Permit Fact Sheet

General Information

Permit Number	WI-0023078-09-0
Permittee Name and Address	WI Air National Guard - Volk Field Volk Field CRTC 100 Independence Dr., Camp Douglas, WI 54618
Permitted Facility Name and Address	WI Air National Guard - Volk Field 100 Independence Dr., Camp Douglas, WI
Permit Term	January 01, 2027 to December 31, 2031
Discharge Location	South bank of the Lemonweir River 150 yards downstream from the 6th Ave. N bridge in the township of Orange.
Receiving Water	Lemonweir River in Little Lemonweir River Watershed of Lower Wisconsin River Basin in Juneau County
Stream Flow ($Q_{7,10}$)	46 cfs
Stream Classification	Warm Water Sport Fish
Discharge Type	Existing, Continuous
Annual Average Design Flow (MGD)	0.200 MGD
Industrial or Commercial Contributors	None
Plant Classification	A4 - Ponds, Lagoons and Natural Systems; P - Total Phosphorus; D - Disinfection; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The Wisconsin Air National Guard owns and operates the wastewater treatment facility located at Volk Field near the village of Camp Douglas for the treatment of domestic wastewater from Camp Douglas and the facilities at Volk Field. The facility has an annual average design flow of 0.200 million gallons per day (MGD). The facility discharged an average flow of 0.062 MGD to the Lemonweir River from Oct. 2020 – Oct. 2025. The influent flow is screened at the influent lift station. It is then treated in a two-cell aerated pond system followed by a polishing pond. Alum is added to the polishing pond to facilitate phosphorus precipitation. The effluent is disinfected using chlorination and is then dechlorinated by adding sodium bisulfite prior to discharge.

Substantial Compliance Determination

Enforcement During Last Permit: No formal enforcement actions taken during the previous permit term.

After a desktop review of all discharge monitoring reports, CMARs, compliance schedule items, and a site visit on October 15th, 2025, the Volk Field Wastewater Treatment Facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Logan Rubeck, Wastewater Engineer, on 07/15/2026.

Sample Point Descriptions

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
701	N/A	Influent: 24-hr flow-proportional composite sampler intake located in the main lift station wet well. Flow meter located at the influent wet well after pumping and screening.
001	0.062 MGD (Oct. 2020 – Oct. 2025)	Effluent: 24-hr flow-proportional composite sampler intake located between tertiary pond and chlorine contact tank. Grab samples collected at chlorine contact tank outlet. Flow meter located between tertiary pond and chlorine contact tank.
004	0 dry U.S. tons per year (2025 permit application)	Representative composite sludge samples shall be collected from the first lagoon (Cell 1) prior to disposal.
005	0 dry U.S. tons per year (2025 permit application)	Representative composite sludge samples shall be collected from the second lagoon (Cell 2) prior to disposal.
006	0.5 dry U.S. tons per year (2025 permit application)	Representative composite sludge samples shall be collected from the third lagoon (Cell 3) prior to disposal.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 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	

1.1.1 Changes from Previous Permit:

No changes from previous permit.

1.1.2 Explanation of Limits and Monitoring Requirements

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

2 Surface Water - Monitoring and Limitations

2.1 Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Monthly Avg	30 mg/L	2/Week	24-Hr Flow Prop Comp	
BOD5, Total	Weekly Avg	45 mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	2/Week	24-Hr Flow Prop Comp	
pH Field	Daily Min	6.0 su	5/Week	Grab	
pH Field	Daily Max	9.0 su	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.
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 Limitations permit section.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	108 mg/L	2/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	101 mg/L	2/Week	24-Hr Flow Prop Comp	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	May through September

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
E. coli	% Exceedance	10 Percent	Monthly	Calculated	May through September
Chlorine, Total Residual	Daily Max	38 ug/L	5/Week	Grab	May through September
Chlorine, Total Residual	Weekly Avg	38 ug/L	5/Week	Grab	May through September
Chlorine, Total Residual	Monthly Avg	38 ug/L	5/Week	Grab	May through September
PFOS		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Sampling and Reporting Requirements in permit.
PFOA		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Sampling and Reporting Requirements in permit.
Phosphorus, Total	Monthly Avg	1.0 mg/L	2/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	1.74 lbs/day	2/Week	Calculated	See TMDL permit section.
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of phosphorus and report on the last day of the month on the DMR. See TMDL permit section.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of phosphorus discharged and report on the last day of the month on the DMR. See TMDL permit section.
Nitrogen, Total Kjeldahl		mg/L	Quarterly	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring permit section.
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring permit section.
Nitrogen, Total		mg/L	Quarterly	Calculated	Annual in rotating quarters. See Nitrogen Series Monitoring permit section.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Acute WET	Daily Max	1.0 TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET testing permit section.

2.1.1 Changes from Previous Permit

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

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

PFOS and PFOA – Monitoring once every two months is included in the permit in accordance with s. NR 106.98(2)(c), Wis. Adm. Code.

2.1.2 Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo dated March 23, 2026.

Monitoring Frequencies – The Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term.

PFOS and PFOA – NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for municipal dischargers with an average flow rate less than 1 MGD, to be evaluated on a case-by-case basis to determine if monitoring is required pursuant to s. NR 106.98(2)(c), 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.

Prior to permit drafting, high levels of PFOS had been measured in the lagoon sludge. Therefore, monitoring once every two months is included. A sample frequency of 1/2 months means one sample is taken during any two-month period. Examples of 1/2 month sample would be every other month (Jan, March, May, etc.) or back-to-back months with a break in between (February & March, May & June, Aug & Sept, etc.). DMR Short Forms will be generated for the following time periods: January-February, March-April, May-June, July-August, September-October, and November-December. At a minimum one sample result will be present on each form.

The initial determination of the need for sampling shall be conducted for up to two years in order to determine if the permitted discharge has the reasonable potential to cause or contribute to an exceedance of the PFOS or PFOA standards under s. NR 102.04(8)(d)1, Wis. Adm. Code.

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)**
004	B	Liquid	N/A	N/A	N/A	N/A
005	B	Liquid	N/A	N/A	N/A	N/A
006	B	Liquid	N/A	N/A	Hauled	0.5 US dry tons/year
Does sludge management demonstrate compliance? Yes						
Is additional sludge storage required? No, treatment lagoon system provides adequate storage.						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No						
Is a priority pollutant scan required? No						

3.1 Sample Point Number: 004- FIRST AERATED POND; 005- SECOND AERATED POND, and 006- THIRD POLISHING POND

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Once	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Once	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Once	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Once	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Once	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Once	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Once	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Once	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Once	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Once	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Once	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nickel Dry Wt	Ceiling	420 mg/kg	Once	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Once	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Once	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Once	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Once	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Once	Composite	
Nitrogen, Total Kjeldahl		Percent	Per Application	Composite	
Nitrogen, Ammonium (NH4-N) Total		Percent	Per Application	Composite	
Phosphorus, Total		Percent	Per Application	Composite	
Phosphorus, Water Extractable		% of Tot P	Per Application	Composite	
Potassium, Total Recoverable		Percent	Per Application	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2028
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2028
PFOA + PFOS		ug/kg	Once	Calculated	Report the sum of PFOA and PFOS. See PFAS Land Application Requirements permit section.
PFAS Dry Wt			Once	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

3.1.1 Changes from Previous Permit:

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

Outfalls – Outfalls were created for and assigned to each pond.

List 1 – List 1 monitoring required once for each outfall pursuant to s. NR 204.06(2)(b)3., Wis. Adm. Code.

List 2 – List 2 monitoring added to all outfalls. List 2 monitoring required prior to land application pursuant to s. NR 204.06(2)(b)2., Wis. Adm. Code.

PCBs – PCB monitoring required once for each outfall pursuant to s. NR 204.06(2)(b)5., Wis. Adm. Code.

PFAS – Monitoring of each outfall is required once pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.

3.1.2 Explanation of Limits and Monitoring Requirements

Requirements for disposal, including land application of municipal sludge, are determined in accordance with ch. NR 204, Wis. Adm. Code. Ceiling and high-quality limits for metals in sludge are specified in s. NR 204.07(5), Wis. Adm. Code. Requirements for pathogens are specified in s. NR 204.07(6) and 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 has developed a draft risk assessment to determine future land application rates and released this risk assessment in January of 2025. The Department is evaluating this new information.

2025 Wisconsin Act 201 was enacted on April 6, 2026 to address monitoring for PFAS in sewage sludge. The Act created s. 283.82(4), Wis. Stats., and requires the Department to include PFOA & PFOS limitations or conditions in WPDES permits for the land application of sewage sludge. The Department's implementation strategy is outlined in the "Interim Strategy for Land Application of Biosolids and Industrial Sludges containing PFAS". The Department intends to periodically review and update this interim strategy. See the PFAS Land Application Requirements permit section for more information about the limitations in this permit.

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

4 Schedules

4.1 Effluent PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
Report on Effluent Discharge: Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.	12/31/2027
Report on Effluent Discharge and Evaluation of Need: Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results. The permittee shall also submit a request to the Department to evaluate the need for a PFOS/PFOA minimization plan. If the Department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for Department	12/31/2028

approval no later than 90 days after written notification was sent from the Department. The Department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued. If, however, the Department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.	

4.1.1 Explanation of Schedule

Ch. NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Section NR 106.98, Wis. Adm. Code, specifies steps to generate data in order to determine the need for reducing PFOS and PFOA in the discharge. Data generated per the effluent monitoring requirements will be used to determine the need for developing a PFOS/PFOA minimization plan. As part of the schedule, the permittee is required to submit two annual Reports on Effluent Discharge.

If the Department determines that a minimization plan is needed, the permit will be modified or revoked/reissued to include additional requirements.

4.2 Sludge PFOS/PFOA Minimization Plan

Required Action	Due Date
Submit a Sludge PFOS/PFOA Minimization Plan: The permittee shall submit for Department review and approval a sludge PFOS/PFOA minimization plan to reduce concentrations of PFOS/PFOA in the sewage sludge. This plan shall include a schedule for identification and monitoring of potential sources and actions for reducing and/or eliminating identified sources. Upon receiving approval, the permittee shall implement the actions identified in the plan.	12/31/2027

4.2.1 Explanation of Schedule

Due to high levels of PFOS in the sewage sludge prior to permit drafting, a minimization plan is needed to identify sources of PFOS/PFOA in sewage sludge and establish a plan to reduce concentrations in the treatment system pursuant to s. 283.82(4)(a), Wis. Stats.

4.3 Sludge Management Plan

Required Action	Due Date
Submit a Sludge Management Plan: The permittee shall submit a sludge management plan for approval. The plan shall demonstrate compliance with ch. NR 204 Wis. Adm. Code and at minimum address 1) How and where is sludge sampled; 2) Available sludge storage details and location(s); 3) How will the sludge be removed with details on volume, characterization and how will the treatment plant continue to function during the drawdown; 4) Describe the type of transportation and spreading vehicles and loading and unloading practices; 5) Identify approved land application sites, apply for needed sites, site limitations, total acres needed and vegetative cover management; 6) Specify record keeping procedures including site loading; 7) Address contingency plans for adverse weather and	12/31/2027

odor/nuisance abatement; and 8) Include any other pertinent information such as other disposal options that may be used or specifications of any pretreatment processes. Once approved, all sludge management activities shall be conducted in accordance with the plan. Any changes to the plan must be approved by the Department prior to implementing the changes. No desludging may occur unless approval from the Department is obtained. Daily logs shall be kept that record where the sludge has been disposed. The plan is due at least 90 days prior to sludge removal or December 31, 2027, whichever date occurs first.	
Update Sludge Management Plan: If approval from the Department for land application activities is obtained, the permittee shall submit an updated sludge management plan for Department review and approval. Upon approval, all sludge management activities shall be conducted in accordance with the updated plan. This updated plan is due 90 days prior to land application.	

4.3.1 Explanation of Schedule

A management plan is needed to show compliance with ch. NR 204, Wis. Adm. Code. There are outlines available to assist in plan development.

Other Comments

In-plant sample points 101 and 102 and associated monitoring requirements have been removed.

Attachments

Water Quality Based Effluent Limits Memo – March 23, 2026

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance

Prepared By:
Chris Holland
Wastewater Engineer
Date: October 23, 2026

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: March 23, 2026

TO: Chris Holland – WY/3

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Water Quality-Based Effluent Limitations for the WI Air National Guard - Volk Field
WPDES Permit No. WI-0023078

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 WI Air National Guard - Volk Field in Juneau County. This municipal wastewater treatment facility (WWTF) discharges to the Lemonweir River, located in the Little Lemonweir River Watershed in the Lower Wisconsin River Basin. This discharge is included in the Wisconsin River Basin (WRB) Total Maximum Daily Load (TMDL) as approved by EPA on 04/26/2019 with site-specific criteria approved by EPA on 07/09/2020. 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		1,3
TSS			45 mg/L	30 mg/L		1,3
pH	9.0 s.u.	6.0 s.u.				1
Ammonia Nitrogen	Variable		**108 mg/L**	101 mg/L		1,4,5
E. coli May - September				126 #/100 mL geometric mean		6
Chlorine May - September	38 µg/L		**38 µg/L**	**38 µg/L**		4
PFOS and PFOA						7
Phosphorus TBEL TMDL Limit				1.0 mg/L 1.74 lbs/day		8,9
TKN, Nitrate+Nitrite, and Total Nitrogen						10
Acute WET	1.0 TUa					11,12

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. These limits are based on the Warm Water Sport Fish (WWSF) community of the immediate receiving water as described in s. NR 210.05(1), Wis. Adm. Code.
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.

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. Additional Limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
7. PFOS and PFOA monitoring is recommended once every two months in accordance with s. NR 106.98(2), Wis. Adm. Code.
8. The mass limit is based on the Total Maximum Daily Load (TMDL) for the Wisconsin River to address phosphorus within the TMDL area. The TMDL was approved by EPA on 04/26/2019 with site-specific criteria approved by EPA on 07/09/2020.
9. This is a technology based effluent limit (TBEL) for phosphorus required in accordance with s. NR 217.04, Wis. Adm. Code.
10. 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. Sections 283.37(5) and 283.55(1)(e), Wis. Stats, and ss. NR 200.065(1)(g) and NR 200.065(1)(h), Wis. Adm. Codes, provide the authority to request this monitoring during the permit term. Total Nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total Kjeldahl nitrogen (TKN) (all expressed as N).
11. Annual Acute WET tests are recommended. 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. Testing for acute WET should continue after the permit expiration date (until the permit is reissued).
12. 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.

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 (2) – Narrative & Map

PREPARED BY: _____ Date: 3/23/26

Benjamin Hartenbower, PE
Water Resources Engineer

E-cc: Logan Rubeck, Wastewater Engineer – WCR/Eau Claire
Nate Willis, Wastewater Section Manager – WY/3
Diane Figiel, Water Resources Engineer – WY/3
Scott Provost, Water Quality Biologist – WCR/Wisconsin Rapids

Attachment #1

Water Quality-Based Effluent Limitations for
The WI Air National Guard - Volk Field

WPDES Permit No. WI-0023078

Prepared by: Benjamin P. Hartenbower

PART 1 – BACKGROUND INFORMATION

Facility Description

The Wisconsin Air National Guard owns and operates the wastewater treatment facility located at Volk Field near Camp Douglas for the treatment of domestic wastewater from the Camp Douglas and the facilities at Volk Field. The facility has an annual average design flow of 0.200 million gallons per day (MGD). The effluent is treated in an aerated pond system followed by a polishing pond. Alum is added to the polishing pond to reduce effluent phosphorus. Effluent is disinfected via chlorination and then dechlorinated by added sodium bisulfite prior to discharge to the South bank of the Lemonweir river 150 yards downstream from 6th Ave. North bridge in the township of Orange. Analysis of the lagoon sludge indicates a high level of Perflorooctane Sulfonate (PFOS). Attachment #2 is a map of the area showing the approximate location of Outfall 001.

Existing Permit Limitations

The current permit, which expired on September 30, 2025, 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		1,3
TSS			45 mg/L	30 mg/L		1,3
pH	9.0 s.u.	6.0 s.u.				1
Ammonia Nitrogen	Variable		**108 mg/L**	101 mg/L		4,5
Fecal Coliform May - September				400 #/100 mL geometric mean		6
E. coli May - September				126 #/100 mL geometric mean		
Chlorine May - September	38 µg/L		**38 µg/L**	**38 µg/L**		4
Phosphorus TBEL TMDL Limit				1.0 mg/L 1.74 lbs/day		
TKN, Nitrate+Nitrite, and Total Nitrogen						2
Acute WET	1.0 TUa					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. These limits are based on the Warm Water Sport Fish (WWSF) community of the immediate receiving water as described in s. NR 210.05(1), Wis. Adm. Code.
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.
5. The variable daily maximum ammonia nitrogen limit table corresponding to effluent pH values.

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. A compliance schedule is in the current permit for the *E. coli* limit to replace the Fecal Coliform limit by May 1, 2022.
7. Acute WET testing required: October - December 2020, January - March 2021, April - June 2022, July - September 2023, October - December 2024, and October - December 2025.

Receiving Water Information

- Name: Lemonweir River
- Waterbody Identification Code (WBIC): 1301700
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q_{10} and 7-Q_2 values are estimated from the drainage area ratio between USGS Station 05403500, at New Lisbon and the discharge location in the Lemonweir River, where Outfall 001 is located.

  7-Q_{10} = 46 cubic feet per second (cfs)

  7-Q_2 = 65 cfs

  Harmonic Mean Flow = 139 cfs using a drainage area of 417 mi^2

  The Harmonic Mean has been estimated based on average flow and the 7-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 = 67 mg/L as $CaCO_3$. This value represents the geometric mean of hardness from WET Testing from 04/28/2021 to 11/06/2024 (n = 7).
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from the Black River at Hemlock are used in

this evaluation because there is no data available for the Lemonweir River. The Black River is within the same ecological landscape so ambient water quality characteristics are expected to be similar. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.

- Multiple dischargers: New Lisbon Wastewater Treatment Facility also discharges to the Lemonweir 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 Lemonweir River is impaired for Total Phosphorus (miles 0 to 55.88). This discharge is located within the Wisconsin River TMDL for phosphorus.

Effluent Information

- Flow Rate(s):
  Annual Average = 0.200 MGD (Million Gallons per Day)
  For reference, the actual average flow from October 2020 to October 2025 was 0.062 MGD.
- Hardness = 70 mg/L as $CaCO_3$. This value represents the geometric mean four samples collected in April 2025 which were reported in the permit application.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Wastewater source: Domestic wastewater from Camp Douglas and Volk Field
- Water supply: WI Air National Guard Volk Field
- Additives: Chlorine (Biocide), Sodium Bisulfite (Water Quality Conditioner), Alum (Water Quality Conditioner)
- Total Phosphorus Wasteload Allocation: 609 lbs/year = 1.67 lbs/day
- 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 and hardness. The permit-required monitoring for Ammonia Nitrogen, Chlorine, and Phosphorus from October 2020 to October 2025 is used in this evaluation.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2, 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.

Chloride Effluent Data for Outfall 001

Sample Date	Chloride mg/L
04/17/2025	100
04/21/2025	100
04/24/2025	100
04/28/2025	100
mean	100

Attachment #1

The following table presents the average concentrations and loadings at Outfall 001 from October 2020 to October 2025 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameters with Effluent Limits

	Average Measurement	Average Mass Discharged
BOD_5	7 mg/L*	
TSS	8 mg/L*	
pH	7.12 s.u.	
Fecal Coliform	11 #/100 mL**	
E. coli	11 #/100 mL**	
Chlorine	6 µg/L*	
Ammonia Nitrogen	6.5 mg/L*	
Phosphorus	0.32 mg/L*	0.178 lbs/day

*Results below the limit of detection (LOD) were included as zeros in calculation of average.
** The average measurement for bacteria is calculated as a geometric mean. Values reported below the LOD are replaced with a value of 1 for the calculation of the geometric mean.

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.

Attachment #1

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

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 WI Air National Guard - Volk Field, 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 = 37 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.
Chlorine		19.03		38			26	33
Arsenic		339.8		680	136	<7.7		
Cadmium	70	6.85	0.009	14	3	<0.41		
Chromium (+3)	70	1347.09	0.622	2694	539	<1.1		
Copper	70	11.09	1.265	22	4	0.5		5.6
Lead	70	75.81	0.178	152	30	<1.4		
Nickel	70	347.17		694	139	<1.5		
Zinc	70	88.18	1.71	176	35	5.1		
Chloride (mg/L)		757		1514	303	100		100

**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 = 12 cfs, (¼ of 7-Q_{10}), as specified in s. NR 106.06(4)(c), Wis. Adm. Code.

SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Chlorine		7.28		277.8			15
Arsenic		152.2		5808	1162	<7.7	
Cadmium	67	1.79	0.009	68	14	<0.41	
Chromium (+3)	67	94.77	0.622	3594	719	<1.1	
Copper	67	7.32	1.265	232	46	0.5	
Lead	67	18.93	0.178	716	143	<1.4	
Nickel	67	37.03		1413	283	<1.5	
Zinc	67	84.43	1.71	3158	632	5.1	
Chloride (mg/L)		395		15074	3015	100	

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 = 35 cfs, (¼ of Harmonic Mean), as specified in s. NR 106.06(4)(c), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Cadmium	370	0.009	41934	8387	<0.41	
Chromium (+3)	3818000	0.622	432719171	86543834	<1.1	
Lead	140	0.178	15847	3169	<1.4	
Nickel	43000		4873475	974695	<1.5	

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 35 cfs, (¼ of Harmonic Mean), as specified in s. NR 106.06(4)(c), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Arsenic	13.3		1507.4	301.5	<7.7	

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 calculated limitations and effluent data, effluent limitations are required for Chlorine. Limits and/or monitoring recommendations are made in the paragraphs below:

Total Residual Chlorine– Because chlorine is added as a disinfectant, effluent limitations are recommended to assure proper operation of the de-chlorination system. Section NR 210.06(2)(b), Wis. Adm. Code, states, "When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L." Because the WQBELs are more restrictive, they are recommended instead. Specifically, a **daily maximum limit of 38 µg/L is required**. Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required. Weekly average limitations are not needed based on reasonable potential as the daily maximum limitations will provide adequate protection of the resource.

Sections NR 106.07(4) and NR 205.065(7), Wis. Adm. Code require WPDES permits contain weekly and monthly average limitations for municipal dischargers whenever practicable and necessary to protect water quality. **Therefore, weekly and monthly average limits of 38 µg/L is required** to meet expression of limits requirements in addition to the daily maximum limit.

Mercury– The permit application did not require monitoring for mercury because the WI Air National Guard - Volk Field is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code. In accordance with s. NR 106.145(3)(a)3, Wis. Adm. Code, a minor municipal discharger shall monitor, and report results of influent and effluent mercury monitoring once every three months if, "there are two or more exceedances in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5), Wis. Adm. Code." A review of the past five years of sludge characteristics data reveals that all sample results are within expected analytical ranges and well below the 17 mg/kg level. The concentration in the sludge from 2021 was <0.18 mg/kg. **Therefore, no mercury monitoring is recommended at Outfall 001.**

PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code.

Available monitoring sample data from the WI Air National Guard Volk Field (PWS ID: 72901202) is provided in the table below:

Water Supply PFAS Data

Sample Date	Sample ID	Well #	PFOS (ng/L)	PFOA (ng/L)
05/10/2023	CB04927-03	BG846	<0.31	<0.49
05/10/2023	CB04927-01	BG847	<0.3	<0.47
04/14/2022	614228001	BG847	<0.894	<0.894
04/11/2022	613360001	BG846	<0.900	<0.900
		Average =	ND	ND

The limited data above shows the municipal water supply is below 1/5th of the applicable PFOS and PFOA criteria.

Based on the high levels of PFOS found in the lagoon sludge, **PFOS and PFOA monitoring is recommended once every two months.**

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 variable daily maximum, weekly 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 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:

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

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 1324 samples were reported from October 2020 to October 2025. The maximum reported value was 8.91 s.u. (Standard pH Units). The effluent pH was 8.23 s.u. or less 99% of the time. The 1-day P_{99}, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.06 s.u. The mean plus the standard deviation multiplied by a factor of 2.326, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 8.01 s.u. Therefore, a value of 8.23 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 8.23 s.u. into the equation above yields an ATC = 5.40 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	10.81
1-Q_{10}	643

The 2×ATC method yields the most stringent limits for the WI Air National Guard - Volk Field.

The current permit has variable daily maximum effluent limits based on effluent pH. Presented below is a table of daily maximum limitations corresponding to various effluent pH values.

Daily Maximum Ammonia Nitrogen Limits – WWSF

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, because 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 a Warm Water Sport Fish Community is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

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

Where:

pH = the pH (s.u.) of the receiving water,
E = 0.854,
C = the minimum of 2.85 or $1.45 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Present), or
C = $1.45 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Absent), and
T = the temperature (°C) of the receiving water – (Early Life Stages Present), or
T = the maximum of the actual temperature (°C) and 7 - (Early Life Stages Absent)

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q_{10} (4-Q_3, 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 °C, 25% of the flow is used if the Temperature < 11°C, and 50% of the flow is used if the Temperature ≥ 11 °C but < 16 °C.

Section NR 106.32 (3), Wis. Adm. Code, provides a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 °C, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the Lemonweir River, based on raw fish data in the Fisheries Management Information System. So "ELS Absent" criteria apply from October through March, and "ELS Present" criteria will apply from April through September for a Warm Water Sport Fish classification.

The default basin assumed values are used for temperature and background ammonia. The pH values are from the Lemonweir River. These values are shown in the table below, with the resulting criteria and effluent limitations.

Weekly and Monthly Average Ammonia Nitrogen Limits – WWSF

		April & May	June - September	October - March
Effluent Flow	Qe (MGD)	0.200	0.200	0.200
Background Information	7-Q_{10} (cfs)	46	46	46
	7-Q_2 (cfs)	65	65	65
	Ammonia (mg/L)	0.04	0.04	0.04
	Average Temperature (°C)	12	19	3.5
	Maximum Temperature (°C)	14	21	10
	pH (s.u.)	7.61	7.80	7.69
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	23.00	46.00	11.50
	Reference Monthly Flow (cfs)	27.63	55.25	13.81
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	9.84	5.39	9.05
	Early Life Stages Absent	9.89	5.39	12.10
	30-day Chronic			
	Early Life Stages Present	3.94	2.16	3.62
	Early Life Stages Absent	3.95	2.16	4.84
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	738	801	
	Early Life Stages Absent			461
	Monthly Average			
	Early Life Stages Present	352	380	
	Early Life Stages Absent			219

Effluent Data
The following table evaluates the statistics based upon ammonia data reported from October 2020 to October 2025.

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	April & May	June - September	October - March
1-day P_{99}	47.1	20.2	32.6
4-day P_{99}	26.6	11.3	18.5
30-day P_{99}	16.1	6.2	10.0
Mean*	11.5	4.0	6.4
Std	9.4	4.3	7.0
Sample size	86	172	268
Range	0.67 - 82	<0.2 - 14	<0.2 - 23

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

Reasonable Potential
The need to include ammonia limits in the WI Air National Guard - Volk Field permit is determined by calculating 99th upper percentile (or P_{99}) values for ammonia during the month ranges and comparing those to the calculated limits. Based on this comparison, daily limits are required throughout the year. However, since the permit currently has variable daily maximum, weekly and monthly average limits, **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, after rounding to two significant figures, a variable daily maximum ammonia nitrogen limitation is recommended year-round. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
Variable	108	101

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

On May 1, 2020, revisions to chs. NR 102 and NR 210, Wis. Adm. Codes, became effective which replace fecal coliform limits with new *Escherichia coli (E. coli)* limits for protection of recreational uses. Section NR 210.06(2)(a)1, Wis. Adm. Code, includes two limits which must be included in permits for facilities which are required to disinfect:

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

E. coli monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Because the WI Air National Guard - Volk Field 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 May through September. No changes are recommended to the current recreational period and the required disinfection season.

Effluent Data
The WI Air National Guard - Volk Field has monitored effluent *E. coli* from May 2021 to September 2025 and a total of 177 results are available. A geometric mean of 126 counts/100 mL was never exceeded in the 25 months of disinfection, with a maximum monthly geometric mean of 3 counts/100 mL. Effluent data never exceeded 410 counts/100 mL. The maximum reported value was 240 counts/100 mL.

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 WI Air National Guard - Volk Field currently has a limit of 1.0 mg/L, this limit should be included in the reissued permit. This limit remains applicable unless a more stringent WQBEL is given.

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

TMDL Limits
Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs (April 2020)* and are based on the annual phosphorus wasteload allocation (WLA) given in lbs/yr. This WLA is found in Appendix K of the *Wisconsin River TMDL Report (April 2019)* and is expressed as a maximum annual load (lbs/yr). For the WI Air National Guard - Volk Field, this WLA is 609 lbs/yr and 1.667 lbs/day.

The monthly average limit of 1.74 lbs/day was determined in the previous limit evaluation. The monthly multiplier of 1.04 was chosen using a coefficient of variation (CV) of 1.59 and a twice weekly effluent monitoring frequency. The TMDL-based phosphorus WQBEL(s) will be re-evaluated if the annual phosphorus WLA is not being met as described in the prior stated guidance. This is done by comparing each rolling sum of 12 consecutive months of total monthly mass phosphorus discharges over the current permit term directly against the annual WLA.

In this case, the WI Air National Guard - Volk Field has been 100% compliant in meeting the Annual WLA of 609 lbs/yr. None of the 50 available rolling sums have exceeded the annual WLA during October 2020 – October 2025. The WI Air National Guard - Volk Field is considered to be meeting their annual WLA. **Therefore, the monthly average limit of 1.74 lbs/day will remain unchanged during the reissued permit term.**

Phosphorus Effluent Data

	Concentration (mg/L)	Mass Discharge (lbs/day)
1-day P_{99}	1.65	1.118
4-day P_{99}	0.90	0.608
30-day P_{99}	0.49	0.294
Mean*	0.32	0.166
Std	0.34	0.240
Sample size	527	525
Range	<0.02 - 3.1	0.00 - 2.90

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

Conclusions:
In summary, the following limits are recommended by this evaluation:

- Monthly average Total Phosphorus concentration limit of 1.0 mg/L
- Monthly Average Total Phosphorus mass limit of 1.74 lbs/day

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 (Qs:Qe >30:1), the lowest calculated limitation is 120° F (s. NR 106.55(6)(a), Wis. Adm. Code). For treatment systems of domestic waste, there is no reasonable potential for the discharge to exceed this limit.

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 testing is usually not recommended where the ratio of the 7-Q_{10} to the effluent flow exceeds 100:1. For the WI Air National Guard - Volk Field, that ratio is approximately 149:1. With this amount of dilution, there is believed to be little potential for chronic toxicity effects in the Lemonweir River associated with the discharge from the WI Air National Guard - Volk Field, so the need for chronic WET testing will not be considered further.

- 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.

- 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?	
08/03/2005	>100	>100	Pass	Yes						
03/26/2008	**70.71**	>100	Fail	Yes						
02/11/2009	>100	30.3	Fail	No						1
05/20/2009	>100	>100	Pass	No						1
07/08/2009	>100	>100	Pass	No						1
07/22/2009	>100			No						1
08/12/2009	>100	>100	Pass	No						1
08/26/2009	>100	>100	Pass	No						1
10/13/2010	>100	>100	Pass	No						1
03/09/2011	>100	>100	Pass	No						1
08/28/2013	>100	>100	Pass	Yes						
12/17/2014	>100	>100	Pass	Yes						
07/12/2017	>100	>100	Pass	Yes						
05/08/2019	>100	>100	Pass	Yes						
11/18/2020	>100	>100	Pass	Yes						
04/28/2021	>100	>100	Pass	Yes						
04/27/2022	>100	>100	Pass	Yes						
07/19/2023	>100	>100	Pass	Yes						
11/06/2024	>100	>100	Pass	Yes						

Footnotes:

1. *Tests done by S-F Analytical, July 2008 – March 2011.* The DNR has reason to believe that WET tests completed by SF Analytical Labs from July 2008 through March 31, 2011 were not performed using proper test methods. Therefore, WET data from this lab during this period has been disqualified and was not included in the analysis.

- 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)]

Acute WET Limit Parameters

TUa(maximum) $100/LC_{50}$	**B** (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)
100/70.71 = 1.41 TUa	6.2 Based on 1 detect.

[(TUa effluent) (B)] = 8.77 > 1.0

Therefore, reasonable potential is shown for an acute WET limit using the procedures in s. NR 106.08(6), Wis. Adm. Code, and representative data from 2005 to 2024.

Expression of WET limits

Acute WET limit = 1.0 TU_a (daily maximum)

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

WET Checklist Summary

	Acute	**Chronic**
AMZ/IWC	Not Applicable. **0 Points**	Chronic not evaluated.
Historical Data	Eleven tests used to calculate RP. **0 Points**	
Effluent Variability	Little variability, consistent WWTF operations. **0 Points**	
Receiving Water Classification	Warm Water Sport Fish (5 pts) **5 Points**	
Chemical-Specific Data	Reasonable potential for Ammonia and Chlorine limits based on ATC. (6 pts) Ammonia nitrogen limit carried over from the current permit. Chloride, Copper, and Zinc detected. (3 pts) Additional Compounds of Concern: None. **9 Points**	

Attachment #1

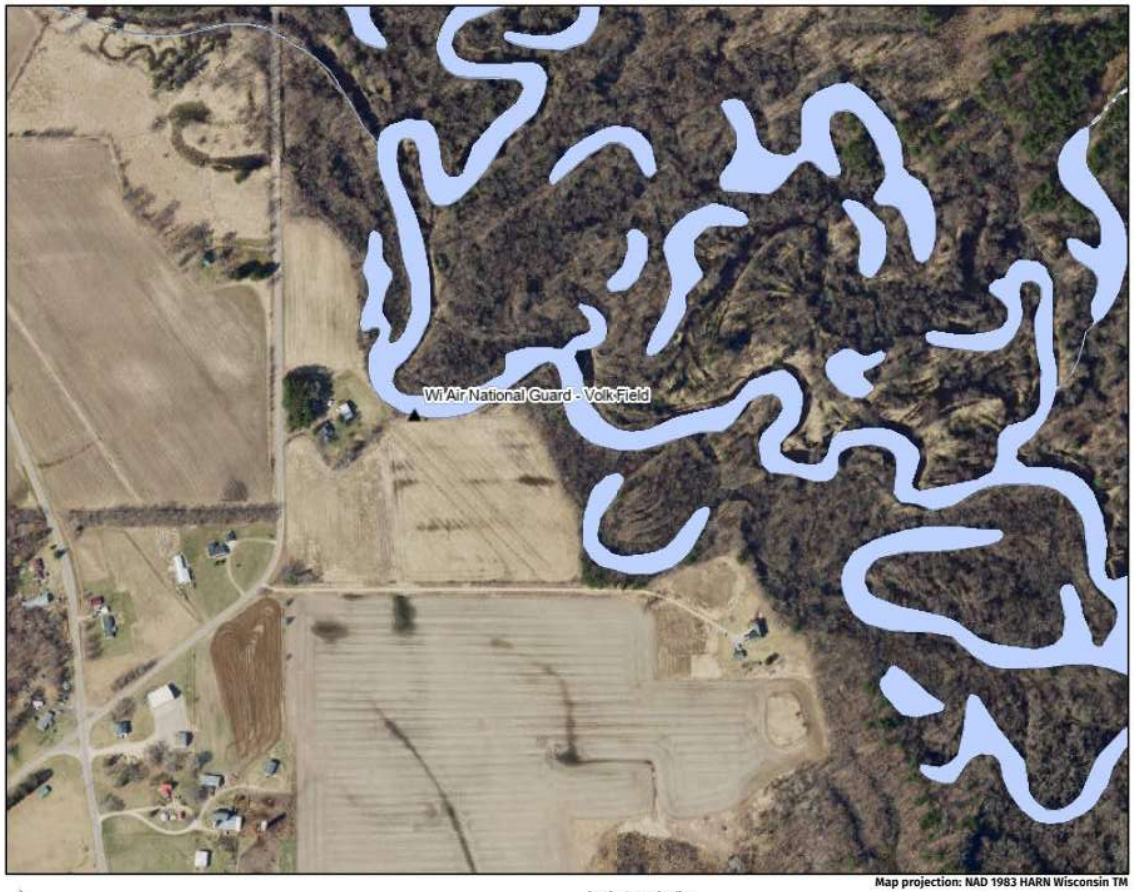
	Acute	Chronic
Additives	One Biocide (3 pts) and two Water Quality Conditioners (2 pts) added. Permittee has proper P chemical SOPs in place. **5 Points**	
Discharge Category	No Industrial Contributors. **0 Points**	
Wastewater Treatment	Secondary or Better **0 Points**	
Downstream Impacts	No impacts known. **0 Points**	
Total Checklist Points:	**19 Points**	
Recommended Monitoring Frequency (from Checklist):	1x yearly throughout permit term (rotating quarters)	
Limit Required?	Yes Limit = 1.0 TUa	
TRE Recommended? (from Checklist)	No	

- After consideration of the guidance provided in the Department's *WET Program Guidance Document* (2022) and other information described above, annual acute 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. Testing should continue after the permit expiration date (until the permit is reissued).

- A minimum of annual acute monitoring is required because an acute WET limit is required. Federal regulations in 40 CFR Part 122.44(i) require that monitoring occur at least once per year when a limit is present.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

WI Air National Guard Volk Field



Legend: (some map layers may not be displayed)

- Surface Water Outfalls
- Rivers and Streams
- Intermittent Streams
- Open Water
- 24K Intermittent Streams
- 24K Lakes and Open Water
- 24K Streams and Rivers

Municipalities

- Civil Town
- County Boundaries
- WI State Boundary

Notes:



Map projection: NAD 1983 HARN Wisconsin TM

N

Map: 0 450 900 Feet / 0 130 260 Meters

Service Layer Credits:
Latest Leaf Off: , DNR Basic Feature Vector Tile Layer WTM: , Permits & Determinations^: WI DNR Bureau of Watershed Management, Surface Water (Cached): WiDNR, USGS, and other data

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