

# Permit Fact Sheet

## General Information

Permit Number:	WI-0023051-10-0	
Permittee Name:	LEBANON SANITARY DISTRICT #2	
Address:	111 Canary Circle	
City/State/Zip:	Watertown WI 53098-7702	
Discharge Location:	East bank of an unnamed dry tributary to the Rock River. Approximately 2100 feet north of Cty. Rd. CW	
Receiving Water:	Unnamed Tributary of the Rock River (Sinissippi Lake Watershed, UR08 - Upper Rock River Basin) in Dodge County	
StreamFlow (Q <sub>7,10</sub> ):	0.0 cfs	
Stream Classification:	Limited Aquatic Life, non-public water supply	
Discharge Type:	Existing, Continuous	
Design Flow	Annual Average	0.05 MGD
Significant Industrial Loading?	None.	
Operator at Proper Grade?	Yes, Plant subclasses required: Basic: A1, B, C, P, SS SS certification (basic) will be required by the end of the next permit term.	
Approved Pretreatment Program?	N/A	

## Facility Description

Lebanon Sanitary District #2 operates a modified sequencing batch reactor (SBR) for treatment with an aerobic digester for solids treatment. The influent is primarily residential in nature. The influent is directed to one of two SBR tanks. Preliminary treatment consists of a fine bar screen. Alum Sulfate is added after screening and prior to the splitter structure for chemical phosphorus removal. Preliminary effluent is directed to one of two SBR units with a capacity of ~27,000 gallons each. After treatment, the effluent is re-aerated prior to discharge to a drainage ditch that empties into the Rock River. Biosolids are hauled to another wastewater treatment facility for further treatment.

## Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, CMARs, compliance schedule items, and a site visit by Jacob Van Susteren-Wedeky on April 4, 2023, this facility has been found to be in substantial compliance with their current permit.

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	N/A	INFLUENT: 24-Hr flow proportional sampler located after the bar screen prior to the SBR. Flow meter located in headworks room.
001	0.027 MGD (2023, available data)	EFFLUENT: Representative effluent samples shall be collected from the aeration tank, prior to discharge to the intermittent tributary of the Rock River. Samples are 24-Hr flow proportional composite samples, except for dissolved oxygen and pH, which shall be grab samples. Effluent flow meter located after reaeration tank.
002	6 dry U.S. tons (WPDES application, submitted February 2023)	Aerobically digested, Liquid, Class B. Digested solids and liquids are hauled to another facility for further treatment. Complete and submit Form 3400-52 'Other Methods of Disposal or Distribution Report' following each year that solids or liquids are hauled from the existing WWTF.

## 1 Influent – Monitoring Requirements

### Sample Point Number: 701- INFLUENT

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

### Changes from Previous Permit:

Changes highlighted in table.

**Flow** - monitoring added.

**BOD & TSS**- Sample frequency increased from weekly to 2/Week. Influent and effluent sample frequencies are set to match.

### Explanation of Limits and Monitoring Requirements

**Flow Rate** - Reporting of flow added because the permittee has an influent flow meter installed.

**BODs and Total Suspected Solids**- Tracking of BODs and Suspended Solids are required for percent removal

requirements found in s. NR 210.05, Wis. Adm. Code and in the Standard Requirements section of the permit.

## 2 Surface Water - Monitoring and Limitations

### Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	30 mg/L	2/Week	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	20 mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	30 mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	14 lbs/day	2/Week	Calculated	Limit effective January, March - December.
Suspended Solids, Total	Weekly Avg	15 lbs/day	2/Week	Calculated	Limit effective February.
Suspended Solids, Total	Monthly Avg	8.7 lbs/day	2/Week	Calculated	Limit effective April, June, September, November.
Suspended Solids, Total	Monthly Avg	8.4 lbs/day	2/Week	Calculated	Limit effective Jan, March, May, July, August, October, and December.
Suspended Solids, Total	Monthly Avg	9.3 lbs/day	2/Week	Calculated	Limit effective February.
pH Field	Daily Min	6.0 su	5/Week	Grab	
pH Field	Daily Max	9.0 su	5/Week	Grab	
Dissolved Oxygen	Daily Min	4.0 mg/L	5/Week	Grab	
Nitrogen, Ammonia Variable Limit		mg/L	2/Week	See Table	Look up the variable ammonia limit from the 'Variable Ammonia Limitation' table and report the variable limit in the Ammonia Variable Limit column on the eDMR.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nitrogen, Ammonia (NH3-N) Total	Daily Max - Variable	mg/L	2/Week	24-Hr Flow Prop Comp	Report the daily maximum Ammonia result in the Nitrogen, Ammonia (NH3-N) Total column of the eDMR. See Ammonia Limitation Section.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	4.8 mg/L	2/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	2.5 mg/L	2/Week	24-Hr Flow Prop Comp	Limit effective May - October.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	4.8 mg/L	2/Week	24-Hr Flow Prop Comp	Limit effective November - April.
Phosphorus, Total	Monthly Avg	3.0 mg/L	2/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	0.51 lbs/day	2/Week	Calculated	Limit effective for July and August.
Phosphorus, Total	Monthly Avg	0.57 lbs/day	2/Week	Calculated	Limit effective for May and September.
Phosphorus, Total	Monthly Avg	0.55 lbs/day	2/Week	Calculated	Limit effective for October.
Phosphorus, Total	Monthly Avg	0.58 lbs/day	2/Week	Calculated	Limit effective for November.
Phosphorus, Total	Monthly Avg	0.67 lbs/day	2/Week	Calculated	Limit effective for December.
Phosphorus, Total	Monthly Avg	0.79 lbs/day	2/Week	Calculated	Limit effective for January.
Phosphorus, Total	Monthly Avg	1.04 lbs/day	2/Week	Calculated	Limit effective for February.
Phosphorus, Total	Monthly Avg	0.82 lbs/day	2/Week	Calculated	Limit effective for March.
Phosphorus, Total	Monthly Avg	0.65 lbs/day	2/Week	Calculated	Limit effective for April.
Phosphorus, Total	Monthly Avg	0.5 lbs/day	2/Week	Calculated	Limit effective for June.
Copper, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	Monitoring only in 2027. See Copper SRM section.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring only in 2027.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. See Nitrogen Series Monitoring section below. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.

## Changes from Previous Permit

Changes highlighted in table.

**Flow:** Sample frequency changed to daily from continuous for eDMR reporting purposes.

**BOD, TSS, TP, NH3-N:** Sample frequency changed from weekly to 2x/week.

**pH and DO:** Sample frequency changed from weekly to 5x/week.

**Ammonia:** Variable Daily Max pH limits added to the permit.

**Copper:** Limit was removed from permit.

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

## Explanation of Limits and Monitoring Requirements

Refer to the Water Quality-Based Effluent Limitations (WQBELs) memo for the Lebanon Sanitary District #2 prepared by Nicole Krueger dated April 16, 2024.

**Monitoring Frequency** - The Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Monitoring frequency decisions are based on requirements in s. NR 205.066(1), Wis. Adm. Code, (decisions are case-by-case) and considering the factors in s. NR 210.04 (a) through (e), Wis. Adm. Code, along with recommendations provided in the *Monitoring Frequencies for Individual Wastewater Permits* guidance (April 12, 2021). After evaluation, sampling frequency was increased for **BOD, TSS, Phosphorus, Dissolved Oxygen, pH and Ammonia Nitrogen**.

**BOD<sub>5</sub>, TSS, DO, pH:** Standard municipal wastewater requirements for BOD<sub>5</sub>, total suspended solids, dissolved oxygen, and pH are included based on ch. NR 210, Wis. Adm. Code, 'Sewage Treatment Works' requirements for discharges to fish and aquatic life streams. Tracking of BOD<sub>5</sub> and total suspended solids are required for percent removal requirements found in s. NR 210.05, Wis. Adm. Code and in the Standard Requirements section of the permit. Chapter NR 102, Wis.

Adm. Code, ‘Water Quality Standards for Surface Waters’ also specifies requirements for pH for fish and aquatic life streams.

**Total Maximum Daily Load (TMDL) Limitations**

The Rock River TMDL for Total Phosphorus (TP) and Total Suspended Solids (TSS) was approved by the Environmental Protection Agency (EPA) in September 28, 2011. The TMDL-derived limits are expressed as weekly average and monthly average effluent limits.

**Total Suspended Solids:** The current permit includes a weekly average concentration limit of 30 mg/L and a monthly average concentration limit of 20 mg/L. The current permit contains the following TMDL-based mass limits shown below, which were calculated from WLAs listed in Appendix Q of the Rock River TMDL. Monthly average and weekly average mass effluent limitations should be included in the permit according to the table below, along with the currently imposed concentration limits. No changes were made to the TSS limits in the reissued permit.

**Total Suspended Solids Effluent Limitations**

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)
Jan	8.4	14
Feb	9.3	15
March	8.4	14
April	8.7	14
May	8.4	14
June	8.7	14
July	8.4	14
Aug	8.4	14
Sept	8.7	14
Oct	8.4	14
Nov	8.7	14
Dec	8.4	14

**Phosphorus-** Waste load allocations specified in TMDLs are expressed as monthly average (lbs/day) and became effective on June 30, 2020. The Rock River remains impaired for phosphorus meaning the Rock River TMDL limits remain applicable. The following limits according to the table below from the current permit are retained for phosphorus.

**Total Phosphorus Effluent Limitations**

<b>Month</b>	<b>Monthly Total P WLA<sup>1</sup> (lbs/month)</b>	<b>Monthly Ave Total P Effluent Limit<sup>2</sup> (lbs/day)</b>
Jan	24.46	<b>0.79</b>
Feb	29.22	<b>1.04</b>
March	25.31	<b>0.82</b>
April	19.44	<b>0.65</b>
May	17.56	<b>0.57</b>
June	14.99	<b>0.50</b>
July	15.71	<b>0.51</b>
Aug	15.84	<b>0.51</b>
Sept	16.94	<b>0.57</b>
Oct	17.03	<b>0.55</b>
Nov	17.26	<b>0.58</b>
Dec	20.66	<b>0.67</b>

**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 permittee elected for the variable daily max pH limits in lieu of a single year-round daily max limit.

**Copper:** Daily maximum and weekly average limitations for copper are no longer required. Monthly monitoring is included in the reissued permit for the year 2027 and reasonable potential will be evaluated at the next reissuance. Source reduction measures (SRMs) should be continued in the permit term to prevent backsliding from current conditions.

**Chloride:** Acute and chronic chloride toxicity criteria for the protection of aquatic life are included in Tables 1 and 5 of ch. NR 105, Wis. Adm. Code. Subchapter VII of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for chloride. Chloride monitoring in the year 2027 was added to the permit to ensure that 11 sample results are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code.

**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

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

### 3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
002	Do not land apply	Liquid	Do not land apply	Do not land apply	Hauled to another facility	6 dry US tons
Does sludge management demonstrate compliance? Yes.						
Is additional sludge storage required? No.						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No.						
Is a priority pollutant scan required? No.						

### Sample Point Number: 002- HAULED SOLIDS/LIQUIDS

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Jan 1, 2025 - Dec 31, 2025
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Jan 1, 2025 - Dec 31, 2025
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	



Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	PFAS Dry Wt	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

## Changes from Previous Permit:

Changes highlighted in table.

**PCB** - Updated monitoring year to 2025.

**PFAS** – Annual monitoring is included in the permit pursuant s. NR 204.06(2)(b)9, Wis. Adm. Code.

## Explanation of Limits and Monitoring Requirements

Requirements for municipal sludge are determined in accordance with ss. NR 204.06(2)(b) & (c), 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), Wis. Adm. Code for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k), Wis. Adm. Code.

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

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

## Special Reporting Requirements

None.

## Other Comments:

Disinfection of the effluent is not required at this time. It should be noted that recreational use surveys and other information may be re-evaluated in the future to ensure the conditions of s. NR 210.06(3), Wis. Adm. Code, are being met. This re-evaluation could result in requiring disinfection of the effluent at that time. Disinfection would likely apply during May through September and would require *Escherichia coli* (*E. coli*) limits for protection of recreational uses. Section NR 210.06(2)(a)1, Wis. Adm. Code, includes two limits which must be included in permits for facilities which are required to disinfect:

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

## Attachments:

Water Quality Based Effluent Limitations Memo dated April 16, 2024 and prepared by Nicole Krueger.

## Expiration Date:

June 30, 2029

## Justification Of Any Waivers From Permit Application Requirements

No waivers were requested or granted from permit application requirements.

**Prepared By:** Melanie Burns, Wastewater Specialist

**Date:** March 28, 2024

**Date: (Post fact check):** May 2, 2024. Changes in sampling frequency were made to the following parameters BOD, TSS, TP, NH<sub>3</sub>-N, from 3/week to 2/week at the request of the permittee. The sampling frequency for the parameters referenced is at the minimum standard.

**Date: (Post Public Notice):**

# CORRESPONDENCE/MEMORANDUM

DATE: 04/16/2024

TO: Melanie Burns – SER

FROM: Nicole Krueger – SER *Nicole Krueger*

SUBJECT: Water Quality-Based Effluent Limitations for Lebanon Sanitary District #2  
 WPDES Permit No. WI-0023051-10

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 Lebanon Sanitary District #2 in Dodge County. This municipal wastewater treatment facility (WWTF) discharges to an unnamed tributary to the Rock River, located in the Sinissippi Lake Watershed in the Upper Rock River Basin. This discharge is included in the Rock River TMDL as approved by EPA. The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations are made on a chemical-specific basis at Outfall 001:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1,2
BOD <sub>5</sub>			30 mg/L	20 mg/L	1
TSS			30 mg/L	20 mg/L	1,3
pH	9.0 s.u.	6.0 s.u.			1
Dissolved Oxygen		4.0 mg/L			1
Ammonia Nitrogen					4,5
May – October	3.4 mg/L		<b>3.4 mg/L</b>	2.5 mg/L	
November – April	3.4 mg/L		<b>3.4 mg/L</b>	<b>3.4 mg/L</b>	
Phosphorus				3.0 mg/L TMDL	3
Copper					2,6
Chloride					7
TKN, Nitrate+Nitrite, and Total Nitrogen					8

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. The TSS and phosphorus mass limitations are required in accordance with the waste load allocations specified in the Rock River TMDL, shown below:

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave Total P Effluent Limit (lbs/day)
Jan	8.4	14	0.79
Feb	9.3	15	1.04
March	8.4	14	0.82
April	8.7	14	0.65

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave Total P Effluent Limit (lbs/day)
May	8.4	14	0.57
June	8.7	14	0.50
July	8.4	14	0.51
Aug	8.4	14	0.51
Sept	8.7	14	0.57
Oct	8.4	14	0.55
Nov	8.7	14	0.58
Dec	8.4	14	0.67

- 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.
- If Lebanon #2 decides to have variable daily maximum ammonia limits rather than the single 3.4 mg/L, the following limits are recommended:

**Year-round daily maximum**

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	83	7.0 < pH ≤ 7.1	51	8.0 < pH ≤ 8.1	11
6.1 < pH ≤ 6.2	82	7.1 < pH ≤ 7.2	46	8.1 < pH ≤ 8.2	8.8
6.2 < pH ≤ 6.3	80	7.2 < pH ≤ 7.3	40	8.2 < pH ≤ 8.3	7.3
6.3 < pH ≤ 6.4	78	7.3 < pH ≤ 7.4	35	8.3 < pH ≤ 8.4	6.0
6.4 < pH ≤ 6.5	75	7.4 < pH ≤ 7.5	31	8.4 < pH ≤ 8.5	4.9
6.5 < pH ≤ 6.6	72	7.5 < pH ≤ 7.6	26	8.5 < pH ≤ 8.6	4.1
6.6 < pH ≤ 6.7	69	7.6 < pH ≤ 7.7	22	8.6 < pH ≤ 8.7	3.4
6.7 < pH ≤ 6.8	65	7.7 < pH ≤ 7.8	19	8.7 < pH ≤ 8.8	2.8
6.8 < pH ≤ 6.9	60	7.8 < pH ≤ 7.9	16	8.8 < pH ≤ 8.9	2.4
6.9 < pH ≤ 7.0	56	7.9 < pH ≤ 8.0	13	8.9 < pH ≤ 9.0	2.0

Month	Weekly Average mg/L	Monthly Average mg/L
May – October	4.8	2.5
November – April	4.8	<b>4.8</b>

- Source reduction measures (SRMs) should be included in the reissued permit to prevent backsliding from current conditions.
- Monitoring at a frequency to ensure that 11 samples are available at the next permit issuance.
- 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).

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

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Nicole Krueger at [Nicole.Krueger@wisconsin.gov](mailto:Nicole.Krueger@wisconsin.gov) or Diane Figiel at [Diane.Figiel@wisconsin.gov](mailto:Diane.Figiel@wisconsin.gov).

Attachments (3) – Narrative, Outfall Map, & 2006 Ammonia Calculations

PREPARED BY: Nicole Krueger, Water Resources Engineer – SER

E-cc: Jacob Van Susteren-Wedesky, Wastewater Engineer – SER  
Bryan Hartsook, Regional Wastewater Supervisor – SER  
Diane Figiel, Water Resources Engineer – WY/3  
Nate Willis, Wastewater Engineer – WY/3

Attachment #1  
**Water Quality-Based Effluent Limitations for  
 Lebanon Sanitary District #2**

**WPDES Permit No. WI-0023051-10**

Prepared by: Nicole Krueger

**PART 1 – BACKGROUND INFORMATION**

**Facility Description**

Lebanon Sanitary District #2 operates a modified sequencing batch reactor (SBR) for treatment with an aerobic digester for solids treatment. The influent is primarily residential in nature. The influent is directed to one of two SBR tanks. Preliminary treatment consists of a fine bar screen. Alum Sulfate is added after screening and prior to the splitter structure for chemical phosphorus removal. Preliminary effluent is directed to one of two SBR units with a capacity of ~27,000 gallons each. After treatment, the effluent is re-aerated prior to discharge to a drainage ditch that empties into the Rock River. Biosolids are hauled to another wastewater treatment facility for further treatment.

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

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

**Existing Permit Limitations**

The current permit, which expired on 09/30/2023, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD <sub>5</sub>			30 mg/L	20 mg/L	2,3
TSS			30 mg/L	20 mg/L	2,4
pH	9.0 s.u.	6.0 s.u.			3
Dissolved Oxygen		4.0 mg/L			2,3
Ammonia Nitrogen					5
May – October	4.8 mg/L		<b>4.8 mg/L</b>	2.5 mg/L	
November – April	4.8 mg/L		<b>4.8 mg/L</b>	<b>4.8 mg/L</b>	
Phosphorus					6
Interim				3.0 mg/L	
Final				TMDL	
Copper	55 µg/L		33 µg/L 0.014 lbs/day	<b>33 µg/L</b>	5
Chloride					1

Attachment #1

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
TKN, Nitrate+Nitrite, and Total Nitrogen					1
Arsenic					1
Cadmium					1
Chromium					1
Lead					1
Nickel					1
Zinc					1
Hardness					1

Footnotes:

1. Monitoring only.
2. These concentration limits are based on the Limited Aquatic Life (LAL) community of the immediate receiving water as described in s. NR 104.02(3)(b), Wis. Adm. Code.
3. 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.
4. The Rock Rivel TMDL TSS mass limitations, shown below, are currently effective.

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)
Jan	8.4	14
Feb	9.3	15
March	8.4	14
April	8.7	14
May	8.4	14
June	8.7	14
July	8.4	14
Aug	8.4	14
Sept	8.7	14
Oct	8.4	14
Nov	8.7	14
Dec	8.4	14

5. 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.
6. The Rock Rivel TMDL phosphorus mass limitations, shown below, became effective 06/30/2020.

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Month	Monthly Ave Total P Effluent Limit (lbs/day)
Jan	0.79
Feb	1.04
March	0.82
April	0.65
May	0.57
June	0.50
July	0.51
Aug	0.51
Sept	0.57
Oct	0.55
Nov	0.58
Dec	0.67

**Receiving Water Information**

- Name: Unnamed tributary to the Rock River
- Waterbody Identification Code (WBIC): 853750
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Limited aquatic life (LAL) community, non-public water supply. This tributary is listed in ch. NR 104, Wis. Adm. Code in Table 3 under “Hidden Meadows Mobile Home Park”.  
The Rock River, approximately 5 miles downstream of Outfall 001 is classified as a warmwater sport fish (WWSF), non-public water supply.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q<sub>10</sub> and 7-Q<sub>2</sub> values are estimates from Outfall 001.
  - Unnamed tributary
    - 7-Q<sub>10</sub> = 0 cfs (cubic feet per second)
    - 7-Q<sub>2</sub> = 0 cfs
  - Rock River at USGS Station #05424090 at Ashippun Sanitary District, approximately 8 miles upstream of the unnamed tributary
    - 7-Q<sub>10</sub> = 5.0 cfs
    - 7-Q<sub>2</sub> = 24.5 cfs
- Hardness = mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data from Effluent hardness is used in place of receiving water because there is no receiving water flow upstream of the discharge.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: Not applicable where the receiving water low flows are zero.
- Source of background concentration data: Background concentrations are not included because they don’t impact the calculated WQBEL when the receiving water low flows are equal to zero.
- Multiple dischargers: None.
- Impaired water status: The immediate receiving water is not listed as impaired. The Rock River, approximately 5 miles downstream of Outfall 001 is 303(d) listed as impaired for total phosphorus and TSS which are addressed in the Rock River TMDL.



**Effluent Information**

- Design flow rate(s):  
 Annual average = 0.050 MGD (Million Gallons per Day)  
 Peak daily = 0.35 MGD  
 Peak weekly = 0.11 MGD  
 The peak design flows were estimated from the annual average design flow and a peaking factor based on data from 02/01/2019 – 01/31/2024.  
 For reference, the actual average flow from 02/01/2019 – 01/31/2024 was 0.026 MGD.
- Hardness = 386 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data from 12/06/2017 – 10/06/2021 (n=5).
- 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: Alum is used for phosphorus removal.
- Effluent characterization: This facility is categorized as a minor municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus ammonia, chloride, hardness and phosphorus.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled “MEAN EFFL. CONC.”. Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

**Effluent Chloride Data**

Sample Date	Chloride mg/L	Sample Date	Chloride mg/L	Sample Date	Chloride mg/L
01/04/2022	310	06/01/2022	250	11/02/2022	200
02/01/2022	360	07/06/2022	320	12/07/2022	220
03/01/2022	390	08/10/2022	290	11/08/2023	210
04/05/2022	170	09/07/2022	290	12/06/2023	280
05/04/2022	290	10/05/2022	270	01/03/2024	270
1-day P <sub>99</sub> = 441 mg/L					
4-day P <sub>99</sub> = 351 mg/L					

**Effluent Copper Data**

	Copper µg/L	Copper lbs/day
1-day P <sub>99</sub>	47.9	0.0114
4-day P <sub>99</sub>	30.5	0.0070
30-day P <sub>99</sub>	21.6	0.0047
Mean	17.5	0.0037
Std	8.96	0.0022
Sample size	56	56
Range	4.1 – 46	0.001 - 0.011

The following table presents the average concentrations and loadings at Outfall 001 from 02/01/2019 – 01/31/2024 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

**Parameter Averages with Limits**

	Average Measurement	Average Mass Discharged
BOD <sub>5</sub>	2.9 mg/L*	
TSS	2.5 mg/L*	0.40 lbs/day
pH field	8.4 s.u.	
Phosphorus	1.8 mg/L	0.34 lbs/day
Ammonia Nitrogen	0.81 mg/L*	
Copper	14 µg/L	
Dissolved Oxygen	10 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.

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

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

Attachment #1

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 the case for Lebanon.

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 = 0 cfs

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		340		340	68.0	<1.1		
Cadmium	386	135.9		136	27.2	<0.19		
Chromium	301	4446		4446	889	<1.1		
Copper	386	55.5		55.5			47.9	46
Lead	356	365		365	72.9	<4.3		
Nickel	268	1080		1080	216	1.6		
Zinc	333	345		345	68.9	18		
Chloride (mg/L)		757		757			441	320

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

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

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

RECEIVING WATER FLOW = 0 cfs

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		152	30.4	<1.1	
Cadmium	175	3.82		3.82	0.76	<0.19	
Chromium	301	326		326	65.2	<1.1	
Copper	386	32.9		32.9			30.5
Lead	356	95.5		95.5	19.1	<4.3	
Nickel	268	169		169	33.8	1.60	
Zinc	333	345		345	68.9	18.00	
Chloride (mg/L)		395		395			351

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

**Monthly Average Limits based on Wildlife Criteria (WC)**

The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

**Monthly Average Limits based on Human Threshold Criteria (HTC)**

RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	880		880	176	<0.19
Chromium (+3)	8400000		8400000	1680000	<1.1
Lead	2240		2240	448	<4.3
Nickel	110000		110000	22000	1.6

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

RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	40		40.0	8.0	<1.1

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.

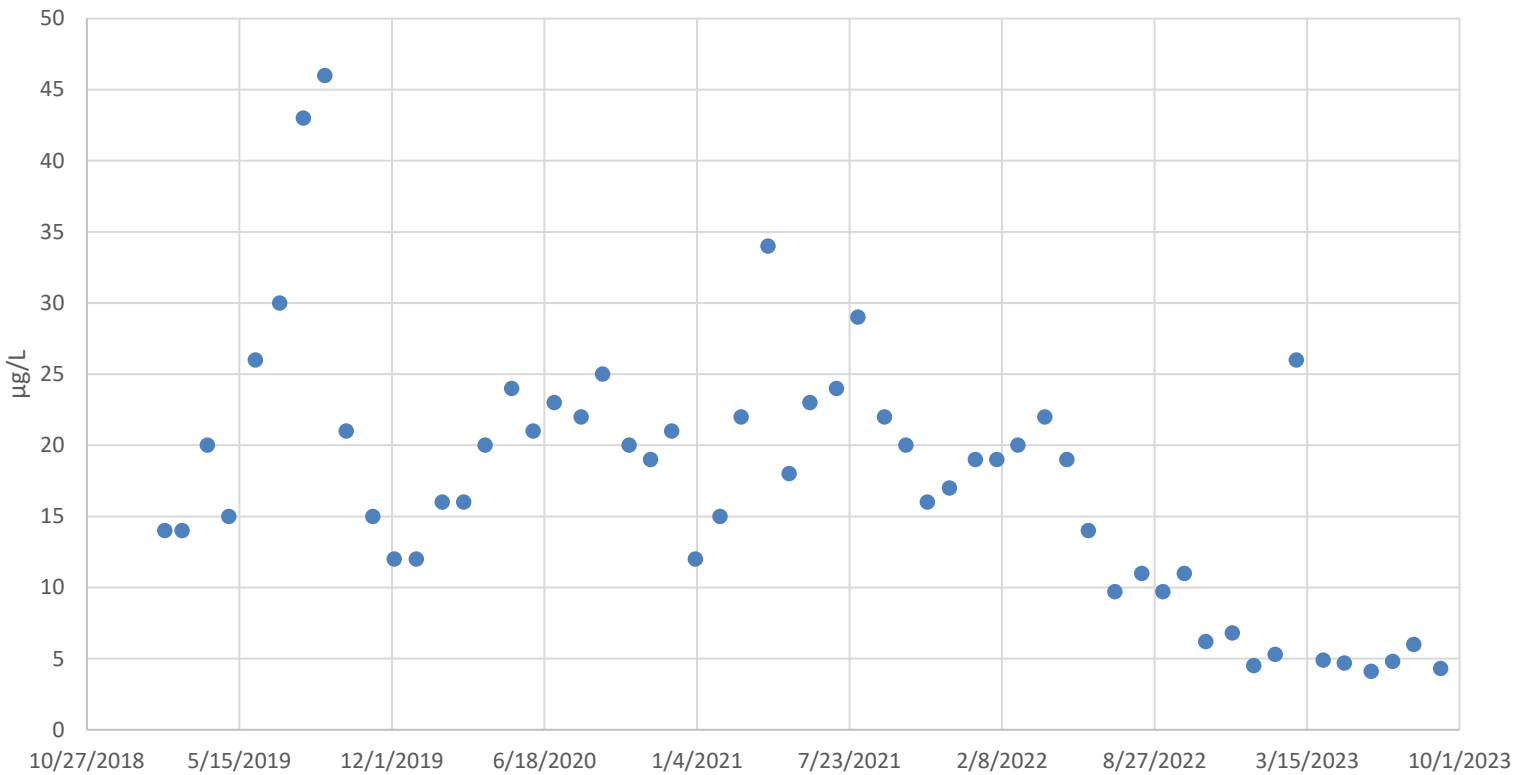
**Conclusions and Recommendations**

Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are not required for toxics in this section.

Copper – Considering available effluent data from the current permit term (02/06/2019 – 09/06/2023), the 1-day P<sub>99</sub> concentration is 47.9 µg/L and a 4-day P<sub>99</sub> of 30.5 µg/L, with a maximum concentration of 30.5 µg/L. These do not exceed the calculated daily maximum or weekly average limits. **Daily maximum and weekly average limitations for copper are no longer required. It is recommended that monthly monitoring for copper using clean sampling techniques continue in the reissued permit.**

A graph of the data from the current permit term is shown below:

## Effluent Copper



It appears that effluent copper concentrations have decreased overall throughout the permit term. **It's recommended that the daily maximum and weekly average limits be removed per s. NR 207.12(3)(b)2. Wis. Adm. Code** because new data is now available since the last permit issuance which shows no reasonable potential. Lebanon is not treating for copper so no treatment would be removed with the removal of the limit.

**It is recommended that copper monitoring be included in the reissued permit and source reduction measures (SRMs) be included to prevent backsliding from current conditions.** Reasonable potential will be evaluated at the next reissuance.

Chloride – Considering available effluent data from the current permit term (01/04/2022 – 01/03/2024), the 1-day P<sub>99</sub> chloride concentration is 441 mg/L, and the 4-day P<sub>99</sub> of effluent data is 351 mg/L.

These effluent concentrations are below the calculated WQBELs for chloride, therefore **no effluent limits are needed. Chloride monitoring is recommended** to ensure that 11 sample results are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code.

Mercury – The permit application did not require monitoring for mercury because Lebanon is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code. In accordance with s. NR 106.145(3)(a)3., Wis. Adm. Code, a minor municipal discharger shall monitor, and report results of influent and effluent mercury monitoring once every three months if, “there are two or more exceedances

in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5).” However, sludge sampling is not available but should be included in the reissued permit. It is not expected that there are exceedances of the high-quality mercury concentration based on similar municipal treatment plants and the lack of industries. **No effluent monitoring is recommended.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the type of discharge and effluent flow rate, **PFOS and PFOA monitoring is not recommended.** The Department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

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

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

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

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

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

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

Where:

A = 0.633 and B = 90.0 for Limited Aquatic Life, and  
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. The pH data from April 2019 were removed from this evaluation because this data was all above 10 s.u. and is not considered representative of normal conditions. A total of 245 sample results were reported from 02/14/2019 – 01/23/2024. The maximum reported value was 8.9 s.u. (Standard pH Units). The effluent pH was 8.8 s.u. or less 99% of the time. The 1-day P<sub>99</sub>, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.8 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 8.8 s.u. Therefore, a value of 8.8 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 8.8 s.u. into the equation above yields an ATC = 3.4 mg/L.

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

In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are calculated using the 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.

Attachment #1

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	6.8
1-Q <sub>10</sub>	3.4

The 1-Q<sub>10</sub> method yields the most stringent limits for Lebanon.

Presented below is a table of daily maximum limitations corresponding to various effluent pH values. Use of this table is not necessarily recommended in the permit, but it is presented herein for informational purposes.

**Daily Maximum Ammonia Nitrogen Limits – LAL**

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	83	7.0 < pH ≤ 7.1	51	8.0 < pH ≤ 8.1	11
6.1 < pH ≤ 6.2	82	7.1 < pH ≤ 7.2	46	8.1 < pH ≤ 8.2	8.8
6.2 < pH ≤ 6.3	80	7.2 < pH ≤ 7.3	40	8.2 < pH ≤ 8.3	7.3
6.3 < pH ≤ 6.4	78	7.3 < pH ≤ 7.4	35	8.3 < pH ≤ 8.4	6.0
6.4 < pH ≤ 6.5	75	7.4 < pH ≤ 7.5	31	8.4 < pH ≤ 8.5	5.0
6.5 < pH ≤ 6.6	72	7.5 < pH ≤ 7.6	26	8.5 < pH ≤ 8.6	4.1
6.6 < pH ≤ 6.7	69	7.6 < pH ≤ 7.7	22	8.6 < pH ≤ 8.7	3.4
6.7 < pH ≤ 6.8	65	7.7 < pH ≤ 7.8	19	8.7 < pH ≤ 8.8	2.8
6.8 < pH ≤ 6.9	60	7.8 < pH ≤ 7.9	16	8.8 < pH ≤ 8.9	2.4
6.9 < pH ≤ 7.0	56	7.9 < pH ≤ 8.0	13	8.9 < pH ≤ 9.0	2.0

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

The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do **not change** because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous WQBEL memo are shown in Attachment #3.

**Effluent Data**

The following table evaluates the statistics based upon ammonia data reported from 02/06/2019 – 01/24/2024, with those results being compared to the calculated limits to determine the need to include ammonia limits in Lebanon’s permit for the respective month ranges. That need is determined by calculating 99<sup>th</sup> upper percentile (or P<sub>99</sub>) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

**Ammonia Nitrogen Effluent Data**

Ammonia Nitrogen mg/L	May – October	November – April
1-day P <sub>99</sub>	9.30	7.63

Attachment #1

Ammonia Nitrogen mg/L	May – October	November – April
4-day P <sub>99</sub>	5.57	4.94
30-day P <sub>99</sub>	2.34	2.07
Mean*	0.96	0.66
Std	2.37	2.33
Sample size	126	120
Range	<0.039 – 18.6	<0.039 – 20

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

Based on this comparison, daily limits are required year-round.

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

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

**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 a daily maximum ammonia limit is necessary for Lebanon, 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.

The current permit has a year-round weekly average limit of 4.8 mg/L and a monthly average limit of 2.5 mg/L for May – October and 4.8 mg/L for November – April. **If Lebanon decides to continue with a single daily maximum ammonia limit, the weekly and monthly average limits shall be equal to or less than the calculated daily maximum limit of 3.4 mg/L.**

**If Lebanon decides to have variable daily maximum ammonia limits, the current weekly and monthly average limits are recommended to remain the same** because they are less than the maximum daily maximum limit of 83 mg/L.



### Conclusions and Recommendations

In summary, after rounding to two significant figures, the following ammonia nitrogen limitations are recommended. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code. Additional limits to meet the requirements in s. NR 106.07, Wis. Adm Code, are in bold.

#### Final Ammonia Nitrogen Limits – Single Daily Max Limit

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
May – October	3.4	<b>3.4</b>	2.5
November – April	3.4	<b>3.4</b>	<b>3.4</b>

#### Final Ammonia Nitrogen Limits – Variable Daily Max Limit

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
May – October	Variable	4.8	2.5
November – April	Variable	4.8	<b>4.8</b>

## 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.

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

#### Annual Average Mass Total Phosphorus Loading

Month	Monthly Avg. mg/L	Total Flow MG/month	Total Phosphorus lb./mo.
Jan 2020	0.90	0.60	4.5
Feb 2020	0.86	1.18	8.5
Mar 2020	1.10	1.35	12.5
April 2020	1.08	0.99	8.9
May 2020	0.93	0.44	3.4
June 2020	0.81	0.81	5.5
July 2020	0.74	1.23	7.6
Aug 2020	0.75	2.55	16.0
Sept 2020	0.74	1.78	11.0
Oct 2020	0.89	1.15	8.5
Nov 2020	0.70	1.56	9.1
Dec 2020	0.70	3.21	18.7
Average			9.5

Total P (lbs/month) =  
 Monthly average (mg/L) × annual average design flow (MGD) × 8.34 (lbs/gallon) × 30 (day/month)

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

**Rock River TMDL**

Revisions to the administrative rules for phosphorus discharges took effect on December 1, 2010. These rule revisions include additions to ch. NR 102 (s. NR 102.05), which establish phosphorus standards for surface waters. Revisions to ch. NR 217 (s. NR 217, Subchapter III) establish procedures for determining water quality based effluent limits for phosphorus, based on the applicable standards in ch. NR 102.

The Department has developed a TMDL for the Upper and Lower Rock River Basins. The US EPA approved the Rock River TMDL on September 28, 2011. The document, along with the referenced appendices can be found at:

[http://dnr.wi.gov/topic/TMDLs/RockRiver/Final\\_Rock\\_River\\_TMDL\\_Report\\_with\\_Tables.pdf](http://dnr.wi.gov/topic/TMDLs/RockRiver/Final_Rock_River_TMDL_Report_with_Tables.pdf)

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL-derived water quality based effluent limit (WQBEL) for phosphorus in addition to, or in lieu of, a s. NR 217.13 WQBEL in a WPDES permit. Because the Rock River Basin TMDL was developed to protect and improve the water quality of phosphorus impaired waters within the basin. The discharge from Lebanon is to a LAL water which is not 303(d) listed as phosphorus-impaired at this time or at the time of TMDL development. Because phosphorus criteria in s. NR 102.06, Wis. Adm. Code, do not apply to LAL waters, the next downstream waterbody is considered for a s. NR 217.13, Wis. Adm. Code, WQBEL.

The next downstream water is the Rock River which was 303(d) listed as impaired during TMDL development. Therefore, the TMDL-based limits can be included in the WPDES permit absent the s. NR 217.13, Wis. Adm. Code, WQBEL. This limit should be expressed in a manner consistent with the wasteload allocation and assumptions of the TMDL. If after two permit terms, the Department determines the nonpoint source load allocation has not been substantially reduced, the Department may include the s. NR 217.13, Wis. Adm. Code, WQBEL unless these reductions are likely to occur.

**TMDL Limits**

The monthly average total phosphorus (Total P) effluent limits in lbs/day are calculated based on the monthly phosphorus wasteload allocation (WLA) given in pounds per month as suggested in the *TMDL Implementation Guidance for Wastewater Permits* dated October 1, 2019. The WLA for this facility is found in the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin* report dated July 2011. The limits are equivalent to concentrations ranging from 1.2 – 2.5 mg/L at the facility design flow of 0.050 MGD. **Monthly average mass effluent limits in the following table are recommended for this discharge.**

**Total Phosphorus Effluent Limitations**

Month	Monthly Total P WLA <sup>1</sup> (lbs/month)	Days Per Month	Monthly Ave Total P Effluent Limit <sup>2</sup> (lbs/day)
Jan	24.46	31	<b>0.79</b>
Feb	29.22	28	<b>1.04</b>
March	25.31	31	<b>0.82</b>

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Month	Monthly Total P WLA <sup>1</sup> (lbs/month)	Days Per Month	Monthly Ave Total P Effluent Limit <sup>2</sup> (lbs/day)
April	19.44	30	<b>0.65</b>
May	17.56	31	<b>0.57</b>
June	14.99	30	<b>0.50</b>
July	15.71	31	<b>0.51</b>
Aug	15.84	31	<b>0.51</b>
Sept	16.94	30	<b>0.57</b>
Oct	17.03	31	<b>0.55</b>
Nov	17.26	30	<b>0.58</b>
Dec	20.66	31	<b>0.67</b>

Footnotes:

1- Rock River TMDL Appendix P. Monthly Total Phosphorus Allocations by Wastewater Treatment Facility (p. 147)

2- monthly average Total P effluent limit (lbs/day) = monthly Total P WLA (lbs/month) ÷ days per month

**These limits are currently effective in the permit and no changes are recommended. The TMDL-mass limits shall continue as well as the concentration limit of 3.0 mg/L as a monthly average.**

**Effluent Data**

The following table summarizes effluent total phosphorus monitoring data from 02/06/2019 – 01/24/2024.

**Total Phosphorus Effluent Data**

	Phosphorus mg/L	Phosphorus lbs/day
1-day P <sub>99</sub>	5.64	1.20
4-day P <sub>99</sub>	3.40	0.70
30-day P <sub>99</sub>	2.27	0.45
Mean*	1.75	0.34
Std	1.09	0.24
Sample size	242	242
Range	0.13 – 10.3	0.0156 – 2.567

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

**PART 5 – TOTAL SUSPENDED SOLIDS**

The Rock River TMDL also has wasteload allocations (WLA) for total suspended solids (TSS). For a municipal facility the limits for TSS must be expressed as weekly and monthly averages. The current permit includes a weekly average limit of 30 mg/L and a monthly average limit of 20 mg/L along with the TMDL-based mass limits.

**The current permit contains the following TMDL-based mass limits shown below, which were calculated from WLAs listed in Appendix Q of the Rock River TMDL:**

**Total Suspended Solids Effluent Limitations**

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)
Jan	8.4	14
Feb	9.3	15
March	8.4	14
April	8.7	14
May	8.4	14
June	8.7	14
July	8.4	14
Aug	8.4	14
Sept	8.7	14
Oct	8.4	14
Nov	8.7	14
Dec	8.4	14

Lebanon is currently meeting all TMDL limits so they are not recalculated. **No changes are recommended for the TSS limits in the reissued permit.**

The following table summarizes effluent total suspended solids monitoring data from 02/06/2019 – 01/24/2024.

**Effluent TSS Data**

Sample Type	TSS (mg/L)	TSS (lbs/day)
1-day P <sub>99</sub>	20.0	4.19
4-day P <sub>99</sub>	10.8	2.42
30-day P <sub>99</sub>	4.96	1.01
Mean*	2.53	0.40
Std	5.08	1.18
Sample Size	240	350
Range	<0 - 39	<0 - 11.3

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

**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 Chapters NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. The daily maximum effluent temperature limitation shall be 86 °F for discharges to surface waters classified as Limited Aquatic Life according to s. NR 104.02(3)(b)1, Wis. Adm. Code, except for those classified as wastewater effluent channels and wetlands regulated under ch. NR 103 and described in s. NR 106.55(2), Wis. Adm. Code, which has a daily maximum effluent temperature limitation of 120 °F. The 86 °F limit applies because the hydrologic classification is not listed as wetland in ch. NR 104, Wis. Adm. Code.

**Reasonable Potential**

Based on the available discharge temperature data from 02/12/2011 – 12/25/2017 shown below, the maximum daily effluent temperature reported was 68 °F; therefore, no reasonable potential for exceeding the daily maximum limit exists, and **no limits or monitoring are recommended**.

**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	51	52	-	86
FEB	52	52	-	86
MAR	52	52	-	86
APR	54	55	-	86
MAY	54	59	-	86
JUN	67	67	-	86
JUL	67	68	-	86
AUG	67	68	-	86
SEP	66	66	-	86
OCT	62	64	-	86
NOV	59	60	-	86
DEC	59	59	-	86

**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 LC<sub>50</sub> (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic 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<sub>25</sub> (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).

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The IWC of **6%** shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

$$IWC \text{ (as \%)} = Q_e \div \{(1 - f) Q_e + Q_s\} \times 100$$

Where:

- Q<sub>e</sub> = annual average flow = 0.05 MGD = 0.077 cfs
- f = fraction of the Q<sub>e</sub> withdrawn from the receiving water = 0
- Q<sub>s</sub> = ¼ of the 7-Q<sub>10</sub> = 5 cfs ÷ 4 = 1.25 cfs

The low flow used for the ICW calculation is from the Rock River, where the classification changes to a warmwater sport fish classification. Previous evaluations concluded that presence of aquatic life in the unnamed tributary is not likely due to poor habitat and low flows.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.
- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), 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.

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

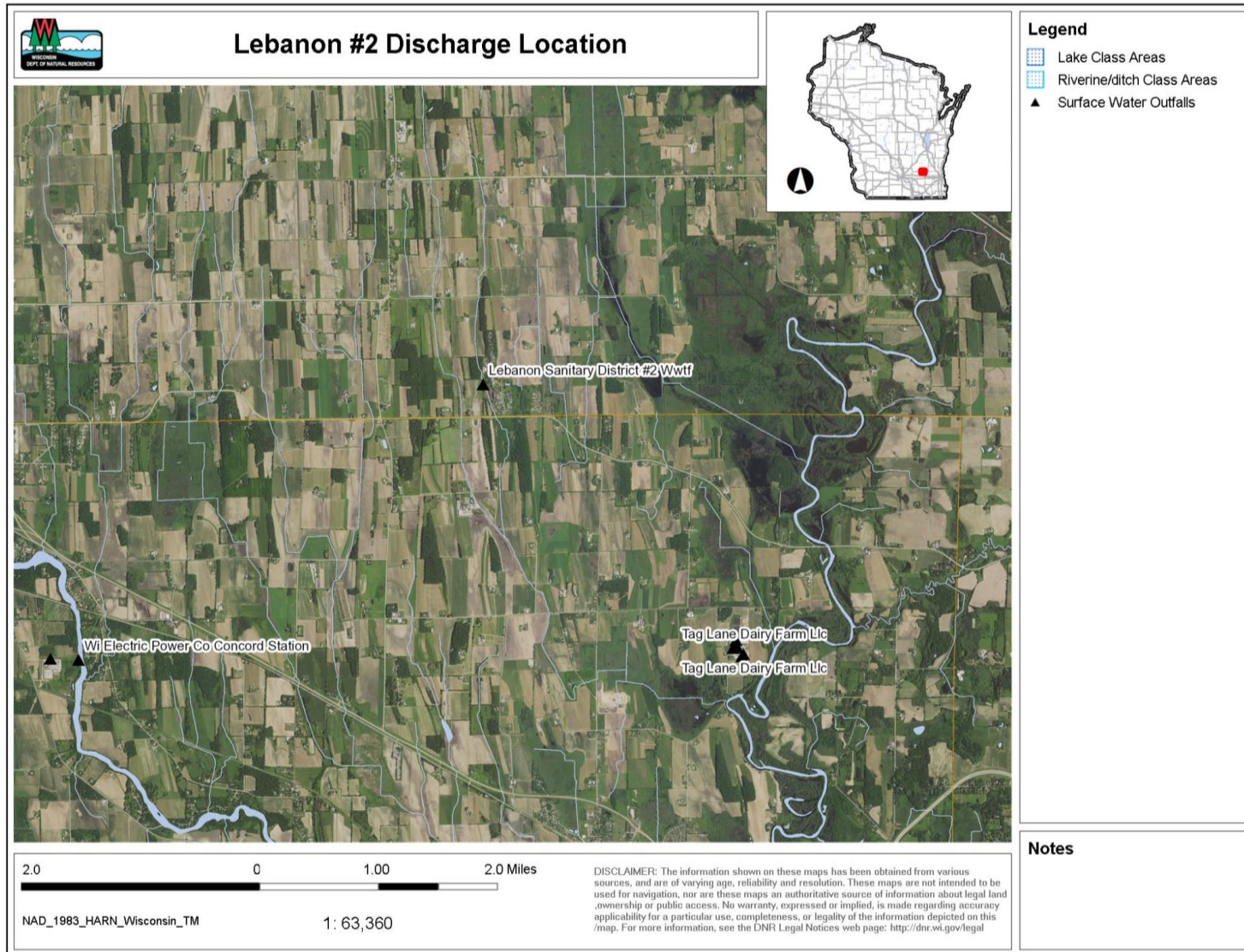
**WET Checklist Summary**

	<b>Acute</b>	<b>Chronic</b>
<b>AMZ/IWC</b>	Not Applicable. <b>0 Points</b>	IWC = 6%. <b>0 Points</b>
<b>Historical Data</b>	0 tests used to calculate RP. <b>5 Points</b>	0 tests used to calculate RP. <b>5 Points</b>
<b>Effluent Variability</b>	Little variability, no violations or upsets, consistent WWTF operations. <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Receiving Water Classification</b>	LAL classification, over 4 miles to WWSF.	Same as Acute.

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	<b>Acute</b>	<b>Chronic</b>
	<b>0 Points</b>	<b>0 Points</b>
<b>Chemical-Specific Data</b>	Reasonable potential for limits for ammonia based on ATC; Copper, nickel, zinc, and chloride detected. Additional Compounds of Concern: None. <b>8 Points</b>	Reasonable potential for limits for ammonia based on CTC; Copper, nickel, zinc, and chloride detected. Additional Compounds of Concern: None. <b>8 Points</b>
<b>Additives</b>	0 Biocides and 1 Water Quality Conditioner added. Permittee has proper P chemical SOPs in place: Yes <b>1 Point</b>	All additives used more than once per 4 days. <b>1 Point</b>
<b>Discharge Category</b>	0 Industrial Contributors. <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Wastewater Treatment</b>	Secondary or Better <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Downstream Impacts</b>	No impacts known. <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Total Checklist Points:</b>	<b>14 Points</b>	<b>14 Points</b>
<b>Recommended Monitoring Frequency (from Checklist):</b>	No tests recommended	No tests recommended
<b>Limit Required?</b>	No	No
<b>TRE Recommended? (from Checklist)</b>	No	No

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





Attachment #3  
**2006 Ammonia Calculations**

Water quality-based effluent limitations are evaluated in this report for Ammonia Nitrogen based upon water quality criteria in ch. NR 105 (as revised in March, 2004), including acute toxicity criteria (ATC) and chronic toxicity criteria (CTC). Effluent limitations for ammonia are calculated using the procedures in s. NR 106.32. The acute criteria relate to the pH of the effluent; the chronic criteria relate to both the pH and temperature of the receiving water body. This approach will establish criteria that are necessary to assure attainment of the designated use for the water body receiving the discharge.

A 99<sup>th</sup> percentile or a reasonable maximum value may be used for effluent pH to calculate the ammonia limit depending on the number of results available, the variability of those results, and the potential for outlier values. An effluent variability analysis was conducted according to the procedures of s. NR 106.05(5) and resulted in one day P99 of 8.8 s.u. for effluent pH.

The following sections summarize the effluent quality and associated limitations calculated in accordance with chs. NR 105, and 106 (Wis. Adm. Code).

<b>AMMONIA (as N) LIMITS</b>		<b>LIMITED AQUATIC LIFE</b>	
<b>CLASSIFICATION:</b>			
EFFLUENT FLOW (mgd):		0.05	
EFFLUENT FLOW (cfs):		0.077	
MAX. EFFLUENT pH (s.u.):		8.8	
<b>BACKGROUND INFORMATION:</b>		<i>summer</i>	<i>winter</i>
7Q10 (cfs)		0	0
7Q2 (cfs)		0	0
Ammonia (mg/L)		0.07	0.17
Temperature (deg C)		23	3
pH (std. units)		8.8	8.8
% of river flow used:		100	100
Reference weekly flow:		0	0
Reference monthly flow:		0	0
<b>CRITERIA (in mg/L):</b>			
Acute (@ effl. pH):		3.40	3.40
4-day Chronic (@ backgrd. pH):		16.68	87.18
30-day Chronic (@ backgrd. pH)		6.67	34.87
<b>EFFLUENT LIMITS (in mg/L):</b>			
<b>Daily maximum</b> (also see below)		5.69	5.69
<b>Weekly average</b>		6.25	22.69
<b>Monthly average</b>		2.50	9.08

Early life stages present limits do not apply for LAL streams because burbot are not expected to be present in the receiving water.

Acute ammonia limits are function of the effluent pH and may be necessary depending on the effluent pH. The effluent pH data generated after the plant up grade (August 2005) to the present were used and resulted in a daily maximum effluent pH p99 = 8.8 s.u.

The following table provides daily maximum limits throughout the pH range:

Daily Maximum Ammonia Limitations (mg/L) (LAL)					
pH	Criterion	Limit	pH	Criterion	Limit
6	84.74	169.48	7.6	26.25	52.50
6.2	81.94	163.89	7.8	18.71	37.41
6.4	77.87	155.74	8	12.96	25.91
6.6	72.19	144.38	8.2	8.83	17.65
6.8	64.72	129.44	8.4	5.98	11.97
7	55.62	111.24	8.6	4.08	8.17
7.2	45.52	91.04	8.8	2.84	5.69
7.4	35.40	70.80	9	2.04	4.08

**RECOMMENDED AMMONIA LIMITATIONS:**

Using the available information summarized earlier and pursuant to s. NR 106.33(2), the ammonia limitations would be as follows.

Ammonia Nitrogen	Daily max.	Weekly average	Monthly average
<i>May – Oct.</i>	5.7 mg/L	6.2 mg/L	2.5 mg/L
<i>Nov. - April</i>	5.7 mg/L	23 mg/L	9.1 mg/L

**Antidegradation Review:** An antidegradation analysis is needed pursuant to ch. NR 207 for every limitation that is greater than the corresponding limit in the existing WPDES permit. There are no ammonia limits in the existing permit therefore, the recommended limits are considered to be an initial imposition of limit and are exempt from antidegradation under s. NR 207.02(6) (b).