Permit Fact Sheet

General Information

Permit Number	WI-0024597-10-0
Permittee Name and Address	MADISON METROPOLITAN SEWERAGE DISTRICT 1610 Moorland Rd, Madison, WI 53713
Permitted Facility Name and Address	Madison Metropolitan Sewerage District WWTF 1610 Moorland Rd, Madison, WI
Permit Term	April 01, 2026 to March 31, 2031
Discharge Location	Badfish Creek outfall (Outfall 001) is located in the NW 1/4, SE 1/4, section 19, T6N, R10E (Town of Dunn), approximately 1,100 feet north of Highway B
Receiving Water	Badfish Creek in the Lower Rock River Basin in Dane County
Stream Flow ($Q_{7,10}$)	0 cfs
Stream Classification	Limited Aquatic Life (LAL), non-public water supply
Discharge Type	Existing; Continuous
Annual Average Design Flow	50 MGD
Industrial or Commercial Contributors	25 Industrial Contributors (22 CIUs and 3 SIUs)
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 (Approved January 1, 1984)

Facility Description

Madison Metropolitan Sewerage District (MMSD) Wastewater Treatment Facility (also known as the Nine Springs Wastewater Treatment Plant) is located in Madison, Wisconsin and handles the wastewater from five cities, eight villages, and some or all of eight towns representing 24 separate sanitary districts, all located in Dane County. Preliminary treatment is performed by fine screening of inorganic solids and separation of grit in vortex grit tanks. The inorganic solids and grit are hauled to the Dane County Landfill for disposal. The wastewater receives primary and advanced secondary treatment. The advanced secondary treatment system is composed of aeration tanks with selectors and clarifiers. Phosphorus removal is accomplished biologically in this process. Following final clarification, the treated water is disinfected seasonally (March 1-November 30) using ultraviolet disinfection. Treated effluent is discharged to Badfish Creek; discharge to Badger Mill Creek via Outfall 005 was permanently discontinued on 8/16/2024.

Twenty five percent of waste activated sludge (WAS) from the secondary treatment system is thickened using Dissolved Air Floatation (DAF) and sent to phosphorus release tanks prior to being thickened on gravity belt thickeners. The thickened primary sludge and thickened WAS are fed to an acid-phase anaerobic digester process. Following this process the sludge is further anaerobically digested at mesophilic temperatures. Approximately 85% of the digested biosolids are then thickened by gravity belt thickeners and temporarily stored in Metrogro Storage Tanks before being recycled through land application on agricultural land. A smaller portion, approximately 15% of the mesophilicly digested biosolids is

further digested at thermophilic temperatures to meet EPA time/temperature requirements for Class A Biosolids. These biosolids are then dewatered on a centrifuge. The resulting cake biosolids can be managed alone or mixed with amendments such as sand and sawdust to produce a soil-like material. Phosphorus in the form of struvite is harvested from waste streams using the Ostara process. Effluent sampling and DO monitoring are conducted at the plant, prior to pumping away to the outfall.

In order to comply with the total phosphorus effluent limitations calculated based on s. NR 217.13, Wis. Adm. Code, and the Rock River TMDL, MMSD will continue to implement a Department-approved Adaptive Management Plan to pursue final phosphorus limit compliance. This effort will involve close partnerships with MMSD, Village of Oregon, City of Stoughton, WI DNR Nevin Fish Hatchery, various Municipal Separate Storm Sewer Systems (MS4s) within the Yahara River watershed, County Land & Water Conservation Departments, NGOs, Lake Management Groups, and the agricultural community in an effort to reduce in-stream phosphorus concentrations in Badfish Creek and the Yahara River watershed.

Substantial Compliance Determination

Enforcement During Last Permit: There have been a total of six Notices of Noncompliance (NONs) and one Notice of Violation (NOV) sent during the previous permit term: NON for multiple Treatment Facility Overflows (TFOs) sent September 2020, NON for land applying on unapproved fields and nitrogen limits exceedances sent October 2022, NON for a TFO sent October 2023, NON for a Sanitary Sewer Overflow (SSO) sent October 2023, NON for a SSO sent March 2024, NON for a SSO sent March 2025, and NOV for a SSO sent November 2025. The facility has completed all previously required actions as part of the enforcement process (with the exception of any required actions following the NOV as that enforcement process is still in progress).

After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items, and a site visit on 8/12/25, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Ashley Brechlin, Wastewater Engineer, on November 26, 2025.

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	38 MGD (Avg. May 2020-April 2025)	Influent: 24-hour flow proportional composite samplers located prior to screening and grit removal at each of the five force mains at headworks building. Results are reported on a flow weighted basis. Flow is measured by 5 venturi flow meters one on each force main into the plant.
001	36 MGD (Avg. May 2020-April 2025)	Effluent: 24-hour flow proportional composite sampler intake located at effluent building after seasonal UV disinfection. Grab samples taken at effluent sampler prior to discharge to Badfish Creek. Flow is measured by a venturi flow meter.
601	N/A – new sample point	In-stream Sampling Point 601: representative water samples shall be collected from Badfish Creek. Sample point 601 is located at the Highway 59 Bridge. (42.83359, -89.19735). Sample point 601 corresponds to the sample location 69 / BFC 8-b as described in the approved AM Plan No. AM-2025-02 (September 2025).

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
002	Est. 7,800 Dry Tons/Year	Class B, Liquid, Anaerobically (mesophilic) digested, gravity belt thickened liquid biosolids. Representative samples are taken directly from Metrogro loading pumps, except PFAS samples may be taken from the gravity belt thickener.
011	Est. 780 Dry Tons/Year	Class A, Cake from Storage, Anaerobically (thermophilic treatment after mesophilic treatment) digested, Time-Temperature Batch, gravity belt thickened, centrifuged biosolids from storage. Monitor for Lists 1, 2, 3 and 4. Representative samples are taken at the distribution point at the Madison Metropolitan Sewerage District Wastewater Treatment Facility. Monitoring shall apply only when the outfall is active.
012	Est. 608 Dry Tons/Year	Class A, Struvite Harvesting Process Solids, solids removed through treatment of wastewater side stream flow. Monitor for fecal coliform and percent solids on the final product. Class A treatment process or department approved variance from Class A treatment process required for EQ distribution.
016	No discharge May 2020-April 2025	Automatically-Activated Overflow: located in City of Madison at manhole 06-102 - Drainage ditch near PS6. During times of wet weather untreated flow could be discharged to Starkweather Creek near Atwood Ave.
017	No discharge May 2020-April 2025	Automatically-Activated Overflow: located in City of Monona at manhole PS7 - Entrance chamber behind PS7. During times of wet weather untreated flow could be discharged to the Yahara River between Lake Monona and Mud Lake.
018	No discharge May 2020-April 2025	Automatically-Activated Overflow: located in City of Madison at manhole 08-100 - North side of Wingra Creek across from PS8. During times of wet weather untreated flow could be discharged to Wingra Creek near Fish Hatchery Rd.
020	No discharge May 2020-April 2025	Automatically-Activated Overflow: located in Town of Dunn at manhole PS11 near PS11 entrance chamber. During times of wet weather untreated flow could be discharged to Nine Springs Creek.
021	No discharge May 2020-April 2025	Automatically-Activated Overflow: located in City of Madison at manhole 13-105 upstream of PS13 - Along drainage ditch, west of Hwy 51 at Dane County Airport access road. Inside airport perimeter fence. During times of wet weather untreated flow could be discharged to Starkweather Creek East of airport near Hwy. 51.
022	N/A – not an outfall	Class A, Liquid, Anaerobically (thermophilic treatment after mesophilic treatment) digested, Time-Temperature Batch, gravity belt thickened, biosolids. Collection of pathogen density required immediately after Class A treatment process. Monitor for List 3 only. Note that the Class A Sludge: Composting Process

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
		requirements in the Land Application Requirements (Standard Requirements) section may not apply if all sludge feedstocks have been determined to meet Class A treatment requirements prior to the composting treatment process. Department approval is required to activate this outfall and must be received prior to use.
023	Est. 0 Dry Tons/Year	Class A, Cake, Composted, Anaerobically (thermophilic treatment after mesophilic treatment) digested, Time-Temperature Batch, gravity belt thickened, centrifuged biosolids. Collection of pathogen density required immediately after Composting and prior to storage. Monitor for List 3, except that if additional sludge feedstocks other than those already determined to meet exceptional quality requirements are used in the compost treatment process, then the permittee shall notify the Department to activate Lists 1, 2 and 4 for this outfall. Monitoring shall apply only when the outfall is active. Department approval is required to activate this outfall and must be received prior to use.
024	Est. 0 Dry Tons/Year	Class B, Cake, Anaerobically (mesophilic) digested, gravity belt thickened, centrifuged biosolids. Representative samples are taken from the cake storage building. Monitor for Lists 1, 2, 3 and 4. Department may allow monitoring of metals (List 1) at location providing similar results (See Section 4.2.1.3). Monitoring for List 3 (pathogens) shall include Treatment Process OR Pathogen Density for compliance purposes. Monitoring shall apply only when the outfall is active.
025	Est. 0 Dry Tons/Year	Class B, Cake, Composted, Anaerobically (mesophilic) digested, gravity belt thickened, centrifuged, composted biosolids. Representative samples are taken from the composted solids in the compost pile and from storage. Monitor for List 1, 2, 3 and 4. Department may allow monitoring of metals (List 1) at location providing similar results (See Section 4.2.1.3. However, if additional sludge feedstocks other than Madison Metropolitan Sewerage District Wastewater Treatment Facility sludge are used, Section 4.2.1.3 does not apply to this outfall.). Monitoring for List 3 (pathogens) shall include Treatment Process OR Pathogen Density for compliance purposes. Monitoring shall apply only when the outfall is active. Department approval is required to activate this outfall and must be received prior to use.
111	N/A – no flow monitoring	In-Plant Mercury: collect a mercury field blank at the effluent building using the Clean Hands/Dirty Hands sample collection procedure excerpted from EPA Method 1669.
112	No discharge May 2020-April 2025	Diversion Structure: during times of wet weather, treated flow prior to disinfection is conveyed out to storage lagoons and either discharged back to east plant aeration tanks or to Nine Springs

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
		Creek tributary.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 701- INFLUENT TO PLANT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	Daily	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	Daily	24-Hr Flow Prop Comp	
Cadmium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
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	Monthly	24-Hr Flow Prop Comp	See the Mercury Monitoring permit section.

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.

- The sample frequency for flow has been changed from “continuous” to “daily” for eDMR reporting purposes.
- Removed $CBOD_5$ monitoring; this is no longer required because BOD_5 monitoring is being used to assess compliance with the surface water effluent limits.

1.1.2 Explanation of Limits and Monitoring Requirements

Monitoring of influent flow, BOD_5 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. Total metals monitoring is included because MMSD operates an Approved Pretreatment Program.

2 In-plant - Monitoring and Limitations

2.1 Sample Point Number: 111- In-Plant Mercury Monitoring

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

2.1.1 Changes from Previous Permit

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

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.

2.2 Sample Point Number: 112- Diversion Structure Nine Springs Creek

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Volume		MGD	Per Occurrence	Estimated	
E. coli		#/100 ml	Per Occurrence	Grab	

2.2.1 Changes from Previous Permit

In-plant limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit.

- Fecal coliform monitoring has been replaced with Escherichia coli (E. coli) monitoring.

2.2.2 Explanation of Limits and Monitoring Requirements

Monitoring only, should discharge occur. Any discharge to Nine Springs Creek is considered bypassing and is prohibited. See the Bypass section in the Standard Requirements section of the permit.

3 Surface Water - Monitoring and Limitations

3.1 Sample Point Number: 001- EFFL/BADFISH CREEK

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	20 mg/L	Daily	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	19 mg/L	Daily	24-Hr Flow Prop Comp	
BOD5, Total	Weekly Avg	8,340 lbs/day	Daily	Calculated	
BOD5, Total	Monthly Avg	7,923 lbs/day	Daily	Calculated	
Suspended Solids, Total	Weekly Avg	23 mg/L	Daily	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	Daily	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	9,591 lbs/day	Daily	Calculated	Limit effective January-August and October-December.
Suspended Solids, Total	Weekly Avg	7,690 lbs/day	Daily	Calculated	Limit effective in September.
Suspended Solids, Total	Monthly Avg	6,860 lbs/day	Daily	Calculated	Limit effective in January.
Suspended Solids, Total	Monthly Avg	8,340 lbs/day	Daily	Calculated	Limit effective in February, April, June and November.
Suspended Solids, Total	Monthly Avg	8,160 lbs/day	Daily	Calculated	Limit effective in March, May and July.
Suspended Solids, Total	Monthly Avg	7,080 lbs/day	Daily	Calculated	Limit effective in August.
Suspended Solids, Total	Monthly Avg	4,600 lbs/day	Daily	Calculated	Limit effective in September.
Suspended Solids, Total	Monthly Avg	7,180 lbs/day	Daily	Calculated	Limit effective in October.
Suspended Solids, Total	Monthly Avg	7,170 lbs/day	Daily	Calculated	Limit effective in December.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
pH Field	Daily Min	6.0 su	Daily	Grab	
pH Field	Daily Max	9.0 su	Daily	Grab	
Dissolved Oxygen	Daily Min	5.0 mg/L	Daily	Continuous	See the Compliance with DO Limit permit section.
Nitrogen, Ammonia (NH3-N) Total	Daily Max	17 mg/L	Daily	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	10 mg/L	Daily	24-Hr Flow Prop Comp	Limit effective October-April.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	4.4 mg/L	Daily	24-Hr Flow Prop Comp	Limit effective May-September.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	4.1 mg/L	Daily	24-Hr Flow Prop Comp	Limit effective October-April.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	1.8 mg/L	Daily	24-Hr Flow Prop Comp	Limit effective May-September.
E. coli	Geometric Mean - Monthly	126 #/100 ml	2/Week	Grab	Monitoring and limit effective March-November.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Monitoring and limit effective March-November. See the E. coli Percent Limit permit section. Enter the result in the eDMR on the last day of the month.
Chloride	Weekly Avg	408 mg/L	Daily	24-Hr Flow Prop Comp	This is an interim limit effective year-round. See the Chloride Variance - Implement Source Reduction Measures permit section and the Chloride SRM (Target Value) Schedule.
Chloride		lbs/day	Daily	Calculated	Calculate the daily mass discharge of chloride in lbs/day on the same days chloride sampling occurs.
Mercury, Total Recoverable		ng/L	Monthly	Grab	See the Mercury - Pollutant Minimization Plan permit section and the Mercury Pollutant Minimization Summary Schedule.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
PFOS		ng/L	Monthly	Grab	
PFOA		ng/L	Monthly	Grab	
Phosphorus, Total	Monthly Avg	1.0 mg/L	Daily	24-Hr Flow Prop Comp	
Phosphorus, Total	6-Month Avg	0.6 mg/L	Daily	24-Hr Flow Prop Comp	This is the current Adaptive Management interim limit which remains effective upon permit issuance until April 30, 2026.
Phosphorus, Total	6-Month Avg	0.5 mg/L	Daily	24-Hr Flow Prop Comp	This is an Adaptive Management interim limit that goes into effect May 1, 2026. See the Schedules section and effluent requirements in the permit.
Phosphorus, Total		lbs/day	Daily	Calculated	Calculate the daily mass discharge of phosphorus in lbs/day on the same days phosphorus sampling occurs. Mass (lbs/day) = Concentration (mg/L) x Flow (MGD) x 8.34
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	
Nitrogen, Total Kjeldahl		mg/L	Quarterly	24-Hr Flow Prop Comp	
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hr Flow Prop Comp	
Nitrogen, Total		mg/L	Quarterly	Calculated	Total Nitrogen shall be

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					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 Time Prop Comp	Annual monitoring in rotating quarters. See the Whole Effluent Toxicity (WET) Testing permit section.
Chronic WET	Monthly Avg	1.0 TUc	See Listed Qtr(s)	24-Hr Time Prop Comp	Twice annual monitoring in rotating quarters. See the Whole Effluent Toxicity (WET) Testing permit section.

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.

- The sample frequency for flow has been changed from "continuous" to "daily" for eDMR reporting purposes.
- $CBOD_5$ monitoring and limits have been replaced with BOD_5 monitoring and limits.
- Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.
- Updated adaptive management interim limit from 0.6 mg/L to 0.5 mg/L (as a 6-month average) to become effective May 1, 2026.
- Decreased the chloride variance interim effluent limit to 408 mg/L as a weekly average and updated source reduction measures throughout the permit term.
- Removed the alternative effluent limit (AEL) for mercury due to the reasonable potential analysis; however, monthly monitoring and pollutant minimization efforts are required to continue during the reissued permit term to maintain effluent quality at or below current levels.
- Addition of PFOS/PFOA monitoring at a frequency of monthly in accordance with s. NR 106.98(2), Wis. Adm. Code.
- Addition of a Chronic WET effluent limit.

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 August 28, 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 average and monthly average limits whenever practicable.

$CBOD_5$ – $CBOD_5$ monitoring and limits (previously in effect during permit term WI-0024597-09) have been replaced with BOD_5 monitoring and limits. Chapter NR 210.05, Wis. Adm. Code, allows for the use of $CBOD_5$ limits in place of categorical BOD_5 limits, but not in place of calculated BOD_5 limits. Categorical BOD_5 limits given in ch. NR 210.05, Wis. Adm. Code, and their $CBOD_5$ equivalents, are based on the expected performance of biological treatment technology. Calculated BOD_5 WQBELs, such as those in effect during permit term WI-0024597-08, are set to ensure that dissolved oxygen criteria are met in the receiving water, and they do not consider the effectiveness of the treatment technology, therefore are not eligible for corresponding $CBOD_5$ limits. More information may be found in the WQBEL memo dated August 28, 2025.

Compliance with Dissolved Oxygen Limit (Daily Min) – Dissolved Oxygen (DO) values of 4.5 mg/L or greater, as measured at Sample Point 001, will be deemed as compliant by the Department for Outfall 001 based on the results of a previous study by the permittee sent to the Department on August 18, 1999, and approved September 22, 1999. This study demonstrated that the minimum DO gain across the Badfish Creek aerator was 0.5 mg/L. If DO levels fall below 4.5 mg/L for more than an hour and are not attributable to equipment failure, per the study, the District shall take DO measurements at the discharge to Badfish Creek.

E. coli – E. coli effluent limits of 126 #/100 mL as a monthly geometric mean that may not be exceeded and 410 #/100 mL as a daily maximum that may not be exceeded more than 10 percent of the time in any calendar month are effective at permit reissuance. Section NR 102.04(5)(a), Wis. Adm. Code, states that all surface waters shall be suitable for recreational use and meet the E. coli criteria established to protect this use. As part of the reissuance process, the requirements for disinfection were reviewed under s. NR 210.06(3), Wis. Adm. Code. Disinfection is required March through November annually.

Phosphorus – New administrative rules for phosphorus discharges took effect December 1, 2010. Details regarding the administrative rules for phosphorus discharges may be found at: https://dnr.wisconsin.gov/topic/Wastewater/Phosphorus. Phosphorus rules are contained in s. NR 102.06 and ch. NR 217, Subchapter III, Wis. Adm. Code. A monthly average interim limit of 1 mg/L is effective upon reissuance and remains in effect for the duration of the reissued permit term. An Adaptive Management interim limit of 0.5 mg/L expressed as a 6-month average (averaging period of May through October and November through April) becomes effective May 1, 2026. Compliance with the 6-month average interim limit is evaluated at the end of each six-month period on April 30th and October 31st annually.

Adaptive Management for Total Phosphorus Compliance – The permittee requested and the Department approved a plan to implement a watershed adaptive management approach under s. NR 217.18, Wis. Adm. Code, and s. 283.13(7) Wis. Stats., as a means to achieve compliance with the phosphorus water quality standard in s. NR 102.06, Wis. Adm. Code. The phosphorus limitations and conditions in this permit reflect the approved Adaptive Management (AM) Plan No. AM-2025-02 (September 2025). The permittee shall implement the actions identified in the approved AM Plan in accordance with the goals and measures identified. The goal of the AM Plan is to reduce phosphorus loadings within the watershed action area by a minimum of 22,117 lbs/yr by the end of this permit term. In addition, annual reports are required. See the Schedules section for more details. The Department may terminate the AM option based on the reasons enumerated in NR 217.18(3)(e)2, Wis. Adm. Code. Surface water monitoring requirements are included in the proposed permit in support of the goals and measures of the Adaptive Management Plan. Sampling is required as outlined in the approved Adaptive Management Plan.

Chloride – The permittee has applied for a chloride variance, under the provisions of s. NR 106.83, Wis. Adm. Code, with its application for permit reissuance. The Department reviewed MMSD's application for a chloride variance and the information supplied in the application supports the establishment of an interim effluent limit. The proposed permit includes an interim chloride limit of 408 mg/L (expressed as a weekly average), a target value of 400 mg/L (the calculated WQBEL), implementation of the chloride source reduction measures identified in the MMSD Source Reduction

Initiatives 2026-2031 Pollutant Minimization Plan – Chloride, and submittal of annual progress reports each year by January 31st. The Department concludes that MMSD is qualified for a variance from the water quality standard for chloride and proposes reissuance of this permit with the proposed variance.

Mercury – Requirements for mercury are included in s. NR 106.145, Wis. Adm. Code. (See http://dnr.wi.gov/topic/Mercury/). The permittee applied for a mercury variance, under the provisions of s. NR 106.145, Wis. Adm. Code, with its application for permit reissuance. The previous permit included a mercury variance. The Department reviewed MMSD's application for a mercury variance and determined that MMSD is ineligible for this variance due to the lack of reasonable potential and the need for a mercury limit. If MMSD does not withdraw the mercury variance application, it is the Department's intent to formally deny this request.

PFOS and PFOA – NR 106 Subchapter VIII - Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Pursuant to s. NR 106.98(3)(b), 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. Monthly monitoring is included in the permit in accordance with s. NR 106.98(2)(c), Wis. Adm. Code. MMSD does not need the PFOS/PFOA Minimization Plan Determination of Need Schedule, that the Department has been including in permits for similar facilities, because MMSD has been voluntarily monitoring for PFOS/PFOA since 2021.

Acute WET – Testing is required annually during the following quarters: October-December 2026; April-June 2027; July-September 2028; January-March 2029; and October-December 2030.

Chronic WET – Testing is required twice annually during the following quarters: April-June 2026; October-December 2026; January-March 2027; April-June 2027; April-June 2028; July-September 2028; January-March 2029; July-September 2029; July-September 2030; and October-December 2030.

3.2 Sampling Point 601 - Badfish Creek at Highway 59

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		cfs	Monthly	Calculated	Provide an estimate of river flow for each day that in-stream phosphorus monitoring is performed May 1 through October 31 annually.
Flow Rate		cfs	Per Occurrence	Calculated	Voluntary river flow estimates for each day that in-stream phosphorus monitoring is performed November 1 through April 30 annually.
Phosphorus, Total		mg/L	Monthly	Grab	Collect samples monthly May 1 through October 31 annually. See permit subsections for sampling and reporting requirements.

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Total		mg/L	Per Occurrence	Grab	Voluntary monitoring November 1 through April 30 annually. See permit subsections for sampling and reporting requirements.
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate and report total monthly phosphorus loads for the months of May through October annually. See permit subsection for calculation of total monthly loads.
Phosphorus, Total		lbs/month	Per Occurrence	Calculated	Calculated total phosphorus loads may also be reported for the months of November through April, as data is available. See permit subsection for calculation of total monthly loads.

3.2.1 Changes from Previous Permit

This is a new sample point. In-stream surface water monitoring was not included in the previous permit. Monitoring is included this permit term as part of the approved Adaptive Management Plan requirements.

3.2.2 Explanation of Limits and Monitoring Requirements

As part of the Adaptive Management Plan requirements, in-stream monitoring for river flow rate, phosphorus concentration and total monthly phosphorus loading is required during the months of May through October. Monitoring for these same parameters is voluntary during the months of November through April. When voluntary monitoring is completed, results must be reported on the monthly eDMR. The in-stream phosphorus concentration and river flow rate are used to calculate the total monthly loading of phosphorus in Badfish Creek on a monthly basis.

3.3 Sample Point Number: 016- PS6 Flapgate; 017- PS7 Stoplog; 018- PS8 Stoplog; 020- PS11 Flapgate, and 021- Flapgate Upstream of PS13

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Volume		MGD	Per Occurrence	Estimated	
E. coli		#/100 ml	Per Occurrence	Grab	

3.3.1 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.

- Fecal coliform monitoring has been replaced with Escherichia coli (E. coli) monitoring.
- Sample Point 019 (SEI Upstream of PS9) has been removed since it is no longer in use.

3.3.2 Explanation of Limits and Monitoring Requirements

Sample Points 016, 017, 018, 020 and 021 are used to track potential sanitary sewage overflows from five automatic overflow structures located throughout MMSD's sanitary sewage collection system. Any discharge of untreated wastewater through any of the five overflow structures to surface water is deemed a Sanitary Sewer Overflow (SSO) and is prohibited. In addition to the "Volume" and "E. coli" monitoring requirements listed above, the permittee shall report any discharges through any of these five overflow structures to surface water as required by the Sanitary Sewage Overflows and Sewage Treatment Facility Overflows Standard Requirements section of the permit. The estimated "Volume" of the overflow and results of the "E. coli" monitoring are to be reported on the eDMRs.

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)**
002	B	Liquid	Fecal Coliform or Mesophilic Anaerobic Digestion	Injection	Land Application	7,800 Dry Tons/Year
024	B	Cake	Fecal Coliform or Mesophilic Anaerobic Digestion	Incorporation	Land Application	0 Dry Tons/Year
025	B	Composted Cake	Fecal Coliform or Mesophilic Anaerobic Digestion	Incorporation	Land Application	0 Dry Tons/Year
011	A	Cake	Fecal Coliform and Temp/Time	Volatile Solids Reduction	Exceptional Quality Bulk	780 Dry Tons/Year
022	A	Liquid	Fecal Coliform and Temp/Time	Volatile Solids Reduction	N/A – not an outfall	N/A – not an outfall
023	A	Liquid	Fecal Coliform AND either Temp/Time or Class A Compost Requirements pending feedstocks	Volatile Solids Reduction or Aerobic Process	Exceptional Quality Sludge or Exceptional Quality Bulk	0 Dry Tons/Year
012	Struvite	Solid	N/A	N/A	Hauled	608 Dry Tons/Year
Does sludge management demonstrate compliance? **Yes.**						
Is additional sludge storage required? **No.**						

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)**
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? **No.**						
Is a priority pollutant scan required? **Yes.** Priority pollutant scans are required once every 5 years if design flow is greater than 40 MGD.						

- Land Application Sample Points 013 (Class A Composted Cake) and 026 (Off-Site Storage) have been removed since they are no longer in use.

4.1 Sample Point Number: 002- Class B Anaerobically Digested Liquid; 024- Class B Anaerobically Digested Cake, and 025- Class B Composted Cake

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

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nitrogen, Ammonium (NH4-N) Total		Percent	1/ 2 Months	Composite	
Phosphorus, Total		Percent	1/ 2 Months	Composite	
Phosphorus, Water Extractable		% of Tot P	1/ 2 Months	Composite	
Potassium, Total Recoverable		Percent	1/ 2 Months	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	PCB monitoring requirements only apply to Sampling Point (Outfall) 002. Sample in 2027 as part of Priority Pollutant Scan.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	PCB monitoring requirements only apply to Sampling Point (Outfall) 002. Sample in 2027 as part of Priority Pollutant Scan.
Municipal Sludge Priority Pollutant Scan			Once	Composite	Priority Pollutant Scan monitoring requirements only apply to Sampling Point (Outfall) 002. As specified in ch. NR 215.03 (1-4), Wis. Adm. Code. Sample in 2027.
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

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.

- **PFAS** – Annual monitoring has been added pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.
- **PCBs and Priority Pollutant Scan –** The year in which PCB monitoring and the Priority Pollutant Scan is required has been updated to calendar year 2027.

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. 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: 011- Class A Centrifuged Anaerobic Cake Storage and 023- Class A Composted Cake

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

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Kjeldahl					
Nitrogen, Ammonium (NH4-N) Total		Percent	1/ 2 Months	Composite	
Phosphorus, Total		Percent	1/ 2 Months	Composite	
Phosphorus, Water Extractable		% of Tot P	1/ 2 Months	Composite	
Potassium, Total Recoverable		Percent	1/ 2 Months	Composite	
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

4.2.1 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.

- **PFAS** – Annual monitoring has been added pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.

4.2.2 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. 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. 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.

4.3 Sample Point Number: 012- Struvite Harvesting

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Weight		tons/yr	Annual	Total Annual	Report tons of product produced.
Solids, Total		Percent	Quarterly	Grab	
Fecal Coliform	Daily Max	1,000 MPN/g TS	Quarterly	Grab	

4.3.1 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.

- **Fecal Coliform and Total Solids** – Quarterly monitoring, and a daily maximum limit of 1,000 MPN/g TS for Fecal Coliform, has been added because the Department has determined that struvite meets the definition of "sewage sludge" in s. NR 204.03(55), Wis. Adm. Code.

4.3.2 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. Struvite is considered an exceptional quality sludge and the use of exceptional quality sludge is exempt from many of the requirements in ch. NR 204, Wis. Adm. Code, per NR 204.04(3), Wis. Adm. Code. Additionally, MMSD may request a variance from any non-statutory requirement in ch. NR 204, Wis. Adm. Code, and the Department may approve a variance from those requirements provided the variance will not negatively impact the environment or pose a threat to public health in accordance with s. NR 204.15(1), Wis. Adm. Code.

4.4 Sample Point Number: 022- Class A Thermophilic Digested Liquid

4.4.1 Changes from Previous Permit

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

4.4.2 Explanation of Limits and Monitoring Requirements

Sampling Point 022 is included to report the results of bimonthly monitoring for List 3, methods for Pathogen Control for Class A Sludge. Per s. NR 204.07(6)(a)1, Wis. Adm. Code, the required fecal coliform density or salmonella density shall be satisfied immediately after the Class A treatment process. This is a sample point for List 3 monitoring only and is not an outfall from which the Class A sludge is discharged for land application.

5 Schedules

5.1 Watershed Adaptive Management Option Annual Report Submittals

The permittee shall submit annual reports on the implementation of AM Plan No. AM-2025-02 (September 2025) as specified in permit Sections 3.2.1.7 and 3.2.1.8 and the following schedule.

Required Action	Due Date
Annual Adaptive Management Report #6: Submit an annual Adaptive Management (AM) report. The annual AM report shall: o Identify those actions from Section 3 of the approved adaptive management plan that were completed during the previous calendar year and those actions that are in progress; o Include total phosphorus, total suspended solids and river flow measurements; o Evaluate collected monitoring data; o Document progress in achieving the goals and measures identified in the approved adaptive management plan; o Describe the outreach and education efforts that occurred during the past calendar year; o Identify any corrections or adjustments to the adaptive management plan that are needed to achieve compliance with the phosphorus water quality standards specified in s. NR 102.06, Wis. Adm. Code; o Describe any updates needed to Madison Metropolitan Sewerage District's approved phosphorus optimization plan; o Submit results from all sample points outlined in AM Plan No. AM-2025-02 (September 2025) to the Department using the Department's Laboratory Data Entry System (LDES); and o Submit all biomonitoring results from all locations outlined in AM Plan No. AM-2025-02 (September 2025) to the Department using the Department's Laboratory Data Entry System (LDES).	07/31/2026
Annual Adaptive Management Report #7: Submit an Adaptive Management report as defined above.	07/31/2027
Annual Adaptive Management Report #8: Submit an Adaptive Management report as defined above.	07/31/2028
Annual Adaptive Management Report #9: Submit an Adaptive Management report as defined above.	07/31/2029
Final Adaptive Management Report for 2nd Permit Term: Submit the final Adaptive Management (AM) report documenting progress made during the second permit term under AM in meeting the watershed phosphorus reduction target of 65,824 lbs/yr, as well as the anticipated future reductions in phosphorus sources and phosphorus effluent concentrations, which shall be measured in accordance with the AM Plan modeling protocols. The report shall summarize AM activities that have been implemented during the current permit term and state which, if any, actions from the approved AM Plan No. AM-2025-02 (September 2025) were not pursued and why. The report shall include an analysis of trends on both a monthly and six-month average basis for concentrations and mass effluent discharged. Additionally, for informational purposes, there shall be an analysis of any improvements to the quality of surface waters in the Adaptive Management Action Area focusing on phosphorus and flow results collected during the permit term. The surface water analysis shall evaluate how the in-stream loadings have changed over the permit term in comparison to implemented AM actions.	07/31/2030

Renewal of Adaptive Management Plan for Permit Reissuance: If the permittee intends to seek renewal of AM Plan No. AM-2025-02 (September 2025) per s. NR 217.18, Wis. Adm. Code, for the reissued permit term, proposed AM goals and actions based on an updated AM Plan shall be submitted to the Department for review and approval. The permittee may propose to adjust load reductions required by AM Plan No. AM-2025-02 (September 2025) either up or down at the beginning of each WPDES permit term to reflect changes in loads associated with point and nonpoint sources. This schedule may be modified to incorporate any changes in AM goals and actions, removed if the AM program is terminated per the Adaptive Management Reopener Clause section, or removed if the adaptive management plan has achieved water quality standards as determined by the Department within the AM action area.	09/30/2030
Annual Adaptive Management Report #10: Submit an Adaptive Management report as defined above.	07/31/2031
Annual Adaptive Management Report #11: Submit an Adaptive Management report as defined above.	07/31/2032
Annual Adaptive Management Report #12: Submit an Adaptive Management report as defined above.	07/31/2033
Annual Adaptive Management Report #13: Submit an Adaptive Management report as defined above.	07/31/2034
Final Adaptive Management Report for 3rd Permit Term: Submit the final Adaptive Management (AM) report documenting progress made during the second permit term under AM in meeting the watershed phosphorus reduction target of 93,250 lbs/yr, as well as the anticipated future reductions in phosphorus sources and phosphorus effluent concentrations, which shall be measured in accordance with the AM Plan modeling protocols. The report shall summarize AM activities that have been implemented during the current permit term and state which, if any, actions from the approved AM Plan No. AM-2025-02 (September 2025) were not pursued and why. The report shall include an analysis of trends on both a monthly and six-month average basis for concentrations and mass effluent discharged. Additionally, for informational purposes, there shall be an analysis of any improvements to the quality of surface waters in the Adaptive Management Action Area focusing on phosphorus and flow results collected during the permit term. The surface water analysis shall evaluate how the in-stream loadings have changed over the permit term in comparison to implemented AM actions.	07/31/2035
Renewal of Adaptive Management Plan for Permit Reissuance: If the permittee intends to seek renewal of AM Plan No. AM-2025-02 (September 2025) per s. NR 217.18, Wis. Adm. Code, for the reissued permit term, proposed AM goals and actions based on an updated AM Plan shall be submitted to the Department for review and approval. The permittee may propose to adjust load reductions required by AM Plan No. AM-2025-02 (September 2025) either up or down at the beginning of each WPDES permit term to reflect changes in loads associated with point and nonpoint sources. This schedule may be modified to incorporate any changes in AM goals and actions, removed if the AM program is terminated per the Adaptive Management Reopener Clause section, or removed if the adaptive management plan has achieved water quality standards as determined by the Department within the AM action area.	09/30/2035
Annual Adaptive Management Report #14: Submit an Adaptive Management report as defined above.	07/31/2036
Annual Adaptive Management Report #15: Submit an Adaptive Management report as defined above.	07/31/2037

Annual Adaptive Management Report #16: Submit an Adaptive Management report as defined above.	07/31/2038
Annual Adaptive Management Report #17: Submit an Adaptive Management report as defined above.	07/31/2039
Final Adaptive Management Report: Submit the final Adaptive Management (AM) report documenting progress made throughout the AM project in meeting the watershed phosphorus reduction target of 109,706 lbs/yr, and in-stream water quality standards specified in s. NR 102.06, Wis. Adm. Code. The report shall summarize AM activities that have been implemented during the current permit term and state which, if any, actions from the approved AM Plan No. AM-2025-02 (September 2025) were not pursued and why. The report shall include an analysis of trends on both a monthly and six-month average basis for concentrations and mass effluent discharged. Additionally, there should be an analysis of any improvements to the quality of surface waters in the Adaptive Management Action Area focusing on phosphorus and flow results collected during the permit term. The surface water analysis shall evaluate how the in-stream loadings have changed over the permit term in comparison to implemented AM actions.	07/31/2040
Achieve Water Quality Standards and Adaptive Management Plan Success: All the receiving waters identified within the AM Plan No. AM-2025-02 (September 2025) shall be measured for success in accordance with Section IV of the AM Plan. Compliance may be demonstrated using effluent data and watershed modeling that uses similar assumptions as the TMDL to demonstrate that the sum total of the allocations have been achieved for each reach. If some, but not all, reaches are complying with the allocations of the TMDL, only those point sources in the complying reaches will be considered in compliance at the end of the adaptive management period. The permittee shall continue to comply with applicable effluent limits (required under s. NR 217.18(3)(e)3, Wis. Adm. Code, expressed as a 6-month avg and 1.0 mg/L monthly avg) and continue monitoring of surface waters (stream reaches 62-69 per AM-2025-02 (September 2025)) at a minimum of monthly May through October for total phosphorus. If the allocations in the TMDL have been achieved but the applicable phosphorus water quality criterion in s. NR 102.06, Wis. Adm. Code, has not been achieved in the reach for MMSD's outfall to Badfish Creek, consistent with s. 283.13(5), Wis. Stats., and Clean Water Act section 301(b)(1)(C), further evaluation and additional actions will be necessary in the next reissued permit as necessary to achieve phosphorus water quality criterion (e.g., DNR reevaluation of TMDL allocations, imposition of more stringent limits, etc.).	03/31/2041

5.1.1 Explanation of Schedule

Watershed Adaptive Management Option Annual Report Submittals – This compliance schedule requires the permittee to submit annual Adaptive Management (AM) reports that show progress towards meeting the goals and measures contained in the approved AM Plan. The schedule may be modified at permit reissuance, should changes in AM goals and measures or timing necessitate different dates for schedule items.

Pursuant to s. NR 217.18(1), Wis. Adm. Code, phosphorus water quality criteria must be achieved "as soon as possible". The duration for this adaptative management schedule is 15 years. This timeframe is consistent with the approved AM Plan, and represents the shortest possible duration based upon the following factors that influence time required for the water body to achieve the phosphorus criterion:

- Magnitude of point and/or nonpoint source phosphorus reductions required;
- Costs associated with point and/or nonpoint source phosphorus reductions;
- For nonpoint source reductions, the time required to contact landowners and receive adequate participation to implement practices;

- Physical characteristics of the watershed and receiving water, including landuse, soil properties, slopes, channel gradient, and level of legacy sediment/phosphorus currently in the system.

5.2 Chloride Source Reduction Measures (Target Value)

As a condition of the variance to the water quality-based effluent limitation(s) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code, the permittee shall perform the following actions.

Required Action	Due Date
Annual Chloride Progress Report: Submit an annual chloride progress report related to the source reduction activities for the previous year. The annual chloride progress report shall: Indicate which chloride source reduction measures or activities in the Source Reduction Plan have been implemented and state which, if any, source reduction measures from the Source Reduction Plan were not pursued and why. Include an assessment of whether each implemented source reduction measure appears to be effective or ineffective at reducing pollutant discharge concentrations and identify actions planned for the upcoming year; Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data; and Include an analysis of how effluent chloride varies with time and with significant loadings of chloride. Note that the interim limitation listed in the Surface Water section of this permit remains enforceable until new enforceable limits are established in the next permit issuance. The first annual chloride progress report is to be submitted by the Date Due.	01/31/2027
Annual Chloride Progress Report #2: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.	01/31/2028
Annual Chloride Progress Report #3: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.	01/31/2029
Annual Chloride Progress Report #4: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.	01/31/2030
Final Chloride Report: Submit the final chloride report documenting the success in meeting the chloride target value of 400 mg/L (as a weekly and monthly average), as well as the anticipated future reduction in chloride sources and chloride effluent concentrations. The report shall: Summarize chloride source reduction measures that have been implemented during the current permit term and state which, if any, source reduction measures from the Source Reduction Plan were not pursued and why; Include an assessment of which source reduction measures appear to have been effective or ineffective. Evaluate any needed changes to the pollutant reduction strategy accordingly; Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data during the current permit term; and Include an analysis of how influent and effluent chloride varies with time and with significant loadings of chloride as identified in the source reduction plan. If the permittee intends to reapply for a chloride variance, for the reissued permit, proposed target limits and a detailed source reduction measures plan, outlining the source reduction activities	09/30/2030

proposed for the upcoming permit term, shall also be included per ss. NR 106.90 (5) and NR 106.83 (4), Wis. Adm. Code. An updated source reduction measures plan shall: Include an explanation of why or how each source reduction measure will result in reduced discharge of the target pollutant; and Evaluate any available information on pollutant sources, timing, and concentration to update the mass balance assumptions and expected sources of the pollutant, and Identify any information needs that would help to better determine pollutant sources and make plans to collect that information. Note that the target value is the benchmark for evaluating the effectiveness of the chloride source reduction measures but is not an enforceable limitation under the terms of this permit.	
Annual Chloride Reports After Permit Expiration: In the event that this permit is not reissued by the date the permit expires the permittee shall continue to submit annual chloride reports for the previous year following the due date of Annual Chloride Progress Reports listed above. Annual Chloride Progress Reports shall include the information as defined above.	

5.2.1 Explanation of Schedule

Chloride Source Reduction Measures (Target Value) – This schedule is required to ensure that the permittee maintains compliance with the conditions and requirements of receiving a variance from the water quality-based chloride effluent limits of 400 mg/L expressed as a weekly average and a monthly average. Since a compliance schedule is being granted, an interim limit is required, and that limit is established as 408 mg/L (as a weekly average). The schedule requires that annual reports shall indicate which source reduction measures have been implemented during each calendar year, and an analysis of chloride concentration and mass discharge data based on chloride sampling and flow data. The annual reports shall document progress made towards meeting the chloride target value of 400 mg/L (weekly and monthly average) by the end of the permit term.

5.3 Mercury Pollutant Minimization Summary

Required Action	Due Date
Final Mercury Report: Submit a report summarizing the mercury pollutant minimization measures implemented during the current permit term and the success in maintaining effluent quality at or below the current concentrations. The report shall include an analysis of trends in quarterly and annual average mercury concentrations and total mass discharge of mercury based on mercury sampling and flow data covering the current permit term. The report shall also include an analysis of how influent and effluent mercury varies with time and with significant loadings of mercury such as loads from industries or collection system maintenance.	09/30/2030

5.3.1 Explanation of Schedule

Mercury Pollutant Minimization Summary – The permittee is required to continue pollutant minimization measures to maintain effluent quality at or below current levels. This schedule requires a report documenting the continued measures.

5.4 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
Land Application Management Plan Submittal: Submit an update to the management plan to	03/31/2027

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; and 10) include any other pertinent information. Once approved, all landspreading 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.	

5.4.1 Explanation of Schedule

Land Application Management Plan Submittal – This schedule requires the permittee to submit an updated Land Application Management Plan to demonstrate compliance with ch. NR 204, Wis. Adm. Code. The plan is due by the Due Date or at least 60 days prior to landspreading sludge.

Attachments

Water Quality-Based Effluent Limitations for Madison Metropolitan Sewerage District Wastewater Treatment Facility WPDES Permit No. WI-0024597-10-0, by Sarah Luck, Water Resources Engineer, dated December 8, 2025

Madison Metropolitan Sewerage District Source Reduction Initiatives 2026-2031 Pollutant Minimization Plan – Chloride

Chloride Variance EPA Data Sheet

Adaptive Management Plan No. AM-2025-02 (September 2025)

Adaptive Management Conditional Approval Letter (November 2025)

Justification Of Any Waivers From Permit Application Requirements

No waivers from permit application requirements were requested or granted as part of this permit reissuance.

Prepared By: Sarah Donoughe, Wastewater Specialist-Adv **Date:** December 11, 2025

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: December 8, 2025; revised in response to fact check comments

TO: Sarah Donoughe – SER/Green Bay

FROM: Sarah Luck – SCR/Fitchburg

SUBJECT: Water Quality-Based Effluent Limitations for Madison Metropolitan Sewerage District Wastewater Treatment Facility
WPDES Permit No. WI-0024597-10-0

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 the Madison Metropolitan Sewerage District (Nine Springs) Wastewater Treatment Facility in Dane County. This municipal wastewater treatment facility discharges to Badfish Creek, located in the Badfish Creek Watershed (LR-07) in the Lower Rock River Basin. This discharge is included in the Rock River TMDL as approved by EPA on 09/28/2011. 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
BOD_5			20 mg/L 8340 lbs/day	19 mg/L 7923 lbs/day		-
TSS			23 mg/L TMDL	20 mg/L TMDL		2,3
pH	9.0 s.u.	6.0 s.u.				2
Dissolved Oxygen		5.0 mg/L				2
Ammonia Nitrogen May – September October – April	 17 mg/L 17 mg/L		 4.4 mg/L 10 mg/L	 1.8 mg/L 4.1 mg/L		2
E. coli March 1 – November 30				126 #/100 mL geometric mean		4
Chloride			400 mg/L	**400 mg/L**		5
Mercury						6
PFOS and PFOA						7
Phosphorus AM Interim Limits Final Conc. Limits Final Mass Limits				 1.0 mg/L 0.225 mg/L TMDL	 0.50 mg/L 0.075 mg/L	3,8
Cadmium, Chromium, Copper, Lead, Nickel, Zinc (all as Total Recoverable)						2,9
TKN, Nitrate+Nitrite, and Total Nitrogen						2,10
Acute WET						11,13
Chronic WET				1.0 TU_c		12,13

Footnotes:

1. Monitoring only.
2. No changes from the current permit.
3. Additional TSS and phosphorus mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL.

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave Total P Effluent Limit (lbs/day)
January	6860	9591	60.48
February	8340	9591	67.38
March	8160	9591	58.59
April	8340	9591	59.90
May	8160	9591	56.76
June	8340	9591	61.19
July	8160	9591	56.17
August	7080	9591	54.09
September	4600	7690	54.13
October	7180	9591	55.40
November	8340	9591	60.14
December	7170	9591	60.11

4. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
5. These are the WQBELs for chloride. An additional limit to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code, is included in bold. If these limits are included in the permit, dry weather and wet weather mass limits would also need to be included. An alternative effluent limitation of 408 mg/L as a weekly average, which represents the upper 99th percentile of the permittee's 4−day average of the representative data, may be included in the permit in place of the WQBELs if the chloride variance application that was submitted is approved by EPA.
6. Monthly monitoring and pollutant minimization efforts are recommended to continue during the reissued permit term to maintain effluent quality at or below current levels.
7. Monthly PFOS and PFOA monitoring is recommended in accordance with s. NR 106.98(2), Wis. Adm. Code.
8. Under the phosphorus Adaptive Management (AM) Plan, the interim limits (and technology-based effluent limit (TBEL) of 1.0 mg/L, monthly average and 0.50 mg/L, six-month average should be effective upon permit reissuance. The final water quality based effluent limits are 0.225 mg/L as a monthly average, 0.075 mg/L as a six-month average, and the Rock River TMDL monthly average mass limits in the above table.
9. Monitoring for total recoverable cadmium, chromium, copper, lead, nickel, and zinc is required because MMSD implements a pretreatment program for the industries that discharge to the treatment facility.
10. As recommended in the Department's October 1, 2019 *Guidance for Total Nitrogen Monitoring in Wastewater Permits*, quarterly total nitrogen monitoring is recommended for all municipal major 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. Code, provide the authority to request this monitoring during the permit term. Total Nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total Kjeldahl nitrogen (TKN) (all expressed as N).
11. Annual acute WET monitoring is required. 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.

12. Twice annual chronic WET monitoring is required. The Instream Waste Concentration (IWC) to assess chronic test results is 100%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 75%, 50%, 25% & 12.5%. The primary control water used in chronic WET tests conducted on Outfall 001 shall continue to be standard laboratory control water that has a hardness of +/- 10% of the hardness of the Yahara River above the confluence with Badfish Creek.
13. 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. Testing should continue after the permit expiration date (until the permit is reissued).

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Sarah Luck (Sarah.Luck@wisconsin.gov) or Diane Figiel (Diane.Figiel@wisconsin.gov).

Attachments (5) – Narrative, Site Map, PFOA and PFOS Calculations, BOD and CBOD Policy Guidance, and Ammonia Nitrogen Calculations

PREPARED BY: Sarah Luck _____ Date: December 8, 2025

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Attachment #1

Water Quality-Based Effluent Limitations for
Madison Metropolitan Sewerage District Wastewater Treatment Facility

WPDES Permit No. WI-0024597-10-0

PART 1 – BACKGROUND INFORMATION

Facility Description

Madison Metropolitan Sewerage District (MMSD) Wastewater Treatment Facility (also known as the Nine Springs Wastewater Treatment Plant) is located in Madison, Wisconsin and handles the wastewater from five cities, eight villages, and some or all of eight towns representing 24 separate sanitary districts, all located in Dane County. Preliminary treatment is performed by fine screening of inorganic solids and separation of grit in vortex grit tanks. The inorganic solids and grit are hauled to the Dane County Landfill for disposal. The wastewater receives primary and advanced secondary treatment. The advanced secondary treatment system is composed of aeration tanks with selectors and clarifiers. Phosphorus removal is accomplished biologically in this process. Following final clarification, the treated water is disinfected using ultraviolet disinfection. Treated effluent is discharged to Badfish Creek; discharge to Badger Mill Creek via Outfall 005 was permanently discontinued on 8/16/2024.

In order to comply with the total phosphorus effluent limitations calculated based on s. NR 217.13, Wis. Adm. Code, and the Rock River TMDL, MMSD will continue to implement a Department-approved Adaptive Management Plan to pursue final phosphorus limit compliance. This effort will involve close partnerships with MMSD, Village of Oregon, City of Stoughton, WDNR Nevin Fish Hatchery, various Municipal Separate Storm Sewer Systems (MS4s) within the Yahara River watershed, County Land & Water Conservation Departments, NGOs, Lake Management Groups, and the agricultural community in an effort to reduce in-stream phosphorus concentrations in Badfish Creek and the Yahara River watershed.

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

Existing Permit Limitations

The current permit, which expired on March 31, 2025, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
$CBOD_5$			20 mg/L 8340 lbs/day	19 mg/L 7923 lbs/day		-
TSS			23 mg/L TMDL	20 mg/L TMDL		2
pH	9.0 s.u.	6.0 s.u.				3
Dissolved Oxygen		5.0 mg/L				3
Ammonia Nitrogen May – September October – April	 17 mg/L 17 mg/L		 4.4 mg/L 10 mg/L	 1.8 mg/L 4.1 mg/L		-

Attachment #1

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Fecal Coliform April 15 to October 15			**780#/100 mL** **geometric mean**	400#/100 mL geometric mean		4,5
Chloride November – March April – October			 465 mg/L 430 mg/L			6
Mercury	3.4 ng/L					7
Phosphorus AM Interim Limits Final Conc. Limits Final Mass Limits				 1.0 mg/L 0.225 mg/L TMDL	 0.60 mg/L 0.075 mg/L	2,8
Cadmium, Chromium, Copper, Lead, Nickel, Zinc (all as Total Recoverable)						9
TKN, Nitrate+Nitrite, and Total Nitrogen						1
Acute WET						10
Chronic WET						10

Footnotes:

1. Monitoring only.
2. Additional TSS and phosphorus mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL.

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave Total P Effluent Limit (lbs/day)
January	6860	9591	60.48
February	8340	9591	67.38
March	8160	9591	58.59
April	8340	9591	59.90
May	8160	9591	56.76
June	8340	9591	61.19
July	8160	9591	56.17
August	7080	9591	54.09
September	4600	7690	54.13
October	7180	9591	55.40
November	8340	9591	60.14
December	7170	9591	60.11

3. These limitations are not being evaluated as part of this review since the water quality criteria, reference effluent flow rates, and receiving water characteristics have not changed.
4. A compliance schedule was given to extend the disinfection season from April 15 through October 15 annually through October 15, 2022. Beginning March 1, 2023, disinfection was required March 1 through November 30 annually.
5. An additional limit to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code, is included in bold.
6. The facility was covered under a chloride variance.

7. The facility was covered under a mercury variance.
8. The facility is complying with phosphorus limits through Adaptive Management (AM).
9. Monitoring for total recoverable cadmium, chromium, copper, lead, nickel, and zinc was required because MMSD implements a pretreatment program for the industries that discharge to the treatment facility.
10. Annual acute and twice annual chronic WET tests were required. The IWC for chronic WET was 93%.

Receiving Water Information

- Name: Badfish Creek (also known as "Ditch to the Oregon Branch of Badfish Creek" and "Madison Metro Sewerage Commission effluent ditch")
- Waterbody Identification Codes (WBIC): 800800 (Badfish Creek ditch), 800700 (Oregon Branch), 799500 (Badfish Creek), and 798300 (Yahara River)
- Classifications used in accordance with chs. NR 102 and 104, Wis. Adm. Code:
    - Badfish Creek (named "Madison Metro Sewerage Commission effluent ditch" in code) is classified in ch. NR 104, Wis. Adm. Code, as limited aquatic life (LAL) from the "outfall aerator to the Oregon Branch" (approximately 3.6 miles downstream). Badfish Creek is not classified as a public water supply.
    - The confluence of Badfish Creek and Oregon Branch to CTH "A" (approximately 5.4 miles downstream of the confluence) is classified in ch. NR 104, Wis. Adm. Code, as limited forage fish (LFF).
    - Downstream of the CTH "A" bridge to the confluence with the Yahara River, near Cooksville, is classified a warmwater sport fish (WWSF) community.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code:
    - Badfish Creek
      The following 7-Q_{10} and 7-Q_2 values are from USGS for Station LR57, where Outfall 001 is located.
      7-Q_{10} = 0 cubic feet per second (cfs)
      7-Q_2 = 0 cfs
      90-Q_{10} = 0 cfs
      Harmonic Mean Flow = 0 cfs
    - Confluence of Badfish Creek and the Oregon Branch
      The following 7-Q_{10} and 7-Q_2 values are from USGS station located at the NW ¼ of SE ¼ of SEC. 6, T5N-R10E.
      7-Q_{10} = 0.20 cfs
      7-Q_2 = 0.37 cfs
- Hardness = 405 mg/L as $CaCO_3$. Effluent hardness is used in place of receiving water because there is no receiving water flow upstream of the discharge.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: Not applicable where the receiving water low flows are zero.
- Source of background concentration data: Background concentrations are not included because they do not impact the calculated WQBEL when the receiving water low flows are equal to zero.
- Multiple dischargers: There are several downstream dischargers to Badfish Creek, Oregon Branch, and the Yahara River. However, these dischargers are not in the immediate vicinity of Outfall 001 and the mixing zones do not overlap. Therefore, the other dischargers do not impact the limits for Outfall 001.
- Impaired water status: Badfish Creek is listed as impaired for PCBs at the point of discharge, as is the

Oregon Branch, approximately 3.6 miles downstream of the outfall. The Yahara River from its mouth at the Rock River to Badfish Creek (miles 0 to 7.3) was listed in the 1998 cycle due to elevated levels of phosphorus and sediment/TSS causing low dissolved oxygen and degraded habitat. Approximately 26 miles downstream of the outfall, the Rock River is listed as impaired for phosphorus and TSS. A TMDL has been approved for the entire Rock River Basin for phosphorus and TSS.

Effluent Information

- Flow rates:
  Design annual average = 50 million gallons per day (MGD)
  Peak daily = 65 MGD
  Peak weekly = 62.5 MGD
  Peak monthly = 57.5 MGD
  For reference, the actual average flow from May 2020 through April 2025 was 36 MGD.
- Hardness = 405 mg/L as $CaCO_3$. This value represents the geometric mean of four samples collected in March 2024 which were reported on the permit application.
- Wastewater source: Domestic wastewater with 25 industrial contributors.
- Water supply: The following municipal waterworks were listed as water supply sources in the permit application: Village of McFarland, Verona Sewer and Water, Monona Water Utility, City of Middleton, and City of Madison.
- Additives: MMSD has included nine additives in the permit application that have the potential to be present in Outfall 001. These additives are:
  - Clarifloc CE 1880 - WAS Thickening
  - Clarifloc CE 1881 - Digested Sludge Thickening
  - Clarifloc CE 1898 - Centrifuge Thickening
  - Foam-A-Tac 435 - Digester Defoamant
  - Ferric Chloride - Hydrogen Sulfide Reduction
  - Magnesium Chloride - Struvite Molar Ratio Balance
  - Calcium Hypochlorite - Effluent Reuse Chlorination
  - Sodium Hypochlorite - Effluent Reuse Chlorination
  - Sodium Hydroxide - pH Balancing in the struvite recovery process

  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 initial review for the listed additives.
- Effluent characterization: This facility is categorized as a major municipal discharger, 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, Cl, Cr, Cu, Pb, Hg, Ni, and Zn from May 2020 through April 2025 is used in this evaluation.
- 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.

Attachment #1

Effluent Data

	Cadmium (µg/L)	Chloride (mg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Mercury (ng/L)	Nickel (µg/L)	Zinc (µg/L)
1-day P_{99}	-	447	1.50	18.7	-	1.62	2.61	105
4-day P_{99}	-	408	1.09	13.4	-	1.28	2.43	74.4
30-day P_{99}	-	384	0.62	10.7	-	1.02	1.57	58.2
Mean	0.01	370	0.38	9.27	0.12	0.89	1.17	50.2
Sample size	60	1802	60	60	60	59	60	60.0
Non-detects	58	0	33	0	58	2		0
Range	<0.134 - 0.289	248 - 488	<0.59 - 1.59	3.83 - 17.6	<1.92 - 5.02	<0.21 - 1.52	<0.91 - 2.46	30.8 - 148

"<" means that the pollutant was not detected (ND) at the indicated limit of detection. The mean concentration was calculated using zero in place of the non-detected results.
"P_{99}" refers to the 99th upper percentile value that was calculated using the procedures in s. NR 106.05(5), Wis. Adm. Code. P_{99} values are only calculated when 11 or more detected results are available for a pollutant.

The following table presents the average concentrations and loadings at Outfall 001 from May 2020 through April 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
$CBOD_5$	2.9 mg/L*	864 lbs/day
TSS	5.3 mg/L	1,593 lbs/day
pH field	7.4 s.u.	
Dissolved Oxygen	7.3 mg/L	
Ammonia Nitrogen	0.32 mg/L*	
Fecal Coliform	52#/100 mL**	
Phosphorus	0.32 mg/L	96 lbs/day
Chloride	370 mg/L	
Mercury	0.89 ng/L*	

*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.

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.

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) and mercury (ng/L).

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0 cfs

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	339.8	68.0	<1.1		
Cadmium	405	143.6	143.6	28.7	0.01		
Chromium	301	4446	4445.8			1.50	1.59
Copper	405	58.1	58.1			18.7	17.6
Lead	356	365	364.7	72.9	0.12		
Mercury (ng/L)		830	830			1.62	1.52
Nickel	268	1080	1080.3			2.61	2.46
Zinc	333	345	344.7			105	148
Chloride (mg/L)		757	757.0			447	488

* Per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016 consideration of ambient concentrations and 1-Q_{10} flow rates yields a more restrictive limit than the 2 × ATC method of limit calculation.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	REF. HARD.* mg/L	CTC	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Arsenic		152.2	152	30.4	<1.1	
Cadmium	175	3.82	3.82	0.8	0.01	
Chromium	301	325.75	326	65.2		1.09
Copper	405	34.26	34.3	6.85		13.4
Lead	356	95.51	95.5	19.1	0.12	
Mercury (ng/L)		440	440	88.0		1.28
Nickel	268	169.08	169	33.8		2.43
Zinc	333	344.68	345	68.9		74.4
Chloride (mg/L)		395	395			**408**

Monthly Average Limits based on Wildlife Criteria (WC)

RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	WC	MO'LY AVE. LIMIT	30-day P_{99}
Mercury (ng/L)	1.3	1.3	1.02

Monthly Average Limits based on Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	HTC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Antimony	1120	1120	224.0	0.43	
Cadmium	880	880	176.0	0.01	
Chromium (+3)	8400000	8400000			0.62
Lead	2240	2240		0.12	
Mercury (ng/L)	336	336.0			1.02
Nickel	110000	110000			1.17

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	HCC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	40	40.0	8.00	<1.1
Chloroform	11200	11200	2240	0.48
1,4-Dichlorobenzene	2940	2940	588.0	0.41

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. Since no effluent limits

are needed based on HCC, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

Conclusions and Recommendations
Based on a comparison of the effluent data and calculated effluent limitations, **effluent limitations are required for chloride**. Limits and monitoring recommendations are made in the paragraphs below.

Chloride – Considering available effluent data from the current permit term (May 2020 through April 2025), the 1-day P_{99} chloride concentration is 447 mg/L, the 4-day P_{99} of effluent data is 408 mg/L, and the peak weekly average is 448 mg/L. Since the 4-day P_{99} and the max weekly average exceed the calculated weekly average WQBEL, an effluent limit is needed in accordance with s. NR 106.05(4)(b), Wis. Adm. Code.

However, Subchapter VII of ch. NR 106, Wis. Adm. Code, provides for a variance from water quality standards for this substance, and MMSD has requested such a variance. That variance may be granted subject to the following conditions:
1) The permit shall include an "Interim" limitation intended to prevent an increase in the discharge of chloride;
2) The permit shall specify "Source Reduction Measures" to be implemented during the permit term, with periodic progress reports; and
3) The permit shall include a "Target Limit" or "Target Value" to gage the effectiveness of the Source Reduction Measures, and progress toward the WQBELs.

Interim Limit for Chloride
Section NR 106.82(9), Wis. Adm. Code, defines a "Weekly average interim limitation" as either the 4-day P_{99} concentration or 105% of the highest weekly average concentration of the representative data.

The current permit includes seasonal interim weekly average limits of 430 mg/L for April through October and 465 mg/L for November through March. The following table shows a statistical breakdown of effluent chloride data from the current permit term (May 2020 through April 2025).

MMSD Effluent Chloride Concentration (mg/L)			
	All Data	**April – October**	**November – March**
1-day P_{99}	447	435	450
4-day P_{99}	408	397	416
Mean	370	361	384
Standard deviation	30.64	29.57	26.64
Sample size	1802	1059	743
Range	248 - 488	248 - 476	301 - 488

In review of effluent chloride data from the current permit term, the difference between the chloride levels observed between the two seasons has apparently decreased. The average and peaks have also decreased. As a result, **a year-round weekly average interim limitation of 408 mg/L is recommended for permit reissuance**. This value is equal to the 4-day P_{99} of representative effluent data.

A target limit and permit language for Source Reduction Measures are not recommended as part of this evaluation. These should follow contact with MMSD. If the Department and MMSD are unable to reach

agreement on all the terms of a chloride variance, the calculated limits described below should be included in the permit, in accordance with s. NR 106.83(3), Wis. Adm. Code.

Chloride Monitoring Recommendations
Daily sampling is recommended to continue. Sampling on consecutive days allows for averaging of the results to compare with the interim limit and allows the use of the average in determining future interim limits, and degree of success with chloride reduction measures.

In the absence of a variance, MMSD would be subject to the water quality-based effluent limit of 400 mg/L (395 mg/L, rounded) as a weekly average, the weekly average mass limit of 165,000 lbs/day (395 mg/L x 50 MGD x 8.34), and a wet weather mass limit of 206,000 lbs/day (395 mg/L x 62.5 MGD x 8.34) using the peak weekly flow rate in accordance with s. NR 106.07(9), Wis. Adm. Code. The wet weather mass limit applies when the dry weather mass limit is exceeded and the facility demonstrates to the Department the exceedance occurred during a wet weather event. An additional concentration limit of 400 mg/L (395 mg/L, rounded) as a monthly average to meet the expression of limits requirements in s. NR 106.07, Wis. Adm. Code, would also be required.

Mercury – Considering available effluent data from the current permit term (n = 59, May 2020 – April 2025), the 1-day, 4-day, and 30-day P_{99} values are 1.62 ng/L, 1.28 ng/L, and 1.02 ng/L, respectively. These levels are below the calculated mercury WQBELs; therefore, **no mercury limits are recommended during the reissued permit term. Monthly monitoring and pollutant minimization measures (PMP) efforts are recommended to continue during the reissued permit term to maintain effluent quality at or below current levels.**

The current permit has the interim limit of 3.4 ng/L as a daily maximum and is an alternative mercury effluent limit based on the variance granted by EPA as described in s. NR 106.145(4), Wis. Adm. Code. **This limit is recommended to be removed during the reissued permit term because reasonable potential for mercury WQBELs is not demonstrated.**

Antidegradation and Antibacksliding
Since current treatment capability and PMPs are expected to remain in place, the removal of the daily maximum mercury variance limit will not increase the concentration, level, or loading of mercury to Badfish Creek. Therefore, antidegradation would not be applicable. To be consistent with antibacksliding requirements, the current limit may be removed in accordance with s. NR 207.12(4)(b), Wis. Adm. Code.

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code.

Water Quality Based Limit
Administrative rules for PFOS and PFOA took effect on August 1, 2022. These rule revisions include additions to ch. NR 102 (s. NR 102.05), Wis. Adm. Code, which establish PFOS and PFOA standards for surface waters. Revisions to ch. NR 106 (s. NR 106, Subchapter VIII), Wis. Adm. Code establish procedures for determining water quality based effluent limits for PFOS and PFOA, based on the applicable standards in ch. NR 102, Wis. Adm. Code.

PFOS

Due to PFOS being a bioaccumulating compound of concern (BCC), no mixing zone is allowed pursuant s. NR 106.98(4), Wis. Adm. Code. Therefore, the effluent limit for PFOS is set equal to the criterion (8 ng/L).

PFOA

The conservation of mass equation is described in s. NR 106.06(4)(b)1., Wis. Adm. Code, and includes variables of water quality criterion (WQC), receiving water flow rate (Qs), effluent flow rate (Qe), and upstream PFOA concentrations (Cs) provided below.

$$\text{Limitation} = [(WQC)(Qs+(1-f)\ Qe) - (Qs-f\ Qe)\ (Cs)]/Qe$$

Where:

WQC = 95 ng/L for Badfish Creek
Qs = 25% of the harmonic mean pursuant s. NR 106.06(4)(c)10., Wis. Adm. Code = 0 cfs
Cs = background concentration of PFOA in the receiving water pursuant to s. NR 106.06(4)(e), Wis. Adm. Code
Qe = effluent flow rate = 50 MGD = 77.4 cfs
f = the fraction of effluent withdrawn from the receiving water = 0

After substituting the appropriate variables, the calculated PFOA limit is 95 ng/L.

Reasonable Potential Determination

MMSD voluntarily collected 42 PFOS and 42 PFOA samples from January 2021 through December 2024, shown in the table below. The complete dataset can be found in Attachment #3.

PFOS and PFOA Effluent Data

	PFOS (ng/L)	PFOA (ng/L)
1-day P_{99}	12.46	13.90
4-day P_{99}	8.01	10.99
30-day P_{99}	5.75	9.39
Mean	4.68	8.56
Std	2.31	1.89
Sample Size	42	42
Range	1.58 – 17	6.5 – 16.8

In accordance with s. NR 106.98(4)(a), Wis. Adm. Code, **the discharge does not have reasonable potential to cause or contribute to an exceedance of the water quality criterion for PFOS** because the 30-day P_{99} of reported effluent PFOS data (5.75 ng/L) is less than the calculated WQBEL (8 ng/L). Therefore, **a WQBEL is not required.**

The discharge does not have reasonable potential to cause or contribute to an exceedance of the water quality criterion for PFOA because the 30-day P99 of reported effluent PFOA data (9.39 ng/L) is less than the calculated WQBEL (95 ng/L). Therefore, **a WQBEL is not required.**

Conclusions

The discharge has no reasonable potential to cause or contribute to an exceedance of the water quality

criterion for PFOS nor PFOA. Therefore, no WQBELs are required. However, based on the effluent flow rate, the types of indirect dischargers contributing to the collection system, and known levels of PFOS/PFOA in the source water, **PFOS and PFOA monitoring is recommended at a monthly frequency.**

PART 3 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BIOLOGICAL OXYGEN DEMAND

Biological oxygen demand (BOD) includes oxygen demand from both carbon sources and ammonia nitrification (BOD = CBOD + NBOD). Chapter NR 210, Wis. Adm. Code, includes an option for Carbonaceous biological oxygen demand ($CBOD_5$) categorical limits to be used in place of BOD_5 categorical limits. $CBOD_5$ WQBEL derivation, however, is not specified in code. Historical Department guidance recommends that a facility provide concurrent monitoring for BOD_5, $CBOD_5$, ammonia, and nitrate (the same requirements that are to be used to determine if a significant portion of BOD_5 is from NBOD). MMSD completed this, and $CBOD_5$ WQBEL limits were set equal to the BOD_5 WQBEL limits in the current permit. However, based on updated information examined by the Department, $CBOD_5$ WQBELs equal to BOD_5 WQBELs essentially result in a less restrictive limit.

Categorical limits for BOD_5 are based on the expected performance of biological treatment technology to remove organic materials and solids which can degrade through biological processes. BOD_5 WQBELs, however, are set only to ensure that dissolved oxygen criteria are met in the receiving water and do not consider the effectiveness of the treatment system. In the WQBEL context, any oxygen demand, whether it is carbonaceous or nitrogenous, can cause non-attainment of water quality criteria.

For this reason, any $CBOD_5$ WQBELs would need to account for NBOD in order to be protective of water quality. A protective $CBOD_5$ WQBEL would equal the BOD_5 WQBEL minus the ultimate NBOD. In most cases, this would result in a $CBOD_5$ WQBEL limit that is more restrictive than the original BOD_5 WQBEL, and therefore, $CBOD_5$ WQBELs are generally not recommended.

In an Issue Brief dated January 6, 2020 (see Attachment #4) **it is recommended that MMSD revert to the BOD_5 limits previously in effect of 20 mg/L as a weekly average and 19 mg/L as a monthly average, as well as the corresponding mass limits.**

Effluent Data

For informational purposes, the following table presents effluent $CBOD_5$ data from May 2020 through April 2025.

$CBOD_5$ Effluent Data

	Concentration (mg/L)	Mass (lbs/day)
1-day P_{99}	5.5	2046
4-day P_{99}	4.5	1375
30-day P_{99}	3.4	1030
Mean*	2.9	864
Std	0.82	366
Sample size	1813 (160 ND)	1813
Range	<2.0 - 11.2	0 - 3169

*"<" 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 (ND) result. Mass was reported as 0 lbs/day when the concentration was a ND.

Along with the BOD_5 limits, **the dissolved oxygen limit of 5.0 mg/L is recommended to continue**.

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

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. The current permit has daily maximum, weekly average, and monthly average limits.

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:

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

Where:

A = 0.633 and B = 90.0 for Limited Aquatic Life, and
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 1821 sample results were reported from May 2020 through April 2025. The maximum reported value was 7.7 s.u. (Standard pH Units). The effluent pH was 7.6 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 7.6 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 7.6 s.u. Therefore, a value of 7.6 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 7.6 s.u. into the equation above yields an ATC = 26.25 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	53
1-Q_{10}	26

The 1-Q_{10} method yields the most stringent limits for MMSD.

The limit of 26 mg/L, calculated above, is greater than the current daily maximum limit of 17 mg/L. If MMSD 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), Wis. Adm. Code, 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 daily maximum limit of 17 mg/L must be continued in the reissued permit.**

Presented below is a table of daily maximum limitations corresponding to various effluent pH values. Use of this table is not necessarily recommended in the permit, but it is presented herein for informational purposes.

Daily Maximum Ammonia Nitrogen Limits – LAL

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	83	7.0 < pH ≤ 7.1	51	8.0 < pH ≤ 8.1	11
6.1 < pH ≤ 6.2	82	7.1 < pH ≤ 7.2	46	8.1 < pH ≤ 8.2	8.8
6.2 < pH ≤ 6.3	80	7.2 < pH ≤ 7.3	40	8.2 < pH ≤ 8.3	7.3
6.3 < pH ≤ 6.4	78	7.3 < pH ≤ 7.4	35	8.3 < pH ≤ 8.4	6.0
6.4 < pH ≤ 6.5	75	7.4 < pH ≤ 7.5	31	8.4 < pH ≤ 8.5	5.0
6.5 < pH ≤ 6.6	72	7.5 < pH ≤ 7.6	26	8.5 < pH ≤ 8.6	4.1
6.6 < pH ≤ 6.7	69	7.6 < pH ≤ 7.7	22	8.6 < pH ≤ 8.7	3.4
6.7 < pH ≤ 6.8	65	7.7 < pH ≤ 7.8	19	8.7 < pH ≤ 8.8	2.8
6.8 < pH ≤ 6.9	60	7.8 < pH ≤ 7.9	16	8.8 < pH ≤ 8.9	2.4
6.9 < pH ≤ 7.0	56	7.9 < pH ≤ 8.0	13	8.9 < pH ≤ 9.0	2.0

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)
The weekly and monthly average ammonia nitrogen limits calculation do not change because there have been no changes in the effluent and receiving water flow rates. The calculations from the 2004 WQBEL memo are shown in Attachment #5.

Effluent Data
The following table evaluates the statistics based upon ammonia data reported from May 2020 through April 2025.

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen (mg/L)	May – September	October – April
1-day P_{99}	2.45	2.22
4-day P_{99}	1.38	1.21
30-day P_{99}	0.61	0.59
Mean*	0.30	0.34
Std	0.57	0.49
Sample size	761 (39 ND)	1052 (90 ND)
Range	<0.06 - 6.63	<0.06 - 3.91

*"<" 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 (ND) result.

Reasonable Potential
The need to include ammonia limits in MMSD's permit is determined by calculating 99th upper percentile (or P_{99}) values for ammonia during the month ranges 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 daily, 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.

Final Ammonia Nitrogen Limits

	Daily Maximum (mg/L)	Weekly Average (mg/L)	Monthly Average (mg/L)
May – September	17	4.4	1.8
October – April	17	10	4.1

PART 5 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

On May 1, 2020, revisions to chs. NR 102 and NR 210, Wis. Adm. Code, 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. Since MMSD's permit requires twice per week 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 March 1 through November 30.

Effluent Data
MMSD has monitored effluent *E. coli* from May 2024 through November 2024, and a total of 30 results are available. A geometric mean of 126 counts/100 mL was not exceeded with a maximum monthly geometric mean of 100 counts/100 mL. Effluent data did not exceed 410 counts/100 mL, and the maximum reported value was 184 counts/100 mL. Based on this effluent data **it appears that the facility can meet new *E. coli* limits, and a compliance schedule is not needed in the reissued permit.**

PART 6 – PHOSPHORUS

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

Since MMSD currently has a phosphorus limit equal to the TBEL limit of 1.0 mg/L as a monthly average, the need for a TBEL will not be considered further.

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

TMDL Limits
The Department has developed a TMDL for the Upper and Lower Rock River Basins. The US EPA approved the Rock River TMDL on September 28, 2011. The document, along with the referenced appendices, can be found at: https://dnr.wisconsin.gov/topic/TMDLs/RockRiver/index.html.

The monthly average total phosphorus effluent limits in pounds per day (lbs/day) are calculated based on the monthly phosphorus wasteload allocation (WLA) given in pounds per month as suggested in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* dated April 15, 2013. The WLA for this facility is found in the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin* report dated July 2011. The limits are equivalent to concentrations ranging from 0.129 mg/L to 0.161 mg/L at the facility design flow of 50 MGD. **Monthly average mass effluent limits in accordance with the following table are recommended for this discharge.**

Total Phosphorus Effluent Limitations

Month	Monthly Total P WLA[1] (lbs/month)	Days Per Month	Monthly Ave Total P Effluent Limit[2] (lbs/day)
January	1874.87	31	**60.48**
February	1886.69	28	**67.38**
March	1816.15	31	**58.59**
April	1796.94	30	**59.90**
May	1759.56	31	**56.76**
June	1835.71	30	**61.19**
July	1741.16	31	**56.17**
August	1676.93	31	**54.09**
September	1623.92	30	**54.13**
October	1717.37	31	**55.40**

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Month	Monthly Total P WLA[1] (lbs/month)	Days Per Month	Monthly Ave Total P Effluent Limit[2] (lbs/day)
November	1804.09	30	**60.14**
December	1863.48	31	**60.11**

Footnotes:
1- Appendix P. Monthly Total Phosphorus Allocations by Wastewater Treatment Facility (p. 147)
2- Monthly Average Total P effluent limit (lbs/day) = monthly Total P WLA (lbs/month) ÷ days per month

The TMDL-derived limits should be expressed in a manner consistent with the wasteload allocation and assumptions of the TMDL.

Point of Discharge Limits
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, Wis. Adm. Code, WQBEL in a WPDES permit. Since the receiving water is not a direct impaired segment covered under an approved TMDL, both TMDL-based limits and s. NR 217.13, Wis. Adm. Code, WQBELs are required.

As a limited aquatic life water, Badfish Creek does not have an applicable phosphorus criterion at Outfall 001. However, a phosphorus criterion of 0.075 mg/L applies for the Oregon Branch, located approximately 3.6 miles below the discharge, where the waterbody is classified as limited forage fish. Section NR 217.13, Wis. Adm. Code, limits are required to protect the downstream water of Oregon Branch where the classification changes and since the Oregon Branch was not listed as impaired prior to TMDL development and therefore the Rock River TMDL does not include a wasteload allocation that ensures compliance with the phosphorus criterion in the Oregon Branch.

The conservation of mass equation is described in s. NR 217.13(2)(a), Wis. Adm. Code, for phosphorus WQBELs and includes variables of water quality criterion (WQC), receiving water flow rate (Qs), effluent flow rate (Qe), and upstream phosphorus concentrations (Cs):

$$\text{Limitation} = [(WQC)(Qs+(1-f)\ Qe) - (Qs-f\ Qe)\ (Cs)]/Qe$$

Where: WQC = 0.075 mg/L for Oregon Branch
Qs = 100% of the 7-Q_2 of 0.37 cfs at the downstream location
Cs = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code
Qe = effluent flow rate = 50 MGD = 77.3 cfs
f = the fraction of effluent withdrawn from the receiving water = 0

Section NR 217.13(2)(d), Wis. Adm. Code, specifies that the background phosphorus concentration used in the limit calculation formula shall be calculated as a median using the procedures specified in s. NR 102.07(1)(b) to (c), Wis. Adm. Code. All representative data from the most recent 5 years shall be used, but data from the most recent 10 years may be used if representative of current conditions.

A previous evaluation resulted in a WQBEL of 0.075 mg/L. Section NR 217.13(2)(d), Wis. Adm. Code, states that the determination of upstream concentrations shall be evaluated at each permit reissuance. No

upstream data are available nor are any additional data than were considered in the previous evaluation, shown in the table below.

SWIMS ID	133044	10012601	543226
Station Name	Yahara River at U.S. Hwy 51	Badfish Creek - Casey Road	Yahara River at Sth 59 Near Fulton WI
Waterbody	Yahara River	Badfish Creek	Yahara River
Sample Count	6	6	20
First Sample	10/21/2008	10/18/2006	05/01/2000
Last Sample	09/15/2009	09/18/2007	09/18/2007
Mean	0.0782	0.304	0.219
Median	0.0765	0.294	0.208

Substituting a median value above criteria into the limit calculation equation above would result in a calculated limit that is less than the applicable criterion of 0.075 mg/L. However, s. NR 217.13(7), Wis. Adm. Code, specifies that "if the water quality-based effluent limitation calculated pursuant to the procedures in this section is less than the phosphorus criterion specified in s. NR 102.06, Wis. Adm. Code, for the water body, the effluent limit shall be set equal to the criterion."

Limit Expression
Since the calculated WQBEL is less than or equal to 0.3 mg/L, the effluent limit of 0.075 may be expressed as a six-month average. If a concentration limitation expressed as a six-month average is included in the permit, a monthly average concentration limitation of 0.225, equal to three times the WQBEL calculated under s. NR 217.13 shall also be included in the permit. The six-month average should be averaged during the months of May – October and November – April.

Mass Limits
A mass limit is also required since the discharge is upstream of a surface water that has an approved TMDL. The **monthly average mass limits based on WLA, discussed above, are recommended**.

Effluent Data
The following table summarizes effluent total phosphorus monitoring data from May 2020 through April 2025.

Total Phosphorus Effluent Data

	Concentration (mg/L)	**Mass (lbs/day)**
1-day P_{99}	0.90	262
4-day P_{99}	0.57	167
30-day P_{99}	0.40	119
Mean	0.32	96
Std	0.17	48.9
Sample size	1813 (1 ND)	1813
Range	<0.06 - 2.01	0 - 542

"<" 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 (ND) result. Mass was reported as 0 lbs/day when the concentration was a ND.

Reasonable Potential Determination
The discharge has reasonable potential to cause or contribute to an exceedance of the water quality criterion and is currently operating the treatment facility to remove phosphorus and meet the WQBELs. Therefore, **the WQBELs and TMDL mass limits are required to continue in the reissued permit per ss. NR 217.15 and 205.067(5), Wis. Adm. Code.**

Adaptive Management Interim Limit
MMSD intends to pursue adaptive management (AM) to comply with the total phosphorus effluent limitations calculated based on s. NR 217.13, Wis. Adm. Code, and the Rock River TMDL. Since this is the second permit term in which AM is being pursued, **the required interim limits are 0.50 mg/L, expressed as a 6-month average, and 1.0 mg/L, expressed as a monthly average,** per s. NR 217.18(3)(e)3, Wis. Adm. Code.

MMSD currently has an AM interim limit of 0.6 mg/L as a six-month average. The six-month average effluent data from the current permit term is shown below. Based on this data, **it appears MMSD can meet the 0.50 mg/L six-month average interim limit, and no compliance schedule is recommended in the reissued permit.**

Effluent Total Phosphorus Six-month Averages

	Concentration (mg/L)
May 2020 - Oct 2020	0.29
Nov 2020 - April 2021	0.28
May 2021 - Oct 2021	0.37
Nov 2022 - April 2022	0.29
May 2022 - Oct 2022	0.37
Nov 2022 - April 2023	0.25
May 2023 - Oct 2023	0.46
Nov 2023 - April 2024	0.27
May 2024 - Oct 2024	0.36
Nov 2024 - April 2025	0.25

PART 7 – TOTAL SUSPENDED SOLIDS

TMDL Limits
The Rock River TMDL also has wasteload allocations (WLA) for total suspended solids (TSS).

Total Suspended Solids (TSS) Effluent Limitations

Month	Monthly TSS WLA[1] (tons/month)	Days Per Month	Monthly Ave TSS Effluent Limit from WLA[2] (lbs/day)	Weekly Ave TSS Effluent Limit from WLA[3] (lbs/day)	Recommended Monthly Ave TSS Effluent Limit (lbs/day)	Recommended Weekly Ave TSS Effluent Limit (lbs/day)
Jan	106	31	6860	11500	**6860**	**9591**
Feb	119	28	8470	14100	**8340**	**9591**
March	126	31	8160	13600	**8160**	**9591**
April	126	30	8430	14100	**8340**	**9591**

Attachment #1

Month	Monthly TSS WLA[1] (tons/month)	Days Per Month	Monthly Ave TSS Effluent Limit from WLA[2] (lbs/day)	Weekly Ave TSS Effluent Limit from WLA[3] (lbs/day)	Recommended Monthly Ave TSS Effluent Limit (lbs/day)	Recommended Weekly Ave TSS Effluent Limit (lbs/day)
May	126	31	8160	13600	**8160**	**9591**
June	126	30	8430	14100	**8340**	**9591**
July	126	31	8160	13600	**8160**	**9591**
Aug	110	31	7080	11800	**7080**	**9591**
Sept	69.1	30	4600	7690	**4600**	**7690**
Oct	111	31	7180	12000	**7180**	**9591**
Nov	126	30	8430	14100	**8340**	**9591**
Dec	111	31	7170	12000	**7170**	**9591**

Footnotes:
1- Appendix Q. Monthly Total Suspended Solids Allocations by Wastewater Treatment Facility (p. 149)
2- Monthly average TSS effluent limit (lbs/day) = maximum monthly TSS WLA (tons/month) ÷ days per month x 2,000 lbs/ton
3- Weekly average effluent limit (lbs/day) = monthly average limit (lbs/day) x 1.67 multiplier

Prior to TMDL implementation, the permit contained weekly average and monthly average mass limits for TSS of 9591 lbs/day and 8340 lbs/day, respectively. The TSS mass limits already in effect were retained in months where the TMDL limit was less restrictive.

For September, the TMDL weekly average mass limits was calculated using a coefficient of variation (the standard deviation divided by the mean) of 0.31 and the daily monitoring frequency to derive a multiplier of 1.67. Using updated TSS mass data, the coefficient of variation is calculated to be 0.52 (= 829 ÷ 1593). This value, along with the daily monitoring frequency, would yield a multiplier of 2.18. However, **since MMSD is currently meeting the WLA, the TSS mass limits do not need to be reevaluated at this time.**

Effluent Data
Limits based on a WLA should be given in a permit regardless of reasonable potential. However, for informational purposes, the following table lists the statistics for TSS discharge, as both a concentration and a mass, from May 2020 through April 2025.

Overall TSS Effluent Data

	Concentration (mg/L)	Mass (lbs/day)
1-day P_{99}	15.7	4416
4-day P_{99}	9.7	2798
30-day P_{99}	6.7	1978
Mean	5.3	1593
Std	3.0	829.3
Sample Size	1813	1813
Range	2.1 - 68.6	622 - 18695

Attachment #1

PART 8 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in Chapters NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. The daily maximum effluent temperature limitation shall be 86 °F for discharges to surface waters classified as Limited Aquatic Life according to s. NR 104.02(3)(b)1, Wis. Adm. Code, except for those classified as wastewater effluent channels and wetlands regulated under ch. NR 103 and described in s. NR 106.55(2), Wis. Adm. Code, which has a daily maximum effluent temperature limitation of 120ºF. The 120°F limit applies because the hydrologic classification is listed as wastewater effluent channel ("effluent ditch") in ch. NR 104, Wis. Adm. Code.

Effluent Data

Temperature was last monitored from October 2012 through December 2013 and is summarized in the table below.

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	56	57	-	120
FEB	54	55	-	120
MAR	54	55	-	120
APR	55	58	-	120
MAY	61	63	-	120
JUN	65	65	-	120
JUL	69	70	-	120
AUG	70	71	-	120
SEP	70	71	-	120
OCT	68	69	-	120
NOV	63	64	-	120
DEC	58	60	-	120

Reasonable Potential

Based on the available discharge temperature data from October 2012 through December 2013, the maximum daily effluent temperature reported was 71°F. Therefore, no reasonable potential for exceeding the daily maximum limit of 120ºF exists, and **no limits or monitoring for temperature are recommended**.

Attachment #1

PART 9 – WHOLE EFFLUENT TOXICITY (WET)

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

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid 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 100%,** 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 = 50 MGD = 77 cfs
f = fraction of the Q_e withdrawn from the receiving water = 0
Q_s = 0 cfs at the outfall

- The new IWC of 100% is higher than the previous IWC of 93%. This change is because the IWC should consider the presence of aquatic organisms at the outfall and not just the code listing. The modeled natural community at the outfall is Cool-Warm Mainstem, and Department fish data indicate aquatic organisms beyond macroinvertebrates are present in the immediate receiving water and not just downstream where the classification changes. Therefore, WET determinations (including the IWC calculation) should be protective of the aquatic life community found at the outfall location.

- 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 standard laboratory control water that has a hardness of +/- 10% of the hardness of the Yahara River above the confluence with Badfish Creek, as has been used previously. A different control water may be used if prior approval has been given by the Department.

- 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.

Tests conducted prior to July 1, 2005 are not presented in the table below due to significant changes that were made to WET test methods in 2004. These changes were assumed to be fully implemented by certified labs by no later than June 2005. Data collected before July 1, 2005 do not show repeated toxicity that was never resolved and is not the only data that is available.

WET Data History

Date Test Initiated	Acute Results LC_{50} %				Chronic Results IC_{25} %				Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	*C. dubia*	Fathead Minnow	Pass or Fail?	Use in RP?	
03/09/2006	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
09/13/2007	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
05/15/2008	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
10/22/2009	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
07/20/2010	-	-	-	-	>100	>100	Pass	Yes	
03/22/2011	>100	>100	Pass	Yes	-	-	-	-	
04/05/2011	-	-	-	-	>100	>100	Pass	Yes	QA retest
05/17/2011	-	-	-	-	>100	>100	Pass	Yes	
06/26/2012	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
08/21/2012	-	-	-	-	>100	>100	Pass	Yes	
08/20/2013	-	-	-	-	82.1	100	Fail	No	1
09/24/2013	-	-	-	-	>100	>100	Pass	Yes	Retest; UV light treated
10/08/2013	-	-	-	-	>100	>100	Pass	Yes	Retest
12/10/2013	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
08/05/2014	>100	>100	Pass	Yes	-	-	-	-	
09/23/2014	-	-	-	-	>100	>100	Pass	Yes	
11/18/2014	-	-	-	-	>100	>100	Pass	Yes	
03/03/2015	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
06/16/2015	-	-	-	-	>100	>100	Pass	Yes	
05/12/2020	-	-	-	-	>100	>100	Pass	Yes	
11/03/2020	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
03/02/2021	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
05/18/2021	-	-	-	-	61.7	>100	Fail	Yes	
08/03/2021	-	-	-	-	>100	>100	Pass	Yes	Retest
04/05/2022	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
09/13/2022	-	-	-	-	>100	>100	Pass	Yes	
07/11/2023	>100	>100	Pass	Yes	93	>100	Fail	Yes	2
10/03/2023	-	-	-	-	>100	>100	Pass	Yes	
03/26/2024	>100	>100	Pass	Yes	>100	95.5	Fail	Yes	2
06/04/2024	-	-	-	-	>100	>100	Pass	Yes	
03/18/2025	>100	>100	Pass	Yes	>100	>100	Pass	Yes	

Footnotes:

1. *Qualified or Inconclusive Data.* QA concerns were noted during testing which calls into question the reliability of the test results. A retest was requested.

2. The IWC has been recalculated and has increased; therefore, this test appears as a failure based on the new IWC in WET Checklist analysis. The pass/fail setting does not impact the reasonable potential analysis.

- 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.**

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

  Acute Reasonable Potential = 0 < 1.0, reasonable potential is not shown, and **an acute WET limit is not required.**

  Chronic Reasonable Potential = [(TU_c effluent) (B)(IWC)]

Chronic WET Limit Parameters

TUc (maximum) $100/IC_{25}$	**B** (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	**IWC**
100/61.7	3.0 Based on 3 detects	100%

[(TUc effluent) (B)(IWC)] = 5.9 > 1.0

Therefore, **reasonable potential is shown for a chronic WET limit** using the procedures in s. NR 106.08(6), Wis. Adm. Code, and representative data from March 2006 through March 2025.

Expression of WET limits
Chronic WET limit = [100/IWC] TU_c = 100/100 = **1.0 TU_c expressed as a monthly average**

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

WET Checklist Summary

	Acute	**Chronic**
AMZ/IWC	Not Applicable.	IWC = 100%

Attachment #1

	Acute	Chronic
	0 Points	**15 Points**
Historical Data	15 tests used to calculate RP. No tests failed. **0 Points**	28 tests used to calculate RP. 3 tests failed (based on newly calculated IWC) **0 Points**
Effluent Variability	Some variability, no upsets or significant violations, consistent WWTF operations. **0 Points**	Same as Acute. **0 Points**
Receiving Water Classification	> 4 miles to WWSF **0 Points**	Same as Acute. **0 Points**
Chemical-Specific Data	No reasonable potential for limits based on ATC. Ammonia nitrogen limit carried over from the current permit. Cd, Cl, Cr, Cu, Pb, Hg, Ni, Zn detected. Additional Compounds of Concern: 1,4-Dichloro-benzene, antimony, and chloroform detected. **5 Points**	Reasonable potential for limits for chloride based on CTC. Ammonia nitrogen limit carried over from the current permit. Cd, Cr, Cu, Pb, Hg, Ni, Zn detected. Additional Compounds of Concern: 1,4-Dichloro- benzene, antimony, and chloroform detected. **10 Points**
Additives	3 biocides and 6 water quality conditioners added. Phosphorus removal chemicals not in use. **15 Points**	All additives used more than once per 4 days. **15 Points**
Discharge Category	25 industrial contributors including food processing, dairy operations, meat packing, and waste from other activities. **15 Points**	Same as Acute. **15 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:	**35 Points**	**55 Points**
Recommended Monitoring Frequency (from Checklist):	1x yearly	2x yearly
Limit Required?	No	Limit = 1.0 TU_c
TRE Recommended? (from Checklist)	No	No

- After consideration of the guidance provided in the Department's *WET Program Guidance Document* (2022) and other information described above, **annual acute and twice annual chronic WET tests are recommended in the reissued permit.** 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. Testing should continue after the permit expiration date (until the permit is reissued).

- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, **a chronic WET limit is required. The chronic WET limit shall be expressed as 1.0 TU_c as a monthly average** in the effluent limits table of the permit. A minimum of annual chronic monitoring is required because a

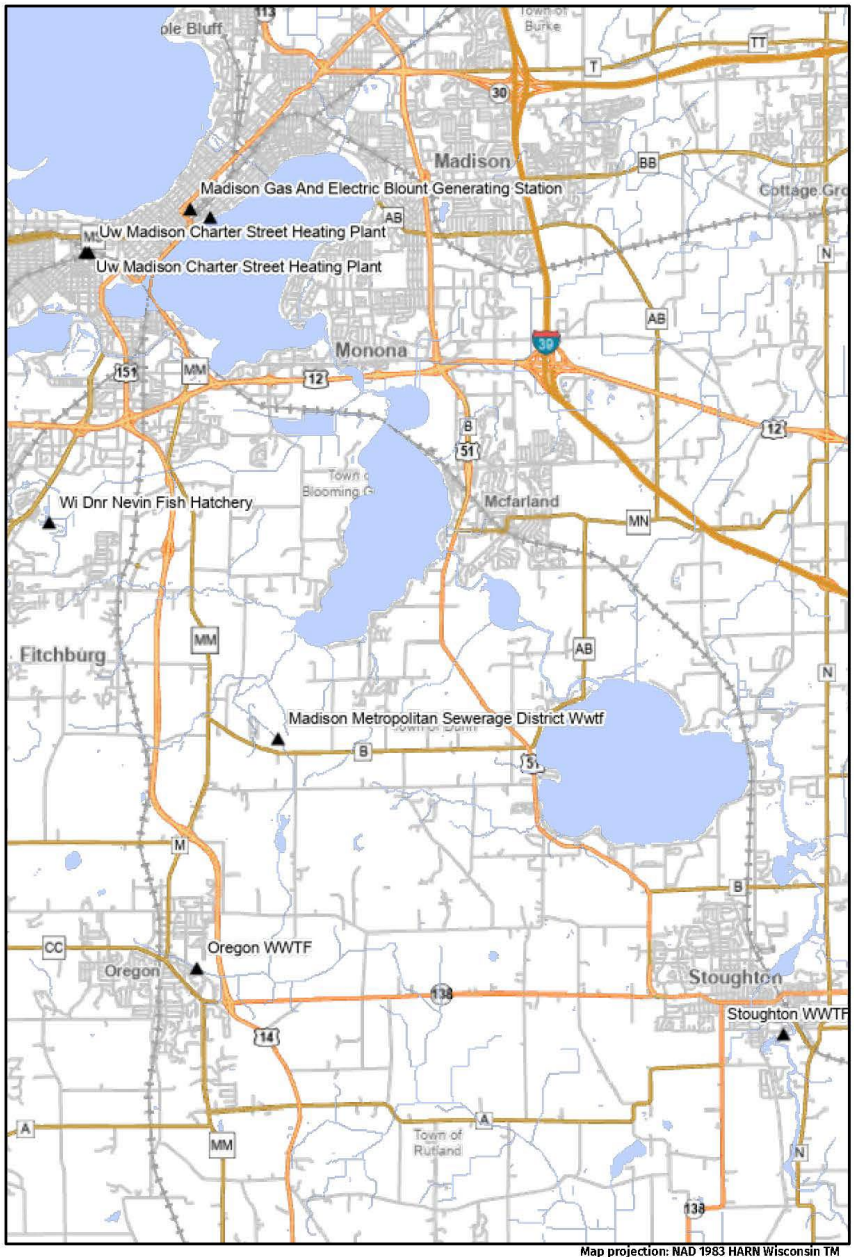
chronic WET limit is required. Federal regulations in 40 CFR Part 122.44(i) require that monitoring occur at least once per year when a limit is present.

- **A minimum of annual acute and chronic monitoring is recommended because MMSD 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.

Attachment #2
Site Map

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

MMSD Wastewater Treatment Facility



Legend: (some map layers may not be displayed)

- Surface Water Outfalls
- Rivers and Streams
- Intermittent Streams
- Open Water
- City or Village
- County Boundaries

Major Roads

- Interstate Highway
- State Highway
- US Highway

County and Local Roads

- County HWY
- Local Road
- Railroads
- Tribal Lands

Notes:

No longer to scale.

Service Layer Credits:
Permits & Determinations^: WI DNR Bureau of Watershed Management, Cities, Roads & Boundaries: , Surface Water (Cached): WiDNR, USGS, and other data

Map projection: NAD 1983 HARN Wisconsin TM

N

Map: 0 10,000 20,000 Feet
0 3,000 6,000 Meters

This map is a product generated by a DNR web mapping application.

This map is for informational purposes only and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. The user is solely responsible for verifying the accuracy of information before using for any purpose. By using this product for any purpose user agrees to be bound by all disclaimers found here: https://dnr.wisconsin.gov/legal

Date Printed: 8/15/2025 2:50 PM

PFOS Data

EFFLUENT VARIABILITY ANALYSIS -				DATABASE SUMMARY	
=	= = =	= = =	=		n
SUBSTANCE:					------
NUMBER OF VALUES:	------			Jan-21	1.58
TOTAL	42			Jan-21	1.65
DETECTED	42			May-21	3.7
NON-DETECTED				Mar-22	3.8
				Apr-22	3
d	0			May-22	3.1
				Jun-22	4.3
m	4.68405			Jul-22	4.5
				Aug-22	3.3
mean of all data	4.68405			Sep-22	5.9
				Oct-22	5.2
s	2.31409			Nov-22	4.4
				Dec-22	3.6
	------	------	------	Jan-23	4.1
n	1	4	30	Feb-23	5.6
				Mar-23	5.5
d^n	0	0	0	Apr-23	5.4
				May-23	5.6
p	0.99	0.99	0.99	Jun-23	3.8
				Jul-23	4.9
Z_p	2.32679	2.32679	2.32679	Sep-23	5.2
				Oct-23	3.2
				Nov-23	4
1+(s/m)^2	1.24407	1.24407	1.24407	Dec-23	4.3
				Jan-24	3.4
(sigma_d)^2	0.21839	0.21839	0.21839	Feb-24	3.4
				Mar-24	3.8
mu_d	1.43497	1.43497	1.43497	Mar-24	3.2
				Apr-24	4.8
				Apr-24	4.9
(sigma_dn)^2	0.21839	0.05923	0.0081	May-24	4.1
				May-24	3.6
mu_dn	1.43497	1.51455	1.54011	Jun-24	5.8
				Jun-24	5.6
				Jul-24	7.2
P_99 exponent	2.52233	2.08082	1.74956	Jul-24	7.3
				Aug-24	5.9
	-------	-------	-------	Aug-24	6.1
P_99	12.46	8.01	5.75	Sep-24	3.6
	-------	-------	-------	Oct-24	3.8
				Nov-24	17
NOTES: For purposes of this summary, ^ represents an exponent				Dec-24	3.6
or superscript while _ represents a subscript.					

PFOA Data

EFFLUENT VARIABILITY ANALYSIS -				DATABASE SUMMARY	
=	= =	=	= =	=	n
SUBSTANCE:					------
NUMBER OF VALUES:	------			Jan-21	8.07
TOTAL	42			Jan-21	8.14
DETECTED	42			May-21	9.7
NON-DETECTED	0			Mar-22	9
				Apr-22	7.8
d	0			May-22	6.8
				Jun-22	7.2
m	8.555			Jul-22	8.2
				Aug-22	7.8
mean of all data	8.555			Sep-22	11
				Oct-22	8.5
s	1.89452			Nov-22	7.8
				Dec-22	6.5
	------	------	------	Jan-23	16.8
n	1	4	30	Feb-23	8.6
				Mar-23	9.3
d^n	0	0	0	Apr-23	12
				May-23	11
p	0.99	0.99	0.99	Jun-23	7.4
				Jul-23	12
Z_p	2.32679	2.32679	2.32679	Sep-23	7.8
				Oct-23	7.2
				Nov-23	8
1+(s/m)^2	1.04904	1.04904	1.04904	Dec-23	8.6
				Jan-24	6.5
(sigma_d)^2	0.04788	0.04788	0.04788	Feb-24	8.4
				Mar-24	7.7
mu_d	2.12258	2.12258	2.12258	Mar-24	7.5
				Apr-24	7.2
				Apr-24	6.5
(sigma_dn)^2	0.04788	0.01219	0.00163	May-24	7.7
				May-24	8.2
mu_dn	2.12258	2.14042	2.1457	Jun-24	10
				Jun-24	9.3
				Jul-24	9.1
P_99 exponent	2.63169	2.39727	2.23974	Jul-24	9.4
				Aug-24	8.3
	-------	-------	-------	Aug-24	8.3
P_99	13.90	10.99	9.39	Sep-24	6.6
	-------	-------	-------	Oct-24	7.7
				Nov-24	9.2
NOTES: For purposes of this summary, ^ represents an exponent				Dec-24	6.5
or superscript while _ represents a subscript.					

BOD and CBOD Guidance Policy

PRESENTED TO: Wastewater PMT
DATE: January 6, 2020
WW PMT SPONSOR: Wade Strickland
PREPARED BY: Rachel Fritz

SUBJECT: BOD and CBOD guidance policy

TYPE OF ISSUE: Decision

ISSUE STATEMENT: There are three guidance documents relating to this briefing. The subject guidance documents are attached below. The question is whether or not to retain the policy guidance documents, retain and/or modify in part, completely revise or some variation thereof.

The current BOD guidance for limit calculators recommends minimum BOD limits for municipal dischargers be set at 5 mg/L in summer and 10 mg/L in winter along with a dissolved oxygen limit of 7.0 mg/L. A second guidance document allows for alternative, higher minimum set of BOD limits is presented for certain facilities located in two ecoregions of the state. However, this guidance has not been applied consistently.

Current guidance also includes recommended procedures for calculating CBOD WQBELS. When CBOD WQBELs are determined to be appropriate, the recommendation is to set CBOD limits equal to the calculated BOD WQBELs. However, this policy ignores any nitrogenous oxygen demand from the effluent and consequently does not ensure that dissolved oxygen (DO) criteria are met in the receiving water.

RECOMMENDATIONS:

- Continue the 5/10 minimum limit policy with a DO limit of 7.0 mg/L.
- Do not continue the "excursions from the 5/10 limit" policy because it cannot be applied consistently statewide and it is based on the assumption that other water quality parameters limit attainment of designated uses.
    - However, a facility may opt to perform a fish survey and/or a stream DO study to determine appropriate BOD limits on a site-specific basis.
- In future reissued permits, do not include CBOD WQBELs in permits. Altering CBOD WQBELs to ensure that they are protective of water quality would ultimately lead to more restrictive limits than the original BOD limits.

BACKGROUND: The recommendations in current BOD and CBOD WQBELs guidance are particularly important since we do not have at codes on how BOD WQBELs should be calculated. There is code on categorical BOD limits but the policies for BOD and CBOD WQBELS are completely contained in guidance.

These are the guidance documents of concern:


Effluent Limits Below 10 mg.doc


Final WCR Small Stream Guidance.do


Calculating CBOD5 Limitations.doc

For reference, the following table summarizes the possible types of BOD and CBOD limits:

1

Limit Type	Set by...	Value	Applies to	Corresponding CBOD limits
LAL and LFF	NR 104	LAL: 20 mg/L monthly and 30 mg/L weekly LFF: 15 mg/L monthly and 30 mg/L daily	Discharges to LAL and LFF waters	LAL: 16 mg/L monthly and 25 mg/L weekly LFF: 12 mg/L monthly and 25 mg/L daily
Categorical 30/45	NR 210	30 mg/L monthly and 45 mg/L weekly	Municipal discharges	25 mg/L monthly and 40 mg/L weekly
WQBEL	Calculations from guidance	Calculated, between 5 and 45 mg/L weekly	All discharges	Guidance on this. CBOD limits = BOD limits
Minimum 5/10	Guidance	10 mg/L winter and 5 mg/L summer, weekly average with 7.0 mg/L min DO limit	Municipal discharges	NA
WCR Minimum 10/20	Guidance	10 mg/L monthly and 20 mg/L daily year-round	Small discharges in 2 ecoregions	NA
Industry Categorical	NR 225, 240, 284	Mass limits often accompanied by BPJ concentration limits	Certain industries	NA

5/10 Minimum Limits

In BOD WQBEL calculation, the assumed DO concentration is typically 7.0 mg/L for the receiving water. If effluent DO level is at the same 7.0 mg/L, a drop of 2.0 mg/L would be allowed in order to meet the WQC of 5.0 mg/L in warm waters. Assuming this drop in DO, the 26-lb method results in minimum BOD limits of about 5.0 mg/L in the summer and 10 mg/L in the winter. Therefore, these minimum limits are recommended in zero flow streams or whenever limits are otherwise below 5.0 mg/L and 10 mg/L. The permit should also include a minimum DO limit of 7.0 mg/L to ensure that the assumed 2.0 mg/L drop in DO is true.

While guidance recommends these limits only for municipal discharges, using the 26-lb method for an industrial discharger would result in the same limits. The permits where this approach is currently applied are summarized below.

Permit No.	Facility	Outfall No.	95th percentile of weekly average BOD	
			May-Oct	Nov-Apr
0051535	Cedar Valley Cheese	011	5.0	7.5
0020192	Hartford	001	2.0	2.0
0020478	Sun Prairie	001	4.4	8.0
0021695	Twin Lakes	003	3.5	6.0
0025062	Paddock Lake	001	4.7	3.3
0021679	Howards Grove	001	7.1	5.4
0049794	Bloomfield	001	2.4	3.0
0065889	Springfield Clean Water	001	No data	No data

Excursions for the "5/10" Guidance (10/20 Minimum Limits)

Instead of the 5/10 minimum discussed in the attached guidance document, a 2003 memo recommends an alternative set of minimum BOD limits for facilities under certain conditions. The alternative minimum limits are 10 mg/L as a monthly average and 20 mg/L as a daily max (year-round). Additionally, a DO limit of 7.0 mg/L

should be included in the permit. Guidance recommends that these limits only be included in permits under the following conditions:

- The receiving stream has the potential to support a diverse fish and aquatic life community, but does not have the potential to support a cold water community
- The receiving stream 7Q10 estimate is less than 0.1 cfs
- The receiving stream mean stream width is less than roughly 2.5 m
- The treatment plant design flow is less than ~0.5 MGD
- Facility located in the Central Wisconsin Till Plain and Glacial Lake Wisconsin Sand Plain Ecoregions

This determination was made based on evaluations of BOD effluent data and fish shocking studies at 5 small municipal discharges located in these ecoregions. The facilities were in one of two situations:

- Some discharges with BOD levels significantly higher than the 5/10 minimums supported a diverse fish and aquatic life community in the receiving water.
- Some discharges meeting the 5/10 limits did not have a receiving water with a diverse fish and aquatic life community.

Therefore, higher minimum limits were recommended for facilities located near the other facilities in this study.

For cases where a diverse fish and aquatic life community was not supported, there was not a determination on what factor(s) prevented that attainment. A determination that other factors prevent a water from achieving its designated uses generally is insufficient justification for not meeting DO water quality criteria. If "alternative", higher BOD limits would be allowed based on a finding that BOD levels allow for a diverse fish and aquatic life community, this determination should be made on a case-by-case basis using site-specific information and be re-evaluated regularly in order to ensure that the BOD limits continue to be protective of water quality.

The permits where these limits are currently applied are summarized below. Red 95th percentile values indicate that the value exceeds the respective 5/10 limits.

Permit No.	Facility	Outfall No.	Located in recommended ecoregion?	95th percentile of weekly average BOD_5	
				May-Oct	Nov-Apr
0065579	Belgioioso Cheese – Chase	005	No	12.3	9.5
0066371	Wisconsin Whey Protein	001	No	No data	No data
0053694	Mullins Cheese – Marshfield[1]	007	Yes	10.5	10.0
0060259	Warrens Monroe	003	Yes	10.0	20.0

1. Permit doesn't include the recommended 7.0 mg/L DO limit.

CBOD WQBELs

BOD includes oxygen demand from both carbon sources and ammonia nitrification (BOD = CBOD + NBOD). NR 210 includes an option for CBOD categorical limits to be used in place of BOD categorical limits. The corresponding categorical CBOD limits are lower than the BOD counterparts to account for some expected level of nitrification oxygen demand.

CBOD WQBEL derivation is not covered in code, but covered in guidance. To summarize, current guidance recommends that a facility provide concurrent monitoring for BOD, CBOD, ammonia, and nitrate (same requirements that are to be used to determine if a significant portion of BOD is from NBOD). If it's shown that

significant nitrification is taking place, CBOD limits are determined to be appropriate and are most commonly set equal to the BOD limits. This essentially results in a less restrictive limit.

Using CBOD make sense for categorical limits, since the technology-based limits are focusing on solids and organics removal and do not set a performance standard regarding nitrification. But in the context of WQBELs, BOD has a different significance since BOD WQBELs are based only on attaining DO criteria. In the WQBEL context, any oxygen demand whether its carbaceous or nitrogenous can cause non-attainment of water quality criteria. Therefore, if there is significant nitrification of the effluent after discharge, current CBOD WQBELs are not protective of water quality.

The facilities with CBOD WQBELs in at least part of the year are summarized below. There has been interest in CBOD limits recently so more requests for CBOD WQBELs may be expected. Only the bolded limits are WQBELs. Other limits are based on the categorical standards in NR 210 or NR 104 and indicate that the calculated WQBEL for those months is less restrictive than the categorical limit.

	Weekly Average Limits (mg/L CBOD)	Monthly Average Limits (mg/L CBOD)	Could the discharge meet equal BOD limits?
Chilton	**9.6 May-Oct, 15 Nov-Apr**	**9.6 May-Oct, 15 Nov-Apr**	Yes[1]
Dane Iowa	**30 May-Oct,** 40 Nov-Apr	25	Yes[1]
Dorchester[2]	**10 June** 40 Mar-May	**10 June** 25 Mar-May **12 Jul-Feb**	May not meet 10 mg/L limit in June, but they already wouldn't meet the limit for CBOD. Currently no discharge in June.
Green Bay Met (051)	**18**	**9**	Yes[1]
Stoughton	**33 May-Oct,** 40 Nov-Apr	25	Yes[1]
Sturgeon Bay	**25**	**15**	Yes[1]
Madison Met (001)[3]	**20**	**19**	Yes[1]
Madison Met (005)[3]	**7 May-Oct 16 Nov-April**	**7**	Would exceed limits occasionally, 98.5% compliance[4]

1. Predicted based on effluent CBOD data, assuming that BOD effluent values will be about 5 mg/L higher than corresponding CBOD measurements.
2. Also has a daily max limit of 25 mg/L in July through February.
3. These limits are not current yet. The permit is on public notice.
4. Exceedances are almost completely from high periods in April 2016, June 2018, and April 2019

APPROVED:

Wastewater Policy Management Team

1/29/2019
DATE

4

Attachment #5

Ammonia Nitrogen Calculations from the WQBEL Memo Dated February 2, 2004

A. Discharge to Badfish Creek outfall 001: In the following table ammonia limitations are calculated for the first segment of the steam, starting at the head water (effluent ditch) to the Oregon Branch tributary of the Badfish Creek which is classified as **limited aquatic life (marginal) according to NR 104.02(3)(b).**

AMMONIA (as N) LIMITS **CLASSIFICATION:**	**DRAFT** **APPROACH** **LIMITED AQUATIC LIFE COMMUNITY**			**Outfall 001**
EFFLUENT FLOW (mgd):	50			
EFFLUENT FLOW (cfs):	77.362			
MAX. EFFLUENT pH (s.u.):	8.00			
BACKGROUND INFORMATION:	***summer***	***Winter***	***Spring***	***fall***
4Q3 (cfs)		0		
7Q10 (cfs)	0	0		
30Q5 (cfs)		0		
7Q2 (cfs)	0	0		
Ammonia (mg/L)	0.07	0.17		
Temperature (deg C)	25	3		
pH (std. units)	8	8		
% of river flow used:	100	25		
Reference weekly flow:	0	0		
Reference monthly flow:	0	0		
CRITERIA (in mg/L):				
Acute (@ effl. pH):	12.96	12.96		
4-day Chronic (@ backgrd. pH):	20.22	83.53		
30-day Chronic (@ backgrd. pH)	8.09	33.41		
EFFLUENT LIMITS (in mg/L):				
Weekly average	**20.22**	**83.53**		
Monthly average	**8.09**	**33.41**		

B. Discharge to Badfish Creek outfall 001: In the following table ammonia limitations are calculated for the second segment of the steam, starting after the Oregon Branch confluence with the Badfish Creek to the CTH "A" bridge which is classified as **limited forage fish community (intermediate)** according to NR 104.02(3)(a).

AMMONIA (as N) LIMITS **CLASSIFICATION:**	**DRAFT** **APPROACH** **LIMITED FORAGE FISH COMMUNITY**			**Outfall 001**
EFFLUENT FLOW (mgd):	50			
EFFLUENT FLOW (cfs):	77.362			
MAX. EFFLUENT pH (s.u.):	8.00			
BACKGROUND INFORMATION:	***summer***	***Winter***	***Spring***	***Fall***
4Q3 (cfs)		0		
7Q10 (cfs)	0	0		
30Q5 (cfs)		0		
7Q2 (cfs)	0	0		
Ammonia (mg/L)	0.07	0.17		
Temperature (deg C)	25	3		
PH (std. units)	8	8		
% of river flow used:	100	25		
Reference weekly flow:	0	0		
Reference monthly flow:	0	0		
CRITERIA (in mg/L):				
Acute (@ effl. pH):	8.41	8.41		
4-day Chronic (@ backgrd. pH):				
Early life stages present	7.72	7.72		
Early life stages absent	9.32	29.76		
30-day Chronic (@ backgrd. pH)				
Early life stages present	3.09	3.09		
Early life stages absent	3.73	11.90		
EFFLUENT LIMITS (in mg/L):				
Weekly average				
Early life stages present	**7.72**	**7.72**		
Early life stages absent	**9.32**	**29.76**		
Monthly average				
Early life stages present	**3.09**	**3.09**		
Early life stages absent	**3.73**	**11.90**		

C. Discharge to Badfish Creek outfall 001: In the following table ammonia limitations are calculated for the third segment of the Badfish Creek, starting after the CTH "A" bridge to the confluence with the Yahara River which is classified as **warm water sportfish community according** to NR 102.04(3)(c).

AMMONIA (as N) LIMITS	**DRAFT APPROACH**			**Outfall 001**
CLASSIFICATION: WARMWATER SPORTFISH, WARMWATER FORAGE FISH COMMUNITY				
EFFLUENT FLOW (mgd):	50			
EFFLUENT FLOW (cfs):	77.362			
MAX. EFFLUENT pH (s.u.):	8.00			
BACKGROUND INFORMATION:	***summer***	***Winter***	***spring***	***fall***
4Q3 (cfs)				
7Q10 (cfs)	5.7	5.7		
30Q5 (cfs)				
7Q2 (cfs)	10.54	10.54		
Ammonia (mg/L)	0.07	0.17		
Temperature (deg C)	25	3		
pH (std. units)	8	8		
% of river flow used:	100	25		
Reference weekly flow:	5.7	1.425		
Reference monthly flow:	8.959	2.23975		
CRITERIA (in mg/L):				
Acute (@ effl. pH):	8.41	8.41		
4-day Chronic (@ backgrd. pH):				
early life stages present	3.10	6.08		
early life stages absent	3.10	9.88		
30-day Chronic (@ backgrd. pH)				
early life stages present	1.24	2.43		
early life stages absent	1.24	3.95		
EFFLUENT LIMITS (in mg/L):				
Weekly average				
early life stages present	**3.32**	**6.19**		
early life stages absent		**10.06**		
Monthly average				
early life stages present	**1.37**	**2.50**		
early life stages absent		**4.06**		

Monthly average limits are based on the 30-day average, 5-year low flow ($_{30}Q_5$) or 85% of the 7-day average, 2-year low flow ($_7Q_2$).

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Goal	Task	Commentary	Timeline
A. Source Identification Actions			
Continue to refine knowledge of **Industrial Contributors sources.**	Work towards better understanding current industrial permittees' chloride contributions as opportunities arise. We will work with the District's Pretreatment program to reassess permittees. Pretreatment will be checking in with permittees during annual inspections and by using a new digital format.	Knowing contributions from permitted industrial users helps refine the overall chloride mass balance which guides source reduction actions. If large users are identified, the district does have the ability to issue permits for large salt dischargers if needed.	Pilot testing of new form will take place on a limited basis in 2025-26. Any needed refinements will be undertaken and the full solicitation will occur from 2027-2029.
Continue to refine knowledge of **Hauled Waste sources.**	Work towards better understanding current contributions of chloride from Hauled Wastes.	Knowing contributions from hauled waste sources helps develop the overall chloride mass balance which guides source reduction actions. The District recently hired a dedicated Hauled Waste Coordinator who is working on new system and protocols for hauled waste identification. Dedicated staff will advance possibilities for collecting data in this area.	Once the new system is in place to better tack and categorize hauled waste, chloride will be added to monitoring for certain loads. This is expected to begin in 2027.
Continue to develop inventories of **Large Softeners.**	Begin building an inventory of large softeners through pretreatment surveys and in partnership with City of Madison Programs.	Developing a list of large softening systems in the region in partnership with City of Madison programs will be especially useful for determining whether non-permitted industrial entities might be considered for permits.	Large buildings (greater than 100,000 sq. ft.) will start the tune-up process in 2026, Medium buildings (50,000-100000 sq. ft.) in 2027. Voluntary reporting for smaller buildings

		The City of Madison's BESP program is benchmarking energy efficiency in non-residential buildings throughout the City and will provide a starting point for this inventory.	(25,000-49,999 sq. ft.) Benchmarking will be ongoing. Once Benchmarking is complete, District grants will be offered to encourage salt reduction.
Understand and quantify **source water** chloride contribution.	Collect municipal drinking water well chloride concentrations annually. Organize data and analyze for trends.	Per. MMSD SUO Section 4.7.2 (b), municipal customers with public drinking water wells are required to submit chloride concentration of all wells annually. Trends observed in this data helps quantify indirect impacts from road salt, as well as help with constructing a mass balance for influent chloride; knowing sources guides source reduction actions. Data collected over the past permit term show service area well chloride concentration trends to be increasing. Recent data shows that seven service-area wells now have concentrations >100mg/L.	Data will be gathered each year 2026-2031; findings will be assessed and shared annually in the PMP reports to DNR.
B. Actions to Minimize Pollutant Sources			
Optimize Plant Chloride Use.	Track salt use at Nine Springs, and update/optimize systems as necessary and feasible.	Continue to assess chloride use with plant operation and during plant upgrades and process improvements.	Review plant use during design review 2026. Plant Operation's staff review chemical use for changes

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			in any chloride containing chemicals at a minimum every two years, 2026, 2028, 2030.
Reduce Winter Maintenance Salt.	Remain an active contributing and funding member of WI Salt Wise. Advocate for winter maintenance processes that reduce the amount of salt used throughout the service area. Continue offering innovation grants for innovative salt reduction projects/programs.	Data shows that road salt continues to be the source of spikes in effluent chloride concentration through winter melt events. Even with improvements in baseline chloride concentration from direct sources, continued investments in time and financial support for winter salt reduction will be necessary to reach the water quality standard long term. Although salt impacts many water resources, not all have the urgency of a permit, so the district's continued advocacy and leadership in this area is necessary.	Each year 2026-2031
Increase use of blending valves	Following up on the data gathered during pilot tests in 2024-2025, we will continue promoting the adoption of blending valves to reduce softener salt use. (Blending valves allow a percentage of hard water to mix with the softened water which proportionally reduces the amount of salt used in softening. This could make a sustainable reduction in chloride and pilot	In 2024-2025, two pilot programs were tested and expanded this work. The Tim Obrien homes/Dave Jones partnership for new construction blending valves and the City of Middleton Pilot blending valve program. Learnings from these programs will determine the next steps and programs. The District continues to	Develop training program and resources for installers, plumbers and water quality professionals (2026-2027) and share training through a variety of targeted methods. Conduct outreach to

	tests have shown tolerance for 5 grains or more of hard water – which could reduce water softening salt by up to 25%.) This work will involve provider engagement to increase supply and community outreach to spur demand. When appropriate, incentives will be offered to encourage blending valve adoption.	work on a summary which documents the findings of the pilot program.	residential property owners encouraging blending valve use starting in 2026 and thereafter as necessary. The District's Innovation Grant program will be offered each year through the permit term.
Normalize low-salt/no salt plumbing practices	Engage plumbers in trainings and communications. Develop public outreach and messaging such as blogs and social posts to help address perceived barriers and normalize action. Work with area home builders and developers to encourage implementation of low/no salt strategies such as blending valves installed as default, hot-only softening, and right-sized/high-efficiency softeners only where needed.	Dedicated trainings will be held on blending valves and efficient softening practices to individual plumbing companies as requested. Additional activities will be detailed in yearly reports. Dane county has been the fastest developing area of the state a few years in a row. Local newspapers have been recently been reporting about the housing affordability crisis. As these trends converge, working with home builders and developers will be important to keep the baseline level of influent chloride from increasing.	Yearly 2026-2031: Trainings with Local 75 and/or other plumbers. On requested basis: Training for plumbers On-going CEU credit for various trades through Wisconsin DSPS will continue 2026-2031.

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	Offer Commercial & Industrial Softener Improvement Rebates.	This program offers financial support for a wide variety of softener efficiency improvement, as well as conversion to low/no salt systems.	This Rebate was launched in 2025 and is guaranteed funding through 2027.
Increase efficiency of existing softener stock.	Continue to partner with Efficiency Navigator Program. Include minimum efficiency performance standards as part of the City of Madison BESP Tune-Up Process. Offer Commercial & Industrial Softener Improvement Rebates.	Partnership with Sustain Dane's Efficiency Navigator program assesses and improves softeners in naturally occurring affordable housing. Buildings that are required by City Ordinance to complete a tune-up will be required to check water softener efficiency and have an efficiency of at least 4,000 grains/lb. This program offers financial support for a wide variety of softener efficiency improvement, as well as conversion to low/no salt systems.	This work is supported by a 3-year innovation grant 2025-2027. Tune ups are required starting 2026 and 2027. This Rebate was launched in 2025 and is guaranteed funding through 2027.
Raise awareness of salt pollution.	Conduct general outreach and education as opportunities arise. Continue to facilitate conversations between salt reduction champions and their peers.	Leveraging early adopters to build confidence, case studies, and champions, has been a successful way to bring new technologies from the fringes into mainstream.	These activities will be continue to be pursued during the five year permit term from 2026-2031.
Assess behavior change opportunities.	Conduct full scientific survey w/ representative sample to measure	Periodically reaching out to gage community perceptions helps inform	Planning for the next survey will begin in 2026

	community attitudes, awareness, barriers and opportunities related to salt use. Conduct pulse surveys as needed.	development of outreach strategies. The District did full service-area surveys in 2019 and 2023. A short water hardness pulse survey was conducted in 2025.	with full service-area survey rolling out in 2027.
Cultivate partnerships.	Give community presentations upon request. Meet with sustainability focused programs in the region to identify potential partnerships where interests align. Leverage existing social networks to communicate from trusted messengers	An example of a partnership opportunity that arose in 2025 was working with the Apartment Association of Southcentral Wisconsin. The District reached members of this organization through exhibiting at a conference and presenting at a maintenance seminar on salt reduction and other water protection topics.	These activities will be pursued during the five year permit term. Each annual report will refine the next year's actions.
C. Actions to Maintain Source Reduction			
Evaluate policy options.	Determine what policies would help move reductions from voluntary to permanent, and work to figure out implementation pathways.	Updates to the District's Sewer Use Ordinance (SUO) are proposed for 2028-2029. The District will be working with customer communities to test and strengthen chloride reduction requirements so that they can be successfully implemented in the updated SUO.	Starting in 2026 and continuing through 2029, District staff will be engaging with customer communities.
Communicate successes.	Share case studies, engage in public speaking events, work with peer organizations, and celebrate champions, to leverage proof and inspire others.	The District will work to share information in a variety of ways. This information will elevate Salt Reduction strategies as well as Champions.	These activities will be pursued during each of the years of this permit term: 2026-2031.

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Engage/Activate Community Customers:	Maintain communication with customer communities to understand what practices are in place, which new technologies or processes are being adopted, as well as what needs and barriers are for adding new BMPs and trial and testing of new approaches, techniques and equipment with Innovation Grants. Work to develop materials, articles and resources for customer communities to share with their customers.	These activities will continue each year. The District's Sewer Use Ordinance requires reporting from each of the District's customer communities and through on-going engagement with staff in our customer communities. The District is working to refine resources for salt use awareness and reduction opportunities that customers can share with their constituents.	Reporting required yearly from 2026-2031. The District will assess findings and report in annual PMP reporting to DNR. Annual PMP goals will include outlook for next year and reporting will include successes from each year of the permit.
Maintain Funding and Staffing and Grant/Incentive Programs	Maintain on-going staffing and budget to support Chloride Source Reduction Program. Maintain funding for Innovation as well as for upgrades to reduce use of salt in large softeners.	Chloride reduction requires changing norms, behaviors, attitudes and individual's actions. This takes trial and testing, piloting of new approaches and developing champions. These all involve dedicated staff with diverse capabilities as well as funding. The district is committed to continuing both of these.	The District commits to maintain current funding and staffing levels for chloride source reduction each of the years of the five-year permit term. In addition, we have funding allocated for Incentive programs to

Facility Specific Chloride Variance Data Sheet

Directions: Please complete this form electronically. Record information in the space provided. Select checkboxes by double clicking on them. Do not delete or alter any fields. For citations, include page number and section if applicable. Please ensure that all data requested are included and as complete as possible. Attach additional sheets if needed.

Section I: General Information

A. Name of Permittee: Madison Metropolitan Sewerage District

B. Facility Name: Madison Metropolitan Sewerage District Wastewater Treatment Facility

C. Submitted by: Wisconsin Department of Natural Resources

D. State: Wisconsin **Substance:** Chloride **Date completed:** December 5, 2025

E. Permit #: WI-0024597-10-0 **WQSTS #:** (EPA USE ONLY)

F. Duration of Variance **Start Date:** April 1, 2026 **End Date:** March 31, 2031

G. Date of Variance Application: September 30, 2024

H. Is this permit a: ☐ **First time submittal for variance**
☒ **Renewal of a previous submittal for variance** *(Complete Section IX)*

I. Description of proposed variance: The variance for chloride is from the water quality-based effluent limit of 395 mg/L, expressed as a weekly average limit, to an interim limit of 408 mg/L, expressed as a weekly average limit. The proposed permit also includes a requirement to implement source reduction measures. The term of the proposed variance is five years, concurrent with the term of the proposed WPDES permit.

This is a renewal of a previous submittal to EPA for a chloride variance for this permittee. The previous permit for this facility contained seasonal interim chloride limits, target values and requirements to implement source reduction measures, in accordance with s. NR 106.83(2), Wis. Adm. Code.

Citation: An interim chloride effluent limitation under s. NR 106.83(2), Wis. Adm. Code, represents a variance to water quality standard authorized by s. 283.15, Wis. Stats., and 40 CFR §131.14.

J. List of all who assisted in the compilation of data for this form

Name	Email	Phone	Contribution
Sarah Donoughe	Sarah.Donoughe@wisconsin.gov	920-366-6076	Permit Drafter/Variance Coordinator
Ashley Brechlin	Ashley.Brechlin@wisconsin.gov	608-438-9930	Compliance Engineer
Sarah Luck	Sarah.Luck@wisconsin.gov	608-843-3876	Limits Calculator

Section II: Criteria and Variance Information

A. Water Quality Standard from which variance is sought: Chloride (395 mg/L chronic toxicity criterion)

B. List other criteria likely to be affected by variance: None.

C. Source of Substance: Primarily from commercial and residential water softener regeneration brine, road salt intrusion into the sewage collection system, and car washes.

D. Ambient Substance Concentration: 0 mg/L ☐ **Measured** ☐ **Estimated** ☒ **Default** ☐ **Unknown**

E. If measured or estimated, what was the basis? Include citation. The background streamflow in Badfish Creek at the point of discharge is zero, so the background chloride concentration is irrelevant. Background concentrations are not included because they do not impact the calculated WQBEL when the receiving water low flows are equal to zero.

F. Average effluent discharge rate: 36 MGD (May 2020 – April 2025) **Maximum effluent discharge rate:** Peak daily = 65 MGD

G. Effluent Substance Concentration: 1-day P99 = 447 mg/L; 4-day P99 = 408 mg/L; Mean = 370 mg/L ☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

H. If measured or estimated, what was the basis? Include Citation. 1-day and 4-day P99 values were calculated from 1,802 sample results taken from May 2020 through April 2025.

I. Type of HAC:
☐ **Type 1: HAC reflects waterbody/receiving water conditions**
☐ **Type 2: HAC reflects achievable effluent conditions**
☒ **Type 3: HAC reflects current effluent conditions**

J. Statement of HAC: The Department has determined the highest attainable condition of the receiving water is achieved through the application of the variance limit in the permit, combined with a permit requirement that the permittee implement its Chloride SRM plan. Thus, the HAC at commencement of this variance is 408 mg/L, which reflects the greatest chloride reduction achievable with the current treatment processes, in conjunction with the implementation of the permittee's Chloride SRM plan. The current effluent condition is reflective of on-site optimization measures that have already occurred. The permittee may seek to renew this variance in the subsequent reissuance of this permit; the Department will reevaluate the HAC in its review of such a request. A subsequent HAC cannot be defined as less stringent than this HAC.

K. Variance Limit: 408 mg/L (weekly average; year-round)

L. Level currently achievable (LCA): 408 mg/L (weekly average)

M. What data were used to calculate the LCA, and how was the LCA derived? (*Immediate compliance with LCA is required.)*
The LCA is based on the 4-day P99 value calculated from sample results taken from May 2020 through April 2025.

N. Explain the basis used to determine the variance limit (which must be ≤ LCA). Include citation.
Chapter NR 106, Subchapter VII, Wis. Adm. Code, allows for a variance; the imposition of a less restrictive interim limit; a compliance schedule that stresses source reduction and public education; and allowance for a target value or limit to be a goal for reduction.

Citation: The variance limit = 4-day P99. The limit is established in accordance with s. 283.15 (5), Wis. Stats., and ch. NR 106 Subchapter II, Wis. Adm. Code.

O. Select all factors applicable as the basis for the variance provided under 40 CFR 131.10(g). Summarize justification below: ☐ **1** ☐ **2** ☒ **3** ☐ **4** ☐ **5** ☒ **6**

Based on information provided by the permittee in the simplified Triple Bottom Line analysis and other supporting documents, the Department has determined, that in the case of Madison Metropolitan Sewerage District WWTF (MMSD) for the reasons presented by MMSD in the documentation supporting this variance request, treatment of chlorides by MMSD would cause more environmental damage than the continued discharge of effluent at levels currently achievable with current treatment at MMSD and associated source reduction measures. The Department concurs with MMSD's demonstration.

Additional detail is available in the attached public noticed documents or by request to WDNR.

Section III: Location Information

A. Counties in which water quality is potentially impacted: Dane; Rock

B. Receiving waterbody at discharge point: Badfish Creek

C. Flows into which stream/river? Yahara River (20 miles); Rock River (27 miles) **How many miles downstream?** 27 miles

D. Coordinates of discharge point (UTM or Lat/Long): Lat: 42.97119° N / Long: 89.35259° W

E. What is the distance from the point of discharge to the point downstream where the concentration of the substance falls to less than or equal to the chronic criterion of the substance for aquatic life protection?
Less than 20 miles

F. Provide the equation used to calculate that distance *(Include definitions of all variables, identify the values used for the clarification, and include citation):*
(interim limit in mg/L x effluent design flow in cfs) + (background concentration mg/L x background stream flow in cfs)) / (effluent design flow in cfs + background stream flow in cfs) = < 395 mg/L.

Some dilution is provided by the Yahara River (7Q10 = 21 cfs at Stoughton). Therefore, at the interim limit of 408 mg/L and a design flow of 65 MGD (approximately 100 cfs) at Outfall 001 with ¼ of the 7Q10 (5.25 cfs), and assuming a background chloride concentration in the Yahara River of 67.81 mg/L, the calculated mixed instream chloride is 391 mg/L at the Yahara River which is below the criteria of 395 mg/L.

G. What are the designated uses associated with the direct receiving waterbody, and the designated uses for any downstream waterbodies until the water quality standard is met?

Badfish Creek (Madison Metro Sewerage Commission effluent ditch) is classified in ch. NR 104, Wis. Adm. Code, as Limited Aquatic Life (LAL) from the outfall aerator to the Oregon Branch (approximately 3.6 miles downstream). Badfish Creek is not classified as a public water supply.

The confluence of Badfish Creek and the Oregon Branch to CTH "A" (approximately 5.4 miles downstream of the confluence) is classified in ch. NR 104, Wis. Adm. Code, as Limited Forage Fish (LFF).

Downstream of the CTH "A" bridge to the confluence with the Yahara River, near Cooksville, is classified a Warm Water Sport Fish (WWSF) community.

H. Identify all other variance permittees for the same substance which discharge to the same stream, river, or waterbody in a location where the effects of the combined variances would have an additive effect on the waterbody: None.

Permit Number	Facility Name	Facility Location	Variance Limit [mg/L]
N/A			

I. Please attach a map, photographs, or a simple schematic showing the location of the discharge point as well as all variances for the substance currently draining to this waterbody on a separate sheet

See attached map "MMSD Wastewater Treatment Facility Surface Water Outfall Location"

J. Is the receiving waterbody on the CWA 303(d) list? If yes, please list the impairments below. ☒ **Yes** ☐ **No** ☐ **Unknown**

River Mile	Pollutant	Impairment
0-20 miles	PCB	Contaminated Fish Tissue
0-12.3 miles	Total Phosphorus	Water Quality Use Restrictions

***K.* Please list any contributors to the POTW in the following categories:**
May need to contact facility for this information

Food processors (cheese, vegetables, meat, pickles, soy sauce, etc.)	None
Metal Plating/Metal Finishing	Seven metal finishing industries; none are known contributors of chloride
Car Washes	See the Variance Application (dated 9-30-24), Attachment A, for the list of car washes
Municipal Maintenance Sheds (salt storage, truck washing, etc.)	See the Variance Application (dated 9-30-24), Attachment B, for information on salt storage areas
Laundromats	Aramark, Cintas, Madison United Healthcare, Superior Health Lines, VA hospital, and other smaller facilities
Other presumed commercial or industrial chloride contributors to the POTW	Large commercial buildings, the zoo, and breweries are all being evaluated

L. If the POTW does not have a DNR-approved pretreatment program, is a sewer use ordinance enacted to address the chloride contributions from the industrial and commercial users? If so, please describe.

MMSD has a DNR-approved pretreatment program.

Section IV: Pretreatment (complete this section only for POTWs with DNR-Approved Pretreatment Programs. See w:\Variances\Templates and Guidance\Pretreatment Programs.docx)

A. Are there any industrial users contributing chloride to the POTW? If so, please list.

None of the industrial users are known contributors of chloride to the POTW.

B. Are all industrial users in compliance with local pretreatment limits for chloride? If not, please include a list of industrial users that are not complying with local limits and include any relevant correspondence between the POTW and the industry (NOVs, industrial SRM updates and timeframe, etc)
N/A – MMSD does not have local pretreatment limits for chloride.

C. When were local pretreatment limits for chloride last calculated?
Local limits were last calculated in 2012; however, local limits for chlorides were not calculated at that time. The Sewer Use Ordinance only includes general chloride pollution prevention and source reduction language.

D. Please provide information on specific SRM activities that will be implemented during the permit term to reduce the industry's discharge of the variance pollutant to the POTW
A majority of the chloride contribution to the POTW is from water softeners and road salt intrusion; therefore, most of the SRMs focus on those sources. In 2012, additional staffing resources were added with the hiring of an Environmental Specialist (ES) at MMSD. The ES leads chloride pollution prevention and source reduction planning and project implementation.

MMSD continues to implement their grant and rebate program which targets commercial, industrial and multi-unit residential facilities to implement projects that reduce salt in their facilities. For additional information please visit http://www.madsewer.org/Programs-Initiatives/Chloride-Reduction/Chloride-Grants.

Section V: Public Notice

A. Has a public notice been given for this proposed variance? ☒ **Yes** ☐ **No**
B. If yes, was a public hearing held as well? ☒ **Yes** ☐ **No** ☐ **N/A**
C. What type of notice was given?
☒ **Notice of variance included in notice for permit** ☐ **Separate notice of variance**
D. Date of public notice: December 12, 2025 **Date of hearing:** January 27, 2026
E. Were comments received from the public in regards to this notice or hearing? *(If yes, see notice of final determination)* ☐ **Yes** ☐ **No**

Section VI: Human Health

A. Is the receiving water designated as a Public Water Supply? ☐ **Yes** ☒ **No**
B. Applicable criteria affected by variance: No human health criteria for chloride.

C. Identify any expected impacts that the variance may have upon human health, and include any citations:
None.

Section VII: Aquatic Life and Environmental Impact

A. Aquatic life use designation of receiving water:
Badfish Creek (Madison Metro Sewerage Commission effluent ditch) is classified in ch. NR 104, Wis. Adm. Code, as Limited Aquatic Life (LAL) from the outfall aerator to the Oregon Branch (approximately 3.6 miles downstream).

The confluence of Badfish Creek and the Oregon Branch to CTH "A" (approximately 5.4 miles downstream of the confluence) is classified in ch. NR 104, Wis. Adm. Code, as Limited Forage Fish (LFF).

Downstream of the CTH "A" bridge to the confluence with the Yahara River is classified a Warm Water Sport Fish (WWSF) community.

B. Applicable criteria affected by variance:
Chronic toxicity criterion of 395 mg/L from ch. NR 105, Wis. Adm. Code, applicable in all Wisconsin waters regardless of use designation.

C. Identify any environmental impacts to aquatic life expected to occur with this variance, and include any citations:
The interim limit of 408 mg/L does not exceed the genus mean chronic values for any species. The closest genus mean chronic value is for *Ceriodaphnia* and is 417 mg/L.

D. List any Endangered or Threatened species known or likely to occur within the affected area, and include any citations: None that would affect the water quality criterion, as the chronic toxicity criterion for chloride is more stringent than all genus mean chronic values for organisms with chloride toxicity data. As a result, no endangered species with data would need more protection than already provided by the existing criterion.

Citation: U.S. Fish & Wildlife Service – Environmental Conservation Online System (http://www.fws.gov/endangered/) and National Heritage Index (http://dnr.wi.gov/topic/nhi/)

Section VIII: Economic Impact and Feasibility

A. Describe the permittee's current pollutant control technology in the treatment process:
MMSD does not currently have any treatment for chloride.

B. What modifications would be necessary to comply with the current limits? Include any citations.
As described in more detail in the Chloride Compliance Study Report, treatment using reverse osmosis (RO) or electrodialysis reversal (EDR) would be necessary to comply with the current limits. While lime softening was also evaluated as a treatment technology, MMSD determined that uncertainty related to removal of water softeners and infrastructure limitations related to ownership of drinking water infrastructure and the land necessary to build lime softening treatment made lime softening an infeasible technology at this time.

C. How long would it take to implement these changes?
Due to the environmental harm associated with these technologies, a timeline for implementation has not been established.

D. Estimate the capital cost *(Citation)***:** N/A – This variance is not based on economic hardship. Therefore, financial costs are not part of the documentation for this variance.

E. Estimate additional O & M cost *(Citation)***:** N/A

F. Estimate the impact of treatment on the effluent substance concentration, and include any citations:
The previous permit included seasonal interim limits of 465 mg/L (November-March) and 430 mg/L (April-October) with a target value of 419 mg/L. MMSD achieved a 10.5% reduction in chloride discharged November-March (4-day P99: 416 mg/L) and a 7.7% reduction in chloride discharged April-October (4-day P99: 397 mg/L). To achieve the final water quality-based effluent limit of 395 mg/L, there would need to be an additional 3.2% reduction in chloride discharged (4-day P99: 408 mg/L) during the proposed permit term.

G. Identify any expected environmental impacts that would result from further treatment, and include any citations:
As summarized above and detailed in the simplified Triple Bottom Line analysis and Chloride Compliance Study Report, potential treatment options for MMSD would result in greater environmental harm than continuing to discharge at the LCA and implementing source reduction measures.

H. Is it technically and economically feasible for this permittee to modify the treatment process to reduce the level of the substance in the discharge? ☒ **Yes** ☐ **No** ☐ **Unknown**
As described in the submitted documentation, it may be technically feasible for the permittee to modify treatment to reduce the level of chloride but doing so would cause greater environmental harm than continued discharge of chloride at current levels in addition to continued implementation of the facility's source reduction measures plan for chloride.

I. If treatment is possible, is it possible to comply with the limits on the substance? ☒ **Yes** ☐ **No** ☐ **Unknown**
As described in more detail in the Chloride Compliance Study Report, it is technologically possible to comply with the limits using RO or EDR.

J. If yes, what prevents this from being done? Include any citations.
All technologically feasible treatments would cause more environmental harm than continued discharge of effluent at the LCA in addition to continued implementation of the facility's source reduction measures plan for chloride.

K. List any alternatives to current practices that have been considered, and why they have been rejected as a course of action, including any citations:

As described in the Chloride Compliance Study Report the following technologies were evaluated; lime softening, electrodialysis reversal (EDR), and reverse osmosis (RO). All were rejected as a course of action either due to uncertainty of compliance (lime softening) or greater amounts of environmental harm from installing treatment than continued discharge at LCA (EDR; RO) and continued implementation of the facility's source reduction measures plan for chloride.

Section IX: Compliance with Water Quality Standards

A. Describe all activities that have been, and are being, conducted to reduce the discharge of the substance into the receiving stream. This may include existing treatments and controls, consumer education, promising centralized or remote treatment technologies, planned research, etc. Include any citations.

The previous permit contained a variance to the water quality-based effluent limit (WQBEL) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code. As conditions of the variance the permittee was required to (a) maintain effluent quality at or below the interim effluent limitation specified in the permit, (b) implement the chloride source reduction measures specified in the "Madison Metropolitan Sewerage District, Chloride Pollutant Minimization Program/Source Reduction Measures" plan and other supporting documentation, and (c) perform the actions listed in the Schedule section of the permit.

MMSD was also required to submit annual chloride progress reports indicating which chloride source reduction measures were implemented and a calculated annual mass discharge of chloride. The permittee was also required to submit a final chloride report documenting the success in meeting the chloride target value of 419 mg/L.

B. Describe all actions that the permit requires the permittee to complete during the variance period to ensure reasonable progress towards attainment of the water quality standard. Include any citations.

As conditions of this variance the permittee shall (a) maintain effluent quality at or below the interim effluent limitation (b) implement the chloride source reduction measures specified in the MMSD Source Reduction Initiatives 2026-2031 Pollutant Minimization Plan – Chloride, and (c) perform the actions listed in the Schedule section of the permit.

Section X: Compliance with Previous Permit *(Variance Reissuances Only)*

A. Date of previous submittal: July 16, 2019 **Date of EPA Approval:** August 30, 2019

B. Previous Permit #: WI-0024597-09-0 **Previous WQSTS #:** (EPA USE ONLY)

C. Effluent substance concentration: 4-day P99: 408 mg/L (May 2020 – April 2025) **Variance Limit:** 465 mg/L (weekly avg; Nov-March); 430 mg/L (weekly avg; April-Oct)

D. Target Value(s): 419 mg/L (weekly avg) **Achieved?** ☒ **Yes** ☐ **No** ☐ **Partial**

E. For renewals, list previous steps that were to be completed. Show whether these steps have been completed in compliance with the terms of the previous variance permit. Attach additional sheets if necessary.

Condition of Previous Variance	Compliance
Maintain effluent quality at or below the interim effluent limitations specified in the permit	☒ **Yes** ☐ **No**
Implement the chloride source reduction measures specified in the Madison Metropolitan Sewerage District, Chloride Pollutant Minimization Program/ Source Reduction Measures Plan (January 2019)	☒ **Yes** ☐ **No**
Implement the chloride source reduction measures specified in the Water Softening Source Reduction Initiatives plan amendment	☒ **Yes** ☐ **No**
Submit the Annual Chloride Progress Report (due 01/31/2021)	☒ **Yes** ☐ **No**
Submit the Annual Chloride Progress Report (due 01/31/2022)	☒ **Yes** ☐ **No**
Submit the Annual Chloride Progress Report (due 01/31/2023)	☒ **Yes** ☐ **No**
Submit the Annual Chloride Progress Report (due 01/31/2024)	☒ **Yes** ☐ **No**

Submit the Final Chloride Report (due 09/30/2024)	☒ **Yes** ☐ **No**
Submit Annual Chloride Reports After Permit Expiration (due 01/31/2025)	☒ **Yes** ☐ **No**
Submit Annual Chloride Reports After Permit Expiration (due 01/31/2026)	☐ **Yes** ☐ **No** **Note: This report is not due yet.**