CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: August 21, 2024

TO: Holly Heldstab – WCR/Eau Claire

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Water Quality-Based Effluent Limitations for the Whitehall Wastewater Treatment Facility WPDES Permit No. WI-0030970

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 Whitehall Wastewater Treatment Facility in Trempealeau County. This municipal wastewater treatment facility (WWTF) discharges to the Trempealeau River, located in the Pigeon Creek Watershed in the Buffalo - Trempealeau 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						1,2
BOD_5			45 mg/L	30 mg/L		1
TSS				60 mg/L		1,3
pH	9.0 s.u.	6.0 s.u.				1
Ammonia Nitrogen	Variable		**34 mg/L**	**34 mg/L**		4,5
E.Coli				126 #/100 mL geometric mean		6
Copper	34 µg/L, 0.74 lbs/day		**34 µg/L**	**34 µg/L**		4,7
Zinc						2,8
Hardness						9
PFOS and PFOA						10
Phosphorus LCA Interim Limit HAC Interim Limit Final WQBEL				 0.8 mg/L 0.6 mg/L 0.225 mg/L	 0.075 mg/L	11
TKN, Nitrate+Nitrite, and Total Nitrogen						12
Acute WET						13
Chronic WET						13,14

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. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.

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5. 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
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

6. Bacteria limits apply during the disinfection season of May - September. Additional limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
7. Dissolved based copper limits: If the dissolved based limits are not requested in accordance with the procedures in s. NR 106.06(7)(b), Wis. Adm. Code, the daily maximum, weekly, and monthly average copper limits would be 17 µg/L along with a daily maximum mass limit of 0.37 lbs/day.
8. If the dissolved based effluent limit calculations are requested in accordance with the procedures in s. NR 106.06(7)(b), Wis. Adm. Code, monitoring conditions in s. NR 106.06(7)(c), Wis. Adm. Code may be included in lieu of zinc limits.
9. Hardness monitoring is recommended because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.
10. Monitoring once every two months is required in accordance with s. NR 106.98(2), Wis. Adm. Code.
11. Under the phosphorus MDV, a level currently achievable (LCA) interim limit of 0.8 mg/L should be effective upon permit reissuance. A compliance schedule may be included in the permit until the highest attainable condition (HAC) limit of 0.6 mg/L can be met. The final WQBELs remain at 0.225 mg/L as a monthly average and 0.075 mg/L as a six-month average.
12. 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).
13. Three acute and chronic WET tests are recommended in the reissued permit. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).
14. The Instream Waste Concentration (IWC) to assess chronic test results is 10%. According to the State of Wisconsin Aquatic Life Toxicity Testing Methods Manual (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 30%, 10%, 3% & 1% and the dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the Trempealeau River.

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 (4) – Narrative, Dissolved-Based Metal Limit Evaluation, Thermal Table, & Map

PREPARED BY: _____ Date: 08/21/2024

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E-cc:

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Attachment #1

Water Quality-Based Effluent Limitations for the Whitehall Wastewater Treatment Facility WPDES Permit No. WI-0030970

Prepared by: Benjamin P. Hartenbower

PART 1 – BACKGROUND INFORMATION

Facility Description:
The Whitehall Wastewater Treatment Facility consists of six aerated lagoons on approximately 25 acres that run in series and discharges into the Trempealeau River. Outfall 001 is located on the east bank of the Trempealeau River about a mile downstream of the Wade Rd. Bridge.

Attachment #4 is a map of the area showing the approximate location of Outfall 001.

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	Six-Month Average	Footnotes
Flow Rate						1,2
BOD_5			45 mg/L	30 mg/L		1
TSS				60 mg/L		1
pH	9.0 s.u.	6.0 s.u.				1
Ammonia Nitrogen	Variable		**34 mg/L**	**34 mg/L**		3,4
Fecal Coliform May - September			**656 #/100 mL geometric mean**	400 #/100 mL geometric mean		4
Copper	46 µg/L, 0.58 lbs/day		**46 µg/L**	**46 µg/L**		4
Hardness						2
Phosphorus Interim MDV Interim Final WQBEL				 1.00 mg/L 0.80 mg/L 0.225 mg/L	 0.075 mg/L, 0.75 lbs/day	5
TKN, Nitrate+Nitrite, and Total Nitrogen						2
Acute WET						6
Chronic WET						7

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. 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
7.4 < pH ≤ 7.5	>34	8.2 < pH ≤ 8.3	9.4
7.5 < pH ≤ 7.6	34	8.3 < pH ≤ 8.4	7.8
7.6 < pH ≤ 7.7	29	8.4 < pH ≤ 8.5	6.4
7.7 < pH ≤ 7.8	24	8.5 < pH ≤ 8.6	5.3
7.8 < pH ≤ 7.9	20	8.6 < pH ≤ 8.7	4.4
7.9 < pH ≤ 8.0	17	8.7 < pH ≤ 8.8	3.7
8.0 < pH ≤ 8.1	14	8.8 < pH ≤ 8.9	3.1
8.1 < pH ≤ 8.2	11	8.9 < pH ≤ 9.0	2.6

4. Additional limits to comply with the expression of limits requirements are included in bold.
3. A compliance schedule is in the current permit to meet the MDV Interim limit by August 31, 2024.
6. Acute WET testing required: Apr - June 2020, July - Sept 2021, and Jan - March 2023.
7. Chronic WET testing required: Apr - June 2020, July - Sept 2021, and Jan - March 2023. The IWC for chronic WET was 10%.

Receiving Water Information

- Name: Trempealeau River
- Waterbody Identification Code (WBIC): 1769900
- 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: USGS for Station 05379276, in the Trempealeau River at Whitehall
  $7\text{-}Q_{10}$ = 66.0 cfs (cubic feet per second)
  $7\text{-}Q_2$ = 100.0 cfs
  Harmonic Mean Flow = 147 cfs using a drainage area of 323.0 mi^2.
  The Harmonic Mean has been estimated based on average flow and the $7\text{-}Q_{10}$ using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).
- Hardness = 70 mg/L as $CaCO_3$. This value represents the geometric mean of 22 samples collected in the Trempealeau River from 10/04/1988 to 09/21/2021.
- % 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 Trempealeau River. Metals data from the Pigeon Creek at York is used for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: There are several other dischargers to the Trempealeau River however they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: The Trempealeau River is listed as impaired for Total Phosphorus from miles 0 to 81.51 and Mercury from miles 0 to 31.28.

Effluent Information:

- Design Flow Rates(s):
  Annual Average = 1.200 MGD (Million Gallons per Day)
  Peak daily = 2.601 MGD (estimated)
  For reference, the actual average flow from December 2019 to June 2024 was 0.6 MGD.
- Hardness = 53 mg/L as $CaCO_3$. This value represents the geometric mean of 18 effluent samples collected from 03/18/2020 to 04/03/2024.
- 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 from the Lincoln Sanitary District and Cities of Blair and Whitehall with water supply from wells and nondomestic contributions from AMPI and Ornua Ingredients.
- 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 Chloride. The permit-required monitoring for Copper, Hardness, and Phosphorus from December 2019 to June 2024 is used in this evaluation.

Chemical Specific Effluent Data at Outfall 001

	Copper µg/L
1-day P_{99}	82.67
4-day P_{99}	45.05
30-day P_{99}	24.77
Mean	16.27
Std	16.92
Sample size	55
Range	3 - 97

Chemical Specific Effluent Data at Outfall 001

Sample Date	Chloride mg/L
11/08/2023	354
11/15/2023	386
11/22/2023	350
11/29/2023	332
mean	356

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.”.

The following table presents the average concentrations and loadings at Outfall 001 from December 2019 to June 2024 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6):

Attachment #1

Parameter Averages with Limits

	Average Measurement	Average Mass Discharged
BOD_5	19.2 mg/L	
TSS	20.6 mg/L	
pH	7.54 s.u.	
Fecal Coliform	2182#/100 mL	
Ammonia Nitrogen	5.16 mg/L	
Copper	16.27 µg/L	0.09 lbs/day
Phosphorus	1.07 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 99th 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 the Whitehall 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 = 53 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 P_{99}	1-day MAX. CONC.
Arsenic		340		680	136	<1		
Cadmium	53	5.0	0.038	10.0	2.0	<2		
Chromium (+3)	53	1074	0.678	2148	430	<3		
Copper	53	8.5	1.1	17.1			82.7	97.0
Lead	53	58	0.526	116	23	<1		
Nickel	53	275		550	110	19.0		
Zinc	53	69	19.7	138	28	64.00		
Chloride		757	9.4	1514			411	386

* * 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 = 17 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.	MAX. EFFL. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Arsenic		152		1505	301	<1	
Cadmium	70	1.9	0.038	18.0	3.6	<2	
Chromium (+3)	70	99	0.678	969	194	<3	
Copper	70	7.6	1.1	65.3			45.1
Lead	70	20	0.526	191	38	<1	
Nickel	70	39		381	76	19.0	
Zinc	70	88	19.7	696	139	64.00	
Chloride		395	9.4	3822			382

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 = 37 cfs (¼ of the Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MAX. EFFL. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Cadmium	370	0.038	7672.4	1534.5	<2	
Chromium (+3)	3818000	0.678	79178406	15835681	<3	
Lead	140	0.526	2893	579	<1	
Nickel	43000		891742	178348	19.0	

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 37 cfs (¼ of the Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Arsenic	13.3		275.8	55.2	<1	

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 required for Copper and Zinc.

Copper – Considering available effluent data from the current permit term (December 2019 to June 2024), the 30-day P_{99} concentration is 24.8 µg/L, the 4-day P_{99} concentration is 45.1 µg/L, and the 1-day P99 concentration is 82.7 µg/L, with a maximum concentration of 97.0 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 0.37 lbs/day is based on the concentration limit and the peak daily flow rate of 2.601 MGD (17.1 µg/L * 2.601 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.

Zinc – Considering available effluent data from the current permit term (December 2019 to June 2024), the mean effluent concentration is 64.00 µg/L. This value exceeds 1/5 of the calculated daily limit, therefore concentration and mass limits, as well as monthly monitoring, are required.

The acute mass limitation of 3.0 lbs/day is based on the concentration limit and the peak daily flow rate of 2.601 MGD (138 µg/L * 2.601 MGD * 8.34/1000) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

Expression of Limits:

Revisions to ch. NR 106, Wis. Adm. Code, in September 2016 aligned Wisconsin's WQBELs with 40 CFR § 122.45(d), which specifies that effluent limits for continuous dischargers must be expressed as weekly and monthly averages for publicly owned treatment works and as daily maximums and monthly averages for all other dischargers, unless shown to be impracticable. Because daily maximum copper limits are necessary for the Whitehall Wastewater Treatment Facility, weekly and monthly average limits are also required under this code revision.

The methods for calculating limitations for municipal treatment facilities to conform to 40 CFR 122.45(d) are specified in s. NR 106.07(3), Wis. Adm. Code, and are as follows:

> Whenever a daily maximum limitation is determined necessary to protect water quality, a weekly and monthly average limitation shall also be included in the permit and set equal to the daily maximum limit unless a more restrictive limit is already determined necessary to protect water quality.

Therefore, **weekly and monthly average copper limits** are recommended in the permit.

PFOS and PFOA

The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98, Wis. Adm. Code. Based on the nondomestic contributions, PFOS and PFOA monitoring is recommended once every two months.

Mercury – The permit application did not require monitoring for mercury because the Whitehall 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 to 2023 was 0.83 mg/kg, with a maximum reported concentration of 2.10 mg/kg. Therefore, no mercury monitoring is recommended at Outfall 001.

Attachment #1

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 weekly average and monthly average limits. These limits are re-evaluated at this time due to the following changes:

- Subchapter IV of ch. NR 106, Wis. Adm. Code allows limits based on available dilution instead of limits set to twice the acute criteria.
- Section NR 106.07(3), Wis. Adm. Code requires weekly and monthly average limits for municipal treatment plants.
- 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 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 1673 sample results were reported from December 2019 to June 2024. The maximum reported value was 7.70 s.u. (Standard pH Units). The effluent pH was 7.60 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 7.66 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 7.66 s.u. Therefore, a value of 7.66 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 7.66 s.u. into the equation above yields an ATC = 15.44 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	30.89
1-Q_{10}	452.62

The 2×ATC method yields the most stringent limits for the Whitehall 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. The table has been expanded from the table in the current permit to included ammonia nitrogen limits throughout the pH range.

Daily Maximum Ammonia Nitrogen Limits – WWSF

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

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

The 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 <u>receiving water</u>,
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 (ºC) of the receiving water – (Early Life Stages Present), or
T = the maximum of the actual temperature (ºC) 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_{10} (4-Q3, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q_5 (estimated as 85% of the 7-Q_2 if the 30-Q_5 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 ºC, 25% of the flow is used if the Temperature < 11 ºC, and 50% of the flow is used if the Temperature ≥ 11 ºC but < 16 ºC.

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 ºC, during the winter and spring months. Based on a review of the DNR Fisheries database, burbot, an early spawning species, are not believed to be present in the Trempealeau 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 Trempealeau 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	June-September	October-March
Effluent Flow	Qe (MGD)	1.200	1.200	1.200
Background Information	7-Q_{10} (cfs)	66	66	66
	7-Q_2 (cfs)	100	100	100
	Ammonia (mg/L)	0.07	0.07	0.14
	Temperature (°C)	14.4	20.6	10.0
	pH (s.u.)	7.84	7.81	7.81
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	33	66	17
	Reference Monthly Flow (cfs)	43	85	21
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	6.79	4.83	7.05
	Early Life Stages Absent	6.82	4.83	9.43
	30-day Chronic			
	Early Life Stages Present	2.72	1.93	2.82
	Early Life Stages Absent	2.73	1.93	3.77
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	126	174	
	Early Life Stages Absent			92
	Monthly Average			
	Early Life Stages Present	63	87	
	Early Life Stages Absent			45

Effluent Data
The following table evaluates the statistics based upon ammonia data reported from December 2019 to June 2024, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Whitehall Wastewater Treatment Facility permit for the respective month ranges.

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	April & May	June-September	October-March
1-day P_{99}	33.30	37.60	24.70
4-day P_{99}	18.50	21.10	13.40
30-day P_{99}	10.90	9.40	7.20
Mean*	7.60	4.70	4.60
Std	6.70	8.50	5.10
Sample size	43	73	121
Range	0.1 - 30.3	0.1 - 44.4	0.1 - 29.2

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

Based on this comparison, daily limits are required April through September.

The permit currently has variable daily maximum, weekly average, and monthly limits. 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 recommendation is to expand the variable daily maximum ammonia nitrogen limit table throughout the pH range. These limits apply year-round. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

Final Ammonia Nitrogen Limits

Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
Variable	**34**	**34**

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

Section NR 102.04(5), Wis. Adm. Code, states that all surface waters shall be suitable for supporting recreational use and shall meet *E. coli* criteria during the recreation season. Section NR 102.04(5)(b), Wis. Adm. Code, allows the Department to make exceptions when it determines, in accordance with s. NR 210.06(3), Wis. Adm. Code, that wastewater disinfection is not required to meet *E. coli* limits and protect the recreational use. Section NR 210.06(3), Wis. Adm. Code, tasks the Department with determining the need for disinfection using a site-specific analysis based on potential risk to human or animal health. It sets out the factors that must be considered in determining the necessity to disinfect municipal wastewater or to change the length of the disinfection season.

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

E. coli monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Because the Whitehall 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. No changes are recommended to the required disinfection season.

Effluent Data
The Whitehall Wastewater Treatment Facility has monitored effluent *E. coli* from May 2023 to September 2023 and a total of 21 results are available. A geometric mean of 126 counts/100 mL was exceeded in 1 out of 5 months, with a maximum monthly geometric mean of 226 counts/100 mL. Effluent data exceeded 410 counts/100 mL 2 times (which is 10% of the total sample results). The maximum reported value was 1400 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 the Whitehall Wastewater Treatment Facility currently has an existing phosphorus limit below 1.0 mg/L, it remains applicable unless a more stringent WQBEL is given.

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

Water Quality-Based Effluent Limits (WQBEL)
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 Trempealeau River.

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

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

Where:

WQC = 0.075 mg/L for the Trempealeau River.
Qs = 100% of the 7-Q_2 of 100 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 = 1.200 MGD = 1.857 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.

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

SWIMS ID	10028785	273008	10021693
Station Name	Monitoring station at Trempealeau River At Wade Road	Monitoring station at Trempealeau River at Cth P	Monitoring station at Trempeleau River At Sth 121
Waterbody	Trempealeau River	Trempealeau River	Trempealeau River
Sample Count	1	1	8
First Sample	07/24/2008	06/13/2007	09/24/2007
Last Sample	07/24/2008	06/13/2007	10/15/2015
Mean	0.377 mg/L	0.298 mg/L	0.586 mg/L
Median	0.377 mg/L	0.298 mg/L	0.437 mg/L

Substituting a background concentration above criteria into the limit calculation equation above would result in a calculated limit that is less than the applicable criterion of 0.075 mg/L. However, s. NR 217.13(7), Wis. Adm. Code, specifies that "if the water quality-based effluent limitation calculated pursuant to the procedures in this section is less than the phosphorus criterion specified in s. NR 102.06, Wis. Adm. Code, for the water body, the effluent limit shall be set equal to the criterion."

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

Effluent Data

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

	Phosphorus mg/L
1-day P_{99}	5.19
4-day P_{99}	2.85
30-day P_{99}	1.60
Mean	1.07
Std	1.06
Sample size	238
Range	0.05 - 8.65

Reasonable Potential Determination

Since the 30-day P_{99} of reported effluent total phosphorus data is greater than the calculated WQBEL, the discharge has reasonable potential to cause or contribute to an exceedance of the water quality criterion. Therefore, a WQBEL is required.

In accordance with s. NR 217.15(2), Wis. Adm. Code, there is reasonable potential for the discharge to cause or contribute to an exceedance of the water quality criteria. The data suggest that a compliance schedule will be necessary for the facility to meet the given phosphorus limits.

Limit Expression

According to s. NR 217.14 (2), Wis. Adm. Code, because the calculated WQBEL is less than or equal to 0.3 mg/L, the effluent limit of 0.075 mg/L may be expressed as a six-month average. If a concentration limitation expressed as a six-month average is included in the permit, a monthly average concentration limitation of 0.225 mg/L, equal to three times the WQBEL calculated under s. NR 217.13, Wis. Adm. Code shall also be included in the permit. The six-month average should be averaged during the months of May – October and November – April.

Mass Limits

Because the discharge is to a surface water that is to or upstream of a phosphorus impaired water, a mass limit is also required, pursuant to s. NR 217.14(1)(a), Wis. Adm. Code. This final mass limit shall be 0.075 mg/L × 8.34 × 1.2 MGD = 0.75 lbs/day expressed as a six-month average.

Multi-Discharge Variance Interim Limit
With the permit application, the City of Whitehall has re-applied for the phosphorus multi-discharger variance (MDV). Conditions of the phosphorus MDV require the facility to comply with an interim phosphorus limit in lieu of meeting the final WQBEL. The recommended interim limit during the 2nd permit under MDV approval, pursuant to s. 283.16 (6) (a), Wis. Stats., is 0.6 mg/L as a monthly average. A compliance schedule may be appropriate to meet this interim limit but compliance with 0.6 mg/L shall be no later than the end of the reissued permit. The previous interim limit of 0.8 mg/L should not be exceeded during the compliance schedule.

PART 6 – 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, the lowest calculated limitation is 120° F. For lagoon treatment systems of domestic waste, there is no reasonable potential for the discharge to exceed this limit. **Therefore, no temperature limits or monitoring are recommended.**

Monthly Temperature Effluent Data & Limits

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

PART 7 – WHOLE EFFLUENT TOXICITY (WET)

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

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC50 (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC_{25} (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 10% shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

$$\text{IWC (as \%)} = Qe \div \{(1 - f)\, Qe + Qs\} \times 100$$

Where:

Qe = annual average flow = 1.200 MGD = 1.857 cfs
f = fraction of the Qe withdrawn from the receiving water = 0
Qs = ¼ of the 7-Q_{10} = 66.00 cfs ÷ 4 = 16.50 cfs

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual*, a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.

- Receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.

- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations.

Attachment #1

WET Data History

Date Test Initiated	Acute Results LC_{50} %				Chronic Results IC_{25} %					Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	*C. dubia*	Fathead Minnow	Algae (IC_{50})	Pass or Fail?	Use in RP?	
01/07/1997					>40				No	1
08/25/1999	>100	>100	Pass	No						1
06/05/2002	>100	>100	Pass	No						1
07/21/2004	>100	>100	Pass	No						1
07/12/2007	>100	100	Pass	Yes	98.21	>100		Pass	Yes	
09/16/2008	>100	>100	Pass	Yes	>100			Pass	Yes	
04/03/2013	>100	>100	Pass	Yes						
08/27/2014	>100	>100	Pass	Yes						
06/02/2020	>100	>100	Pass	Yes						
07/21/2020					>100	>100		Pass	Yes	
09/21/2021	>100	>100	Pass	Yes	>100	>100		Pass	Yes	

Footnotes:

1. *Data Not Representative.* Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005.

- According to s. NR 106.08, Wis. Adm. Code, WET reasonable potential is determined by multiplying the highest toxicity value that has been measured in the effluent by a safety factor, to predict the likelihood (95% probability) of toxicity occurring in the effluent above the applicable WET limit. The safety factor used in the equation changes based on the number of toxicity detects in the dataset. The fewer detects present, the higher the safety factor, because there is more uncertainty surrounding the predicted value. WET limits must be given, according to s. NR 106.08(6), Wis. Adm. Code, whenever the applicable Reasonable Potential equation results in a value greater than 1.0.

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

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

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

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

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

Attachment #1

WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 10% **0 Points**
Historical Data	Six tests used to calculate RP. No tests failed. **0 Points**	Four tests used to calculate RP. No tests failed. **0 Points**
Effluent Variability	BOD5, TSS, Copper, Fecal Coliform, Ammonia, and Phosphorus exceedances. NONs sent in 2022 and 2023. NOVs sent in 2019. Frequent treatment plant upsets. **10 Points**	Same as Acute. **10 Points**
Receiving Water Classification	Warm Water Sport Fish (WWSF) (5 pts) **5 Points**	Same as Acute. **5 Points**
Chemical-Specific Data	Reasonable potential for Ammonia, Copper, and Zinc limits based on ATC; (7 pts) Nickel and Chloride detected. (2 pts) Additional Compounds of Concern: none **9 Points**	No reasonable potential for limits based on CTC. Ammonia nitrogen limit carried over from the current permit. Copper, Nickel, Zinc, and Chloride detected. (3 pts) Additional Compounds of Concern: none **3 Points**
Additives	No biocides and One Water Quality Conditioner (1 pt) added. Permittee has proper P chemical SOPs in place. **1 Point**	All additives used more than once per 4 days. **1 Point**
Discharge Category	Four Industrial Contributors (8 pts) **8 Points**	Same as Acute. **8 Points**
Wastewater Treatment	Secondary or Better **0 Points**	Same as Acute. **0 Points**
Downstream Impacts	No impacts known. **0 Points**	Same as Acute. **0 Points**
Total Checklist Points:	**33 Points**	**27 Points**
Recommended Monitoring Frequency (from Checklist):	3 tests during permit term	3 tests during permit term
Limit Required?	No	No
TRE Recommended? (from Checklist)	No	No

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above three and chronic WET tests are recommended in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).

Attachment #2

Evaluation of Dissolved-Based Metal Limits

Dissolved-based limits may be evaluated for the Whitehall Wastewater Treatment Facility pursuant to chs. NR 105 and 106, Wis. Adm. Code. Typically, the first approach in evaluating the need for the dissolved-based limits is to look at the variability of the metals data already provided to the department.

It should be noted that the permittee has not formally requested the evaluation of dissolved-based limits, which normally triggers the consideration of such according to s. NR 106.06(7)(b), Wis. Adm. Code. Since this request has not been submitted, the dissolved-based limits are provided for informational purposes in this Addendum with an explanation of the additional data which the permittee would need to submit to demonstrate that the dissolved-based recommendations belong in the permit.

Information required for the calculation of dissolved-based limits includes the conversion factors from ss. NR 105.05(5) (for acute criteria), or NR 105.06(8) (for chronic criteria), Wis. Adm. Code. Background data is also required to translate the dissolved criteria into a site-specific number (the "translator") from which a total recoverable limit may be calculated based on the fraction of the discharged metal which would be dissolved in the receiving water. To perform this translation the following background data is required:

$$\text{Translator} = \frac{M_{\text{p}} \times TSS + M_d}{M_d}$$

Where:

TSS: Total Suspended Solids concentration in the receiving water (µg/L)
M_d: Dissolved metals concentration in the receiving water (µg/L)
M_{TR}: Total Recoverable metals concentration in the receiving water (µg/L)
M_p: Particle-bound metals concentration in the receiving water (µg/g)

$$M_{\text{p}} = \frac{M_{\text{TR}} - M_d}{TSS}$$

This type of metals data is not available for the receiving water for the Whitehall Wastewater Treatment Facility. However, the nearest site with such data is in a nearby basin, in the La Crosse River at Sparta. Use of a data from nearby basins may be considered per s. NR 106.06(4)(e)1. There are data on total recoverable and dissolved copper and zinc such that translators may be estimated at the site:

La Crosse River at Sparta

Date	Total Suspended Solids (mg/L)	Total Recoverable Copper (µg/L)	Dissolved Copper (µg/L)	Particulate Bound Copper (µg/g)
05/18/01	15.8	1.61	0.96	0.0411
10/04/01	6.19	0.913	0.501	0.0666
06/19/02	8.95	1.33	0.738	0.0661
09/25/02	6.13	1.08	1.01	0.0114
05/20/03	9.36	1.31	0.234	0.1150
10/09/03	3.33	0.881	0.541	0.1021
Geomean	7.42	1.16	0.60	0.0538

La Crosse River at Sparta

Date	Total Suspended Solids (mg/L)	Total Recoverable Zinc (µg/L)	Dissolved Zinc (µg/L)	Particulate Bound Zinc (µg/g)
05/18/01	15.8	5.21	1.67	0.2241
10/04/01	6.19	2.09	0.699	0.2247
06/19/02	8.95	3.33	1.25	0.2324
09/25/02	6.13	1.75	0.72	0.1680
05/20/03	9.36	3.04	1.17	0.1998
10/09/03	3.33	2.06	1.09	0.2913
Geomean	7.42	2.71	1.05	0.2203

TSS Data for the Trempealeau River

Date	Location	Total Suspended Solids (mg/L)	Date	Location	Total Suspended Solids (mg/L)
07/07/1988	Sth 53 Bridge	16	08/02/1988	At Wade Road	21
08/02/1988	Sth 53 Bridge	20	07/07/1988	At Wade Road	27
09/06/1988	Sth 53 Bridge	15	07/24/2008	At Wade Road	17
10/04/1988	Sth 53 Bridge	10	01/04/1989	-1 Mi Abv Whitehall	5
11/08/1988	Sth 53 Bridge	6	02/08/1989	-1 Mi Abv Whitehall	10
12/07/1988	Sth 53 Bridge	6	03/07/1989	-1 Mi Abv Whitehall	7
01/04/1989	Sth 53 Bridge	4	04/05/1989	-1 Mi Abv Whitehall	23
02/08/1989	Sth 53 Bridge	11	05/02/1989	-1 Mi Abv Whitehall	13
03/07/1989	Sth 53 Bridge	6	07/25/2007	At Cross Road	25
04/05/1989	Sth 53 Bridge	34	11/15/2007	At Cross Road	11
05/02/1989	Sth 53 Bridge	13	01/28/2009	At Cross Road	8
09/24/2007	At Sth 121	10	05/21/2018	East of Independence	18.3
Geomean	12.0 mg/L				

$$\text{Copper Translator} = \frac{0.0538(\text{mg/g}) \times 12.0(\text{mg/L}) + 0.60(\text{mg/L})}{0.60(\text{mg/L})} = 2.08$$

$$\text{Zinc Translator} = \frac{0.2203(\text{mg/g}) \times 12.0(\text{mg/L}) + 1.05(\text{mg/L})}{1.05(\text{mg/L})} = 3.52$$

Multiplying the translator, the conversion factor from ch. NR 105, Wis. Adm. Code, and the applicable criterion will give an indication of the amount of "relief" potentially available to the recommended permit limits if the dissolved fraction is considered from the available data:

Translated Criteria = NR 105 Criterion * Conversion Factor * Translator

Copper = 8.54 μg/L * 0.960 * 2.08 = 16.99 μg/L
Zinc = 69.23 μg/L * 0.978 * 3.52 = 237.62 μg/L

Effluent limits calculated based on the translated criteria are as follows:

Daily Maximum Limit: 2 * ATC = 2 * 16.99 = 33.98 μg/L

Using the dissolved-based approach for copper limits, the daily maximum limit is 34 μg/L (rounded to two significant digits). The associated mass limit would be 0.74 lbs/day (rounded) and is based on the estimated peak daily design flow of 2.601 MGD.

Daily Maximum Limit: 2 * ATC = 2 * 237.62 = 475.24 μg/L

Using the dissolved-based approach for zinc limits, the daily maximum limit is 475 μg/L. The effluent sample result of 64 μg/L is below 1/5 of the calculated daily maximum limit. Therefore, zinc limits would not be necessary if using the dissolved-based approach. On-site monitoring would be required to verify the zinc translator.

The permittee can collect on-site information to support either the estimated dissolved-based criteria or some alternate criteria. The following monitoring would be recommended for copper and zinc at or near the Whitehall Wastewater Treatment Facility outfall:

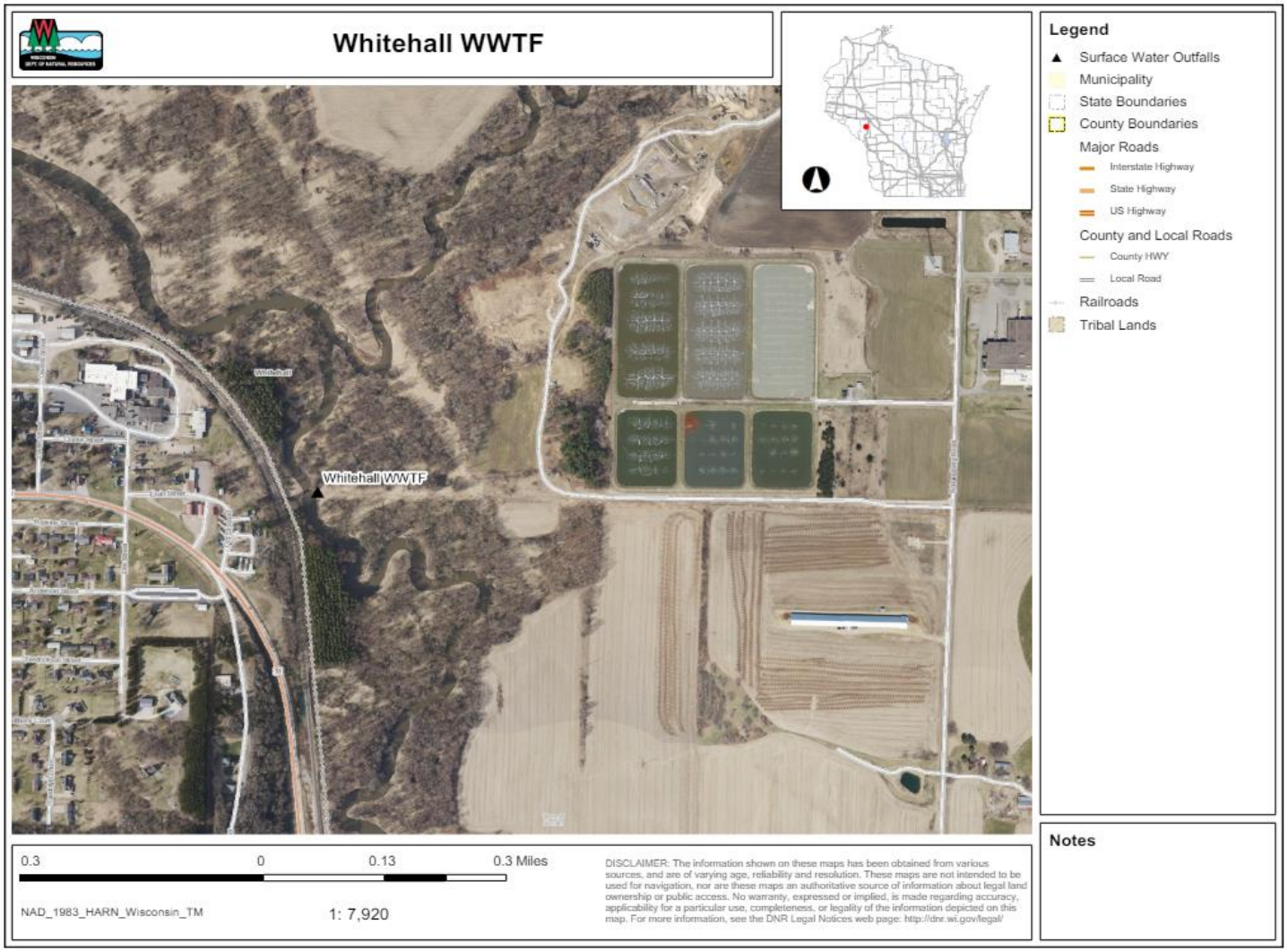
- At least two rounds of monitoring of total suspended solids and both total recoverable and filterable metals (copper and zinc) in the receiving water would be needed. This information would be used to further verify a site-specific translator for each metal. The monitoring (grab sampling) should take place at a point downstream that is representative of mixed receiving water and effluent, where chemical equilibrium has been reached.

Attachment #3

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

Facility:	Whitehall WWTF		**7-Q_{10}:**	66.00	cfs		**Temp Dates**	**Flow Dates**
Outfall(s):	001		**Dilution:**	25%		**Start:**	N/A	12/01/19
Date Prepared:	07/31/2024		**f:**	0		**End:**	N/A	06/30/24
Design Flow (Qe):	1.200	MGD	**Stream type:**	Small warm water sport or forage fish community				
Storm Sewer Dist.	0	ft	**Qs:Qe ratio:**	8.9	:1			
			Calculation Needed?	YES				

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs)	Representative Highest Effluent Flow Rate (Qe)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qea)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(cfs)	(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	16.50	0.917	1.000	0			NA	120
FEB	34	50	76	16.50	0.868	0.956	0			NA	120
MAR	38	52	77	16.50	0.902	2.500	0			NA	120
APR	48	55	79	16.50	0.919	2.500	0			NA	120
MAY	58	65	82	16.50	0.878	1.330	0			NA	120
JUN	66	76	84	16.50	1.194	1.730	0			NA	120
JUL	69	81	85	16.50	0.781	3.000	0			NA	120
AUG	67	81	84	16.50	0.803	1.530	0			NA	120
SEP	60	73	82	16.50	0.834	1.100	0			NA	120
OCT	50	61	80	16.50	0.924	2.100	0			NA	120
NOV	40	49	77	16.50	0.884	0.988	0			NA	120
DEC	35	49	76	16.50	0.848	0.944	0			NA	120

Attachment #4