
As a result of these two changes, thermal limits are replaced by a recommendation of monitoring only during the months of November through April, and chloride limits (including a variance) are replaced by a recommendation of monitoring only throughout the upcoming permit term.

Temperature) A Dissipative Cooling evaluation was performed and a report was submitted to the Department in a document dated March 13, 2017, as allowed under s. NR 106.59. Based on this report, it was concluded that mixing conditions in the receiving water (Sheboygan River) resulted in compliance with the state's thermal water quality standards in ch. NR 102 without significantly compromising the zone of free passage for fish in the river. As a result of the study, which was approved by the Department on August 1, 2017, it was determined that the thermal limits for the months of September through April which were recommended "subject to drop" in my memo to you dated May 9, 2017 are not necessary at this time. However, because the study was based on effluent data and stream conditions that are several years old, it is recommended that monitoring remain in the reissued WPDES permit for Kiel. Given the most critical cold-weather months in terms of ambient temperatures and water quality criteria, this monitoring is recommended only for the months of November through April at a frequency of once per week. That way, a sufficiently large database of current conditions for both effluent flow and temperature will be accumulated throughout the permit term which will provide the Department with much more useful and extensive data on variable conditions over the term of the reissued permit.

Chloride) Additional effluent chloride data collected by the permittee suggests a noticeable decrease in concentration since late 2015. This decrease appears to be associated with a significant reduction in the amount of hauled process water from Baker Cheese. It is noted that Baker Cheese now has a WPDES permit for the discharge of treated process water to a wetland tributary to the Mullet River near its plant location in far eastern Fond du Lac County. The modified permit allowing this surface water discharge from Baker Cheese took effect on December 1, 2015, which confirms a direct connection to changes in Kiel's effluent chloride levels.

On the following page is a plot of the chloride results reported by Kiel since the beginning of 2012. With one exception (discussed later), all of the results reported since December of 2015 are at or below 440 mg/L. Prior to late 2015, there were several days in which effluent concentrations were in the range of 500 to 600 mg/L, and that led to a recommendation of a weekly average limit of 460 mg/L in the water quality-based effluent limit evaluation dated September 30, 2013, and was re-affirmed in an update dated

May 9, 2017 before the recent data became available. Because of the exceedances noted before the end of 2015, it was projected that a variance was potentially necessary.



From the above chart, it is noted that a single high result was measured following the December, 2015 date (750 mg/L on April 11, 2017). This high result was unexplainable by the permittee and was confirmed to be a statistical outlier. Excluding the outlier, a total of 17 effluent results were available over the period of December 1, 2015 through June 13, 2017. The 4-day 99th upper percentile (or "P99") value of those 17 results was 421.28 mg/L, which is below the calculated weekly average limit of 460 mg/L mentioned earlier for Kiel. As such, the 460 mg/L limit is no longer required to be included in the reissued permit for Kiel and as such, the variance is no longer necessary.

In order to determine if chloride levels remain relatively low, it is recommended that once per month monitoring of effluent chloride be included in the reissued permit, but chloride limits are not recommended at this time.

With the above revisions for temperature and chloride, the recommended permit limits for Kiel are as follows:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Monitoring Only
BOD5:					
May – October			10 mg/L, 72 lbs/day	10 mg/L	
November – April			15 mg/L, 108 lbs/day	15 mg/L	

(continued on next page)

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average
Total Susp. Solids: May – October November – April			 10 mg/L 15 mg/L	 10 mg/L 15 mg/L	
pH	9.0 s.u.	6.0 s.u.			
Dissolved Oxygen		6.0 mg/L			
Fecal Coliforms May – Sept.			656 co. / 100 mL (geo. mean)	400 co. / 100 mL (geo. mean)	
Total Res. Chlorine	38 ug/L		8.4 ug/L	8.4 ug/L	
Total Phosphorus: WQ-based Interim				 0.3 mg/L 1.0 mg/L	 0.1 mg/L, 0.72 lbs.day
Chloride %					
Temperature %					
Whole Effluent Toxicity %					
Ammonia *: April May June – September October November December Jan. – Feb. March	 6.7 mg/L 6.7 mg/L 6.7 mg/L 6.7 mg/L 6.7 mg/L 6.7 mg/L 6.7 mg/L 6.7 mg/L		 19 mg/L 5.2 mg/L 3.7 mg/L 9.4 mg/L 13 mg/L 12 mg/L 15 mg/L 19 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 5.3 mg/L 5.3 mg/L	

NOTES: A variable daily maximum limit table is available for Kiel based on effluent pH which would replace the 6.7 mg/L limit.. As indicated in the September 30, 2013 evaluation, that table is as follows:

Daily Maximum Ammonia Nitrogen (NH_3-N) Limits

Effluent pH - s.u.	NH_3-N Limit – mg/L	Effluent pH - s.u.	NH_3-N Limit – mg/L
$pH \leq 7.5$	> 34	$8.2 < pH \leq 8.3$	9.4
$7.5 < pH \leq 7.6$	34	$8.3 < pH \leq 8.4$	7.8
$7.6 < pH \leq 7.7$	29	$8.4 < pH \leq 8.5$	6.4
$7.7 < pH \leq 7.8$	24	$8.5 < pH \leq 8.6$	5.3
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$7.9 < pH \leq 8.0$	17	$8.7 < pH \leq 8.8$	3.7
$8.0 < pH \leq 8.1$	14	$8.8 < pH \leq 8.9$	3.1
$8.1 < pH \leq 8.2$	11	$8.9 < pH \leq 9.0$	2.6
		$pH > 9.0$	< 2.6

The "< 2.6 mg/L" limit at pH above 9.0 s.u. has been added to be consistent with other recently-issued permits with variable limit tables for ammonia.

% - No permit limitations are recommended for chloride, temperature, and whole effluent toxicity. Monitoring only is recommended for those parameters at the following frequencies:

Temperature = Once per week in November through April
Chloride = Once per month, year-round
Whole effluent toxicity:
Acute = Three tests during the permit term in rotating quarters
Chronic = Two tests per year during the permit term in rotating quarters

NOTE: Although the chloride limit had been a factor in the chronic WET testing recommendations, it was not a significant factor which would warrant a change in test frequency as a result of its removal. Since ammonia limits related to chronic toxicity are still recommended in the permit, the monitoring frequency does not change.

e-cc: David Gerdman – East Water District / Green Bay
Kelley O'Connor - East Water District / Green Bay