

# Permit Fact Sheet

## General Information

Permit Number:	WI-0022322-09-0	
Permittee Name:	VILLAGE OF THERESA	
Address:	P O Box 327	
City/State/Zip:	Theresa WI 53091-0327	
Discharge Location:	McArthur Road, Theresa WI, NWQ, NWQ, Sec 16, T12N R17E	
Receiving Water:	East Branch of the Rock River, (East Branch Rock River Watershed, UR13 – Upper Rock Basin) in Dodge County	
StreamFlow (Q <sub>7,10</sub> ):	1.1 cfs	
Stream Classification:	Warm Water Sport Fish	
Discharge Type:	Existing, Continuous	
Design Flow(s)	Annual Average	0.202 MGD
Significant Industrial Loading?	Widmer Cheese Cellar	
Operator at Proper Grade?	Yes- Basic Facility with required subclasses A1, B, C, D, SS. Subclass P is required during the permit term.	
Approved Pretreatment Program?	N/A	

## Facility Description

The Village of Theresa operates an activated sludge (oxidation ditch) wastewater treatment facility consisting of a bar screen, aeration basin, two final clarifiers, chemical addition for phosphorus removal, and ultraviolet disinfection. The secondary clarifier was added in the 2019 facility upgrade. There is a two million-gallon lagoon used for septage hauling intake and to assist with wet weather flows. The lagoon acts as a reservoir/equalization basin to feed the plant steadily. The wastewater is primarily residential in nature, with one industrial contributor. Effluent is discharged year-round to the East Branch of the Rock River. The annual average design flow of the facility is 0.202 MGD with an average of 0.188 MGD discharged. Sludge that is produced during the treatment process is aerobically digested and stored on-site prior to being land applied on DNR-approved sites. Additional sludge storage is provided off-site by a local farmer.

## Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, CMARs, land app reports, compliance schedule items, and a site visit on May 1, 2023, this facility has been found to be in substantial compliance with their current permit.

**Compliance determination entered by Jordan Main, Wastewater Engineer on May 10, 2023.**

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	Flow measurement is not required	Influent: 24-hour flow proportional composite samples shall be collected before the headworks.
001	0.188 MGD (Average October 2018 – November 2023)	Effluent: 24-hour flow proportional composite sampler intake located at the Parshall flume and ultrasonic flow meter, prior to UV disinfection. Grab samples are collected directly after UV disinfection, prior to discharge to the East Branch of the Rock River. Effluent flow is measured with Parshall flume and ultrasonic, located after the parallel clarifiers before UV disinfection.
002	46 U.S. tons (2023 permit application)	Aerobically digested, Liquid, Class B. Grab samples of the sludge shall be collected from the aerated sludge on-site holding tank and combined to form a representative sample. Sampling shall occur prior to transfer to an off-site tank or land application.

## 1 Influent – Monitoring Requirements

### Sample Point Number: 701- INFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
BOD <sub>5</sub> , Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	

#### Changes from Previous Permit:

Increase sampling frequency to 3/week to align with effluent discharge monitoring.

#### Explanation of Limits and Monitoring Requirements

**BOD<sub>5</sub> and Total Suspended Solids:** Tracking of BOD<sub>5</sub> and Suspended Solids are required for percent removal requirements found in s. NR 210.05, Wis. Adm. Code and in the standard requirements section of the permit.

## 2 Surface Water - Monitoring and Limitations

### Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Monthly Avg	19 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May through October each year.
BOD5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through April each year.
BOD5, Total	Weekly Avg	19 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May through October each year.
BOD5, Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through April each year.
BOD5, Total	Weekly Avg	24 lbs/day	3/Week	Calculated	Limit effective May through October each year.
BOD5, Total	Weekly Avg	36 lbs/day	3/Week	Calculated	Limit effective November through April each year.
Suspended Solids, Total	Monthly Avg	19 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May through October each year.
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through April each year.
Suspended Solids, Total	Weekly Avg	19 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May through October each year.
Suspended Solids, Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through April each year.
Suspended Solids, Total	Monthly Avg	32 lbs/day	3/Week	Calculated	Limit effective January, March, May, July, August, October, and December each year.
Suspended Solids, Total	Monthly Avg	35 lbs/day	3/Week	Calculated	Limit effective February each year.
Suspended Solids, Total	Monthly Avg	31 lbs/day	3/Week	Calculated	Limit effective April, June, September, and November each year.
Suspended Solids, Total	Weekly Avg	24 lbs/day	3/Week	Calculated	Limit effective May through October each year.
Suspended Solids, Total	Weekly Avg	36 lbs/day	3/Week	Calculated	Limit effective November through April each year.

<b>Monitoring Requirements and Limitations</b>					
<b>Parameter</b>	<b>Limit Type</b>	<b>Limit and Units</b>	<b>Sample Frequency</b>	<b>Sample Type</b>	<b>Notes</b>
Nitrogen, Ammonia (NH3-N) Total	Daily Max	14 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through April each year.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	14 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through March each year.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	8.0 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective April each year.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	9.0 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May through October each year.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	14 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective November through March each year.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	12 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective April each year.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	10 mg/L	3/Week	24-Hr Flow Prop Comp	Limit effective May through October each year.
pH Field	Daily Max	9.0 su	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	
Dissolved Oxygen	Daily Min	6.0 mg/L	5/Week	Grab	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit effective May through September each year.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit effective May through September each year.
Phosphorus, Total	Monthly Avg	1.0 mg/L	3/Week	24-Hr Flow Prop Comp	This is a technology-based limit, consistent with what is already effective and will be retained throughout the permit term.
Phosphorus, Total	Monthly Avg	2.28 lbs/day	3/Week	24-Hr Flow Prop Comp	Limit effective January each year.
Phosphorus, Total	Monthly Avg	2.44 lbs/day	3/Week	24-Hr Flow Prop Comp	Limit effective February each year.
Phosphorus, Total	Monthly Avg	1.63 lbs/day	3/Week	24-Hr Flow Prop Comp	Limit effective March each year.
Phosphorus, Total	Monthly Avg	1.0 lbs/day	3/Week	24-Hr Flow Prop Comp	Limit effective April each year.
Phosphorus, Total	Monthly Avg	0.86 lbs/day	3/Week	24-Hr Flow	Limit effective May each

<b>Monitoring Requirements and Limitations</b>					
<b>Parameter</b>	<b>Limit Type</b>	<b>Limit and Units</b>	<b>Sample Frequency</b>	<b>Sample Type</b>	<b>Notes</b>
				Prop Comp	year.
Phosphorus, Total	Monthly Avg	1.37 lbs/day	3/Week	24-Hr Flow Prop Comp	Limit effective June each year.
Phosphorus, Total	Monthly Avg	1.32 lbs/day	3/Week	24-Hr Flow Prop Comp	Limit effective July and September each year.
Phosphorus, Total	Monthly Avg	1.38 lbs/day	3/Week	24-Hr Flow Prop Comp	Limit effective August each year.
Phosphorus, Total	Monthly Avg	1.49 lbs/day	3/Week	24-Hr Flow Prop Comp	Limit effective October each year.
Phosphorus, Total	Monthly Avg	1.77 lbs/day	3/Week	24-Hr Flow Prop Comp	Limit effective November each year.
Phosphorus, Total	Monthly Avg	2.02 lbs/day	3/Week	24-Hr Flow Prop Comp	Limit effective December each year.
Temperature Maximum		deg F	3/Week	Grab	Monitoring only. January - December 2028.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring only. January - December 2028.
PFOA		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
PFOS		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. See Nitrogen Series Monitoring section. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Chronic WET		rTUc	3See Listed Qtr(s)	24-Hr Flow Prop Comp	The permittee shall conduct a Chronic WET test during each of the calendar quarters specified in the Whole Effluent Toxicity (WET) Testing section.

## Changes from Previous Permit

**BOD<sub>5</sub>, Total Suspended Solids, Ammonia, and Total Phosphorus:** The sample frequency for these parameters has increased to 3/week.

**Dissolved Oxygen (DO) and pH:** The sample frequency for these parameters has increase to 5/week.

**Ammonia:** The daily max limit has changed from 17 mg/L to 14 mg/L.

**E. coli:** Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits. See additional explanation of limits under “Explanation of Limits and Monitoring Requirements” below.

**Temperature:** The sample frequency has increased to 3/week and the sample type has been changed to grab. The monitoring year for this parameter has been updated to 2028.

**Chloride:** The monitoring year for this parameter has been updated to 2028. The sample frequency has changed to monthly.

**PFOS & PFOA:** Monitoring once every two months is included in the permit in accordance with s. NR 106.98(2)(c), Wis. Adm. Code.

**Total Nitrogen Monitoring (TKN, N02+N03 and Total N):** Annual monitoring in rotating quarters throughout the permit term was added to the proposed permit.

**Acute WET:** Acute WET testing has been removed from the permit.

**Chronic WET:** The permit includes two chronic WET tests.

## Explanation of Limits and Monitoring Requirements

Please refer to the Water Quality Based Effluent Limitations memo for the Theresa Wastewater Treatment Facility prepared by Sarah Luck dated February 5, 2024, and used for this reissuance.

**BOD<sub>5</sub>, Total Suspended Solids, pH, and DO:** No changes are recommended in the categorical permit limitations for BOD<sub>5</sub>, total suspended solids, pH, and dissolved oxygen. Because the water quality criteria, reference effluent flow rates and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.

**TMDL:** A total maximum daily load (TMDL) was developed for the Rock River Basin to determine the maximum amounts of phosphorus and sediment that can be discharged to protect and improve water quality. The Rock River Basin’s TMDL was approved by the Environmental Protection Agency (EPA) in September 2011. These final effluent limits were derived from and comply with the applicable water quality criterion and is consistent with the assumptions and requirements of the EPA-approved WLA for the Rock River. The entire report can be found at: [http://dnr.wi.gov/topic/TMDLs/RockRiver/Final\\_Rock\\_River\\_TMDL\\_Report\\_with\\_Tables.pdf](http://dnr.wi.gov/topic/TMDLs/RockRiver/Final_Rock_River_TMDL_Report_with_Tables.pdf). The proposed permit includes limitations and requirements necessary to implement the recommendations of the TMDL. For specific limits see below.

- Suspended Solids, Total:** These limits are in addition to the concentration limit for suspended solids. The existing weekly average TSS mass limits are more restrictive than those allocated in the TMDL and are therefore included in place of the weekly average TMDL mass limits. The approved total suspended solids limits for this permittee are included in the following table, expressed as weekly average and monthly average effluent limits, and were already effective during the previous permit term:

**Total Suspended Solids (TSS) Effluent Limits**

Month	Monthly Ave TSS (lbs/day)	Weekly Ave TSS (lbs/day)*
Jan	32	36
Feb	35	36
March	32	36
April	31	36
May	32	24
June	31	24
July	32	24
Aug	32	24
Sept	31	24
Oct	32	24
Nov	31	36
Dec	32	36

- Phosphorus:** Waste load allocations specified in TMDLs are expressed as QWBELs (water quality based effluent limits). The waste load allocated-derived QWBELs are consistent with the assumptions and requirements of the approved Rock River TMDL. The approved total phosphorus TMDL limits for this permittee are included in the following table, expressed as monthly average effluent limits, and were already effective during the previous permit term:

**Total Phosphorus (TP) Effluent Limits**

Month	Monthly Ave Total P (lbs/day)
Jan	2.28
Feb	2.44
March	1.63
April	1.00
May	0.86
June	1.37
July	1.32
Aug	1.38
Sept	1.32
Oct	1.49
Nov	1.77
Dec	2.02

**Ammonia:** Current acute and chronic ammonia toxicity criteria for the protection of aquatic life are included in Tables 2C and 4B of ch. NR 105, Wis. Adm. Code. Subchapter IV of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (QWBELs) for ammonia. Additional weekly average limits are required to comply 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.

**E. Coli:** Revisions to bacteria surface water quality criteria to protect recreational uses and accompanying E. coli WPDES permit implementation procedures became effective May 1, 2020. The new rule requires that WPDES permits for facilities with required disinfection include monitoring for E. coli while facilities are disinfecting during the recreation period, and establish effluent limitations for E. coli established in s. NR 210.06 (2), Wis. Adm Code. The administrative code rule changes included the following actions: revised the bacteria water quality criteria from fecal coliform to E. coli to protect recreation in ch. NR 102, Wis. Adm. Code.; removed fecal coliform criteria for certain individual waters from ch. NR 104, Wis. Adm. Code.; revised permit requirements for publicly and privately owned sewage treatment works in ch. NR 210, Wis. Adm. Code.; and, updated approved analytical methods for bacteria in ch. NR 219, Wis. Adm. Code.

E. coli monitoring is required at the permit effective date. E. coli 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 will apply.

**Phosphorus, Total:** Phosphorus requirements are based on the Phosphorus Rules that became effective 12/1/2010 as detailed in NR 102 Water Quality Standards and NR 217 Effluent Standards and Limitations for Phosphorus. Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters. The monthly average phosphorus limit is a technology-based effluent limit. All phosphorus limits are already in effect.

**Thermal:** Requirements for Temperature are included in NR 102 Subchapter II Water Quality Standards for Temperature and NR 106 Subchapter V Effluent Limitations for Temperature. Thermal discharges must meet the Public Health criterion of 120 degrees F and the Fish & Aquatic Life criteria which are established to protect aquatic communities from lethal and sub-lethal thermal effects. Theresa has submitted a successful DC demonstration which was approved by the Department in 2013. The facility submitted a written statement on January 25, 2024 certifying that there have been no substantial changes in the findings of the DC study or the operations or thermal loadings at the facility since the DC study was approved. Therefore, temperature limits are not required, but one year of thermal monitoring is included in the proposed permit.

Dissipative cooling requests must be re-evaluated every permit reissuance. The permittee is responsible to submit an updated DC request as part of the permit application. Such a request must either include:

- a) A statement by the permittee that there have been no substantial changes in operations of, or thermal loadings to, the treatment facility or receiving water; or
- b) New information demonstrating DC to supplement the information used in the previous DC determination. If significant changes in operations or thermal loads have occurred, additional DC data must be submitted to the Department.

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

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



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

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

**Whole Effluent Toxicity:** Whole effluent toxicity (WET) testing requirements and limits (if applicable) are determined in accordance with ss. NR 106.08 and NR 106.09 Wis. Adm. Code, as revised August 2016. (See the current version of the Whole Effluent Toxicity Program Guidance Document and checklist and WET information, guidance and test methods at <http://dnr.wi.gov/topic/wastewater/wet.html>). Two chronic WET tests are scheduled during the proposed permit term.

**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 fairness and consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term.

The department has been revisiting the sampling frequencies at every facility to evaluate whether current frequencies are appropriate or if an increase is warranted. The frequencies for BOD5, TSS, ammonia, phosphorus, DO, and pH were increased to align Theresa with other facilities of similar size to ensure fairness and in consideration of department guidance on sampling frequencies.

Requirements in administrative code (NR 108, 205, 210, and 214 Wis. Adm. Code) and Sections 283.55, Wis. Stats., were considered, where applicable, when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. The department has determined at this time that the aforementioned changes in monitoring frequency are warranted based on the size and type of the facility.

### 3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
002	Class B	Liquid	Fecal Coliform	Aerobic SOUR Test	Land Application	46
Does sludge management demonstrate compliance? <b>Yes</b>						
Is additional sludge storage required? <b>No</b>						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? <b>Yes</b> Well # BF632 7/20/2021, 3.57 pCi/liter 4/12/2021, 3.17 pCi/liter 1/12/2021, 2.42 pCi/liter						

<b>Municipal Sludge Description</b>						
<b>Sample Point</b>	<b>Sludge Class (A or B)</b>	<b>Sludge Type (Liquid or Cake)</b>	<b>Pathogen Reduction Method</b>	<b>Vector Attraction Method</b>	<b>Reuse Option</b>	<b>Amount Reused/Disposed (Dry Tons/Year)</b>
Special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility						
Is a priority pollutant scan required? <b>No, design flow is less than 5 MGD.</b>						
Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

### **Sample Point Number: 002- SLUDGE**

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

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nitrogen, Ammonium (NH4-N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	January - December 2026
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	January - December 2026
Radium 226 Dry Wt		pCi/g	Annual	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.

### Changes from Previous Permit:

**Radium-226:** Monitoring for Radium-226 has been added to the proposed permit.

**PCBs:** Monitoring for PCBs in the year 2026 has been added to the proposed permit.

**PFAS:** Annual sludge monitoring is included in the permit pursuant s. NR 204.06(2)(b)9, Wis. Adm. Code.

### Explanation of Limits and Monitoring Requirements

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

**Radium-226:** Water Supply Well #BF632 contains levels of Radium-226 great than 2 pCi/liter.

**PCBs:** PCBs are not expected to be present due to the lack of any industrial or commercial discharges. Pursuant to s. NR 204.06(2)(c), Wis. Adm. Code, PCB monitoring may be included with a monitoring frequency of ‘once’ every other permit term.

**PFAS:** The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA is currently developing a risk assessment to determine future land application rates and expects to release this risk

assessment by the end of 2024. In the interim, the department has developed the “Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS”

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 the proposed WPDES permit pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9, Wis. Adm. Code.

## 4 Schedules

### 4.1 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
<p><b>Land Application Management Plan Submittal:</b> Submit an update to the management plan to optimize the land application system performance and demonstrate compliance with ch. NR 204, Wis. Adm. Code, by the Due Date. The management plan shall be consistent with the requirements of this permit, and ch. NR 204, Wis. Adm. Code. All Department issued approval maps and Land Application Approval Forms (3400-122) for all approved sites shall be included in the management plan to comply with s. NR 204.07(2), Wis. Adm. Code. Sites that no longer match approval conditions in the Department issued approval maps and Land Application Approval Forms (3400-122) in the management plan, including those sites without approval maps or forms, must be reviewed and potentially reauthorized to comply with ch. NR 204, Wis. Adm. Code. 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.</p>	12/31/2024

### Explanation of Schedule

An updated land application management plan shall be submitted to the department for approval in the fourth year of the permit term.

### 4.2 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
<p><b>Report on Effluent Discharge:</b> Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code.</p> <p>This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.</p>	6/30/2025
<p><b>Report on Effluent Discharge and Evaluation of Need:</b> Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan.</p> <p>This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.</p> <p>The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan.</p>	6/30/2026

<p>If the department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for department approval no later than 90 days after written notification was sent from the department. The department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued.</p> <p>If, however, the department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.</p>	
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**Explanation of Schedule**

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

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

**Special Reporting Requirements**

None.

**Other Comments:**

None.

**Attachments:**

Water Quality Based Effluent Limits dated February 5, 2024

**Expiration Date:**

June 30, 2029

**Justification Of Any Waivers From Permit Application Requirements**

No waivers were requested or given from permit application requirements.

**Prepared By:** BetsyJo Howe, Wastewater Specialist

**Date:** 3/15/2024

Updated (based on fact check comments): Editorial changes for clarity. 4/4/2024

Updated (based on public notice comments):

# CORRESPONDENCE/MEMORANDUM

DATE: February 5, 2024

TO: BetsyJo Howe – SCR/Fitchburg

FROM: Sarah Luck – SCR/Fitchburg

SUBJECT: Water Quality-Based Effluent Limitations for the Theresa Wastewater Treatment Facility  
WPDES Permit No. WI-0022322-09-0

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 Theresa Wastewater Treatment Facility in Dodge County. This municipal wastewater treatment facility (WWTF) discharges to the East Branch Rock River, located in the East Branch Rock River Watershed (UR13) Watershed in the Upper Rock River Basin. This discharge is included in the Rock River TMDL as approved by EPA. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD <sub>5</sub> May-October			19 mg/L 24 lbs/day	19 mg/L		2
November-April			30 mg/L 36 lbs/day	30 mg/L		
TSS May-October			19 mg/L	19 mg/L		2,3
November-April			30 mg/L	30 mg/L		
pH	9.0 s.u.	6.0 s.u.				2
Dissolved Oxygen		6.0 mg/L				2
Ammonia Nitrogen						4
January	14 mg/L		<b>14 mg/L</b>	14 mg/L		
February	14 mg/L		<b>14 mg/L</b>	14 mg/L		
March	14 mg/L		<b>14 mg/L</b>	14 mg/L		
April	14 mg/L		12 mg/L	8.0 mg/L		
May	-		10 mg/L	9.0 mg/L		
June	-		10 mg/L	9.0 mg/L		
July	-		10 mg/L	9.0 mg/L		
August	-		10 mg/L	9.0 mg/L		
September	-		10 mg/L	9.0 mg/L		
October	-		10 mg/L	9.0 mg/L		
November	14 mg/L		<b>14 mg/L</b>	14 mg/L		
December	14 mg/L		<b>14 mg/L</b>	14 mg/L		
Bacteria <i>E. coli</i>				126 #/100 mL geometric mean		5
PFOS and PFOA						6

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Phosphorus TBEL				1.0 mg/L		3,7
Chloride						8
Temperature Maximum						9
TKN, Nitrate+Nitrite, and Total Nitrogen						10
Chronic WET						11

Footnotes:

1. Monitoring only.
2. No changes from the current permit.
3. The following additional phosphorus and TSS mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL as well as TSS mass limitations already in effect prior to the TMDL implementation.

Month	Monthly Ave TSS (lbs/day)	Weekly Ave TSS (lbs/day)*	Monthly Ave Total P (lbs/day)
Jan	32	36	2.28
Feb	35	36	2.44
March	32	36	1.63
April	31	36	1.00
May	32	24	0.86
June	31	24	1.37
July	32	24	1.32
Aug	32	24	1.38
Sept	31	24	1.32
Oct	32	24	1.49
Nov	31	36	1.77
Dec	32	36	2.02

\*The existing weekly average TSS mass limits are more restrictive than those allocated in the TMDL and are therefore included in place of the weekly average TMDL mass limits.

4. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code, are included in bold.
5. Bacteria limits apply during the disinfection season of May through September. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
6. PFOS and PFOA monitoring is recommended at a once every two months frequency.
7. The monthly average phosphorus concentration limit of 1.0 mg/L is a technology-based limit. All phosphorus limits are already in effect as of July 1, 2020.
8. Monitoring in the fourth year of the permit term at a frequency to ensure that 11 samples are available at the next permit issuance.
9. One year of thermal monitoring is recommended.
10. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate (NO<sub>3</sub>), nitrite (NO<sub>2</sub>), and total kjeldahl nitrogen (TKN) (all expressed as N).
11. Two chronic WET tests are recommended. The Instream Waste Concentration (IWC) to assess chronic test results is 53%. According to the *State of Wisconsin Aquatic Life Toxicity Testing*





**Water Quality-Based Effluent Limitations for  
Theresa Wastewater Treatment Facility**

**WPDES Permit No. WI-0022322**

**PART 1 – BACKGROUND INFORMATION**

**Facility Description**

Theresa Wastewater Treatment Facility consists of an oxidation ditch (activated sludge), final clarification, and ultra-violet disinfection. Sludge that is produced is aerobically digested and stored on-site prior to being land applied on DNR-approved sites.

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

**Existing Permit Limitations**

The current permit, which expired on September 30, 2023, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD <sub>5</sub> May-October			19 mg/L 24 lbs/day	19 mg/L	2
November-April			30 mg/L 36 lbs/day	30 mg/L	
TSS May-October			19 mg/L	19 mg/L	3
November-April			30 mg/L	30 mg/L	
Ammonia Nitrogen January	17 mg/L		<b>17 mg/L</b>	14 mg/L	-
February	17 mg/L		<b>17 mg/L</b>	14 mg/L	
March	17 mg/L		<b>17 mg/L</b>	14 mg/L	
April	17 mg/L		12 mg/L	8.0 mg/L	
May			10 mg/L	9.0 mg/L	
June			10 mg/L	9.0 mg/L	
July			10 mg/L	9.0 mg/L	
August			10 mg/L	9.0 mg/L	
September			10 mg/L	9.0 mg/L	
October			10 mg/L	9.0 mg/L	
November	17 mg/L		<b>17 mg/L</b>	14 mg/L	
December	17 mg/L		<b>17 mg/L</b>	14 mg/L	
Fecal Coliform May – September			<b>656#/100 mL (geometric mean)</b>	400#/100 mL (geometric mean)	-

Attachment #1

pH	9.0 s.u.	6.0 s.u.			2
Dissolved Oxygen		6.0 mg/L			2
Phosphorus TBEL Interim				1.0 mg/L 6.4 mg/L	3,4
Chloride					1
Temperature					1

Footnotes:

1. Monitoring only.
2. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
3. The following additional phosphorus and TSS mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL.

Month	Monthly Ave TSS (lbs/day)	Weekly Ave TSS (lbs/day)*	Monthly Ave Total P (lbs/day)
Jan	32	36	2.28
Feb	35	36	2.44
March	32	36	1.63
April	31	36	1.00
May	32	24	0.86
June	31	24	1.37
July	32	24	1.32
Aug	32	24	1.38
Sept	31	24	1.32
Oct	32	24	1.49
Nov	31	36	1.77
Dec	32	36	2.02

\*The existing weekly average TSS mass limits are more restrictive than those allocated in the TMDL and are therefore retained.

4. Final compliance with limits by July 1, 2020.

**Receiving Water Information**

- Name: East Branch Rock River
- Waterbody Identification Code (WBIC): 861400
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q<sub>10</sub> and 7-Q<sub>2</sub> values are from USGS, estimated for the East Branch of Rock River at section 10, T12N-R17E, where Outfall 001 is located.
  - 7-Q<sub>10</sub> = 1.1 cfs (cubic feet per second)
  - 7-Q<sub>2</sub> = 3.5 cfs
  - 90-Q<sub>10</sub> = 3.0
  - Harmonic Mean Flow = 12 cfs using a drainage area of 140 mi<sup>2</sup>

Attachment #1

The Harmonic Mean has been estimated based on average flow and the 7-Q<sub>10</sub> using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).

- Hardness = 336 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data (n=8) from WET testing performed by Mayville Wastewater Treatment Facility, which discharges to the same receiving water approximately 12 miles downstream from Outfall 001.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from the East Branch of the Rock River approximately 30 feet upstream of the Allenton Wastewater Treatment Facility outfall is used for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: Mayville Wastewater Treatment Facility discharges approximately 12 miles downstream of the outfall. Combined impacts are not evaluated since there is little likelihood of an overlapping mixing zone.
- Impaired water status: The East Branch Rock River is impaired for total suspended solids and total phosphorus approximately 12 miles downstream of the outfall near Mayville.

**Effluent Information**

- Flow rate:  
 Design annual average = 0.202 MGD (Million Gallons per Day)  
 For reference, the actual average flow from October 2018 through November 2023 was 0.188 MGD.
- Hardness = 398 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data (n=4) from January 2023 reported on the permit application.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water source: Domestic wastewater with water supply from wells and one industrial contributor (Widmer's Cheese Cellars)
- Additives: Alum (phosphorus removal)
- Effluent characterization: This facility is categorized as a minor municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus ammonia, chloride, hardness, and phosphorus.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled “MEAN EFFL. CONC.”. Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

**Copper Effluent Data**

Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)
1/6/2023	5.8	1/20/2023	5.8	2/3/2023	16
1/10/2023	5.5	1/24/2023	5.5	2/7/2023	17
1/13/2023	6.2	1/27/2023	10	2/10/2023	15
1/17/2023	6.4	1/30/2023	11		
1-day P <sub>99</sub> = 25 µg/L					
4-day P <sub>99</sub> = 16 µg/L					

Attachment #1  
**Chloride Effluent Data**

	Chloride (mg/L)
1-day P <sub>99</sub>	623
4-day P <sub>99</sub>	514
30-day P <sub>99</sub>	452
Mean	419
Std	74.88
Sample size	52
Range	223 - 577

The following table presents the average concentrations and loadings at Outfall 001 from October 2018 through November 2023 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

**Parameter Averages with Limits**

	Average Measurement	Average Mass Discharged
BOD <sub>5</sub>	2 mg/L*	3.3 lbs/day*
TSS	2 mg/L*	3.7 lbs/day*
pH field	7.59 s.u.	
Phosphorus	1.62 mg/L	2.69 lbs/day
Ammonia Nitrogen	0.31 mg/L*	
Fecal Coliform	1.3 #/100 mL*	
Dissolved Oxygen	7.71 mg/L	

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

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

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

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99<sup>th</sup> percentile (or P<sub>99</sub>) 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<sub>10</sub>**

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. 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<sub>10</sub> 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.

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

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

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<sub>10</sub> method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for Theresa Wastewater Treatment Facility, and the limits are set based on two times the acute toxicity criteria.

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

**Daily Maximum Limits based on Acute Toxicity Criteria (ATC)**

RECEIVING WATER FLOW = 0.88 cfs, (1-Q<sub>10</sub> (estimated as 80% of 7-Q<sub>10</sub>)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P <sub>99</sub>	1-day MAX. CONC.
Arsenic		340	679.6	135.9	<14		
Cadmium	398	50.2	100.5	20.1	<0.3		
Chromium	301	4446	8891.7	1778	<1.3		
Copper	398	57.1	114.2			25	17
Lead	356	365	729.3	145.9	<3.5		
Nickel	268	1080	2160.6	432	4.6		
Zinc	333	345	689.4	137.9	30		
Chloride (mg/L)		757	1514.0			623	577

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

\*\* The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q<sub>10</sub> flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

**Weekly Average Limits based on Chronic Toxicity Criteria (CTC)**

RECEIVING WATER FLOW = 0.28 cfs (¼ of the 7-Q<sub>10</sub>), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P <sub>99</sub>
Arsenic		152.2		286	57.2	<14	

Attachment #1

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P <sub>99</sub>
Cadmium	175	3.82	0.03	7.15	1.4	<0.3	
Chromium	301	325.75	1.07	611	122.3	<1.3	
Copper	336	29.20	2.0	53.1			16
Lead	336	90.33	0.16	169.7	33.9	<3.5	
Nickel	268	120.18		226	45.2	4.6	
Zinc	333	344.68	27	624	124.9	30	
Chloride (mg/L)		395	45.2	703			514

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

**Monthly Average Limits based on Wildlife Criteria (WC)**

The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

**Monthly Average Limits based on Human Threshold Criteria (HTC)**

RECEIVING WATER FLOW = 3.11 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	0.03	4057	811.4	<0.3
Chromium (+3)	3818000	1.07	41867524	8373505	<1.3
Lead	140	0.16	1534	306.7	<3.5
Nickel	43000		471531	94306	4.6

**Monthly Average Limits based on Human Cancer Criteria (HCC)**

RECEIVING WATER FLOW = 3.11 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3		145.8	29.17	<14

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

**Conclusions and Recommendations**

Based on a comparison of the effluent data and calculated effluent limitations, **no effluent limitations are required.**

Chloride – Considering available effluent data from the current permit term (January 2021 through December 2021), the 1-day P<sub>99</sub> chloride concentration is 623 mg/L, and the 4-day P<sub>99</sub> of effluent data is 514 mg/L. These effluent concentrations are below the calculated WQBELs for chloride; therefore, **no**

**effluent limits are needed. Chloride monitoring is recommended to ensure that 11 sample results are available at the next permit issuance** to meet the data requirements of s. NR 106.85, Wis. Adm. Code.

Mercury – The permit application did not require monitoring for mercury because the Theresa Wastewater Treatment Facility is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code. In accordance with s. NR 106.145(3)(a)3, Wis. Adm. Code, a minor municipal discharger shall monitor, and report results of influent and effluent mercury monitoring once every three months if, “there are two or more exceedances in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5), Wis. Adm. Code.” A review of the past five years of sludge characteristics data reveals that all the sample results are within expected analytical ranges and well below the 17 mg/kg level. All five samples were below the level of detection. Therefore, **no mercury monitoring is recommended at Outfall 001.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the type of indirect discharger contributing to the collection system, **PFOS and PFOA monitoring is recommended at a frequency of once every two months.**

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

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

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

#### **Daily Maximum Limits based on Acute Toxicity Criteria (ATC)**

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

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

Where:

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

The effluent pH data was examined as part of this evaluation. A total of 538 sample results were reported from October 2018 through November 2023. The maximum reported value was 8.09 s.u. (Standard pH Units). The effluent pH was 7.98 s.u. or less 99% of the time. The 1-day P<sub>99</sub>, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.11 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 8.10 s.u. Therefore, a value of 8.10 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 8.10 s.u. into the equation above yields an ATC = 6.95 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<sub>10</sub> 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<sub>10</sub> (estimated as 80 % of 7-Q<sub>10</sub>) and the 2×ATC approach are shown below.

**Daily Maximum Ammonia Nitrogen Determination**

	Ammonia Nitrogen Limit mg/L
2×ATC	14
1-Q <sub>10</sub>	26

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

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 – WWSF**

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

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

The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do not change because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous WQBEL memo are shown in Attachment #3.

**Effluent Data**

The following table evaluates the statistics based upon ammonia data reported from October 2018 through November 2023, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Theresa Wastewater Treatment Facility permit for the respective month ranges. That need is determined by calculating 99<sup>th</sup> upper percentile (or P<sub>99</sub>) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

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**Ammonia Nitrogen Effluent Data**

Data in mg/L	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1-day P <sub>99</sub> *	-	1.5	8.3	5.8	4.0	-	-	-	-	-	-	5.9
4-day P <sub>99</sub> *	-	0.7	4.6	3.0	2.1	-	-	-	-	-	-	3.0
30-day P <sub>99</sub> *	-	0.35	2.2	1.4	0.88	-	-	-	-	-	-	1.3
Mean **	0.05	0.16	1.23	0.62	0.31	0.06	0.38	0.04	0.02	0.05	0.29	0.54
Std	0.09	0.39	2.01	1.64	1.42	0.27	3.33	0.12	0.07	0.18	5.23	1.80
Sample size	45 (35 ND)	41 (29 ND)	47 (24 ND)	44 (26 ND)	45 (32 ND)	45 (36 ND)	42 (34 ND)	44 (34 ND)	44 (40 ND)	54 (46 ND)	52 (45 ND)	43 (30 ND)
Range	<0.1 - 0.4	<0.1 - 1.272	<0.1 - 7.4	<0.1 - 5.0	<0.1 - 5.1	<0.1 - 0.93	<0.1 - 7.8	<0.1 - 0.49	<0.1 - 0.27	<0.1 - 0.59	<0.1 - 14	<0.1 - 5.1

\*“-” means these statistics cannot be calculated since there are fewer than 11 detected results available.

\*\*“<” 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.

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 maximum limits November through April and weekly and monthly year-round, where there are existing ammonia nitrogen limits in the permit, **the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:**

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

**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
January	14	<b>14</b>	14
February	14	<b>14</b>	14
March	14	<b>14</b>	14
April	14	12	8.0
May	-	10	9.0
June	-	10	9.0
July	-	10	9.0
August	-	10	9.0
September	-	10	9.0
October	-	10	9.0
November	14	<b>14</b>	14
December	14	<b>14</b>	14

Additional limits to meet the requirements in s. NR 106.07, Wis. Adm Code, are denoted in bold text.

## **PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA**

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

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

*E. coli* monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Since Theresa's permit requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit.

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

### **Effluent Data**

Theresa Wastewater Treatment Facility has monitored effluent *E. coli* from May through September 2023 and a total of 19 results are available. A geometric mean of 126 counts/100 mL was not exceeded, and the maximum monthly geometric mean was 15 counts/100 mL (September 2023). Effluent data has not exceeded 410 counts/100 mL. The maximum reported value was 20.7 counts/100 mL (9/29/23). Based on this effluent data **it appears that the facility can meet new *E. coli* limits and a compliance schedule is not needed in the reissued permit.**

## **PART 5 – PHOSPHORUS**

### **Technology-Based Effluent Limit**

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

**Since Theresa Wastewater Treatment Facility currently has a limit of 1.0 mg/L, this limit should be included in the reissued permit.** This limit remains applicable unless a more stringent WQBEL is given.

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

### **Water Quality-Based Effluent Limits (WQBEL)**

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. The Rock River TMDL was developed to protect the water quality of impaired waters within the watershed, and the discharge from the Theresa Wastewater Treatment Facility is to the East Branch Rock River in Dodge County. Since the East Branch Rock River was listed as impaired prior to the TMDL development, the TMDL-based phosphorus limits were

included in the permit at the last reissuance rather than the s. NR 217.13, Wis. Adm. Code, WQBEL.

The East Branch Rock River remains impaired for phosphorus meaning the Rock River TMDL limits remain applicable. The following limits from the current permit are recommended to be retained for phosphorus.

**Total Phosphorus Effluent Limitations**

Month	Monthly Total P WLA <sup>1</sup> (lbs/month)	Days Per Month	Monthly Ave Total P Effluent Limit <sup>2</sup> (lbs/day)	Equivalent Concentration (for informational purposes only) (mg/L)
Jan	70.66	31	2.28	1.35
Feb	68.44	28	2.44	1.45
March	50.68	31	1.63	0.97
April	30.01	30	1.00	0.59
May	26.66	31	0.86	0.51
June	41.17	30	1.37	0.81
July	41.02	31	1.32	0.78
Aug	42.84	31	1.38	0.82
Sept	39.50	30	1.32	0.78
Oct	46.13	31	1.49	0.88
Nov	53.06	30	1.77	1.05
Dec	62.47	31	2.02	1.20

Footnotes:

1- Rock River TMDL Appendix P. Monthly Total Phosphorus Allocations by Wastewater Treatment Facility (p. 147)

2- Monthly Average Total P mass effluent limit (lbs/day) = monthly Total P WLA (lbs/month) ÷ days per month

**Effluent Data**

The following table summarizes effluent total phosphorus monitoring data from October 2018 through November 2023. TMDL limits went into effect July 1, 2020, so data from that time period onward is presented separately since it is most representative of current conditions.

**Total Phosphorus Effluent Data**

	Oct 2018 through Nov 2023		July 2020 through Nov 2023	
	mg/L	lbs/day	mg/L	lbs/day
1-day P <sub>99</sub>	9.07	16.01	2.03	3.25
4-day P <sub>99</sub>	4.91	8.66	1.21	1.85
30-day P <sub>99</sub>	2.58	4.42	0.80	1.14
Mean	1.62	2.69	0.62	0.83
Std	1.88	3.35	0.39	0.65
Sample size	547	544	356	356
Range	0.07 - 11	0.08 - 20.11	0.09 - 4.1	0.08 - 7.544

**PART 6 – TOTAL SUSPENDED SOLIDS**

The Rock River TMDL also has wasteload allocations (WLA) for total suspended solids (TSS). The limits for TSS must be expressed as weekly and monthly averages for a municipal facility. For reference, the mass limits shown are equivalent to concentrations ranging from 18.4 mg/L – 20.8 mg/L as a monthly average and 27.3 mg/L – 30.9 mg/L as a weekly average at the design flow rate of 0.202 MGD.

**Total Suspended Solids Effluent Limitations**

Month	Monthly TSS WLA <sup>1</sup> (tons/month)	Days Per Month	Monthly Ave TSS Effluent Limit <sup>2</sup> (lbs/day)	Weekly Ave TSS Effluent Limit <sup>3</sup> (lbs/day)
January	0.49	31	32	47
February	0.49	28	35	52
March	0.49	31	32	47
April	0.47	30	31	46
May	0.49	31	32	47
June	0.47	30	31	46
July	0.49	31	32	47
August	0.49	31	32	47
September	0.47	30	31	46
October	0.49	31	32	47
November	0.47	30	31	46
December	0.49	31	32	47

Footnotes:

1- Rock River TMDL 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 multiplier

Weekly average mass limits were calculated in 2012. At that time, the coefficient of variation (the standard deviation divided by the mean) was assumed to be 0.6 (actually calculated to be 0.95), and the monitoring frequency was 2x/week. Given these two factors, a multiplier of 1.48 was used. Using updated mass data, the coefficient of variation is calculated to be 2.2 (= 11 ÷ 5). This value, along with the 2x/week monitoring frequency, would yield a higher multiplier and therefore increased limits. An increase in limits is not permitted unless a demonstration of need is shown in accordance with ch. NR 207, Wis. Adm. Code. Therefore, the previous multiplier and limits are retained.

**Effluent Data**

For informational purposes, the table below lists the statistics for total suspended solids discharge as both a concentration and a mass, from October 2018 through November 2023.

**Total Suspended Solids Effluent Data**

	TSS (mg/L)	TSS (lbs/day)
1-day P <sub>99</sub>	16	42
4-day P <sub>99</sub>	9	23
30-day P <sub>99</sub>	4	10
Mean*	3	5

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	TSS (mg/L)	TSS (lbs/day)
Std	3	11
Sample Size	551 (152 ND)	548
Range	<2 - 44	0 - 140.55

\*“<” 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.

**Summary**

The current weekly average mass limits of 24 lbs/day from May – Oct and 36 lbs/day from Nov – April are more restrictive than the corresponding WLA limits (described earlier). Since the mass limits that were in place prior to the Rock River TMDL are to protect the immediate receiving water, whereas the WLA limits are protective of downstream waters, the most restrictive limits are applicable. **The following table shows the recommended TSS limits for outfall 001:**

**Total Suspended Solids (TSS) Effluent Limitations**

Month	Monthly Average Limit (mg/L)	Weekly Average Limit (mg/L)	Monthly Average Limit (lbs/day)	Weekly Average Limit (lbs/day)
Jan	30	30	32	36
Feb	30	30	35	36
March	30	30	32	36
April	30	30	31	36
May	19	19	32	24
June	19	19	31	24
July	19	19	32	24
Aug	19	19	32	24
Sept	19	19	31	24
Oct	19	19	32	24
Nov	30	30	31	36
Dec	30	30	32	36

**PART 7 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL**

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

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from October 2018 through November 2023.

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The table below summarizes the maximum temperatures reported during monitoring from January 2021 through December 2021.

**Monthly Temperature Effluent Data & Limits**

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
JAN	50	50	58	93
FEB	48	49	61	92
MAR	48	49	58	88
APR	52	55	58	90
MAY	60	60	69	91
JUN	66	67	82	92
JUL	71	71	89	93
AUG	72	73	88	90
SEP	69	69	81	92
OCT	68	69	<b>65</b>	90
NOV	62	62	<b>53</b>	92
DEC	55	56	57	96

**Reasonable Potential**

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

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

Comparing the representative highest effluent temperature to the calculated effluent limits determines the reasonable potential of exceeding the effluent limits. The months in which limitations are recommended are shown in bold. Based on this analysis, weekly average temperature maximum limits are necessary for the months of October and November.

However, Theresa Wastewater Treatment Facility completed a dissipative cooling (DC) study in

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accordance with NR 106.59, Wis. Adm. Code, which was approved on May 8, 2013. This study, which began November 16, 2012 and ended on November 21, 2012, showed a return to near ambient temperatures within 30 feet of the outfall as well as a zone of free passage.

Theresa Wastewater Treatment Facility submitted a written statement on January 25, 2024 certifying that there have been no substantial changes in the findings of the DC study or the operation or thermal loadings at the facility since the DC study was approved, and that they would like continued consideration of dissipative cooling. Therefore, **temperature limits are not required, but one year of thermal monitoring is recommended.** The complete thermal table used for this calculation is in Attachment #4.

**Future WPDES Permit Reissuance**

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

- a) A statement by the permittee that there have been no substantial changes in operation of, or thermal loadings to, the treatment facility and the receiving water; or
- b) New information demonstrating DC to supplement the information used in the previous DC determination. If significant changes in operation or thermal loads have occurred, additional DC data must be submitted to the Department.

**PART 8 – WHOLE EFFLUENT TOXICITY (WET)**

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

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC<sub>50</sub> (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<sub>25</sub> (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 53%, 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:

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

Where:

- Q<sub>e</sub> = annual average flow = 0.202 MGD = 0.313 cfs
- f = fraction of the Q<sub>e</sub> withdrawn from the receiving water = 0
- Q<sub>s</sub> = ¼ of the 7-Q<sub>10</sub> = 1.1 cfs ÷ 4 = 0.275 cfs



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- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.
- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.
- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations.

**WET Data History**

Date Test Initiated	Acute Results LC <sub>50</sub> %				Chronic Results IC <sub>25</sub> %				Footnotes or Comments
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	<i>C. dubia</i>	Fathead Minnow	Pass or Fail?	Use in RP?	
04/24/2008	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
07/30/2009	>100	>100	Pass	No	>100	>100	Pass	No	1
10/29/2010	-	-	-	-	>100	>100	Pass	No	1
02/24/2015	-	-	-	-	>100	>100	Pass	Yes	
09/24/2019	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
11/10/2020	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
06/21/2022	-	-	-	-	>100	>100	Pass	Yes	

Footnote:

1. *Tests done by S-F Analytical, July 2008 – March 2011.* The DNR has reason to believe that WET tests completed by SF Analytical Labs from July 2008 through March 31, 2011 were not performed using proper test methods. Therefore, WET data from this lab during this period has been disqualified and was not included in the analysis.
- 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, TUA and TUC effluent values are equal to zero whenever toxicity is not detected (i.e., when the LC<sub>50</sub>, IC<sub>25</sub> or IC<sub>50</sub> ≥ 100%).

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

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

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

**WET Checklist Summary**

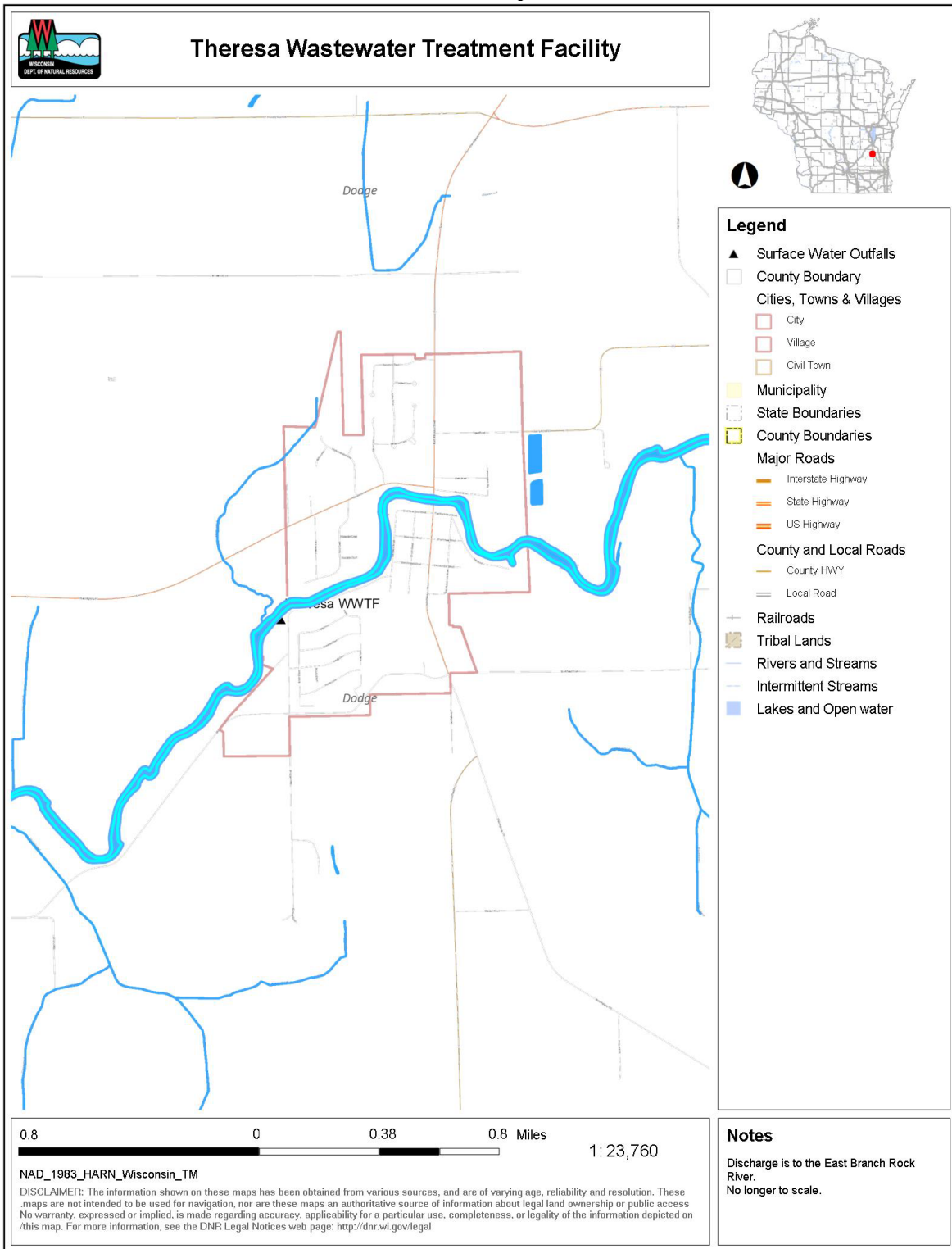
	<b>Acute</b>	<b>Chronic</b>
<b>AMZ/IWC</b>	Not Applicable. <b>0 Points</b>	IWC = 53% <b>10 Points</b>
<b>Historical Data</b>	3 tests used to calculate RP. No tests failed. <b>0 Points</b>	5 tests used to calculate RP. No tests failed. <b>0 Points</b>
<b>Effluent Variability</b>	Little variability, few violations, no upsets, consistent WWTF operations. <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Receiving Water Classification</b>	WWFF <b>5 Points</b>	Same as Acute. <b>5 Points</b>
<b>Chemical-Specific Data</b>	No reasonable potential for limits based on ATC. Ammonia nitrogen limit carried over from the current permit. Chloride, copper, nickel, and zinc detected. Additional Compounds of Concern: None. <b>3 Points</b>	No reasonable potential for limits based on CTC. Ammonia nitrogen limit carried over from the current permit. Chloride, copper, nickel, and zinc detected. Additional Compounds of Concern: None. <b>3 Points</b>
<b>Additives</b>	No biocides and one water quality conditioner (alum) added. Permittee has proper P chemical SOP in place? Yes <b>1 Point</b>	All additives used more than once per 4 days. <b>1 Point</b>
<b>Discharge Category</b>	1 Industrial Contributor (Widmer's Cheese Cellars) <b>5 Points</b>	Same as Acute. <b>5 Points</b>
<b>Wastewater Treatment</b>	Secondary or better. <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Downstream Impacts</b>	No impacts known. <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Total Checklist Points:</b>	<b>14 Points</b>	<b>24 Points</b>
<b>Recommended Monitoring Frequency (from Checklist):</b>	None.	2 tests during permit term.
<b>Limit Required?</b>	No	No

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	Acute	Chronic
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, **no acute and two chronic WET tests are recommended in the reissued permit.** Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).

Attachment #2  
Site Map



## Ammonia Nitrogen Calculations from the WQBEL Memo Dated November 16, 2012

		Summer	Winter	
		May – Sept.	Oct. - March	April
<b>Background Information:</b>	7-Q <sub>10</sub> (cfs)	1.1	1.1	1.1
	7-Q <sub>2</sub> (cfs)	3.5	3.5	3.5
	Ammonia (mg/L)	0.07	0.17	0.09
	Temperature (°C)	25	3	9
	pH (su)	8.21	7.82	7.82
	% of Flow used	100	25	25
	Reference Weekly Flow (cfs)	1.1	0.275	0.275
	Reference Monthly Flow (cfs)	2.975	0.744	0.744
<b>Criteria mg/L:</b>	4-Day Chronic			
	Early Life Stages Present	2.24	7.76	7.76
	Early Life Stages Absent	2.24	12.60	12.60
	30-Day Chronic			
	Early Life Stages Present	0.90	3.10	3.10
	Early Life Stages Absent	0.90	5.04	5.04
<b>Effluent Limitations mg/L:</b>	Weekly Average			
	Early Life Stages Present	<b>9.90</b>		<b>14.51</b>
	Early Life Stages Absent		<b>23.54</b>	
	Monthly Average			
	Early Life Stages Present	<b>8.78</b>		<b>10.28</b>
	Early Life Stages Absent		<b>16.63</b>	

Note, in a warm water sport fish community early life stages present limits apply during the months of April through September and early life stages absent limits apply from October through March.

An antidegradation analysis is needed pursuant to ch. NR 207 for every limitation that is greater than the corresponding limit in the existing WPDES permit. The following tables show the limits based on current data, rounded from the above evaluation, and the limits which are imposed in the current permit.

<b>2012 Nitrogen Ammonia WQBELs, mg/L</b>		
	<b>Weekly Average</b>	<b>Monthly Average</b>
<b>April</b>	15	10
<b>May – Sept.</b>	10	9
<b>Oct. – March</b>	24	17

<b>2007 Nitrogen Ammonia Permit Limits, mg/L</b>		
	<b>Weekly Average</b>	<b>Monthly Average</b>
<b>April</b>	12	8
<b>May – Oct.</b>	10	9
<b>Nov. – March</b>	19	14

### Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

<b>Facility:</b>	Theresa WWTF	<b>7-Q<sub>10</sub>:</b>	1.1 cfs	<b>Temp Dates</b>	<b>Flow Dates</b>
<b>Outfall(s):</b>	001	<b>Dilution:</b>	25%	<b>Start:</b>	01/06/21 10/01/18
<b>Date Prepared:</b>	12/14/2023	<b>f:</b>	0	<b>End:</b>	12/30/21 11/30/23
<b>Design Flow (Q<sub>e</sub>):</b>	0.202 MGD	<b>Stream type:</b>	Small warm water sport or forage fish		
<b>Storm Sewer Dist.</b>	0 ft	<b>Q<sub>s</sub>:Q<sub>e</sub> ratio:</b>	0.9 :1		
		<b>Calculation Needed?</b>	YES		

Month	Water Quality Criteria			Receiving Water Flow Rate (Q <sub>s</sub> ) (cfs)	Representative Highest Effluent Flow Rate (Q <sub>e</sub> )		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	T <sub>a</sub> (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Q <sub>esl</sub> ) (MGD)	Daily Maximum Flow Rate (Q <sub>ea</sub> ) (MGD)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)		(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	1.1	0.327	0.462	0	50	50	58	93
FEB	34	50	76	1.1	0.253	0.468	0	48	49	61	92
MAR	38	52	77	1.1	0.443	0.614	0	48	49	58	88
APR	48	55	79	1.1	0.404	0.483	0	52	55	58	90
MAY	58	65	82	1.1	0.321	0.451	0	60	60	69	91
JUN	66	76	84	1.1	0.283	0.418	0	66	67	82	92
JUL	69	81	85	1.1	0.277	0.358	0	71	71	89	93
AUG	67	81	84	1.1	0.356	0.468	0	72	73	88	90
SEP	60	73	82	1.1	0.274	0.383	0	69	69	81	92
OCT	50	61	80	1.1	0.471	0.512	0	68	69	65	90
NOV	40	49	77	1.1	0.373	0.453	0	62	62	53	92
DEC	35	49	76	1.1	0.311	0.368	0	55	56	57	96