

Permit Fact Sheet

General Information

Permit Number:	WI-0031381-10-0	
Permittee Name:	ASHIPPUN SANITARY DISTRICT	
Address:	P O Box 28	
City/State/Zip:	Ashippun WI 53003	
Discharge Location:	East side of Rock River, 1 mile west out of Ashippun on Highway O (NE ¼ of NE ¼ Section 25, T9N, R16E)	
Receiving Water:	Rock River (Ashippun River Watershed, UR10 – Upper Rock River Basin) in Dodge County	
StreamFlow (Q _{7,10}):	5.0 cfs	
Stream Classification:	Warm Water Sport Fish (WWSF), non-public water supply	
Discharge Type:	Existing, Continuous	
Design Flow(s)	Annual Average	.202 MGD
Significant Industrial Loading?	N/A	
Operator at Proper Grade?	Yes. Plant Classification: Basic - A1, B, C, D, P, L & SS	
Approved Pretreatment Program?	N/A	

Facility Description

The Ashippun Sanitary District Wastewater Treatment Facility currently serves a population of around 1400 with no industrial contributors but is expecting future development. The Sanitary District operates an oxidation ditch (activated sludge) where the influent receives preliminary treatment via screening before being treated with the activated sludge system which then passes through a final clarifier and is disinfected with an ultraviolet system. The treated effluent is pumped approximately 3 miles and is discharged to the Rock River daily throughout the year. The design flow is 0.202 MGD with a daily average flow of 0.15 MGD. Ferric chloride was added in 2020 to help with phosphorus removal. Sludge is stored on-site in a 350,000-gallon storage tank until the sludge is land applied on approved farm fields by a contract hauler under the hauler's permit.

Substantial Compliance Determination

Enforcement During Last Permit: Enforcement During Last Permit: No formal enforcement was taken during the last permit term.

After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items and a facility inspection on January 24, 2023, conducted by DNR Wastewater Engineer, Amy Garbe, this facility has been

found to be in substantial compliance with their current permit, WI-0031381-09-0.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)
701	N/A- no flow reported under current permit.	INFLUENT: 24-Hr Flow Prop Composite samples taken from the inlet manhole after headworks.
004	0.13 MGD (2022)	EFFLUENT: 24-Hr Flow Prop Comp and grab samples taken at the effluent weir.
005	17.45 dry U.S. tons generated annually (WPDES permit application submitted 12/2022)	Class B, aerobically digested, liquid sludge. Representative composite samples shall be taken from the sludge holding tank prior to 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
Flow Rate		MGD	Daily	Continuous	
BOD ₅ , 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:

Changes highlighted in table.

Flow - monitoring added.

BOD & TSS- Sample frequency increased from weekly to 2/week.

Explanation of Limits and Monitoring Requirements

Flow Rate - Reporting of flow added because the permittee has an influent flow meter that was installed with recent construction.

BOD₅ and Total Suspected Solids- Tracking of BOD₅ 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: 004- discharge from oxidation ditch

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	45 mg/L	2/Week	24-Hr Flow Prop Comp	
BOD5, 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	
Suspended Solids, Total	Monthly Avg	30 mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	57.1 lbs/day	2/Week	Calculated	Limit effective for January, March, May, July, August, October, and December.
Suspended Solids, Total	Weekly Avg	63.3 lbs/day	2/Week	Calculated	Limit effective for February.
Suspended Solids, Total	Weekly Avg	59 lbs/day	2/Week	Calculated	Limit effective for April, June, September, and November.
Suspended Solids, Total	Monthly Avg	34.8 lbs/day	2/Week	Calculated	Limit effective for January, March, May, July, August, October, and December.
Suspended Solids, Total	Monthly Avg	38.6 lbs/day	2/Week	Calculated	Limit effective for February.
Suspended Solids, Total	Monthly Avg	36 lbs/day	2/Week	Calculated	Limit effective for April, June, September, and November.
Nitrogen, Ammonia (NH3-N) Total		mg/L	2/Week	24-Hr Flow Prop Comp	Monitoring only in 2027.
Phosphorus, Total	Monthly Avg	1.12 lbs/day	2/Week	Calculated	Limit effective for January.
Phosphorus, Total	Monthly Avg	1.48 lbs/day	2/Week	Calculated	Limit effective for February.
Phosphorus, Total	Monthly Avg	1.16 lbs/day	2/Week	Calculated	Limit effective for March.
Phosphorus, Total	Monthly Avg	0.92 lbs/day	2/Week	Calculated	Limit effective for April.
Phosphorus, Total	Monthly Avg	0.8 lbs/day	2/Week	Calculated	Limit effective for May and September.
Phosphorus, Total	Monthly Avg	0.71 lbs/day	2/Week	Calculated	Limit effective for June.

Monitoring Requirements and Limitations

Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Phosphorus, Total	Monthly Avg	0.72 lbs/day	2/Week	Calculated	Limit effective for July.
Phosphorus, Total	Monthly Avg	0.73 lbs/day	2/Week	Calculated	Limit effective for August.
Phosphorus, Total	Monthly Avg	0.78 lbs/day	2/Week	Calculated	Limit effective for October.
Phosphorus, Total	Monthly Avg	0.82 lbs/day	2/Week	Calculated	Limit effective for November.
Phosphorus, Total	Monthly Avg	0.95 lbs/day	2/Week	Calculated	Limit effective for December.
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit effective upon reissuance during the disinfection season of May through September annually.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit effective upon reissuance during the disinfection season of May through September annually. See the E. coli Percent Limit section. Enter the result in the DMR on the last day of the month.
pH Field	Daily Min	6.0 su	5/Week	Grab	
pH Field	Daily Max	9.0 su	5/Week	Grab	
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.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring only in 2027.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Temperature Maximum		deg F	3/Week	Grab	Monitoring only in 2027.

Changes from Previous Permit

Changes highlighted in table.

BOD, TSS, Phosphorus, and Ammonia- Sampling frequency increased from weekly to 2/week.

Ammonia- Monitoring year updated to 2027.

E. coli- Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) limits. E. coli limits are effective at the permit reissuance date. E. coli limits of 126 #/100 ml as a monthly geometric mean 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.

pH: Sampling frequency increased to 5/week.

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

Chloride: Monitoring year updated to 2027.

Temperature: Monitoring was added to the permit for year 2027.

Explanation of Limits and Monitoring Requirements

Categorical Limits

Total Suspended Solids, BOD5, pH: Standard municipal wastewater requirements for total suspended solids and pH are included based on ch. NR 210, Wis. Adm. Code, ‘Sewage Treatment Works’ requirements for discharges to fish and aquatic life streams. Tracking of BOD5 and total 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. Chapter NR 102, Wis. Adm. Code, ‘Water Quality Standards for Surface Waters’ also specifies requirements for pH for fish and aquatic life streams.

Water Quality Based Limits

Refer to the Water Quality-Based Effluent Limitations (WQBELs) memo for the Ashippun Sanitary District Wastewater Treatment Facility prepared by Sarah Luck dated October 3, 2023.

Ammonia, Nitrogen: Current acute and chronic ammonia toxicity criteria for the protection of aquatic life are included in Tables 2C and 4B of ch. NR 105. Subchapter III of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for ammonia. Based on the data provided, there are no limits for Ammonia, Nitrogen are proposed in the permit but monitoring during calendar year 2028 is included to gather data for the next reissuance.

Total Maximum Daily Load (TMDL) Limitations

The Rock River TMDL for Total Phosphorus (TP) and Total Suspended Solids (TSS) was approved by the Environmental Protection Agency (EPA) in September 2011. The TMDL-derived limits are expressed as weekly average and monthly average effluent limits.

Total Suspended Solids: The current permit includes a weekly average concentration limit of 45 mg/L and a monthly average concentration limit of 30 mg/L. Monthly average and weekly average mass effluent limitations should be included in the permit according to the table below, along with the currently imposed concentration limits.

Total Suspended Solids Effluent Limitations

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)
January	34.8	57.1
February	38.6	63.3
March	34.8	57.1
April	36.0	59.0
May	34.8	57.1
June	36.0	59.0
July	34.8	57.1
August	34.8	57.1
September	36.0	59.0
October	34.8	57.1
November	36.0	59.0
December	34.8	57.1

Phosphorus- Waste load allocations specified in TMDLs are expressed as monthly average (lbs/day) and became effective on July 1, 2020. The Rock River remains impaired for phosphorus meaning the Rock River TMDL limits remain applicable. The following limits according to the table below from the current permit are recommended to be retained for phosphorus.

Total Phosphorus TMDL Mass Limits

Month	Monthly Ave(lbs/day)
January	1.12
February	1.48
March	1.16
April	0.92
May	0.80
June	0.71
July	0.72
August	0.73
September	0.80
October	0.78
November	0.82
December	0.95

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.

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 ss. 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.

Chloride- Acute and chronic chloride toxicity criteria for the protection of aquatic life are included in Tables 1 and 5 of ch. NR 105, Wis. Adm. Code. Subchapter VII of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for chloride. One year of monitoring is recommended in the proposed permit to determine reasonable potential in the next evaluation.

Temperature - 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. One year of monitoring in year 2028, is recommended in the proposed permit because it has been more than 10 years since data has been collected.

PFOS and PFOA - NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Pursuant to s. NR 106.98(3)(b), Wis. Adm. Code, the department evaluated the need for PFOS and PFOA monitoring taking into consideration the presence of potential PFOS or PFOA industrial wastes, remediation sites and other potential sources of PFOS or PFOA. Based on information available at the time the proposed permit was drafted, the department has determined the permittee does not need to sample the effluent for PFOS or PFOA as part of this permit reissuance. 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.

Monitoring Frequency - 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. Monitoring frequency decisions are based on requirements in s. NR 205.066(1), Wis. Adm. Code, (decisions are case-by-case) and considering the factors in s. NR 210.04 (a) through (e), Wis. Adm. Code, along with recommendations provided in the *Monitoring Frequencies for Individual Wastewater Permits* guidance (April 12, 2021). After evaluation, sampling frequency was increased to the minimum standard for BOD, TSS, Phosphorus, pH and Ammonia Nitrogen.

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)
005	B	Liquid	Fecal	Injection	Land Application	17.45
Does sludge management demonstrate compliance? Yes.						
Is additional sludge storage required? No.						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No.						
If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility						
Is a priority pollutant scan required? No.						
Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

Sample Point Number: 005- Municipal Sludge

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Jan 1, 2025 - Dec 31, 2025
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Jan 1, 2025 - Dec 31, 2025
Radium 226 Dry Wt		pCi/g	Once	Composite	Jan 1, 2025 - Dec 31, 2025
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	

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

Changes highlighted in table.

PCB- Sampling year updated to 2025.

Radium- Sampling year updated to 2025.

PFAS – Annual 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) 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 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.”

Water Extractable Phosphorus - Water extractable phosphorus (WEP) is the coefficient for determining plant available phosphorus from measured total phosphorus. In Wisconsin, the Penn State Method is utilized and is expressed in percent. While a total P may be significant, the WEP may show that only a small percentage of the P is available to plants because of factors such as treatment processes and chemical addition that “tie-up” phosphorus limiting the amount of phosphorus that is plant available. As part of the Wisconsin’s nutrient management plan (NMP) requirements, the accounting of all fertilizers must be included over the NMP cycle. The fertilizer value of the waste needs to be communicated to the farmer and accounted for in the NMP.

4 Schedules

4.1 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
Land Application Management Plan Submittal: Submit 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.	90 Days prior to land application.

Explanation of Schedule

A compliance schedule is included in the permit to submit a Land Application Management Plan for the permittee to outline how sludge would be land applied if the permittee decides to land apply under their permit instead of under a contract hauler’s. The plan is required to be submitted for approval 90 days prior to land application.

Special Reporting Requirements

None.

Other Comments:

None.

Attachments:

Water Quality-Based Effluent Limitations Memo dated 10/3/2023 and prepared by Sarah Luck.

Expiration Date:

March 31, 2029

Justification Of Any Waivers From Permit Application Requirements

No waivers were requested or granted from permit application requirements.

Prepared By: Melanie Burns Wastewater Specialist

Date: January 22, 2024

Date (post fact check): February 7, 2024

Date (post public notice):

CORRESPONDENCE/MEMORANDUM

DATE: October 3, 2023

TO: Permit Drafter

FROM: Sarah Luck – SCR/Fitchburg

SUBJECT: Water Quality-Based Effluent Limitations for the Ashippun Sanitary District Wastewater Treatment Facility
 WPDES Permit No. WI-0031381-10-0

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 Ashippun Sanitary District Wastewater Treatment Facility in Dodge County. This municipal wastewater treatment facility (WWTF) discharges to the Rock River, located in the Ashippun River 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 004:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD ₅			45 mg/L	30 mg/L		2
TSS			45 mg/L	30 mg/L		2,3
pH	9.0 s.u.	6.0 s.u.				2
Ammonia Nitrogen						1,2
Bacteria						4
<i>E. coli</i>				126 #/100 mL geometric mean		
Phosphorus						3
TKN, Nitrate+Nitrite, and Total Nitrogen						5
Chloride						1,2
Temperature						1

Footnotes:

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

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave Total P Effluent Limit (lbs/day)
Jan	34.8	57.1	1.12
Feb	38.6	63.3	1.48
March	34.8	57.1	1.16
April	36.0	59.0	0.92

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave Total P Effluent Limit (lbs/day)
May	34.8	57.1	0.80
June	36.0	59.0	0.71
July	34.8	57.1	0.72
Aug	34.8	57.1	0.73
Sept	36.0	59.0	0.80
Oct	34.8	57.1	0.78
Nov	36.0	59.0	0.82
Dec	34.8	57.1	0.95

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. No compliance schedule is necessary.
5. 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 (NO₃), nitrite (NO₂), and total kjeldahl nitrogen (TKN) (all expressed as N).

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

The recommended limits meet the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, and additional limits are not required.

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

Attachments (4) – Narrative, Site Map, Ammonia Nitrogen Calculations, and Thermal Table

PREPARED BY:

Sarah Luck

Date: October 3, 2023

Sarah Luck
Water Resources Engineer

E-cc: Jacob Wedesky, Wastewater Engineer – SER/Milwaukee
Tom Bauman, Regional Wastewater Supervisor – SCR/Fitchburg
Diane Figiel, Water Resources Engineer – WY/3

**Water Quality-Based Effluent Limitations for
Ashippun Sanitary District Wastewater Treatment Facility**

WPDES Permit No. WI-0031381-10-0

PART 1 – BACKGROUND INFORMATION

Facility Description

The Ashippun Sanitary District wastewater treatment facility completed upgrades in August 2009 and phosphorus upgrades in 2020. The facility begins with preliminary treatment via screening. After screening, the wastewater receives primary treatment in an oxidation ditch, followed by final clarification and effluent disinfection by ultraviolet light. Treated effluent is pumped approximately 3 miles and is discharged to the Rock River. Sludge is stored onsite and land applied on approved fields.

Attachment #2 is a map of the area showing the approximate location of Outfall 004.

Existing Permit Limitations

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD ₅			45 mg/L	30 mg/L	2
TSS			45 mg/L	30 mg/L	2,3
pH	9.0 s.u.	6.0 s.u.			2
Ammonia Nitrogen					1
Fecal Coliform May – September			656#/100 mL geometric mean	400#/100 mL geometric mean	4
Phosphorus Interim				6.1 mg/L	3,5
Chloride					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. Additional phosphorus and TSS mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL.

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave Total P Effluent Limit (lbs/day)
Jan	34.8	57.1	1.12

Attachment #1

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave Total P Effluent Limit (lbs/day)
Feb	38.6	63.3	1.48
March	34.8	57.1	1.16
April	36	59	0.92
May	34.8	57.1	0.80
June	36	59	0.71
July	34.8	57.1	0.72
Aug	34.8	57.1	0.73
Sept	36	59	0.80
Oct	34.8	57.1	0.78
Nov	36	59	0.82
Dec	34.8	57.1	0.95

- 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.
- A compliance schedule was in the current permit to meet the final TMDL WQBELs by July 1, 2020.

Receiving Water Information

- Name: Rock River
- Waterbody Identification Code (WBIC): 788800
- Classification: Warmwater sport fish community, non-public water supply.
- Low Flow: The following 7-Q₁₀ and 7-Q₂ values are based on flow information 1000 feet downstream of the dam at Hustisford for Station #05424090, UR4, obtained by USGS.
 - 7-Q₁₀ = 5.0 cubic feet per second (cfs)
 - 7-Q₂ = 24.5 cfs
 - Harmonic Mean Flow = 52.84 cfs

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7-Q₁₀ (cfs)	21	26.1	56.9	149	58.3	23.9	12.8	6.6	6.1	8.2	20.5	19.5
7-Q₂ (cfs)	81.7	92	230	414	185	89.1	52.1	42.6	37.9	48.2	92.6	87.1

- Hardness = 327 mg/L as CaCO₃. This value represents the geometric mean of data (n=6) from 2018-2023 WET tests conducted by Watertown WWTF. Although Watertown WWTF is located downstream of the Ashippun Sanitary District Wastewater Treatment Facility, only two data points were available upstream, in Dodge County, and were outdated. The hardness values from Watertown WWTF are consistent with previous hardness values used in limit calculations.
- % of low flow used to calculate limits: 25%
- Source of background concentration data: Metals data from the Rock River upstream of Davy Creek near Ashippun (SWIMS Station 143301) are 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: The Hustisford Wastewater Treatment Facility discharges to the Rock River

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approximately 16 miles upstream from Ashippun Sanitary District Wastewater Treatment Facility’s outfall. Combined impacts are not considered in this evaluation because the mixing zones do not overlap.

- Impaired water status: The Rock River in Dodge County (River Miles 269.66-293.25) is impaired for total phosphorus and sediment.

Effluent Information

- Flow rate:
 Design annual average = 0.202 MGD (Million Gallons per Day)
 For reference, the actual average flow from July 2018 through August 2023 was 0.147 MGD.
- Hardness = 427 mg/L as CaCO₃. This value represents the geometric mean of data (n=4) from July and August 2022 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.
- Additives: Ferric chloride (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)
7/8/2022	7.0	8/25/2022	9.3	10/6/2022	5.2
8/4/2022	6.1	9/8/2022	6.3	10/13/2022	5.1
8/11/2022	9.6	9/22/2022	4.5	10/20/2022	4.6
8/18/2022	6.0	9/29/2022	5.1		
1-day P ₉₉ = 11 µg/L					
4-day P ₉₉ = 8.6 µg/L					

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

Chloride Effluent Data

Sample Date	Chloride (mg/L)	Sample Date	Chloride (mg/L)	Sample Date	Chloride (mg/L)
1/7/2021	560	5/6/2021	530	9/2/2021	650
2/4/2021	550	6/2/2021	580	10/6/2021	610
3/4/2021	590	7/1/2021	560	11/3/2021	630
4/1/2021	490	8/5/2021	630	12/1/2021	660
1-day P ₉₉ = 716 mg/L					
4-day P ₉₉ = 649 mg/L					

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The following table presents the average concentrations and loadings at Outfall 004 from July 2018 through August 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 ₅	4 mg/L*	
TSS	3 mg/L*	4 lbs/day
pH field	7.7 s.u.	
Phosphorus	1.0 mg/L	1.5 lbs/day
Fecal coliform	#/100 mL	

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

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

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

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

Acute Limits based on 1-Q₁₀

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Code, (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q₁₀ receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

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

Where:

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

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

Q_e = 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

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

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If the receiving water is effluent dominated under low stream flow conditions, the 1-Q₁₀ method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for Ashippun Sanitary District 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 = 4.0 cfs, (1-Q₁₀ (estimated as 80% of 7-Q₁₀)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P ₉₉	1-day MAX. CONC.
Arsenic		340	679.6	135.9	<4.9		
Cadmium	427	54.5	109.0	21.8	<0.19		
Chromium	301	4446	8891.7	1778	1.2		
Copper	427	61.1	122.2			11	9.6
Lead	356	365	729.3	145.9	<4.3		
Nickel	268	1080	2160.6	432	3.4		
Zinc	333	345	689.4	137.9	12		
Chloride (mg/L)		757	1514.0			716	660

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

** The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q₁₀ flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 1.25 cfs (¼ of the 7-Q₁₀), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P ₉₉
Arsenic		152.2		761	152.2	<4.9	
Cadmium	175	3.82	0.07	18.82	3.8	<0.19	
Chromium	301	325.75	2.1	1620	324.0	1.2	
Copper	327	28.53	2.1	134.2			8.6
Lead	327	87.98		439.8	88.0	<4.3	
Nickel	268	120.18	2	593	118.6	3.4	
Zinc	327	339.24	1	1692	338.4	12	
Chloride (mg/L)		395		1975			649

* 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 = 13.2 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	0.07	16005	3201.1	<0.19
Chromium (+3)	3818000	2.1	165187439	33037488	1.2
Lead	140		6057	1211.4	<4.3
Nickel	43000	2	1860330	372066	3.4

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 13.2 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		575.4	115.09	<4.9

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 P₉₉ chloride concentration is 716 mg/L, and the 4-day P₉₉ of effluent data is 649 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 Ashippun Sanitary District 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 2019 through October 2022 (n=4) was 0.14 mg/kg, with a maximum reported concentration of 0.38 mg/kg, with two non-detect sample results. Therefore, **no mercury monitoring is recommended at Outfall 004.**

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 discharge, the effluent flow rate, and lack of indirect dischargers, **PFOS and PFOA monitoring is not recommended**. 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:

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

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 264 sample results were reported from July 2018 through August 2023. The maximum reported value was 8.0 s.u. (Standard pH Units). The effluent pH was 8.0 s.u. or less 99% of the time. The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.2 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 8.2 s.u. Therefore, a value of 8.2 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 8.2 s.u. into the equation above yields an ATC = 5.7 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-Q₁₀ 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-Q₁₀ (estimated as 80 % of 7-Q₁₀) and the 2×ATC approach are shown on the next page.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	11
1-Q ₁₀	79

The 2×ATC method yields the most stringent limits for Ashippun Sanitary District 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, WWFF & LFF

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 July 2018 through August 2023, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Ashippun Sanitary District Wastewater Treatment Facility permit. That need is determined by calculating 99th upper percentile (or P₉₉) values for ammonia and comparing the daily maximum values to the daily maximum limit.

Ammonia Nitrogen Effluent Data

	Ammonia Nitrogen mg/L
1-day P ₉₉	0.58
4-day P ₉₉	0.32
30-day P ₉₉	0.16
Mean*	0.10

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	Ammonia Nitrogen mg/L
Std	0.12
Sample size	48
Range	<0.04 - 0.77

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

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

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 Ashippun Sanitary District 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.

Effluent Data

Ashippun Sanitary District Wastewater Treatment Facility has monitored effluent *E. coli* from August 2022 through August 2023, and a total of 21 detected results are available. A geometric mean of 126 counts/100 mL was not exceeded, with a maximum monthly geometric mean of 4 counts/100 mL. Effluent data has not exceeded 410 counts/100 mL. The maximum reported value was 6 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.

Since Ashippun Sanitary District Wastewater Treatment Facility does not currently have an existing technology-based 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/greater than 150 lbs/month, which is the threshold for municipalities in accordance with s. NR 217.04(1)(a)1, Wis. Adm. Code, and therefore **no technology-based limit is required.**

Annual Average Mass Total Phosphorus Loading

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
September 2022	0.23	5.301	10
October 2022	0.30	3.434	8.7
November 2022	0.27	3.976	9.0
December 2022	0.15	4.307	5.3
January 2023	0.22	4.315	7.8
February 2023	0.17	4.390	6.1
March 2023	0.19	7.039	11
April 2023	0.23	5.827	11
May 2023	0.24	3.761	7.4
June 2023	0.23	2.485	4.8
July 2023	0.18	2.634	4.0
August 2023	0.28	2.260	5.3
Average			8

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)

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 Ashippun Wastewater Treatment Facility is to the Rock River in Dodge County. Since the 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. Ashippun Wastewater Treatment Facility was unable to meet the TMDL limits so a compliance schedule and an interim limit of 6.1 mg/L were included in the permit.

The 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 TMDL Mass Limits

Month	Monthly Ave (lbs/day)	Month	Monthly Ave (lbs/day)
Jan	1.12	July	0.72
Feb	1.48	Aug	0.73
March	1.16	Sept	0.80
April	0.92	Oct	0.78
May	0.80	Nov	0.82

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Month	Monthly Ave (lbs/day)	Month	Monthly Ave (lbs/day)
June	0.71	Dec	0.95

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from July 2018 through August 2023.

Total Phosphorus Effluent Data

	July 2018 through August 2023		July 2020 through August 2023 <small>(data since final phosphorus limits went into effect)</small>	
	Phosphorus mg/L	Phosphorus lbs/day	Phosphorus mg/L	Phosphorus lbs/day
1-day P ₉₉	5.7	8.2	0.60	0.69
4-day P ₉₉	3.1	4.4	0.38	0.42
30-day P ₉₉	1.6	2.3	0.27	0.29
Mean*	1.0	1.5	0.22	0.23
Std	1.2	1.7	0.11	0.13
Sample size	248	246	152	150
Range	0.09 - 5	0.08 - 7.9	0.09 - 0.79	0.08 - 0.88

Ashippun Sanitary District Wastewater Treatment Facility completed upgrades for phosphorus removal at the facility in 2020, and the TMDL phosphorus limits went into effect July 1, 2020.

PART 6 – TOTAL SUSPENDED SOLIDS

The Rock River TMDL also has wasteload allocations (WLA) for total suspended solids (TSS). For a municipal facility the limits for TSS must be expressed as weekly and monthly averages. The current permit includes a weekly average concentration limit of 45 mg/L and a monthly average concentration limit of 30 mg/L.

Monthly average and weekly average mass effluent limitations should be included in the permit according to the table below, along with the currently imposed concentration limits. For reference, the mass limits shown are equivalent to concentrations ranging from 20.6 – 21.4 mg/L as a monthly average and 33.9 – 37.6 mg/L as a weekly average at the design flow rate of 0.202 MGD.

Total Suspended Solids Effluent Limitations

Month	Monthly TSS WLA ¹ (tons/month)	Days Per Month	Monthly Ave TSS Effluent Limit ² (lbs/day)	Weekly Ave TSS Effluent Limit ³ (lbs/day)
January	0.54	31	34.8	57.1
February	0.54	28	38.6	63.3
March	0.54	31	34.8	57.1
April	0.54	30	36.0	59.0
May	0.54	31	34.8	57.1
June	0.54	30	36.0	59.0
July	0.54	31	34.8	57.1

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Month	Monthly TSS WLA ¹ (tons/month)	Days Per Month	Monthly Ave TSS Effluent Limit ² (lbs/day)	Weekly Ave TSS Effluent Limit ³ (lbs/day)
August	0.54	31	34.8	57.1
September	0.54	30	36.0	59.0
October	0.54	31	34.8	57.1
November	0.54	30	36.0	59.0
December	0.54	31	34.8	57.1

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

The multiplier used in the weekly average limit calculation was determined according to implementation guidance. A coefficient of variation (the standard deviation divided by the mean) was calculated, based on TSS mass monitoring data, to be 0.6 (= 2.3 ÷ 4). This value, along with the weekly monitoring frequency, is used to select the multiplier of 1.64. The current permit specifies TSS monitoring as weekly; **if a different monitoring frequency is used, the stated limits should be re-evaluated.**

Limits based on a WLA should be given in a permit regardless of reasonable potential. However, for informational purposes, the following table lists the statistics for Total Suspended Solids discharge as both a concentration and a mass, from July 2018 through August 2023.

Sample Type	TSS (mg/L)	TSS (lbs/day)
1-day P ₉₉	8	12
4-day P ₉₉	5	7
30-day P ₉₉	4	5
Mean	3	4
Std	1.5	2.3
Sample Size	248	246
Range	<2 - 12	0 - 17.5

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, shown in the table below, were based off actual flow reported from July 2018 through August 2023. No thermal effluent data

were available.

Monthly Temperature Limits

Month	Calculated Effluent Limit	
	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)
JAN	103	120
FEB	115	120
MAR	92	120
APR	76	120
MAY	86	120
JUN	112	120
JUL	NA	120
AUG	116	116
SEP	96	110
OCT	85	120
NOV	80	120
DEC	98	120

Reasonable Potential

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

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

At temperatures above ~103°F, conventional biological treatment systems stop functioning properly and experience upsets. There is no indication that this has ever occurred at this treatment system. This information, coupled with the lack of significant industrial heat load, lead to the conclusion that there is no reasonable potential for the discharge to exceed the 120°F limitation. No limits are recommended to be included in the reissued permit for temperature. However, **one year of thermal monitoring is recommended since it has been more than 10 years since data were collected.**

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 LC₅₀ (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC₂₅ (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 20% 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_e = annual average flow = 0.202 MGD = 0.313 cfs
- f = fraction of the Q_e withdrawn from the receiving water = 0
- Q_s = ¼ of the 7-Q₁₀ = 5.0 cfs ÷ 4 = 1.25 cfs

- Shown below is a tabulation of all available WET data for Outfall 004. 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 ₅₀ %				Footnotes or Comments
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	
08/29/2007	>100	>100	Pass	Yes	
12/17/2008	>100	32.9	Fail	No	1

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.

Attachment #1

- 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 LC₅₀, IC₂₅ or IC₅₀ ≥ 100%).

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

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

WET Checklist Summary

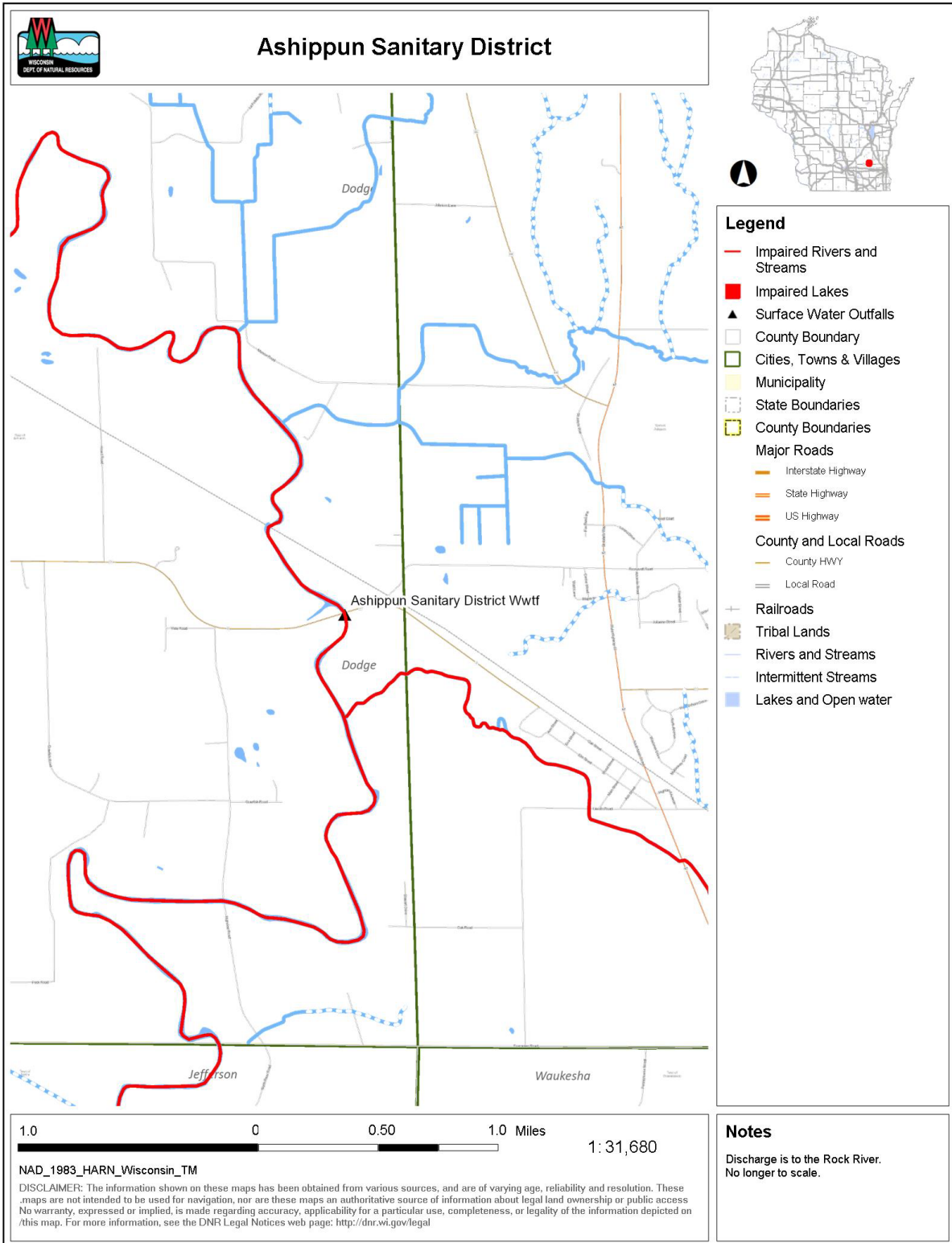
	Acute	Chronic
AMZ/IWC	Not applicable. 0 Points	IWC = 20% 0 Points
Historical Data	1 test used to calculate RP. No tests failed. No data from past five years. 5 Points	No data available. 5 Points
Effluent Variability	Little variability, few permit violations, no upsets, consistent WWTF operations. 0 Points	Same as Acute. 0 Points
Receiving Water Classification	WWSF 5 Points	Same as Acute. 5 Points
Chemical-Specific Data	No reasonable potential for limits based on ATC. Ammonia nitrogen, chloride, chromium, copper, nickel, and zinc detected. Additional Compounds of Concern: None. 3 Points	No reasonable potential for limits based on CTC. Ammonia nitrogen, chloride, chromium, copper, nickel, and zinc detected. Additional Compounds of Concern: None. 3 Points
Additives	No biocides and one water quality conditioner (Ferric Chloride) added. Permittee has proper SOP in place. 1 Point	All additives used more than once per 4 days. 1 Point
Discharge Category	No industrial contributors. 0 Points	Same as Acute. 0 Points

Attachment #1

	Acute	Chronic
Wastewater Treatment	Secondary or better. 0 Points	Same as Acute. 0 Points
Downstream Impacts	No impacts known. 0 Points	Same as Acute. 0 Points
Total Checklist Points:	14 Points	14 Points
Recommended Monitoring Frequency (from Checklist):	None.	None.
Limit Required?	No	No

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

Attachment #2
Site Map



Ammonia Nitrogen Limitations Calculated in the WQBEL Memo Dated February 15, 2018

The rules provide a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 °C, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the Rock River, based on conversations with local fisheries biologists. So “ELS Absent” criteria apply from October through March, and “ELS Present” criteria will apply from April through September.

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
Background Information	7-Q ₁₀ (cfs)	5	5	5
	7-Q ₂ (cfs)	24.5	24.5	24.5
	Ammonia (mg/L)	0.09	0.07	0.135
	Temperature (°C)	6	18.6	4
	pH (s.u.)	8.06	8.31	7.91
	% of Flow used	25	100	25
	Reference Weekly Flow (cfs)	1.25	5	1.25
	Reference Monthly Flow (cfs)	5.21	20.83	5.21
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	5.57	2.88	
	Early Life Stages Absent			11.20
	30-day Chronic			
	Early Life Stages Present	2.23	1.15	
Early Life Stages Absent			4.48	
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	27.49	47.81	
	Early Life Stages Absent			55.48
	Monthly Average			
	Early Life Stages Present	37.84	73.20	
Early Life Stages Absent			76.89	

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

Facility:	Ashippun SD WWTF	7-Q₁₀:	5.0 cfs	Temp Dates	Flow Dates
Outfall(s):	004	Dilution:	25%	Start:	No data 07/01/18
Date Prepared:	9/19/2023	f:	0	End:	No data 08/31/23
Design Flow (Q_e):	0.202 MGD	Stream type:	Small warm water sport or forage fish		
Storm Sewer Dist.	0 ft	Q_s:Q_e ratio:	4.0 :1		
		Calculation Needed?	YES		

Month	Water Quality Criteria			Receiving Water Flow Rate (Q _s) (cfs)	Representative Highest Effluent Flow Rate (Q _e)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	T _a (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Q _{esl}) (MGD)	Daily Maximum Flow Rate (Q _{ea}) (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	5.0	0.239	0.277	0			103	120
FEB	34	50	76	5.0	0.198	0.356	0			115	120
MAR	38	52	77	5.0	0.280	0.351	0			92	120
APR	48	55	79	5.0	0.276	0.303	0			76	120
MAY	58	65	82	5.0	0.270	0.345	0			86	120
JUN	66	76	84	5.0	0.226	0.334	0			112	120
JUL	69	81	85	5.0	0.203	0.260	0			NA	120
AUG	67	81	84	5.0	0.319	0.428	0			116	116
SEP	60	73	82	5.0	0.466	0.643	0			96	110
OCT	50	61	80	5.0	0.368	0.502	0			85	120
NOV	40	49	77	5.0	0.238	0.257	0			80	120
DEC	35	49	76	5.0	0.232	0.288	0			98	120