

Permit Fact Sheet

General Information

Permit Number	WI-0024686-09-0
Permittee Name and Address	Fox West Regional Sewerage Commission 1965 W Butte Des Morts Road, Neenah, WI 54956
Permitted Facility Name and Address	Fox West Regional Sewerage Commission 1965 W. Butte des Morts Beach Road, Neenah, Wisconsin
Permit Term	January 01, 2026 to December 31, 2030
Discharge Location	West Shore of Little Lake Butte des Morts NW 1/4 of the NW 1/4 of Sec. 10, T20N-R17E, Village of Fox Crossing, Winnebago County
Receiving Water	Little Lake Butte des Morts in Little Lake Butte des Morts of Fox River (lower) in Winnebago County
Stream Flow (Q _{7,10})	930 cfs
Stream Classification	Warm Water Sport Fish (WWSF), Public Water Supply
Discharge Type	Existing, Continuous
Annual Average Design Flow (MGD)	8.2 MGD
Industrial or Commercial Contributors	4 categorical industries and 2 other significant (non-categorical) industrial users
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?	Yes

Facility Description

Domestic, commercial, and industrial wastewaters are received at the plant from the Village of Fox Crossing, the Town of Grand Chute, the Village of Greenville, and the Town of Clayton. Along with wastewater, hauled in waste (holding tanks, septic waste) is also received for treatment at this facility. The wastewater passes through fine screens, grit removal, and primary clarification prior to entering one of three trains of IFAS (Integrated Fixed Film Activated Sludge) aeration basins. Ferric chloride is added for phosphorus removal. After secondary clarification in one of five final clarifiers, effluent passes through Ultraviolet (UV) lights for disinfection and is discharged into Little Lake Butte des Morts.

Solids (primary sludge, waste activated sludge) are treated using ATAD (autothermo thermophilic aerobic digestion) digesters. Solids are stored in a sludge storage tank prior to being fed into one of two ThermAir digesters. Following the ThermAir digesters, sludge is moved through the SNDR (storage nitrification denitrification reactor) tanks prior to being

sent to a sludge storage tank. Following the storage tank, sludge is dewatered with one of two belt filter presses and is then stored in the sludge storage barn prior to land application on Department approved fields.

Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, CMARs, land app reports, compliance schedule items, and a site visit on November 14, 2023, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Mark Stanek on November 14, 2023.

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	6.05 MGD (August 2022-August 2025)	INFLUENT: Representative influent samples shall be collected from the composite sampling device drawing samples from the combined influent channel after the fine screens and before all sidestreams.
111	N/A	IN-PLANT: Sample point for reporting analysis results of field blanks collected using standard sample handling procedures for grab type effluent samples for Total Recoverable Mercury at sample point 001.
001	6.49 MGD (August 2022-August 2025)	EFFLUENT: Representative samples shall be collected from the composite sampling device following the UV channels in the UV building. Flow meter is located in the manhole following the UV building prior to outfall 001.
601	N/A	RIVER MONITORING: Lower Fox River data collected at the Appleton Lutz Park-USGS/ACOE Gauge Station as reported by the Lower Fox River Discharger's Association shall be used in the determination of the daily BOD5 wasteload allocation.
003	2,760 cu yards (2024)	LAND APPLICATION: (Cake Sludge) Representative samples of the cake sludge shall be collected from the sludge storage building. Compliance with Class A fecal coliform or salmonella requirements shall be demonstrated immediately after the treatment process and again prior to land application if that is more than three weeks later. See also Standard Requirements section for "Class A Fecal Coliform". Cake sludge is produced through the following process. Liquid sludge is treated through Auto Thermal Aerobic Digestion (ATAD) then held in a Post-ATAD cooling tank. The liquid sludge post digestion is dewatered on belt presses with the aid of a polymer. The resulting cake sludge (sample point/outfall 003) is then stored on-site until disposal by land application.
006	N/A	LAND APPLICATION: (In-Plant) Sample from tap located in the digester building following the SNDR tanks but prior to digested sludge storage tank, post digestion.

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	5/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	5/Week	24-Hr Flow Prop Comp	
Phosphorus, Total		mg/L	5/Week	24-Hr Flow Prop Comp	
Cadmium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Chromium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Copper, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Lead, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Nickel, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Zinc, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Mercury, Total Recoverable		ng/L	Quarterly	24-Hr Flow Prop Comp	

1.1.1 Changes from Previous Permit:

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

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 Inplant - Monitoring and Limitations

2.1 Sample Point Number: 111- Field Blank

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

2.1.1 Changes from Previous Permit:

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

2.1.2 Explanation of Limits and Monitoring Requirements

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

3 Surface Water - Monitoring and Limitations

3.1 Sample Point Number: 001- Effluent

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Monthly Avg	30 mg/L	5/Week	24-Hr Flow Prop Comp	Applies November - April, each year.
BOD5, Total	Weekly Avg	45 mg/L	5/Week	24-Hr Flow Prop Comp	Applies November - April, each year.
BOD5, Total	Monthly Avg	30 mg/L	Daily	24-Hr Flow Prop Comp	Applies May - October, each year.
BOD5, Total	Weekly Avg	45 mg/L	Daily	24-Hr Flow Prop Comp	Applies May - October, each year.
pH Field	Daily Max	9.0 su	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	
E. coli	Monthly Avg	126 #/100 ml	2/Week	Grab	
E. coli	% Exceedance	10 Percent	Monthly	Calculated	
Phosphorus, Total	Monthly Avg	0.7 mg/L	5/Week	24-Hr Flow	Existing concentration

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
				Prop Comp	limits that are already in effect will be maintained to prevent backsliding.
Phosphorus, Total	Monthly Avg	29 lbs/day	5/Week	Calculated	
Phosphorus, Total	6-Month Avg	9.6 lbs/day	5/Week	Calculated	
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of phosphorus and report on the last day of the month on the DMR. See TMDL Calculations section.
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 below.
Suspended Solids, Total	Weekly Avg	45 mg/L	5/Week	24-Hr Flow Prop Comp	Existing concentration limits that are already in effect will be maintained to prevent backsliding
Suspended Solids, Total	Monthly Avg	30 mg/L	5/Week	24-Hr Flow Prop Comp	Existing concentration limits that are already in effect will be maintained to prevent backsliding
Suspended Solids, Total	Weekly Avg	4,355 lbs/day	5/Week	Calculated	
Suspended Solids, Total	Monthly Avg	2,382 lbs/day	5/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.
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

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					TMDL Calculations section.
Nitrogen, Ammonia (NH3-N) Total	Daily Max	20 mg/L	5/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	20 mg/L	5/Week	24-Hr Flow Prop Comp	Applies October - May.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	11 mg/L	5/Week	24-Hr Flow Prop Comp	Applies June - September.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	10 mg/L	5/Week	24-Hr Flow Prop Comp	Applies January - March.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	11 mg/L	5/Week	24-Hr Flow Prop Comp	Applies April - May.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	4.4 mg/L	5/Week	24-Hr Flow Prop Comp	Applies June - September.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	18 mg/L	5/Week	24-Hr Flow Prop Comp	Applies October - December.
Mercury, Total Recoverable		ng/L	Quarterly	Grab	
Cadmium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Chromium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Copper, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Lead, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Nickel, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Zinc, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monthly monitoring in 2027.
Nitrogen, Total Kjeldahl		mg/L	Quarterly	24-Hr Flow Prop Comp	
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hr Flow Prop Comp	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nitrogen, Total		mg/L	Quarterly	Calculated	Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	
Chronic WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	
PFOS		ng/L	Monthly	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
PFOA		ng/L	Monthly	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
WLA BOD5 Value		lbs/day	Daily	See Table	Applies May - October, each year.
WLA Adjusted Value		lbs/day	Daily	Calculated	Applies May - October, each year.
WLA BOD5 Discharged	Daily Max - Variable	lbs/day	Daily	24-Hr Comp	Applies May - October, each year.
WLA 7 Day Sum Of WLA Values		lbs/day	Daily	Calculated	Applies May - October, each year.
WLA 7 Day Sum Of BOD5 Discharged	Daily Max - Variable	lbs/day	Daily	Calculated	Applies May - October, each year.

3.1.1 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.

- **BOD & CBOD:** All limits and monitoring previously reported as CBOD₅ are changed to BOD₅. This permit includes BOD WLA limits that were reported at Outfall 004. The Department has determined that it is appropriate for all BOD WLA to be reported at the main effluent outfall, in this case Outfall 001.
- **E. coli:** Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.
- **Total Nitrogen Monitoring (TKN, N02+N03 and Total N):** Quarterly monitoring is required.
- **Nitrogen, Ammonia:** Daily limits and weekly average limits have changed.

- **Mercury:** Quarterly monitoring only, variance limit has been removed.
- **Chloride:** Monthly chloride monitoring has been added.
- **Nitrogen, Total:** Quarterly monitoring has been added.
- **Nitrogen, Nitrite + Nitrate Total:** Quarterly monitoring has been added.
- **PFOS/PFOA:** Monthly monitoring has been added.
- **Waste Load Allocation:** Waste load allocation sampling parameter has changed from “CBOD” to “BOD”. WLA parameters have been added to Outfall 001 instead of previous Outfall 004.

3.1.2 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 October 14, 2025.

- **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.
- **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 average limits whenever practicable.
- **CBOD/BOD:** The previous permit included CBOD limitations instead of BOD due to an effluent limitation variance pursuant s. NR 210.07(4), Wis. Adm. Code. However, that variance is only applicable to limitations under s. NR 210.05(1) to (3), Wis. Adm. code. The variance is not applicable to water quality based waste load allocations under ch. NR 212, Wis. Adm. Code.

In addition, the Department determined that the BOD categorical limitations under s. NR 210.05(1), Wis. Adm. Code are able to be met, therefore a CBOD variance under s. NR 210.07(4), Wis. Adm. Code is no longer needed or included.

- **Lower Fox River Basin Total Maximum Daily Load (TMDL):** The permitted facility is located within the Lower Fox River Basin Total Maximum Daily Load (LFRB TMDL), which was approved by EPA in March 2012. 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 3,110 lbs/yr for phosphorus and 225,925 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 2020 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 LFRB 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 0.7 mg/L was calculated for the facility, thus, TMDL based mass limits are expressed as a six-month average and a monthly average equal to three times the six-month average limits.

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

Facilities with LFRB 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.

- **Mercury:** The permittee is coming off a mercury variance and limits are not recommended during the reissued permit term. Quarterly monitoring and PMP monitoring efforts are recommended to continue during the reissued permit term to maintain effluent quality at or below current levels.
- **Chloride:** 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.
- **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. Quarterly effluent monitoring for Total Nitrogen is included in the permit because of the potential for higher nitrogen loading resulting from higher flows (major facilities), higher concentrations, or both. 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.
- **PFOS and PFOA:** NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for major municipal dischargers, with an average flow rate greater than or equal to 5 MGD, at a minimum sample effluent on a monthly basis for PFOS and PFOA pursuant s. NR 106.98(2)(a), Wis. Adm. Code. 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.

3.2 Sample Point Number: 601- River Monitoring

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
WLA Previous Day River Flow		cfs	Daily	Measure	Applies May - October, each year.
WLA Previous 4 Day Avg River Flow		cfs	Daily	Calculated	Applies May - October, each year.
WLA Previous Day River Temp		deg F	Daily	Calculated	Applies May - October, each year.

3.2.1 Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section. Sampling requirements and frequencies are the same as the previous permit.

4 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
003	A	Cake	Fecal Coliform Testing	Volatile Solids Reduction	Land Application	1150 dry tons
Does sludge management demonstrate compliance? Yes.						
Is additional sludge storage required? No.						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No.						
If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility						
Is a priority pollutant scan required? No.						
Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

4.1 Sample Point Number: 003- Cake Sludge

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

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Mercury Dry Wt	High Quality	17 mg/kg	Quarterly	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Quarterly	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Quarterly	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Quarterly	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Quarterly	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Quarterly	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Quarterly	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Quarterly	Composite	
Nitrogen, Total Kjeldahl		Percent	Quarterly	Composite	
Nitrogen, Ammonium (NH ₄ -N) Total		Percent	Quarterly	Composite	
Phosphorus, Total		Percent	Quarterly	Composite	
Phosphorus, Water Extractable		% of Tot P	Quarterly	Composite	
Potassium, Total Recoverable		Percent	Quarterly	Composite	
PFOA + PFOS		ug/kg	Annual	Calculated	
PFAS Dry Wt			Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

4.1.1 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 annually pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.

PCB: Monitoring removed.

4.1.2 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. Limitations for PCBs are addressed in s. NR 204.07(3)(k). Radium requirements are addressed in s. NR 204.07(3)(n).

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

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

4.2 Sample Point Number: 006- In-Plant SNDR Sample Tap

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Volatile Solids Reduction		Percent	Quarterly	Calculated	
Fecal Coliform		MPN/g TS	Quarterly	Grab	

4.2.1 Changes from Previous Permit:

N/A – New sample point

4.2.2 Explanation of Limits and Monitoring Requirements

Outfall 006 has been added to the permit to demonstrate compliance with Class A biosolids requirements.

5 Schedules

5.1 Mercury Pollutant Minimization Program

Required Action	Due Date
Mercury Report: Submit a report documenting the success in reducing mercury concentrations in the effluent, as well as the anticipated future reduction in mercury sources and mercury effluent concentrations. The report shall summarize mercury pollutant minimization activities that have been implemented during the current permit term. The report shall include an analysis of trends in quarterly and annual total effluent mercury concentrations based on mercury sampling during the current permit term. The report shall also include an analysis of how influent and effluent mercury varies with time and with significant loading of mercury such as loads from industries into the collection system.	10/01/2029

5.1.1 Explanation of Schedule

The permittee is required to continue the actions in the pollutant minimization plan to maintain effluent quality at or below current levels. This schedule requires a report once prior to permit reissuance documenting the continued measures.

5.2 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.	01/01/2027
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.	01/01/2028

5.2.1 Explanation of Schedule

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

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

5.3 Sludge Management Plan

A sludge management plan is required.

Required Action	Due Date
Sludge Management Plan Submittal: Submit a sludge management plan (SMP) to optimize the sludge management performance and demonstrate compliance with Ch. NR 204, Wis. Adm. Code, by the Due Date. This management plan shall include sufficient detail of the sludge management	01/01/2027

program for the facility. The plan shall include separate sections for each type of sewage sludge included in this permit.

The SMP shall provide standardized information for communication to operators and the department including but not limited to the following:

- 1) Specify information on the sludge treatment processes for each sampling point and outfall;
- 2) Show and describe sample point and outfall monitoring locations on a schematic and provide photos of the specific sampling points;
- 3) Show, describe and tabulate the monitoring requirements at each sampling point and outfall locations;
- 4) Show, describe and explain sampling protocols for each location listing parameters to be monitored including:
 - a) Pollutants,
 - b) Nutrients,
 - c) Pathogen treatment process requirements including treatment temperature, moisture content (total solids) and pathogen densities (fecal concentrations),
 - d) Vector Reduction appropriate for the pathogen treatment process such as but not limited to temperatures, volatile solids reduction, moisture content, etc. as required by the WPDES permit and Ch. NR 204, Wis. Adm. Code;
- 5) Monitoring frequencies at each sample point and outfall;
- 6) Analytical methods with appropriate hold times and chain of custody procedures;
- 7) Documentation relating to temperature monitoring data recording, retrieval and printing out the data when requested;
- 8) Storage, verification monitoring, loading, transportation and discharge details associated with all outfalls;
- 9) Collection, storage, disposal information for sludge detailing pickups including loading and similar details;
- 10) Collection, storage and disposal processes of sludge when the sludge does not meet minimum requires to meet Class A and EQ requirements. [Note: EQ and Class A are similar, but are different. Explain.]
- 11) Identify land application sites;
- 12) Describe site limitations;
- 13) Address vegetative cover management and removal including loading to crop needs, crop harvesting;
- 14) Specific the availability of storage for sludge;
- 15) Describe the type of transportation and spreading vehicles;
- 16) Track site loadings to facility's land application sites;
- 17) Address contingency plans for adverse weather and odor/nuisance abatement;
- 18) Address construction contingencies when treatment equipment is out of service; and
- 19) 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.	
Note: The SMP is a living document and should be designed and constructed to allow for future updates. Consider providing an overview to explain the facilities solids flow processes, then using sections and appendices to provide more details. The use of appendices to explain start up, operation and shutdown of the sludge treatment units is encouraged to show that all sludge particles meet Class A requirements.	

5.3.1 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.

Attachments

Water Quality Based Effluent Limitations for Fox West Regional Sewerage Commission WPDES Permit No. 0024686-09, Nicole Krueger, dated March 20, 2022, updated October 14, 2025

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: October 6, 2025

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 03/10/2022 – updated 10/14/2025 for updated information

TO: Ashley Clark – NER

FROM: Nicole Krueger – SER *Nicole Krueger*

SUBJECT: Water Quality-Based Effluent Limitations for Fox West Regional Sewerage Commission
WPDES Permit No. WI-0024686-09

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 Fox West Regional Sewerage Commission in Winnebago County. This municipal wastewater treatment facility (WWTF) discharges to Little Lake Butte des Morts, located in the Little Lake Butte des Morts Watershed in the Lower Fox River Basin. This discharge is included in the Lower Fox River TMDL as approved by EPA. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
CBOD ₅			40 mg/L	25 mg/L		1
pH	9.0 s.u.	6.0 s.u.				1
Bacteria						3
Final Limit <i>E. coli</i>				126 #/100 mL geometric mean		
TSS			45 mg/L 4,355 lbs/day	30 mg/L 2,382 lbs/day		1,4
Phosphorus TMDL				0.7 mg/L 29 lbs/day	9.6 lbs/day	1,4
Ammonia Nitrogen						5
Jan – March	20 mg/L		20 mg/L	10 mg/L		
April – May	20 mg/L		20 mg/L	11 mg/L		
June – Sept	20 mg/L		11 mg/L	4.4 mg/L		
Oct – Dec	20 mg/L		20 mg/L	18 mg/L		
Mercury						2
Chloride						6
TKN, Nitrate + Nitrite, and Total Nitrogen						7
Acute WET						8,9
Chronic WET						8,9
PFOS and PFOA						10

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. Bacteria limits apply during the disinfection season of May through September. Additional limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.

4. The TSS and phosphorus mass limits are based on the Total Maximum Daily Load (TMDL) for the Lower Fox Wolf Basin to address phosphorus water quality impairments within the TMDL area. The TMDL was approved by EPA in March 2012.
5. 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.
6. Monitoring at a frequency to ensure that 11 samples are available at the next permit issuance.
7. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, quarterly total nitrogen monitoring is recommended for all municipal major permittees. Total Nitrogen is the sum of nitrate (NO₃), nitrite (NO₂), and total kjeldahl nitrogen (TKN) (all expressed as N).
8. Acute and chronic WET testing is recommended 1x yearly. The Instream Waste Concentration (IWC) to assess chronic test results is 5%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 30%, 10%, 3% & 1% and the dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from Little Lake Butte des Morts.
9. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).
10. PFOS and PFOA monitoring is recommended at a frequency of monthly in accordance with s. NR 106.98(2), Wis. Adm. Code.

Continued monitoring for total recoverable cadmium, chromium, copper, lead, nickel and zinc is also required because Fox West Regional operates a local pretreatment program for the many industries that discharge to the treatment facility.

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, Thermal Table, Map, & 2007 Ammonia Calculations

PREPARED BY: Nicole Krueger, Water Resources Engineer – SER

E-cc: Mark Stanek, Wastewater Engineer – NER
Heidi Schmitt Marquez, Regional Wastewater Supervisor – NER
Diane Figiel, Water Resources Engineer – WY/3
Kari Fleming, Environmental Toxicologist – WY/3

Attachment #1
**Water Quality-Based Effluent Limitations for
Fox West Regional Sewerage Commission**

WPDES Permit No. WI-0024686-09

Prepared by: Nicole Krueger

PART 1 – BACKGROUND INFORMATION

Facility Description

Domestic, commercial, and industrial wastewaters are received at the plant from the Town of Menasha, the Town of Grand Chute S.D. #2, and the Town of Greenville. There is no combined sewers in this situation. Only wastewater is received for treatment at this facility. The wastewater passes through fine screens, grit removal, and primary clarification prior to entering one of two trains of IFAS (Integrated Fixed Film Activated Sludge) aeration basins. Iron salts are added for phosphorus removal. After secondary clarification in one of five final clarifiers, the stream passes through Ultraviolet (UV) lights for disinfection and is discharged into Little Lake Butte des Morts.

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

Existing Permit Limitations

The current permit, which expired on 06/30/2022, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
CBOD ₅			40 mg/L	25 mg/L		2
pH	9.0 s.u.	6.0 s.u.				2
Fecal Coliform May – September			780#/100 mL geometric mean	400#/100 mL geometric mean		
TSS			45 mg/L 4,355 lbs/day	30 mg/L 2,382 lbs/day		
Phosphorus Interim TMDL				0.7 mg/L 29 lbs/day	9.6 lbs/day	3
Ammonia Nitrogen Jan – March April – May June – Sept Oct – Dec	29 mg/L 29 mg/L 29 mg/L 29 mg/L		28 mg/L 29 mg/L 11 mg/L 29 mg/L	10 mg/L 11 mg/L 4.4 mg/L 18 mg/L		
Mercury	4.8 ng/L					4
WET						5

Footnotes:

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

3. A compliance schedule is in the current permit to meet the final WQBEL by 04/01/2023.
4. This is a variance interim limit.
5. Acute and chronic WET testing is required 1x/yearly. The IWC is 5%.

Monitoring for total recoverable cadmium, chromium, copper, lead, nickel and zinc is also required because Fox West Regional operates a local pretreatment program for the many industries that discharge to the treatment facility.

Receiving Water Information

- Name: Fox River at Little Lake Butte des Morts
- Waterbody Identification Code (WBIC): 117900
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, public water supply. Per 104.07(1)(b) Wis Adm Code, the Fox River from Lake Winnebago downstream to the upper dam in the city of Appleton shall meet the public water supply standards. Therefore, the public water supply criteria for toxic parameters apply for this discharge. Previously, non-public water supply criteria were used in WQBEL evaluations. Note: Cold Water and Public Water Supply criteria are used for bioaccumulating compounds of concern, because the discharge is within the Great Lakes basin.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q₁₀ and 7-Q₂ values are estimated from USGS, where Outfall 001 is located.
 - 7-Q₁₀ = 930 cfs (cubic feet per second)
 - 7-Q₂ = 1550 cfs
 - 90-Q₁₀ = 1318 cfs
 - Harmonic Mean Flow = 3040 cfsThe Harmonic Mean has been estimated based on average flow and the 7-Q₁₀ 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 = 178 mg/L as CaCO₃. This value represents the geometric mean of data from WET testing data from 12/13/2018 to 09/21/2021.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from the Fox River at Little Lake Butte des Morts is used for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: There are several other dischargers to Little Lake Butte des Morts, however they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: The immediate receiving water is 303(d) listed as impaired for PCBs and total phosphorus.

Effluent Information

- Design flow rate(s):
 - Annual average = 8.2 MGD (Million Gallons per Day)
 - Peak daily = 23.2 MGD
 - Peak weekly = 14.2 MGD

Attachment #1

Peak monthly = 11.0 MGD

The peak design flows were estimated from the annual average design flow and a peaking factor based on data from 07/01/2017 to 12/31/2021.

For reference, the actual average flow from 07/01/2017 to 12/31/2021 was 6.48 MGD.

- Hardness = 341 mg/L as CaCO₃. This value represents the geometric mean of data from the permit reissuance application from 06/13/2021 to 07/04/2021.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water source: Domestic wastewater with process wastewater from 6 industrial facilities.
- Additives: Ferric chloride is added for phosphorus removal.
- Effluent characterization: This facility is categorized as a major municipal, so the permit application required effluent sample analyses for all the “priority pollutants” except for the Dioxins and Furans as specified in s. NR 200.065, Table 1, Wis. Adm. Code. The permit-required monitoring for Cd, Cr, Cu, Pb, Ni, Hg and Zn is used in this evaluation.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled “MEAN EFFL. CONC.”. Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

	Copper µg/L		Zinc µg/L
1-day P ₉₉	14.5	1-day P ₉₉	26.8
4-day P ₉₉	10.1	4-day P ₉₉	22.5
30-day P ₉₉	7.86	30-day P ₉₉	16.3
Mean	6.74	Mean*	13.4
Std	2.48	Std	4.06
Sample size	54	Sample size	54
Range	1.6 – 14	Range	<2.2 – 26
	Mercury ng/L		Cadmium µg/L
1-day P ₉₉	2.8	1-day P ₉₉	
4-day P ₉₉	1.7	4-day P ₉₉	
30-day P ₉₉	0.97	30-day P ₉₉	
Mean*	0.66	Mean*	0.02
Std	0.57	Std	0.00
Sample size	18	Sample size	54
Range	<0.18 – 2.5	Range	<0.03 – 0.3
	Chromium µg/L		Lead µg/L
1-day P ₉₉		1-day P ₉₉	6.4
4-day P ₉₉		4-day P ₉₉	3.1
30-day P ₉₉		30-day P ₉₉	1.6
Mean*	0.31	Mean*	0.66
Std	0.97	Std	1.6
Sample size	54	Sample size	54
Range	<0.2 – 3.2	Range	<0.56 – 6.2
	Nickel µg/L		Chloride mg/L
1-day P ₉₉	13.8	1-day P ₉₉	594
4-day P ₉₉	11.0	4-day P ₉₉	480

Attachment #1

30-day P ₉₉	9.44	30-day P ₉₉	416
Mean	8.63	Mean	382
Std	1.84	Std	76.2
Sample size	54	Sample size	24
Range	4.8 – 14	Range	180 – 490

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

The following table presents the average concentrations and loadings at Outfall 001 from 07/01/2017 to 12/31/2021 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter Averages with Limits

	Average Measurement	Average Mass Discharged
CBOD ₅	1.98 mg/L*	
TSS	4.08 mg/L	243 lbs/day
pH field	7.4 s.u.	
Phosphorus	0.13 mg/L*	49.4 lbs/day
Ammonia Nitrogen	3.2 mg/L*	
Mercury	0.66 ng/L	
Fecal Coliform	44.6 #/100 mL	

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

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

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

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P₉₉) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q₁₀

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. 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-Q₁₀ receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

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

Where:

Attachment #1

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

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-Q₁₀ 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 Fox West Regional 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 for all the detected substances. All concentrations are expressed in terms of micrograms per Liter (µg/L), except for hardness and chloride (mg/L) and mercury (ng/L).

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 744.0 cfs, (1-Q₁₀ (estimated as 80% of 7-Q₁₀)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P ₉₉	1-day MAX. CONC.
Arsenic		340	680	136	<14		
Cadmium	341	42.1	84.2	16.8	0.02		
Chromium	301	4446	8892	1778	0.31		
Copper	341	49.4	98.7			14.5	14
Lead	341	350	700			6.4	6.2
Mercury		830	1660			2.8	2.5
Nickel	268	1080	2161			13.8	14
Zinc	333	345	689			26.8	26
Chloride (mg/L)		757	1514			594	490

* 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-Q₁₀ 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 = 232.5 cfs (¼ of the 7-Q₁₀), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK- GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P ₉₉
Arsenic		152		2941	588	<14	
Cadmium	175	3.82	0.02	73.4	14.7	0.02	

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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
Chromium	178	212		4094	819	0.31	
Copper	178	17.0	1.34	303			10.1
Lead	178	48.9	1.45	918			3.1
Mercury		440	6.61	8382			1.7
Nickel	178	85.0		1643			11.0
Zinc	178	199	3.47	3788			22.5
Chloride (mg/L)		395		7633			480

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

Monthly Average Limits based on Wildlife Criteria (WC)

RECEIVING WATER FLOW = 329.4 cfs (¼ of the 90-Q₁₀), as specified in s. NR 106.06(4), Wis. Adm. Code

SUBSTANCE	WC	MEAN BACK- GRD.	MO'LY AVE. LIMIT	30-day P ₉₉
Mercury (ng/L)	1.3	6.61	1.3	0.97

Monthly Average Limits based on Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 760.0 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.	30-day P ₉₉
Cadmium	4.4	0.02	266	53.3	0.02	
Chromium (+3)	100		6090	1218	0.31	
Lead	10	1.45	522	104.4		1.6
Mercury	1.5	6.61	1.5	0.30		0.97
Nickel	100		6090	1218		9.44

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 760.0 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	0.2	12.2	2.44	<14

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

Conclusions and Recommendations

Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are not required for toxic parameters in this section.

Chloride – Considering available effluent data from the current and previous permit applications and a previous permit (07/10/2002 to 07/07/2021) the 1-day P₉₉ chloride concentration is 594 mg/L, and the 4-day P₉₉ of effluent data is 480 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.**

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

The current permit requires quarterly monitoring of the influent and effluent for total recoverable mercury. A total of 18 effluent sampling results are available from 07/12/2017 to 10/05/2021 for total recoverable mercury. The average concentration was 0.66 ng/L, and the maximum was 2.5 ng/L. Because the 30-day P₉₉ of available data (0.97 ng/L) is less than the most stringent WQBEL of 1.3 ng/L, **no WQBEL for mercury is required for permit reissuance. Monitoring is recommended in the reissued permit.**

Fox West Regional currently has a mercury variance with an interim limit of 4.8 ng/L as a daily maximum limit. This limit may be removed from the reissued permit per s. NR 207.12(4) Wis. Adm. Code because effluent data has significantly decreased since the previous reissuance due to source reductions. There is not mercury treatment at the facility, so the effluent mercury is not expected to increase with the removal of the limit.

Arsenic – The sample that was collected for the permit reissuance application had a limit of detection (LOD) of 14 µg/L which is greater than 1/5th of the most stringent calculated limit of 2.44 µg/L based on the human cancer criteria. Arsenic data from the previous two permit applications are shown below:

Date	Arsenic µg/L
07/09/2013	1.8
06/13/2021	<14

Fox West Regional sampled arsenic 05/03/2005 to 04/07/2008, summarized below:

	Arsenic µg/L
# Detects	1
# Non-Detects	35
Average	0.03
Maximum	1.2
Range	<1.0 – 1.2

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

The past LODs are below 1/5th of the lowest calculated limit and there is not reasonable potential. Because this data is representative of current conditions, there is not reasonable potential for arsenic limits and monitoring is not recommended in the reissued permit.

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Previous monitoring produced a PFOS result of 3.21 ng/L and a PFOA result of 4.80 ng/L. These results are greater than one fifth of the respective criteria for each substance. Based on the effluent flow rate, and the available PFOS/PFOA monitoring data, PFOS and PFOA monitoring is recommended at a monthly 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.
- Section NR 106.07(3), Wis. Adm. Code requires weekly and monthly average limits for municipal treatment plants.
- The maximum expected effluent pH has changed

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

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

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

Where:

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

The effluent pH data was examined as part of this evaluation. A total of 1411 sample results were reported from 07/02/2017 to 12/31/2021. The maximum reported value was 8.10 s.u. (Standard pH Units). The effluent pH was 7.80 s.u. or less 99% of the time. The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.91 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 7.89 s.u. Therefore, a value of 7.91 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 7.91 s.u. into the equation above yields an ATC = 10 mg/L.

Potential Changes to Daily Maximum Ammonia Nitrogen Effluent Limitations

Subchapter IV of ch. NR 106, Wis. Adm. Code (effective September 1, 2016) specifies methods for the use of the 1-Q₁₀ 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 shall apply.

Attachment #1

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-Q₁₀ (estimated as 80 % of 7-Q₁₀) and the 2×ATC approach are shown below.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	20
1-Q ₁₀	589

The 2×ATC method yields the most stringent limits for Fox West Regional.

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 #4. The current limits are shown below:

	Weekly Average	Monthly Average
Jan – March	28 mg/L	10 mg/L
April – May	29 mg/L	11 mg/L
June – Sept	11 mg/L	4.4 mg/L
Oct – Dec	29 mg/L	18 mg/L

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from 07/02/2017 to 12/30/2021, with those results being compared to the calculated limits to determine the need to include ammonia limits in Fox West's permit for the respective month ranges. That need is determined by calculating 99th upper percentile (or P₉₉) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

Ammonia Nitrogen mg/L	Jan – March	April – May	June – Sept	Oct – Dec
1-day P ₉₉	16.4	14.8	12.1	14.1
4-day P ₉₉	10.1	8.70	6.60	7.70
30-day P ₉₉	6.85	5.60	3.38	4.10
Mean*	5.38	4.22	2.07	2.61
Std	3.15	2.90	2.55	2.95
Sample size	257	184	495	329
Range	0.6 – 18.3	0.2 – 14	<0.1 – 16	<0.1 – 18

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

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

Attachment #1

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

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

Expression of Limits

Revisions to ch. NR 106, Wis. Adm. Code, in September 2016 aligned Wisconsin's WQBELs with 40 CFR § 122.45(d), which specifies that effluent limits for continuous dischargers must be expressed as weekly and monthly averages for publicly owned treatment works and as daily maximums and monthly averages for all other dischargers, unless shown to be impracticable. Because a daily maximum ammonia limit is necessary for Fox West Regional, weekly and monthly average limits are also required under this code revision.

The methods for calculating limitations for municipal treatment facilities to conform to 40 CFR 122.45(d) are specified in s. NR 106.07(3), Wis. Adm. Code, and are as follows:

Whenever a daily maximum limitation is determined necessary to protect water quality, a weekly and monthly average limitation shall also be included in the permit and set equal to the daily maximum limit unless a more restrictive limit is already determined necessary to protect water quality.

The calculated daily maximum limit is 20 mg/L which is more restrictive than the weekly average limits for October – May. Therefore, the weekly average limits for these months are recommended to be 20 mg/L.

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 shown in bold in the table below.

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
January – March	20	20	10
April – May	20	20	11
June – September	20	11	4.4
October – December	20	20	18

**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:

Attachment #1

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 Fox West's permit requires 2/weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit.

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

Effluent Data

Fox West Regional has monitored effluent *E. coli* from 05/04/2021 to 09/28/2021 and a total of 41 results are available. A geometric mean of 126 counts/100 mL was exceeded in 0 times, with a maximum monthly geometric mean of 20 counts/100 mL. Effluent data has exceeded 410 counts/100 mL 0 times. The maximum reported value was 147 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

Technology-Based Effluent Limit

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

Because Fox West Regional does currently has a monthly average limit of 0.7 mg/L which is more stringent than the TBEL, this limit is recommended to continue. In addition, the need for a WQBEL for phosphorus must be considered.

Water Quality Based Limit

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

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL-derived water quality based effluent limit (WQBEL) for phosphorus in addition to, or in lieu of, a s. NR 217.13 WQBEL in a WPDES permit. Because the discharge is directly to the Fox River which is an impaired segment covered under an approved TMDL, the TMDL-based limit is protective of the immediate receiving water as well as downstream waters and can be included in the WPDES permit absent the s. NR 217.13 WQBEL. This limit should be expressed in a manner consistent with the wasteload allocation and assumptions of the TMDL. If after two permit terms, the Department determines the nonpoint source load allocation has not been substantially reduced, the Department may include the s. NR 217.13 WQBEL unless these reductions are likely to occur.

TMDL Limits

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 the *Total Maximum Daily Loads and Watershed Management Plan for Total Phosphorus and Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay (LFR TMDL)* report dated March 2012 are expressed as maximum annual loads (lbs/year). The annual WLA for Fox West Regional is 3,110 lbs/year.

Fox West Regional can currently meet the current TP annual WLA of 3,110 lbs/year, as shown in the table below.

Annual TP Mass Loading	
	Total Phosphorus
TMDL WLA	3,110
2018	2,229
2019	4,276
2020	2,252
2021	2,484

Because Fox West Regional can currently meet the annual WLA, it is not necessary to change the current mass limits, so no changes are recommended for the phosphorus limits for the reissued permit. **It is recommended that the monthly average and six-month average limits of 29 lbs/day and 9.6 lbs/day be continued in the reissued permit.** The limits became effective in April 2023.

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 07/02/2017 to 12/30/2021.

Total Phosphorus Effluent Data		
	Phosphorus mg/L	Phosphorus lbs/day
1-day P ₉₉	0.80	63.3
4-day P ₉₉	0.40	37.3
30-day P ₉₉	0.21	15.9
Mean	0.12	6.86
Std	0.16	15.4
Sample size	1122	1179
Range	0.04 – 4.5	0 – 400

The current limit of 0.7 mg/L shall also continue in the reissued permit for antibacksliding purposes per ch. NR 207, Wis. Adm. Code.

PART 6 – TOTAL SUSPENDED SOLIDS

The Lower Fox River TMDL also has wasteload allocations for total suspended solids (TSS). 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). The annual WLA for Fox West Regional is 225,925 lbs/year. For a municipal facility, the limits for TSS must be expressed as weekly and monthly averages. **The current permit includes a weekly average limit of 45 mg/L and a monthly average limit of 30 mg/L which are recommended to continue in the reissued permit.**

Fox West Regional can currently meet the current TSS annual WLA of 225,925 lbs/year, as shown in the table below.

Annual TSS Mass Loading	
	TSS lbs/year
TMDL WLA	225,925
2018	81,368
2019	162,580
2020	75,582
2021	69,373

Because Fox West Regional can currently meet the annual WLA with the current weekly and monthly average limits, it is not necessary to recalculate the TMDL limits. Therefore, **no changes are recommended for the TSS limits in the reissued permit. It is recommended that weekly average and monthly average limits of 4,355 lbs/day and 2,382 lbs/day be continued in the reissued permit along with the current concentration limits.**

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

For informational purposes, the following table lists the statistics for TSS discharge as both a concentration and a mass, using data from 07/02/2017 to 12/30/2021.

	TSS (mg/L)	TSS (lbs/day)
1-day P ₉₉	29.1	2426
4-day P ₉₉	15.9	1488
30-day P ₉₉	7.49	622.3
Mean	4.08	242.8
Std	6.33	626.3
Sample Size	1179	1179
Range	1 – 182	37 – 16,192

PART 7 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

Attachment #1

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.

Due to the amount of upstream flow available for dilution in the limit calculation ($Q_s:Q_e > 20:1$), the lowest calculated limitation is 120° F (s. NR 106.55(6)(a), Wis. Adm. Code).

The table below summarizes the maximum temperatures reported during monitoring from 04/01/2013 to 03/31/2014.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
JAN	56	58	NA	120
FEB	53	56	NA	120
MAR	50	51	NA	120
APR	52	54	NA	120
MAY	57	60	NA	120
JUN	60	62	NA	120
JUL	64	66	NA	120
AUG	68	69	NA	120
SEP	68	69	NA	120
OCT	66	66	NA	120
NOV	63	63	NA	120
DEC	59	60	NA	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

Based on the available effluent data no effluent limits are recommended for temperature. The complete thermal table used for the limit calculation is attached.

At temperatures above approximately 103° F, conventional biological treatment systems do not function properly and experience upsets. Therefore, the effluent will likely not ever be above 103°F, so **no monitoring is recommended.**

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 (October 29, 2019)*.

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC₅₀ (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC₂₅ (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 5% shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

Q_e = annual average flow = 8.2 MGD = 12.7 cfs

f = fraction of the Q_e withdrawn from the receiving water = 0

Q_s = 1/4 of the 7- Q_{10} = 930 cfs $\div$ 4 = 233 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

Attachment #1

106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations. Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005. Data collected prior to this is excluded in this evaluation.

WET Data History

Date Test Initiated	Acute Results LC ₅₀ %				Chronic Results IC ₂₅ %				Footnotes or Comments
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	<i>C. dubia</i>	Fathead Minnow	Pass or Fail?	Use in RP?	
10/17/2005	>100	>100	Pass	Yes	58.1	50.24	Pass	Yes	
09/11/2006	>100	>100	Pass	Yes	42.84	17.26	Pass	Yes	
06/11/2007	>100	>100	Pass	Yes	44.65	51.84	Pass	Yes	
03/03/2008	>100	>100	Pass	Yes	71.79	>100	Pass	Yes	
10/13/2009					46.12	45.86	Pass	No	1
07/26/2010	>100	>100	Pass	No					1
10/04/2011	>100	>100	Pass	Yes	>100		Pass	Yes	
08/21/2012					>100	>100	Pass	Yes	
08/27/2013	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
12/03/2013					>100	>100	Pass	Yes	
03/11/2014	>100	29.2	Fail	No	60.5	43.5	Pass	Yes	2
05/14/2014	>100	>100	Pass	Yes					
07/18/2017	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
12/13/2018	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
03/05/2019	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
05/05/2020	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
09/21/2021	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
10/04/2022	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
01/24/2023	>100	>100	Pass	Yes	>100	>100	Pass	Yes	

Footnotes:

1. *Tests done by S-F Analytical, July 2008 – March 2011.* The DNR has reason to believe that WET tests completed by SF Analytical Labs from July 2008 through March 31, 2011 were not performed using proper test methods. Therefore, WET data from this lab during this period has been disqualified and was not included in the analysis.
 2. Ammonia was present in the effluent during this test at levels that are known to cause toxicity to the fathead minnow. Mechanical problems with NH3 sensors and blowers at the WWTP caused high ammonia levels that were not representative of typical effluent conditions, therefore this WET test was not used in RP calculations.
- 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.**

Attachment #1

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

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

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

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

Chronic WET Limit Parameters

TU_c (maximum) 100/IC ₂₅	B (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
100/17.26 = 5.79	2.3 Based on 5 detects	5%

$$[(TU_c \text{ effluent}) (B)(IWC)] = 0.67 < 1.0$$

Therefore, no reasonable potential is shown for any WET limits using the procedures in s. NR 106.08(6) and representative data from 10/17/2005 to 09/21/2021.

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>.

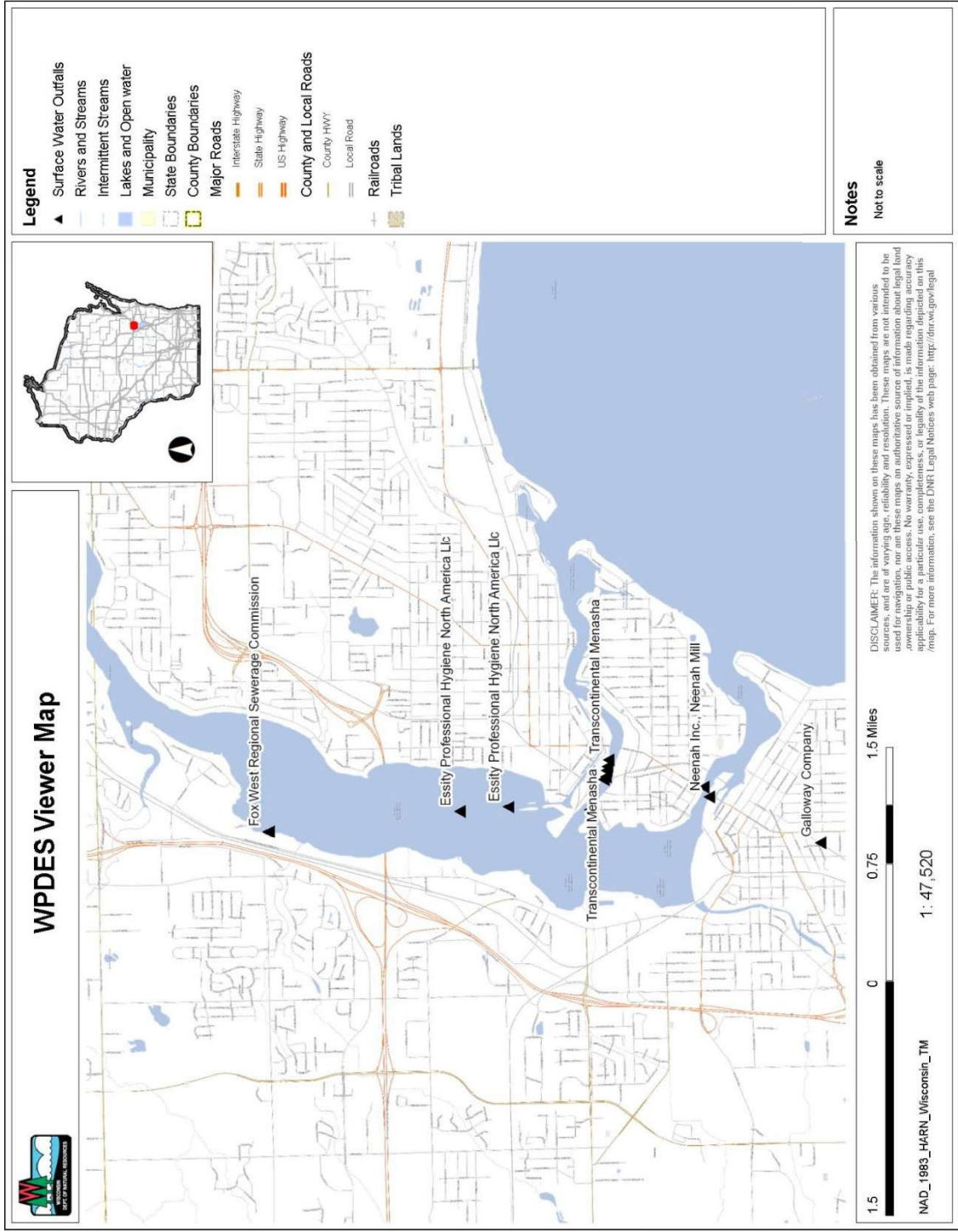
WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. 0 Points	IWC = 5%. 0 Points
Historical Data	14 tests used to calculate RP. 0 Points	16 tests used to calculate RP. No tests failed. 0 Points
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. 0 Points	Same as Acute. 0 Points
Receiving Water Classification	Warmwater sport fish classification 5 Points	Same as Acute. 5 Points
Chemical-Specific Data	Reasonable potential for limits for no substances based on ATC; Ammonia	Reasonable potential limits for no substances based on CTC; Ammonia

Attachment #1

	Acute	Chronic
	nitrogen limit carried over from the current permit. Cadmium, chromium, copper, lead, mercury, nickel, zinc, chloride, and ammonia detected. Additional Compounds of Concern: None 3 Points	nitrogen limit carried over from the current permit. Cadmium, chromium, copper, lead, mercury, nickel, zinc, chloride, and ammonia detected. Additional Compounds of Concern: None 3 Points
Additives	0 Biocides and 1 Water Quality Conditioners added. P treatment chemical other than Ferric Chloride (FeCl ₃), Ferrous Sulfate (FeSO ₄), or alum used: No 1 Point	All additives used more than once per 4 days. 1 Point
Discharge Category	6 Industrial Contributors. 10 Points	Same as Acute. 10 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:	19 Points	19 Points
Recommended Monitoring Frequency (from Checklist):	1x yearly	1x yearly
TRE Recommended? (from Checklist)	No	No

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2019) and other information described above, 1x yearly acute and chronic WET tests are recommended in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).
- A minimum of annual acute and chronic monitoring is recommended because Fox West Regional is a major municipal discharger with a design flow greater than 1.0 MGD. Federal regulations at 40 CFR Part 122.21(j) require at least 4 acute and chronic WET tests with each permit application on samples collected since the previous reissuance. Therefore, annual monitoring is recommended in the permit term, so that data will be available for the next permit application.



Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

Facility:	Fox West Sewerage	7-Q₁₀:	930 cfs	Temp Dates	Flow Dates
Outfall(s):	001	Dilution:	25%	Start:	07/01/17
Date Prepared:	1/25/2022	f:	0	End:	12/31/21
Design Flow (Q_e):	8.20 MGD	Stream type:	Small warm water sport or forage fish co		
Storm Sewer Dist.	0 ft	Qs:Q_e ratio:	18.3 :1		
		Calculation Needed?	YES		

Month	Water Quality Criteria		Receiving Water Flow Rate (Qs) (cfs)	Representative Highest Effluent Flow Rate (Q _e)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default) (°F)	Sub-Lethal WQC (°F)		7-day Rolling Average (Qesl) (MGD)	Daily Maximum Flow Rate (Qea) (MGD)		Weekly Average (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	33	49	930	4.027	4.658	0	56	58	NA	120
FEB	34	50	930	5.278	5.965	0	53	56	NA	120
MAR	38	52	930	5.142	5.715	0	50	51	NA	120
APR	48	55	930	13.069	15.252	0	52	54	NA	120
MAY	58	65	930	13.545	23.203	0	57	60	NA	120
JUN	66	76	930	9.329	15.169	0	60	62	NA	120
JUL	69	81	930	6.392	6.645	0	64	66	NA	120
AUG	67	81	930	9.650	16.722	0	68	69	NA	120
SEP	60	73	930	14.149	22.167	0	68	69	NA	120
OCT	50	61	930	6.024	6.576	0	66	66	NA	120
NOV	40	49	930	4.985	5.457	0	63	63	NA	120
DEC	35	49	930	4.445	4.927	0	59	60	NA	120

11/24/2007 Ammonia Limits Calculations

Weekly Average & Monthly Average Limits based on Chronic Toxicity Criteria (CTC): Weekly average and monthly average limits for Ammonia Nitrogen are based on chronic toxicity criteria. The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as a Warmwater sport fishery 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
 $1.45 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Absent), and
 T = the temperature (°C) of the receiving water – (Early Life Stages Present), or
 T = the maximum of the actual temperature (°C) and 7 – (Early Life Stages Absent)

Where: Limitation = $\{ [(WQC) (Q_s + (1-f)Q_e)] - [(Q_s - fQ_e)(C_s)] \} \div Q_e$
 Limitation = Water quality based effluent limitation (mg/L)
 WQC = CTC - The applicable water quality criterion (mg/L)
 Q_s = Receiving water flow (cfs)
 Q_e = Effluent flow (converted to cfs) = 12.4 cfs
 f = Fraction of the effluent flow withdrawn from the receiving water = 0.5
 C_s = Background concentration of the substance (mg/L)

Effluent Limitations for NH ₃ -N for a discharge to a flowing river classified for WWSF use.		Summer	Winter	Winter	Spring
		June – Sept.	Oct. – Dec.	Jan. – March	April & May
Background Information:	4-Q ₃ (cfs)	790	790	790	790
	30-Q ₅ (cfs)	1240	1240	1240	1240
	Ammonia (mg/L)	0.019	0.22	0.12	0.021
	Temperature (°C)	26	7	7	9
	pH (su)	8.63	8.30	8.20	8.39
	% of Flow used	100	25	25	25
	Reference Weekly Flow (cfs)	395	98.75	98.75	98.75
	Reference Monthly Flow (cfs)	620	155	155	155
Criteria mg/L:	4-Day Chronic				
	Early Life Stages Present	1.04	3.81	4.48	3.28
	Early Life Stages Absent	1.04	6.19	7.28	4.68
	30-Day Chronic				
	Early Life Stages Present	0.42	1.52	1.79	1.31
	Early Life Stages Absent	0.42	2.47	2.91	1.87
Effluent Limitations mg/L:	Weekly Average				
	Early Life Stages Present	65.88		71.91	53.64
	Early Life Stages Absent		98.40		
	Monthly Average				
	Early Life Stages Present	40.11		42.86	32.99

Attachment #4

	Early Life Stages Absent		57.81		
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Effluent Limitations for NH₃-N for a discharge to a WWSF lake
(Using basin “default” background conditions)

		Summer	Winter	Winter	Spring
		June – Sept.	Oct. – Dec.	Jan. – March	April & May
Effluent Limitations mg/L:	Weekly Average				
	Early Life Stages Present	9.86		28.36	29.26
	Early Life Stages Absent		47.04		
	Monthly Average				
	Early Life Stages Present	3.65		10.38	11.28
	Early Life Stages Absent		17.86		

As a point of reference, the above limitations were provided as Facilities Planning limitations to the Heart of the Valley Metropolitan Sewerage District, several miles downstream from GCMW. On the other hand, using the background data from the long-term trends monitoring station at the outlet from Lake Winnebago yields the following effluent limitations.

Effluent Limitations for NH₃-N for a discharge to a WWSF lake
(Using long term trends data for background pH and NH₃-N)

		Summer	Winter	Winter	Spring
		June – Sept.	Oct. – Dec.	Jan. – March	April & May
Effluent Limitations mg/L:	Weekly Average				
	Early Life Stages Present	11.28		48.11	35.86
	Early Life Stages Absent		65.85		
	Monthly Average				
	Early Life Stages Present	4.40		18.52	14.22
	Early Life Stages Absent		25.02		