

Permit Fact Sheet

General Information

Permit Number:	WI-0020508-10-0	
Permittee Name:	Village of Nichols	
Address:	P O Box 169	
City/State/Zip:	Nichols WI 54152	
Discharge Location:	NW ¼, SE ¼, Sec 7, T24N, R17E, Town of Cicero, Outagamie County	
Receiving Water:	Shioc River	
StreamFlow (Q _{7,10}):	0.13 cfs (cubic feet per second)	
Stream Classification:	Fish and aquatic life biological use (warm water sport fish community), recreation and non-public water supply	
Discharge Type:	Existing, continuous	
Design Flow(s)	Daily Maximum	0.165 MGD
	Weekly Maximum	0.101 MGD
	Monthly Maximum	0.050 MGD
	Annual Average	0.0316 MGD
Significant Industrial Loading?	Nichols Paper Products contributes 10% of the treatment facility's total flow. Factory waste ink in discharge has occasionally impacted POTW treatment efficiency. Waste ink is now contained at the factory and hauled off site.	
Operator at Proper Grade?	License for Operator in Charge is valid through 05/01/2024. SS certification is needed by six months from the effective date of the permit.	
Approved Pretreatment Program?	N/A	

Facility Description

The Village of Nichols, located in northern Outagamie County, owns and operates an activated sludge type wastewater treatment facility (WWTF). The concentric tank, package-plant facility includes; a 2016 refurbished, Gorman-Rupp influent lift station wet-well fitted with two new 3Hp Flygt submersible pumps and motors, preliminary treatment mechanical fine-screening (hydrosieve), influent sampling, an activated sludge biological treatment basin on the outer ring and a circular final clarifier in the center. Ferric Chloride is added in the aeration basin for phosphorus reduction. Effluent flow metering is achieved with a 90degree, V-notch weir followed by effluent sampling. Secondary effluent is seasonally disinfected with Sodium Hypochlorite solution, followed by Sodium Bisulfite solution for dechlorination. Final effluent flows by gravity into the Shioc River via outfall 001. Activated sludge is stabilized in an aerobic digester vessel which occupies part of the outer tank ring next to the activated sludge basin. Digested liquid sludge is stored in an adjacent above ground Harvester-style tank, prior to land application on approval agricultural fields.

Substantial Compliance Determination

Enforcement During Last Permit:

After a desktop review of all discharge monitoring reports, CMARs, land app reports, CMOM, compliance schedule items, and a site visit on March 16, 2023, this facility has been found to be in substantial compliance with their current permit.

Compliance determination was made by Barti Oumarou, Compliance Engineer, on March 23, 2023.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/sample Contents and Treatment Description (as applicable)
701	Flow is not monitored at this sample point	Influent: Representative samples shall be collected after the headworks hydrosieve.
001	0.021 MGD July 2017-December 2023	Effluent: Flow shall be measured with transducer at the 90-degree, v-notch weir. Composite and grab samples shall be collected after the final clarifier from the weir box preceding the chlorine contact tank, except that samples for total residual chlorine, fecal coliform, and Whole Effluent Toxicity shall be collected after dechlorination.
002	9 dry U.S. tons per permit application	Aerobically digested liquid, sludge samples shall be collected from the sludge storage tank. Composite samples of the sludge shall be collected after proper mixing.

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
BOD5, Total		mg/L	2/Week	24-Hr Comp	
Suspended Solids, Total		mg/L	2/Week	24-Hr Comp	

1.1.1 Changes from Previous Permit:

Flow monitoring removed and sample type changed from 24-hr flow proportional composite to 24-hr comp. There is no flow meter at this sample point.

1.1.2 Explanation of Limits and Monitoring Requirements

Influent monitoring is needed to assess loading to the facility and treatment performance. Requirements for flow, BOD, and TSS are established in accordance with ch. NR 210.04(2), Wis. Adm. Code.

2 Surface Water - Monitoring and Limitations

2.1 Sample Point Number: 001- Effluent

Monitoring Requirements and Effluent Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD ₅ , Total	Monthly Avg	mg/L See Section 2.2.1.3	2/Week	24-Hr Flow Prop Comp	See permit Section 2.2.1.3 for limits for each month. See Section 5.4.6 for percent removal requirement.
BOD ₅ , Total	Weekly Avg	mg/L See Section 2.2.1.3	2/Week	24-Hr Flow Prop Comp	"See Section 2.2.1.3 for limits for each month. See Section 5.4.6 for percent removal requirement.
BOD ₅ , Total	Weekly Avg	lbs/day See Section 2.2.1.3	2/Week	Calculated	See Section 2.2.1.3 for limits for each month. See Section 5.4.6 for percent removal requirement.
Suspended Solids, Total	Weekly Avg	mg/L See Section 2.2.1.4	2/Week	24-Hr Flow Prop Comp	See Section 2.2.1.4 for limits for each month. See Section 5.4.6 for percent removal requirement.
Suspended Solids, Total	Monthly Avg	mg/L See Section 2.2.1.4	2/Week	24-Hr Flow Prop Comp	See Section 2.2.1.4 for limits for each month. See Section 5.4.6 for percent removal requirement.
Suspended Solids, Total	Weekly Avg	13 lbs/day	2/Week	Calculated	
Suspended Solids, Total	Monthly Avg	8.1 lbs/day	2/Week	Calculated	
Suspended Solids, Total		lbs/month	Monthly	Calculated	Calculate the total monthly discharge of TSS and report on the last day of the month on the DMR. See TMDL Calculations section in the permit.

Monitoring Requirements and Effluent Limitations

Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Suspended Solids, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of TSS discharged and report on the last day of the month on the DMR. See TMDL Calculations section in the permit.
pH Field	Daily Min	6.0 su	5/Week	Grab	
pH Field	Daily Max	9.0 su	5/Week	Grab	
Dissolved Oxygen	Daily Min	7.0 mg/L	5/Week	Grab	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Monitoring and limit effective May through September annually.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Monitoring and limit effective May through September annually. See the E. coli Percent Limit section below. Enter the result in the DMR on the last day of the month.
Chlorine, Total Residual	Daily Max	38 µg/L	5/Week	Grab	Monitoring and limit effective May through September annually.
Chlorine, Total Residual	Weekly Avg	12 µg/L	5/Week	Grab	Monitoring and limit effective May through September annually.
Chlorine, Total Residual	Monthly Avg	12 µg/L	5/Week	Grab	Monitoring and limit effective May through September annually.
Nitrogen, Ammonia (NH ₃ -N) Total	Daily Max	16 mg/L	2/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH ₃ -N) Total	Weekly Avg	16 mg/L	2/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH ₃ -N) Total	Monthly Avg	16 mg/L	2/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	0.95 mg/L	Weekly	24-Hr Flow Prop Comp	

Monitoring Requirements and Effluent Limitations

Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Phosphorus, Total	Monthly Avg	0.17 lbs/day	Weekly	Calculated	Monitoring only upon permit effective date. Final TMDL-based mass limits go into effect per the phosphorus compliance schedule. See Phosphorus TMDL section in the permit.
Phosphorus, Total	6-Month Avg	0.057 lbs/day	Weekly	Calculated	Monitoring only upon permit effective date. Final TMDL-based mass limits go into effect per the phosphorus compliance schedule. See Phosphorus TMDL section in the permit.
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 Calculations section in the permit.
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 Calculations section in the permit.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	See Nitrogen Series Monitoring section below.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	See Nitrogen Series Monitoring section below.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	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.

Monitoring Requirements and Effluent Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Temperature Maximum		deg F	Weekly	Measure	Monitoring only 2028.
PFOS		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
PFOA		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
Acute WET		TU _a	See Listed Qtr(s)	24-Hr Flow Prop Comp	See section 2.2.1.13 in the permit for WET testing requirements and schedule.
Chronic WET	Monthly Avg	1.7 TU _c	See Listed Qtr(s)	24-Hr Flow Prop Comp	See section 2.2.1.13 in the permit for WET testing requirements and schedule.

2.1.1 Changes from Previous Permit

Total Suspended Solids TMDL Limits- Mass based TSS limits of 13 lbs/day expressed as a weekly average and 8.1 lbs/day expressed as a monthly average have been added to the permit to comply with requirements of the Upper Fox Wolf River TMDL. Effluent concentration (mg/L) shall be monitored and reported twice per week upon permit reissuance and will be used to calculate amounts reported for mass-based limits. An additional reporting requirement for lbs/month will be used to calculate the facility's 12-month rolling sum of total monthly discharge, which can be compared directly to the facility's designated annual WLA.

E. coli- Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits. See additional explanation of limits under "Explanation of Limits and Monitoring Requirements" below.

Nitrogen, Ammonia- Monitoring has been increased to 2/week to meet the minimum monitoring frequency applied to minor municipal facilities that discharge less than 0.25 MGD across the state.

Phosphorus TMDL Limits- An interim limit of 0.95 mg/L will remain in effect unless a more stringent limit is required at a future permit issuance by ss. NR 217.13 and 217.16(2), Wis. Adm. Code, or the limit is relaxed following procedures outlined in ch. NR 207, Wis. Adm. Code. Discharge effluent concentration (mg/L) shall be reported once per week upon permit reissuance and will be used to calculate amounts reported for mass-based parameters. An additional reporting requirement for lbs/month will be used to calculate the facility's 12-month rolling sum of total monthly discharge, which can be compared directly to the facility's designated annual WLA. Final TMDL WLA-based effluent limits of 0.17 lbs/day expressed as a monthly average and 0.057 lbs/day expressed as a 6-month average will go into effect in accordance with compliance schedule 4.1.

The monitoring frequency for phosphorus has been increased from monthly to weekly.

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

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

Whole Effluent Toxicity (WET)- A monthly average chronic WET limit of 1.7 TU_c has been added to the permit.

2.1.2 Explanation of Limits and Monitoring Requirements

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated March 13, 2023 used for this reissuance.

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 fairness and 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.

Expression of Limits- In accordance with the federal regulation 40 CFR 122.45(d) and s. NR 205.065, Wis. Adm. Code. limits in this permit are to be expressed as weekly average and monthly average limits whenever practicable.

BOD₅, Dissolved Oxygen, and pH- Categorical limits are included in the permit as outlined in s. NR 210.04, Wis. Adm. Code. The effluent limitations for BOD₅, dissolved oxygen and pH are carried over into this permit and are not subject to change at this time because the receiving water characteristics have not changed.

Upper Fox Wolf River Total Maximum Daily Load (TMDL)- The permitted facility is located within the Upper Fox Wolf River Basin Total Maximum Daily Load (UFWRB TMDL), which was approved by EPA February 27, 2020. The TMDL establishes Waste Load Allocations (WLAs) for point source dischargers and determines the maximum amounts of phosphorus and total suspended solids that can be discharged and still protect water quality. The final effluent limits and monitoring expressed in the permit were derived from and comply with the applicable water quality criterion and are consistent with the assumptions and requirements of the EPA-approved WLAs in the TMDL, which are 16 lbs/yr for phosphorus and 1,564 lbs/year for TSS for the permitted facility.

The approved TMDL expresses WLAs as lbs/year and lbs/day (maximum annual load divided by 365 days). As outlined in Section 4.6 of the department's 2020 TMDL Implementation Guidance for Wastewater Permits, TMDL limits must be given in the permit that are consistent with the TMDL WLA permit limits derived from the TMDL and need to be expressed as specified by 40 CFR 122.45 (d), s. NR 212.76 (4), and s. NR 205.065 (7), Wis. Adm. Code, unless determined to be impracticable. Impracticability has already been determined for phosphorus limits as laid out in the phosphorus impracticability agreement that was approved by USEPA in 2012 (see NPDES MOA Addendum dated July 12, 2012 at <https://prodoasint.dnr.wi.gov/swims/downloadDocument.do?id=167886175>).

For phosphorus, continuously discharging facilities covered by the UFWRB TMDL are given monthly average mass limits. If the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits (averaging period of May through October and November through April) are also included. The equivalent effluent concentration of 0.17 mg/L was calculated for the facility, thus, TMDL based mass limits are expressed as a six-month average and a monthly average equal to three times the six-month average limits.

For TSS, continuously discharging municipal/industrial facilities covered by the UFWRB TMDL are given monthly average and weekly average/daily max mass limits.

Facilities with UFWRB TMDL based effluent limits for phosphorus and TSS must report the 12-month rolling sum of total monthly discharge (lbs/yr). If reported 12-month rolling sums exceed the facility's max annual WLA, the facility's mass limits (monthly average and six-month average) may be recalculated using more appropriate CVs or monitoring frequencies when the permit is reissued to bring discharge levels into compliance with the facility's given WLA.

E. Coli- Revisions to bacteria surface water quality criteria to protect recreational uses and accompanying E. coli WPDES permit implementation procedures became effective May 1, 2020. The new rule requires that WPDES permits for facilities with required disinfection include monitoring for E. coli while facilities are disinfecting during the recreation period, and establish effluent limitations for E. coli established in s. NR 210.06 (2), Wis. Adm Code. The administrative code rule changes included the following actions: revised the bacteria water quality criteria from fecal coliform to E. coli

to protect recreation in ch. NR 102, Wis. Adm. Code.; removed fecal coliform criteria for certain individual waters from ch. NR 104, Wis. Adm. Code.; revised permit requirements for publicly and privately owned sewage treatment works in ch. NR 210, Wis. Adm. Code.; and, updated approved analytical methods for bacteria in ch. NR 219, Wis. Adm. Code.

E. coli monitoring is required at the permit effective date along with E. coli limits of 126 #/100 ml as a monthly geometric mean that may not be exceeded and 410 #/100 ml as a daily maximum that may not be exceeded more than 10 percent of the time in any calendar month will apply.

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.” The existing effluent limits are more restrictive than the categorical requirement in code, and so, remain in the permit.

Ammonia- Current acute and chronic ammonia toxicity criteria for the protection of aquatic life are included in Tables 2C and 4B of ch. NR 105, Wis. Adm. Code. Subchapter IV of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for ammonia.

Total Nitrogen Monitoring (NO₂+NO₃, TKN and Total N)- The Department has included effluent monitoring for Total Nitrogen in the permit through the authority under §§ 283.55(1)(e), Wis. Stats., which allows the department to require the permittee to submit information necessary to identify the type and quantity of any pollutants discharged from the point source, and through s. NR 200.065(1)(h), Wis. Adm. Code, which allows for this monitoring to be collected during the permit term. More information on the justification to include total nitrogen monitoring in wastewater permits can be found in the “Guidance for Total Nitrogen Monitoring in Wastewater Permits” dated October 1, 2019. Annual tests are scheduled in the following rotating quarters: October – December 2024; April – June 2025; January – March 2026; July – September 2027; and October – December 2028

Thermal- Requirements for Temperature are included in NR 102 Subchapter II Water Quality Standards for Temperature and NR 106 Subchapter V Effluent Limitations for Temperature. Thermal discharges must meet the Public Health criterion of 120 degrees F and the Fish & Aquatic Life criteria which are established to protect aquatic communities from lethal and sub-lethal thermal effects.

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. Based on information available at the time the proposed permit was drafted, it was identified that the POTW has an indirect discharger(s) that may be a potential source of PFOS/PFOA. 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.

Whole Effluent Toxicity- Whole effluent toxicity (WET) testing requirements and limits (if applicable) are determined in accordance with ss. NR 106.08 and NR 106.09 Wis. Adm. Code, as revised August 2016. (See the current version of the Whole Effluent Toxicity Program Guidance Document and checklist and WET information, guidance and test methods at <http://dnr.wi.gov/topic/wastewater/wet.html>)

- **Acute:** April – June 2025; and July – September 2027

- **Chronic:** October – December 2024; April – June 2025; January – March 2026; July – September 2027; and October – December 2028

3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
002	B	Liquid	Fecal Coliform	Injection	Land Application	9 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 If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility						
Is a priority pollutant scan required? No Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

3.1 Sample Point Number: 002- Liquid Sludge

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
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	
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	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
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	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	
Nitrogen, Ammonium (NH4-N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Monitoring and limits apply 2026.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Monitoring and limits apply 2026.
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	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:

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

3.1.2 Explanation of Limits and Monitoring Requirements

Requirements for land application of municipal sludge are determined in accordance with ch. NR 204 Wis. Adm. Code. Ceiling and high quality limits for metals in sludge are specified in s. NR 204.07(5). Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7) for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k). Radium requirements are addressed in s. NR 204.07(3)(n).

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.

Water Extractable Phosphorus- Water extractable phosphorus (WEP) is the coefficient for determining plant available phosphorus from measured total phosphorus. In Wisconsin, the Penn State Method is utilized and is expressed in percent. While a total P may be significant, the WEP may show that only a small percentage of the P is available to plants because of factors such as treatment processes and chemical addition that “tie-up” phosphorus limiting the amount of phosphorus that is plant available. As part of the Wisconsin’s nutrient management plan (NMP) requirements, the accounting of all fertilizers must be included over the NMP cycle. The fertilizer value of the waste needs to be communicated to the farmer and accounted for in the NMP.

4 Schedules

4.1 Final Phosphorus Limits

Required Action	Due Date
Progress Report: The permittee shall prepare and submit to the Department a report on the facility's progress towards meeting the final TMDL-based effluent limits for phosphorus. The report shall include an evaluation of collected effluent data, possible source reduction measures, operational improvements or other minor facility modifications that will optimize reductions in phosphorus discharges from the treatment plant and enable compliance with final phosphorus limits by May 1, 2026.	04/30/2025
Final Phosphorus Limits Effective: The permittee shall achieve compliance with final phosphorus limits.	05/01/2026

4.1.1 Explanation of schedule

The Wastewater Treatment Facility Final Compliance Alternatives Plan prepared for the Village of Nichols, dated June 30, 2021, indicates the facility will be able to achieve the six-month average total P limit of 0.058 lbs/day using ferric chloride. Per the WQBEL memo, the facility was not achieving final limits at the time of WQBEL calculation and an interim limit was recommended. This schedule gives the facility time to optimize phosphorus removal and achieve compliance with the final effluent limit by the end of the second year of the permitted term.

4.2 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.	04/30/2025

<p>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.</p>	
<p>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.</p> <p>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.</p> <p>The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan.</p> <p>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 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.</p> <p>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.</p>	<p>04/30/2026</p>

4.2.1 Explanation of Schedule

As stated above, NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. S. 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.

4.3 Subclass SS - Sanitary Sewage Collection System Operator Certification

Required Action	Due Date
<p>Wastewater Operator Certification for Subclass SS: The permittee shall have at least one person obtain certification for Subclass SS - Sanitary Sewage Collection System by the due date.</p>	<p>09/30/2024</p>

4.3.1 Explanation of Schedule

Ch. NR 113, Wis. Adm. Code, was revised to create Subclass SS and requires that facilities have at least one person certified in Subclass SS at the end of the first permit term after the rules effective date (June 2014).

5 Attachments:

Water Quality-Based Effluent Limitations for Nichols Wastewater Treatment Facility WPDES Permit No. WI-0020508-10, March 13, 2023, Nicole Krueger, Water Resources Engineer.

6 Expiration Date:

March 30, 2029

7 Justification Of Any Waivers From Permit Application Requirements

No waivers given from permit application requirements.

Prepared By: Amanda Perdsock, Wastewater Specialist

Date: February 28, 2024

Notice of issuance was published in the Post Crescent, 306 W Washington St., Appleton, WI 54911-4745.

CORRESPONDENCE/MEMORANDUM

DATE: 03/13/2023

TO: Sarah Adkins – NER

FROM: Nicole Krueger – SER *Nicole Krueger*

SUBJECT: Water Quality-Based Effluent Limitations for Nichols Wastewater Treatment Facility
 WPDES Permit No. WI-0020508-10

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 Nichols in Outagamie County. This municipal wastewater treatment facility (WWTF) discharges to the Shioc River, located in the Shioc River Watershed in the Wolf River Basin. This discharge is included in the Upper Fox and Wolf River TMDL as approved by EPA in February 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
BOD ₅						2,3
TSS TMDL			13 lbs/day	8.1 lbs/day		4,5
pH	9.0 s.u.	6.0 s.u.				2
Dissolved Oxygen		7.0 mg/L				2
Bacteria <i>E. coli</i>				126 #/100 mL geometric mean		6
Residual Chlorine May – September	38 µg/L		12 µg/L	12 µg/L		7
Ammonia Nitrogen	16 mg/L		16 mg/L	16 mg/L		7
Phosphorus Interim TMDL				0.95 mg/L 0.17 lbs/day	0.057 lbs/day	5
Acute WET						8,9
Chronic WET				1.7 TUc		8,9
TKN, Nitrate+Nitrite, and Total Nitrogen						10
PFOS and PFOA						11
Temperature						12

Footnotes:

1. Monitoring only.
2. No changes from the current permit.
3. Monthly BOD₅ limits are below:

Month	BOD₅ Weekly Average Limit (mg/L)	BOD₅ Monthly Average Limit (mg/L)	BOD₅ Weekly Average Mass Limit (lbs/day)
January	26	26	6.9
February	28	28	7.4
March	38	30	9.9
April	45	30	
May	45	30	
June	30	30	7.8
July	12	12	3.3
August	10	10	3.0
September	15	15	4.0
October	33	30	8.6
November	45	30	
December	36	30	9.6

4. Monthly TSS concentration limits are shown below:

Month	TSS Weekly Average Limit (mg/L)	TSS Monthly Average Limit (mg/L)
January	26	26
February	28	28
March	38	30
April	45	30
May	45	30
June	30	30
July	12	12
August	10	10
September	15	15
October	33	30
November	45	30
December	36	30

5. The TSS and phosphorus mass limits are based on the Total Maximum Daily Load (TMDL) for the Upper Fox and Wolf River Basin to address phosphorus water quality impairments within the TMDL area. The TMDL was approved by EPA in February 2020.
6. Bacteria limits apply during the disinfection season of May through September. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
7. The limits shown in bold are required to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code.
8. 2/permit term acute and 1x yearly chronic WET testing is recommended. The Instream Waste Concentration (IWC) to assess chronic test results is 60%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 75%, 50%, 25% & 12.5% and the dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the Shioc River.
9. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).
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. Total Nitrogen is the sum of nitrate (NO₃), nitrite (NO₂), and total kjeldahl nitrogen (TKN) (all expressed as N).

11. Monitoring is required in accordance with s. NR 106.98(2), Wis. Adm. Code at a frequency of once every two months.
12. One year of temperature monitoring is recommended.

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 or Diane Figiel at Diane.Figiel@wisconsin.gov.

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

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Attachment #1
**Water Quality-Based Effluent Limitations for
Nichols Wastewater Treatment Facility**

WPDES Permit No. WI-0020508-10

Prepared by: Nicole Krueger

PART 1 – BACKGROUND INFORMATION

Facility Description

The Village of Nichols, located in northern Outagamie County, owns and operates an activated sludge type wastewater treatment facility (WWTF). The concentric tank, package-plant facility includes an influent lift station wet-well, preliminary treatment mechanical fine-screening, an activated sludge biological treatment basin on the outer ring and a circular final clarifier in the center. Effluent is seasonally disinfected with sodium hypochlorite, followed by sodium bisulfite solution for dechlorination. Final effluent flows by gravity into the Shioc River via Outfall 001. Activated sludge is stabilized in an aerobic digester vessel which occupies part of the outer tank ring next to the activated sludge basin. Digested liquid sludge is stored in an adjacent above ground tank, prior to land application on approved agricultural fields.

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

Existing Permit Limitations

The current permit, which expired 06/30/2022, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD ₅						2,4
TSS						3
pH	9.0 s.u.	6.0 s.u.				4
Dissolved Oxygen		7.0 mg/L				4
Fecal Coliform May – September			656#/100 mL geometric mean	400#/100 mL geometric mean		
Residual Chlorine May – September	38 µg/L		12 µg/L	12 µg/L		5
Ammonia Nitrogen	16 mg/L		16 mg/L	16 mg/L		5
Phosphorus Interim Final				1.4 mg/L 0.225 mg/L	0.075 mg/L 0.02 lbs/day	6
Acute WET						7
Chronic WET						7

Footnotes:

1. Monitoring only.
2. BOD limits are shown below:

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Month	BOD ₅ Weekly Average Limit (mg/L)	BOD ₅ Monthly Average Limit (mg/L)	BOD ₅ Weekly Average Mass Limit (lbs/day)
January	26	26	6.9
February	28	28	7.4
March	38	30	9.9
April	45	30	-
May	45	30	-
June	30	30	7.8
July	12	12	3.3
August	10	10	3.0
September	15	15	4.0
October	33	30	8.6
November	45	30	
December	36	30	9.6

3. TSS limits are shown below:

Month	TSS Weekly Average Limit (mg/L)	TSS Monthly Average Limit (mg/L)
January	26	26
February	28	28
March	38	30
April	45	30
May	45	30
June	30	30
July	12	12
August	10	10
September	15	15
October	33	30
November	45	30
December	36	30

4. 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.
5. The limits shown in bold are required to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code.
6. A compliance schedule is in the current permit to meet the final WQBEL by 07/01/2026.
7. Acute tests are required twice during the permit term and chronic tests are required once every other year. The IWC for chronic WET is 60%.

Receiving Water Information

- Name: Shioc River
- Waterbody Identification Code (WBIC): 316800
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply. Cold Water and Public Water Supply criteria are used for bioaccumulating compounds of concern because the discharge is within the Great Lakes basin.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q₁₀ and

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7-Q₂ values updated October 19, 2005, are from USGS for Station W22, 0.8 miles west of Nichols, where Outfall 001 is located.

7-Q₁₀ = 0.13 cfs (cubic feet per second)

7-Q₂ = 0.46 cfs

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7-Q ₁₀ (cfs)	0.22	0.24	0.38	6.3	2.3	0.55	0.22	0.15	0.21	0.39	0.77	0.35
7-Q ₂ (cfs)	0.97	0.94	2.2	15	9.3	4.6	1.1	0.69	1.3	2.5	4.6	2.2

- Hardness = 324 mg/L as CaCO₃. This value represents the geometric mean of data from chronic WET testing from 05/20/2014 – 08/24/2021.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from the Wolf River at Shiocton is used for this evaluation. The Wolf River is within the same ecological landscape so ambient water quality characteristics are expected to be similar. Background chloride data is from the Shioct River at the STH 187 Bridge. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: None.
- Impaired water status: The immediate receiving water is 303(d) listed as impaired for total phosphorus.

Effluent Information

- Design flow rate(s):
Annual average = 0.0316 MGD (Million Gallons per Day)
For reference, the actual average flow from 07/01/2017 – 12/31/2022 was 0.022 MGD.
- Hardness = 284 mg/L as CaCO₃. This value represents the geometric mean of data from 05/25/2021 – 06/15/2021.
- 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 with industrial wastewater from Nichols Paper Products.
- Additives: Sodium hypochlorite is added for disinfection, sodium bisulfite is added for dechlorination, and ferric chloride is added 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 Copper Data

Sample Date	Copper µg/L	Sample Date	Copper µg/L	Sample Date	Copper µg/L
05/25/2021	8.7	07/29/2021	3.8	08/12/2021	<3.4

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Sample Date	Copper µg/L	Sample Date	Copper µg/L	Sample Date	Copper µg/L
07/19/2021	4.0	08/02/2021	3.5	08/16/2021	3.7
07/22/2021	3.4	08/05/2021	<3.4	08/16/2021	<3.4
07/26/2021	5.5	08/09/2021	<3.4		
Average = 3.0 µg/L					

“<” means that the pollutant was not detected at the indicated level of detection. The mean concentration was calculated using zero in place of the non-detected results.

Effluent Chloride Data

Sample Date	Chloride mg/L
05/25/2021	128
06/01/2021	97.3
06/08/2021	145
06/15/2021	107
Average	119

The following table presents the average concentrations and loadings at Outfall 001 from 07/01/2017 – 12/31/2022 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 ₅	9.9 mg/L	1.8 lbs/day
TSS	8.0 mg/L	
pH field	7.5 s.u.	
Phosphorus	1.2 mg/L	
Ammonia Nitrogen	0.36 mg/L*	
Dissolved Oxygen	10.2 mg/L	

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

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

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

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P₉₉) 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-Q₁₀

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)

Attachment #1

require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q₁₀ 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_s = average minimum 1-day flow which occurs once in 10 years (1-day Q₁₀)
if the 1-day Q₁₀ flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q₁₀).

Q_e = 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_s = 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-Q₁₀ 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 Nichols 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 = 0.10 cfs, (1-Q₁₀ (estimated as 80% of 7-Q₁₀)), 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		19.0		38.1			17.2	16
Arsenic		340		680	136	<8.3		
Cadmium	284	34.1	0.01	68.3	13.7	<1.3		
Chromium	284	4239		8478	1696	<2.5		
Copper	284	41.5	0.46	83.1	16.6	2.96		
Lead	284	293		586	117	<5.9		
Nickel	268	1080		2161	432	4.1		
Zinc	284	300	1.05	600	120	37.9		
Chloride (mg/L)		757	43.86	1514	303	119		

* 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.

** The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q₁₀ 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 = 0.0325 cfs (¼ of the 7-Q₁₀), 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		12.1			10.2
Arsenic		152		253	50.7	<8.3	
Cadmium	175	3.82	0.01	6.35	1.3	<1.3	
Chromium	301	326		542	108	<2.5	
Copper	325	28.4	0.46	46.9	9.39	2.96	
Lead	325	87.5		146	29.1	<5.9	
Nickel	268	120		200	40.0	4.1	
Zinc	325	337	1.05	561	112	37.9	
Chloride (mg/L)		395	43.86	628	126	119	

* 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 = 0.869 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	0.01	6946	1389.1	<1.3
Chromium (+3)	3818000		71674336	14334867	<2.5
Lead	140		2628	525.6	<5.9
Nickel	43000		807228	161446	4.10

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 0.869 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3	250	49.9	<8.3

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 required for chlorine.

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, **the daily maximum WQBEL of 38 µg/L and weekly average WQBEL of 12 µg/L are recommended to continue.** The current monthly average limit of 12 µg/L based on expression of limits requirements per s. NR 106.07(3), Wis. Adm. Code, is also recommended to continue.

Mercury – The permit application did not require monitoring for mercury because Nichols 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 the sample results are within expected analytical ranges and well below the 17 mg/kg level. The average concentration in the sludge from 10/03/2017 – 10/13/2022 was 0.047 mg/kg, with a maximum reported concentration of 0.28 mg/kg. Therefore, **no mercury monitoring is recommended at Outfall 001.**

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 indirect discharger (paper manufacturing) contributing to the collection system, **PFOS and PFOA monitoring is recommended at once every two months frequency.**

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 = 0.411 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 1435 sample results were reported from 07/03/2017 – 12/30/2022. The maximum reported value was 8.03 s.u. (Standard pH Units). The effluent pH was 7.92 s.u. or less 99% of the time. The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.91 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 7.91 s.u. Therefore, a value of 7.91 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 7.91 s.u. into the equation above yields an ATC = 10 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 either set equal to two times the nitrogen limits 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-Q₁₀ (estimated as 80 % of 7-Q₁₀) and the 2×ATC approach are shown below.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	20
1-Q ₁₀	31

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

This limit is greater than the current daily maximum limit of 16 mg/L. If Nichols would like to request an increase to the existing permit limits an assessment of their effluent data consistent with the requirements of ss. NR 207.04(1)(a) and (c), Wis. Adm. Code, must be provided. This evaluation is on a parameter-by-parameter basis and includes consideration of operations, maintenance and temporary upsets. Without a demonstration of need for a higher limit in accordance with s. NR 207.04, Wis. Adm. Code, the current limits must be continued in the reissued permit. The Department would be unable to increase the limit due to the lack of need as shown via the antidegradation rule (ch. NR 207, Wis. Adm. Code) because the highest reported concentration was 4.3 mg/L during the previous permit term. No changes are recommended in any of the permit limits for ammonia.

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 #4. The current permit has daily maximum, weekly average, and monthly average ammonia limits year-round of 16 mg/L.

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from 07/18/2017 – 09/20/2022, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Nichols’ permit. That need is determined by calculating 99th upper percentile (or P₉₉) values for ammonia and comparing the daily maximum values to the daily maximum limit.

Effluent Ammonia Data

	Ammonia Nitrogen mg/L
1-day P ₉₉	3.4
4-day P ₉₉	1.7
30-day P ₉₉	0.79
Mean*	0.36
Std	0.94
Sample size	66
Range	<0.25 – 4.3

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

Based on this comparison, there is no reasonable potential for the discharge to exceed the ammonia limits of 16 mg/L. However, since the permit currently has daily maximum, weekly average, and monthly average limits year-round, 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, the following ammonia nitrogen limitations are recommended. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
Year-round	16	16	16

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 Nichols’ permit requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any

additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit.

These limits are required during May through September. No changes are recommended to the current recreational period and the required disinfection season.

Effluent Data

Nichols has monitored effluent *E. coli* from 06/30/2022 – 09/29/2022 and a total of 13 results are available. A geometric mean of 126 counts/100 mL not exceeded, with a maximum monthly geometric mean of 120 counts/100 mL. Effluent data did not exceed 410 counts/100 mL. The maximum reported value was 328 counts/100 mL. Based on this effluent data **it appears that the facility can meet new *E. coli* limits and a compliance schedule is not needed in the reissued permit.**

PART 5 – PHOSPHORUS

Technology-Based Effluent Limit

Subchapter II of Chapter NR 217, Wis. Adm. Code, requires municipal wastewater treatment facilities that discharge greater than 150 pounds of Total Phosphorus per month to comply with a monthly average limit of 1.0 mg/L, or an approved alternative concentration limit.

Because Nichols 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 2022	0.62	0.304	1.57
Feb 2022	1.30	0.253	2.74
Mar 2022	0.86	0.582	4.18
April 2022	0.66	0.982	5.40
May 2022	0.62	0.650	3.36
June 2022	0.55	0.420	1.93
July 2022	0.95	0.362	2.86
Aug 2022	0.57	0.473	2.25
Sept 2022	0.46	0.545	2.09
Oct 2022	0.72	0.344	2.06
Nov 2022	0.40	0.565	1.88
Dec 2022	0.52	0.483	2.09
Average			2.70

Total P (lbs/month) = Monthly average (mg/L) × total flow (MG/month) × 8.34 (lbs/gallon)
 Where total flow is the sum of the actual (not design) flow (in MGD) for that month

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

TMDL Limits – Phosphorus

Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL*

Attachment #1

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 pounds per year. This WLA found in Appendix H of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Upper Fox and Wolf River Basins (UFW TMDL)* report dated February 2020 are expressed as maximum annual loads (lbs/year). The WLA for Nichols is 16 lbs/year.

For the reasons explained in the April 30, 2012 paper entitled *Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin*, WDNR has determined that the phosphorus WQBELs set equal to WLAs would not be consistent with the assumptions and requirements of the TMDL. Therefore, limits given to facilities included in the Upper Fox and Wolf River Basins TMDL are given monthly average mass limits and, if the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits are also included. The following equation shows the calculation of equivalent effluent concentration:

$$\begin{aligned} \text{TP Equivalent Effluent Concentration} &= \text{WLA} \div (\text{365 days/yr} * \text{Flow Rate} * \text{Conversion Factor}) \\ &= 16 \text{ lbs/yr} \div (\text{365 days/yr} * \text{0.0316 MGD} * \text{8.34}) \\ &= 0.17 \text{ mg/L} \end{aligned}$$

Since this value is less than 0.3 mg/L, both a six-month average mass limit and a monthly average mass limit are applicable for total phosphorus. The monthly average limit is set equal to three times the six-month average limit.

$$\begin{aligned} \text{TP 6-Month Average Permit Limit} &= \text{WLA} \div \text{365 days/yr} * \text{multiplier} \\ &= (16 \text{ lbs/yr} \div \text{365 days/yr}) * \text{1.30} \\ &= 0.057 \text{ lbs/day} \end{aligned}$$

$$\begin{aligned} \text{TP Monthly Average Permit Limit} &= \text{TP 6-Month Average Permit Limit} * \text{3} \\ &= 0.057 \text{ lbs/day} * \text{3} \\ &= 0.17 \text{ lbs/day} \end{aligned}$$

The multiplier used in the six-month average calculation was determined according to the implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 0.72. This is the standard deviation divided by the mean of mass data. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by the facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as monthly. The EPA recommends that limits be derived using a monitoring frequency of at least weekly, so the multiplier used is for weekly monitoring.

Six-month average and monthly average mass effluent limits are recommended for this discharge. The limits are equivalent to a concentration of 0.22 mg/L and 0.65 mg/L at the facility design flow of 0.0316 MGD.

The UFW TMDL establishes TP wasteload allocations to reduce the loading in the entire watershed including WLAs to meet water quality standards for tributaries to the Upper Fox and Wolf River. Therefore, WLA-based WQBELs are protective of immediate receiving waters and TP WQBELs derived according to s. NR 217.13, Wis. Adm. Code are not required.

Since wasteload allocations are expressed as annual loads (lbs/yr), permits with TMDL-derived monthly average permit limits should require the permittee to calculate and report rolling 12-month sums of total monthly loads for TP. Rolling 12-month sums can be compared directly to the annual wasteload allocation.

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from 01/07/2020 – 12/06/2022. Effluent data prior to 2020 was removed in this analysis because Nichols has been using ferric chloride to treat for phosphorus.

Total Phosphorus Effluent Data

	Phosphorus mg/L	Phosphorus lbs/day
1-day P ₉₉	1.5	0.32
4-day P ₉₉	0.95	0.18
30-day P ₉₉	0.64	0.12
Mean	0.51	0.09
Std	0.30	0.06
Sample size	53	53
Range	0.084 – 1.3	0.011 – 0.32

Interim Limit

An interim limit is required per s. NR 217.17, Wis. Adm. Code, when a compliance schedule is needed in the permit to meet the QBEL. The interim limit should reflect a concentration that the facility is able to meet without investing in additional “temporary” treatment, but also should prevent backsliding from current conditions. Therefore, **it is recommended that the interim limit be set equal to 0.95 mg/L for permit reissuance along with requirements for optimization of phosphorus removal.** This value reflects the 4-day P₉₉ concentration of 0.95 mg/L from 01/07/2020 – 12/06/2022. This value is recommended instead of the 30-day P₉₉ concentration of 0.64 mg/L to allow operational flexibility when the facility begins to initiate phosphorus treatment optimization activities, which often consist of trial and error.

PART 6 – TOTAL SUSPENDED SOLIDS

Total Suspended Solids (TSS) 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). This WLAs found in Appendix I of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Upper Fox and Wolf Basins (UFW TMDL)* report dated February 2020 are expressed as maximum annual loads (lbs/year). The WLA for Nichols is 1,564 lbs/year.

Revisions to chs. NR 106 and 205, Wis. Adm. Code align Wisconsin water quality-based effluent limits with 40 CFR 122.45(d), which requires WPDES permits to contain the following concentration limits, whenever practicable and necessary to protect water quality:

- Weekly average and monthly average limitations for continuous discharges subject to ch. NR 210.
- Daily maximum and monthly average limitations for all other discharges.

Attachment #1

Nichols is a municipal treatment facility and is therefore subject to weekly average and monthly average TSS limits derived from TSS annual WLAs.

$$\begin{aligned} \text{TSS Weekly Average Permit Limit} &= \text{WLA} \div 365 \text{ days/yr} * \text{multiplier} \\ &= (1564 \text{ lbs/yr} \div 365 \text{ days/yr}) * 3.11 \\ &= 13 \text{ lbs/day} \end{aligned}$$

$$\begin{aligned} \text{TSS Monthly Average Permit Limit} &= \text{WLA} \div 365 \text{ days/yr} * \text{multiplier} \\ &= (1564 \text{ lbs/yr} \div 365 \text{ days/yr}) * 1.90 \\ &= 8.1 \text{ lbs/day} \end{aligned}$$

The multiplier used in the weekly average and monthly average calculation was determined according to implementation guidance. A coefficient of variation was calculated, based on TSS mass monitoring data, to be 0.95. This is the standard deviation divided by the mean of mass data. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by the facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies TSS monitoring as 3/week; if a different monitoring frequency is used, the stated limits should be reevaluated.

Weekly average and monthly average mass effluent limits are recommended for this discharge. The limits are equivalent to a concentration of 51 mg/L and 31 mg/L at the facility design flow of 0.0316 MGD.

Since wasteload allocations are expressed as annual loads (lbs/yr), permits with TMDL-derived monthly average permit limits should require the permittee to calculate and report rolling 12-month sums of total monthly loads for TSS. Rolling 12-month sums can be compared directly to the annual wasteload allocation.

Effluent Data

The following table summarizes effluent total suspended solids monitoring data from 07/04/2017 – 12/29/2022.

Total Suspended Solids Effluent Data

	TSS mg/L	TSS lbs/day
1-day P ₉₉	25.7	7.0
4-day P ₉₉	15.5	3.8
30-day P ₉₉	10.4	2.2
Mean	8.03	1.5
Std	4.96	1.4
Sample size	574	574
Range	1.5 – 50.6	0.13 – 12.9

Nichols can currently meet the TSS mass limits, and a compliance schedule is not needed.

**PART 7 – WATER QUALITY-BASED EFFLUENT LIMITATIONS
FOR THERMAL**

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in chs. NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. Daily maximum and weekly average temperature criteria are available for the 12 different months of the year depending on the receiving water classification.

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from 07/01/2017 – 12/22/2022.

The table below summarizes the maximum temperatures reported during monitoring from 02/11/2014 – 06/30/2017.

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	53	71	112
FEB	50	51	82	120
MAR	51	51	67	99
APR	55	56	NA	120
MAY	60	62	106	120
JUN	64	66	97	111
JUL	68	69	96	91
AUG	70	71	99	100
SEP	68	69	86	96
OCT	66	67	72	102
NOV	61	62	81	120
DEC	56	57	89	120

Reasonable Potential

Permit limits for temperature are recommended based on the procedures in s. NR 106.56, Wis. Adm. Code.

- An acute limit for temperature is recommended for each month in which the representative daily maximum effluent temperature for that month exceeds the acute WQBEL. The representative daily maximum effluent temperature is the greater of the following:
 - (a) The highest recorded representative daily maximum effluent temperature

(b) The projected 99th percentile of all representative daily maximum effluent temperatures

- A sub-lethal limitation for temperature is recommended for each month in which the representative weekly average effluent temperature for that month exceeds the weekly average WQBEL. The representative weekly average effluent temperature is the greater of the following:
 - (a) The highest weekly average effluent temperature for the month.
 - (b) The projected 99th percentile of all representative weekly average effluent temperatures for the month

Based on the available effluent data **no effluent limits are recommended for temperature**. The complete thermal table used for the limit calculation is attached. **One year of monitoring is recommended in the reissued permit** to determine reasonable potential in the next reissuance.

PART 8 – WHOLE EFFLUENT TOXICITY (WET)

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

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC₅₀ (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC₂₅ (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of **60%** shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

Q_e = annual average flow = 0.032 MGD = 0.049 cfs

f = fraction of the Q_e withdrawn from the receiving water = 0

Q_s = 1/4 of the 7-Q₁₀ = 0.13 cfs ÷ 4 = 0.0325 cfs

- 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.

Attachment #1

The dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.

- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations. Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005. Data collected before July 1, 2005 is excluded from this evaluation.

WET Data History

Date Test Initiated	Acute Results LC ₅₀ %				Chronic Results IC ₂₅ %				Footnotes or Comments
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Use in RP?	
09/20/2005	>100	>100	Pass	No	>100	>100	Pass	No	1
03/23/2006	70.7	>100	Fail	No	10.64	>100	Fail	No	1
06/15/2006					>100	>100	Pass	Yes	
07/13/2006					>100	>100	Pass	Yes	
05/02/2007	>100	>100	Pass	Yes					
06/12/2007	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
07/17/2007	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
11/04/2010	>100	>100	Pass	No	>100	>100	Pass	No	2
09/27/2011					>100	>100	Pass	Yes	
04/10/2012	>100	>100	Pass	Yes	75.9	>100	Pass	Yes	
01/22/2013	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
05/20/2014					>100	>100	Pass	Yes	
10/17/2017	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
06/11/2019					>100	>100	Pass	Yes	
08/24/2021	>100	>100	Pass	Yes	>100	>100	Pass	Yes	

Footnotes:

1. Prior to June 2006, Nichols WWTF effluent was high in copper caused by a local industry. Nichols required the industry dispose of their wastewater with elevated copper concentrations through other means. Data prior to this change is not considered representative of current conditions and is not considered in this evaluation.
 2. *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.**

Attachment #1

According to s. NR 106.08(6)(d), Wis. Adm. Code, TU_a and TU_c effluent values are equal to zero whenever toxicity is not detected (i.e. when the LC₅₀, IC₂₅ or IC₅₀ ≥ 100%).

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

Chronic Reasonable Potential = [(TU_c effluent) (B)(IWC)]

Chronic WET Limit Parameters

TU _c (maximum) 100/IC ₂₅	B (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
100/75.9 = 1.3	6.2 Based on 1 detect	60%

[(TU_c effluent) (B)(IWC)] = 4.8 > 1.0

Therefore, **reasonable potential is shown for a chronic WET limit** using the procedures in s. NR 106.08(6) and representative data from 06/15/2006 – 08/24/2021.

Expression of WET limits

Chronic WET limit = [100/IWC] TU_c = **1.7 TU_c expressed as a monthly average**

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	IWC = 60%. 10 Points
Historical Data	7 tests used to calculate RP. No tests failed. 0 Points	11 tests used to calculate RP. No tests failed. 0 Points
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. 0 Points	Same as Acute. 0 Points
Receiving Water Classification	Warmwater sport fish classification. 5 Points	Same as Acute. 5 Points

Attachment #1

	Acute	Chronic
Chemical-Specific Data	Reasonable potential for limits for chlorine based on ATC; Ammonia nitrogen limit carried over from the current permit. Copper, nickel, zinc, chloride, and ammonia detected. Additional Compounds of Concern: None. 8 Points	Reasonable potential for limits for chlorine based on CTC; Ammonia nitrogen limit carried over from the current permit. Copper, nickel, zinc, chloride, and ammonia detected. Additional Compounds of Concern: None. 8 Points
Additives	1 Biocides and 2 Water Quality Conditioners added. Permittee has proper P chemical SOPs in place: Yes 5 Points	All additives used more than once per 4 days. 5 Points
Discharge Category	1 Industrial Contributor: Nichols Paper Products. 5 Points	Same as Acute. 5 Points
Wastewater Treatment	Secondary treatment. 0 Points	Same as Acute. 0 Points
Downstream Impacts	No impacts known. 0 Points	Same as Acute. 0 Points
Total Checklist Points:	23 Points	33 Points
Recommended Monitoring Frequency (from Checklist):	2 tests during permit term	1x yearly
Limit Required?	No	Yes Limit = 1.7 TU _c
TRE Recommended? (from Checklist)	No	No

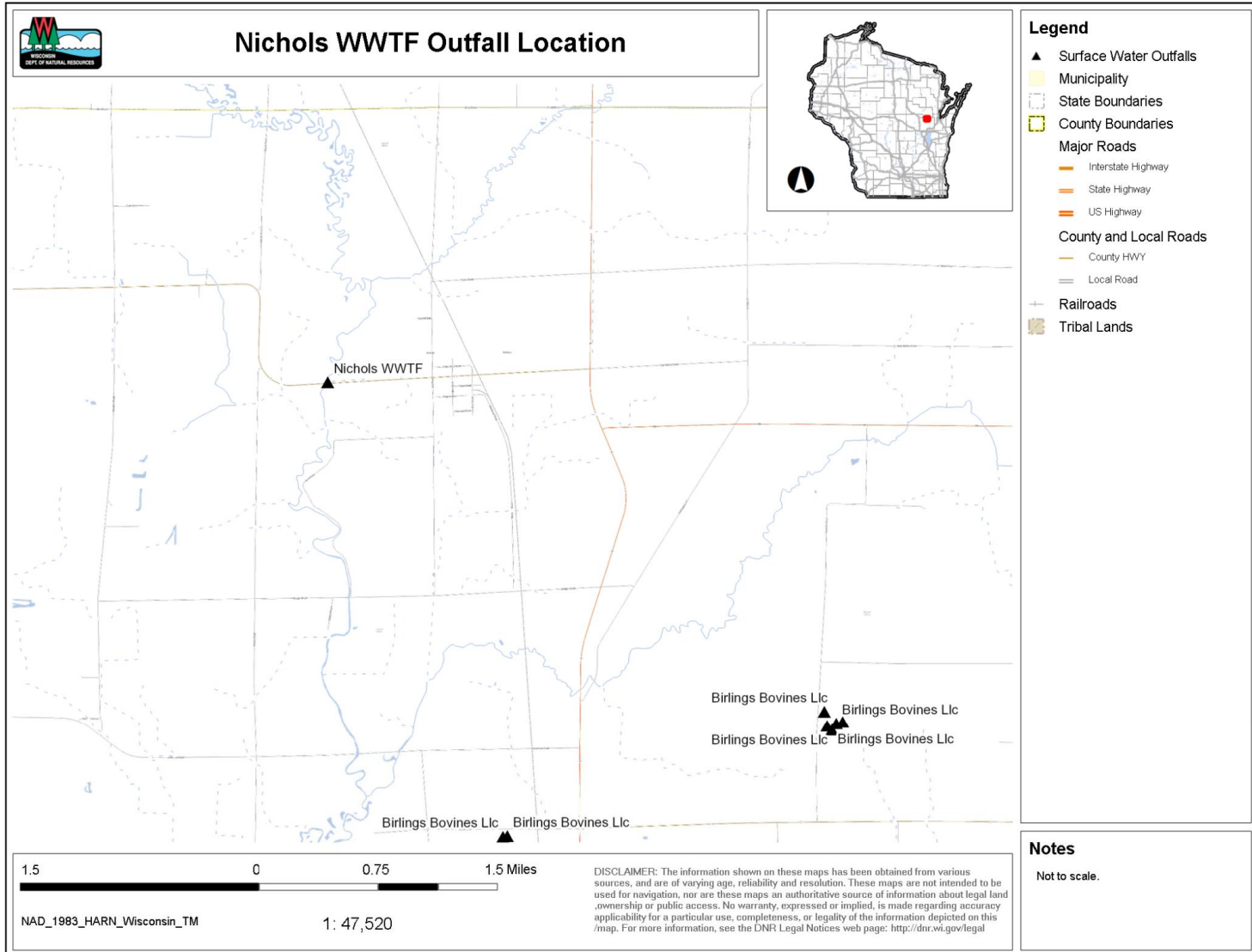
- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above 2/permit term acute and 1x yearly chronic WET tests are recommended in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).
- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, a chronic WET limit is required. The chronic WET limit shall be expressed as 1.7 TU_c as a monthly average in the effluent limits table of the permit.
- A minimum of annual chronic monitoring is required because a chronic 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.

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

Facility:	Nichols WWTF	7-Q₁₀:	0.13 cfs	Temp Dates	Flow Dates
Outfall(s):	001	Dilution:	25%	Start:	02/11/14 07/01/17
Date Prepared:	2/14/2023	f:	0	End:	06/30/17 12/22/22
Design Flow (Q_e):	0.03 MGD	Stream type:	Small warm water sport or forage fish co		
Storm Sewer Dist.	0 ft	Q_s:Q_e ratio:	0.7 :1		
		Calculation Needed?	YES		

Month	Water Quality Criteria			Receiving Water Flow Rate (Q _s) (cfs)	Representative Highest Effluent Flow Rate (Q _e)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	T _a (default) (°F)	Sub-Lethal WQC (°F)	Acute WQC (°F)		7-day Rolling Average (Q _{esl}) (MGD)	Daily Maximum Flow Rate (Q _{ea}) (MGD)		Weekly Average (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	33	49	76	0.22	0.026	0.042	0	51	53	71	112
FEB	34	50	76	0.24	0.020	0.024	0	50	51	82	120
MAR	38	52	77	0.38	0.057	0.107	0	51	51	67	99
APR	48	55	79	6.30	0.071	0.109	0	55	56	NA	120
MAY	58	65	82	2.30	0.064	0.109	0	60	62	106	120
JUN	66	76	84	0.55	0.042	0.059	0	64	66	97	111
JUL	69	81	85	0.22	0.029	0.099	0	68	69	96	91
AUG	67	81	84	0.15	0.019	0.026	0	70	71	99	100
SEP	60	73	82	0.21	0.033	0.052	0	68	69	86	96
OCT	50	61	80	0.39	0.061	0.087	0	66	67	72	102
NOV	40	49	77	0.77	0.035	0.043	0	61	62	81	120
DEC	35	49	76	0.35	0.020	0.024	0	56	57	89	120



2014 Ammonia Calculations

Ammonia: No ammonia limits are contained in the current WPDES Permit for Nichols, monitoring only was required at a frequency of once per month in 2013. The results of that monitoring were summarized on page 3 of this document.

In the 2007 effluent limits calculation document, limits were calculated on a daily maximum, weekly average, and/or monthly average basis using an effluent flow of 0.05 MGD (which is now considered to represent the peak monthly average flow) and the year-round 7Q10 of 0.13 cfs and 7Q2 of 0.46 cfs (which have since been modified by low flows for each month of the year). At that time, a decision was made to not include ammonia limits in the permit because the effluent data showed that there was no reasonable potential for exceedance of the limits. However, it is noted that the decision on ammonia limit reasonable potential in municipal permits is not appropriate because of the availability for ammonia treatment which affects effluent variability considerations. The only situation in which ammonia limits are excluded from municipal permits is when the calculated May – October limit exceeds 20 mg/L and/or the calculated November – April limit exceeds 40 mg/L, pursuant to s. NR 106.33(2).

The 2007 evaluation calculated daily maximum ammonia limits of 9.4 mg/L at Nichols based on a 99th upper percentile effluent pH of 8.3 s.u. The effluent pH data submitted during the current permit term are used to determine if the daily maximum limit is changed. Between January 1, 2010 and June 30, 2014, a total of 1,172 effluent pH values were reported at Nichols. Those results were all below 8.3 s.u., ranging from 7.07 to 8.17 s.u. Most importantly, the 99th upper percentile, as represented by the 12th highest result in the current permit database, is only 8.04 s.u. Since ammonia is less toxic at lower pH, this means the new daily maximum ammonia limit is greater than 9.4 mg/L. Using the acute toxicity criteria in ch. NR 105, at a pH of 8.04 s.u. the daily maximum ammonia limit would be 16 mg/L after rounding. Since this number is lower than the 20 and 40 mg/L thresholds mentioned earlier, it is recommended that a 16 mg/L daily maximum limit be included in Nichols' permit. Based on the 2013 data submittals, it appears Nichols will easily be able to comply with this limit.

The calculated weekly and monthly average limits were all greater than 9.4 mg/L, even based on a 0.05 MGD flow and the year-round stream flow. When making the adjustment to use the 0.0316 MGD annual average design flow and the monthly 7Q10 and 7Q2 flows, all of the calculated weekly and monthly average limits exceed 16 mg/L. As a result, only the 16 mg/L daily maximum limit is recommended for the reissued permit.