## Permit Fact Sheet

## **General Information**

Permit Number	WI-0022292-10-0
Permittee Name	VILLAGE OF SOUTH WAYNE
and Address	P O Box 305 107 East Center Street, South Wayne, WI 53587
Permitted Facility	South Wayne Wastewater Treatment Facility
Name and Address	STH "11", SOUTH WAYNE, WISCONSIN
Permit Term	July 01, 2025 to June 30, 2030
Discharge Location	West bank of Pecatonica River approx. 2.5 miles downstream of CTH Dbridge. SE <sup>1</sup> / <sub>4</sub> of NW <sup>1</sup> / <sub>4</sub> , Section 11, T1N, R5E Lat.: 42.57291°N Long.:89.86794°W
Receiving Water	Pecatonica River in Lower Pecatonica River watershed of the Sugar-Pecatonica River Basin in Lafayette County
Stream Flow (Q <sub>7,10</sub> )	72 cfs
Stream Classification	Warm water sport fish (WWSF), non-public water supply
Discharge Type	Existing, Continuous
Annual Average Design Flow (MGD)	0.069 MGD
Industrial Contributors	None
Plant Classification	A1 - Suspended Growth Processes; B - Solids Separation; C - Biological Solids/Sludges; D - Disinfection; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

## **Facility Description**

The Village of South Wayne operates an activated sludge wastewater treatment facility that consists of a grinder, aeration tanks, final clarification, and seasonal disinfection/dechlorination. Sludge from the treatment process is aerobically digested, stored and land spread as needed on DNR approved land. At the time of reissuance, upgrades were underway to replace the existing chlorine disinfection system with UV disinfection and to add a chemical phosphorus removal system.

Shaded cells in tables are changes from the current permit for informational purposes.

## **Substantial Compliance Determination**

There have been several violations of effluent limits, missed samples, late compliance reporting, overflow, and individual phosphorus variance implementation. The permittee has taken the necessary steps to correct most of their actions, and the existing violations associated with phosphorus compliance will be corrected with permit reissuance.

After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items, and a site visit on 04/22/2025, this facility has been found to be in substantial compliance with their current permit.

## **Sample Point Descriptions**

	Sample Point Designation				
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)			
701	0.04 MGD (February 2020 to January 2025)	Influent: 24-hr flow proportional composite samples shall be taken between the influent pumps and the aeration tanks in the influent pump channel.			
001	N/A	Effluent: 24-hr flow proportional composite samples shall be taken upstream of disinfection. Flow and grab samples shall be taken after disinfection.			
002	3.3 Dry US Tons(2024 Permit Application)	Aerobically digested, Thickened Liquid, Class B. Representative sludge samples shall be collected from the sludge storage tank.			

## Permit Requirements

## **1** Influent – Monitoring Requirements

### 1.1 Sample Point Number: 701- INFLUENT

Monitoring Requirements and Limitations						
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes	
Flow Rate		MGD	Daily	Continuous		
BOD5, Total		mg/L	2/Week	24-Hr Flow Prop Comp		
Suspended Solids, Total		mg/L	2/Week	24-Hr Flow Prop Comp		

### **Changes from Previous Permit:**

Influent limitations and monitoring requirements were evaluated for this permit term and no changes were made from the previous permit.

### **Explanation of Limits and Monitoring Requirements**

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

## 2 Surface Water - Monitoring and Limitations

### 2.1 Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations						
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes	
Flow Rate		MGD	Daily	Continuous		
BOD5, Total	Monthly Avg	30 mg/L	2/Week	24-Hr Flow Prop Comp		
BOD5, Total	Weekly Avg	45 mg/L	2/Week	24-Hr Flow Prop Comp		
Suspended Solids, Total	Monthly Avg	30 mg/L	2/Week	24-Hr Flow Prop Comp		
Suspended Solids, Total	Weekly Avg	45 mg/L	2/Week	24-Hr Flow Prop Comp		
pH Field	Daily Max	9.0 su	5/Week	Grab		
pH Field	Daily Min	6.0 su	5/Week	Grab		
Nitrogen, Ammonia Variable Limit		mg/L	See Table	24-Hr Flow Prop Comp	Look up the variable ammonia limit from the 'Variable Ammonia Limitation' table and report the variable limit in the Ammonia Variable Limit column on the eDMR.	
Nitrogen, Ammonia (NH3-N) Total	Daily Max - Variable	mg/L	2/Week	24-Hr Flow Prop Comp	Look up the variable ammonia limit from the 'Variable Ammonia Limitation' table and report the variable limit in the Ammonia Variable Limit column on the eDMR.	
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	108 mg/L	2/Week	24-Hr Flow Prop Comp		
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	108 mg/L	2/Week	24-Hr Flow Prop Comp		
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit Effective May through September annually per the Effluent Limitations for E. coli Schedule.	
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit Effective May through September annually. See the E. coli Percent Limit section. Enter the result in the DMR on the last day of the month.	

	Mo	nitoring Requi	rements and Li	mitations	
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Chlorine, Total Residual	Daily Max	38 ug/L	Daily	Grab	May – September when chlorinating until UV disinfection begins.
Chlorine, Total Residual	Weekly Avg	38 ug/L	Daily	Grab	May – September when chlorinating until UV disinfection begins.
Chlorine, Total Residual	Monthly Avg	38 ug/L	Daily	Grab	May – September when chlorinating until UV disinfection begins.
Phosphorus, Total	Monthly Avg	5.6 mg/L	2/Week	24-Hr Flow Prop Comp	Limit effective throughout the permit term, as it represents a minimum control level. See Water Quality Trading (WQT) sections for more information.
Phosphorus, Total		lbs/day	2/Week	Calculated	Report daily mass discharged using Equation 1a. in the Water Quality Trading (WQT) section.
WQT Credits Used (TP)		lbs/month	Monthly	Calculated	Report WQT TP Credits used per month using Equation 2c. in the Water Quality Trading (WQT) section. Available TP Credits are specified in Table 2 and in the approved Water Quality Trading Plan.
WQT Computed Compliance (TP)	Monthly Avg	0.3 mg/L	Monthly	Calculated	Report the WQT TP Computed Compliance value using Equation 4a. in the Water Quality Trading (WQT) section. Value entered on the last day of the month.
WQT Computed Compliance (TP)	6-Month Avg	0.1 mg/L	Monthly	Calculated	Compliance with the six- month average limit is evaluated at the end of the six-month period on June 30 and Dec 31.
WQT Computed	6-Month Avg	0.06 lbs/day	Monthly	Calculated	Report the WQT TP

Monitoring Requirements and Limitations						
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes	
Compliance (TP)					Computed Compliance value using Equation 4b. in the Water Quality Trading (WQT) section. Compliance with the six- month average limit is evaluated at the end of the six-month period on June 30 and Dec 31.	
WQT Credits Used (TP)	Annual Total	105 lbs/yr	Annual	Calculated	The sum of total monthly credits used may not exceed Table 2 values listed.	
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring in 2029 only.	
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 below. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.	
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET section.	

### **Changes from Previous Permit**

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

- Flow Rate- Sections NR 108.06(4)(b), Wis. Adm. Code, and NR 205.07(1)(r)2., Wis. Adm. Code, require adequate flow measurement and recording equipment to measure the volume of effluent discharged and to report it to the department at the frequency specified in the permit.
- **pH-** This parameter was moved to be directly before the variable ammonia for access for eDMR reporting purposes and sample frequency increased.

- Ammonia- Weekly average and monthly average limits corrected.
- E. coli- Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.
- Chlorine- The permittee is in the process of installing UV disinfection. Chlorine sampling and limits are effective only while chlorinating and are not required after UV disinfection is operational.
- **TP-** Water Quality Trading added to the permit with required reporting and limits.
- Chloride- Sampling year updated.
- Total Nitrogen Monitoring (TKN, N02+N03 and Total N)- Annual monitoring is required in specific quarters as outlined in the permit.

### **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 April 29, 2025.

**Monitoring Frequencies-** The <u>Monitoring Frequencies for Individual Wastewater Permits</u> guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. The department has been revisiting the sampling frequencies at every facility to evaluate whether current frequencies are appropriate or if an increase is warranted. In evaluating the monitoring frequency for parameters with limits in the permit, the department considered the potential public health impacts, probable environmental impact, and past operating performance. The frequency for pH was increased to align this permittee with other facilities of similar size to ensure fairness and in consideration of department guidance on sampling frequencies.

**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. Minor changes have been made to ammonia to correct the weekly and monthly average limits.

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 (WQBELs) for ammonia. In the previous permit term, a daily pH variable ammonia limit was included in consultation with the Compliance Engineer and operator. With this change from a daily maximum limit the weekly average and monthly average limits should have been adjusted but were not. This permit term the department has corrected this error, updating the weekly average and monthly average limits to 108 mg/L.

**Phosphorus** – Phosphorus requirements are based on the Phosphorus Rules that became effective December 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. Currently in NR 217 Wis. Adm. Code there are two methods used to determine if a phosphorus limit is needed: a technology based effluent limit (TBEL) and a water quality based effluent limit (WQBEL). Based on the size and classification of the stream, the water quality criteria for the Pecatonica River is 100 ug/L. In this case, *the WQBEL is 0.3 mg/L (monthly average), 0.1 mg/L & 0.06 lbs/day (6-month average)*. For the reasons explained in the April 30, 2012 paper entitled 'Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin', WDNR has determined that it is impracticable to express the phosphorus WQBEL for the permittee as a maximum daily, weekly or monthly value. The final effluent limit for phosphorus is expressed as a sixmonth average. It is also expressed as a monthly average equal to three times the derived WQBEL (which equates to 0.3 mg/L). This final effluent limit was derived from and complies with the applicable water quality criterion. A phosphorus concentration limit is necessary to prevent backsliding during the term of the permit. The TBL limit of 1.0 mg/L will be retained in the permit.

The wastewater treatment facility is not able to meet the WQBEL. This permit authorizes the use of trading as a tool to demonstrate compliance with the phosphorus WQBELs. This permit includes terms and conditions related to the Water Quality Trading Plan (WQT-2024-0028) or approved amendments thereof. The total 'WQT TP Credits' available are designated in the approved WQT Plan. The permittee is transferring credits from the City of Darlington through point to point transfer. The WQT Plan proposes the generation of 105 lbs/yr of phosphorus credits for the next five years.

Additional WQT subsections in the permit provide information on compliance determinations, annual reporting and reopening of the permit.

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/Dis posed (Dry Tons/Year)	
002	В	Liquid	Fecal Coliform	Injection Or Aerobic SOUR	Land Application	3.3 (2024 application)	
Does sludge management demonstrate compliance? Yes							
Is additional s	ludge storage re	equired? No					
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? Yes							
If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility							
Is a priority pollutant scan required? No, design flow is less than 5 MGD (0.069 MGD).							
Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.							

## **3** Land Application - Monitoring and Limitations

### 3.1 Sample Point Number: 002- SLUDGE

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
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	

	Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes	
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		
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		
Radium 226 Dry Wt		pCi/g	Annual	Composite		
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2026.	
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2026.	
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.	
PFAS Dry Wt	1	1	Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.	

### 3.1.1 Changes from Previous Permit:

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

**PCB** – Sampling year updated.

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

### 3.1.2 Explanation of Limits and Monitoring Requirements

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

**PFAS-** The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA has released a draft assessment which documents the potential public health risks associated with land applying biosolids contaminated with PFOA and/or PFOS, and the department is currently evaluating this information. In the interim, the department has developed the "Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing <u>PFAS</u>".

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 Annual Water Quality Trading (WQT) Report

Required Action	Due Date
<b>Annual WQT Report:</b> Submit an annual WQT report that shall cover the first year of the permit term. The WQT Report shall include:	01/31/2026
The number of pollutant reduction credits (lbs/month) used each month of the previous year to demonstrate compliance;	
The source of each month's pollutant reduction credits by identifying the approved water quality trading plan that details the source;	
A summary of the annual inspection of each nonpoint source management practice that generated any of the pollutant reduction credits used during the previous year; and	

Identification of noncompliance or failure to implement any terms or conditions of this permit with respect to water quality trading that have not been reported in discharge monitoring reports.	
Annual WQT Report #2: Submit an annual WQT report that shall cover the previous year.	01/31/2027
Annual WQT Report #3: Submit an annual WQT report that shall cover the previous year.	01/31/2028
Annual WQT Report #4: Submit an annual WQT report that shall cover the previous year.	01/31/2029
<b>Annual WQT Report #5:</b> Submit the 5th annual WQT report. If the permittee wishes to continue to comply with phosphorus limits through WQT in subsequent permit terms, the permittee shall submit a revised WQT plan including a demonstration of credit need, compliance record of the existing WQT, and any additional practices needed to maintain compliance over time.	01/31/2030
<b>Annual WQT Report Required After Permit Expiration:</b> In the event that this permit is not reissued by the expiration date, the permittee shall continue to submit annual WQT reports by January 31 each year covering the total number of pollutant credits used, the source of the pollution reduction credits, a summary of annual inspection reports performed, and identification of noncompliance or failure to implement any terms or conditions of the approved water quality trading plan for the previous calendar year.	

### **Explanation of Schedule**

Reports are required that include the following information:

- Verification that site inspections occurred;
- Brief summary of site inspection findings;
- Identification of noncompliance or failure to implement any terms or conditions of the permit or trading plan that have not been reported in discharge monitoring reports;
- Any applicable notices of termination or management practice registration; and
- A summary of credits used each month over the calendar year.

### 4.2 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 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.	07/01/2026

### 4.2.1 Explanation of Schedule

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

## **Other Comments**

None

## Attachments

Water Quality Based Effluent Limits dated 4/29/2025 WQT Plan dated 11/6/2024 WQT Conditional Approval Letter dated 11/8/2024

## Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance

Prepared By: Jennifer Jerich, Wastewater Specialist

Date: 5/1/2025 Revision date post fact check: 5/14/2025 Revision date post public notice:

### CORRESPONDENCE/MEMORANDUM

DATE	April 29, 2025
DATE.	April 29, 2025

TO: Jennifer Jerich – SCR/Horicon

FROM: Zainah Masri – WY/3

SUBJECT:Water Quality-Based Effluent Limitations for the South Wayne Wastewater TreatmentFacilityWPDES Permit No. WI-0022292-10-0

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 South Wayne Wastewater Treatment Facility in Lafayette County. This municipal wastewater treatment facility (WWTF) discharges to the Pecatonica River located in the Lower Pecatonica River Watershed in the Sugar – Pecatonica River Basin. 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:

	Daily	Daily	Weekly	Monthly	Six-Month	Footnotes
Parameter	Maximum	Minimum	Average	Average	Average	
Flow Rate						2
BOD <sub>5</sub>			45 mg/L	30 mg/L		1
TSS			45 mg/L	30 mg/L		1
pН	9.0 s.u.	6.0 s.u.				1
Ammonia Nitrogen	Variable		108 mg/L	108 mg/L		3,7
Bacteria						
E. coli				126 #/100 mL geometric mean		
Chloride						5
Chlorine, Total Residual	38 µg/L		38 μg/L	38 µg/L		7
Phosphorus						
WQT MCL				5.6 mg/L		
Final WQBELs				0.300 mg/L	0.100 mg/L 0.06 lbs/day	6
TKN.						8
Nitrate+Nitrite, and						-
Total Nitrogen						
Acute WET						9

Footnotes:

- 1. No changes from the current permit.
- 2. Monitoring only.
- 3. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values may be included in the permit in place of the single limit. These limits apply year-round.



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

- 4. 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.
- 5. Monitoring at a frequency to ensure that 11 samples are available at the next permit issuance.
- 6. Phosphorus WQBELs are met through WQT, which also requires a corresponding Minimum Control Level (MCL) to be met at the discharge. The
- 7. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
- 8. 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  $(NO_3)$ , nitrite  $(NO_2)$ , and total kjeldahl nitrogen (TKN) (all expressed as N).
- 9. After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, two acute WET tests are recommended during the permit term in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge.

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

Attachments (3) - Narrative, Ammonia Nitrogen Calculations and Map

PREPARED BY:

Zainah Masri, Water Resources Engineer Zainah Masri Dians Figiel Date: <u>04/29/2025</u>

APPROVED BY:

Diane Figiel Diane Figiel, PE, Water Resources Engineer

E-cc: Caitlin O'Connell, Wastewater Engineer – SCR/Fitchburg Lisa Creegan, Regional Wastewater Supervisor – SCR/Fitchburg Diane Figiel, Water Resources Engineer – WY/3 Kari Fleming, NR Program Manager – WY/3 Nate Willis, Wastewater Engineer – WY/3

#### Water Quality-Based Effluent Limitations for South Wayne Wastewater Treatment Facility

#### WPDES Permit No. WI-0022292-10-0

Prepared by: Zainah Masri – WY/3

#### **PART 1 – BACKGROUND INFORMATION**

#### **Facility Description**

The Village of South Wayne operates an activated sludge wastewater treatment facility that includes a grinder, aeration tanks, final clarifier, and a chlorination/dechlorination system for seasonal disinfection. Currently, they are in the process of upgrading the plant to add chemical treatment (alum) for phosphorus removal and to transition from chlorination/dechlorination to UV disinfection. In addition, they have recently been approved for WQT credits of 105 lbs/year for phosphorus, which was acquired through purchase of excess credits from the Darlington Wastewater Treatment Facility.

Attachment #3 is a map of the area showing the approximate location of Outfall 001.

#### **Existing Permit Limitations**

The current permit, expired on December 31, 2024 and included the following effluent limitations and monitoring requirements.

	Daily	Daily	Weekly	Monthly	Six-Month	Footnotes
Parameter	Maximum	Minimum	Average	Average	Average	
Flow Rate						1
BOD <sub>5</sub>			45 mg/L	30 mg/L		1
TSS			45 mg/L	30 mg/L		1
pН	9.0 s.u.	6.0 s.u.				1
Ammonia Nitrogen	Variable		16 mg/L	16 mg/L		2,5
Fecal Coliform			656#/100 mL geometric mean	400#/100 mL geometric mean		2
Residual Chlorine	38 µg/L		38 μg/L	38 µg/L		2
Phosphorus						3
Interim				6.8 mg/L		
Final				0.30 mg/L	0.10 mg/L	
					0.058 lbs/day	
Chloride						4
Acute WET						6

Footnotes:

- 1. 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.
- 2. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7) are included in bold.
- 3. If the phosphorus variance application that was submitted is approved by the EPA, the existing interim limit of 3.9 mg/L as a monthly average may be extended beyond the end of the compliance schedule along with a requirement for total phosphorus pollutant minimization program.
- 4. Monitoring only from January 1, 2023 to December 31, 2023.
- The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values is included in the permit in place of the single limit. These limits apply year-round.
   Daily Maximum Ammonia Nitrogen Limits WWSF, WWFF & LFF

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

6. Acute tests shall be conducted twice during the permit term in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

Acute: April 1 – June 30, 2020; July 1 – September 30, 2023

#### **Receiving Water Information**

- Name: Pecatonica River
- Waterbody Identification Code (WBIC): 889100
- 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 for Station SW ¼ of NE ¼ of Sec. 11 T1N-R5E where Outfall 001 is located.

$$7-Q_{10} = 72$$
 cfs (cubic feet per second)

$$7-Q_2 = 124.5 \text{ cfs}$$

Harmonic Mean Flow = 455.18 cfs

- Hardness = 341 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data from SWIMS station 233002 the Pecatonica River at Martintown from September 2001 to April 2024.
- % 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: The background concentration is assumed to be negligible South Wayne Wastewater Treatment Facility

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and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.

- Multiple dischargers: There are several other dischargers to the Pecatonica River however they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: The Pecatonica River is listed as impaired for total phosphorus along stream miles 93.05 to 144.80 at the point of discharge.

#### **Effluent Information**

• Design flow rate(s):

Annual average = 0.069 MGD (Million Gallons per Day) For reference, the actual average flow from February 2020 to January 2025 was 0.040 MGD. Please note that the flows are measured at sample point 701 which is the influent to the plant.

- Hardness = 357 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of effluent data from October 2024 to November 2024 taken from 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 the Village of South Wayne.
- Additives: Chlorine. Currently they are in the process of upgrading the plant to add chemical treatment (alum) for phosphorus removal and to transition from chlorination/dechlorination to UV disinfection.
- 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.

Sample Date	Copper µg/L	Sample Date	Copper µg/L	Sample Date	Copper µg/L				
10/24/2023	10	11/09/2023	9.5	11/21/2023	8.6				
10/31/2023	9.1	11/12/2023	9.0	11/24/2023	7.2				
11/03/2023	9.5	11/15/2023	9.9	11/27/2023	8.4				
11/06/2023	9.6	11/18/2023	8.3						
$1 - day P_{99} = 11 \ \mu g/L$									
		4-day P99	= 10 µg/L						

#### **Effluent Copper Data**

Ennacht Restauar Chronine D'ata						
	Residual Chlorine µg/L					
1-day P <sub>99</sub>	100					
4-day P99	123.2					
30-day P <sub>99</sub>	74.93					
Mean	49.97					
Std	0					

#### Effluent Residual Chlorine Data

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Attachment #1					
Residual Chlorine µg/					
Sample size	1527				
Range	100				

#### **Effluent Chloride Data**

	Chloride mg/L
1-day P99	355
4-day P <sub>99</sub>	303
30-day P <sub>99</sub>	273
Mean	254
Std	37
Sample size	23
Range	192 - 334

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

I arameter reverages with Limits							
	Average Measurement	Average Mass Discharged					
BOD <sub>5</sub>	3.4 mg/L*	-					
TSS	5.3 mg/L*	-					
pH field	7.4 s.u.	-					
Phosphorus	5.0 mg/L	1.2 lbs/day					
Ammonia Nitrogen	0.13 mg/L*	-					
Fecal Coliform	151 #/ 100 mL*	-					
Residual Chlorine	51 µg/L	-					

#### **Parameter Averages with Limits**

\*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

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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  $1-Q_{10}$  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.

Limitation = (WQC) (Qs + (1-f) Qe) - (Qs - f Qe) (Cs)Oe

Where:

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

 $Qs = average minimum 1-day flow which occurs once in 10 years (1-day <math>Q_{10}$ )

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

Qe = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

f = Fraction of the effluent flow that is withdrawn from the receiving water, and

Cs = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e), Wis. Adm. Code.

If the receiving water is effluent dominated under low stream flow conditions, the  $1-Q_{10}$  method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for South Wayne 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 for all the detected substances. All concentrations are expressed in terms of micrograms per Liter ( $\mu$ g/L), except for hardness and chloride (mg/L).

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

RECEIVING WATER FLOW = 58 cfs,  $(1-Q_{10} \text{ (estimated as 80\% of 7-}Q_{10}))$ , as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

	REF.		MAX.	1/5 OF	MEAN		1-day
	HARD.*	ATC	EFFL.	EFFL.	EFFL.	1-day	MAX.
SUBSTANCE	mg/L		LIMIT**	LIMIT	CONC.	P99	CONC.
Chlorine		19	38			100	100
Arsenic		340	680	136	1.6		
Cadmium	357	44	89	18	< 0.19		
Chromium	301	4,446	8,892	1,778	<1.1		
Copper	357	52	103			11	10
Lead	356	365	730	146	<4.3		
Nickel	268	1,080	2,161	432	1.6		
Zinc	333	345	689	138	29		
Chloride (mg/L)		757	1,514	303		355	334

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

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

LIVING WAILKILOW I	$\sqrt{100}$ while $\sqrt{-200}$ , as specified in 3. NR 100.00(4)(c), wis. Adm. Code						
	REF.		WEEKLY	1/5 OF	MEAN		
	HARD.*	CTC	AVE.	EFFL.	EFFL.	4-day	
SUBSTANCE	mg/L		LIMIT	LIMIT	CONC.	P99	
Chlorine		7.3	1,235			123.2	
Arsenic		152	25,813	5,163	1.6		
Cadmium	175	3.8	648	130	< 0.19		
Chromium	301	326	55,247	11,049	<1.1		
Copper	341	30	5,015			10	
Lead	341	92	15,539	3,108	<4.3		
Nickel	268	120	20,383	4,077	1.6		
Zinc	333	345	58,458	11,692	29		
Chloride (mg/L)		395	66,992			303	

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

RECEIVING WATER FLOW = 18 cfs (<sup>1</sup>/<sub>4</sub> of the 7-Q<sub>10</sub>), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

\* 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 = 114 cfs (1/4 of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

		MO'LY	1/5 OF	MEAN
	HTC	AVE.	EFFL.	EFFL.
SUBSTANCE		LIMIT	LIMIT	CONC.
Cadmium	370	397,789	79,558	< 0.19
Chromium (+3)	3,818,000	4,071,737,917	814,347,583	<1.1
Lead	140	149,304	29,861	<4.3
Nickel	43,000	45,847,708	9, 171,542	1.6

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

RECEIVING WATER FLOW = 114 cfs (1/4 of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

		MO'LY	1/5 OF	MEAN
	HCC	AVE.	EFFL.	EFFL.
SUBSTANCE		LIMIT	LIMIT	CONC.
Arsenic	13	14,184	2,837	1.6

**Conclusions and Recommendations** 

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## Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are required for total Residual Chlorine and monitoring is recommended for Chloride.

<u>Total Residual Chlorine</u> – Because chlorine is added as a disinfectant, effluent limitations are recommended to assure proper operation of the de-chlorination system. Section NR 210.06(2)(b), Wis. Adm. Code, states, "When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L." Because the WQBELs are more restrictive, they are recommended instead. Specifically, **a daily maximum limit of 38 \mug/L is required**. Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required.

Weekly average limitations are not needed based on reasonable potential as the daily maximum limitations will provide adequate protection of the resource; however, additional limits are needed to meet the expression of limits requirements in s. NR 106.07(3), Wis. Adm. Code. Whenever a daily maximum limitation is determined necessary to protect water quality, a weekly and monthly average limitation shall also be included in the permit and set equal to the daily maximum limit unless a more restrictive limit is already determined necessary to protect water quality.

<u>Copper</u> – Considering available effluent data from October 2023 to November 2023 the 1-day  $P_{99}$  concentration is 11 µg/L, with a maximum concentration of 10 µg/L. The maximum effluent concentration and the 1-day  $P_{99}$  of the effluent data **do not exceed the calculated daily maximum limit**, therefore concentration and mass limits, as well as monthly monitoring, are not required.

<u>Chloride</u> – Considering available effluent data from the January 2023 to December 2023, the 1-day  $P_{99}$  chloride concentration is 355 mg/L, and the 4-day  $P_{99}$  of effluent data is 303 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.

<u>Magnesium</u> – Though magnesium result of 50 mg/L was detected in the lab results for the South Wayne Wastewater Treatment Facility, a limit will not be considered further as magnesium is one of the factors that influences water hardness and will not affect the water toxicity of South Wayne. Therefore, **a** calculation of a secondary value and a limit are not needed.

<u>Mercury</u> – The permit application did not require monitoring for mercury because the South Wayne 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. The average concentration in the sludge from October 2020 to December 2022 was 0.90 mg/kg, with a maximum reported concentration of 1.8 mg/kg. Therefore, **no mercury monitoring is recommended at Outfall 001.** 

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<u>PFOS and PFOA</u> – 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 discharge, and unknown levels of PFOS/PFOA in the source water **PFOS and PFOA monitoring is not recommended at this time.** 

The Department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

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

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

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

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

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

ATC in mg/L =  $[A \div (1 + 10^{(7.204 - pH)})] + [B \div (1 + 10^{(pH - 7.204)})]$ Where: A = 0.411 and B = 58.4 for a Warm Water Sport fishery pH (s.u.) = that characteristic of the <u>effluent</u>.

The effluent pH data was examined as part of this evaluation. A total of 992 sample results were reported from February 2020 to January 2025. The maximum reported value was 8.3 s.u. (Standard pH Units). The effluent pH was 8.2 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 8.0 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 8.0 s.u. Therefore, a value of 8.0 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 8.0 s.u. into the equation above yields an ATC = 8.4 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<sub>10</sub> (estimated as 80 % of 7-Q<sub>10</sub>) and the  $2 \times ATC$  approach are shown below.

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-J.				
		Ammonia Nitrogen		
		Limit mg/L		
	2×ATC	17		
	1-Q <sub>10</sub>	4,507		

Attachment #1
Daily Maximum Ammonia Nitrogen Determination

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

The current permit has variable daily maximum effluent limits based on effluent pH. Presented below is a table of daily maximum limitations corresponding to various effluent pH values.

Dany Maximum Animonia Mitogen Linnits – WWSF						
Effluent pH	Limit mg/L	Effluent pH	Limit	Effluent pH	Limit mg/L	
5.0.	mg/L	5.u.	mg/L	5.u.	mg/L	
$6.0 \le pH \le 6.1$	108	$7.0 < pH \le 7.1$	66	$8.0 < pH \leq 8.1$	14	
$6.1 < pH \le 6.2$	106	$7.1 < pH \leq 7.2$	59	$8.1 < pH \leq 8.2$	11	
$6.2 < pH \leq 6.3$	104	$7.2 < pH \leq 7.3$	52	$8.2 < pH \leq 8.3$	9.4	
$6.3 < pH \leq 6.4$	101	$7.3 < pH \leq 7.4$	46	$8.3 < pH \leq 8.4$	7.8	
$6.4 < pH \leq 6.5$	98	$7.4 < pH \leq 7.5$	40	$8.4 < pH \leq 8.5$	6.4	
$6.5 < pH \leq 6.6$	94	$7.5 < pH \leq 7.6$	34	$8.5 < pH \leq 8.6$	5.3	
$6.6 < pH \le 6.7$	89	$7.6 < pH \leq 7.7$	29	$8.6 < pH \leq 8.7$	4.4	
$6.7 < pH \leq 6.8$	84	$7.7 < pH \leq 7.8$	24	$8.7 < pH \leq 8.8$	3.7	
$6.8 < pH \le 6.9$	78	$7.8 < pH \le 7.9$	20	$8.8 < pH \le 8.9$	3.1	
$6.9 < pH \le 7.0$	72	$7.9 < pH \le 8.0$	17	$8.9 < pH \le 9.0$	2.6	

Daily Maximum Ammonia Nitrogen Limits - WWSF

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

The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do not change because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous WQBEL memo are shown in attachment #2. The current weekly and monthly average ammonia nitrogen limits come from the calculation of a single limit and were included in the permit to meet expression of limits requirements as though a single daily maximum limit had been included. This was an error in the previous permit since the variable limit table was included instead of the single limit and the weekly and monthly average limits should have been 108 mg/L which is the highest value in the daily maximum effluent limit table. This number is more restrictive than the calculated weekly and monthly average limits. This increase in limits meets the antibacksliding and antidegradation conditions in ch. NR 207 because water quality standards will be met and new information is available which shows this was an error in the previous permit.

#### **Effluent Data**

Samples for ammonia nitrogen were taken February 2020 to January 2025, and their results were as follows:

- Inninoma Tantos	en Elmaent D'ata
	Ammonia Nitrogen
	mg/L
1-day P <sub>99</sub>	2.92

Ammonia Nitrogen Effluent Data
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Attachment #1			
4-day P <sub>99</sub>	2.15		
30-day P <sub>99</sub>	0.97		
Mean	0.23		
Std	1.07		
Sample size	502		
Range	0.02-15.74		

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

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

#### **Conclusions and Recommendations**

In summary, after rounding to two significant figures, the following ammonia nitrogen limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

	Daily	Weekly	Monthly		
	Maximum	Average	Average		
	mg/L	mg/L	mg/L		
Year round	Variable	108 mg/L	108 mg/L		

**Final Ammonia Nitrogen Limits** 

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

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

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

*E. coli* monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Because the South Wayne Wastewater Treatment Facility'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.

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#### **Effluent Data**

The South Wayne Wastewater Treatment Facility has monitored effluent *E. coli* from May 2024 to September 2024 and a total of 30 results are available. A geometric mean of 126 counts/100 mL was exceeded twice in September 2024, with a maximum monthly geometric mean of 1000 counts/100 mL. Based on this effluent data, it appears that the facility can meet new *E. coli* limits and a compliance schedule is not needed in the reissued permit.

#### **PART 5 – PHOSPHORUS**

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

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

Because South Wayne Wastewater Treatment Facility does not currently have an existing technologybased limit, the need for this limit in the reissued permit is evaluated. The data demonstrates that the annual monthly average phosphorus loading is less than 150 lbs/month, which is the threshold for municipalities in accordance to s. NR 217.04(1)(a)1, Wis. Adm. Code, and therefore **no technologybased limit is required.** 

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
January 2024	4.8	0.94	37
February 2024	4.9	0.82	33
March 2024	4.2	1.1	38
April 2024	4.4	1.2	45
May 2024	4.3	1.4	50
June 2024	5.3	1.4	61
July 2024	4.3	1.3	49
August 2024	5.3	1.3	60
September 2024	6.0	1.2	61
October 2024	6.6	1.0	54
November 2024	5.6	1.0	49
December 2024	5.2	0.90	39
Average			48

Annual Average Mass Total Phosphorus Loading

Total P (lbs/month) = Monthly average (mg/L) × total flow (MG/month) × 8.34 (lbs/gallon) Where total flow is the sum of the actual (not design) flow (in MGD) for that month

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

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

Revisions to administrative rules regulating phosphorus took effect on December 1, 2010. These rule revisions include additions to s. NR 102.06, Wis. Adm. Code, which establish phosphorus standards for

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surface waters. Subchapter III of NR 217, Wis. Adm. Code, establishes procedures for determining WQBELs for phosphorus, based on the applicable standards in ch. NR 102, Wis. Adm. Code. Section NR 102.06(3)(a), Wis. Adm. Code, specifically names river segments for which a phosphorus criterion of 0.100 mg/L applies. For other stream segments that are not specified in s. NR 102.06(3)(a), Wis. Adm. Code, s. NR 102.06(3)(b), Wis. Adm. Code, specifies a phosphorus criterion of 0.075 mg/L. The phosphorus criterion of 0.100 mg/L applies for the Pecatonica River.

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) provided below.

Limitation = [(WQC)(Qs+(1-f)Qe) - (Qs-fQe)(Cs)]/Qe

Where:

WQC = 0.100 mg/L for Pecatonica River Qs = 100% of the 7-Q<sub>2</sub> of 125 cfs Cs = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code Qe = effluent flow rate = 0.069 MGD = 0.107 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. 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 0.100 mg/L using a background concentration of 0.205 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. Additional data were considered in estimating the background phosphorus concentration.

A review of all available in stream total phosphorus data from 18 data points taken from July 2005 to October 2015 stored in the Surface Water Integrated Monitoring System database indicates the median background total phosphorus concentration in Pecatonica River at Sth 176 S. Wayne (SWIMS ID 333029) is 0.205 mg/L, just upstream from the point of discharge to the Pecatonica River.

333029
Monitoring station at
Pecatonica River – Sth
176 S. Wayne
Pecatonica River
18
07/14/2005
10/24/2015
0.208 mg/L
0.205 mg/L

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Substituting a background concentration above criteria into the limit calculation equation above would result in a calculated limit that is less than the applicable criterion of 0.100 mg/L. However, s. NR 217.13(7), Wis. Adm. Code, specifies that "if the WQBEL 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."

The impaired water listing of the Pecatonica River also points towards the notion that effluent phosphorus limits equal to the water quality criterion are needed to prevent the discharge from contributing to further impairment of the receiving water. *The Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges (2020)* suggests setting effluent limits equal to the criterion in the absence of an EPA approved total maximum daily load for discharges of phosphorus to phosphorus impaired waters.

#### **Effluent Data**

The following table summarizes effluent total phosphorus monitoring data from February 2020 to January 2025.

1000011000000000	i otal i nosphol as Elliacht Data			
	Phosphorus mg/L			
1-day P <sub>99</sub>	8.9			
4-day P <sub>99</sub>	6.7			
30-day P <sub>99</sub>	5.56			
Mean	4.96			
Std	1.35			
Sample size	503			
Range	2.08 - 11.04			

#### **Total Phosphorus Effluent Data**

#### **Reasonable Potential Determination**

The calculated WQBEL of 0.100 mg/L is less than the current limit of 6.8 mg/L, so the WQBEL must be included in the permit per s. NR 217.15(2), Wis. Adm. Code.

# The discharge has reasonable potential to cause or contribute to an exceedance of the water quality criterion because the 30-day P<sub>99</sub> of reported effluent total phosphorus data is greater the calculated WQBEL. Therefore, a WQBEL is required.

#### Limit Expression

According to s. NR 217.14(2), Wis. Adm. Code, because the calculated WQBEL is less than or equal to 0.3 mg/L, the effluent limit of 0.100 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 0.300 mg/L, equal to three times the WQBEL calculated under s. NR 217.13, Wis. Adm. Code shall also be included in the permit. The six-month average should be averaged during the months of May – October and November – April.

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#### **Mass Limits**

A mass limit is also required, pursuant to s. NR 217.14(1)(a), Wis. Adm. Code, because the discharge is to a surface water that is to or upstream of impaired total phosphorus. This final mass limit shall be  $0.100 \text{ mg/L} \times 8.34 \times 0.069 \text{ MGD} = 0.06 \text{ lbs/day expressed as a six-month average.}$ 

#### WQT Minimum Control Level (MCL)

A water quality trading plan has been submitted as an alternative compliance option to offset any Total Phosphorus discharged from Outfall 001 that exceeds the WQBELs. The phosphorus WQBELs may be expressed as computed compliance limits, but a Minimum Control Level (MCL) must be set as a limit not to be exceeded at the outfall location. The South Wayne Wastewater Treatment Facility has been allocated 105 lbs/year of water quality trading credits which was bought from the Darlington Wastewater Treatment Facility. The limit of 5.6 mg/L is recommended as the MCL which is equal to the 30-day  $P_{99}$ .

## PART 5 – 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.

Due to the amount of upstream flow available for dilution in the limit calculation, and water designation, the flow ratio must be Qs: Qe >20:1 the lowest calculated limitation would be  $120^{\circ}$  F according to chs. NR 106.55(6)(a), Wis. Adm. Code). The Qs:Qe ratio for South Wayne Wastewater Treatment Facility is 168:1, and thus **no effluent limits or monitoring are recommended for temperature**.

#### PART 6 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. 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 testing is usually not recommended where the ratio of the 7-Q<sub>10</sub> to the effluent flow exceeds South Wayne Wastewater Treatment Facility Page 14 of 19

100:1. For the South Wayne Wastewater Treatment Facility, that ratio is approximately 672:1. With this amount of dilution, there is believed to be little potential for chronic toxicity effects in the Pecatonica River associated with the discharge from South Wayne, so the need for chronic WET testing will not be considered further.

- 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.
- 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.

Date	Acute Results LC <sub>50</sub> %				Footnotes
Test Initiated	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	or Comments
09/17/2008	>100	>100	Pass	No	1
09/24/2014	>100	>100	Pass	Yes	-
10/28/2015	>100	>100	Pass	Yes	-
10/20/2020	>100	>100	Pass	Yes	-
12/13/2022	>100	>100	Pass	Yes	-
09/06/2023	>100	>100	Pass	Yes	-

#### WET Data History

Footnotes:

- 1. *Tests done by S-F Analytical, July 2008 March 2011*. The DNR has reason to believe that WET tests completed by SF Analytical Labs from July 2008 through March 31, 2011 were not performed using proper test methods. Therefore, WET data from this lab during this period has been disqualified and was not included in the analysis.
- According to s. NR 106.08, Wis. Adm. Code, WET reasonable potential is determined by multiplying the highest toxicity value that has been measured in the effluent by a safety factor, to predict the likelihood (95% probability) of toxicity occurring in the effluent above the applicable WET limit. The safety factor used in the equation changes based on the number of toxicity detects in the dataset. The fewer detects present, the higher the safety factor, because there is more uncertainty surrounding the predicted value. WET limits must be given, according to s. NR 106.08(6), Wis. Adm. Code, whenever the applicable Reasonable Potential equation results in a value greater than 1.0.

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

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

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.

Therefore, no reasonable potential is shown for acute and chronic WET limits using the procedures in s. NR 106.08(6) and representative data from September 2008 to September 2023.

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					
	Not Applicable.					
AMZ/IWC						
	0 Points					
	4 tests used to calculate RP.					
Historical	No tests failed.					
Data						
	0 Points					
	Violations or upsets, consistent WWTF					
Effluent	operations.					
Variability	1					
v	0 Points					
<b>D</b> • • • • •	WWSF or < 4 mi to non-variance					
Receiving Water						
Classification	5 Points					
	Reasonable potential for limits for Residual					
	Chlorine based on ATC.					
Chemical-Specific	Ammonia Nitrogen, Arsenic, Copper, Nickel,					
Data	Zinc detected.					
	8 Points					
	1 Biocides and 0 Water Quality Conditioners					
A J J:4:	added.					
Additives	No SOP developed.					
	5 Points					
Disahawaa	0 Industrial Contributors.					
Discharge						
Category	0 Points					
Wastewater	Secondary or Better					
Treatment						

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Attachment #1					
	Acute				
	0 Points				
	No impacts known				
Downstream					
Impacts					
	0 Points				
Total Checklist Points:	18 Points				
Recommended Monitoring Frequency (from Checklist):	2 tests during permit term				
Limit Required?	No				
TRE Recommended? (from Checklist)	No				

• After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, **two acute WET tests are recommended during the permit term** in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge.

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AMMONIA (as N) LIMITS								
CLASSIFICATION: WARMWATER SPORTFISH								
EFFLUENT FLOW (mgd):	0.069							
EFFLUENT FLOW (cfs):	0.107	_						
MAX. EFFLUENT pH (s.u.):	7.7							
BACKGROUND INFO:	May-Sept.	OctMarch	April					
7Q10 (cfs)	72	72	72					
7Q2 (cfs)	124.5	124.5	124.5					
Ammonia (mg/L)	0.06	0.19	0.07					
Temperature (deg C)	23	3	9					
pH (std. units)	8.21	7.97	7.97					
% of river flow used:	100	25	25					
Reference weekly flow:	72	18	18					
Reference monthly flow:	105.825	26.45625	26.45625					
CRITERIA (in mg/L):								
Acute (@ effl. pH):	14.44	14.44	14.44					
4-day Chronic (@ backgrd. pH):								
early life stages present	2.55	6.35	6.35					
early life stages absent	2.55 10.31		9.06					
30-day Chronic (@ backgrd. pH)								
early life stages present	1.02	2.54	2.54					
early life stages absent	1.02	4.12	3.63					
EFFLUENT LIMITS (in mg/L):								
Daily maximum (also see below)	28.88	28.88	28.88					
Weekly average								
early life stages present	1684.14	1044.99	1065.22					
early life stages absent		1716.80	1525.46					
Monthly average								
early life stages present	953.97	584.92	614.66					
early life stages absent		979.15	884.73					

Attachment #2 Ammonia Nitrogen Calculations from WQBEL dated December 18, 2012

Expression of Limits for Ammonia Nitrogen from Memo dated June 22, 2018

#### Additional limitations needed to comply with s. NR 106.07 Expression of limits:

	Daily	Weekly	Monthly	Weekly	Monthly	Multiplication	Assumed
Parameter	Maximum	Average	Average	Geometric	Geometric	Factor	Monitoring
		_		Mean	Mean	(CV)	Frequency (n)
Ammonia	16 mg/L	16 mg/L	16 mg/L				

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Site Map:



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