Permit Fact Sheet

General Information

Permit Number:	**WI-0028703-10-0**	
Permittee Name:	**CITY OF KENOSHA**	
Address:	4401 Green Bay Rd	
City/State/Zip:	Kenosha WI 53144-1716	
Discharge Location:	1200 Foot outfall pipe into Lake Michigan from above address.	
Receiving Water:	Lake Michigan, Kenosha County	
StreamFlow ($Q_{7,10}$):	NA	
Stream Classification:	Cold water fishery and Aquatic Life; public drinking water supply	
Design Flow(s)	Daily Maximum	68 MGD
	Weekly Maximum	58 MGD
	Monthly Maximum	47.6 MGD
	Annual Average	28.6 MGD
Significant Industrial Loading?	Yes, Kenosha accepts categorical industrial waste from seven (7) facilities and non-categorical waste from eight (8) facilities.	
Operator at Proper Grade?	Kenosha is an advanced plant in subclasses A1, B, C, P, D, L, and SS; and OIT in subclass U2. Director of Wastewater Treatment, Katrina Karow, is certified in all subclasses listed.	
Approved Pretreatment Program?	Yes.	

Facility Description

The City of Kenosha operates a Wastewater Treatment Facility with an average annual design flow of 28.6 MGD, serving an approx. population of 110,000 people and seven categorical industries. The treatment plant process consists of flow equalization, perforated plate screening, grit chambers, primary clarifiers, conventional activated sludge, phosphorus removal using ferric chloride, secondary clarification, chlorination, de-chlorination, and an equalization basin. The sludge generated is currently anaerobically digested, thickened and dewatered by centrifuge (DAF tanks used as needed), and dried to produce EQ Class A biosolids. Biosolids not meeting the Class A requirements are hauled offsite to be landfilled.

The Department has found the permittee to be in substantial compliance with the current permit.

BLENDING: The permittee has requested blending approval as part of their permit application. Based on an evaluation of their request and associated documentation, blending is approved per s. NR 210.12(2), Wis. Adm. Code.

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)**
701	23.258 MGD Annual average (Sept 2017-August 2018)	Influent: 24 hr flow proportion composite sampler intake located after perforated plate screening, before grit removal (includes plant sidestreams and hauled waste)
001	Not measured.	Effluent: 24 hr flow proportional composite sampler intake after chlorination/dechlorination in channel just prior to drop box, includes EQ basin overflow. Representative samples for fecal coliform and e. coli shall be collected during blending events to the extent practicable.
002	1000 dry U.S. tons estimated per year per 2018 permit application.	Class B, Anaerobically digested cake sludge. Representative sludge samples shall be collected in the solids handling building at the sludge centrifuge dishcharge point. Sludge will be hauled to a landfill for disposal and may be landspread with approval of a land application plan.
005	1300 dry U.S. tons estimated per year per 2018 permit application.	Class A, Anaerobically digested, dewatered, hot air dried, and immediately distributed/bagged sludge. Representative samples shall be collected after the dryer. Sludge is immediately distributed or bagged.
006	Sludge from sample point 006 is included in the 1300 dry U.S. tons per year estimate for sample point 005. Minimal EQ Class A biosolids will be stored on site per 2018 permit application.	Class A, Anaerobically digested, dewatered, hot air dried and stored sludge. Representative samples shall be collected from bulk storage prior to distribution.
110		Blending route is used when facility influent rates exceeds the capacity of the off-site EQ basin. Flow exits the fourth EQ basin chamber through a standpipe into a blending channel. Flow rate is estimated from run time of fixed pump and is blended with final effluent. Blended effluent receives primary settling and disinfection before discharge.
111		Field blank for mercury. Take the field blank at the same time and location as the mercury effluent sample.
112	New in plant sample point.	Blending route is utilized when facility influent exceeds 42,000 GPM and is unable to be accommodated by the off-site EQ basin. Flow in excess of 42000 GPM exit the primary clarifier via an overflow weir and is multiplied by overflow time to calculate the volume of diverted flow for each blending event.
113		Grab sample of Lake Michigan untreated drinking water supply for Arsenic.

1 Influent - Proposed Monitoring

1.1 Sample Point Number: 701- INFLUENT TO PLANT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
Precipitation		in/day	Per Occurrence	Gauge Station	Rain at WWTP. Please note by date snowmelt occurring as a result of rain in the general comments of the eDMR.
BOD5, Total		mg/L	Daily	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	Daily	24-Hr Flow Prop Comp	
Cadmium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	See permit sections 1.2.1.1 & 1.2.1.2.
Chromium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	See permit sections 1.2.1.1 & 1.2.1.2.
Copper, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	See permit sections 1.2.1.1 & 1.2.1.2.
Lead, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	See permit sections 1.2.1.1 & 1.2.1.2.
Nickel, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	See permit sections 1.2.1.1 & 1.2.1.2.
Zinc, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	See permit sections 1.2.1.1 & 1.2.1.2.
Mercury, Total Recoverable		ng/L	Monthly	Grab	See permit section 1.2.1.3.

1.1.1 Changes from Previous Permit:

Total phosphorus and total ammonia nitrogen monitoring requirement removed.

Mercury sample type updated from 24-hr flow proportional composite to “Grab”.

1.1.2 Explanation of Limits and Monitoring Requirements

Total phosphorus and ammonia monitoring requirement removed to make monitoring requirements consistent with other plants of this type and size throughout the state. Since the facility is currently operating under current WQBEL phosphorus limits, influent phosphorus monitoring is no longer needed.

Mercury monitoring is included in the proposed permit pursuant to s. NR 106.145, Wis. Adm. Code. The permittee shall collect a mercury field blank for each set of mercury samples (a set of samples may include a combination of influent,

effluent or other samples all collected on the same day). The permittee shall report results of influent samples and field blanks to the Department on Discharge Monitoring Reports.

2 Inplant - Proposed Monitoring and Limitations

2.1 Sample Point Number: 110- EQ Basin Overflow BLENDING

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Volume		MGD	Daily	Continuous	Report the total volume of flow routed around the biological treatment processes for a given day (12:00am - 11:59pm) in which blending occurs. See section 2.2.1.1.
Time		hours	Daily	Calculated	Report the total duration of blending within a given day (12:00am - 11:59pm) in which blending occurs. See section 2.2.1.1.

2.1.1 Changes from Previous Permit:

Sample frequency updated to "Daily", permittee only needs to report when blending occurs.

2.1.2 Explanation of Limits and Monitoring Requirements

Sample point 110 was included for measuring diverted flows during high flow events when blending occurs. During these times excess flows are routed to an off-site EQ basin prior to in-plant biological treatment processes, and then recombined with fully treated effluent prior to the in-plant chlorine contact tank. Monitoring of diverted flows will track the volume of wastewater diverted and help inform future decisions of whether additional measures are needed in the future to prevent the discharge of partially treated wastewater. Blending is approved for this facility and will be reported to the department as specified in permit section 6.2.9. The volume of blended flow along with the total time of each days blending event shall be reported on the monthly eDMR.

2.2 Sample Point Number: 111- FIELD BLANK

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Mercury, Total Recoverable		ng/L	Monthly	Blank	See permit section 2.2.2.1.

2.2.1 Changes from Previous Permit:

No changes from previous permit.

2.2.2 Explanation of Limits and Monitoring Requirements

Mercury monitoring is included in the proposed permit pursuant to s. NR 106.145, Wis. Adm. Code. Required field blanks for Mercury monitoring per ss. NR 106.145(9) and (10), Wis. Adm. Code, requirements. The permittee shall collect a mercury field blank for each set of mercury samples (a set of samples may include a combination of influent, effluent or other samples all collected on the same day). The permittee shall report results of field blanks to the Department on Discharge Monitoring Reports.

2.3 Sample Point Number: 112- EQ Basin Bypass BLENDING

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Volume		MGD	Daily	Continuous	Report the total volume of flow routed around the biological treatment processes for a given day (12:00am - 11:59pm) in which blending occurs. See permit section 2.2.3.1.
Time		hours	Daily	Calculated	Report the total duration of blending within a given day (12:00am - 11:59pm) in which blending occurs. See permit section 2.2.3.1.

2.3.1 Changes from Previous Permit:

Sample point 112 has been added to measure flows diverted around biological treatment processes.

2.3.2 Explanation of Limits and Monitoring Requirements

Sample point 112 was included in previous permits as sample point 008- primary overflow. In 2001, the facility built an equalization basin which was designated as sample point 110- EQ Basin for subsequent permits and sample point 008 was removed from the permit. The primary clarifier weir that was used for sample point 008 was never removed from the plant and is still utilized during high-flow events. During high-flow events, wherein peak flows exceed 68 MGD, flow is diverted around secondary treatment via the primary clarifier weir to the chlorine contact tanks to prevent the EQ basin from filling too quickly. All waters diverted via the primary clarifier overflow during high flow events will now be monitored for flow rate and time at sample point 112. In-plant diversion (blending) flows is approved for this facility and will be reported to the department as specified in permit section 6.2.9. The volume of blended flow along with the total time of each days blending event shall be reported on the monthly eDMR.

2.4 Sample Point Number: 113- CITY WATER INTAKE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Arsenic, Total Recoverable		ug/L	Quarterly	Grab	See permit section 2.2.4.1.

2.4.1 Changes from Previous Permit:

Sample point 113 has been added to monitor arsenic levels coming into the plant via the city water intake. Grab samples will be collected on a quarterly basis to measure for total recoverable arsenic. No arsenic limit is included in the permit at this time.

2.4.2 Explanation of Limits and Monitoring Requirements

Due to a strong correlation between background data and the WWTP effluent data, it appears that the discharge concentrations at Kenosha are due to the presence of arsenic in the source water. However, there is only a limited amount of data from the facility to base this assertion (seven paired samples over a nine-day period). Therefore, similar to what has been recommended for other facilities along Lake Michigan in Southeastern Wisconsin, untreated drinking water intake and effluent monitoring for total recoverable arsenic is required for permit reissuance. A separate sample point for the drinking water intake has been added to the permit to allow for data reporting and retrieval. Pursuant to s. NR 106.07(6)(a), Wis. Adm. Code, the permittee shall perform effluent monitoring required in the permit using an acceptable analytical methodology for total recoverable arsenic in ch. NR 219, Wis. Adm. Code, which produces the lowest limit of detection and limit of quantification possible.

Collection of this data will be used to illustrate the local arsenic cycle and provide a means for determining if conditions in s. NR 106.06(6)(b)1-5, Wis. Adm. Code, are met. Monitoring will occur quarterly to provide enough information by the next permit reissuance to determine if continued monitoring and/or a water quality-based effluent limit is necessary for total recoverable arsenic. The available data so far supports the idea that an effluent limit is not needed for arsenic, even though the discharge concentration exceeds the criteria.

3 Surface Water - Proposed Monitoring and Limitations

3.1 Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
BOD5, Total	Weekly Avg	45 mg/L	Daily	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	30 mg/L	Daily	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	Daily	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	Daily	24-Hr Flow Prop Comp	
pH Field	Daily Min	6.0 su	Daily	Continuous	
pH Field	Daily Max	9.0 su	Daily	Continuous	
Chlorine, Total Residual	Daily Max	38 ug/L	Daily	Grab	
Chlorine, Total Residual	Weekly Avg	38 ug/L	Daily	Grab	
Chlorine, Total	Monthly Avg	38 ug/L	Daily	Grab	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Residual					
Fecal Coliform	Geometric Mean - Wkly	848 #/100 ml	3/Week	Grab	Year-round limit and monitoring. Limit becomes effective on December 31, 2020. See Schedules section 5.3. If sampling does not coincide with blending events, additional samples shall be taken when blending occurs.
Fecal Coliform	Geometric Mean - Monthly	400 #/100 ml	3/Week	Grab	Year-round limit and monitoring. If sampling does not coincide with blending events, additional samples shall also be taken when blending occurs.
E. coli		#/100 ml	3/Week	Grab	
Phosphorus, Total	Monthly Avg	1.0 mg/L	Daily	24-Hr Flow Prop Comp	See permit section 3.2.1.5. and schedules section 5.1.
Phosphorus, Total	6-Month Avg	0.6 mg/L	Daily	24-Hr Flow Prop Comp	See permit section 3.2.1.5. and schedules section 5.1.
Phosphorus, Total		lbs/day	Daily	Calculated	See permit section 3.2.1.5. and schedules section 5.1.
Arsenic, Total Recoverable		ug/L	Quarterly	24-Hr Flow Prop Comp	See permit section 3.2.1.2.
Cadmium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	See permit section 3.2.1.2.
Chromium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	See permit section 3.2.1.2.
Copper, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	See permit section 3.2.1.2.
Lead, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	See permit section 3.2.1.2.
Nickel, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	See permit section 3.2.1.2.
Zinc, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	See permit section 3.2.1.2.
Mercury, Total Recoverable	Daily Max	3.0 ng/L	Monthly	Grab	See permit section 3.2.1.3. and schedules section 5.2.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nitrogen, Ammonia (NH3-N) Total	Daily Max	16.2 mg/L	Daily	24-Hr Flow Prop Comp	Limits apply for November through April of every year.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	16.2 mg/L	Daily	24-Hr Flow Prop Comp	Limits apply for November through April of every year.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	16.2 mg/L	Daily	24-Hr Flow Prop Comp	Limits apply for November through April of every year.
Temperature Maximum		deg F	Daily	Continuous	Monitoring to happen daily in calendar year 2022. See permit section 3.2.1.4.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	Sample annually in rotating quarters, and concurrently with chemical-specific toxic substances. See permit section 3.2.1.6.
Chronic WET		TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	Sample annually in rotating quarters, and concurrently with chemical-specific toxic substances. See permit section 3.2.1.6.

3.1.1 Changes from Previous Permit

Changes from the previous permit include:

Total Residual Chlorine: A weekly average limit of 38 ug/L and monthly average limit of 38 ug/L were added to the proposed permit. Samples will be collected as daily grab samples.

Fecal Coliform: A weekly geometric mean limit of 848#/100ml was added to the proposed permit and becomes effective on December 31, 2020.

Total Ammonia: A weekly average limit of 16.2 mg/L and monthly average limit of 16.2 mg/L were added to the proposed permit. Limits will apply from November until April throughout the permit term and samples will be collected daily via a 24-Hr flow proportional composite sampler.

Whole Effluent Toxicity: Annual Acute and chronic WET testing will be required, with sampling coinciding with chemical-specific toxic substances sampling, through the duration of the permit. No WET limits have been set.

3.1.2 Explanation of Limits and Monitoring Requirements

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated August 28, 2018, used for this reissuance.

Categorical Limits:

Categorical limits are required per ch. NR 210, Wis. Adm. Code.

- **BOD5, Total Suspended Solids, and pH:** Standard municipal wastewater requirements for BOD5, total suspended solids, and pH are included based on ch. NR 210, Wis. Adm. Code 'Sewage Treatment Works'

requirements for discharges to waters classified as fish and aquatic life. Chapter NR 102, Wis. Adm. Code 'Water Quality Standards for Surface Waters' also specifies requirements for pH for fish and aquatic life waters.

- **Fecal Coliform:** Weekly average fecal coliform limits have been included in the permit, based upon new regulations that became effective on September 1, 2016 affecting chapters NR 106 and 205 of the Wisconsin Administrative Code, to align Wisconsin's effluent limitations with 40 CFR 122.45(d). As a condition of blending approval, fecal coliform monitoring is required during periods of in-plant diversion, each day that in-plant diversion occurs.
- **Total Residual Chlorine and Total Ammonia:** Regulatory changes to s. NR 205.065, Wis. Adm. Code, became effective September 1, 2016 that requires limits in this permit to be expressed as weekly average and monthly average limits whenever practicable. These changes are based on 40 CFR 122.45(d). Minor changes have been made to fecal coliform and ammonia limitations from the previous permit in order to comply with this regulation.

Water Quality Based Limits and WET Requirements:

- **Total Chlorine:** Year-round disinfection is required to protect the use of Lake Michigan as a public water supply (the City of Kenosha Waterworks raw water intake is within 5 miles of the WWTF outfall). The effluent is disinfected with chlorine, and then dechlorinated, prior to discharge. Weekly and monthly average total residual chlorine limits have also been included in the permit, based upon new regulations that became effective on September 1, 2016 affecting chapters NR 106 and 205 of the Wisconsin Administrative Code, to align Wisconsin's effluent limitations with 40 CFR 122.45(d).
- **Total Ammonia:** 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 WQBELs for ammonia (effective March 1, 2004). Effluent limits are necessary in accordance with the reasonable potential analysis. Weekly average ammonia limits have been included in the permit, based upon new regulations that became effective on September 1, 2016 affecting chapters NR 106 and 205 of the Wisconsin Administrative Code, to align Wisconsin's effluent limitations with 40 CFR 122.45(d).
- **Total Phosphorus:** Phosphorus requirements are based on the Phosphorus Rules that became effective 12/1/2010 as detailed in NR 102 Water Quality Standards and NR 217 Effluent Standards and Limitations for Phosphorus. Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters. The code categorically limits municipal dischargers of more than 150 pounds of phosphorus per month to 1.0 mg/L unless an alternative limit is approved. Chapter NR 217, Wis. Adm. Code, also specifies WQBELs (water quality based effluent limits) for discharges of phosphorus to surface waters of the state from publicly and privately-owned wastewater facilities, noncontact cooling water discharges which contain phosphorus, concentrated animal feeding operations that discharge through alternative treatment facilities and a facility/site that is regulated under ch. NR 216, Wis. Adm. Code where the standards in chs. NR 151 and NR 216, Wis. Adm. Code are not sufficient to meet phosphorus criteria. WQBELs for phosphorus are needed whenever the discharge contains phosphorus at concentrations or loadings that will cause or contribute to an exceedance of the water quality standards.

  Section NR 102.06(5)(b), Wis. Adm. Code, specifies a total phosphorus criteria of 7 µg/L (0.007 mg/L) for the open and near shore waters of Lake Michigan. For discharges directly to the Great Lakes, s. NR 217.13(4), Wis. Adm. Code, says that the Department shall set effluent limits consistent with near shore or whole lake models approved by the Department. At this time there is no model available, although work is ongoing by a contractor to EPA Region 5. A six-month avg**.** interim limit of 0.6 mg/L is included in the proposed permit. The permittee shall continue to reduce phosphorus as much as practical from their discharge and continue to minimize phosphorus in their discharge. It is not appropriate to include a mass total phosphorus mass limit in the permit at this time since the 0.6 mg/L concentration limit is considered and interim limit.
- **Mercury, Total Recoverable:** The City of Kenosha has requested an extension of a mixing zone phase out exception for mercury. The Department has granted the exception which applies only to the 5-year permit term of

the proposed WPDES permit. Requirements for mercury are included in s. NR 106.145 Wis. Adm. Code. A Daily Maximum limit of 3 ng/L with monthly monitoring is included in the proposed permit.

- **Whole Effluent Toxicity:** Whole effluent toxicity (WET) testing requirements and limits are determined in accordance with ss. NR 106.08 and NR 106.09 Wis. Adm. Code, as revised August 2016. (See the current version of the Whole Effluent Toxicity Program Guidance Document and checklist and WET information, guidance and test methods at http://dnr.wi.gov/topic/wastewater/wet.html) Acute and Chronic WET tests are scheduled in the following rotating quarters: July 01, 2019- September 30, 2019; October 1, 2020- December 31, 2020; April 1, 2021- June 30, 2021; January 1, 2022- March 31, 2022; and July 1, 2023- September 30, 2023.

3.2 Sample Point Number: 004- 67th St. & 3rd Ave.; 010- 61st St. & 49th Ave.; 011- 81st St. & 25th Ave.; 012- 67th St. & 57th Ave.; 013- 89th Pl. & 17th Ave., and 014- 65th St. & 49th Ave.

3.2.1 Changes from Previous Permit

Sample points 004, 010, 011, 012, 013, and 014 have been removed from the surface water section of the facility's permit. These sample points are covered under the facility's CMOM program and permit section 6.3.1- Sanitary Sewage Overflows and Sewage Treatment Facility Overflows. Flows from sample points 004, 010, 011, 012, 013, and 014 will be reported as sanitary sewage overflows following requirements outlined in permit section 6.3.1.

4 Land Application - Proposed Monitoring and Limitations

Municipal Sludge Description						
Sample Point	**Sludge Class (A or B)**	**Sludge Type (Liquid or Cake)**	**Pathogen Reduction Method**	**Vector Attraction Method**	**Reuse Option**	**Amount Reused/Disposed (Dry Tons/Year)**
002	B	Cake	Anaerobic digestion	Volatile Solids Reduction	Landfilled	1000 dry U.S. tons
005	A	Cake	Heat drying	Drying w/ Unstabilized Solids	EQ Distribution	1300 dry U.S. tons
006	A	Cake	Heat drying	Drying w/ Unstabilized Solids	EQ Distribution	1300 dry U.S. tons
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? **Yes. The last scan took place in 2012. A new scan will be needed in 2022.** Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

4.1 Sample Point Number: 002- CAKE SLUDGE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Quarterly	Composite	See permit subsection 4.2.1.1
Arsenic Dry Wt	Ceiling	75 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Arsenic Dry Wt	High Quality	41 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Cadmium Dry Wt	Ceiling	85 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Cadmium Dry Wt	High Quality	39 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Copper Dry Wt	Ceiling	4,300 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Copper Dry Wt	High Quality	1,500 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Lead Dry Wt	Ceiling	840 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Lead Dry Wt	High Quality	300 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Mercury Dry Wt	Ceiling	57 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Mercury Dry Wt	High Quality	17 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Molybdenum Dry Wt	Ceiling	75 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Nickel Dry Wt	Ceiling	420 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Nickel Dry Wt	High Quality	420 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Selenium Dry Wt	Ceiling	100 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Selenium Dry Wt	High Quality	100 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Zinc Dry Wt	Ceiling	7,500 mg/kg	Quarterly	Composite	See permit subsection 4.2.1.1
Zinc Dry Wt	High Quality	2,800 mg/kg	Quarterly	Composite	See permit subsection

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					4.2.1.1
Nitrogen, Total Kjeldahl		Percent	Quarterly	Composite	See permit subsection 4.2.1.1
Phosphorus, Total		Percent	Quarterly	Composite	See permit subsection 4.2.1.1
Phosphorus, Water Extractable		% of Tot P	Quarterly	Composite	See permit subsection 4.2.1.1
Potassium, Total Recoverable		Percent	Quarterly	Composite	See permit subsection 4.2.1.1
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2020.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2020.

4.1.1 Changes from Previous Permit:

Sample frequencies for all parameters except for PCB were changed from bimonthly to Quarterly. PCB sample frequency was changed from bimonthly to once in 2022. A municipal sludge priority pollutant scan is required once in 2022.

4.1.2 Explanation of Limits and Monitoring Requirements

List 2 parameters were included in the monitoring requirements table to give the permittee the flexibility to land apply Class B cake sludge under outfall 002 without having to modify the permit. As long as landfilling remains the sole method of disposal, the permittee may continue to monitor sludge on a quarterly basis and is not required to monitor for the List 2 parameters. 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). Radium requirements are addressed in s. NR 204.07(3)(n). Metal limits included in the permit do not apply to landfilled sludge and only take effect when land application of sludge is initiated per permit section 4.2.1.1. The permittee shall notify the Department prior to land applying sludge.

4.2 Sample Point Number: 005- EQ Dried Sludge Class A

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Quarterly	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Quarterly	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Quarterly	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Quarterly	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Quarterly	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Quarterly	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Molybdenum Dry Wt	Ceiling	75 mg/kg	Quarterly	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Quarterly	Composite	
Selenium Dry Wt	High Quality	100 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	

4.2.1 Changes from Previous Permit:

Sample frequencies for all parameters were changed from bimonthly to Quarterly based on the volume of sludge reported in the 2018 permit application.

4.2.2 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). Radium requirements are addressed in s. NR 204.07(3)(n).

4.3 Sample Point Number: 006- EQ Sludge - Onsite Un-Bagged

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Volume		tons/day	Quarterly	Estimated	Maintain a daily log of unbagged EQ sludge transferred to on-site storage. Report tons/day as a quarterly average on the quarterly forms.

4.3.1 Changes from Previous Permit:

Sample frequencies for volume was changed from bimonthly to Quarterly based on the volume of sludge reported in the 2018 permit application.

4.3.2 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). Radium requirements are addressed in s. NR 204.07(3)(n).

5 Schedules

5.1 Phosphorus Optimization

No later than 14 days following each compliance date, the permittee shall notify the Department in writing of its compliance or noncompliance with the required action. If a submittal is part of the required action, then a timely submittal fulfills the written notification requirement.

Required Action	Due Date
Optimization Summary Report: The permittee shall continue to implement phosphorus optimization efforts throughout the permit term and identify any new optimization efforts. The permittee shall submit a final report documenting successes in reducing phosphorus concentrations in the effluent. The report shall summarize the actions taken for continued optimization of phosphorus removal. The report shall also include an analysis of trends in monthly and annual total effluent phosphorus concentrations based on sampling during the current permit term and include an evaluation of collected effluent data. The final report shall also identify any possible source reduction measures and operational improvements to continue to optimize removal of phosphorus in the future.	06/30/2023

5.1.1 Explanation of Schedule

Phosphorus Optimization

The 0.6 mg/L six-month avg. interim limit for phosphorus requires the permittee to optimize removal of this parameter in the effluent. The narrative interim limits are the Department's strategy for dealing with the pending development of the near shore or whole lake model for direct discharges to Lake Michigan. The schedule requires the permittee prepare an optimization summary report that shall include an evaluation of collected effluent data, possible source reduction measures and operational improvements to optimize removal of phosphorus.

5.2 Mercury Pollutant Minimization Program

As a condition of the mixing zone phase out exception for mercury granted in accordance with s. NR 106.06(2)(br), Wis. Adm. Code, and 40 CFR 132, Appendix F, the permittee shall perform the following actions in accordance with s. NR 106.145, Wis. Adm. Code.

Required Action	Due Date
Submit Annual Status Report: The permittee shall submit to the Department an annual status report to summarize and evaluate mercury monitoring data and other relevant information collected to document background and effluent levels of mercury. The report shall also document any continuing reasonable cost-effective efforts to identify and reduce potential sources of mercury in the effluent.	12/31/2019

The first annual report shall be due on the date specified and annually thereafter. Note: If the permittee wishes to apply for an alternative mercury effluent limitation in the next permit, that application is due with the application for permit reissuance, 6 months prior to permit expiration. The permittee should submit or reference the PMP plan as updated by the Annual Status Report or more recent developments as part of that application.	
Submit Annual Status Report #2: The permittee shall submit to the Department the second annual status report on the progress of the PMP. Submittal of the second annual status report is required by the Date Due.	12/31/2020
Submit Annual Status Report #3: The permittee shall submit to the Department the third annual status report on the progress of the PMP. Submittal of the third annual status report is required by the Date Due.	12/31/2021
Submit Annual Status Report #4: The permittee shall submit to the Department the fourth annual status report on the progress of the PMP. Submittal of the fourth annual status report is required by the Date Due.	12/31/2022
Final Status Report: Submit a final report documenting the success in reducing or maintaining mercury concentrations in the effluent. The report shall summarize mercury pollutant minimization activities that have been implemented during the current permit term. The report shall include an analysis of trends in monthly and annual total effluent mercury concentrations based on mercury sampling during the current permit term. The report shall also include an analysis of how influent and effluent mercury varies with time and with significant loading of mercury such as loads from industries into the collection system.	12/31/2023
Annual Reports After Permit Expiration: In the event this permit is not reissued by the expiration date, the permittee shall continue to submit annual mercury status reports.	

5.2.1 Explanation of Schedule

Mercury Pollutant Minimization Program

The City of Kenosha has requested an exception to the proposed mixing zone phase out when calculating effluent limitations for mercury beyond the November 15, 2010 phase out date under the exception for technical and economic considerations to the mixing zone phase-out for bio-accumulating chemicals of concern (BCC's) at 40 CFR, Part 132, Appendix F, Procedure 3 C. 6. Therefore, Kenosha will accept a permit requirement for continued mercury PMP that meets the requirements of s. 106.145(7), Wis. Adm. Code. WDNR believes that the finding at s.106.145(1)(a), Wis. Adm. Code, sufficiently demonstrates that controls beyond a PMP would result in unreasonable economic effects because controls to remove mercury using wastewater treatment technology are not feasible or cost-effective.

Note: The granting of this exception shall only apply to the 5-year term of the proposed WPDES permit. The City of Kenosha will need to make a similar request and WDNR will need to make a similar determination for a further continuation of a mixing zone if those actions become appropriate for the next permit term.

5.3 Fecal Coliform- Weekly Geometric Mean Limitation

The permittee shall comply with the weekly geometric mean fecal coliform limitations as specified.

Required Action	Due Date
Operational Evaluation Report: The permittee shall prepare and submit to the Department an operational evaluation report. The report shall include an evaluation of collected effluent data, possible operational changes or improvements or alterations of existing systems that will optimize reductions in fecal coliform discharges from the treatment plant specifically during wet weather	01/31/2020

blending events. If the evaluation report concludes that the facility can achieve compliance with the weekly fecal coliform limit during all facility operations, including wet weather blending events, with only operational changes, the permittee shall comply with the limit June 30, 2020 and is not required to comply with the required actions identified below. If the evaluation concludes that improvements or alterations of existing systems are needed to achieve compliance with the weekly fecal coliform limit during all facility operations, including wet weather blending events, the submittal shall include a final engineering design report and a facility plan pursuant to ch. NR 110, Wis. Adm. Code.	
Final Compliance Alternatives Plan: The permittee shall submit final construction plans for improvements or alterations of existing systems, to the Department for approval pursuant to s. 281.41, Stats.	06/30/2020
Achieve Compliance: The permittee shall achieve compliance with the weekly geometric mean fecal coliform limitation.	12/31/2020

5.3.1 Explanation of Schedule

Weekly geometric mean fecal coliform limits are included in the proposed permit based upon new regulations that became effective on September 1, 2016 affecting chapters NR 106 and 205 of the Wisconsin Administrative Code, to align Wisconsin's effluent limitations with 40 CFR 122.45(d). While Kenosha is able to meet the new limits during normal operating conditions, it is unclear and there is a lack of available data to show that Kenosha can meet the new weekly average limits during wet weather blending events. Since this is a new limit for the facility the Department is granting a 24-month compliance schedule to allow the facility time to evaluate and update the system to be able to meet the weekly fecal coliform limits during wet weather blending events, should they occur.

Attachments:

Substantial Compliance Determination, dated June 12, 2018 and prepared by Andrew Greer, Wastewater Engineer (no longer with the Department).

Water Quality Based Effluent Limits, dated August 28, 2018, and prepared by Nick Lent, Water Resources Engineer.

Proposed Expiration Date:

December 31, 2023

Justification Of Any Waivers From Permit Application Requirements

No waivers were given from permit application requirements.

Prepared By:

Amanda Perdzock, Wastewater Specialist

Date: October 30, 2018

Substantial Compliance Determination

Permittee Name: CITY OF KENOSHA		Permit Number: 0028703-10-0
	Compliance?	Comments
Discharge Limits	Yes	Plant consistently meets limits. Limit violations during past permit term below. Date Amount Limit Description 7/3/2017 449.4 400 Fecal Coliform violated Geometric Mean - Monthly limit 3/18/2015 19.2 16.2 Nitrogen, Ammonia (NH3-N) Total violated Daily Max limit
Sampling/testing requirements	Yes	Sampling and testing have been done correctly per permit requirements.
Groundwater standards	NA	No groundwater requirements
Reporting requirements	Yes	All DMRs submitted correctly
Compliance schedules	Yes	Mercury Pollutant Minimization Program Status Reports (5 Total) were submitted on time and complete Phosphorus compliance schedule was completed November 2016 after facility has shown it was able to achieve compliance with 0.6 mg/L (six month average, May-October and November-April) and 143 lb./day (annual average), through optimiztion.
Management plan	NA	
Other:	NA	
Enforcement Considerations		
In substantial compliance?	Yes Comments: After review of compliance schedule reports, discharge monitoring reports, and a site visit on 2/13/18, City Of Kenosha, has been found in substantial compliance with their current permit. Signature: Andrew Greer Date: 6/12/2018 Concurrence: Date:	

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: August 28, 2018

TO: Amanda Perdzock – WY/3

FROM: Nick Lent – Milwaukee

SUBJECT: Water Quality-Based Effluent Limitations for the Kenosha Wastewater Treatment Facility WPDES Permit No. WI-0028703-10-0 (FID 230002960)

This is in response to your request for an evaluation of the need for water quality-based effluent limitations using Chapters NR 102, 104, 105, 106, 205, 207, 210 and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from the Kenosha Wastewater Treatment Facility (WWTF) to Lake Michigan in Kenosha County. The evaluation of the permit recommendations is discussed in more detail in the attached report.

No changes are recommended in the permit limitations for BOD_5, total suspended solids, pH & phosphorus at outfall 001. Based on our review, the following recommendations are made on a chemical-specific basis:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Annual Average	Footnotes
BOD_5			45 mg/L	30 mg/L			
TSS			45 mg/L	30 mg/L			
pH, field	9.0 s.u.	6.0 s.u.					
Chlorine, Total Residual	38 µg/L		**38 µg/L**	**38 µg/L**			1
Fecal Coliforms year-round			**848#/100 mL geometric mean**	400#/100 mL geometric mean			1
E Coli							2
Phosphorus, total TBL				1.0 mg/L			3
Phosphorus, total Interim					0.6 mg/L	143 lbs/day	3
Arsenic							4
Cadmium							5
Chromium							5
Copper							5
Lead							5
Nickel							5
Zinc							5
Mercury, total recoverable	3.0 ng/L						6
Ammonia Nitrogen November – April	16.2 mg/L		**16.2 mg/L**	**16.2 mg/L**			1
Temperature, maximum							7
Acute WET							8
Chronic WET							8

Footnotes:

1. Additional limits to comply with the expression of limits requirements in s. NR 106.07 and s. NR 205.065(7), Wis. Adm. Code, are included in bold.

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2. Monitoring only
3. A phosphorus optimization requirement is also recommended for permit reissuance.
4. Quarterly monitoring using the lowest levels of detection possible is recommended. Water supply intake monitoring is also recommended to determine the extent of the permittee's potential actual net addition or reduction of arsenic to the environment. See Part 2 of Attachment # 1 for more information.
5. Monitoring of influent and effluent should be continued as part of the pretreatment program. Metals monitoring should be in the total recoverable form.
6. This concentration is equal to the 1-day P_{99} of mercury data from outfall 001 over the past 55 months using an exception to the mixing zone phase out for bioaccumulating compounds of concern. See Attachment # 1 and 2 for more information about effluent limit calculation for mercury.
7. Daily monitoring in the fourth year of the reissued permit for daily maximum temperature.
8. Along with the chemical-specific recommendations mentioned above, the need for acute and chronic whole effluent toxicity (WET) monitoring and limits has also been evaluated for the discharge from Outfall 001. Following the guidance provided in the Department's November 1, 2016 *Whole Effluent Toxicity Program Guidance Document - Revision #11*, **annual acute and chronic WET testing is recommended for reissuance.**

   Sampling WET concurrently with any chemical-specific toxic substances is recommended. Chronic WET testing shall be performed using a dilution series of 100 %, 30 %, 10 %, 3 % & 1 %. The Instream Waste Concentration to assess chronic test results is 9 %. The primary control and dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from Lake Michigan, offshore and outside of the mixing zone and any other discharges.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Nick Lent at (414) 263-8623 or Nicholas.Lent@wisconsin.gov.

Attachments:
1. WQBEL memo for Kenosha – Outfall 001
2. Temperature Limit Calculation Table
3. Kenosha BCC Mixing Zone Phase Out Exception
4. Site Map – Kenosha Surrounding Area

PREPARED BY: Nick Lent, Water Resources Engineer, Effluent Limits Calculator

E-cc: Diane Figiel, P.E. - WY/3
Bryan Hartsook, P.E. - Milwaukee

Attachment # 1

Water Quality-Based Effluent Limitations for Kenosha Wastewater Treatment Facility

WPDES Permit No. WI-0028703-10-0
(FID 230002960)

Prepared by: Nick Lent

PART 1 – BACKGROUND INFORMATION

Facility Description:
The City of Kenosha operates a 28.6 MGD annual average design flow extended aeration activated sludge wastewater treatment facility (WWTF), serving approximately 110,000 people and 7 categorical industries. The wastewater treatment process consists of influent flow equalization, perforated plate screening, grit removal, primary clarification, primary sludge thickening centrifuge, conventional activated sludge - aeration basins, secondary clarification, waste activated sludge - WAS thickening centrifuge, WAS chemical thermal hydrolysis, anaerobic digestion, anaerobic biosolids dewatering centrifuge, biosolids dryer (for production of Class A "EQ" biosolids), combined heat and power units, phosphorus removal with ferric chloride, chlorination with chlorine gas, and dechlorination with sulfur dioxide gas. Effluent is discharged to Lake Michigan through a 1200-foot outfall structure to Lake Michigan.

Existing Permit Limitations: The current permit expires on September 30, 2018, and includes the following effluent limitations for the discharge from outfall 001 to Lake Michigan:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Annual Average	Footnotes
BOD_5			45 mg/L	30 mg/L			1
TSS			45 mg/L	30 mg/L			1
pH	9.0 s.u.	6.0 s.u.					1
Chlorine, Total Residual	38 µg/L						
Fecal Coliforms Year round				400#/100 mL geometric mean			
E Coli							2
Phosphorus TBL Interim				1.0 mg/L	0.6 mg/L	143 lbs/day	3
Cadmium							2
Chromium							2
Copper							2
Lead							2
Nickel							2
Zinc							2
Mercury, Total Recoverable	9.65 ng/L						4
Ammonia Nitrogen November - April	16.2 mg/L						
Temperature, maximum							2

Attachment # 1

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Annual Average	Footnotes
Acute WET							5
Chronic WET							5

Footnotes:

1. These limitations are not being evaluated as part of this review. Because the water quality criteria, reference effluent flow rates, and receiving water characteristics have not changed significantly, limitations for these water quality characteristics do not need to be re-evaluated at this time.
2. Monitoring only, metals monitoring is in the total recoverable form.
3. These "final interim" limitations went into effect May 1, 2018.
4. This daily maximum limit for mercury is a variance limit equal to the 1-day P_{99} of effluent mercury data from the previous permit term.
5. In addition to these specific effluent limitations, the current permit requires annual acute and chronic WET testing using an IWC of 9 %.

Receiving Water Information:

- Name: Lake Michigan
- Classification: Cold Water 1, Public Water Supply.
- Flow: A ten-to-one (receiving water-to-effluent) dilution ratio is used for calculating effluent limits based on chronic or long-term impacts, in accordance with s. NR 106.06(4)(b)2, Wis. Adm. Code, because the receiving water does not exhibit a unidirectional flow at the point of discharge.
- Hardness = 139 mg/L as $CaCO_3$. (from geometric mean of data from Lake Michigan near Oak Creek)
- Background metal concentrations (geometric mean) of receiving water used in limit calculations:

Substance	Concentration	Unit	Source
Cadmium	0.0085	µg/L	1
Copper	0.44	µg/L	1
Lead	0.052	µg/L	1
Chromium	0.49	µg/L	1

Substance	Concentration	Unit	Source
Zinc	0.39	µg/L	1
Mercury	0.33	ng/L	2, 3
Arsenic	0.88	µg/L	3
Chloride	20	mg/L	4

Sources:

1. DNR Water Quality Rules Implementation Plan, Chapter 4, January 1998 – Lake Michigan 7 miles off Milwaukee. Data expected to be similar near Kenosha.
2. Lake Michigan Mass Balance: Mercury Report, page 93 (2004, EPA).
3. 7 results from untreated drinking water supply intake at Kenosha Water Utility.
4. Estimate using data from nearshore Lake Michigan, in southern Milwaukee County.

- Multiple dischargers: None within the immediate mixing zone for Kenosha outfall 001.
- Impaired water status: the following table illustrates the 303d listing status of Lake Michigan as of the most recently approved listing cycle (2016). No changes are included on the proposed 2018 list.

Waterbody Name	Waterbody Type	Start	End	Length / Size	Source Category	Pollutant	Impairment Indicator	TMDL Priority
Lake Michigan	Great Lakes Shoreline	Kenosha to Door County		103 mi	Atmospheric Deposition	Mercury	Contaminated Fish Tissue	Low
Lake Michigan	Great Lakes Shoreline	Kenosha to Door County		103 mi	Contaminated Sediment	PCBs	Contaminated Fish Tissue	Low

Effluent Information:

- Design Flow Rate(s):
  Annual average = 28.6 MGD (Million Gallons per Day) - based on a plant rerating, which received concurrence from Gerald Novotny, WDNR, in a letter dated 3/25/2003
  Peak daily = 68 MGD (from facilities plan)
  Peak weekly = 58 MGD (from design flow worksheets)
  Peak monthly = 47.6 MGD (from facilities plan)
  For reference, the actual average influent flow from Nov 2013 through May 2018 was 22.8 MGD.
- Hardness = 263 mg/L as $CaCO_3$. geometric mean of data from 2018 permit application
- Acute dilution factor used: Not applicable – there is no approved Zone of Initial Dilution (ZID).
- Effluent characterization: Kenosha is categorized as a major municipal discharger, so the permit application required effluent sample analyses for hardness and all the "priority pollutants" except for the Dioxins and Furans. An evaluation and discussion of the results is included in Part 2. Effluent data from the permit application and all other permit-required monitoring from November 2013 through May 2018 is used in this evaluation. For informational purposes, the following table summarizes effluent data for metals for which more than eleven data points are available. Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled "MEAN EFFL. CONC."

Kenosha – Outfall 001 Metals Data Summary	Cadmium µg/L	Chromium µg/L	Copper µg/L	Lead µg/L	Nickel µg/L	Zinc µg/L	Mercury ng/L
# of samples collected	55	55	55	55	55	55	55
# of detected concentrations	0	49	55	1	53	55	55
Maximum	<0.68	4.62	34.74	0.91	15.22	84	4.1
Mean	<0.19	1.48	11.17	0.02	4.16	33.38	1.13
1-day P_{99}	-	4.31	39.28	-	12.45	80.24	3.03
4-day P_{99}	-	2.87	23.04	-	7.85	53.63	1.94
30-day P_{99}	-	1.91	14.84	-	5.32	39.97	1.39

For informational purposes and to meet the requirements in s. NR 201.03(6), Wis. Adm. Code, the following table illustrates the average concentrations at Outfall 001 from November 2013 through May 2018 for all parameters with limits in the current permit, or recommended as a part of this memo:

	Average	Average Mass
BOD_5	13.0 mg/L	
TSS	8.3 mg/L	
pH field	7.17 s.u.	
Fecal coliforms	83#/100ml*	
Phosphorus	0.49 mg/L	93 lbs/day
Ammonia Nitrogen	1.98 mg/L	
Mercury	1.13 ng/L	

*One value was reported as zero but changed to 1 to calculate this geometric mean.

- Water Source: the water supply for the greater Kenosha area is Lake Michigan.
- Additives: Ferric for total phosphorus removal, chlorination and dechlorination before discharge.

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

In general, permit limits for toxic substances are recommended whenever any of the following occur:

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

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

Codified criteria for toxic substances are drawn from ch. NR 105, Wis. Adm. Code, and Secondary Values were derived per s. NR 105.08, Wis. Adm. Code, where water quality criteria are unavailable for detected substances in the effluent characterization for the permit application. Daily maximum effluent limits for substances without codified criteria are set equal to the secondary acute value, per s. NR 106.06(3)2, Wis. Adm. Code. Chrysene, Heptachlorepoxide, and Dichlorobromo-methane were detected at low levels, but there isn't enough toxicity data available to calculate a secondary value for those substances.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

10:1 dilution ratio (limits = 2×ATC)

SUBSTANCE	REF. HARD. mg/L	ATC or Secondary Value (SV)	MAX. EFFL. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Chlorine		19.03	38.06				
Arsenic		339.8	679.60	135.92	1.7		
Cadmium	263	13.21	26.42	5.28	<0.68		
Chromium (+3)	263	3980.63	7961.26			4.31	4.62
Chromium (+6)		16.02	32.04	6.41	2.9		
Copper	263	38.64	77.28			39.28	34.74
Lead	263	272.17	544.34	108.87	0.02		
Mercury (ng/L)		830	830.00			3.03	4.1
Nickel	263	1032.3	2064.60			12.45	15.22
Zinc	263	280.41	560.82			80.24	84
Cyanide		22.36	44.72	8.94	8.0		
Chloride (mg/L)		757	1514	302.8	170		
Bis(2-ethylhexyl) phthalate		33.92 (SV)	33.92	6.78	< 0.6		

Attachment # 1

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

10:1 dilution ratio

SUBSTANCE	REF. HARD. mg/L	CTC or Secondary Value (SV)	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Chlorine		7.28		80.08			
Arsenic		148	0.88	1619.20	323.84	0.86	
Cadmium	139	3.19	0.0085	35.01	7.00	<0.68	
Chromium (+3)	139	112.89	0.49	1236.89			2.87
Chromium (+6)		10.98		120.78	24.16	2.9	
Copper	139	13.72	0.44	146.52			23.04
Lead	139	38.5	0.052	422.98	84.60	0.02	
Mercury - ng/L		440	0.33	440.00			1.94
Nickel	139	68.96		758.56			7.85
Zinc	139	160.55	0.39	1762.15			53.63
Cyanide		5.22		57.42	11.48	8.0	
Chloride - mg/L		395	20	4145	829	170	
Bis(2-ethylhexyl) phthalate		4.36 (SV)		47.96	9.59	< 0.6	

Monthly Average Limits based on Wildlife Criteria (WC)

10:1 dilution ratio

SUBSTANCE	WC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Mercury - ng/L	1.30	0.33	1.30 – no mix			1.39
Mercury - ng/L	1.30	0.33	11.30 – with mixing			1.39

Monthly Average Limits based on Human Threshold Criteria (HTC)

10:1 dilution ratio

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Antimony	5.6		62	12	0.49	
Cadmium	4.4	0.0085	48	10	<0.68	
Chromium, total	100	0.49	1095			1.91
Chromium (+6)	83.5		919	184	2.9	
Lead	10	0.052	109	22	0.02	
Mercury - ng/L	1.5	0.33	1.50			1.39
Nickel	100		1100			5.32
Methylene Chloride	5		55	11	0.99	
Hexachlorocyclopentadiene	25.6		282	56	0.006	

Attachment # 1

Monthly Average Limits based on Human Cancer Criteria (HCC)

10:1 dilution ratio

SUBSTANCE	HCC or Secondary Value (SV)	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Arsenic	0.2	0.88	0.20*	0.04	0.86	
Chloroform	53		583	117	1.02	
Dichlorobromomethane	53		583	117	0.37	
Methylene Chloride	5		55	11	0.99	
Bis(2-ethylhexyl) phthalate	1.35 (SV)		14.85	2.97	< 0.6	
Chlorodibromo-methane	3.2 (SV)		35.20	7.04	0.22	
Heptachlor	0.00151 (SV)		0.0166	0.0033	0.00235	

*The monthly average effluent limit for arsenic could be set equal to the background concentration if, after further investigation, the conditions in 106.06(b) 1-5, Wis. Adm. Code, are met.

In addition to evaluating the need for limits for each individual substance for which HCC exist, s. NR 106.06(8), Wis. Adm. Code requires the evaluation of the cumulative cancer risk. That risk is considered additive, as represented in the table below. If the sum of the effluent concentration divided by the calculated limit is greater than 1.0, effluent limits for all substances that were detected may be considered. Arsenic is temporarily excluded from this calculation due to uncertainty about the effluent concentration, what the background concentration is, and the need for an effluent limit (see discussion below for more information). The sum of the effluent concentrations divided by the limits is less than 1.0 as shown.

DETECTED CARCINOGEN	HCC-BASED EFFLUENT LIMIT	MEAN EFFLUENT CONC.	EFFLUENT CONC. ÷ LIMIT
Chloroform	583	1.02	0.00174957
Dichlorobromomethane	583	0.37	0.00063465
Methylene Chloride	55	0.99	0.018
Chlorodibromo-methane	35.20	0.22	0.00625
Heptachlor	0.0166	0.00235	0.14156627
TOTAL (must be < 1.0) =			0.16820048

Monthly Average Limits based on Taste and Odor Criteria (TOC):

10:1 dilution ratio

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Copper	1000	0.44	10996			14.84
Zinc	5000	0.39	54996			39.97
Hexachlorocyclopentadiene	1		11.00	2.20	0.006	

Conclusions and Recommendations: Based on a comparison of the effluent data and calculated effluent limitations, the following recommendations are made;

Total Residual Chlorine – Because chlorine is added as a disinfectant, effluent limitations are recommended to assure proper operation of the dechlorination system. Section NR 210.06(2)(b), Wis. Adm. Code, states, "When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L." But since the water quality-based effluent limitations are more restrictive, the water quality-based limits are recommended instead. Specifically, a daily maximum limit of 38 µg/L (38.06, rounded to two significant figures) is recommended. Also, **the 38 µg/L daily maximum limit is recommended to be expressed as both a weekly and monthly average**, to satisfy s. NR 106.07(3)(e)1, Wis. Adm. Code. See Part 7 of this attachment for more information about limit expression requirements.

Total Recoverable Cyanide – The sampling for the priority pollutant scan included an initial result of 35 ug/L for total cyanide, which was higher than expected. So, Kenosha retested three more times before submitting the permit application, using split samples and their own lab for additional analysis. The two sets of data were considerably different. However due to uncertainty about the true effluent concentration, and the potential that the average concentration was still more than 9 µg/L (1/5 of the lowest calculated limit), six more split samples were analyzed. The results of both sets of data trend down. Because the Kenosha WWTP Lab has achieved a lower LOD and LOQ than Northern Lake Service, it is possible that those results are the most representative of effluent quality. The average of the nine different Kenosha WWTP Lab results is 2.7 µg/L. The average of all 19 results is 8.0 µg/L. Based upon these results, **no effluent limits or additional effluent monitoring for total recoverable cyanide is recommended for permit reissuance.** There is no criteria for cyanide amenable to chlorination so no evaluation is made for that parameter.

Cyanide Results Summary										
	Cyanide (ug/L)					Cyanide (ug/L)				
Sample Date	Total	Amenable	LOD	LOQ	Laboratory	Total	Amenable	LOD	LOQ	Laboratory
2/14/18	35	29	5.0	15.0	Northern Lake Service					
3/7/18 (07:25) *	26	26	5.0	15.0	Northern Lake Service	8.8		3	9	Kenosha WWTP Lab
3/8/18 (15:00) *	22	22	5.0	15.0	Northern Lake Service	6.9		3	9	Kenosha WWTP Lab
3/12/18 *	19	19	5.0	15.0	Northern Lake Service	ND		3	9	Kenosha WWTP Lab
7/17/2018 *	ND	ND	5.0	15.0	Northern Lake Service	3		3	10	Kenosha WWTP Lab
7/18/18 *	ND	ND	5.0	15.0	Northern Lake Service	ND		3	10	Kenosha WWTP Lab
7/19/18 *	ND	ND	5.0	15.0	Northern Lake Service	ND		3	10	Kenosha WWTP Lab
7/23/18 *	ND	ND	5.0	15.0	Northern Lake Service	6		3	10	Kenosha WWTP Lab
7/24/18 *	5	5	5.0	15.0	Northern Lake Service	ND		3	10	Kenosha WWTP Lab
7/25/18 *	6	6	5.0	15.0	Northern Lake Service	ND		3	10	Kenosha WWTP Lab
*** Collected samples were split between the 2 labs for analyses.*										
Average	11.3				Average	2.7				
[all averages include non detects as zeros]					Average all data	8.0				

Total Recoverable Arsenic – The priority pollutant scan completed for the permit application included a single effluent result of 1.7 micrograms per liter (µg/L) which was between the level of detection (LOD) of 1.0 µg/L and quantification (LOQ) of 2.0 µg/L, so there was limited confidence in the result. Due to the human cancer criteria for public water supply designated waters of 0.2 µg/L as a monthly average, there is a need to use the lowest LOD and LOQ from approved test methods in ch. NR 219, Wis. Adm. Code. Because the ambient concentration of Lake Michigan is known to be above the Human Cancer criterion for public water supply designated receiving waters (~1 µg/L ambient vs 0.2 µg/L criteria), the calculated WQBEL is set equal to the 0.2 µg/L criteria, *unless the conditions described in s. NR 106.06(6), Wis. Adm.*

Code can be demonstrated, in which case the calculated effluent limit could be set equal to the background concentration.

Updates to s. NR 106.06(6)(b), Wis. Adm. Code, allow a facility to demonstrate that an intake pollutant in the discharge does not cause, have the reasonable potential to cause, or contribute to the excursion of water quality criteria in the receiving water. The demonstration has five conditions, all of which must be met:

1. The permittee withdraws 100 percent its intake water containing the substance from the same body of water into which the discharge is made;
2. The permittee does not contribute any additional mass of the substance to the wastewater;
3. The permittee does not alter the substance chemically or physically in a manner that would cause adverse water quality impacts to occur that would not occur if the pollutants were left in-stream;
4. The permittee does not increase the concentration at the edge of the mixing zone, or at the point of discharge if a mixing zone is not allowed, as compared to the concentration in the intake water, unless the increased concentration does not cause or contribute to an excursion above an applicable water quality standard; and
5. The timing and location of the discharge would not cause adverse water quality impacts to occur that would not occur if the identified intake pollutant were left instream.

Because the water supply for Kenosha is Lake Michigan, and the discharge is also to Lake Michigan, monitoring of background data from a source like the drinking water supply intake (before any treatment) was requested in addition to paired effluent data (from the same day). Kenosha submitted the results of seven days of drinking water supply intake and effluent data from August 2018, using the lowest LOD and LOQ possible. The intake data was collected via grab sample at approximately the same time each day, and the effluent data was collected as 24-hour composite samples. Similar to what has been observed at other WWTPs like Racine, the data indicates that the average effluent concentration is less than the average background concentration in Lake Michigan.

Kenosha Water Utility WWTP – Arsenic Results (µg/L)
Method EPA 200.8

Sample Date	Raw Water Intake	WWTP Effluent	LOD	LOQ
08/07/2018	0.87	1.1	0.28	1.0
08/08/2018	1.1	1.1	0.28	1.0
08/09/2018	1.0	1.1	0.28	1.0
08/10/2018	0.87	0.7	0.28	1.0
08/13/2018	0.74	0.64	0.28	1.0
08/14/2018	0.82	0.64	0.28	1.0
08/15/2018	0.79	0.74	0.28	1.0
Average	0.884	0.860		

Due to the strong correlation between the background data and the WWTP effluent data, it appears that the discharge concentrations at Kenosha are due to the presence of arsenic in the source water. However, there is only a limited amount of data from the facility to base this assertion (seven paired samples over a nine-day period). Therefore, similar to what has been recommended for other facilities along Lake Michigan in Southeastern Wisconsin, **untreated drinking water intake and effluent monitoring for total**

recoverable arsenic is recommended for permit reissuance. A separate sample point for the drinking water intake would need to be added to the permit, to allow for data reporting and retrieval. Pursuant to s. NR 106.07(6)(a), Wis. Adm. Code, **the permittee shall perform effluent monitoring required in the permit using an acceptable analytical methodology for total recoverable arsenic in ch. NR 219, Wis. Adm. Code, which produces the lowest limit of detection and limit of quantification possible**.

Collection of this data is recommended to illustrate the local arsenic cycle and provide a means for determining if conditions in s. NR 106.06(6)(b)1-5, Wis. Adm. Code, are met. If quarterly monitoring were included, there should be enough information by the next permit reissuance to determine if continued monitoring and or a water quality-based effluent limit is necessary for total recoverable arsenic.

Total Recoverable Mercury – As shown in the tables, the water quality-based effluent limits are set equal to the available criteria. This is because the discharge is within the Great Lakes system, and mercury is a bioaccumulative chemical of concern (s. NR 106.06(2)(br), Wis. Adm. Code). As a result, the proposed water quality-based effluent limit would be equal to the most stringent criterion which is the 1.3 ng/L monthly average based on the wildlife criterion in ch. NR 105, Wis. Adm. Code.

However, a mixing zone may be granted and an effluent limit may exceed the most stringent water quality criterion or secondary value for the discharged BCC if the permittee is able to demonstrate the conditions listed in s. NR 106.06(2)(a) and (b), Wis. Adm. Code, are met. This section of code is only applicable to existing discharges that currently have a WPDES permit and have had coverage continuously since November 6, 2000. Previously, before official promulgation into Wisconsin administrative code on September 1, 2016, this process was described as an exception to the mixing zone phase out for BCCs for technical and economic considerations as described in 40 CFR, Part 132, Appendix F, Procedure 3. C. 6.

In the permit application materials submitted in 2018, Kenosha requested a continued exception to the mixing zone phase out when calculating effluent limitations for mercury at Kenosha based on the technical and economic considerations narratively described in s. NR 106.06(2)(br),2,b, Wis. Adm. Code. **A supporting document providing more information is provided in attachment # 2.**

Considering that the mercury concentrations in the open waters of Lake Michigan are known to be below criteria, and because the 30-day P_{99} of the discharge from Kenosha is only slightly above the 1.3 ng/L monthly criteria (long term average = 1.13 ng/L, 30-day P_{99} = 1.39 ng/L), the water quality criteria is met within a very small mixing zone (0.09 parts receiving water: 1-part effluent).

As noted in s. NR 106.06(2),3.c, Wis. Adm. Code, the permit shall contain a numeric effluent limit. Similar to the methodology used for permits with variances to the water quality standard, **it is recommended that the effluent limit be set equal to 1-day P_{99} of 3.0 ng/L (3.03, rounded)**, which was determined using effluent data from the existing permit term. Since the 3.0 ng/L value is based on effluent data from outfall 001 over the existing permit term, and is an estimate of the highest expected daily concentration; the facility is expected to be able to meet the limit without pollutant specific treatment. Continued implementation of the mercury pollutant minimization plan should be sufficient to ensure the effluent concentrations are below this limit, and trend downwards towards the water quality criteria with time.

Bis-(2ethylhexyl) phthalate – The permit application included a single result for bis-(2ethylhexyl) phthalate of 14 μg/L, with an LOD of 0.99 μg/L and LOQ of 3.0 μg/L. Based upon experience with other

facilities, a composite grab sample was recommended in July 2018 to bypass the automatic composite sampling equipment (tubing, sample bottles, and cleaning agents), which has been linked to sample contamination and false positives for this substance in some cases. The 24-hour grab sample composite result from July 12, 2018 was a non-detect (< 0.6 µg/L), indicating that Bis-(2ethylhexyl) phthalate may not actually be present in the discharge in the amount reported using the automatic composite sampler. Therefore, only the grab sample composite is considered to represent the true effluent quality for this substance. Because representative data shows that Bis-(2ethylhexyl) phthalate is not present in the discharge, **no additional monitoring or effluent limitations are needed for permit reissuance.**

There are no other toxic substances where available effluent data from Kenosha is above a level of concern for the discharge to Lake Michigan.

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

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. The acute toxicity criterion (ATC) for ammonia is calculated using the following equation.

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

Where:

A = 0.275 and B = 39.0 for a Cold Water Category 1 fishery, and
pH (s.u.) = maximum reasonably expected pH of the effluent.

The effluent pH data from the current permit term was examined as part of this evaluation to calculate a single daily maximum limit. A total of 1673 sample results were reported from November 2013 through May 2018. The maximum reported value was 7.8 s.u. (Standard pH Units), and a pH of greater than 7.6 s.u. was reported eight times. 99 % of the effluent pH data was 7.6 s.u. or less. The 1-day P_{99}, calculated in accordance with s. NR 106.05(5), is 7.56 s.u. And the mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 7.55 s.u. A value of 7.6 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 7.6 s.u. into the equation above yields an ATC = 11.37 mg/L and a computed daily maximum limit 22.75 mg/L using two times the ATC.

This calculated limit is higher than the current daily maximum limit of 16.2 mg/L which is included in the current permit from November through April. The Department would be unable to increase this limit without a demonstration of need under ch. NR 207, Wis. Adm. Code. An effluent data summary is included below to determine reasonable potential with respect to the procedures in ch. NR 106.05, Wis. Adm. Code, to evaluate the need for a daily maximum limit from May through October.

Weekly Average & Monthly Average Limits based on Chronic Toxicity Criteria (CTC):
The ammonia limit calculation also warrants evaluation of weekly and monthly average limits based on chronic toxicity criteria for ammonia, since those limits relate to the assimilative capacity of the receiving water. There have been no significant changes in the inputs which determine the calculated limits based on chronic toxicity criteria. They are summarized below for informational purposes.

Attachment # 1

Ammonia Nitrogen Effluent Limit Calculations - Kenosha

		Summer	Winter
		May – Oct.	**Nov. - April**
Effluent Flow	Qe (MGD)	28.6	28.6
Background Information	Dilution	10:1	10:1
	Ammonia (mg/L)	0.1	0.1
	Temperature (°C)	3	12
	pH (s.u.)	7.5	7.5
Criteria (mg/L)	4-day Chronic	10.91	10.91
	30-day Chronic	4.36	4.36
Effluent Limitations (mg/L_	Weekly Average	119	119
	Monthly Average	47	47

Because the discharge is to Lake Michigan, a 10:1 dilution ratio is used. This results in all the calculated weekly and monthly average limits are higher than the calculated daily maximum limit of 22.75 mg/L. A summary of all the calculated water quality-based effluent limits effluent limits for ammonia nitrogen is shown in the following table for informational purposes. Values are shown in mg/L.

Months Applicable	Daily Maximum	Weekly Average	Monthly Average
May – October	22.75	119	47
November – March	22.75	119	47

Reasonable potential determination:

The following table summarizes effluent ammonia nitrogen data from the Kenosha Wastewater Treatment Facility from November 2013 through May 2018.

	May – October mg/L	November – April mg/L	Year round mg/L
# of samples collected	767	906	1673
# of detected concentrations	767	906	1673
Maximum	18.6	19.2	19.2
Mean	1.25	2.60	1.98
Standard Deviation	1.87	3.18	2.75
1-day P_{99}	8.64	15.24	12.89
4-day P_{99}	4.72	8.24	6.99
30-day P_{99}	2.25	4.24	3.43

The 1-day P_{99} and maximum effluent concentration May – October data reported from the current permit term is less than the calculated limit, therefore, there is no reasonable potential for the discharge to exceed the calculated limit of 22.75 mg/L. In summary, no changes are recommended to the existing ammonia nitrogen limits strictly based upon the reasonable potential determination. However, the daily maximum limit of 16.2 mg/L will need to be expressed as a weekly and monthly average to satisfy limit expression requirements. Therefore, **the 16.2 mg/L daily maximum from November through April shall also be included as a weekly and monthly average limit for permit reissuance** (s. NR 106.07(3)(e)1, Wis. Adm. Code). More information about limit expression requirements is included in Part 7 of this memo.

PART 4 – PHOSPHORUS

Technology Based Limit (TBL)
Wisconsin Administrative Code, ch. NR 217, requires municipal wastewater treatment facilities that discharge greater than 150 pounds of Total Phosphorus per month to comply with a Monthly Average Limit of 1.0 mg/L, or an approved Alternative Concentration Limit. Since Kenosha currently has an existing technology-based limit of 1.0 mg/L, this limit should be included in the reissued permit. This limit remains applicable unless a more stringent water quality-based effluent limit or interim limit is given *with the same averaging period.*

Phosphorus – Water Quality Based
Revisions to the administrative rules for phosphorus discharges took effect on December 1, 2010. These rule revisions include additions to ch. NR 102, Wis. Adm. Code, (s. NR 102.05, Wis. Adm. Code,), which establish phosphorus standards for surface waters. Revisions to ch. NR 217, Wis. Adm. Code, (s. NR 217, Subchapter III) establish procedures for determining water quality based effluent limits for phosphorus, based on the applicable standards in ch. NR 102, Wis. Adm. Code.

For informational purposes, the Department published *Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges* on February 8th 2017 (second edition) and can be found at: http://dnr.wi.gov/topic/SurfaceWater/documents/phosphorus/PhosphorusGuidance.pdf

Section NR 102.06(5)(b), Wis. Adm. Code, specifies that a total phosphorus criterion of 7 µg/L (0.007 mg/L) applies for the open and nearshore waters of Lake Michigan. However effluent limitations for discharges of phosphorus to either Lake Michigan or Lake Superior are not calculated based upon a traditional mass balance equation. For direct discharges to Lake Michigan such as Kenosha, s. NR 217.13(4), Wis. Adm. Code, says that the Department shall set effluent limits consistent with nearshore or whole lake models approved by the Department. In the absence of an approved model, retention of the 0.6 mg/L six-month average interim limit is recommended for permit reissuance.

The guidance suggests setting the interim limit equal to a calculated P_{99} if the phosphorus effluent concentration has consistently been below 0.6 mg/L and will continue to be below this concentration. A summary of effluent total phosphorus data is provided below. The average of all effluent total phosphorus data from the current permit term is 0.49 mg/L which is approximately 80 % of the current limit. More recent effluent data was compared to earlier effluent data and no significant reductions of effluent total phosphorus have occurred in the past three years, therefore, **no changes from the 0.6 mg/L six-month average interim limit are recommended for permit reissuance. This implies that no changes are needed from the existing annual average mass limit of 143 lbs/day, which is equal to 0.6 mg/L × 28.6 MGD × 8.34.** Finally, to be consistent with page 30 of the guidance, **a requirement for phosphorus optimization is also recommended for permit reissuance.**

November 2013 – May 2018 Total Phosphorus Effluent Data Summary, mg/L			
Sample size	1673	Range	0.04 – 1.87
# of non-detects	0	1-day P_{99}	1.10 mg/L
Mean*	0.49 mg/L	4-day P_{99}	0.76 mg/L
Standard Deviation	0.19 mg/L	30-day P_{99}	0.58 mg/L

Attachment # 1

PART 5 – THERMAL

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

In accordance with s. NR 106.53(2)(b), the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from November 2013 – May 2018.

The table below summarizes the maximum temperatures reported during monitoring from November 2013 – May 2018. Comparing the representative highest effluent temperature to the calculated effluent limits determines the reasonable potential of exceeding the effluent limits. The months in which limitations are recommended are highlighted in bold. The complete thermal table used for calculation is attached.

Month	Representative Highest Monthly Effluent Temperature		**Calculated Effluent Limit**	
	Weekly Maximum (°F)	Daily Maximum (°F)	**Weekly Average Effluent Limitation** (°F)	**Daily Maximum Effluent Limitation** (°F)
JAN	55	56	67	120
FEB	54	55	75	110
MAR	53	54	74	97
APR	56	57	80	96
MAY	61	67	86	90
JUN	65	72	103	96
JUL	68	70	82	83
AUG	71	73	NA	120
SEP	71	72	82	96
OCT	68	69	71	109
NOV	64	66	**57**	99
DEC	59	61	59	117

Kenosha submitted a dissipative cooling study in December 7, 2017, which included assessments of temperature collected near the outfall on November 16, 2017. The study was approved on December 8, 2017, and is saved in SWAMP. The data demonstrated that the discharge does not increase water temperature beyond ambient temperatures, and does not cause any exceedances of sub-lethal temperature standards. Therefore, an exemption from the sub-lethal (weekly average) effluent temperature limits is granted in the reissued permit, under s. NR 106.59(4), Wis. Adm. Code, dissipative cooling (DC) request.

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

a) A statement by the permittee that there have been no substantial changes in operation of, or thermal loadings to, the treatment facility and the receiving water; or

b) Additional information demonstrating DC to supplement the information used in the previous DC determination. If significant changes in operation or thermal loads have occurred, additional DC data must be submitted to the Department.

No effluent temperature limits are required, however **daily maximum effluent temperature monitoring is recommended during the fourth year of the reissued permit to allow for updated data at the next permit reissuance.**

PART 6 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. The following evaluation is based on procedures in the Department's WET Program Guidance Document (revision #11, dated November 1, 2016).

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC_{50} (Lethal Concentration to 50 % of the test organisms) greater than 100 % effluent.
- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC_{25} (Inhibition Concentration) greater than the instream waste concentration (IWC).
- The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 9 % shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm. Code:

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

Where:

Q_e = annual average flow = 28.6 MGD = 44.2 cfs
f = fraction of the Q_e withdrawn from the receiving water = 0
Q_s = 10:1 "dilution" for non-unidirectional water

The IWC is 9 % based on dilution of 10 parts lake water to 1-part effluent, or a factor of 1 in 11 to calculate the IWC.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (referenced in 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 1, 3, 10, 30, 100 %. The permittee or Department staff may choose another dilution series, but it must be specified in the WPDES permit. For guidance on selecting an alternate series, see Chapter 2.11 of the WET Guidance Document.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.
- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), the receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from Lake Michigan, out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.
- The following is a tabulation of all available WET data for Outfall 001 from the current permit. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data. Data which is not believed to be representative of the discharge is not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations.

Date Initiated	Acute Results LC_{50} % (% survival in 100% effluent)				Chronic Results IC_{25} %				Footnotes
	C. dubia	Fathead minnow	Pass or Fail?	Use in RP?	*C. dubia*	Fathead Minnow	Pass or Fail?	Use in RP?	
03/04/2014	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
06/09/2015	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
08/18/2016	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
11/14/2017	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
01/30/2018	>100	>100	Pass	Yes	>100	>100	Pass	Yes	

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

  According to s. NR 106.08(6)(d), Wis. Adm. Code, TUa and TUc effluent values are equal to zero whenever toxicity is not detected (i.e. when the LC_{50}, IC_{25} or $IC_{50} \geq 100$ %.). **Because all the reported acute and chronic WET tests from Kenosha outfall 001 were ">100", RP = 0 and there is no acute or chronic reasonable potential, and limits are not required for permit reissuance.**

The WET Checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other permit conditions. The WET Checklist steps the user through a series of questions that evaluate the potential for effluent toxicity. The WET Checklist indicates whether acute and chronic WET limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code, and recommends monitoring frequencies based on points accumulated during the Checklist analysis. As toxicity potential increases, more points accumulate and more monitoring is recommended to ensure that toxicity is not occurring. The completed WET Checklist recommendations for this permittee are summarized in the table below. Staff recommendations, based on the WET Checklist and best professional judgment, are provided

below the summary table. For guidance related to RP and the WET Checklist, see Chapter 1.3 of the WET Guidance Document: http://dnr.wi.gov/topic/wastewater/WETguidance.html.

WET Checklist Summary – Kenosha Outfall 001

	Acute	Chronic
AMZ/IWC	No Acute Mixing Zone documented. **TOTAL POINTS = 0**	IWC = 9 %. **TOTAL POINTS = 0**
Historical Data	All results >100 in table above **TOTAL POINTS = 0**	All results > 100 in table above **TOTAL POINTS = 0**
Effluent Variability	No history of upsets or limit exceedances **TOTAL POINTS = 0**	Same as Acute **TOTAL POINTS = 0**
Receiving Water Classification	Full Fish and Aquatic Life **TOTAL POINTS = 5**	Same as Acute **TOTAL POINTS = 5**
Chemical-Specific Data	Acute criterion-based limits for chlorine (5 pts). Detects for toxics noted in Part 2 (3 pts). Three additional compounds of concern detected in priority pollutant scan (2 pts). **TOTAL POINTS = 10**	Chronic criterion-based limit for chlorine (5 pts). Detects for other toxics noted in Part 2 (3 pts). Three additional compounds of concern detected at low concentrations in priority pollutant scan (2 pts). **TOTAL POINTS = 10**
Additives	1 biocide and 1 water quality conditioner for chlorination and dechlorination. Plus 1 chemical addition for P removal **TOTAL POINTS = 4**	Same as Acute **TOTAL POINTS = 4**
Discharge Category	7 categorical dischargers noted in application **TOTAL POINTS = 11**	Same as Acute **TOTAL POINTS = 11**
Wastewater Treatment	Secondary or better **TOTAL POINTS = 0**	Same as Acute **TOTAL POINTS = 0**
Downstream Impacts	None directly attributable to this discharge **TOTAL POINTS = 0**	Same as Acute **TOTAL POINTS = 0**
Total Checklist Points:	**30 Points**	**30 Points**
Recommended Monitoring Frequency (from Checklist):	1 × yearly	1 × yearly
Limit Required?	**No**	**No**
TRE Recommended? (from Checklist)	**No**	**No**

Following the guidance provided in the Department's WET Program Guidance Document (revision #11, dated November 1, 2016), based upon the point totals generated by the WET Checklist, other information given above, and Chapter 1.3 of the WET Guidance Document, **annual acute and chronic WET testing is recommended in the reissued permit.** Tests should be done in rotating quarters, to collect seasonal information about this discharge. WET testing shall continue after the permit expiration date (until the permit is reissued).

A minimum of annual acute and chronic monitoring is recommended because Kenosha is a major municipal discharger with a design flow ≥ 1.0 MGD. Federal regulations at 40 CFR Part 122.21(j) require at least 4 acute and chronic WET tests with each permit application on samples collected since the previous reissuance. Therefore, annual monitoring is recommended in the permit term, so that data will be available for the next permit application.

PART 7 – EXPRESSION OF LIMITS

Revisions to ch. NR 106, Wis. Adm. Code, 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 continuous discharges subject to ch. NR 210.
- Daily maximum and monthly average limitations for all other discharges.

Kenosha is a municipal treatment facility and is therefore subject to weekly average and monthly average limitations whenever limitations are determined to be necessary.

This evaluation provides additional limitations necessary to comply with the expression of limits in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code. Pollutants already compliant with these rules or that have an approved impracticability demonstration, are excluded from this evaluation including water-quality based effluent limitations for phosphorus, temperature, and pH, among other parameters. Mass limitations are not subject to the limit expression requirements if concentrations limits are given.

Parameter	Daily Maximum	Weekly Average	Monthly Average	Weekly Geometric Mean	Monthly Geometric Mean	Multiplication Factor (CV)	Assumed Monitoring Frequency (n)
Chlorine, Total Residual	38 µg/L	**38 µg/L**	**38 µg/L**			-	-
Fecal Coliform				**848#/100mL**	400#/100mL	2.12 (0.6)	3/week; n = 12/month
Ammonia Nitrogen November – April	16.2 mg/L	**16.2 mg/L**	**16.2 mg/L**			-	-

Limits in **bold** are needed to satisfy limit expression requirements.

The methods for calculating limitations for continuous discharges subject to ch. NR 210, Wis. Adm. Code, to conform to 40 CFR 122.45(d) are specified in s. NR 106.07(3), Wis. Adm. Code, and are as follows:

1. 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.
2. 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.

3. 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 × MF)

Where: MF= Multiplication factor as defined in Table 1

CV= coefficient of variation (CV) as calculated in s. NR 106.07(5m), Wis. Adm. Code [CV = Standard deviation/arithmetic mean]

n= the number of samples per month required in the permit

s. NR 106.07 (3) (e) 4, Wis. Adm. Code. Table 1 — Multiplication Factor (for CV = 0.6)

CV	n=1	n=2	n=3	n=4	n=8	n=12	n=16	n=20	n=24	n=30
0.6	1.00	1.31	1.51	1.64	1.95	2.12	2.23	2.30	2.36	2.43

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

Chlorine, total residual: The existing permit has a daily maximum limit for chlorine. Consistent with 1. above**, a weekly and monthly average limitation shall also be included in the permit and set equal to the daily maximum of 38 µg/L.**

Fecal Coliforms: The existing permit has a fecal coliform effluent limit of 400 #/100mL as a monthly geometric mean, so the reissued permit will also need to have a weekly geometric mean limit to meet the limit expression requirements. The three times per week monitoring frequency for fecal coliforms at Kenosha is anticipated to remain unchanged in the reissued permit, therefore the average number of samples expected per month is 12 (rounded to the nearest number in the table above).

Using a coefficient of variation of 0.6 for fecal coliform data, and n=12, the multiplication factor is 2.12. 2.12 × 400#/100 mL = 848 #/100 mL. **Therefore, a weekly geometric mean limit of 848 #/100 mL is recommended to be included in the reissued permit in addition to the existing monthly geometric mean limit.**

Ammonia Nitrogen: The existing permit has a daily maximum limit for ammonia nitrogen from November through April. Consistent with 1. above, **a weekly and monthly average limitation shall also be included in the permit and set equal to the daily maximum of 16.2 mg/L from November through April.**

There are no other parameters for which additional limit expressions are thought to be needed at for Kenosha Wastewater Treatment Facility. The limit expression requirements do not apply to variance limits, so mercury is unaffected.

Attachment # 2

Mixing Zone Phase-Out Exception for Mercury

Kenosha Wastewater Treatment Facility – Outfall 001

Kenosha Wastewater Treatment Facility has requested a continued exception to the mixing zone phase out when calculating effluent limitations for mercury at the discharge from "outfall 001," beyond November 15, 2010 under the exception for technical and economic considerations to the mixing zone phase-out for bioaccumulating chemicals of concern (BCC's) in the Great Lakes Basin at s. NR 106.06(2)(br),2, Wis. Adm. Code (and 40 CFR, Part 132, Appendix F, Procedure 3 C. 6).

In consideration of the requirements contained at the above reference, the Wisconsin Department of Natural Resources (WDNR) determines that:

- Kenosha is in compliance with and shall continue to comply with all applicable requirements of Clean Water Act sections 118, 301, 302, 303, 304, 306, 307, 401, and 402, including existing categorical effluent limits and water quality based effluent limits (WQBELs).

- Kenosha **will accept a permit requirement for continued implementation of its Mercury Pollution Minimization Plan (PMP) meeting the requirements of s. NR 106.145(7), Wis. Adm. Code.** WDNR believes the finding at s. 106.145(1)(a), Wis. Adm. Code sufficiently demonstrates that controls beyond a PMP would result in unreasonable economic effects because controls to remove mercury using wastewater treatment technology are not feasible or cost-effective.

- Outfall 001 discharges directly to Lake Michigan through a ~1,200 ft long structure that terminates at the lake bed.

- There have not previously been effluent mercury limitations included in the WPDES permit for - Kenosha (WI-0036820, Outfall 001).

- At the Kenosha Wastewater Treatment Facility, Kenosha has reduced and will continue to reduce, to the maximum extent possible, its discharge of the BCC for which the mixing zones is requested. According to both the federal and state requirements, the granted mixing zones shall be no larger than necessary to account for the technical constraints and economic effects identified pursuant to this exception. Considering the background concentration is approximately 0.33 ng/L, the most restrictive criterion is 1.3 ng/L as a monthly average, and the 30-day P_{99} of the discharge is 1.39 ng/L, **the mixing zone required for boundary conditions to meet the criteria is 0.09 parts receiving water to 1-part effluent from outfall 001 at Kenosha.** Ideally, the permittee will continue to make reductions of mercury into the system where possible, and the effluent concentration will normalize below the 1.3 ng/L monthly average wildlife criteria, and no mixing zone is needed. (At present, using the full 10:1 mixing ratio that is used for the other metals that are not BCCs, the boundary condition is 0.426 ng/L, which is 0.0974 ng/L higher than the ambient Lake Michigan concentration of 0.33 ng/L before any mixing).

- As noted in s. NR 106.06(2),3.c, Wis. Adm. Code, the permit shall contain a numeric effluent limit. Similar to what is done for facilities which have applied for and granted a variance to the water quality standard, the proposed limit is set equal to the 1-day P_{99} of representative effluent

data from the existing permit term. Therefore, **the recommended limit is 3.0 ng/L, expressed as a daily maximum.** Based upon effluent data from the existing permit term, the facility is expected to be able to meet the limit without pollutant specific treatment. Continued implementation of the mercury pollutant minimization plan should be sufficient to ensure the effluent concentrations are below this limit, and trend downwards towards the water quality criteria with time.

- By definition, the water quality criteria are met at the edge of the mixing zone.

- There is currently no applicable TMDL for mercury in Lake Michigan and available data indicate the concentration of mercury in Lake Michigan meets all applicable water quality criteria.

- Other actions in Wisconsin to reduce releases of mercury include rules to control emissions from utility boilers and proposed mercury product legislation.

- This mixing zone and resulting WQBELs meet the requirements at s. NR 106.06 (2), Wis. Adm. Code, and 40 CFR, Part 132, Appendix F, Procedure 3 D., including that the actions will not jeopardize the continued existence of endangered or threatened species. The requirements for authorizing the exception and the circumstances under which it is being granted are essentially the same as those for granting a variance to water quality standards. WDNR has analyzed the potential impacts to endangered and threatened species as part of its variance process. The analysis concluded that approval of mercury variances, with more stringent permit requirements for PMPs, is unlikely to adversely affect any listed species that occur within the State of Wisconsin.

Therefore, WDNR grants a mixing zone extension for effluent discharges from the Kenosha Wastewater Treatment Facility due to technical and economic considerations.

The granting of this exception to the discharge from Kenosha Wastewater Treatment Facility shall apply only to the 5-year permit term of the proposed WPDES permit. The permittee will need to make a similar request and DNR will need to make a similar determination for a further continuation of a mixing zone, if those actions become appropriate for the next permit term.

Attachment # 3

Temperature limits for receiving waters with unidirectional flow
(calculation using default ambient temperature data)

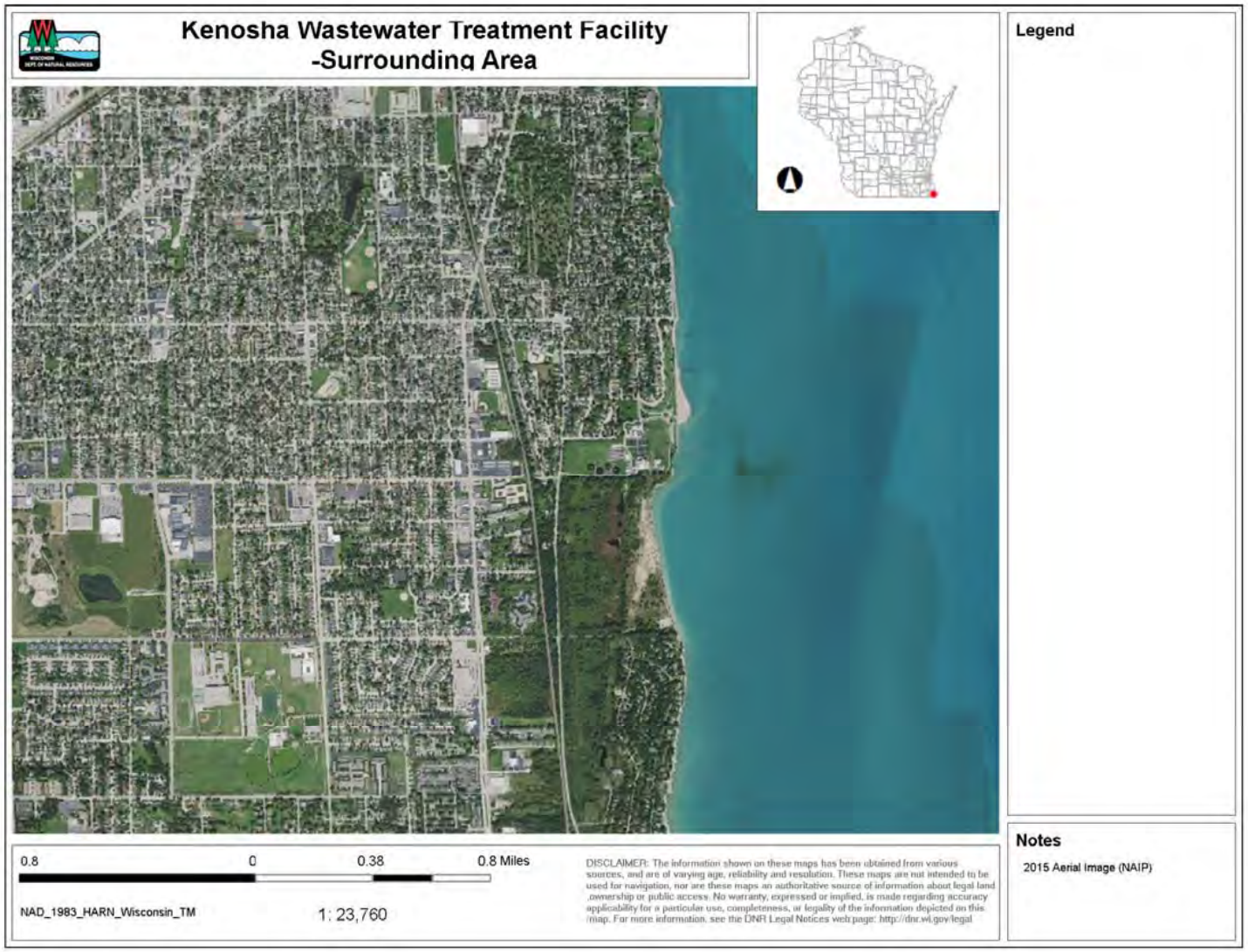
Facility:	Kenosha	**Data Range**	**Lake Type:**	Lake Michigan waters - South	
Prepared by:	Nick Lent	**Start:** 11/01/13	**Discharge Type:**	Great Lakes off-shore discharge	
Date Prepared:	07/09/2018	**End:** 05/31/18	**Max. area of mixing zone allowed (coefficient "A"):**	3,141,593	ft^2
Design Flow (Qe):	28.6 mgd				

Month	Water Quality Criteria			Effluent Flow Rate (Qe)		B	e^{-a} (for SL-WQBEL)	e^{-a} (for A-WQBEL)	Representative Highest Monthly Effluent Temperature		**Calculated Effluent Limit**	
	Ta (default)	Sub-Lethal WQC	Acute WQC	Highest 7-day Rolling Average Flow Rate (Qesl)	Highest Daily Max Flow Rate (Qea)				Weekly Average	Daily Maximum	**Weekly Average Effluent Limitation**	**Daily Maximum Effluent Limitation**
	(°F)	(°F)	(°F)	(mgd)	(mgd)				(°F)	(°F)	(°F)	(°F)
JAN	35	43	69	31.2	36.3	0.405	0.248	0.302	55	56	67	120
FEB	34	46	69	35.6	56.2	0.405	0.295	0.462	54	55	75	110
MAR	37	52	70	48.7	72.8	0.405	0.409	0.550	53	54	74	97
APR	43	59	70	51.5	64.8	0.405	0.430	0.511	56	57	80	96
MAY	48	65	72	53.6	76.5	0.405	0.445	0.567	61	67	86	90
JUN	54	70	73	38.9	54.1	0.405	0.327	0.448	65	72	103	96
JUL	59	71	74	67.9	94.1	0.405	0.527	0.630	68	70	82	83
AUG	63	70	76	24.2	28.9	0.555	0.117	0.166	71	73	NA	120
SEP	60	64	74	30.3	55.5	0.555	0.180	0.392	71	72	82	96
OCT	53	57	73	28.9	42.3	0.405	0.222	0.358	68	69	71	109
NOV	45	49	71	40.5	59.3	0.405	0.342	0.481	64	66	57	99
DEC	38	44	70	34.4	48.1	0.405	0.283	0.405	59	61	59	117

Although maximum weekly average effluent temperatures may exceed the calculated weekly average effluent temperature limitations during the month of November, no limits are recommended for because the facility has demonstrated dissipative cooling near the point of discharge at outfall 001 as described in s. NR 106.59(4), Wis. Adm. Code. Daily maximum effluent temperature monitoring is recommended for the fourth year of the permit to have updated data for the next reissuance.

Temperature Limit Calculation Table

Attachment # 4



Site Map – Kenosha Surrounding Area