# Permit Fact Sheet

## General Information

| | |
|---|---|
| Permit Number | WI-0020974-11-0 |
| Permittee Name and Address | Village of Ferryville<br>P O Box 236<br>Ferryville WI 54628 |
| Permitted Facility Name and Address | Ferryville Wastewater Treatment Facility<br>15655 State Highway 35 (Lagoon Street) |
| Permit Term | January 01, 2025 to December 31, 2029 |
| Discharge Location | Approximately 250 feet north of the lagoon, (43.347286°N, 91.082018°W) |
| Receiving Water | Sugar Creek, Rush Creek Watershed (Bad Axe/La Crosse River Basin), Crawford County |
| Stream Flow ($Q_{7,10}$) | 7.2 cubic feet per second (cfs) |
| Stream Classification | Cold Water (Category 5), Class I Trout Stream, non-public water supply |
| Discharge Type | Existing lagoon, fill and draw system |
| Annual Average Design Flow (MGD) | 0.035 Million Gallons per Day (MGD) |
| Industrial or Commercial Contributors | None |
| Plant Classification | A4 - Ponds, Lagoons and Natural Systems; SS - Sanitary Sewage Collection System |
| Approved Pretreatment Program? | N/A |

## Facility Description

The Village of Ferryville owns and operates a three-cell aerated lagoon facility that receives only domestic wastewater/ The annual average design flow is 0.035 MGD (million gallons per day). The facility is a fill and draw type facility, and discharges into Sugar Creek. Discharge periods are approximately 30 days and have a maximum flow limit of 0.050 MGD.

## Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, CMARs, SSO reporting, compliance schedule items, and a site visit on January 30, 2024, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Katie Jo Jerzak, P.E. on February 19, 2024.

## 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 | 0.011 MGD annual average from previous permit term October 2019 through September 2024.<br>3.46 million gallons per year entering lagoon system calculated as average of sum of measured daily influent flow. | INFLUENT: Representative samples shall be collected from the manhole adjacent to lift station #4. |
| 001 | 0.011 MGD annual average from previous permit term October 2019 through September 2024.<br>2.47 million gallons per year discharged from lagoon system calculated as average of sum of estimated daily effluent flow. | EFFLUENT: Representative samples shall be collected from the north side of the effluent flow monitoring manhole prior to discharge to Sugar Creek. |
| 002 | Lagoon has not been de-sludged. | MUNICIPAL SLUDGE (LAGOON): Representative sludge samples shall be collected from the bottom of the primary aerated, facultative lagoon and analyzed for List 1 Total Solids and Metals, PCBs, and PFAS **once during the 2026 calendar year**. List 2 Nutrients shall be analyzed prior to removal and land application of sludge under an approved management plan. |

# Permit Requirements

# 1 Influent – Monitoring Requirements

## 1.1 Sample Point Number: 701- LIFT STATION WET WELL

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Flow Rate | | MGD | Daily | Continuous | |
| CBOD5 | | mg/L | Weekly | 24-Hr Flow Prop Comp | |
| BOD5, Total | | mg/L | Weekly | 24-Hr Flow Prop Comp | |
| Suspended Solids, Total | | mg/L | Weekly | 24-Hr Flow Prop Comp | |

### 1.1.1 Changes from Previous Permit:

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

An automatic influent sampler was installed in December 2024. The influent sampling has changed from grab composites to 24-hr flow proportional composite samples.

### 1.1.2 Explanation of Limits and Monitoring Requirements

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

# 2 Surface Water - Monitoring and Limitations

## 2.1 Sample Point Number: 001- PRIOR TO SUGAR CREEK

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Flow Rate | | MGD | Daily | Estimated | |
| pH Field | Daily Max | 9.0 su | 5/Week | Grab | |
| pH Field | Daily Min | 6.0 su | 5/Week | Grab | |
| CBOD5 | Monthly Avg | 25 mg/L | Weekly | Grab | |
| CBOD5 | Weekly Avg | 40 mg/L | Weekly | Grab | |
| Suspended Solids, Total | Monthly Avg | 60 mg/L | Weekly | Grab | |
| Nitrogen, Ammonia Variable Limit | | mg/L | Weekly | Grab | Look up the variable ammonia limit from the 'Daily Maximum Ammonia Limits' 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 | Weekly | Grab | Report the daily maximum Ammonia result in the 'Nitrogen, Ammonia (NH3-N) Total' column of the eDMR. See 'Daily Maximum Ammonia Limits' section in permit. |
| Phosphorus, Total | | mg/L | Monthly | Grab | Monitoring only. |
| E. coli | Geometric Mean - Monthly | 126 #/100 ml | Weekly | Grab | Limit Effective May through September annually. |
| E. coli | % Exceedance | 10 Percent | Monthly | Calculated | Limit Effective May through September annually. See the 'E. coli Percent Limit' section in |

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| | | | | | permit. Enter the result in the DMR on the last day of the month. |
| Nitrogen, Total Kjeldahl | | mg/L | See Permit Note | Grab | Annual in alternating seasons. See 'Nitrogen Series Monitoring' section in permit. |
| Nitrogen, Nitrite + Nitrate Total | | mg/L | See Permit Note | Grab | Annual in alternating seasons. See 'Nitrogen Series Monitoring' section in permit. |
| Nitrogen, Total | | mg/L | See Permit Note | Calculated | Annual in alternating seasons. See 'Nitrogen Series Monitoring' section in permit. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen. |
| Zinc, Total Recoverable | Weekly Avg | 518 ug/L | Monthly | Grab | Monitoring only until limit becomes effective per 'Schedules' section in permit. See 'Total Metals Analysis' and 'Potential Removal of Effluent Limitations for Zinc' sections in permit. |
| Zinc, Total Recoverable | Weekly Avg | 0.38 lbs/day | Monthly | Grab | Monitoring only until limit becomes effective per 'Schedules' section in permit. See 'Total Metals Analysis' and 'Potential Removal of Effluent Limitations for Zinc' sections below. Daily mass = daily flow (MGD) x sample concentration x 8.34. |
| Hardness, Total as CaCO3 | | mg/L | Monthly | Grab | |

### 2.1.1 Changes from Previous Permit

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

**Flow** – The sample type for flow has been changed from "Measure" to "Estimated" and the limit of 0.05 MGD has been removed.

**E. coli** – Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.

**Total Nitrogen Monitoring (TKN, N02+N03 and Total N)** – Annual monitoring is required in specific quarters as outlined in the permit.

**Zinc, Total Recoverable –** Zinc limitations and monitoring have been added to the permit.

**Hardness, Total as CaCO3 –** Hardness monitoring has been added to the permit.

### 2.1.2 Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo dated December 11, 2024.

**Monitoring Frequencies** – The Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. No changes were made.

**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.

**Technology Based Effluent Limits (Total Suspended Solids, CBOD5, and 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. Chapter NR 102, Wis. Adm. Code, 'Water Quality Standards for Surface Waters' also specifies requirements for pH for fish and aquatic life streams.

**Flow** – There is no calibrated instrumentation to measure the effluent flow. Effluent flow rate is reported as the reading from the Gould's metering pump in the effluent manhole. This is an estimated value that is serviceable for the purpose of the permit as there are no mass-based effluent limits that are immediately effective.

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

**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 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.

Seasonal E. coli monitoring and limits are required at the permit effective date. An interim limit for fecal coliform or schedule is not necessary as the facility has been monitoring for E. coli and has demonstrated that the effluent can consistently meet the final E. coli limits without disinfection. E. coli limits of 126 #/100 ml as a monthly geometric mean may not be exceeded and 410 #/100 ml as a daily maximum that may not be exceeded more than 10 percent of the time in any calendar month.

**Zinc, Total Recoverable** – Monitoring data showed the presence of zinc in the effluent ranging in concentrations from 200 to 790 ug/L with an average of 422 ug/L and a 4-day P99 of 784 ug/L. The limit protective of acute toxicity criteria for this discharge is 518 ug/L and 0.38 lbs/day expressed as a daily maximum. These limits take effect April 1, 2028, following completion of a schedule to implement source reduction measures. As the final step of the schedule, the permittee shall submit a request to the department to reevaluate the need for zinc limits in consideration of additional data collected. A permit modification would be required to effect this change.

**Hardness, Total as CaCO3** – Monthly hardness monitoring is included in the permit because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.

**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 for PFOS or PFOA in the effluent 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.

# 3 Land Application - Monitoring and Limitations

| Municipal Sludge Description | | | | | | |
|---|---|---|---|---|---|---|
| **Sample Point** | **Sludge Class (A or B)** | **Sludge Type (Liquid or Cake)** | **Pathogen Reduction Method** | **Vector Attraction Method** | **Reuse Option** | **Amount Reused/Disposed (Dry Tons/Year)** |
| 002 | B | Liquid | Undetermined. Sludge has not been land applied. | Undetermined. Sludge has not been land applied. | Undetermined. Sludge has not been land applied. | 0 |
| Does sludge management demonstrate compliance? N/A. Lagoons have not been dredged. | | | | | | |
| Is additional sludge storage required? No. Lagoon System. | | | | | | |
| Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No.<br><br>If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in land applying sludge from this facility | | | | | | |
| Is a priority pollutant scan required? No.<br><br>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. | | | | | | |

## 3.1 Sample Point Number: 002- FROM POND #1

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Solids, Total | | Percent | Once | Composite | |
| Arsenic Dry Wt | Ceiling | 75 mg/kg | Once | Composite | |
| Arsenic Dry Wt | High Quality | 41 mg/kg | Once | Composite | |
| Cadmium Dry Wt | Ceiling | 85 mg/kg | Once | Composite | |
| Cadmium Dry Wt | High Quality | 39 mg/kg | Once | Composite | |
| Copper Dry Wt | Ceiling | 4,300 mg/kg | Once | Composite | |
| Copper Dry Wt | High Quality | 1,500 mg/kg | Once | Composite | |
| Lead Dry Wt | Ceiling | 840 mg/kg | Once | Composite | |
| Lead Dry Wt | High Quality | 300 mg/kg | Once | Composite | |
| Mercury Dry Wt | Ceiling | 57 mg/kg | Once | Composite | |
| Mercury Dry Wt | High Quality | 17 mg/kg | Once | Composite | |
| Molybdenum Dry Wt | Ceiling | 75 mg/kg | Once | Composite | |
| Nickel Dry Wt | Ceiling | 420 mg/kg | Once | Composite | |
| Nickel Dry Wt | High Quality | 420 mg/kg | Once | Composite | |
| Selenium Dry Wt | Ceiling | 100 mg/kg | Once | Composite | |
| Selenium Dry Wt | High Quality | 100 mg/kg | Once | Composite | |
| Zinc Dry Wt | Ceiling | 7,500 mg/kg | Once | Composite | |
| Zinc Dry Wt | High Quality | 2,800 mg/kg | Once | Composite | |
| Nitrogen, Total Kjeldahl | | Percent | Per Application | Composite | |
| Nitrogen, Ammonia (NH3-N) Total | | Percent | Per Application | Composite | |
| Phosphorus, Total | | Percent | Per Application | Composite | |
| Phosphorus, Water Extractable | | % of Tot P | Per Application | Composite | |
| Potassium, Total Recoverable | | Percent | Per Application | Composite | |
| PCB Total Dry Wt | Ceiling | 50 mg/kg | Once | Composite | Sample once in calendar year 2026. See 'Sludge Analysis for PCBs' subsection in permit. |
| PCB Total Dry Wt | High Quality | 10 mg/kg | Once | Composite | Sample once in calendar year 2026. See 'Sludge |

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| | | | | | Analysis for PCBs' subsection in permit. |
| PFOA + PFOS | | ug/kg | Once | Calculated | Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information. |
| PFAS Dry Wt | | | Once | 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.

**PFAS** – Monitoring is required once 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). Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7) for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k). Radium requirements are addressed in s. NR 204.07(3)(n).

**List 2 Analysis for Nutrients** – Monitoring for nutrients has been added to facilitate land application of removed sludge should this occur during the permit term. Sample collection shall occur prior to land application.

**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

**PFAS** – The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA is currently developing a risk assessment to determine future land application rates and expects to release this risk assessment by the end of 2024. In the interim, the department has developed the "Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS."

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

# 4 Schedules

## 4.1 Sludge Management Plan

A sludge management plan is required for the removal of sludge and land application.

| Required Action | Due Date |
|---|---|
| **Sludge Management Plan:** The permittee shall submit an updated land management plan for approval if removal of sludge will occur during this permit term. The plan shall demonstrate compliance with ch. NR 204, Wis. Adm. Code and at minimum address 1) How and where is sludge sampled; 2) Available sludge storage details and location(s); 3)How will the sludge be removed with details on volume, characterization and how will the treatment plant continue to function during the drawdown; 4) describe the type of transportation and spreading vehicles and loading and unloading practices; 5) identify approved land application sites, apply for needed sites, site limitations, total acres needed and vegetative cover management; 6) specify record keeping procedures including site loading; 7) address contingency plans for adverse weather and odor/nuisance abatement; and 8) include any other pertinent information such as other disposal options that may be used or specifications of any pretreatment processes<br><br>Once approved, all sludge management activities shall be conducted in accordance with the plan. Any changes to the plan must be approved by the Department prior to implementing the changes. No desludging may occur unless approval from the Department is obtained. Daily logs shall be kept that record where the sludge has been disposed.<br><br>The plan is due at least 60 days prior to desludging. | |

### 4.1.1 Explanation of Schedule

If the lagoons are to be de-sludged during this permit term a management plan is needed to show compliance with ch. NR 204, Wis. Adm. Code. There are outlines available to assist in plan development.

## 4.2 Zinc Source Reduction and Potential Removal of Effluent Limitations

The permittee shall complete the actions listed below by the dates due.

| Required Action | Due Date |
|---|---|
| **Action Plan:** Submit an action plan consisting of source reduction measures that will be taken to reduce, with the goal of eliminating, sources of zinc. Initiate actions once approved by the Department. | 06/30/2025 |
| **Annual Progress Report:** Submit an annual progress report that shall include an analysis of trends in weekly average and monthly average effluent concentrations and mass loadings. This report shall also include a list of completed and proposed source reduction measures. The first annual progress report is to be submitted by the Date Due. | 03/31/2026 |
| **Annual Progress Report #2:** Submit an annual progress report that shall include an analysis of trends in weekly average and monthly average effluent concentrations and mass loadings. This report shall also include a list of completed and proposed source reduction measures. The first annual progress report is to be submitted by the Date Due. | 03/31/2027 |
| **Final Report and Limit Reevaluation:** Submit a final report on effluent zinc concentrations and include an analysis of trends in weekly average concentrations and mass loadings of data collected. The permittee shall also submit a request to the department to evaluate the need for the final zinc | 09/30/2027 |

| | |
|---|---|
| limits to take effect.<br><br>If the department determines there is no reasonable potential for the facility to discharge zinc above the standard, the department will modify the permit to remove the effluent limitations for zinc and effluent monitoring of zinc shall continue as specified in the permit. If the department determines there is reasonable potential for the facility to discharge zinc above the standard, the zinc limits will take effect April 1, 2028.<br><br>In either case, source reduction measures that are in place must continue to prevent an increase in concentrations and mass loading over time. | |

### 4.2.1 Explanation of Schedule

s. NR 106.117, Wis. Adm. Code, allows time for compliance to achieve final effluent limitations as soon as practicable and no longer than 5 years from the permit effective date. s. NR 106.117(3)(d), Wis.Adm. Code, further specifies that a schedule of compliance may require evaluation of pollution and waste minimization measures as a means of complying with the effluent limitations. The schedule allows for additional data collection and implementation of an action plan to locate and reduce sources of zinc delivered to and within the treatment works.

## Other Comments

None.

## Attachments

Water Quality Based Effluent Limits memo dated December 11, 2024

## Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance.

**Prepared By: Bryan Hartsook** **Wastewater Field Supervisor** **Date: For Public Notice**

# CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: December 11, 2024

TO: Bryan Hartsook – SER/Milwaukee

FROM: Zainah Masri – WY/3

SUBJECT: Water Quality-Based Effluent Limitations for the Ferryville Wastewater Treatment Facility WPDES Permit No. WI-0020974-11-0

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 Ferryville Wastewater Treatment Facility in Crawford County. This municipal wastewater treatment facility (WWTF) discharges to the Sugar Creek, located in the Rush Creek Watershed in the Bad Axe/La Crosse 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:

| Parameter | Daily Maximum | Daily Minimum | Weekly Average | Monthly Average | Six-Month Average | Footnotes |
|---|---|---|---|---|---|---|
| Flow Rate | 0.05 MGD | | | | | 1,2 |
| $CBOD_5$ | | | 40 mg/L | 25 mg/L | | 1 |
| TSS | | | | 60 mg/L | | 2,3 |
| pH | 9.0 s.u. | 6.0 s.u. | | | | 1 |
| Ammonia Nitrogen Year round | Variable | | | | | 7 |
| Bacteria | | | | | | |
| Final Limit *E. coli* | | | | 126 #/100 mL geometric mean | | 4 |
| Zinc | 518 µg/L 0.38 lbs/day | | | | | 5 |
| Hardness | | | | | | 6 |
| Phosphorus | | | | | | 2 |
| TKN, Nitrate+Nitrite, and Total Nitrogen | | | | | | 8 |

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. The TSS limit is a variance limit according to s. NR 210.07(2), Wis. Adm. Code, where aerated lagoons and stabilization ponds are the principal treatment processes.
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. A compliance schedule may be included in the permit to allow the facility time to meet the water quality based effluent limit.
6. **Quarterly hardness monitoring is also recommended** because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.

7. 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 s.u. | Limit mg/L | Effluent pH s.u. | Limit mg/L | Effluent pH s.u. | Limit mg/L |
|---|---|---|---|---|---|
| $6.0 \leq pH \leq 6.1$ | 108 | $7.0 < pH \leq 7.1$ | 66 | $8.0 < pH \leq 8.1$ | 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 |
| $6.8 < pH \leq 6.9$ | 78 | $7.8 < pH \leq 7.9$ | 20 | $8.8 < pH \leq 8.9$ | 3.1 |
| $6.9 < pH \leq 7.0$ | 72 | $7.9 < pH \leq 8.0$ | 17 | $8.9 < pH \leq 9.0$ | 2.7 |

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).

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

Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are not required due to the non-continuous nature of the 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 (4) – Narrative, Map, Thermal Table, and Ammonia Calculations

PREPARED BY: Zainah Masri, Sen. Water Resource Engineer WY/3 Zainah Masri

APPROVED BY: Diane Figiel Date: 12/11/2024
Diane Figiel, PE,
Water Resources Engineer

E-cc: Katie Jo Jerzak, Wastewater Engineer – Eau Claire/WCR
Geisa Thielen, Regional Wastewater Supervisor – Eau Claire/WCR
Diane Figiel, Water Resources Engineer – WY/3
Kari Fleming, Environmental Toxicologist – WY/3
Nate Willis, Wastewater Engineer – WY/3

Attachment #1

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

**WPDES Permit No. WI-0020974-11**

Prepared by: Zainah Masri – WY/3

## PART 1 – BACKGROUND INFORMATION

### Facility Description

The Village of Ferryville owns and operates a three-cell aerated lagoon facility that receives only domestic wastewater/ The annual average design flow is 0.035 MGD (million gallons per day). The facility is a fill and draw type facility, and discharges into Sugar Creek. Discharge periods are approximately 30 days and have a maximum flow limit of 0.050 MGD.

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

### Existing Permit Limitations

The current permit, which expired on September 30, 2024 includes the following effluent limitations and monitoring requirements.

| Parameter | Daily Maximum | Daily Minimum | Weekly Average | Monthly Average | Six-Month Average | Footnotes |
|---|---|---|---|---|---|---|
| Flow Rate | 0.05 MGD | | | | | 1 |
| $CBOD_5$ | | | 40 mg/L | 25 mg/L | | 1 |
| TSS | | | | 60 mg/L | | 1,2 |
| pH | 9.0 s.u. | 6.0 s.u. | | | | 1 |
| Ammonia Nitrogen | Variable | | | | | 4 |
| Fecal Coliform May – September | | | | 400#/100 mL geometric mean | | - |
| Phosphorus | | | | | | 1,3 |

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. The TSS limits is a variance limit based on s. NR 210.07(2) where aerated lagoons and stabilization ponds are the principal treatment processes.
3. Monitoring Only.
4. 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.

Attachment #1

| 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 |

**Receiving Water Information**

- Name: Sugar Creek
- Waterbody Identification Code (WBIC): 1636300
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Cold Water (Category 5), Class I Trout Stream, non-public water supply.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-$Q_{10}$ and 7-$Q_2$ values are from USGS for Station 05388375 at the bridge on highway 35, 1.2 miles SE of Ferryville, where Outfall 001 is located. The harmonic mean has been estimated as recommended in State of Wisconsin Water Quality Rules Implementation Plan (Publ. WT-511-98)
  7-$Q_{10}$ = 7.2 cfs (cubic feet per second)
  7-$Q_2$ = 9.2 cfs
  Harmonic Mean Flow = 13.5 cfs
- Hardness = 293 mg/L as $CaCO_3$. This value represents the geometric mean of data from Sugar Creek from 09/05/1991 to 04/08/1992.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from Rattlesnake Creek at Beetown is used for this evaluation because there is no data available for Sugar Creek. Rattlesnake Creek is within the same ecological landscape so ambient water quality characteristics are expected to be similar. 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: None
- Impaired water status: Approximately one mile downstream of the discharge of the Mississippi River is listed as impaired for PCB's, Total Phosphorus and Mercury.

**Effluent Information**

- Design flow rate(s):
  Annual average = 0.035 MGD (Million Gallons per Day)
  For reference, the actual average flow from January 2019 to June 2024 was 0.05 MGD, excluding days when there is no discharge.

- Hardness = 240 mg/L as $CaCO_3$. This value represents the geometric mean (n=4) of data from October 2023 in 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: Private Wells
- Additives: None
- 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.

**Effluent Copper Data**

| Sample Date | Copper µg/L | Sample Date | Copper µg/L | Sample Date | Copper µg/L |
|---|---|---|---|---|---|
| 10/16/2023 | <1.9 | 10/28/2023 | <1.9 | 11/09/2023 | <1.9 |
| 10/19/2023 | <1.9 | 10/31/2023 | <1.9 | 11/12/2023 | 1.9 |
| 10/22/2023 | 2.0 | 11/03/2023 | <1.9 | 11/15/2023 | <1.9 |
| 10/25/2023 | <1.9 | 11/06/2023 | <1.9 | | |
| Mean = 0.35 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.

**Effluent Zinc Data**

| Sample Date | Zinc µg/L |
|---|---|
| 10/16/2023 | 510 |
| 04/04/2024 | 330 |
| 04/07/2024 | 200 |
| 04/10/2024 | 780 |
| 10/17/2024 | 550 |
| 10/19/2024 | 670 |
| 10/21/2024 | 790 |
| 10/23/2024 | 200 |
| 10/25/2024 | 210 |
| 10/27/2024 | 200 |
| 10/29/2024 | 210 |
| 1-day $P_{99}$ | 1275 |
| 4-day $P_{99}$ | 785 |

Attachment #1

**Effluent Chloride Data**

| Sample Date | Chloride mg/L |
|---|---|
| 10/16/2023 | 59 |
| 10/19/2023 | 60 |
| 10/22/2023 | 60 |
| 10/25/2023 | 60 |
| Mean | 60 |

The following table presents the average concentrations and loadings at Outfall 001 from January 2019 to June 2024 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 |
|---|---|
| $BOD_5$ | 14.3 mg/L* |
| TSS | 28.8 mg/L |
| pH field | 7.98 s.u. |
| Phosphorus | 2.2 mg/L |
| Ammonia Nitrogen | 6.5 mg/L |

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

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

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

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

**Acute Limits based on 1-$Q_{10}$**

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Code, (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-$Q_{10}$ receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

$$\text{Limitation} = \frac{(WQC)\,(Qs + (1-f)\,Qe) - (Qs - f\,Qe)\,(Cs)}{Qe}$$

Where:

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

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

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

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

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-$Q_{10}$ method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for Ferryville 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.

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

RECEIVING WATER FLOW = 5.76 cfs, (1-$Q_{10}$ (estimated as 80% of 7-$Q_{10}$)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

| SUBSTANCE | REF. HARD. mg/L | ATC | MEAN BACK-GRD. | MAX. EFFL. LIMIT | 1/5 OF EFFL. LIMIT | MEAN EFFL. CONC. | 1-day MAX. CONC. |
|---|---|---|---|---|---|---|---|
| Arsenic | | 340 | | 680 | 136 | 2.8 | |
| Cadmium | 240 | 12 | 0.02 | 24 | 5 | <0.19 | |
| Chromium | 240 | 3693 | 0.78 | 7386 | 1477 | 1.1 | |
| Copper | 240 | 35 | 0.96 | 71 | 14.2 | 0.35 | 2.0 |
| Lead | 240 | 249 | 0.81 | 498 | 100 | <4.3 | |
| Nickel | 240 | 984 | | 1968 | 394 | 2.5 | |
| Zinc | 240 | **259** | 3.15 | **518** | | | **1275** |
| Chloride (mg/L) | | 757 | | 1514 | 303 | 60 | 60 |

* * 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.

**Weekly Average Limits based on Chronic Toxicity Criteria (CTC)**
RECEIVING WATER FLOW = 1.8 cfs (¼ of the 7-$Q_{10}$), 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 | | 148 | | 3591 | 718 | 2.8 | |
| Cadmium | 175 | 3.8 | 0.02 | 92 | 18 | <0.19 | |
| Chromium | 293 | 207.9 | 0.78 | 5027 | 1006 | 1.1 | |
| Copper | 293 | 26 | 0.96 | 608 | 122 | 0.35 | |
| Lead | 293 | 79 | 0.81 | 1901 | 380 | <4.3 | |
| Nickel | 268 | 120 | | 2916 | 583 | 2.5 | |
| Zinc | 293 | 308 | 3.15 | 7405 | | | 784 |
| Chloride (mg/L) | | 395 | | 9585 | 1917 | 60 | 60 |

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

**Monthly Average Limits based on Wildlife Criteria (WC)**
The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

**Monthly Average Limits based on Human Threshold Criteria (HTC)**
RECEIVING WATER FLOW = 3.4 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 | 0.02 | 16510 | 3302 | <0.19 |
| Chromium (+3) | 3818000 | 0.78 | 170379170 | 34075834 | 1.1 |
| Lead | 140 | 0.81 | 6212 | 1242 | <4.3 |
| Nickel | 43000 | | 1918886 | 383777 | 2.5 |

**Monthly Average Limits based on Human Cancer Criteria (HCC)**
RECEIVING WATER FLOW = 3.4 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 | | 594 | 119 | 2.8 |

**Conclusions and Recommendations**
Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are required for Zinc.

Copper – Considering available effluent data from January 2019 to June 2024, the maximum concentration of 2.0 µg/L. The maximum effluent concentration and the mean of the effluent data was well below the calculated daily maximum limit, therefore **no limit is required.**

Zinc – Considering available effluent data from October 2023 to October 2024 the 1-day $P_{99}$ concentration is 1275 µg/L, with a maximum concentration of 780 µg/L. The maximum effluent concentration and the 1-day $P_{99}$ of the effluent data exceed the calculated daily maximum limit, therefore **concentration and mass limits, as well as monthly monitoring, are required**.
The acute mass limitation of 0.38 lbs/day is based on the concentration limit and the peak daily design flow rate of 0.088 MGD (518 µg/L * 0.088 MGD * 8.34/1000) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

**Quarterly hardness monitoring is also recommended** because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.

Chloride – Considering available effluent data from the current permit term January 2019 to June 2024, the mean chloride concentration is 59.8 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 Ferryville 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)." However, there is no samples available for the Ferryville Wastewater Treatment Facility. It is not expected that there are exceedances of the high-quality mercury concentration based on similar municipal treatment plants and the lack of industries. **No monitoring is recommended.**

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 the types of indirect dischargers contributing to the collection system, **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 limits. These limits are re-evaluated at this time due to the following changes:

- 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:

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

Where:

A = 0.411 and B = 58.4 for a Cold-Water Category 5 fishery
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 302 sample results were reported from April 2019 to April 2024 The maximum reported value was 8.9 s.u. (Standard pH Units). The effluent pH was 8.9 s.u. or less 99% of the time. The 1-day $P_{99}$, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.8 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 8.8 s.u. Therefore, a value of 8.8 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 8.8 s.u. into the equation above yields an ATC = 1.8 mg/L.

**Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method**
In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are calculated using the 1-$Q_{10}$ receiving water low flow if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits shall apply.

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-$Q_{10}$ (estimated as 80 % of 7-$Q_{10}$) and the 2×ATC approach are shown below.

**Daily Maximum Ammonia Nitrogen Determination**

| | Ammonia Nitrogen Limit mg/L |
|---|---|
| 2×ATC | 3.7 |
| 1-$Q_{10}$ | 136 |

The 2×ATC method yields the most stringent limits for Ferryville 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.

**Daily Maximum Ammonia Nitrogen Limits – Cold water Category 5**

| 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 | 2.7 |

**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.

**Effluent Data**
The following table evaluates the statistics based upon ammonia data reported from April 2019 to April 2024 with those results being compared to the calculated limits to determine the need to include ammonia limits in the Ferryville Wastewater Treatment Facility permit for the respective month ranges. That need is determined by calculating 99$^{th}$ upper percentile (or $P_{99}$) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

**Ammonia Nitrogen Effluent Data**

| | Ammonia Nitrogen mg/L |
|---|---|
| 1-day $P_{99}$ | 26 |
| 4-day $P_{99}$ | 15 |
| 30-day $P_{99}$ | 9.0 |
| Mean | 6.5 |
| Std | 5.1 |
| Sample size | 44 |
| Range | 0.08-18 |

The permit currently has daily maximum 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, the daily maximum ammonia nitrogen limitations are recommended to be retained in the reissued permit in the form of a variable limits table. Additional limits for expression of limits are not needed due to the noncontinuous nature of the discharge. **No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.**

## 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 Ferryville Wastewater Treatment Facility 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 or other disinfection season if applicable. No changes are recommended to the current recreational period and the required disinfection season.

**Effluent Data**
Ferryville Wastewater Treatment Facility has monitored effluent *E. coli* for May 2023 and a total of 4 results are available. A geometric mean of 126 counts/100 mL was not exceeded with a maximum monthly geometric mean of 26 counts/100 mL. Effluent data has not exceeded 410 counts/100 mL. The maximum reported value was 26 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 Ferryville 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 150 lbs/month, which is the threshold for municipalities in accordance with s. NR 217.04(1)(a)1, Wis. Adm. Code, Wis. Adm. Code, and therefore no technology-based limit is required.

Attachment #1

**Annual Average Mass Total Phosphorus Loading**

| Month | Average Phosphorus Concentration (mg/L) | Total Effluent Flow (Million Gallons) | Calculated Mass (lbs/month) |
|---|---|---|---|
| April 2023 | 1.95 | 3.245 | 52.8 |
| May 2023 | 2.5 | 1.805 | 37.6 |
| Oct 2023 | 0.8 | 1.48 | 9.9 |
| Nov 2023 | 0.45 | 1.83 | 6.9 |
| Average = 27 lbs/month | | | |

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 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 0.075 mg/L applies for Sugar Creek.

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.

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

Where:

WQC = 0.075 mg/L for Sugar Creek.
Qs = 100% of the 7-$Q_2$ of 9.2 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 = 0.035 MGD = 0.054 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 0.075 mg/L using a background concentration of 0.022 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.

A review of all available in stream total phosphorus data from May 2012 to October 2012 stored in the Surface Water Integrated Monitoring System database indicates the median background total phosphorus concentration in Sugar Creek at Monitoring Station at Sugar Creek #3 Bridge on Chevold Rd (SWIMS station ID #10009074) is 0.022 mg/L, just upstream from the point of discharge to Sugar Creek.

In stream total phosphorus data upstream of the discharge is not available however the following data were considered in estimating the background phosphorus concentration:

| | |
|---|---|
| SWIMS ID | 10009074 |
| Station Name | Monitoring station at Sugar Creek #3 Bridge on Chevold Rd. |
| Waterbody | Sugar Creek |
| Sample Count | 6 |
| First Sample | 05/12/2012 |
| Last Sample | 10/08/2012 |
| Mean | 0.022 mg/L |
| Median | 0.022 mg/L |

Substituting a median value of 0.022 mg/L into the limit calculation equation above, the calculated limit is 9.1 mg/L.

**Effluent Data**

The following table summarizes effluent total phosphorus monitoring data from January 2019 to June 2024.

**Total Phosphorus Effluent Data**

| | **Phosphorus mg/L** |
|---|---|
| 1-day $P_{99}$ | 5.1 |
| 4-day $P_{99}$ | 3.5 |
| 30-day $P_{99}$ | 2.61 |
| Mean | 2.20 |
| Std | 0.91 |
| Sample size | 44 |
| Range | 0.094 - 4.64 |

**Reasonable Potential Determination**

Phosphorus discharge from the Ferryville Wastewater Treatment Facility does not have reasonable potential to cause or contribute to an exceedance of the water quality criterion because the 30-day $P_{99}$ of reported effluent total phosphorus data is less than the calculated WQBEL. **Therefore, a WQBEL is not required, and monitoring only is recommended.**

## 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 (Qs:Qe >20:1), the lowest calculated limitation is 120° F (s. NR 106.55(6)(a), Wis. Adm. Code).

## 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 $LC_{50}$ (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.

- Chronic testing is usually not recommended where the ratio of the 7-$Q_{10}$ to the effluent flow exceeds 100:1 and acute testing is not typically recommended if the ratio exceeds 1000:1. For Ferryville, that ratio is approximately 133:1. With this amount of dilution, there is believed to be little potential for chronic toxicity effects in the receiving water associated with the discharge from the Ferryville WWTF, so the need for chronic WET testing will not be considered further.

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**

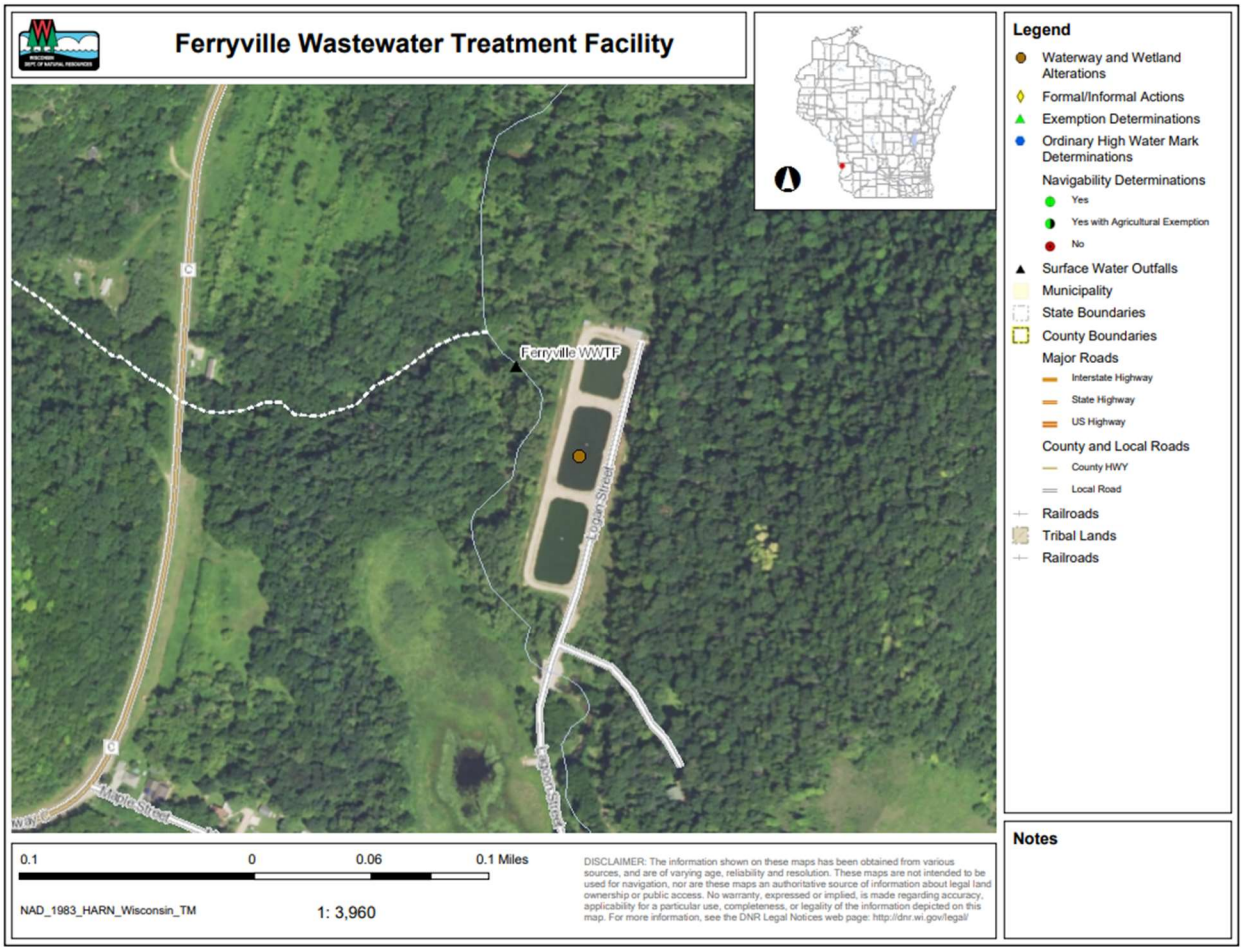
| | Acute |
|---|---|
| **AMZ/IWC** | Not Applicable.<br><br>**0 Points** |
| **Historical Data** | No tests used to calculate RP.<br>No tests failed.<br><br>**5 Points** |
| **Effluent Variability** | Little variability, some violations, or upsets, consistent WWTF operations.<br><br>**0 Points** |
| **Receiving Water Classification** | Cold Water Community<br>**5 Points** |
| **Chemical-Specific Data** | Zinc Limit based on ATC;<br>Ammonia nitrogen, Chloride, Arsenic, Copper, Nickel and Chromium<br>detected.<br><br>**8 Points** |
| **Additives** | 0 Biocides and 0 Water Quality Conditioners added.<br><br>**0 Points** |
| **Discharge Category** | 0 Industrial Contributors.<br><br>**0 Points** |
| **Wastewater Treatment** | Secondary or Better<br><br>**0 Points** |
| **Downstream Impacts** | No impacts known<br><br>**0 Points** |
| **Total Checklist Points:** | **18 Points** |
| **Recommended Monitoring Frequency (from Checklist):** | 2x Acute WET Tests Needed 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 no WET testing is recommended in the reissued permit. Although the points may indicate a need for acute WET testing, 5 points are due to lack of historical data because this is a noncontinuous minor municipal facility that previously was not required to test based on chapter 1.1 of the WET Guidance document (WET Testing of Minor Municipal

Discharges). This is a minor municipal discharge (< 1.0 MGD) comprised solely of domestic wastewater, with no history of WET failures and no toxic compounds previously detected at levels of concern. At this issuance zinc was detected above a level on concern, however the zinc limit in the permit will require the facility to identify the sources of zinc and take action to reduce it. No WET testing is recommended at this time because of the low risk in effluent toxicity.

Attachment #2

Site Map:



Ammonia Nitrogen Calculations from WQBEL memo dated June 3, 2019:

| | | Spring<br>April & May | Summer<br>June – Sept. | Winter<br>Oct. - March |
|---|---|---|---|---|
| **Effluent Flow** | Qe (MGD) | 0.05 | 0.05 | 0.05 |
| **Background Information** | 7-$Q_{10}$ (cfs) | 7.2 | 7.2 | 7.2 |
| | 7-$Q_2$ (cfs) | 9.2 | 9.2 | 9.2 |
| | Ammonia (mg/L) | 0.1 | 0.1 | 0.1 |
| | Temperature (°C) | 13 | 18 | 9 |
| | pH (s.u.) | 8 | 8 | 8 |
| | % of Flow used | 25 | 100 | 25 |
| | Reference Weekly Flow (cfs) | 1.8 | 7.2 | 1.8 |
| | Reference Monthly Flow (cfs) | 1.96 | 7.82 | 1.96 |
| **Criteria mg/L** | 4-day Chronic | 6.08 | 4.93 | 6.08 |
| | 30-day Chronic | 2.43 | 1.97 | 2.43 |
| **Effluent Limits mg/L** | Weekly Average | 145.31 | 454.53 | 145.31 |
| | Monthly Average | 61.40 | 191.23 | 61.40 |