Permit Fact Sheet

General Information

Permit Number	WI-0020176-10-0
Permittee Name and Address	City of Kewaunee 401 Fifth St, Kewaunee, WI 54216
Permitted Facility Name and Address	Kewaunee Wastewater Treatment Facility 77 Dodge St, Kewaunee, Wisconsin
Permit Term	July 01, 2026 to June 30, 2031
Discharge Location	South bank of the Kewaunee River approximately 200 feet North-West of the Headworks building
Receiving Water	Kewaunee River in Kewaunee River Watershed of Twin - Door - Kewaunee River Basin in Kewaunee County
Stream Flow ($Q_{7,10}$)	7.7 cfs
Stream Classification	Warm Water Sport Fish (WWSF) community, non-public water supply and recreational use
Discharge Type	Existing, Continuous
Annual Average Design Flow (MGD)	0.357 MGD
Industrial or Commercial Contributors	N/A
Plant Classification	A1 - Suspended Growth Processes; B - Solids Separation; C - Biological Solids/Sludges; P - Total Phosphorus; D - Disinfection; L - Laboratory; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The City of Kewaunee owns and operates the Kewaunee Wastewater Treatment Facility (Kewaunee). Kewaunee treats raw wastewater conveyed from the sanitary sewer collection system in the city sewer service area and landfill leachate and domestic septage from holding tanks serviced in the area and surrounding townships accepted at the septage receiving station. The raw wastewater from the sanitary sewer collection system is conveyed by gravity to the wastewater treatment facility. The combined influent wastewater from the sanitary sewer collection system and the septage receiving station are conveyed through an influent channel where the wastewater passes through a mechanical fine screen. Screenings are conveyed to an internal washer and press to wash organic material and squeeze out water. The screenings are placed into a trash bag and hauled to a landfill. The influent then passes through a channel where influent samples are collected from an automatic sampler at Sampling Point 701 then a grit basin with grit classifier to separate out any grit. At the grit classifier, the grit is carried on an inclined screw conveyor to separate the grit and water. The grit is placed into a trash bag and then hauled to a landfill. After grit removal, the raw wastewater flows through a Parshall flume where flow is measured by an ultrasonic flow meter at Sampling Point 701. After the Parshall flume, the wastewater flows to a raw wastewater wet well

with three pumps. The raw wastewater is then pumped into a splitter box where the flow can be split between the selector tanks or aeration basins. The main flow is to the selector basins which includes an anerobic/anoxic tank then flows to aerobic tank. From the selector basins, the flow is split between two aeration basins operating in parallel. The mixed liquor from the aeration basins is sent to a distribution box where a poly-aluminum chloride product (PAC) is added for phosphorus removal prior to being conveyed to the final clarifiers. The PAC is delivered to the distribution box via one of two chemical feed pumps. The flow is conveyed to two circular final clarifiers. The clarifier weirs and effluent launders are covered. The settled sludge is either returned to the splitter box ahead of the selector tanks or wasted to the aerated sludge storage tank. The facility has three return activated sludge pumps. The clarified wastewater then passes through a channel where effluent samples are collected from an automatic sampler at Sampling Point 001 and then passes through an ultraviolet (UV) disinfection system. Following UV disinfection, effluent grab samples are collected from the channel prior to flowing through a Parshall flume where the effluent flow rate is measured by an ultrasonic flow meter at Sampling Point 001. The final effluent is then conveyed by gravity through a pipe to the outfall structure with final discharge to the Kewaunee River via Outfall 001. The solids treatment includes an aerated sludge storage tank and reed beds. All generated waste activated sludge (WAS) from the final clarifiers are sent to aerated sludge storage tank. In emergencies, the WAS can be sent directly to the reed beds. The aerobically digested sludge is then pumped to a set of six reed beds for storage. The dried cake sludge is occasionally removed from the reed beds for landfill disposal and tracked under Outfall 003. Under Outfall 005, the facility does have the ability to land apply or haul the reed bed feed sludge from the aerated sludge storage tank in case storage in the reed beds is not available.

Substantial Compliance Determination

After a desktop review of all discharge monitoring reports, compliance maintenance annual reports, land application reports, compliance schedule items, and an onsite inspection performed on March 10, 2026, the facility has been found to be in substantial compliance with their current permit

Compliance determination made by Trevor Moen on March 13, 2026.

Sample Point Descriptions

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
701	0.28 MGD average (2025)	INFLUENT: 24-hr flow proportional composite samples collected from the influent channel after the mechanical bar screen and prior to grit removal system. An ultrasonic, continuous flow meter in located with the Parshall flume, after screening and grit removal but prior to the raw wastewater wet well.
001	0.28 MGD average (2025)	EFFLUENT: 24-hour flow proportional samples shall be collected from the sampler located in the UV Disinfection building, upstream of UV disinfection. Grab samples shall be collected downstream of UV disinfection. Flow is measured downstream of UV disinfection with a Parshall flume and transducer.
003	150 tons (every 3-4 years)	LAND APPLICATION: Aerobically digested cake sludge, Class B. Representative samples shall be collected from various depths and locations within the reed beds and combined to make a composite sample.
005	N/A – No recent land application	LAND APPLICATION: Aerobically digested, liquid, Class B sludge. Representative grab composite samples shall be collected from the aerobic digestor after mixing. This outfall has been

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
		included for emergency use in case storage in the reed bed system is not available. The permittee shall notify the Department prior to use.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 701- INFLUENT

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

1.1.1 Changes from Previous Permit:

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

Flow – Sample frequency changed from "continuous" to "daily" for eDMR reporting purposes.

1.1.2 Explanation of Limits and Monitoring Requirements

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

2 Surface Water - Monitoring and Limitations

2.1 Sample Point Number: 001- EFFLUENT

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

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
BOD5, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	342 lbs/day	3/Week	Calculated	
Suspended Solids, Total	Monthly Avg	224 lbs/day	3/Week	Calculated	
Suspended Solids, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of TSS and report on the last day of the month on the DMR. See TMDL Calculations section below.
Suspended Solids, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of TSS discharged and report on the last day of the month on the DMR. See TMDL Calculations section below.
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
Nitrogen, Ammonia (NH3-N) Total	Daily Max	17 mg/L	3/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	14 mg/L	3/Week	24-Hr Flow Prop Comp	Effective April and May.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	17 mg/L	3/Week	24-Hr Flow Prop Comp	Effective June - March.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	6.3 mg/L	3/Week	24-Hr Flow Prop Comp	Effective April and May.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	11 mg/L	3/Week	24-Hr Flow Prop Comp	Effective June - September.
Nitrogen, Ammonia	Monthly Avg	14 mg/L	3/Week	24-Hr Flow	Effective October - March.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
(NH3-N) Total				Prop Comp	
Fecal Coliform	Geometric Mean - Monthly	400 #/100 ml	2/Week	Grab	Effective October - April, each year.
E. coli	Geometric Mean - Monthly	126 #/100 ml	2/Week	Grab	Effective May - September, each year.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Effective May - September, each year. See the E. coli Percent Limit permit section. Enter the result in the DMR on the last day of the month.
PFOS		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
PFOA		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monthly monitoring in 2028.
Arsenic Dissolved		ug/L	Monthly	24-Hr Flow Prop Comp	Monitoring effective upon permit reissuance. Limits effective per the Arsenic Schedule. See the Potential Removal of Effluent Limitation(s) and Total Recoverable Arsenic Monitoring permit section.
Phosphorus, Total	Monthly Avg	0.225 mg/L	3/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	6-Month Avg	0.075 mg/L	3/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	5.1 lbs/day	3/Week	Calculated	
Phosphorus, Total	6-Month Avg	0.22 lbs/day	3/Week	Calculated	
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of phosphorus and report on

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					the last day of the month on the DMR. See TMDL Calculations section of the permit.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of phosphorus discharged and report on the last day of the month on the DMR. See TMDL Calculations section of the permit.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section in the permit.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section in the permit.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. See Nitrogen Series Monitoring section in the permit. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.

2.1.1 Changes from Previous Permit

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

- **Flow –** Sample frequency changed from "continuous" to "daily" for eDMR reporting purposes.
- **Total Suspended Solids TMDL Limits-** Mass based TSS limits of 342 lbs/day as a weekly average and 224 lbs/day as a monthly average have been added to the permit to comply with requirements of the Northeast Lakeshore TMDL. Effluent concentration (mg/L) shall be monitored and reported 3 times per week upon permit reissuance and will be used to calculate amounts reported for mass-based limits. An additional reporting requirement for lbs/month will be used to calculate the facility's 12-month rolling sum of total monthly discharge, which can be compared directly to the facility's designated WLA.
- **pH –** Sample frequency was changed from "5/week" to "daily" to meet sample frequency guidance standards.

- **E. coli-** Escherichia coli (E. coli) limits have been added for the months of May – September. Sample frequency was changed from "weekly" to "2/week" to meet sample frequency guidance standards.
- **PFOS and PFOA –** Monitoring once every two months is included in the permit in accordance with s. NR 106.98(2)(c), Wis. Adm. Code.
- **Chloride –** Monthly monitoring in 2028 has been added.
- **Arsenic –** Monthly monitoring is included throughout the permit term. Limits effective in accordance with the compliance schedule. The permittee shall collect samples in accordance with the permit. The permittee shall submit a request to re-evaluate the need for arsenic effluent limits. If the Department determines there is no reasonable potential to exceed the calculated arsenic limits, permit modification would be required to remove the arsenic effluent limits and remaining schedule actions.
- **Phosphorus TMDL Limits-** A mass based phosphorus limit of 5.1 lbs/day as a monthly average has been added to the permit to comply with requirements of the Northeast Lakeshore TMDL. Effluent concentration (mg/L) shall be monitored and reported 3 times per week upon permit reissuance and will be used to calculate amounts reported for mass-based limits. An additional reporting requirement for lbs/month will be used to calculate the facility's 12-month rolling sum of total monthly discharge, which can be compared directly to the facility's designated WLA.

2.1.2 Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo dated March 23, 2026.

Monitoring Frequencies- The Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. The sample frequency for pH was increased from "5/week" to "daily" to meet sample frequency guidance recommendations.

Expression of Limits- In accordance with the federal regulation 40 CFR 122.45(d) and s. NR 205.065, Wis. Adm. Code, limits in this permit are to be expressed as weekly and monthly averages whenever practicable.

Northeast Lakeshore Total Maximum Daily Load (TMDL) - The permitted facility is located within the Northeast Lakeshore Total Maximum Daily Load (NEL TMDL), which was approved by EPA October 30, 2023. The TMDL establishes Waste Load Allocations (WLAs) for point source dischargers and determines the maximum amounts of phosphorus and total suspended solids that can be discharged and still protect water quality. The final effluent limits and monitoring expressed in the permit were derived from and comply with the applicable water quality criterion and are consistent with the assumptions and requirements of the EPA-approved WLAs in the TMDL, which are 1,273 lbs/yr for phosphorus and 49,332 lbs/yr for TSS for the permitted facility.

The approved TMDL expresses WLAs as lbs/year and lbs/day (maximum annual load divided by 365 days). As outlined in Section 4.6 of the department's 2023 *TMDL Implementation Guidance for Wastewater Permits*, TMDL limits must be given in the permit that are consistent with the TMDL WLA permit limits derived from the TMDL and need to be expressed as specified by 40 CFR 122.45 (d), s. NR 212.76 (4), and s. NR 205.065 (7),Wis. Adm. Code, unless determined to be impracticable. Impracticability has already been determined for phosphorus limits as laid out in the phosphorus impracticability agreement that was approved by USEPA in 2012 (see NPDES MOA Addendum dated July 12, 2012 at https://apps.dnr.wi.gov/swims/Documents/DownloadDocument?id=167886175.

For phosphorus, continuously discharging facilities covered by the NEL TMDL are given monthly average mass limits. If the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits (averaging period of

May through October and November through April) are also included. The equivalent effluent concentration of 1.17 mg/L was calculated for the facility, thus, TMDL based mass limits are expressed as a monthly average.

For TSS, continuously discharging municipal facilities covered by the NEL TMDL are given monthly average and weekly average mass limits.

Facilities with NEL TMDL based effluent limits for phosphorus and TSS must report the 12-month rolling sum of total monthly discharge (lbs/yr). If reported 12-month rolling sums exceed the facility's max annual WLA, the facility's mass limits (monthly average and six-month average) may be recalculated using more appropriate CVs or monitoring frequencies when the permit is reissued to bring discharge levels into compliance with the facility's given WLA.

PFOS and PFOA – NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for municipal dischargers with an average flow rate less than 1 MGD, to be evaluated on a case-by-case basis to determine if monitoring is required pursuant to s. NR 106.98(2)(c), Wis. Adm. Code. The department evaluated the need for PFOS and PFOA monitoring taking into consideration the presence of potential PFOS or PFOA industrial wastes, remediation sites and other potential sources of PFOS or PFOA. Based on information available at the time the proposed permit was drafted, it was identified that previous PFOS/PFOA sample results were within 1/5 of the PFOS or PFOA standards under s. NR 102.04(8)(d)1, Wis. Adm. Code.

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

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

Arsenic –Data from the three most recent permit applications plus an additional sample collected in March 2026 showed the samples were either reported as exceeding the limit for arsenic or non-detect as LODs that are above the limit based on public water supply criteria. Because the detected samples are above the monthly average limit of 0.2 µg/L, this limit is required. A compliance schedule is included in the reissued permit to allow Kewaunee time to evaluate compliance options such as a variance or treatment and to collect more representative data. If Kewaunee decides to apply for a variance, they should do so prior to the next permit term with a submittal of a PMP plan and a letter requesting the variance. The PMP plan and variance request should be completed at the same time as the permit reissuance application (6 months prior to permit expiration) or sooner. If the variance is approved, an interim limit will be required based on what the facility can meet. Sections NR 106.07(3) and NR 205.067(7), Wis. Adm. Code require WPDES permits contain weekly average and monthly average limitations for municipal dischargers whenever practicable and necessary to protect water quality. Therefore, a weekly average limit of 0.2 µg/L is required to meet expression of limits requirements in addition to the monthly average limit.

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

3 Land Application - Monitoring and Limitations

Municipal Sludge Description

Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
003	B	Cake	Reed beds	Does not land apply	Landfill	150 tons every 3-4 years
005	B	Liquid	Reed beds	Does not land apply	Landfill	N/A

Does sludge management demonstrate compliance? **Yes.**

Is additional sludge storage required? **No.**

Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? **No.**

Is a priority pollutant scan required? **No.**

Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.

3.1 Sample Point Number: 003- REED BED CAKE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Once	Composite	Monitoring required in 2027. Limits apply to land application of sludge.
Nitrogen, Total Kjeldahl		Percent	Per Application	Composite	When land application occurs.
Nitrogen, Ammonium (NH_4-N) Total		Percent	Per Application	Composite	
Phosphorus, Total		Percent	Per Application	Composite	
Phosphorus, Water Extractable		% of Tot P	Per Application	Composite	
Potassium, Total Recoverable		Percent	Per Application	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Once	Composite	Monitoring required in 2027. Limits apply to land application of sludge.
Arsenic Dry Wt	High Quality	41 mg/kg	Once	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Once	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Once	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Copper Dry Wt	Ceiling	4,300 mg/kg	Once	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Once	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Once	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Once	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Once	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Once	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Once	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Once	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Once	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Once	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Once	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Once	Composite	
PFOA + PFOS		ug/kg	Once	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Once	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

3.1.1 Changes from Previous Permit:

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

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

PCB – Monitoring removed. PCB testing is recommended at a frequency of every 10 years and will be included in the next permit term.

3.1.2 Explanation of Limits and Monitoring Requirements

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

PFAS- The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA has developed a draft risk assessment to determine future land application rates and released this risk assessment in January of 2025. The department is evaluating this new information. Until a decision is made, the "Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS" should be followed

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

Reed Bed Requirements - This facility has chosen to utilize a reed bed system for biosolids treatment, dewatering and storage. The beds are planted with the *non-native* species *Phragmites australis australis.* Prior to recycling and/or disposal of any sludge the permittee shall contact the Department and perform all required monitoring.

The reed bed systems shall be operated and maintained to function properly working to reduce the potential of dissemination of Phragmites outside of the system.

3.2 Sample Point Number: 005- LIQUID SLUDGE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Per Application	Composite	Sampling required prior to land application.
Arsenic Dry Wt	Ceiling	75 mg/kg	Per Application	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Per Application	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Per Application	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Per Application	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Per Application	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Per Application	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Per Application	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Per Application	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Per Application	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Per Application	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Per	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
			Application		
Nickel Dry Wt	Ceiling	420 mg/kg	Per Application	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Per Application	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Per Application	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Per Application	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Per Application	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Per Application	Composite	
Nitrogen, Total Kjeldahl		Percent	Per Application	Composite	
Nitrogen, Ammonium (NH4-N) Total		Percent	Per Application	Composite	
Phosphorus, Total		Percent	Per Application	Composite	
Phosphorus, Water Extractable		% of Tot P	Per Application	Composite	
Potassium, Total Recoverable		Percent	Per Application	Composite	
PFOA + PFOS		ug/kg	Once	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Once	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

3.2.1 Changes from Previous Permit:

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

Sample Frequency – Sample frequency was changed from “annual” to “per application”.

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

PCB – Monitoring removed. PCB testing is recommended at a frequency of every 10 years and will be included in the next permit term.

3.2.2 Explanation of Limits and Monitoring Requirements

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

PFAS- The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA has developed a draft risk assessment to determine future land application rates and released this risk assessment in January of 2025. The department is evaluating this new information. Until a decision is made, the “Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS” should be followed

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

4 Schedules

4.1 Arsenic Effluent Limitations

This compliance schedule requires the permittee to achieve compliance by the specified date

Required Action	Due Date
Report on Effluent Discharges: Submit a report on effluent discharges of arsenic. The report shall include an evaluation of collected effluent data and the facility's ability to comply with the final arsenic effluent limits. The report shall conclude whether current treatment, operational improvements, or a pollutant minimization program will result in compliance with the final arsenic effluent limits. This report shall include all additional arsenic data that may be collected including any influent, collection system sampling, drinking water well sampling, hauled waste sampling, and blank sample results.	06/30/2027
Action Plan: Submit an action plan for complying with the effluent limitation. If the plan concludes upgrading of the permittee's wastewater treatment is necessary to meet the final arsenic WQBEL's, the submittal shall include a facility plant with the submittal per s. NR 110.09, Wis. Adm. Code.	06/30/2028
Initiate Actions: Initiate actions identified in the plan.	01/01/2029
Progress Report: Submit a progress report detailing progress made toward meeting the final arsenic effluent limits, including all available arsenic sample results, a summary of actions taken and any arsenic pollutant minimization activities conducted during the previous year.	06/30/2029
Final Evaluation Report: Submit a final evaluation report including all zinc sampling data and a conclusion on the likelihood that arsenic effluent limits will still apply. The permittee shall submit a request to re-evaluate the need for arsenic effluent limits. If the Department determines there is no reasonable potential to exceed the calculated arsenic limits, permit modification would be required to remove the arsenic effluent limits and remaining schedule	06/30/2030

actions. If the Department determines final arsenic WQBELs are still needed based on a reasonable potential evaluation, the permittee will be required to comply with the milestones identified below for years 2 through 4. However, the permittee may request a variance to arsenic water quality standards (WQS) per s. 283.15, Wis. Stats. If the permittee requests a variance to the arsenic WQS and if approved, the Department will modify or revoke and reissue the permit to include arsenic variance requirements along with a schedule of compliance to meet any interim effluent limits. Effluent monitoring of arsenic shall continue as specified in the permit until the modified permit is issued.	
Complete Actions: Complete actions necessary to achieve compliance with the effluent limitations for arsenic. The limitations become effective July 01, 2031.	06/30/2031

4.1.1 Explanation of Schedule

The schedule provides time for the permittee to determine appropriate compliance options and take additional arsenic samples.

4.2 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
Report on Effluent Discharge: Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.	06/30/2027
Report on Effluent Discharge and Evaluation of Need: Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results. The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan. If the Department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for Department approval no later than 90 days after written notification was sent from the Department. The Department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued. If, however, the Department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.	06/30/2028

4.2.1 Explanation of Schedule

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

4.3 Sludge Management Plan

A sludge management plan is required.

Required Action	Due Date
Sludge Management Plan Submittal: Submit a sludge management plan to optimize the land application system performance and demonstrate compliance with ch. NR 204, Wis. Adm. Code, by the Due Date. This management plan shall 1) specify information on pretreatment processes (if any); 2) identify land application sites; 3) describe site limitations; 4) address vegetative cover management and removal; 5) specify availability of storage; 6) describe the type of transporting and spreading vehicle(s); 7) specify monitoring procedures; 8) track site loading; 9) address contingency plans for adverse weather and odor/nuisance abatement; 10) standard reed bed desludging procedures and 11) include any other pertinent information. Once approved, all sludge management activities shall be conducted in accordance with the plan. Any changes to the plan must be approved by the Department prior to implementing the changes.	06/30/2027

4.3.1 Explanation of Schedule

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

4.4 Reed Bed Phragmites Survey

Required Action	Due Date
Submit an Annual Phragmites Survey: The permittee shall conduct an annual survey of adjacent lands for new Phragmites growth. The survey shall follow the conditions for contents and assessment area found in the "Requirements for Reed Bed Systems" section of the permit.	10/31/2026
Annual Reed Bed Phragmites Survey #2: Permittee shall submit Annual Reed Bed Phragmites Survey #2 to the Department.	10/31/2027
Annual Reed Bed Phragmites Survey #3: Permittee shall submit Annual Reed Bed Phragmites Survey #2 to the Department.	10/31/2028
Annual Reed Bed Phragmites Survey #4: Permittee shall submit Annual Reed Bed Phragmites Survey #2 to the Department.	10/31/2029
Annual Reed Bed Phragmites Survey #5: Permittee shall submit Annual Reed Bed Phragmites Survey #2 to the Department.	10/31/2030
Annual Reed Bed Phragmites Surveys After Permit Expiration: In the event that this permit is not reissued on time, the permittee shall continue to conduct annual surveys and submit the report no later than October 31.	

4.4.1 Explanation of Schedule

The reed beds were planted with the non-native reed grass which can be highly invasive in natural wetland habitats if the seeds or rhizomes escape to the natural environment. A Compliance Schedule has been included requiring an annual survey of the wastewater treatment facility and surrounding area. See the Reed Bed Requirements found in section 3 of the permit for more information.

Attachments

Water Quality Based Effluent Limitations for Kewaunee Wastewater Treatment Facility WPDES Permit No. WI-0020176-10, Nicole Krueger, dated March 23, 2026

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance

Prepared By: Ashley Clark, Wastewater Specialist

Date: April 30, 2026

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 03/23/2026

TO: Ashley Clark – NER

FROM: Nicole Krueger – SER Nicole Krueger

SUBJECT: Water Quality-Based Effluent Limitations for Kewaunee Wastewater Treatment Facility WPDES Permit No. WI-0020176-10

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable) for the discharge from Kewaunee Wastewater Treatment Facility in Kewaunee County. This municipal wastewater treatment facility (WWTF) discharges to the Kewaunee River, located in the Kewaunee River Watershed in the Twin-Door-Kewaunee Basin. This discharge is included in the Northeast (NE) Lakeshore Total Maximum Daily Load (TMDL) as approved by EPA on 10/30/2023.

The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD_5			45 mg/L	30 mg/L		1
TSS TMDL			45 mg/L 342 lbs/day	30 mg/L 224 lbs/day		3
pH	9.0 s.u.	6.0 s.u.				1
Ammonia Nitrogen April & May June – September October – March	 17 mg/L 17 mg/L 17 mg/L		 14 mg/L **17 mg/L** **17 mg/L**	 6.3 mg/L 11 mg/L 14 mg/L		1,4
Bacteria						5
Fecal Coliform October – April				400 #/100 mL geometric mean		
E. coli May – September				126 #/100 mL geometric mean		
PFOS & PFOA						6
Chloride						7
Arsenic			**0.2 µg/L**	0.2 µg/L		4,8
Phosphorus s. 217.13 WQBEL TMDL				 0.225 mg/L 5.1 lbs/day	 0.075 mg/L 0.22 lbs/day	3
TKN, Nitrite+Nitrate, and Total Nitrogen						9

Footnotes:

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

3. Additional phosphorus and TSS mass limits are based on the Total Maximum Daily Load (TMDL) for the NE Lakeshore Basin to address phosphorus water quality impairments within the TMDL area. The TMDL was approved by EPA in October 2023.
4. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
5. Bacteria limits apply year-round. Additional limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
6. PFOS and PFOA monitoring is recommended at a frequency of once every two months in accordance with s. NR 106.98(2), Wis. Adm. Code.
7. Monitoring at a frequency to ensure that 11 samples are available at the next permit issuance.
8. These are the WQBELs for arsenic. A compliance schedule is recommended to meet these limits and Kewaunee may apply for a variance before the limits become effective.
9. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Sections 283.37(5) and 283.55(1)(e), Wis. Stats, and ss. NR 200.065(1)(g) and NR 200.065(1)(h), Wis. Adm. Codes, provide the authority to request this monitoring during the permit term. Total Nitrogen is the sum of nitrite (NO_2), nitrate (NO_3), and total Kjeldahl nitrogen (TKN) (all expressed as N).

No WET testing is required because information related to the discharge indicates low to no risk for toxicity.

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

Attachments (4) – Narrative, Outfall Map, 2019 Ammonia Calculations, & Thermal Table

PREPARED BY: Nicole Krueger, Water Resources Engineer – SER

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

Attachment #1

Water Quality-Based Effluent Limitations for
Kewaunee Wastewater Treatment Facility

WPDES Permit No. WI-0020176-11

Prepared by: Nicole Krueger

PART 1 – BACKGROUND INFORMATION

Facility Description

Kewaunee Wastewater Treatment System operates an activated sludge treatment facility. Influent goes through a mechanical bar screen prior to a grit basin. Influent flow is monitored after the grit basin prior to flowing to the raw wastewater wet well. After entering a splitter box, process wastewater enters an anaerobic selector section of a modified aeration basin. One half of the basin is devoted as a selector mode and one half of the basin acts as aerated sludge storage. Wastewater then flows to two aerated basins operating in parallel . The wastewater from the aeration basins is then sent to a distribution box where a poly-aluminum chloride product (PAC) is added for phosphorus removal prior to being conveyed to two parallel secondary clarifiers. Return activated sludge is combined with wastewater prior to the splitter box ahead of the selector tanks. Waste Activated Sludge (WAS) can be stored in the aerated sludge storage or pumped to the reed beds present on site. Wastewater from the secondary clarifiers is disinfected using ultraviolet (UV) radiation and the effluent flow is then monitored prior to discharge to the Kewaunee River. WAS is dried via reed beds using non-native phragmites prior to being sent to a landfill.

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

Existing Permit Limitations

The current permit, which expired 12/31/2024, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD_5			45 mg/L	30 mg/L		2,3
TSS			45 mg/L	30 mg/L		2,3
pH	9.0 s.u.	6.0 s.u.				2
Ammonia Nitrogen April & May June – September October – March	 17 mg/L 17 mg/L 17 mg/L		 14 mg/L **17 mg/L** **17 mg/L**	 6.3 mg/L 11 mg/L 14 mg/L		4
Fecal Coliform Year round			**780#/100 mL** **geometric mean**	400#/100 mL geometric mean		4
E. coli						1
Phosphorus Interim Final				 1.0 mg/L 0.225 mg/L	 0.075 mg/L 0.22 lbs/day	5

Attachment #1

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
TKN, Nitrite+Nitrate, and Total Nitrogen						1

Footnotes:

1. Monitoring only.
2. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
3. These limits are based on the Warm Water Sport Fish (WWSF) community of the immediate receiving water as described in s. NR 210.05(1), Wis. Adm. Code.
4. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
5. The final phosphorus limits became effective on December 31, 2021.

Receiving Water Information

- Name: Kewaunee River
- Waterbody Identification Code (WBIC): 90700
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply and recreational use. Cold Water and Public Water Supply criteria are used for bioaccumulating compounds of concern, because the discharge is within the Great Lakes basin. Kewaunee's discharge is within 5 miles of a drinking water intake in Lake Michigan for Green Bay Utility, so the need for limits to be protective of this intake is evaluated.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q_{10} and 7-Q_2 values are from USGS for Station TK17 at Hwy F, 2.3 miles west of Kewaunee, where Outfall 001 is located.

  7-Q_{10} = 7.7 cubic feet per second (cfs)
  7-Q_2 = 11 cfs
  90-Q_{10} = 9.35 cfs [estimated as 85% of 7-Q_2]
  Harmonic Mean Flow = 31.4 cfs using a drainage area of 127 mi^2

  The Harmonic Mean has been estimated based on average flow and the 7-Q_{10} using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).
- Hardness = 329 mg/L as $CaCO_3$. This value represents the geometric mean of data from 10/17/1988 – 04/01/1998 from the Kewaunee River at CTH F at Bruemmer (Station ID 313038).
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Chloride data from the Kewaunee River upstream of the discharge (Station ID 313038) and arsenic data from the Kewaunee River collected at the Ahnapee State Trail (as part of the arsenic contaminated Kewaunee Marsh project) are used for this evaluation. Other metals data from the Fox River above the De Pere Dam is used in this evaluation because there is no data available for the Kewaunee River. The Fox River is within the same ecological landscape so ambient water quality characteristics are expected to be similar. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for

ammonia nitrogen are described later.

- Multiple dischargers: None.
- Impaired water status: The Kewaunee River and marsh are 303(d) listed as impaired for PCBs, total phosphorus, and arsenic.

Effluent Information

- Design flow rate(s):
  Annual average = 0.357 million gallons per day (MGD)
  For reference, the actual average flow from 01/01/2020 – 12/31/2025 was 0.33 MGD.
- Hardness = 413 mg/L as $CaCO_3$. This value represents the geometric mean of four samples collected in August 2023 which were reported on the permit application from 09/23/2023 – 10/04/2023.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Wastewater source: Domestic wastewater with no industrial contributors.
- Water supply: Municipality waterworks from groundwater.
- Additives: Kewaunee has included one additive in the permit application that have the potential to be present in Outfall 001. These additives are listed below:
  - Chemtrade Hyper+Ion 4107 – Coagulant/flocculant
  - An additive review is not necessary for any additives where either the toxicity is well documented and understood, can be controlled by a WQBEL, or are not believed to be present in the discharge. This is the case upon the review of the listed additives. Therefore, an additive review is not needed at this time.
- Effluent characterization: This facility is categorized as a minor municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus ammonia, chloride, hardness and phosphorus.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2, in the column titled "MEAN EFFL. CONC.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

Copper Effluent Data

Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)
09/25/2023	11	10/07/2023	12	10/19/2023	12
09/28/2023	13	10/10/2023	11	10/22/2023	11
10/01/2023	11	10/13/2023	13	10/25/2023	9.2
10/04/2023	12	10/16/2023	11		
1-day P_{99} = 14 µg/L					
4-day P_{99} = 13 µg/L					

Chloride Effluent Data

Sample Date	Chloride (mg/L)	Sample Date	Chloride (mg/L)	Sample Date	Chloride (mg/L)
11/01/2011	276	07/01/2019	180	09/25/2023	462
11/06/2011	320	07/04/2019	180	09/28/2023	424
11/09/2011	218	07/07/2019	180	10/01/2023	431
11/13/2011	243	07/22/2019	170	10/04/2023	455
1-day P_{99} = 672 mg/L					

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Sample Date	Chloride (mg/L)	Sample Date	Chloride (mg/L)	Sample Date	Chloride (mg/L)
4-day P_{99} = 459 mg/L					

The following table presents the average concentrations and loadings at Outfall 001 from 01/01/2020 – 12/31/2025 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameters with Effluent Limits

	Average Measurement	Average Mass Discharged
BOD_5	3.7 mg/L*	
TSS	2.0 mg/L*	
pH field	7.0 s.u.	
Ammonia Nitrogen	1.18 mg/L*	
Fecal Coliform	2.1 #/100 mL**	
Phosphorus	0.072 mg/L*	0.22 lbs/day

*Results below the limit of detection (LOD) were included as zeroes in calculation of average.
** The average measurement for bacteria is calculated as a geometric mean. Values reported below the LOD are replaced with a value of 1 for the calculation of the geometric mean.

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

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

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

Acute Limits based on 1-Q_{10}

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

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

Where:

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

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

Qe = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.
f = Fraction of the effluent flow that is withdrawn from the receiving water, and
Cs = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e), Wis. Adm. Code.

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

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)
RECEIVING WATER FLOW = 6.16 cfs, (1-Q_{10} (estimated as 80% of 7-Q_{10})), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Arsenic		340	3.56	680	136	3.8		
Cadmium	413	52.4	0.02	105	21.0	<0.3		
Chromium	301	4446	0.79	8892	1778	<1.3		
Copper	413	59.2	1.51	118			14	13
Lead	356	365	0.94	729	146	<3.5		
Nickel	268	1080		2161	432	6.3		
Zinc	333	345	5.75	689	138	15		
Chloride (mg/L)		757	36.6	1514			672	472

* The indicated hardness may differ from the effluent hardness because the effluent hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the acute criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.
* * The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q_{10} flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)
RECEIVING WATER FLOW = 1.925 cfs (¼ of the 7-Q_{10}), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Arsenic		152	3.56	670	134	3.8	
Cadmium	175	3.82	0.02	17.1	3.41	<0.3	
Chromium	301	326	0.79	1458	292	<1.3	
Copper	329	28.7	1.51	123			13
Lead	329	88.5	0.94	394	78.7	<3.5	
Nickel	268	120		539	108	6.3	
Zinc	329	341	5.75	1510	302	15	

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SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Chloride (mg/L)		395	36.6	1644			459

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

Monthly Average Limits based on Wildlife Criteria (WC)
The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

Monthly Average Limits based on Human Threshold Criteria (HTC)
RECEIVING WATER FLOW = 7.85 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	0.02	5627	1125	<0.3
Chromium (+3)	3818000	0.79	58070440	11614088	<1.3
Lead	140	0.94	2116	423	<3.5
Nickel	43000		654015	130803	6.3

Monthly Average Limits based on Human Cancer Criteria (HCC)
RECEIVING WATER FLOW = 7.85 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	0.2	9.47	0.2	0.04	**3.8**

In addition to evaluating the need for limits for each individual substance for which HCC exist, s. NR 106.06(8), Wis. Adm. Code, requires the evaluation of the cumulative cancer risk. Because only one effluent limit is needed based on HCC, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

Conclusions and Recommendations
Based on a comparison of the effluent data and calculated effluent limitations, arsenic limitations are required. Monitoring recommendations are made in the paragraphs below:

Chloride – Considering available effluent data from the three most recent permit applications (11/01/2011 – 10/04/2023), the 1-day P_{99} chloride concentration is 672 mg/L, and the 4-day P_{99} of effluent data is 459 mg/L.

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

Arsenic – Considering available effluent data from the three most recent permit applications plus an additional sample that was collected March 2026.

Effluent Arsenic Data

Sample Date	Arsenic (µg/L)
11/01/2011	<1.8
07/01/2019	<1.0
09/25/2023	15
03/04/2026	0.31
Average	3.8

The arsenic samples were either reported as exceeding the limit or non detect at LODs that are above the limit based on public water supply criteria. **Because the detected samples are above the monthly average limit of 0.2 µg/L, this limit is required.**

A compliance schedule is recommended to be included in the reissued permit to allow Kewaunee time to evaluate compliance options such as a variance or treatment and to collect more representative data. If Kewaunee applies for and is approved for a variance, an interim limit will be required based on what the facility can meet.

Sections NR 106.07(3) and NR 205.067(7), Wis. Adm. Code require WPDES permits contain weekly average and monthly average limitations for municipal dischargers whenever practicable and necessary to protect water quality. **Therefore, a weekly average limit of 0.2 µg/L is required to meet expression of limits requirements in addition to the monthly average limit.** The weekly average limit is calculated, shown below:

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.

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

s. NR 106.07(3)(e)4, Table 1, Wis. Adm. Code — 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.

Weekly Average Limitation = 0.2 µg/L x 1.00 = 0.2 µg/L

Mercury – The permit application did not require monitoring for mercury because Kewaunee is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code. In accordance with s. NR 106.145(3)(a)3, Wis. Adm. Code, a minor municipal discharger shall monitor, and report results of influent and effluent mercury monitoring once every three months if, "there are two or more exceedances in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5), Wis. Adm. Code." A review of the past five years of sludge characteristics data reveals that all the sample results are within expected analytical ranges and well below the 17 mg/kg level. One available

concentration in the sludge from 07/25/2023 was 0.31 mg/kg. Therefore, **no mercury monitoring is recommended at Outfall 001.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Available monitoring sample data from the Kewaunee Wastewater Treatment Facility (PWS ID 43102818) is provided in the table below:

Water Supply PFAS Data

Sample Date	Sample ID	Well #	PFOS (ng/L)	PFOA (ng/L)
06/05/2023	CB05915-01	BG098	ND	8.7
06/05/2023	CB05915-03	EK450	ND	ND
06/06/2023	CB06043-01	BG099	ND	1.3
07/31/2023	CB08786-01	BG098	ND	8.1
03/04/2024	CC02417-01	BG098	ND	8.6
04/15/2025	CD04270-01	BG098	ND	9.9
		Average =	ND	6.1

The limited data above shows the municipal water supply is above 1/5th of the applicable PFOA criteria.

Based on the known levels of PFOS/PFOA in the source water, **PFOS and PFOA monitoring is recommended at a once every two-month frequency.**

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

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

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

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

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

Where:

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

The effluent pH data was examined as part of this evaluation. A total of 1566 sample results were reported from 01/01/2020 – 12/31/2025. The maximum reported value was 7.6 s.u. (Standard pH Units). The effluent pH was 7.4 s.u. or less 99% of the time. The 1-day P_{99}, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.2 s.u. The mean plus the standard deviation multiplied by a factor of

2.326, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 7.2 s.u. Therefore, a value of 7.4 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 7.4 s.u. into the equation above yields an ATC = 23 mg/L.

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

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

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	46
1-Q_{10}	279

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

This limit is greater than the current daily maximum limit of 17 mg/L. An increase to the existing permit limits may be made after an assessment of their effluent data consistent with the requirements of ss. NR 207.04(1)(a) and (c), Wis. Adm. Code. This evaluation is on a parameter by parameter basis and includes consideration of operations, maintenance and temporary upsets. Without a demonstration of need for a higher limit in accordance with s. NR 207.04, Wis. Adm. Code, the current limits must be continued in the reissued permit. The Department would be unable to increase the limit due to the lack of need as shown via the antidegradation rule (ch. NR 207, Wis. Adm. Code) because the highest reported concentration was 16 mg/L during the previous permit term. No changes are recommended in any of the permit limits for ammonia.

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)
The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do not change because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous WQBEL memo are shown in attachment #2.

Effluent Data
The following table evaluates the statistics based upon ammonia data reported from 01/01/2020 – 12/31/2025.

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	April - May	June - September	October - March
1-day P_{99}	13.8	1.01	16.4
4-day P_{99}	7.42	0.52	8.73
30-day P_{99}	3.20	0.21	3.91

Attachment #1

Ammonia Nitrogen mg/L	April - May	June - September	October - March
Mean*	1.38	0.06	1.86
Std	3.96	0.44	4.39
Sample size	156	315	468
Range	<0.078 - 15	<0.078 - 2.7	<0.078 - 16

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

Reasonable Potential

The need to include ammonia limits in Kewaunee's permit is determined by calculating 99th upper percentile (or P_{99}) values for ammonia year-round and comparing those to the calculated limits. Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits. However, since the permit currently has weekly and monthly average limits year-round, **the limits must be retained regardless of reasonable potential**, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:

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

Conclusions and Recommendations

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

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
April & May	17	14	6.3
June – September	17	**17**	11
October – March	17	**17**	14

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

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

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

E. coli monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Because Kewaunee's permit requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any

additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit.

The current permit requires Kewaunee to disinfect year-round for protection of the public water supply, because the drinking water intake for Green Bay is located within 5 miles from the outfall. Because the *E. coli* limits listed in NR 210.06(2)(a)1, Wis. Adm. Code, are set for protection of recreational uses and not drinking water supply, these *E. coli* limits do not necessarily need to be applied year-round. However, either *E. coli* or fecal coliform bacteria limits are needed year-round in order to ensure that there is no reduction from the current level of disinfection needed to protect the public drinking water source.

In accordance with s. NR 210.06(2)(a)2, Wis. Adm. Code, outside of the recreational season, bacteria limits may either be set equal to the previous fecal coliform limits or the listed *E. coli* limits. The facility has selected *E. coli* limits as listed above during the recreation period of May through September and a fecal coliform limit of 400 counts/100 mL as a monthly geometric mean in November through April. Any fecal coliform weekly geometric mean limit which was included in the previous permit for expression of limits purposes does not need to be included in the reissued permit.

Effluent Data
Kewaunee has monitored effluent *E. coli* from 05/05/2020 – 09/30/2025 and a total of 131 results are available. A geometric mean of 126 counts/100 mL was not exceeded, with a maximum monthly geometric mean of 19 counts/100 mL. Effluent data did not exceed 410 counts/100 mL. The maximum reported value was 42 counts/100 mL. **Based on this effluent data it appears that the facility can meet new *E. coli* limits, and a compliance schedule is not needed in the reissued permit.**

PART 5 – PHOSPHORUS

Kewaunee is currently complying with phosphorus WQBELs of 0.075 mg/L and 0.22 lbs/day as six-month averages and 0.225 mg/L as a monthly average through treatment.

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

Since Kewaunee has phosphorus limits in effect that are more stringent than 1.0 mg/L, the need for a TBEL will not be considered further.

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

For the reasons explained in the April 30, 2012 paper entitled *Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin*, WDNR has determined that the phosphorus WQBELs set equal to WLAs would not be

consistent with the assumptions and requirements of the TMDL. Therefore, limits given to facilities included in the Northeast Lakeshore Basin TMDL are given monthly average mass limits and, if the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits are also included. The following equation shows the calculation of equivalent effluent concentration:

TP Equivalent Effluent Concentration = WLA ÷ (365 days/yr * Flow Rate * Conversion Factor)
= 1,273 lbs/yr ÷ (365 days/yr * 0.357 MGD * 8.34)
= 1.17 mg/L

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

TP Monthly Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (1,273 lbs/yr ÷ 365 days/yr) * 1.47
= 5.1 lbs/day

The multiplier used in the monthly average calculation was determined according to the implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 0.5. This is the standard deviation divided by the mean of mass data. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as 3x/weekly; if a different monitoring frequency is used, the stated limits should be reevaluated.

Monthly average mass effluent limits are recommended for this discharge. The limit is equivalent to a concentration of 1.72 mg/L at the facility design flow of 0.357 MGD.

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

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

Effluent Data
The following table summarizes effluent total phosphorus monitoring data from 01/03/2022 – 12/30/2025. The final phosphorus WQBELs become effective 01/01/2022 so data before this date is not included in the evaluation.

Total Phosphorus Effluent Data

	Concentration mg/L	Mass lbs/day
1-day P_{99}	0.147	0.380
4-day P_{99}	0.099	0.245
30-day P_{99}	0.072	0.176
Mean*	0.059	0.143

Attachment #1

	Concentration mg/L	Mass lbs/day
Std	0.027	0.070
Sample size	626	624
Range	<0.019 - 0.196	0 - 0.62

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

Kewaunee can currently meet the TMDL-based monthly average limit, and no compliance schedule is needed in the reissued permit.

Conclusion
Kewaunee is currently operating the treatment facility to remove phosphorus and meet the s. NR 217.13, Wis. Adm. Code, WQBELs. Therefore, **the currently effective WQBELs are required to continue in the reissued permit per ss. NR 217.15 and 205.067(5), Wis. Adm. Codes along with the addition of TMDL-based monthly average limit of 5.1 lbs/day.** If Kewaunee would like to increase their current limits, an antidegradation request under s. NR 207, Wis. Adm. Code must be made which includes an assessment of the effluent data that demonstrates need for a higher limit. Based on the effluent data from the current permit term, Kewaunee can meet the current limits and need for higher limits is not shown.

PART 6 – TOTAL SUSPENDED SOLIDS

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

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

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

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

TSS Monthly Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (49,332 lbs/yr ÷ 365 days/yr) * 1.47
= 224 bs/day

TSS Weekly Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (49,332 lbs/yr ÷ 365 days/yr) * 2.07
= 342 lbs/day

The multipliers used in the weekly average and monthly average calculations were determined according to implementation guidance. A coefficient of variation was calculated, based on TSS mass monitoring

data, to be 0.8. This is the standard deviation divided by the mean of mass data. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies TSS monitoring as 3/week; if a different monitoring frequency is used, the stated limits should be reevaluated.

Weekly average and monthly average mass effluent limits are recommended for this discharge. The limits are equivalent to concentrations of 75 mg/L and 115 mg/L, respectively, at the facility design flow of 0.357 MGD.

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

Effluent Data

The following table summarizes effluent total suspended solids monitoring data from 01/03/2022 – 12/29/2025.

Total Suspended Solids Effluent Data

	Concentration mg/L	Mass lbs/day
1-day P_{99}	4.92	15.9
4-day P_{99}	3.97	10.6
30-day P_{99}	2.41	6.05
Mean*	1.68	4.01
Std	0.82	3.22
Sample size	627	627
Range	<2 – 9.2	0 – 45

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

Kewaunee can currently meet the TSS mass limits, **and a compliance schedule is not needed.**

PART 7 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

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

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from 01/01/2020 – 12/31/2025.

The table below summarizes the maximum temperatures reported during monitoring from 10/25/2011 –

12/31/2012.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	48	49	109	120
FEB	47	47	112	120
MAR	-	-	83	120
APR	53	54	70	120
MAY	65	65	74	104
JUN	70	71	94	111
JUL	75	75	104	112
AUG	73	74	114	112
SEP	72	73	106	120
OCT	64	66	84	119
NOV	57	60	72	120
DEC	53	54	100	120

Reasonable Potential

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

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

There is no data available for the month of March. However, temperatures from the surrounding months of February and April are expected to be similar. Based on the available effluent data, **no effluent limits or monitoring are recommended for temperature.** The complete thermal table used for the limit calculation is in Attachment #4.

Attachment #1

PART 8 – WHOLE EFFLUENT TOXICITY (WET)

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

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC_{50} (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC_{25} (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 21%, shown in the WET Checklist summary below, was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

Q_e = annual average flow = 0.357 MGD = 0.552 cfs
f = fraction of the Q_e withdrawn from the receiving water = 0
Q_s = ¼ of the 7-Q_{10} = 7.7 cfs ÷ 4 = 1.9 cfs

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.
- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.
- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations. Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005. Data that was collected before July 1, 2005 is excluded in this evaluation.

Attachment #1

WET Data History

Date Test Initiated	Acute Results LC_{50} %			
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?
09/20/2006	>100	>100	Pass	Yes
10/12/2011	>100	>100	Pass	Yes
02/15/2012	>100	>100	Pass	Yes

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

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

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

  Acute Reasonable Potential = $0 < 1.0$, reasonable potential is not shown, and a limit is not required.

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

WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 21%. **0 Points**
Historical Data	3 tests used to calculate RP – over 5 years old No tests failed. **5 Points**	None. **5 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations.	Same as Acute.

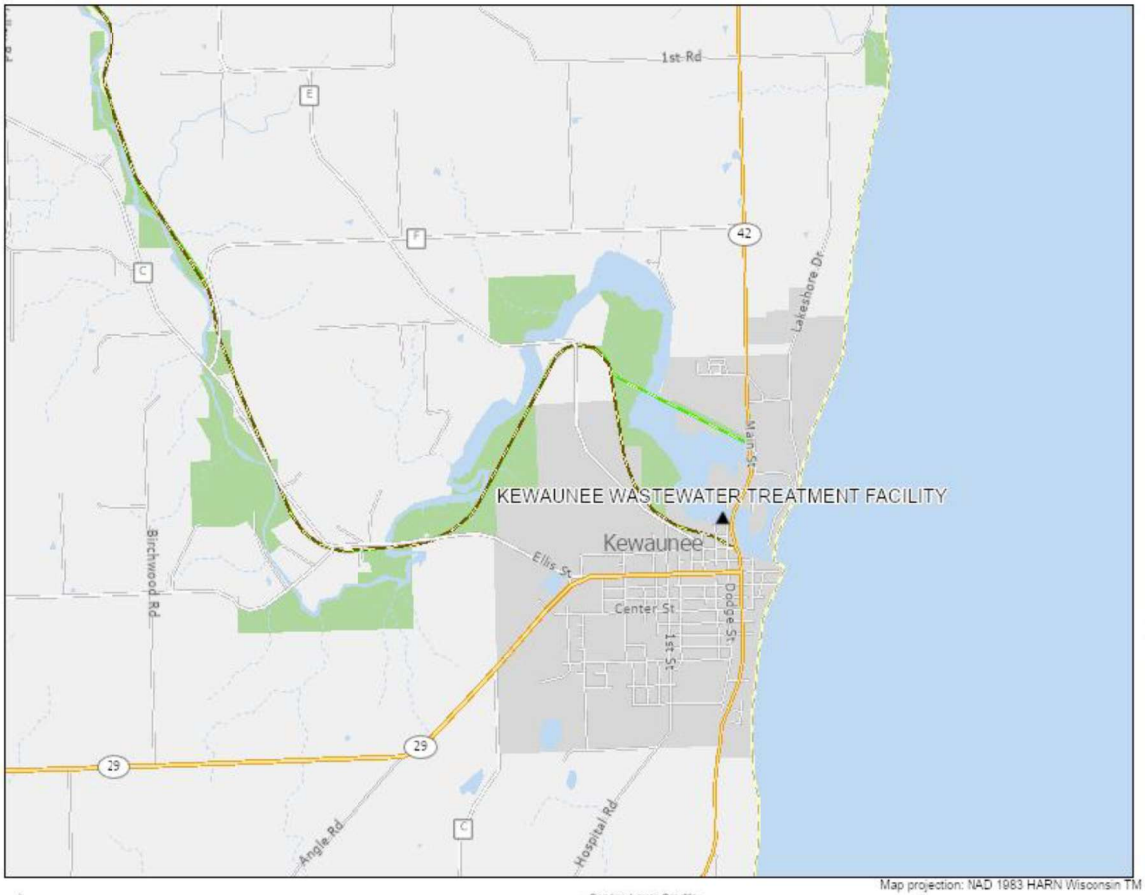
Attachment #1

	Acute	Chronic
	0 Points	**0 Points**
Receiving Water Classification	WWSF. **5 Points**	Same as Acute. **5 Points**
Chemical-Specific Data	No reasonable potential for limits based on ATC; Ammonia nitrogen limit carried over from the current permit. Arsenic, copper, nickel, zinc, chloride, and ammonia detected. Additional Compounds of Concern: None. **3 Points**	No reasonable potential for limits based on CTC; Ammonia nitrogen limit carried over from the current permit. Arsenic, copper, nickel, zinc, chloride, and ammonia detected. Additional Compounds of Concern: None. **3 Points**
Additives	One Water Quality Conditioners added. Permittee has proper P chemical SOPs in place. **1 Point**	All additives used more than once per 4 days. **1 Point**
Discharge Category	No Industrial Contributors. **0 Points**	Same as Acute. **0 Points**
Wastewater Treatment	Secondary or Better. **0 Points**	Same as Acute. **0 Points**
Downstream Impacts	No impacts known. **0 Points**	Same as Acute. **0 Points**
Total Checklist Points:	**14 Points**	**14 Points**
Recommended Monitoring Frequency (from Checklist):	None	None
Limit Required?	No	No
TRE Recommended? (from Checklist)	No	No

- No WET testing is required because information related to the discharge indicates the potential for effluent toxicity is believed to be low.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Kewaunee Discharge Location



Legend: (some map layers may not be displayed)

▲ Surface Water Outfalls

Notes:

Not to scale

Map projection: NAD 1983 HARN Wisconsin TM

N

Map: 0 3,000 6,000 Feet
0 1,000 2,000 Meters

Service Layer Credits:
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Attachment #3

2019 Ammonia Limits Calculations

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. The current permit has daily maximum, weekly average and monthly average limits for Outfall 001 (calculated in 2005). These limits are re-evaluated at this time due to the following changes:

- Updates to subchapter IV of ch. NR 106, Wis. Adm. Code allow limits based on available dilution instead of limits set to twice the acute criteria.
- Updates to s. NR 106.07(3), Wis. Adm. Code require weekly and monthly average limits for municipal treatment plants.
- Seasonal 20 and 40 mg/L thresholds for ammonia limits are no longer applicable under current rules.
- Kewaunee Wastewater Treatment Facility does not currently have weekly average limits for the months of June through March.

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 = 0.411 and B = 58.4 for a Warm Water Sport fishery, and
A = 0.275 and B = 39.0 for a Cold Water Category 1 fishery, and
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 1194 sample results were reported from 01/01/2015 to 07/31/2019. The maximum reported value was 8.2 s.u. (Standard pH Units). The effluent pH was 7.75 s.u. or less 99% of the time. The 1-day P_{99}, calculated in accordance with s. NR 106.05(5), is 7.75 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 7.74 s.u. Therefore, a value of 7.7 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 7.7 s.u. into the equation above yields an ATC = 14.44 mg/L and a computed daily maximum limit of 29 mg/L using two times the ATC.

This limit is greater than the current daily maximum limit of 17 mg/L. If Kewaunee Wastewater Treatment Facility would like to request an increase to the existing permit limits an assessment of their effluent data consistent with the requirements of ss. NR 207.04(1)(a) and (c) must be provided. This evaluation is on a parameter by parameter basis and includes consideration of operations, maintenance and temporary upsets. Without a demonstration of need for a higher limit in accordance with s. NR 207.04 Wis. Adm. Code, the current limits should be continued in the reissued permit. Since the highest reported effluent concentration was 9.9 mg/L during the previous permit term, the Department would be unable to increase the limit due to the lack of need as shown via the antidegradation rule (ch. NR 207). No changes are recommended in any of the permit limits for ammonia.

Potential changes to daily maximum Ammonia Nitrogen effluent limitations:

Updates to subchapter IV of ch. NR 106, Wis. Adm. Code (effective September 1, 2016) outline the option for the Department to implement use of the 1-Q_{10} receiving water low flow to calculate daily maximum ammonia nitrogen limits if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits would apply.

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

	Ammonia Nitrogen Limit mg/L
2×ATC	29
1-Q_{10}	175

The 2×ATC method yields the most stringent limits for Kewaunee Wastewater Treatment Facility.

The permittee may elect to comply with daily ammonia limits through variable daily maximum limits with vary depending on effluent pH. The limits are presented below for reference. Since Kewaunee Wastewater Treatment Facility has not shown any non-compliance with the singular daily maximum ammonia limit of 17 mg/L, it is recommended to be continued due to its ease of use for monitoring data submission.

Daily Maximum Ammonia Nitrogen Limits – WWSF

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

Weekly Average & Monthly Average Limits based on Chronic Toxicity Criteria (CTC)

Weekly and monthly average limits based on chronic toxicity criteria for ammonia are also calculated to determine the weekly and monthly average limits to meet the requirements of s. NR 106.07(3).

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as a Warm Water Sport Fish Community is calculated by the following equation.

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

Where:

pH = the pH (s.u.) of the receiving water,

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

The 4-day criterion is simply equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q_{10} (4-Q_3, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q_5 (estimated as 85% of the 7-Q_2 if the 30-Q_5 is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 ºC, 25% of the flow is used if the Temperature < 11 ºC, and 50% of the flow is used if the Temperature ≥ 11 ºC but < 16 ºC.

The 4-day criterion is simply equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used to derive weekly average limitations, and the 30-day criteria are used to derive monthly average limitations, both by a mass-balance using a ten-to-one dilution ratio.

The rules provide a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 ºC, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the Kewaunee River, based on conversations with local fisheries biologists. So "ELS Absent" criteria apply from October through March, and "ELS Present" criteria will apply from April through September for a WWSF without Burbot classification.

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

WWSF – Kewaunee River		**Spring**	**Summer**	**Winter**
		April & May	**June – Sept.**	**Oct. – March**
Effluent Flow	Qe (MGD)	0.357	0.357	0.357
Background Information	7-Q_{10} (cfs)	7.7	7.7	7.7
	7-Q_2 (cfs)	11	11	11
	Ammonia (mg/L)	0.04	0.05	0.105
	Average Temperature (°C)	12	19	4
	Maximum Temperature (°C)	14	21	10
	pH (s.u.)	8.05	8.05	7.98
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	3.85	7.70	1.93
	Reference Monthly Flow (cfs)	4.68	9.35	2.34
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	**5.65**	**3.83**	
	Early Life Stages Absent			**8.38**
	30-day Chronic			

WWSF – Kewaunee River		Spring April & May	Summer June – Sept.	Winter Oct. – March
	Early Life Stages Present	**2.26**	**1.53**	
	Early Life Stages Absent			**3.35**
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	**45**	**57**	
	Early Life Stages Absent			**37**
	Monthly Average			
	Early Life Stages Present	**21**	**27**	
	Early Life Stages Absent			**17**

Downstream Impacts-
Due to the proximity to Lake Michigan, ammonia limits should be protective of both the Kewaunee River and Lake Michigan which is classified as a Cold-Water Public Water Supply. Ammonia limits derived for Lake Michigan dischargers would be calculated as described below:

Limit = 11×Criteria (mg/L) – 10× Ambient Ammonia (mg/L)

The actual end of pipe ammonia concentration may be less stringent as it mixes with a portion of the Kewaunee River stream flow before the confluence with Lake Michigan. This streamflow is presented in the previous table in which ammonia limits for the Kewaunee River are calculated. The estimated effluent limits are calculated as described below:

End of Pipe Limit =

[11×Criteria (mg/L) – 10× Ambient Ammonia (mg/L)] × [Qe + Qs] ÷ Qe

Cold Water Lake Discharge – Lake Michigan		Spring April & May	Summer June – Sept.	Winter Oct. – March
Effluent Flow	Qe (MGD)	0.357	0.357	0.357
Effluent Flow + Stream Flow	Qe +Qs (cfs) (Weekly Flow)	4.4	8.2	2.5
	Qe + Qs (cfs) (Monthly Flow)	5.2	9.9	2.9
Background Information	Dilution Ratio:	10:1	10:1	10:1
	Ammonia (mg/L)	0.04	0.05	0.105
	Temperature (°C)	11	16	4
	pH (s.u.)	8.05	8.05	7.98
Criteria mg/L	4-day Chronic	5.65	4.58	6.26
	30-day Chronic	2.26	1.83	2.5
Effluent Limits mg/L	Weekly Average	**492**	**746**	**304**
	Monthly Average	**231**	**352**	**138**

The estimated effluent limits are substantially higher than limits calculated to be protective of the Kewaunee River. Therefore, accounting for the minimal ambient ammonia concentrations (<0.105 mg/L) is not needed and would not significantly impact the estimated effluent limits nor the conclusion that ammonia effluent limits to be protective of Lake Michigan are less stringent than limits established to be protective of the Kewaunee River.

Effluent Data
The following table evaluates the statistics based upon ammonia data reported from 01/01/2015 to 07/30/2019, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Kewaunee Wastewater Treatment Facility permit for the respective month ranges. That need is determined by calculating 99th upper percentile (or P_{99}) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit. Based on this comparison, no reasonable potential is shown to exceed the calculated limits.

Ammonia Nitrogen mg/L	April – May	June – September	October – March
1-day P_{99}	6.5	1.9	6.1
4-day P_{99}	3.5	1.3	3.6
30-day P_{99}	1.70	0.57	1.54
Mean*	0.97	0.16	0.70
Std	1.38	0.61	1.45
Sample size	134	233	351
Range	0.0198 - 4.8	0.019 - 8.4	0.024 - 9.9

Where there are existing ammonia nitrogen limits in the permit, the limits are recommended to be retained regardless of reasonable potential, consistent with s. NR 106.33(1), Wis. Adm. Code:
(b) If a permittee is subject to an ammonia limitation in an existing permit, the limitation shall be included in any reissued permit. Ammonia limitations shall be included in the permit if the permitted facility will be providing treatment for ammonia discharges.

Antidegradation:
The calculated monthly and weekly average limits are less restrictive than the weekly and monthly average limits currently in the permit. Without a demonstration of need for a higher limit in accordance with s. NR 207.04 Wis. Adm. Code, the current limits should be continued in the reissued permit.

Conclusions and Recommendations:
All current limits are required to be retained during the reissued permit term. Additional limits to comply with expression of limits requirements are detailed in Part 7 of this document. No mass limitations are recommended in accordance with s. NR 106.32(5).

Attachment #4

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

						Temp Dates	Flow Dates
Facility:	Kewaunee WWTF		**7-Q_{10}:**	7.70	cfs		
Outfall(s):	001		**Dilution:**	25%	**Start:**	10/25/11	01/01/20
Date Prepared:	2/18/2026		**f:**	0	**End:**	12/31/12	12/31/25
Design Flow (Qe):	0.36	MGD	**Stream type:**	Small warm water sport or forage fish com			
Storm Sewer Dist.	0	ft	**Qs:Qe ratio:**	3.5	:1		
			Calculation Needed?	YES			

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs)	Representative Highest Effluent Flow Rate (Qe)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qea)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(cfs)	(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	7.70	0.333	0.384	0	48	49	109	120
FEB	34	50	76	7.70	0.320	0.377	0	47	47	112	120
MAR	38	52	77	7.70	0.571	0.920	0	-	-	83	120
APR	48	55	79	7.70	0.588	0.791	0	53	54	70	120
MAY	58	65	82	7.70	0.922	1.388	0	65	65	74	104
JUN	66	76	84	7.70	0.701	0.821	0	70	71	94	111
JUL	69	81	85	7.70	0.639	0.741	0	75	75	104	112
AUG	67	81	84	7.70	0.521	0.754	0	73	74	114	112
SEP	60	73	82	7.70	0.483	0.514	0	72	73	106	120
OCT	50	61	80	7.70	0.588	0.959	0	64	66	84	119
NOV	40	49	77	7.70	0.492	0.679	0	57	60	72	120
DEC	35	49	76	7.70	0.338	0.402	0	53	54	100	120