

# Public Noticed Fairchild Draft Permit Fact Sheet

## General Information

Permit Number:	WI-0036200-11-0	
Permittee Name:	Village of Fairchild	
Address:	331 Oak St. PO Box 150	
City/State/Zip:	Fairchild WI 54741	
Discharge Location:	Fairchild Wastewater Treatment Facility, Horse Creek Road, Fairchild, WI 54741 SW <sup>1</sup> / <sub>4</sub> , NW <sup>1</sup> / <sub>4</sub> , Section 23, T25N, R5W, Bridge Creek township, Eau Claire County	
Receiving Water:	The South Fork of the Eau Claire River in the South Fork Eau Claire Watershed of the Lower Chippewa River Basin in Eau Claire County.	
StreamFlow (Q <sub>7,10</sub> ):	April Q <sub>7,10</sub> = 41 cfs, May Q <sub>7,10</sub> = 18.5 cfs, October Q <sub>7,10</sub> = 8 cfs, November Q <sub>7,10</sub> = 9.6 cfs	
Stream Classification:	Warmwater Sport Fish, Non-public Water Supply	
Discharge Type:	Fill and draw (intermittent discharge), existing	
Design Flow(s)	Annual Average	0.100 MGD
Significant Industrial Loading?	No	
Operator at Proper Grade?	Yes	
Approved Pretreatment Program?	N/A	

## Facility Description

The Fairchild Wastewater Treatment Facility operates with considerable variability in discharge flow and serves approximately 451 people. The actual annual average discharge for 2023 was 0.727 MGD over 28 days. Wastewater is collected at the main lift station and pumped approximately 8 miles north of the Village for treatment in a 3-cell stabilization pond system preceded by bar screens. There are two additional lift stations along the force main. The pond system is operated on a “fill & draw” method. Discharge is typically over four months of the year, in spring and fall. The treated wastewater is discharged to the South Fork of the Eau Claire River. No major operational changes have occurred since the last permit term. Significant monitoring and/or limit changes for this issuance include 1) removal of the effluent copper limit and replaced with monthly monitoring, 2) the addition of annual effluent monitoring for total nitrogen, nitrite + nitrate nitrogen and TKN, 3) addition of monitoring for effluent PFOS and PFOA once every two months and an associated determination of need schedule in accordance with s. NR 106.98(2)(b), Wis. Adm. Code., and 4) PFAS sludge

sampling has been included in the proposed WPDES permit pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9., Wis. Adm. Code to quantitate risk. Clarification language has been added in the Land Application section notifying the permittee they must monitor sludge for List 2 nutrients and meet the requirements of List 3 (Pathogen Control) and List 4 (Vector Attraction Reduction) prior to landspreading if they remove sludge from the lagoon(s). A schedule has been included requiring the permittee submit a sludge management plan prior to removal and land application of sludge from the pond(s). In addition, some monitoring frequencies have changed which include influent and effluent flow monitoring from continuous to daily, and effluent ammonia nitrogen and phosphorus monitoring frequencies have increased from weekly to 2/week for more accurate compliance/reporting purposes.

## Substantial Compliance Determination

**Enforcement During Last Permit:** Fairchild has exceeded the phosphorus limit and has received approval for chemical addition to help remove phosphorus. The facility has completed all previously required actions as part of the enforcement process.

After a desk top review of all discharge monitoring reports, CMARs, land app reports, compliance schedule items, and a site visit on 10/18/2023, this facility has been found to be in substantial compliance with their current permit.

Compliance determination entered by Adebowale Adesanwo on 12/08/2023.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)
701	0.727 MGD (2023)	Representative influent samples shall be collected at the wetwell in the main lift station after the bar screen.
002	0.575 MGD (Oct 2019-Nov 2023)	Representative effluent samples shall be collected at the final manhole prior to discharge to the South Fork of the Eau Claire River. Discharge is prohibited December-March, and June-September.
003	N/A	Representative sludge samples shall be collected from the primary pond and monitored for list 1 parameters, radium 226, and PFAS once in 2025. If the permittee plans to remove sludge, they shall monitor sludge for Lists 1, 2, 3 & 4 prior to land application. The Department shall be notified at least 30 days in advance of sludge removal so that appropriate monitoring forms can be provided. Approval of landspreading sites must be completed prior to sludge removal.

## 1 Influent – Monitoring Requirements

### Sample Point Number: 701- Lift Station 4th & Humbird St

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Total Daily	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
BOD5, Total		mg/L	Weekly	3-Hr Comp	
Suspended Solids, Total		mg/L	Weekly	3-Hr Comp	

### Changes from Previous Permit:

Flow sample frequency was changed from continuous to daily for eDMR compliance/reporting purposes.

### 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. Influent monitoring requirements are in accordance with NR 206.09(2), Wis. Adm. Code.

## 2 Surface Water - Monitoring and Limitations

### Sample Point Number: 002- Prior to S Fork EC River

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate	Daily Max	0.92 MGD	Daily	Total Daily	Limit applies April, May
Flow Rate	Daily Max	0.6 MGD	Daily	Total Daily	Limit applies October, November
Flow Rate	Daily Max	0 MGD	Daily	Total Daily	Limit applies December - March and June - September
BOD5, Total	Monthly Avg	30 mg/L	2/Week	Grab	
BOD5, Total	Weekly Avg	45 mg/L	2/Week	Grab	
Suspended Solids, Total	Monthly Avg	30 mg/L	2/Week	Grab	
Suspended Solids, Total	Weekly Avg	45 mg/L	2/Week	Grab	
pH Field	Daily Max	9.5 su	2/Week	Grab	
pH Field	Daily Min	6.0 su	2/Week	Grab	
Copper, Total Recoverable		ug/L	Monthly	Grab	

<b>Monitoring Requirements and Limitations</b>					
<b>Parameter</b>	<b>Limit Type</b>	<b>Limit and Units</b>	<b>Sample Frequency</b>	<b>Sample Type</b>	<b>Notes</b>
Hardness, Total as CaCO <sub>3</sub>		mg/L	Monthly	Grab	
Phosphorus, Total	Monthly Avg	2.0 mg/L	2/Week	Grab	
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Daily Max - Variable	mg/L	2/Week	Grab	Variable limit based on effluent pH. See Ammonia subsection below.
Nitrogen, Ammonia Variable Limit		mg/L	2/Week	Grab	
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	Grab	Annual in rotating quarters. See Nitrogen Series Monitoring subsection below.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	Grab	Annual in rotating quarters. See Nitrogen Series Monitoring section below.
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.

## Changes from Previous Permit

Removal of the effluent copper limit and replaced with monthly monitoring, and the addition of annual effluent monitoring for total nitrogen, nitrite + nitrate nitrogen and TKN. In addition, some monitoring frequencies have changed which include flow monitoring frequencies have changed from continuous to daily, and effluent ammonia nitrogen and phosphorus monitoring frequencies have increased from weekly to 2/week for more accurate compliance/reporting purposes.

## Explanation of Limits and Monitoring Requirements

**MUNICIPAL EFFLUENT LIMITS** – In accordance with the federal regulation 40 CFR 122.45(d), and to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, limits in this permit are to be expressed as weekly average and monthly average limits whenever practicable. However, these additional expressions of limits are not required due to the non-continuous nature of the discharge.

The effluent monitoring frequency for all parameters were considered. Monitoring frequencies are based on the size and type of the facility and are established to best characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Requirements in administrative code (NR 108, 205, 210 and 214 Wis. Adm. Code) and Section 283.55, Wis. Stats. were considered, where applicable, when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this

permit term. For more information see the March 22, 2021 version of the Bureau of Water Quality Program Guidance Document “Monitoring Frequencies for Individual Wastewater Permits”. The department has determined that ammonia nitrogen and phosphorus monitoring increase to 2/Week to better align with the standard for similar facilities with limits. Flow frequency was also changed from continuous to daily for eDMR reporting purposes.

Limits were determined for this existing discharge using chs. NR 102, 105, 106, 205, 210, 212 and 217 of the Wisconsin Administrative Code (where applicable). For additional information on any of the limits see the December 21, 2023 memo from Ben Hartenbower to Angela Parkhurst titled “Water Quality-Based Effluent Limitations for the Fairchild Wastewater Treatment Facility WPDES Permit No. WI-0036200”, as well as the June 28, 2022 memo from Ben Hartenbower to Angela Parkhurst titled “Phosphorus Water Quality-Based Effluent Limitations for the Fairchild Wastewater Treatment Facility WPDES Permit No. WI-0036200”.

**BOD, TSS and pH:** Monitoring and limits for BOD, TSS and pH correspond to the requirements in the current permit since the facility has not increased the capacity of the wastewater treatment system since the last permit issuance, nor are increases expected during the term of the proposed permit.

**Ammonia-** Current acute and chronic ammonia toxicity criteria for the protection of aquatic life are included in Tables 2C and 4B of ch. NR 105, Wis. Adm. Code. Subchapter IV of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for ammonia. The permit requires variable daily maximum limits based on pH. Daily maximum ammonia limits that vary with effluent pH apply year-round. See table below titled “Variable Daily Maximum Ammonia Limits” for more information. Samples for ammonia shall be collected at the same time as the pH samples.

Effluent pH s.u.	Limit mg/L	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	6.9 < pH ≤ 7.0	72	7.8 < pH ≤ 7.9	20	8.7 < pH ≤ 8.8	3.7
6.1 < pH ≤ 6.2	106	7.0 < pH ≤ 7.1	66	7.9 < pH ≤ 8.0	17	8.8 < pH ≤ 8.9	3.1
6.2 < pH ≤ 6.3	104	7.1 < pH ≤ 7.2	59	8.0 < pH ≤ 8.1	14	8.9 < pH ≤ 9.0	2.6
6.3 < pH ≤ 6.4	101	7.2 < pH ≤ 7.3	52	8.1 < pH ≤ 8.2	11	9.0 < pH ≤ 9.1	2.3
6.4 < pH ≤ 6.5	98	7.3 < pH ≤ 7.4	46	8.2 < pH ≤ 8.3	9.4	9.1 < pH ≤ 9.2	2.0
6.5 < pH ≤ 6.6	94	7.4 < pH ≤ 7.5	40	8.3 < pH ≤ 8.4	7.8	9.2 < pH ≤ 9.3	1.7
6.6 < pH ≤ 6.7	89	7.5 < pH ≤ 7.6	34	8.4 < pH ≤ 8.5	6.4	9.3 < pH ≤ 9.4	1.6
6.7 < pH ≤ 6.8	84	7.6 < pH ≤ 7.7	29	8.5 < pH ≤ 8.6	5.3	9.4 < pH ≤ 9.5	1.4
6.8 < pH ≤ 6.9	78	7.7 < pH ≤ 7.8	24	8.6 < pH ≤ 8.7	4.4		

**Copper:** Using effluent data from the current permit term, these effluent concentrations are below the calculated WQBELs for copper, therefore no effluent limits are needed. The removal of the daily maximum and weekly average copper limits will not increase the concentration, level, or loading of copper to the South Fork Eau Claire River. Therefore, antidegradation would not be applicable. To be consistent with antibacksliding requirements, the current limits may be removed in accordance with s. NR 207.12(3)(a), Wis. Adm. Code. To ensure that representative sample results are available at the next permit issuance, monthly copper monitoring is required.

**Mercury-** Requirements for mercury are included in s. NR 106.145 Wis. Adm. Code. No limits or monitoring is required.

**Disinfection/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. However,

because the facility is a 3-cell stabilization pond system that operates as a fill & draw method to store wastewater for approximately six months or 180 days prior to being discharged, disinfection is not required.

**Thermal-** Requirements for Temperature are included in NR 102 Subchapter II Water Quality Standards for Temperature and NR 106 Subchapter V Effluent Limitations for Temperature. Thermal discharges must meet the Public Health criterion of 120 degrees F and the Fish & Aquatic Life criteria which are established to protect aquatic communities from lethal and sub-lethal thermal effects. Because this facility provides hydraulic detention times of approximately 180 days, elevated effluent temperatures are unlikely and discharge temperatures are expected to be similar to ambient conditions. The facility uses a fill and draw method of operation with effluent discharges occurring only during the cool weather periods in spring and fall when ambient temperatures are less than 73 deg. F. Based on the available effluent data no effluent limits are required for temperature.

**Phosphorus-** 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.

The Fairchild Wastewater Treatment Facility, which has previously exceeded the 150 lbs. per month threshold, formerly applied for an alternative effluent limit (AEL) in accordance with s. NR 217.04(2)(a)1, Wis. Adm. Code based on the demonstration that 1.0 mg/L is not practically achievable in April 2023.

The department initially determined that the AEL is justified and recommended a limit of 2.0 mg/L, applied as a monthly average, as stated in the June 28, 2022 Memo referenced above. The additional data submitted by the facility in 2023 verified the initial determination by the department. In addition, the need for a WQBEL for phosphorus was considered and was calculated to be 2.2 mg/L. The technology-based limit of 2.0 mg/L is less than calculated WQBEL of 2.2 mg/L, so only the technology-based limit is required as the final limit in the permit.

**Total Nitrogen Monitoring (NO<sub>2</sub>+NO<sub>3</sub>, TKN and Total N)-** The Department has included effluent monitoring for Total Nitrogen in the permit through the authority under §§ 283.55(1)(e), Wis. Stats., which allows the department to require the permittee to submit information necessary to identify the type and quantity of any pollutants discharged from the point source, and through s. NR 200.065(1)(h), Wis. Adm. Code, which allows for this monitoring to be collected during the permit term. More information on the justification to include total nitrogen monitoring in wastewater permits can be found in the “Guidance for Total Nitrogen Monitoring in Wastewater Permits” dated October 1, 2019. Annual tests are scheduled in the following rotating quarters:

- October – December 2024
- April – June 2025
- October – December 2026
- April – June 2027
- October – December 2028

#### **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 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.

**Whole Effluent Toxicity-** Whole effluent toxicity (WET) testing requirements and limits (if applicable) are determined in accordance with ss. NR 106.08 and NR 106.09 Wis. Adm. Code, as revised August 2016. (See the current version of the

Whole Effluent Toxicity Program Guidance Document and checklist and WET information, guidance and test methods at <http://dnr.wi.gov/topic/wastewater/wet.html>). Using this guidance, no WET tests are required.

### 3 Land Application – Monitoring and Limitations

#### Sample Point Number: 003- Lagoon sludge requirements

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)
003	B	Liquid	Unknown	Unknown	Unknown	Unknown
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? Yes						
Is a priority pollutant scan required? No						

#### Sample Point Number: 003- LAGOON SLUDGE

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	

<b>Monitoring Requirements and Limitations</b>					
<b>Parameter</b>	<b>Limit Type</b>	<b>Limit and Units</b>	<b>Sample Frequency</b>	<b>Sample Type</b>	<b>Notes</b>
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	
Radium Dry Wt		pCi/g	Once	Composite	
Nitrogen, Total Kjeldahl		Percent	Per Application	Composite	Prior to land application
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total		Percent	Per Application	Composite	Prior to land application
Phosphorus, Total		Percent	Per Application	Composite	Prior to land application
Phosphorus, Water Extractable		% of Tot P	Per Application	Composite	Prior to land application
Potassium, Total Recoverable		Percent	Per Application	Composite	Prior to land application
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.

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

List 2 Nutrient monitoring – Monitoring for list 2 (nutrients) is highly recommended at the same time as the monitoring of List 1 (metals) in year 2 of the permit. Results will assist in the determination of the acres needed for land application of sludge should it be necessary. The number of acres needed is also required for the Land Treatment Management Schedule (see schedules for more information).

Change in form submittal – In prior permit reissuances when it has been noted in the application that sludge would not be removed during the permit term, the department required sampling during the second year of the permit term and the sludge characteristic report (3400-049) would be generated only during that year. Due to moving to electronic submittal of forms via Switchboard, forms 3400-049 (“Characteristics Report”), 3400-052 (“Other Methods of Disposal”) and 3400-055 (“Annual Land Application”) will now be generated by the department and the permittee will be required to submit all three reports each year of the permit term. This change was adopted to provide the permittee flexibility because many lagoon desludging projects can be unexpected, are delayed or staggered over multiple years. Additionally, it is used to officially report that no land application of sludge has occurred, and annual submittal of the forms is required per the standard requirements section.



PFAS sludge sampling has been included pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9., Wis. Adm. Code to quantitate risk.

Since PCB sampling occurred last permit term, no PCB sampling is required this permit term. For facilities discharging less than 0.25 MGD, PCB monitoring is recommended once every other permit term.

## 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). 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).)

**PCB** - Since no PCB sampling occurred last permit term, addition of PCB sampling this permit term. For facilities discharging less than 0.25 MGD, PCB monitoring is recommended once every other permit term.

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

**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

### Explanation of Schedules

#### 4.1 Sludge Management Plan

Required Action	Due Date
<p><b>Submit a Sludge Management Plan:</b> The permittee shall submit a 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</p> <p>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.</p> <p>The plan is due at least 60 days prior to desludging.</p>	

**Explanation of Sludge Management Plan 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 that clearly explains how the sludge will be safely removed, what contingencies are in place, the type of equipment that will be used and how the sludge will be land applied to ensure the proper precautions are in place to prevent any negative impacts to surface water or groundwater.

**Other Comments:**

None

**Attachments:**

WQBEL: December 21, 2023 memo from Ben Hartenbower to Angela Parkhurst titled “Water Quality-Based Effluent Limitations for the Fairchild Wastewater Treatment Facility WPDES Permit No. WI-0036200”,

WQBEL for Phosphorus Alternative Effluent Limit: June 28, 2022 memo from Ben Hartenbower to Angela Parkhurst titled “Phosphorus Water Quality-Based Effluent Limitations for the Fairchild Wastewater Treatment Facility WPDES Permit No. WI-0036200”.

Public Notice paper: Tri County News 123 West Main Street Mondovi, WI 54755

**Expiration Date:**

**June 30, 2029**

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

None

**Prepared By: Angela Parkhurst      Wastewater Specialist      Date: April 15, 2024**

**Notice of Permit Reissuance will be published in the Tri County News 123 West Main Street Mondovi, WI 54755.**

DATE: June 28, 2022

TO: Angela Parkhurst – WCR/Eau Claire

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Phosphorus Water Quality-Based Effluent Limitations for the Fairchild Wastewater Treatment Facility -WPDES Permit No. (WI-0036200)

This is in response to your request for an evaluation of the need for updated total phosphorus limitations for the Fairchild Wastewater Treatment Facility. The wastewater treatment facility (WWTF) discharges seasonally with a spring daily maximum limit of 0.92 MGD in April and May and with a fall daily maximum limit of 0.60 MGD in October and November.

The current permit, effective since 2019, has a phosphorus limit of 2.0 mg/L and a compliance schedule to meet 1.0 mg/L by September 2024. The following review is based on updated discharge operations at the facility. Recommendations are made in accordance with chapters NR 102, 104, 105, 106, 207, 212, and 217 of the Wisconsin Administrative Code, where applicable.

#### **Effluent Information**

- Design Flow Rate(s):
  - Annual average (Influent) = 0.100 MGD (Million Gallons per Day)
  - Peak Annual Average (Effluent) = 0.119 MGD
  - Daily Maximum Limit (Spring) = 0.92 MGD
  - Daily Maximum Limit (Fall) = 0.60 MGD
- Effluent characterization: This facility is categorized as a minor municipality
- Monitoring data: Data submitted by the facility to the department from October 2019 to May 2022 was used in this evaluation

#### **Technology Based Phosphorus Limit**

Previous data has demonstrated that the annual monthly average phosphorus loading was 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, a technology-based limit was recommended. The Village of Fairchild has requested an Alternative Effluent Limit (AEL) of 2.0 mg/L in accordance with s. NR 217.04(2)(a)1, Wis. Adm. Code. After review of the information submitted on behalf of the Village of Fairchild, an approved AEL of 2.0 mg/L, equal to the current phosphorus limit may remain in the permit subject to applicable WQBELs.

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

Revisions to administrative rules regulating phosphorus took effect on December 1, 2010. These rule revisions include additions to ch. NR 102 (s. NR 102.06), which establish phosphorus standards for surface waters. Revisions to ch. NR 217 (s. NR 217, Subchapter III) establish procedures for determining WQBELs for phosphorus, based on the applicable standards in ch. NR 102.

Section NR 102.06(3)(a) 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), 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 the South Fork of the Eau Claire River.

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

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

Where:

WQC = 0.075 mg/L for the South Fork of the Eau Claire River.

Qs = 100% of the 7-Q<sub>2</sub> of 18 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 (maximum 365-day average) = 0.119 MGD = 0.183 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 equal the median of at least four samples collected during the months of May through October, and that all samples collected during a 28-day period shall be considered as a single sample and the average of these concentrations used to determine a median. Averaging begins at date of the first sample in the range of May through October.

A review of all available in stream total phosphorus data stored in the Surface Water Integrated Monitoring System database indicates the median background total phosphorus concentration in the South Fork of the Eau Claire River at (SWIMS station ID #183077) is 0.053 mg/L, just upstream from the point of discharge to the South Fork of the Eau Claire River.

SWIMS ID	183077
Station Name	Monitoring station at South Fork Eau Claire River
Waterbody	Eau Claire River
Sample Count	6
First Sample	10/15/2008
Last Sample	09/09/2009
Mean	0.054 mg/L
Median	0.053 mg/L
NR 217 Median	0.053 mg/L

Substituting a median value of 0.053 mg/L into the equation, the limit is 2.2 mg/L.

### Effluent Data

The following table summarizes effluent total phosphorus monitoring data from October 2019 to May 2022.

	Phosphorus mg/L
1-day P <sub>99</sub>	1.90
4-day P <sub>99</sub>	1.61
30-day P <sub>99</sub>	1.45
Mean	1.36
Std	0.21
Sample size	37
Range	1.03 – 1.93

**Reasonable Potential Determination**

Since the 30-day P<sub>99</sub> of reported effluent total phosphorus data is less than the calculated WQBEL, the discharge does not have reasonable potential to cause or contribute to an exceedance of the water quality criterion. Therefore, **a WQBEL is not required.**

**Conclusions:**

In summary, the following limit is recommended by this evaluation:

- Monthly average Total Phosphorus concentration limit of 2.0 mg/L

If there are any questions or comments, please contact Benjamin Hartenbower at (715) 225-4705 or Benjamin.Hartenbower@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

PREPARED BY: \_\_\_\_\_ Date: \_\_\_\_\_  
Benjamin Hartenbower, PE,  
Water Resources Engineer

E-cc: Geisa Thielen, Regional Wastewater Supervisor – WCR/Eau Claire  
Diane Figiel, Water Resources Engineer – WY/3

# CORRESPONDENCE/MEMORANDUM

DATE: February 23, 2024

TO: Angela Parkhurst– WCR/Eau Claire

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Water Quality-Based Effluent Limitations for the Fairchild Wastewater Treatment Facility  
WPDES Permit No. WI-0036200

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 Fairchild Wastewater Treatment Facility in Eau Claire County. This municipal wastewater treatment facility (WWTF) discharges to the South Fork of the Eau Claire River, located in the South Fork Eau Claire River Watershed in the Lower Chippewa 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 002:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate October – November December – March April – May June – September	0.6 MGD 0 MGD 0.92 MGD 0 MGD				1
BOD <sub>5</sub>			45 mg/L	30 mg/L	1
TSS			45 mg/L	30 mg/L	1
pH	9.5 s.u.	6.0 s.u.			1
Ammonia Nitrogen	Variable				3,4
Copper					2
Hardness					5
Phosphorus				2.0 mg/L	6
TKN, Nitrate+Nitrite, and Total Nitrogen					7

Footnotes:

1. No changes from the current permit.
2. Monitoring only.

3. The variable daily maximum ammonia nitrogen limit table corresponding to effluent pH values. 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	Effluent pH s.u.	Limit mg/L
6.0 < pH ≤ 6.1	108	6.9 < pH ≤ 7.0	72	7.8 < pH ≤ 7.9	20	8.7 < pH ≤ 8.8	3.7
6.1 < pH ≤ 6.2	106	7.0 < pH ≤ 7.1	66	7.9 < pH ≤ 8.0	17	8.8 < pH ≤ 8.9	3.1
6.2 < pH ≤ 6.3	104	7.1 < pH ≤ 7.2	59	8.0 < pH ≤ 8.1	14	8.9 < pH ≤ 9.0	2.6
6.3 < pH ≤ 6.4	101	7.2 < pH ≤ 7.3	52	8.1 < pH ≤ 8.2	11	9.0 < pH ≤ 9.1	2.3
6.4 < pH ≤ 6.5	98	7.3 < pH ≤ 7.4	46	8.2 < pH ≤ 8.3	9.4	9.1 < pH ≤ 9.2	2.0
6.5 < pH ≤ 6.6	94	7.4 < pH ≤ 7.5	40	8.3 < pH ≤ 8.4	7.8	9.2 < pH ≤ 9.3	1.7
6.6 < pH ≤ 6.7	89	7.5 < pH ≤ 7.6	34	8.4 < pH ≤ 8.5	6.4	9.3 < pH ≤ 9.4	1.6
6.7 < pH ≤ 6.8	84	7.6 < pH ≤ 7.7	29	8.5 < pH ≤ 8.6	5.3	9.4 < pH ≤ 9.5	1.4
6.8 < pH ≤ 6.9	78	7.7 < pH ≤ 7.8	24	8.6 < pH ≤ 8.7	4.4		

4. 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.
5. Hardness monitoring is recommended because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.
6. The monthly average phosphorus limit is an alternative effluent limitation to the technology-based limit for phosphorus, established in accordance with s. NR 217.04(2), Wis. Adm. Code.
7. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate (NO<sub>3</sub>), nitrite (NO<sub>2</sub>), and total kjeldahl nitrogen (TKN) (all expressed as N).

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Benjamin Hartenbower at (715) 225-4705 or Benjamin.Hartenbower@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (3) – Narrative, Thermal Table, & Map

PREPARED BY:



Benjamin Hartenbower, PE,  
Water Resources Engineer

Date: 02/23/2024

E-cc:

Adebowale Adesanwo, Wastewater Engineer – WCR/Eau Claire  
Geisa Thielen, Regional Wastewater Supervisor – WCR/Eau Claire  
Diane Figiel, Water Resources Engineer – WY/3  
Chris Willger, Water Quality Biologist – WCR/Eau Claire  
Nate Willis, Wastewater Engineer – WY/3

Attachment #1  
**Water Quality-Based Effluent Limitations for  
the Fairchild Wastewater Treatment Facility  
WPDES Permit No. WI-0036200**

Prepared by: Benjamin P. Hartenbower

**PART 1 – BACKGROUND INFORMATION**

**Facility Description:**

The Fairchild Wastewater Treatment Facility serves approximately 564 people. Wastewater is collected at the main lift station and pumped approximately 8 miles north of the village for treatment in a 3-cell stabilization pond system. There are two additional lift stations along the main. The pond system is operated on a “fill & draw” method. Discharge is typically over four months of the year, in spring and fall. The treated wastewater is discharged to the South Fork of the Eau Claire River.

Disinfection of the effluent is not required based on the conditions of s. NR 210.06(3), Wis. Adm. Code. It should be noted that this may be re-evaluated in the future to ensure the conditions are being met. This re-evaluation could result in requiring disinfection of the effluent at that time.

Attachment #3 is a map of the area showing the approximate location of Outfall 002.

**Existing Permit Limitations**

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
October – November	0.6 MGD				
December – March	0 MGD				
April – May	0.92 MGD				
June – September	0 MGD				
BOD <sub>5</sub>			45 mg/L	30 mg/L	1
TSS			45 mg/L	30 mg/L	1
pH	9.5 s.u.	6.0 s.u.			1
Ammonia Nitrogen	Variable				2
Copper					
October – November	17 µg/L, 0.084 lbs/day		9 µg/L, 0.045 lbs/day		
April	17 µg/L, 0.130 lbs/day				
May	17 µg/L, 0.130 lbs/day		12 µg/L, 0.092 lbs/day		
Hardness					3
Phosphorus				2.0 mg/L	4
TKN, Nitrate+Nitrite, and Total Nitrogen					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.



Attachment #1

2. The variable daily maximum ammonia nitrogen limit table corresponding to effluent pH values. 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	Effluent pH s.u.	Limit mg/L
6.0 < pH ≤ 6.1	108	6.9 < pH ≤ 7.0	72	7.8 < pH ≤ 7.9	20	8.7 < pH ≤ 8.8	3.7
6.1 < pH ≤ 6.2	106	7.0 < pH ≤ 7.1	66	7.9 < pH ≤ 8.0	17	8.8 < pH ≤ 8.9	3.1
6.2 < pH ≤ 6.3	104	7.1 < pH ≤ 7.2	59	8.0 < pH ≤ 8.1	14	8.9 < pH ≤ 9.0	2.6
6.3 < pH ≤ 6.4	101	7.2 < pH ≤ 7.3	52	8.1 < pH ≤ 8.2	11	9.0 < pH ≤ 9.1	2.3
6.4 < pH ≤ 6.5	98	7.3 < pH ≤ 7.4	46	8.2 < pH ≤ 8.3	9.4	9.1 < pH ≤ 9.2	2.0
6.5 < pH ≤ 6.6	94	7.4 < pH ≤ 7.5	40	8.3 < pH ≤ 8.4	7.8	9.2 < pH ≤ 9.3	1.7
6.6 < pH ≤ 6.7	89	7.5 < pH ≤ 7.6	34	8.4 < pH ≤ 8.5	6.4	9.3 < pH ≤ 9.4	1.6
6.7 < pH ≤ 6.8	84	7.6 < pH ≤ 7.7	29	8.5 < pH ≤ 8.6	5.3	9.4 < pH ≤ 9.5	1.4
6.8 < pH ≤ 6.9	78	7.7 < pH ≤ 7.8	24	8.6 < pH ≤ 8.7	4.4		

3. Monitoring only.  
 4. A compliance schedule is in the current permit to meet a phosphorus limit of 1.0 mg/L by September 1, 2024.

**Receiving Water Information**

- Name: The South Fork of the Eau Claire River
- Waterbody Identification Code (WBIC): 2137000
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply.

Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: the South Fork of the Eau Claire River

7-Q<sub>10</sub> = 8 cfs (cubic feet per second)

7-Q<sub>2</sub> = 18 cfs

Harmonic Mean Flow = 29 cfs

	Apr	May	Oct	Nov
<b>7-Q<sub>10</sub> (cfs)</b>	41	18.5	8	9.6
<b>7-Q<sub>2</sub> (cfs)</b>	91	41	18	21

- Hardness = 30 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of 5 samples collected in the South Fork Eau Claire River from 11/11/1992 to 12/08/1993.
- % 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: Chloride data is from the South Fork Eau Claire River. Metals data from the Black River at Hemlock is used for this evaluation because there is no data available for the South Fork of the Eau Claire River and the the Black River 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: None

**Effluent Information:**

- Design Flow Rates(s):  
 Annual average = 0.100 MGD (Million Gallons per Day)  
 Daily Maximum Limit (Spring) = 0.92 MGD (Million Gallons per Day)  
 Daily Maximum Limit (Fall) = 0.60 MGD  
 Maximum 365 day Average = 0.119 MGD  
 For reference, the actual average flow from October 2019 to November 2023 during discharge occurrences was 0.575 MGD.
- Hardness = 49 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of 16 effluent samples collected from 10/09/2019 to 11/15/2023.
- 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
- 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 Chloride. The permit-required monitoring for Ammonia, Copper, Hardness, and Phosphorus from April 2018 to November 2023 is used in this evaluation.

**Chemical Specific Effluent Data at Outfall 002**

	Copper µg/L
1-day P <sub>99</sub>	N/A
4-day P <sub>99</sub>	N/A
30-day P <sub>99</sub>	N/A
Mean	<3
Std	1
Sample size	34
Range	<3 - 5

“<” 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.

**Chemical Specific Effluent Data at Outfall 002**

Sample Date	Chloride mg/L
11/13/2023	42.9
11/16/2023	43.0
11/20/2023	41.5
11/27/2023	48.6
mean	44.0

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.”.

Attachment #1

The following table presents the average concentrations and loadings at Outfall 002 from October 2019 to November 2023 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6):

<b>Parameter Averages with Limits</b>		
	Average Measurement	Average Mass Discharged
BOD <sub>5</sub>	6 mg/L*	
TSS	10 mg/L*	
pH	8.86 s.u.	
Ammonia Nitrogen	0.5 mg/L*	
Copper	1.87 ug/L*	0.0031 lbs/day
Phosphorus	1.49 mg/L	

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

**PART 2 – WATER QUALITY-BASED Effluent Limitations for Toxic Substances – EXCEPT AMMONIA NITROGEN**

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

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

**Acute Limits based on 1-Q<sub>10</sub>**

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

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

Where:

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

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

Q<sub>e</sub> = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

Attachment #1

f = Fraction of the effluent flow that is withdrawn from the receiving water, and  
 Cs = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e), Wis. Adm. Code.

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q<sub>10</sub> method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for the Village of Fairchild 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 = 6.40 cfs, (1-Q<sub>10</sub> (estimated as 80% of 7-Q<sub>10</sub>)), as specified in s. NR 106.06 (3) (bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD. mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P <sub>99</sub>	1-day MAX. CONC.
Arsenic		339.8		679.6	135.92	<0.77		
Cadmium	49	4.56	0.009	9.12	1.824	<0.084		
Chromium (+3)	49	1006.55	0.622	2013.1	402.6	<0.70		
Copper	49	7.93	1.265	15.9	3.2	<3		
Lead	49	53.75	0.178	107.5	21.5	<1.08		
Nickel	49	256.93		513.86	102.77	<0.90		
Zinc	49	64.6	1.710	129.2	25.8	<26		
Chloride		757	4.300	1514	303	44		49

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

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

RECEIVING WATER FLOW = 2.00 cfs (¼ of the 7-Q<sub>10</sub>), as specified in s. NR 106.06 (4) (c), Wis. Adm. Code

SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P <sub>99</sub>
Arsenic		152.2		366	73.2	<0.77	
Cadmium	30	0.95	0.009	2.3	0.5	<0.084	
Chromium (+3)	30	49.07	0.622	117.1	23.4	<0.70	
Copper	30	3.68	1.265	7.1	1.4	<3	
Lead	30	8.71	0.178	20.7	4.1	<1.08	
Nickel	30	18.76		45.1	9	<0.90	
Zinc	30	41.81	1.710	98.2	19.6	<26	
Chloride		395	4.300	944	189	44	

**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 = 7.25 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	0.009	2254	451	<0.084
Chromium (+3)	3818000	0.622	23263548	4652710	<0.70
Lead	140	0.178	852.1	170.4	<1.08
Nickel	43000		262004	52401	<0.90

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

RECEIVING WATER FLOW = 7.25 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		81.04	16.21	<0.77

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, limits are not required for toxic substances.

Copper – Considering available effluent data from the current permit term (October 2019 to November 2023), only 4 out of the 34 sample results were greater than the detection limit of 3 µg/L with a maximum value of 5 µg/L.

These effluent concentrations are below the calculated WQBELs for copper, therefore no effluent limits are needed. The removal of the daily maximum and weekly average copper limits will not increase the concentration, level, or loading of copper to the South Fork Eau Claire River. Therefore, antidegradation would not be applicable. To be consistent with antibacksliding requirements, the current limits may be removed in accordance with s. NR 207.12(3)(a), Wis. Adm. Code. To ensure that representative sample results are available at the next permit issuance, **copper and hardness monitoring are recommended to continue.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98, Wis. Adm. Code. Monitoring of the water supply produced a PFOS result of 0.39 ng/L and a PFOA result of 1.3 ng/L. These results are less than one fifth of the respective criteria for each substance. Based on the annual design flow and lack of nondomestic contributions, it is unlikely that the effluent will contain PFOS or PFOA. **Therefore, monitoring is not recommended.** If information becomes available that indicates PFOS or PFOA may be present in the effluent, the monitoring requirements may change.

Mercury – The permit application did not require monitoring for mercury because the Fairchild 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). 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 2020 was 0.10 mg/kg. **Therefore, no mercury monitoring is recommended at Outfall 002.**

### **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:

- 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 67 sample results were reported from October 2019 to November 2023. The maximum reported value was 9.50 s.u. (Standard pH Units). The 1-day P<sub>99</sub>, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 10.01 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 9.96 s.u. Therefore, a value of 9.50 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 9.50 s.u. into the equation above yields an ATC = 0.70 mg/L.

**Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method**

In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are calculated using the 1-Q<sub>10</sub> receiving water low flow if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits shall apply.

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-Q<sub>10</sub> (estimated as 80 % of 7-Q<sub>10</sub>) and the 2×ATC approach are shown below.

**Daily Maximum Ammonia Nitrogen Determination**

	Ammonia Nitrogen Limit mg/L
2×ATC	1.40
1-Q <sub>10</sub>	5.00

The 2×ATC method yields the most stringent limits for the Fairchild 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 – WWSF/WWFF**

Effluent pH s.u.	Limit mg/L	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	6.9 < pH ≤ 7.0	72	7.8 < pH ≤ 7.9	20	8.7 < pH ≤ 8.8	3.7
6.1 < pH ≤ 6.2	106	7.0 < pH ≤ 7.1	66	7.9 < pH ≤ 8.0	17	8.8 < pH ≤ 8.9	3.1
6.2 < pH ≤ 6.3	104	7.1 < pH ≤ 7.2	59	8.0 < pH ≤ 8.1	14	8.9 < pH ≤ 9.0	2.6
6.3 < pH ≤ 6.4	101	7.2 < pH ≤ 7.3	52	8.1 < pH ≤ 8.2	11	9.0 < pH ≤ 9.1	2.3
6.4 < pH ≤ 6.5	98	7.3 < pH ≤ 7.4	46	8.2 < pH ≤ 8.3	9.4	9.1 < pH ≤ 9.2	2.0
6.5 < pH ≤ 6.6	94	7.4 < pH ≤ 7.5	40	8.3 < pH ≤ 8.4	7.8	9.2 < pH ≤ 9.3	1.7
6.6 < pH ≤ 6.7	89	7.5 < pH ≤ 7.6	34	8.4 < pH ≤ 8.5	6.4	9.3 < pH ≤ 9.4	1.6
6.7 < pH ≤ 6.8	84	7.6 < pH ≤ 7.7	29	8.5 < pH ≤ 8.6	5.3	9.4 < pH ≤ 9.5	1.4
6.8 < pH ≤ 6.9	78	7.7 < pH ≤ 7.8	24	8.6 < pH ≤ 8.7	4.4		

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

The ammonia limit calculation also warrants evaluation of weekly and monthly average limits based on chronic toxicity criteria for ammonia, since those limits relate to the assimilative capacity of the receiving water.

Weekly average and monthly average limits for ammonia nitrogen are based on chronic toxicity criteria in ch. NR 105, Wis. Adm. Code.

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as Warm Water Sport Fish Community is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

$$CTC = E \times \{ [0.0676 \div (1 + 10^{(7.688 - pH)})] + [2.912 \div (1 + 10^{(pH - 7.688)})] \} \times C$$

Where:

pH = the pH (s.u.) of the receiving water,

E = 0.854,

C = the minimum of 2.85 or  $1.45 \times 10^{(0.028 \times (25 - T))}$  – (Early Life Stages Present), or

C =  $1.45 \times 10^{(0.028 \times (25 - T))}$  – (Early Life Stages Absent), and

T = the temperature (°C) of the receiving water – (Early Life Stages Present), or

T = the maximum of the actual temperature (°C) and 7 – (Early Life Stages Absent)

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q<sub>10</sub> (4-Q<sub>3</sub>, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q<sub>5</sub> (estimated as 85% of the 7-Q<sub>2</sub> if the 30-Q<sub>5</sub> is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 °C, 25% of the flow is used if the Temperature < 11 °C, and 50% of the flow is used if the Temperature ≥ 11 °C but < 16 °C.

Section NR 106.32 (3), Wis. Adm. Code, provides 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 South Fork of the Eau Claire River. So “ELS Absent” criteria apply from October through March, and “ELS Present” criteria will apply from April through September for a WWSF classification.

The “default” basin assumed values are used for temperature and background ammonia concentrations, because minimum ambient data is available. The values for pH are based on data collected from the South Fork Eau Claire River. These values are shown in the table below, with the resulting criteria and effluent limitations.



**Weekly and Monthly Ammonia Nitrogen Limits – WWSF**

		April	May	October	November
<b>Effluent Flow</b>	Qe (MGD)	0.92	0.92	0.60	0.60
<b>Background Information</b>	7-Q <sub>10</sub> (cfs)	41	18.5	8.0	9.6
	7-Q <sub>2</sub> (cfs)	91	41	18	21
	Ammonia (mg/L)	0.07	0.07	0.06	0.06
	Temperature (°C)	8.89	14.44	10.00	4.44
	pH (s.u.)	6.81	6.46	7.49	7.32
	% of Flow used	25	50	25	25
	Reference Weekly Flow (cfs)	10.25	9.25	2.0	2.4
	Reference Monthly Flow (cfs)	19.3375	17.425	3.825	4.4625
<b>Criteria mg/L</b>	4-day Chronic				
	Early Life Stages Present	15.69	16.76	10.96	12.57
	Early Life Stages Absent	22.56	16.84	14.67	20.41
	30-day Chronic				
	Early Life Stages Present	6.28	6.70	4.38	5.03
	Early Life Stages Absent	9.03	6.73	5.87	8.16
<b>Effluent Limitations mg/L</b>	Weekly Average				
	Early Life Stages Present	128	125		
	Early Life Stages Absent			46	73
	Monthly Average				
	Early Life Stages Present	91	88		
	Early Life Stages Absent			30	47

**Effluent Data**

The following table evaluates the statistics based upon ammonia data reported from October 2019 to November 2023, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Fairchild Wastewater Treatment Facility permit for the respective month ranges.

**Ammonia Nitrogen Effluent Data**

Ammonia Nitrogen mg/L	April-May	October-November
1-day P <sub>99</sub>	6.20	1.50
4-day P <sub>99</sub>	3.40	0.90
30-day P <sub>99</sub>	1.50	0.50
Mean*	0.80	0.40
Std	1.50	0.30
Sample size	16	28
Range	<0.1 - 4.9	<0.1 - 1.3

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

Based on this comparison, daily limits are required.

**Conclusions and Recommendations**

In summary, the variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values is recommended to continue as the daily maximum. These limits apply year-round.

Attachment #1  
**PART 4 – 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.

The Fairchild Wastewater Treatment Facility, which has previously exceeded the 150 lbs. per month threshold applied for an alternative effluent limit (AEL) in accordance with s. NR 217.04(2)(a)1, Wis. Adm. Code based on the demonstration that 1.0 mg/L is not practically achievable.

The department has determined that the AEL is justified and recommended a limit of 2.0 mg/L, applied as a monthly average, as stated in the June 28, 2022 Memo. **Therefore, a TBEL of 2.0 mg/L is recommended.**

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 the South Fork of the Eau Claire River.

The conservation of mass equation is described in s. NR 217.13(2)(a), Wis. Adm. Code, for phosphorus WQBELs and includes variables of water quality criterion (WQC), receiving water flow rate ( $Q_s$ ), effluent flow rate ( $Q_e$ ), and upstream phosphorus concentrations ( $C_s$ ) provided below.

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

Where:

WQC = 0.075 mg/L for the South Fork of the Eau Claire River.

$Q_s$  = 100% of the 7- $Q_2$  of 18 cfs

$C_s$  = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code

$Q_e$  = effluent flow rate = 0.119 MGD = 0.183 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 using the procedures specified in s. NR 102.07(1)(b) to (c), Wis. Adm. Code. The median shall be calculated with at least one year of data using samples collected once per month during the period of May through October. 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.

Attachment #1

The following data were considered in estimating the background phosphorus concentration:

SWIMS ID	183077
Station Name	Monitoring station at
Waterbody	South Fork Eau Claire River
Sample Count	6
First Sample	10/15/2008
Last Sample	09/09/2009
Mean	0.054 mg/L
Median	0.053 mg/L

Substituting a median value of 0.053 mg/L into the limit calculation equation above, the calculated limit is 2.2 mg/L.

**Effluent Data**

The following table summarizes effluent total phosphorus monitoring data from October 2019 to November 2023.

	<b>Phosphorus mg/L</b>
1-day P <sub>99</sub>	2.60
4-day P <sub>99</sub>	1.99
30-day P <sub>99</sub>	1.66
Mean	1.49
Std	0.38
Sample size	44
Range	1.03 - 2.62

**Reasonable Potential Determination**

The technology-based limit of 2.0 mg/L is less than calculated WQBEL of 2.2 mg/L, so the technology-based limit should be retained as the final limit.

**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.

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from October 2019 to November 2023.

**Monthly Temperature Effluent Data & Limits**

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
JAN				
FEB				
MAR				
APR			107	120
MAY			90	120
JUN				
JUL				
AUG				
SEP				
OCT			85	120
NOV			73	120
DEC				

Because this facility provides hydraulic detention times of approximately 180 days, elevated effluent temperatures are unlikely and discharge temperatures are expected to be similar to ambient conditions. The facility uses a fill and draw method of operation with effluent discharges occurring only during the cool weather periods in spring and fall when ambient temperatures are less than 73 deg. F. Based on the available effluent data no effluent limits are recommended for temperature. The complete thermal table used for calculation is attached.

**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)*.

Guidance in Chapter 1.11 of the WET Guidance Document (WET Testing of Minor Municipal Discharges) was consulted. This is a minor municipal discharge (< 1.0 MGD) comprised solely of domestic wastewater, with no history of WET failures and no toxic compounds detected at levels of concern. No WET testing is recommended at this time because of the low risk in effluent toxicity.

**Temperature limits for receiving waters with unidirectional flow**

(calculation using default ambient temperature data)

<b>Facility:</b>	Fairchild WWTF	<b>7-Q<sub>10</sub>:</b>	8.00	cfs	<b>Temp Dates</b>		<b>Flow Dates</b>	
<b>Outfall(s):</b>	002	<b>Dilution:</b>	25%		<b>Start:</b>	N/A	10/08/19	
<b>Date Prepared:</b>	02/07/2024	<b>f:</b>	0		<b>End:</b>	N/A	11/30/23	
<b>Design Flow (Q<sub>e</sub>):</b>	0.60 MGD	<b>Stream type:</b>	Small warm water sport or forage fish community					
<b>Storm Sewer Dist.</b>	0 ft	<b>Q<sub>s</sub>:Q<sub>e</sub> ratio:</b>	2.2	:1				
		<b>Calculation Needed?</b>	YES					

Month	Water Quality Criteria			Receiving Water Flow Rate (Q <sub>s</sub> ) (cfs)	Representative Highest Effluent Flow Rate (Q <sub>e</sub> )		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	T <sub>a</sub> (default) (°F)	Sub-Lethal WQC (°F)	Acute WQC (°F)		7-day Rolling Average (Q <sub>esl</sub> ) (MGD)	Daily Maximum Flow Rate (Q <sub>ea</sub> ) (MGD)		Weekly Average (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	33	49	76	2.00			0				
FEB	34	50	76	2.00			0				
MAR	38	52	77	2.00			0				
APR	48	55	79	10.25	0.886	0.899	0			107	120
MAY	58	65	82	4.63	0.831	0.895	0			90	120
JUN	66	76	84	2.00			0				
JUL	69	81	85	2.00			0				
AUG	67	81	84	2.00			0				
SEP	60	73	82	2.00			0				
OCT	50	61	80	2.00	0.581	0.598	0			85	120
NOV	40	49	77	2.40	0.582	0.599	0			73	120
DEC	35	49	76	2.00			0				

