# Permit Fact Sheet

## General Information

| | |
|---|---|
| Permit Number | WI-0022799-09-0 |
| Permittee Name and Mailing Address | City of Chilton, 42 School St, Chilton, WI 53014 |
| Permitted Facility Name and Address | Chilton Wastewater Treatment Facility, 457 East Main St, Chilton, WI |
| Permit Term | April 1, 2025 – March 31, 2030 |
| Discharge Location | NW ¼ of NW ¼ of Section 17, T 18N, R 20E in Calumet County |
| Receiving Water | South Branch of the Manitowoc River (WBIC no. 77900) in Calumet County |
| Stream Flow (7-$Q_{10}$) | 0.25 cfs |
| Stream Classification | Warm Water Sport Fish (WWSF) community, non-public water supply |
| Discharge Type | Existing; Continuous |
| Annual Average Design Flow | 1.19 MGD |
| Industrial or Commercial Contributors | Worthington Industries, Briess Malt and Ingredients, Dubois Chemicals, Kaytee Products, and Milk Products Inc |
| Plant Classification | Chilton WWTF is Classified as Advanced for the following subclasses: A1, B, C, D, L, and P; and Basic for SS. |
| Approved Pretreatment Program? | N/A |

## Facility Description

The City of Chilton owns and operates the Chilton Wastewater Treatment Facility (WWTF) that treats residential, commercial, and industrial wastewaters from the city sanitary sewer collection system and hauled waste from a hauled waste receiving station. The Chilton WWTF has an annual average design flow rate of 1.19 MGD. The paragraphs below describe the liquid and solids treatment trains at the Chilton WWTF.

**Liquid Treatment Train:** Raw wastewater is collected from throughout the City of Chilton by a conventional gravity sewer system and is sent to the wastewater treatment facility (WWTF). Holding tank waste, septic tank waste, and other wastewater are transported by vehicle to the hauled waste receiving station. Influent is pumped from the main lift station to an influent channel and passes through a single inclined screw screen. A bypass channel is available with a manually cleaned bar screen. The influent continues through the influent channel where influent wastewater samples are collected using a 24-hour flow proportional composite sampler, and pH and temperature are measured continuously by a probe. After influent sampling, influent flow rate is measured by an ultrasonic flow meter as it passes through a Parshall flume. Influent sampling is tracked at Sample Point 701. After the headworks, the influent enters the anoxic/anaerobic basin and mixes with return activated sludge from a pre-anoxic basin. Each basin is provided with submersible mixers. At the end of the basin, the facility adds ferrous chloride prior to the splitter box for the oxidation ditches. Following the selector basins, the wastewater is sent to a splitter box where the flow is mixed with sludge decant and split between three oxidation ditches, which act as the aerobic zone for the treatment process. After the oxidation ditches, the wastewater flows to a splitter box where the flow is split between two circular final clarifiers. The facility does add a small amount of polymer

prior to the clarifier to improve settling. Around the circumference of each clarifier are chlorine contact chambers. The facility currently adds gaseous chlorine as it comes out of the clarifiers during the recreation season (May to September). Sulfur dioxide is added for dechlorination after the chlorine contact chambers. After disinfection, the effluent is conveyed to an effluent wet well. In the effluent wet well, the effluent is lifted by effluent pumps to a cascade step aerator. At the end of the cascade step aerator, effluent samples are collected using a 24-hour flow proportional composite sampler, and pH and DO are measured continuously by a probe at Sample Point 105. The effluent then flows by gravity where it combines with the regeneration wastewater from the City's water softening facility (Softener Plant #8) prior to being discharged to the South Branch of the Manitowoc River. There are generally 2-3 regeneration cycles per day at the softening plant tracked at Sample Point 104. Sample Point 002 represents the combined discharge of the wastewater treatment facility and water softening facility.

**Solids Treatment Train:** All waste activated sludge is sent to a 284,000-gallon sludge storage tank. The sludge is then pumped to a 1.4-million-gallon sludge storage tank. Decant from the sludge tank is sent to the splitter box prior to the oxidation ditches. The 1.4-million-gallon sludge storage tank is provided with submersible mixers to stabilize the sludge prior to being loaded onto trucks and land applied on department approved sites via Outfall 004.

# Substantial Compliance Determination

**Enforcement During Last Permit:** There were no formal enforcement actions taken during the previous permit term.

After a desk top review of all discharge monitoring reports, compliance maintenance annual reports, land application reports, compliance schedule items, and a site visit on 12/6/22, this facility has been found to be in substantial compliance with their current permit.

**Compliance determination entered by Trevor Moen, Wastewater Engineer on 10/10/2024.**

| Sample Point Designation | | |
|---|---|---|
| **Sample Point Number** | **Discharge Flow, Units, and Averaging Period** | **Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)** |
| 701 | 0.95 MGD (Avg. 7/1/18-8/31/24) | INFLUENT - Total combined influent from the sanitary sewage collection system and hauled waste receiving station. At Sampling Point 701, the permittee shall collect representative samples of the influent from the influent automatic composite sampler drawing 24-hour flow proportional composite samples from the influent channel following fine screening. The permittee shall measure the influent flow rate using a continuous flow recording device following fine screening and prior to the biological phosphorus removal tanks. |
| 002 | 0.92 MGD (Avg. 7/1/18-8/31/24) | COMBINED EFFLUENT - Total combined effluent from the wastewater treatment facility (Sample Point 105) and Softener Plant #8 (Sample Point 104). At Sampling Point 002, the permittee shall collect representative samples of the combined effluent from the combined effluent composite automatic sampler drawing 24-hour time proportional composite samples from the monitoring manhole except that the permittee shall collect grab samples of the combined effluent for temperature from the monitoring manhole prior to being discharged to the South Branch of the Manitowoc River via Outfall 002. The permittee shall calculate the flow rate, total phosphorus loading, total suspended solids loading, and chloride concentration of the combined effluent in accordance with the conditions of this permit. |

| Sample Point Designation | | |
|---|---|---|
| **Sample Point Number** | **Discharge Flow, Units, and Averaging Period** | **Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)** |
| 004 | 211 Metric Tons were generated and land applied in 2023; Avg. of 251 MT land applied each year (2019-2023) | LIQUID SLUDGE - Waste activated sludge that is thickened and aerobically digested in two sludge storage tanks to generate Class B sludge. At Sampling Point 004, the permittee shall collect representative grab and/or composite samples of the liquid sludge from the storage tank(s) after complete mixing and prior to being land applied on department approved sites via Outfall 004. |
| 104 | 0.036 MGD (Avg. 7/1/18-8/31/24) | SOFTENER PLANT #8 EFFLUENT - This sample point is used for reporting information on the effluent discharged from the Softener Plant #8. At Sampling Point 104, the permittee shall calculate the flow rate, softener regeneration rate, regeneration cycle volume, and collect representative grab samples for chloride, total suspended solids, and total phosphorus of the Softener Plant #8 effluent prior to mixing with the wastewater treatment facility effluent from Sampling Point 105 and discharging to the South Branch of the Manitowoc River via Outfall 002. |
| 105 | N/A – this is a new sample point which replaces the previous Sample Point 001; see also the *Note* below | WWTF EFFLUENT - At Sampling Point 105, the permittee shall collect representative samples of the final effluent from the effluent automatic composite sampler drawing 24-hour flow proportional composite samples and grab samples for dissolved oxygen from after the cascade step aerator except that the permittee shall collect grab samples of the effluent for pH, total residual chlorine, and E. coli from the effluent wet well prior to mixing with the Softener Plant #8 effluent from Sampling Point 104 and discharging to the South Branch of the Manitowoc River via Outfall 002. Starting on April 1, 2028, the permittee shall measure the effluent flow rate using a continuous flow recording device at a representative location following the final clarifiers. |

*Note:* Sample Point 001 has been inactivated for the proposed permit term. All monitoring and reporting requirements previously applied to Sample Point 001 (Surface Water) have been moved and updated to Sample Point 105 (In-Plant).

# 1 Influent – Monitoring Requirements

## Sample Point Number: 701- INFLUENT

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Flow Rate | | MGD | Daily | Continuous | |
| BOD5, Total | | mg/L | 3/Week | 24-Hr Flow Prop Comp | |
| Suspended Solids, Total | | mg/L | 3/Week | 24-Hr Flow Prop Comp | |

## Changes from Previous Permit:

Influent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit.

- Removed $CBOD_5$ monitoring; the effluent limit for $CBOD_5$ was removed so influent monitoring is not required.
- Increased the sample frequency for $BOD_5$ to 3/Week.

## Explanation of Limits and Monitoring Requirements

**Flow, $BOD_5$, and total suspended solids (TSS)** – Influent monitoring 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 In-plant - Monitoring and Limitations

## Sample Point Number: 104- SOFTENER PLANT #8 EFFLUENT

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Flow Rate | | MGD | Daily | Estimated | See the Flow Rate - Estimated permit section. |
| Softener Regeneration | | cycles/day | Daily | Count | See the Softener Regeneration - Count permit section. |
| Regeneration Cycle Volume | | gal/cycle | Daily | Estimated | See the Regeneration Cycle Volume - Estimated permit section. |
| Chloride | | mg/L | Weekly | Grab | |
| Phosphorus, Total | | mg/L | Weekly | Grab | |
| Suspended Solids, Total | | mg/L | Weekly | Grab | |

## Changes from Previous Permit:

In-plant limitations and monitoring requirements were evaluated for this permit term and the following changes have been made from the previous permit.

- Changed sample type for chloride to Grab.
- Reduced sample frequency for chloride to weekly.
- Added weekly total phosphorus and total suspended solids monitoring.

## Explanation of Limits and Monitoring Requirements

Information on the number of softener regeneration cycles per day, the estimated flow rate from Sample Point 104, and the chloride concentration per discharge cycle is required by this permit. Information from 104 is used in calculating the wastewater characteristics of the combined effluent at Sample Point 002. The flow rate from 104 shall be estimated by multiplying the number of discharge cycles per day by the regeneration cycle volume.

## Sample Point Number: 105- WWTF EFFLUENT

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Flow Rate | | MGD | Daily | Continuous | Monitoring begins April 1, 2028. See the Install Continuous Flow Recording Device Schedule. |
| BOD5, Total | Weekly Avg | 16 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies November-April. |
| BOD5, Total | Weekly Avg | 10 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies May-October. |
| BOD5, Total | Monthly Avg | 16 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies November-April. |
| BOD5, Total | Monthly Avg | 10 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies May-October. |
| $BOD_5$, Total | Weekly Avg | 156 lbs/day | 3/Week | Calculated | Applies November-April. |
| $BOD_5$, Total | Weekly Avg | 100 lbs/day | 3/Week | Calculated | Applies May-October. |
| $BOD_5$, Total | Monthly Avg | 156 lbs/day | 3/Week | Calculated | Applies November-April. |
| $BOD_5$, Total | Monthly Avg | 100 lbs/day | 3/Week | Calculated | Applies May-October. |
| Suspended Solids, Total | Weekly Avg | 15 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies November-April. |
| Suspended Solids, Total | Weekly Avg | 10 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies May-October. |
| Suspended Solids, Total | Monthly Avg | 15 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies November-April. |
| Suspended Solids, Total | Monthly Avg | 10 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies May-October. |
| pH Field | Daily Min | 6.0 su | Daily | Continuous | |
| pH Field | Daily Max | 9.0 su | Daily | Continuous | |
| Dissolved Oxygen | Daily Min | 8.0 mg/L | Daily | Continuous | |
| Chlorine, Total Residual | Daily Max | 21 ug/L | Daily | Grab | Applies May-September. |
| Chlorine, Total Residual | Weekly Avg | 6.5 ug/L | Daily | Grab | Applies May-September. |
| Chlorine, Total Residual | Monthly Avg | 6.5 ug/L | Daily | Grab | Applies May-September. |
| E. coli | Geometric Mean - | 126 #/100 ml | Weekly | Grab | Applies May-September. |

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| | Monthly | | | | |
| E. coli | % Exceedance | 10 Percent | Monthly | Calculated | Applies May-September. See the E. coli Percent Limit permit section. Enter the result in the eDMR on the last day of the month. |
| Nitrogen, Ammonia Variable Limit | | mg/L | 3/Week | 24-Hr Flow Prop Comp | |
| Nitrogen, Ammonia (NH3-N) Total | Daily Max - Variable | mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies year-round. See the Daily Maximum Ammonia Nitrogen (NH3-N) Limits permit section. |
| Nitrogen, Ammonia (NH3-N) Total | Weekly Avg | 11 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies December-March. |
| Nitrogen, Ammonia (NH3-N) Total | Weekly Avg | 14 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in April. |
| Nitrogen, Ammonia (NH3-N) Total | Weekly Avg | 5.4 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in May. |
| Nitrogen, Ammonia (NH3-N) Total | Weekly Avg | 3.8 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in June. |
| Nitrogen, Ammonia (NH3-N) Total | Weekly Avg | 3.1 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in July. |
| Nitrogen, Ammonia (NH3-N) Total | Weekly Avg | 3.2 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in August. |
| Nitrogen, Ammonia (NH3-N) Total | Weekly Avg | 4.6 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in September. |
| Nitrogen, Ammonia (NH3-N) Total | Weekly Avg | 7.3 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in October. |
| Nitrogen, Ammonia (NH3-N) Total | Weekly Avg | 13 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in November. |
| Nitrogen, Ammonia (NH3-N) Total | Monthly Avg | 7.9 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in January. |
| Nitrogen, Ammonia (NH3-N) Total | Monthly Avg | 8.5 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in February. |
| Nitrogen, Ammonia (NH3-N) Total | Monthly Avg | 11 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in March. |
| Nitrogen, Ammonia (NH3-N) Total | Monthly Avg | 14 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in April. |

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Nitrogen, Ammonia (NH3-N) Total | Monthly Avg | 5.4 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in May. |
| Nitrogen, Ammonia (NH3-N) Total | Monthly Avg | 3.8 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in June. |
| Nitrogen, Ammonia (NH3-N) Total | Monthly Avg | 2.4 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in July. |
| Nitrogen, Ammonia (NH3-N) Total | Monthly Avg | 2.3 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in August. |
| Nitrogen, Ammonia (NH3-N) Total | Monthly Avg | 3.2 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in September. |
| Nitrogen, Ammonia (NH3-N) Total | Monthly Avg | 6.0 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in October. |
| Nitrogen, Ammonia (NH3-N) Total | Monthly Avg | 13 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in November. |
| Nitrogen, Ammonia (NH3-N) Total | Monthly Avg | 9.6 mg/L | 3/Week | 24-Hr Flow Prop Comp | Applies in December. |
| Phosphorus, Total | Monthly Avg | 1.0 mg/L | Weekly | 24-Hr Flow Prop Comp | |
| Chloride | | mg/L | Weekly | 24-Hr Flow Prop Comp | See the Chloride-Calculated permit section. |
| 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. |
| Chronic WET | Monthly Avg | 1.1 TUc | See Listed Qtr(s) | 24-Hr Flow Prop Comp | See the Whole Effluent Toxicity (WET) Testing permit section. |
| Nitrogen, Total Kjeldahl | | mg/L | See Listed Qtr(s) | 24-Hr Flow Prop Comp | Annual in rotating quarters. See Nitrogen Series Monitoring permit section. |
| Nitrogen, Nitrite + Nitrate Total | | mg/L | See Listed Qtr(s) | 24-Hr Flow Prop Comp | Annual in rotating quarters. See Nitrogen Series Monitoring permit section. |
| Nitrogen, Total | | mg/L | See Listed | Calculated | Annual in rotating quarters. See Nitrogen Series |

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| | | | Qtr(s) | | Monitoring permit section. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen. |

## 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.

- The WWTF effluent monitoring and reporting was previously tracked under Sample Point 001 (Surface Water). After careful consideration of treatment plant operations, the Department determined that it is more appropriate to track the WWTF effluent monitoring and reporting under an In-Plant Sample Point (105). There is no direct discharge of wastewater to surface waters at Sample Point 105 (previously 001) since all WWTF effluent is combined with the softener plant #8 effluent prior to discharge to surface waters. Monitoring requirements previously applied to 001 have been moved to 105, with the exception of temperature monitoring (which has been moved to Sample Point 002). Other changes are listed here.
- Addition of flow rate monitoring, to become effective on April 1, 2028, per the Schedule.
- Changed $CBOD_5$ monitoring to $BOD_5$.
- Addition of weekly average and monthly average mass limits for $BOD_5$.
- Increased the dissolved oxygen effluent limit.
- Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.
- Addition of PFOS/PFOA monitoring at a frequency of every other month in accordance with s. NR 106.98(2), Wis. Adm. Code.
- Updated the monitoring quarters for the chronic whole effluent toxicity (WET) testing and added a monthly average limit of 1.1 $TU_c$.
- Addition of annual total nitrogen monitoring (TKN, $NO_2$+$NO_3$ and Total N) in rotating quarters throughout the permit term.
- Reduced sample frequency for chloride and total phosphorus to weekly.
- Changed sample type to Continuous for pH and dissolved oxygen because the permittee has a continuous probe.

## Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the Water Quality-Based Effluent Limits (WQBEL) Memo, by Nicole Krueger, Water Resources Engineer, dated September 20, 2024. Effluent limitations in the WQBEL Memo for Outfall 001 have been applied to the new In-Plant Sample Point 105 (except for temperature, which is applied at Sample Point 002). Additionally, see the WQBEL Memo Addendum, Biological Oxygen Demand Limits for Chilton Wastewater Treatment Facility WPDES Permit No. WI-0022799-09, by Nicole Krueger, Water Resources Engineer, dated October 24, 2024, for more information on dissolved oxygen and $BOD_5$ limits.

**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. Minor changes have been made to the limits for $BOD_5$, TSS, and total residual chlorine.

**$BOD_5$, TSS, and pH –** Categorical limits and WQBELs are included in the permit as outlined in ch. NR 210, Wis. Adm. Code.

**Total Nitrogen Monitoring (TKN, $NO_2$+$NO_3$, and Total N) –** The Department has included effluent monitoring for Total Nitrogen in the permit through the authority under s. 283.55(1)(e), Wis. Stats. Testing is required during the following quarters: April – June 2025; January – March 2026; July – September 2027; October – December 2028; and April – June 2029.

**Chronic Whole Effluent Toxicity (WET) –** Testing is required annually during the following quarters: April – June 2025; January – March 2026; July – September 2027; October – December 2028; and April – June 2029.

**PFOS and PFOA –** NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Pursuant to s. NR 106.98(3)(b), Wis. Adm. Code, the Department evaluated the need for PFOS and PFOA monitoring taking into consideration the presence of potential PFOS or PFOA industrial wastes, remediation sites and other potential sources of PFOS or PFOA. Every other month monitoring is included in the permit in accordance with s. NR 106.98(2)(c), Wis. Adm. Code.

# 3 Surface Water - Monitoring and Limitations

## Sample Point Number: 002- COMBINED EFFLUENT

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Flow Rate | | MGD | Daily | Calculated | See the Flow Rate-Calculated and Chloride, TSS, and TP-Calculated permit sections. |
| Chloride | Weekly Avg | 560 mg/L | Weekly | Calculated | Interim limit. See the Chloride Variance-Implement Source Reduction Measures permit section and the Chloride Source Reduction Measures (Target Value) Schedule. See also the Chloride-Calculated and Mass Balance Schematic for Chloride Calculation permit sections. |
| Acute WET | | TUa | See Listed Qtr(s) | 24-Hr Comp | See the Whole Effluent Toxicity (WET) Testing permit section. |
| Temperature Maximum | | deg F | 3/Week | Measure | Monitoring only January-December 2028. Dissipative cooling study in October 2028. See the Effluent Temperature Monitoring and Dissipative Cooling Demonstration-POTW Weekly Average Limits permit sections. See also the |

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| | | | | | Dissipative Cooling Study Schedule. |
| Suspended Solids, Total | | mg/L | Weekly | Calculated | See the TSS-Calculated and Mass Balance Schematic for TSS Calculation permit sections. |
| Suspended Solids, Total | Weekly Avg | 247 lbs/day | Weekly | Calculated | |
| Suspended Solids, Total | Monthly Avg | 175 lbs/day | Weekly | 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 eDMR. See TMDL Calculations permit section. |
| 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 eDMR. See TMDL Calculations permit section. |
| Phosphorus, Total | Monthly Avg | 1.0 mg/L | Weekly | Calculated | Interim limit effective upon permit effective date. See the TP-Calculated and Mass Balance Schematic for TP Calculation permit sections. |
| Phosphorus, Total | Monthly Avg | 5.0 lbs/day | Weekly | Calculated | Monitoring only upon permit effective date. Final TMDL-Based Mass Limits for Total Phosphorus go into effect per the Schedule. See also the Phosphorus TMDL permit section. |
| Phosphorus, Total | 6-Month Avg | 1.7 lbs/day | Weekly | Calculated | Monitoring only upon permit effective date. Final TMDL-Based Mass Limits for Total Phosphorus go into effect per the Schedule. See also the Phosphorus TMDL permit section. |

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Phosphorus, Total | | lbs/month | Monthly | Calculated | Calculate the Total Monthly Discharge of phosphorus and report on the last day of the month on the eDMR. See TMDL Calculations 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 Calculations permit section. |

## 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.

- Decreased the chloride variance effluent interim limit to 560 mg/L as a weekly average and updated source reduction measures (SRMs) throughout the permit term.
- Updated the monitoring quarters for the acute whole effluent toxicity (WET) testing.
- Addition of temperature monitoring for one year (2028) including a Schedule to conduct a Dissipative Cooling Study in October 2028.
- Addition of TMDL-based mass limits for total suspended solids (TSS).
- Addition of phosphorus monitoring and interim effluent limit. Addition of TMDL-based mass limits for total phosphorus, to become effective per the TMDL-Based Effluent Mass Limits for Total Phosphorus Schedule.

## Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the Water Quality-Based Effluent Limits (WQBEL) Memo, by Nicole Krueger, Water Resources Engineer, dated September 20, 2024.

**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.

**Chloride –** The City of Chilton applied for a chloride variance, under the provisions of s. NR 106.83, Wis. Adm. Code, with its application for permit reissuance. The previous permit also included a chloride variance. The Department reviewed Chilton's application for a chloride variance and the information supplied in the application supports the establishment of an interim effluent limit. The permittee and the Department have reached agreement on an interim chloride limit of 560 mg/L (expressed as a weekly average), a target value of 505 mg/L, implementation of chloride source reduction measures, and submittal of annual progress reports each year by January 31st. The chloride source reduction measures that are required to be implemented can be found in the proposed permit. The Department concludes that Chilton is qualified for a variance from the water quality standard for chloride and proposes reissuance of this permit with the proposed variance.

**Acute Whole Effluent Toxicity (WET) –** Testing is required twice during the permit term during the following quarters: January – March 2026; and April – June 2029.

# 4 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 | Fecal Coliform Reduction | Injection; Incorporation | Land Application | Avg. of 251 MT land applied each year (2019-2023) |
| Does sludge management demonstrate compliance? Yes. | | | | | | |
| Is additional sludge storage required? No. | | | | | | |
| Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No. | | | | | | |
| Is a priority pollutant scan required? N/A | | | | | | |

## Sample Point Number: 004- 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 | High Quality | 41 mg/kg | Annual | Composite | |
| Arsenic Dry Wt | Ceiling | 75 mg/kg | Annual | Composite | |
| Cadmium Dry Wt | High Quality | 39 mg/kg | Annual | Composite | |
| Cadmium Dry Wt | Ceiling | 85 mg/kg | Annual | Composite | |
| Copper Dry Wt | High Quality | 1,500 mg/kg | Annual | Composite | |
| Copper Dry Wt | Ceiling | 4,300 mg/kg | Annual | Composite | |
| Lead Dry Wt | High Quality | 300 mg/kg | Annual | Composite | |
| Lead Dry Wt | Ceiling | 840 mg/kg | Annual | Composite | |
| Mercury Dry Wt | High Quality | 17 mg/kg | Annual | Composite | |
| Mercury Dry Wt | Ceiling | 57 mg/kg | Annual | Composite | |
| Molybdenum Dry Wt | Ceiling | 75 mg/kg | Annual | Composite | |
| Nickel Dry Wt | High Quality | 420 mg/kg | Annual | Composite | |
| Nickel Dry Wt | Ceiling | 420 mg/kg | Annual | Composite | |
| Selenium Dry Wt | High Quality | 100 mg/kg | Annual | Composite | |
| Selenium Dry Wt | Ceiling | 100 mg/kg | Annual | Composite | |

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Zinc Dry Wt | High Quality | 2,800 mg/kg | Annual | Composite | |
| Zinc Dry Wt | Ceiling | 7,500 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 | |
| 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. |

## 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.

- Removed PCB monitoring requirements. PCB monitoring should be required in the next permit reissuance.
- Addition of annual PFAS (PFOA + PFOS) monitoring pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.

## 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). 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), Wis. Adm. Code.

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

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

# 5 Schedules

## 5.1 Chloride Source Reduction Measures (Target Value)

As a condition of the variance to the water quality based effluent limitation(s) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code, the permittee shall perform the following actions.

| Required Action | Due Date |
|---|---|
| **Annual Chloride Progress Report:** Submit an annual chloride progress report related to the source reduction activities for the previous year. The annual chloride progress report shall:<br><br>Indicate which chloride source reduction measures or activities in the Source Reduction Plan have been implemented and state which, if any, source reduction measures from the Source Reduction Plan were not pursued and why. Include an assessment of whether each implemented source reduction measure appears to be effective or ineffective at reducing pollutant discharge concentrations and identify actions planned for the upcoming year;<br><br>Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data; and<br><br>Include an analysis of how effluent chloride varies with time and with significant loadings of chloride. Note that the interim limitation listed in the Surface Water section of this permit remains enforceable until new enforceable limits are established in the next permit issuance.<br><br>The first annual chloride progress report is to be submitted by the Date Due. | 01/31/2026 |
| **Annual Chloride Progress Report #2:** Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above. | 01/31/2027 |
| **Annual Chloride Progress Report #3:** Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above. | 01/31/2028 |
| **Annual Chloride Progress Report #4:** Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above. | 01/31/2029 |
| **Final Chloride Report:** Submit the final chloride report documenting the success in meeting the chloride target value of 505 mg/L, as well as the anticipated future reduction in chloride sources and chloride effluent concentrations.<br><br>The report shall:<br><br>Summarize chloride source reduction measures that have been implemented during the current permit term and state which, if any, source reduction measures from the Source Reduction Plan were not pursued and why;<br><br>Include an assessment of which source reduction measures appear to have been effective or ineffective. Evaluate any needed changes to the pollutant reduction strategy accordingly;<br><br>Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data during the current permit term; and<br><br>Include an analysis of how influent and effluent chloride varies with time and with significant loadings of chloride as identified in the source reduction plan.<br><br>If the permittee intends to reapply for a chloride variance, for the reissued permit, proposed target limits and a detailed source reduction measures plan, outlining the source reduction activities | 09/30/2029 |

| | |
|---|---|
| proposed for the upcoming permit term, shall also be included per ss. NR 106.90 (5) and NR 106.83 (4), Wis. Adm. Code. An updated source reduction measures plan shall:<br><br>Include an explanation of why or how each source reduction measure will result in reduced discharge of the target pollutant; and<br><br>Evaluate any available information on pollutant sources, timing, and concentration to update the mass balance assumptions and expected sources of the pollutant, and<br><br>Identify any information needs that would help to better determine pollutant sources and make plans to collect that information.<br><br>Note that the target value is the benchmark for evaluating the effectiveness of the chloride source reduction measures but is not an enforceable limitation under the terms of this permit. | |
| **Annual Chloride Reports After Permit Expiration:** In the event that this permit is not reissued by the date the permit expires the permittee shall continue to submit annual chloride reports for the previous year following the due date of Annual Chloride Progress Reports listed above. Annual Chloride Progress Reports shall include the information as defined above. | |

## 5.2 TMDL-Based Effluent Mass Limits for Total Phosphorus

The permittee shall comply with the limits for Phosphorus as specified. No later than 14 days following each compliance date, the permittee shall notify the Department in writing of its compliance or noncompliance. If a submittal is required, a timely submittal fulfills the notification requirement.

| Required Action | Due Date |
|---|---|
| **Construction Upgrade Progress Report #1:** The permittee shall submit a progress report on construction upgrades. | 08/31/2025 |
| **Construction Upgrade Progress Report #2:** The permittee shall submit a progress report on construction upgrades. | 08/31/2026 |
| **Complete Construction:** The permittee shall complete construction of wastewater treatment system upgrades. | 06/30/2027 |
| **Achieve Compliance:** The permittee shall achieve compliance with final phosphorus TMDL-based effluent mass limits. | 07/01/2027 |

## 5.3 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.<br><br>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. | 03/31/2026 |
| **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. | 03/31/2027 |

| | |
|---|---|
| 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.<br><br>The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan.<br><br>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.<br><br>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. | |

## 5.4 Install Continuous Flow Recording Device

The permittee shall install a continuous flow recording device at Sampling Point 105 (In-Plant) in accordance with the following schedule.

| Required Action | Due Date |
|---|---|
| **Plans and Specifications:** Submit plans and specifications per ch. NR 108, Wis. Adm. Code, for installing a continuous flow recording device at Sampling Point 105 (In-Plant). | 03/31/2027 |
| **Complete Install:** The permittee shall complete installation of the continuous flow recording device at Sampling Point 105 (In-Plant). | 03/31/2028 |

## 5.5 Dissipative Cooling Study

| Required Action | Due Date |
|---|---|
| **Complete Dissipative Cooling Study:** Submit an updated dissipative cooling study for the existing outfall meeting the following requirements for determining the need for sub-lethal effluent limitations at the time of next permit reissuance: 1) A written description of the physical characteristics of the receiving water or outfall that encourage rapid dilution, diffusion, dispersion, or dissipation of heat; 2) A written description of the presence or absence of other thermal loads to the receiving stream; 3) The minimum and maximum effluent temperature for each calendar week monitored.<br><br>Note: The month of October is when the difference between the calculated limit and effluent data is the greatest; therefore, the dissipative cooling study shall be conducted in October.<br><br>The study shall also include any site-specific information collected as part of the study, including: 1) Information regarding the biological quality of the animal and plant community of the receiving water including, but not limited to, species composition, richness, diversity, density, distribution, age structure, spawning incidence, and presence of any state or federally listed threatened or endangered species; 2) Data concerning the physical characteristics of the receiving water or permitted outfalls that encourage rapid dilution, diffusion, dispersion, and/or dissipation of heat; 3) The minimum and maximum temperature of the receiving water upstream of all permitted outfalls for each calendar month monitored. | 03/01/2029 |

## 5.6 SS (Sanitary Sewage Collection System) Subclass

The permittee is required to have a designated collection system operator-in-charge (OIC) for the sanitary sewage collection system. The designated OIC shall have passed and be certified in the SS (Sanitary Sewage Collection System) subclass pursuant to s. NR 114.53(2), Wis. Adm. Code.

| Required Action | Due Date |
|---|---|
| **Operator Certification:** The permittee shall designate one person to be the operator-in-charge (OIC) for the sanitary sewage collection system and obtain the SS (Sanitary Sewage Collection System) subclass at the basic level. The designated OIC will have 12 months to pass the exam for the SS (Sanitary Sewage Collection System) subclass and submit the operator experience form for one year of subclass specific experience to be certified at the basic level pursuant to s. NR 114.53(4), Wis. Adm. Code. | 03/31/2026 |

## 5.7 Sludge Management Plan

A sludge management plan is required 60 days prior to sludge removal.

| Required Action | Due Date |
|---|---|
| **Sludge Management Plan Submittal:** Submit a management plan to optimize the land application system performance and demonstrate compliance with ch. NR 204, Wis. Adm. Code. This management plan shall 1) specify information on pretreatment processes (if any); 2) identify land application sites; 3) describe site limitations; 4) address vegetative cover management and removal; 5) specify availability of storage; 6) describe the type of transporting and spreading vehicle(s); 7) specify monitoring procedures; 8) track site loading; 9) address contingency plans for adverse weather and odor/nuisance abatement; and 10) include any other pertinent information. Once approved, all landspreading 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. | 03/31/2026 |

## Explanation of Schedules

**5.1 Chloride Source Reduction Measures (Target Value) –** This schedule is required to ensure that the permittee maintains compliance with the conditions and requirements of receiving a variance from the water quality-based chloride effluent limit of 444 mg/L as a weekly average. Since a compliance schedule is being granted, an interim limit is required, and for Chilton the limit is established as 560 mg/L (as a weekly average). The schedule requires that annual reports shall indicate which source reduction measures Chilton has implemented during each calendar year, and an analysis of chloride concentration and mass discharge data based on chloride sampling and flow data. The annual reports shall document progress made towards meeting the chloride target value of 505 mg/L by the end of the permit term.

**5.2 TMDL-Based Effluent Mass Limits for Total Phosphorus –** This compliance schedule contains the remaining Required Actions from the previous permit in order to achieve compliance with the TMDL-based effluent mass limits for total phosphorus by July 1, 2027.

**5.3 PFOS/PFOA Minimization Plan Determination of Need –** 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.

**5.4 Install Continuous Flow Recording Device –** This schedule is included for the facility to install a continuous flow recording device at Sampling Point 105. Installation of a continuous flow recording device is a reviewable project per ch. NR 108, Wis. Adm. Code, therefore, a plans and specifications submittal requirement is included in this schedule.

**5.5 Dissipative Cooling Study –** Chilton submitted a request for consideration of dissipative cooling, referencing a previous dissipative cooling study from December 2018. During the study, it was noted that receiving water low flows were higher than average. This schedule allows time for another dissipative cooling study to be done during the next permit term when flows are closer to critical conditions. The month of October is when the difference between the calculated limit and effluent data is the greatest; therefore, the dissipative cooling study shall be conducted in October.

**5.6 SS (Sanitary Sewage Collection System) Subclass –** Chilton is required to have a designated collection system operator-in-charge (OIC) for the sanitary sewage collection system pursuant to s. NR 114.53(2), Wis. Adm. Code. This schedule allows the facility time to come into compliance with this requirement.

**5.7 Sludge Management Plan –** A sludge management plan submittal is required at least 60 days prior to sludge removal, but no later than the Due Date.

## Attachments:

WQBEL Memo: Water Quality-Based Effluent Limitations for Chilton Wastewater Treatment Facility WPDES Permit No. WI-0022799-09, by Nicole Krueger, Water Resources Engineer, dated September 20, 2024

WQBEL Memo Addendum: Biological Oxygen Demand Limits for Chilton Wastewater Treatment Facility WPDES Permit No. WI-0022799-09, by Nicole Krueger, Water Resources Engineer, dated October 24, 2024

Chloride Variance EPA Data Sheet

Chloride SRM (Source Reduction Measures) Plan, City of Chilton, dated November 1, 2024

## Justification Of Any Waivers From Permit Application Requirements:

No waivers from permit application requirements were requested or granted.

**Prepared By:** Sarah Donoughe, Wastewater Specialist-Adv **Date:** December 5, 2024

# CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 09/20/2024

TO: Sarah Donoughe – SER

FROM: Nicole Krueger – SER Nicole Krueger

SUBJECT: Water Quality-Based Effluent Limitations for Chilton Wastewater Treatment Facility
WPDES Permit No. WI-0022799-09

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 Chilton Wastewater Treatment Facility in Calumet County. This municipal wastewater treatment facility (WWTF) discharges to the South Branch of the Manitowoc River, located in the South Branch of the Manitowoc River Watershed in the Manitowoc River Basin. This discharge is included in the Northeast Lakeshore Basin Total Maximum Daily Load (TMDL) as approved by USEPA in October 2023. 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:

**Outfall 001 – Effluent**

| Parameter | Daily Maximum | Daily Minimum | Weekly Average | Monthly Average | Footnotes |
|---|---|---|---|---|---|
| $CBOD_5$<br>November – April<br>May – October | | | <br>15 mg/L<br>9.6 mg/L | <br>**15 mg/L**<br>**9.6 mg/L** | 1,2 |
| TSS<br>November – April<br>May – October | | | <br>15 mg/L<br>10 mg/L | <br>**15 mg/L**<br>**10 mg/L** | 2 |
| pH | 9.0 s.u. | 6.0 s.u. | | | 1 |
| Dissolved Oxygen | | 6.0 mg/L | | | 1 |
| Residual Chlorine | 21 µg/L | | 6.5 µg/L | **6.5 µg/L** | 1,2 |
| Bacteria | | | | | 3 |
| Final Limit<br>*E. coli* | | | | 126 #/100 mL<br>geometric mean | |
| Ammonia Nitrogen | Variable | | Variable | Variable | 4 |
| Phosphorus<br>TBEL | | | | <br>1.0 mg/L | 5 |
| Chloride | | | | | 1,6 |
| PFOS and PFOA | | | | | 7 |
| Temperature | | | | | 8 |
| Chronic WET | | | | 1.1 TUc | 9,10 |

| Parameter | Daily Maximum | Daily Minimum | Weekly Average | Monthly Average | Footnotes |
|---|---|---|---|---|---|
| TKN, Nitrate+Nitrite, and Total Nitrogen | | | | | 11 |

**Outfall 002 – Blended Effluent**

| Parameter | Weekly Average | Monthly Average | Six-Month Average | Footnotes |
|---|---|---|---|---|
| Flow Rate | | | | 1,6 |
| Chloride | 444 mg/L<br>3,800 lbs/day | | | 12 |
| Acute WET | | | | 10,13 |
| TSS | 247 lbs/day | 175 lbs/day | | 14 |
| Phosphorus | | 5.0 lbs/day | 1.7 lbs/day | 14 |

Footnotes:

1. No changes from the current permit.
2. 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.
3. 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.
4. The variable daily maximum, weekly average, and monthly average ammonia limits are shown below.

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

| **Month** | **Weekly Avg Ammonia Effluent Limit (mg/L)** | **Monthly Avg Ammonia Effluent Limit (mg/L)** |
|---|---|---|
| Jan | 11 | 7.9 |
| Feb | 11 | 8.5 |

| Month | Weekly Avg Ammonia Effluent Limit (mg/L) | Monthly Avg Ammonia Effluent Limit (mg/L) |
|---|---|---|
| Mar | 11 | **11** |
| Apr | 14 | **14** |
| May | 5.4 | **5.4** |
| Jun | 3.8 | **3.8** |
| Jul | 3.1 | 2.4 |
| Aug | 3.2 | 2.3 |
| Sep | 4.6 | 3.2 |
| Oct | 7.3 | 6.0 |
| Nov | 13 | **13** |
| Dec | 11 | 9.6 |

5. The monthly average phosphorus limit is a technology-based limit which also functions as an interim limit for the phosphorus compliance.
6. Monitoring only.
7. Monitoring is required in accordance with s. NR 106.98(2), Wis. Adm. Code once every other month.
8. Another dissipative cooling study is recommended during the permit term when receiving water flows are closer to critical conditions.
9. Chronic WET testing is recommended 2x yearly. The Instream Waste Concentration (IWC) to assess chronic test results is 88%. 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 South Branch Manitowoc River.
10. 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).
11. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate ($NO_3$), nitrite ($NO_2$), and total Kjeldahl nitrogen (TKN) (all expressed as N).
12. This is the WQBEL for chloride. An alternative effluent limitation of 560 mg/L as a weekly average may be included in the permit in place of this limit if the chloride variance application that was submitted is approved by EPA. If the variance is not approved, a wet weather mass limit would also be required.
13. 1x yearly acute WET testing is recommended.
14. The TSS and phosphorus mass limits apply year-round and are based on the TMDL for the Northeast Lakeshore Basin to address phosphorus water quality impairments within the TMDL area. A compliance schedule is recommended in the reissued permit to meet these limits.

**If Chilton submits an approvable SOP for ferrous chloride, 2x/permit term acute WET testing for Outfall 002 and annual chronic WET testing for Outfall 001 would be 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 (4) – Narrative, Outfall Map, 2007 Ammonia Calculations, & Thermal Table

PREPARED BY: Nicole Krueger, Water Resources Engineer – SER

E-cc: Trevor Moen, Wastewater Engineer – NER
Heidi Schmitt Marquez, Regional Wastewater Supervisor – NER
Diane Figiel, Water Resources Engineer – WY/3
Nate Willis, Wastewater Engineer – WY/3

Attachment #1

**Water Quality-Based Effluent Limitations for**
**Chilton Wastewater Treatment Facility**

**WPDES Permit No. WI-0022799-09**

Prepared by: Nicole Krueger

## PART 1 – BACKGROUND INFORMATION

### Facility Description

Raw wastewater is collected from throughout the City of Chilton by a conventional gravity sewer system and sent to the wastewater treatment facility (WWTF). Holding tank waste, septic tank waste, and other wastewater are transported by vehicle to the hauled waste receiving station. Influent first passes through a mechanically-cleaned fine screen and is then sampled in the influent channel. Wastewater then enters biological phosphorus removal tanks with ferrous chloride added as needed. Next it flows to three oxidation ditches and two final clarifiers afterwards. Seasonal disinfection is then accomplished via a chlorine contact chamber and dechlorination structure. Flow is then sent to a cascade aerator for post-aeration, and effluent is sampled there at Sample Point 001. Prior to discharging into the South Branch of the Manitowoc River, the effluent is blended with regeneration wastewater from the City's water softening facility. There are generally 2-3 regeneration cycles per day at this softening plant. Sample Point 002 represents the combined discharge of the WWTF and water softening facility. Waste activated sludge from the final clarifiers is sent to an on-site storage tank where it is dewatered, then it is transferred to a second on-site storage tank before land application.

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

### Existing Permit Limitations

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

**Outfall 001 – Effluent**

| Parameter | Daily Maximum | Daily Minimum | Weekly Average | Monthly Average | Six-Month Average | Footnotes |
|---|---|---|---|---|---|---|
| $CBOD_5$<br>November – April<br>May – October | | | <br>15 mg/L<br>9.6 mg/L | <br>**15 mg/L**<br>**9.6 mg/L** | | 1,2 |
| TSS<br>November – April<br>May – October | | | <br>15 mg/L<br>10 mg/L | <br>**15 mg/L**<br>**10 mg/L** | | 1,2 |
| pH | 9.0 s.u. | 6.0 s.u. | | | | 1 |
| Dissolved Oxygen | | 6.0 mg/L | | | | 1 |
| Residual Chlorine | 21 µg/L | | 6.5 µg/L | **6.5 µg/L** | | 2 |
| Fecal Coliform<br>May – September | | | **656#/100 mL**<br>**geometric mean** | 400#/100 mL<br>geometric mean | | 2 |
| Ammonia Nitrogen | Variable | | Variable | Variable | | 3 |
| Phosphorus<br>Interim | | | | <br>1.0 mg/L | | 4 |

Attachment #1

| Parameter | Daily Maximum | Daily Minimum | Weekly Average | Monthly Average | Six-Month Average | Footnotes |
|---|---|---|---|---|---|---|
| Final | | | | 0.225 mg/L | 0.075 mg/L<br>0.74 lbs/day | |
| Chloride | | | | | | 5 |
| Temperature | | | | | | 5 |
| Chronic WET | | | | | | 6 |

**Outfall 002 – Blended Effluent**

| Parameter | Weekly Average | Footnotes |
|---|---|---|
| Flow Rate | | 5 |
| Chloride | 670 mg/L | 7 |
| Acute WET | | 8 |

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. 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.
3. The daily maximum ammonia limits below are effective year round.

| **Effluent pH - su** | **$NH_3$-N Limit – mg/L** | **Effluent pH - su** | **$NH_3$-N Limit – mg/L** |
|---|---|---|---|
| $pH \leq 7.5$ | > 19 mg/L | $8.2 < pH \leq 8.3$ | 5.2 |
| $7.5 < pH \leq 7.6$ | 19 | $8.3 < pH \leq 8.4$ | 4.3 |
| $7.6 < pH \leq 7.7$ | 16 | $8.4 < pH \leq 8.5$ | 3.6 |
| $7.7 < pH \leq 7.8$ | 14 | $8.5 < pH \leq 8.6$ | 2.9 |
| $7.8 < pH \leq 7.9$ | 11 | $8.6 < pH \leq 8.7$ | 2.4 |
| $7.9 < pH \leq 8.0$ | 9.3 | $8.7 < pH \leq 8.8$ | 2.0 |
| $8.0 < pH \leq 8.1$ | 7.7 | $8.8 < pH \leq 8.9$ | 1.7 |
| $8.1 < pH \leq 8.2$ | 6.4 | $8.9 < pH \leq 9.0$ | 1.5 |
| | | $9.0 < pH$ | < 1.5 mg/L |

| **Month** | **Weekly Avg Ammonia Effluent Limit (mg/L)** | **Monthly Avg Ammonia Effluent Limit (mg/L)** |
|---|---|---|
| Jan | 11 | 7.9 |
| Feb | 11 | 8.5 |
| Mar | 11 | **11** |
| Apr | 14 | **14** |
| May | 5.4 | **5.4** |
| Jun | 3.8 | **3.8** |

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| Month | Weekly Avg Ammonia Effluent Limit (mg/L) | Monthly Avg Ammonia Effluent Limit (mg/L) |
|---|---|---|
| Jul | 3.1 | 2.4 |
| Aug | 3.2 | 2.3 |
| Sep | 4.6 | 3.2 |
| Oct | 7.3 | 6.0 |
| Nov | 13 | **13** |
| Dec | 11 | 9.6 |

4. A compliance schedule is in the current permit to meet the final WQBEL by 07/01/2027.
5. Monitoring only.
6. Chronic WET tests are required annually at Outfall 001. The IWC is 88%.
7. This is a variance interim limit to the weekly average WQBEL of 444 mg/L.
8. Acute WET testing is required 2x during the permit term at Outfall 002.

**Receiving Water Information**

- Name: South Branch Manitowoc River
- Waterbody Identification Code (WBIC): 77900
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply. Note: 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-$Q_{10}$ and 7-$Q_2$ values are from Station M19 from USGS, where Outfall 001 is located.

  7-$Q_{10}$ = 0.25 cfs (cubic feet per second)
  7-$Q_2$ = 1.83 cfs
  Harmonic Mean Flow = 4.4 cfs

  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).

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **7-$Q_{10}$ (cfs)** | 0.44 | 0.55 | 1.02 | 3.88 | 1.04 | 0.59 | 0.40 | 0.34 | 0.30 | 0.39 | 0.66 | 0.50 |
| **7-$Q_2$ (cfs)** | 3.76 | 4.35 | 15.8 | 37.4 | 10.8 | 6.66 | 3.14 | 2.59 | 2.64 | 4.02 | 6.23 | 5.45 |

- Hardness = 277 mg/L as $CaCO_3$. This value represents the geometric mean of data from chronic WET testing from 10/09/2018 – 03/09/2021.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 100%. Chilton completed a mixing zone study which was approved by the Department in 2004.
- Source of background concentration data: Metals data from the Manitowoc River at County Highway JJ is used for this evaluation because there is no data available for the South Branch Manitowoc River. The Manitowoc River is within the same ecological landscape so ambient water quality

characteristics are expected to be similar. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.

- Multiple dischargers: None.
- Impaired water status: The immediate receiving water is 303(d) listed as impaired for total phosphorus and PCBs.

**Effluent Information**

- Design flow rate(s):
  Annual average = 1.19 MGD (Million Gallons per Day)
  Peak daily = 3.10 MGD
  Peak weekly = 1.60 MGD
  For reference, the actual average flow from 10/01/2019 – 04/30/2024 was 0.94 MGD.
- Hardness = 402 mg/L as $CaCO_3$. This value represents the geometric mean of data from the permit reissuance application from 02/05/2024 – 02/20/2024.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water source: Domestic wastewater with water supply from wells and wastewater from 5 industrial contributors: Worthington Industries, Briess Malt and Ingredients, Dubois Chemicals, Kaytee Products, and Milk Products, Inc.
- Additives: Chlorine is used for disinfection, sulfur dioxide is used for dechlorination, and ferrous chloride is used for phosphorus removal.
- Effluent characterization: This facility is categorized as a minor municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus ammonia, chloride, hardness and phosphorus.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled "MEAN EFFL. CONC.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

**Effluent Copper Data**

| Sample Date | Copper µg/L | Sample Date | Copper µg/L | Sample Date | Copper µg/L |
|---|---|---|---|---|---|
| 12/08/2022 | 11 | 12/20/2022 | 8.1 | 01/01/2023 | 4.7 |
| 12/11/2022 | 10 | 12/23/2022 | 8.4 | 01/04/2023 | 6.3 |
| 12/14/2022 | 9.8 | 12/26/2022 | 7.1 | 01/07/2023 | 6.0 |
| 12/17/2022 | 7.5 | 12/29/2022 | 6.5 | | |
| 1-day $P_{99}$ = 13 µg/L | | | | | |
| 4-day $P_{99}$ = 10 µg/L | | | | | |

**Effluent Chloride Data**

| | Chloride mg/L Outfall 001 | Chloride mg/L Outfall 002 |
|---|---|---|
| 1-day $P_{99}$ | 374 | 697 |
| 4-day $P_{99}$ | 297 | 564 |
| Max 4-day average | 255 | 489 |

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| | Chloride mg/L Outfall 001 | Chloride mg/L Outfall 002 |
|---|---|---|
| Mean | 233 | 450 |
| Standard deviation | 50.4 | 89.13 |
| Sample size | 220 | 220 |
| Range | 128 – 440 | 245 – 718 |

The following table presents the average concentrations and loadings at Outfall 002 from 10/01/2019 – 04/30/2024 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

**Parameter Averages with Limits**

| | Average Measurement |
|---|---|
| $CBOD_5$ | 0.17 mg/L* |
| TSS | 1.97 mg/L* |
| pH field | 8.03 s.u. |
| Phosphorus | 0.30 mg/L |
| Ammonia Nitrogen | 0.14 mg/L* |
| Dissolved Oxygen | 10 mg/L |
| Chlorine | <100 µg/L |
| Fecal Coliform | 22.8 #/100 mL |

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

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

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

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

### Acute Limits based on 1-$Q_{10}$

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

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

Where:

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

Qs = average minimum 1-day flow which occurs once in 10 years (1-day $Q_{10}$) if the 1-day $Q_{10}$ flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day $Q_{10}$).

Qe = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

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

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-$Q_{10}$ method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is the case for Chilton.

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).

**All effluent data shown below is for Outfall 001 unless otherwise noted.**

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

RECEIVING WATER FLOW = 0.20 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. | **002** 1-day $P_{99}$ | **002** 1-day MAX. CONC. |
|---|---|---|---|---|---|---|---|---|---|---|
| Chlorine | | 19.0 | | 21.1 | 4.22 | <100 | | | | |
| Arsenic | | 340 | 0.00 | 377 | 75.3 | <14 | | | | |
| Cadmium | 402 | 50.8 | 0.20 | 56.3 | 11.3 | <0.3 | | | | |
| Chromium | 301 | 4446 | 0.00 | 4929 | 986 | <1.3 | | | | |
| Copper | 402 | 57.7 | 12.3 | 62.6 | | | | | | |
| Lead | 356 | 365 | 9.9 | 403 | 80.6 | <3.5 | | | | |
| Nickel | 268 | 1080 | 20 | 1196 | 239 | 5.8 | | | | |
| Zinc | 333 | 345 | 28.3 | 379 | 75.8 | 42 | | | | |
| Chloride (mg/L) | | 757 | 31.1 | 836 | | | 374 | 440 | 697 | 718 |

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

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

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

RECEIVING WATER FLOW = 0.25 cfs (¼ of the 7-$Q_{10}$), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

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| SUBSTANCE | REF. HARD.* mg/L | CTC | MEAN BACK-GRD. | WEEKLY AVE. LIMIT | 1/5 OF EFFL. LIMIT | MEAN EFFL. CONC. | 4-day $P_{99}$ | **002** 4-day $P_{99}$ |
|---|---|---|---|---|---|---|---|---|
| Chlorine | | 7.28 | | 8.27 | 1.65 | <100 | | |
| Arsenic | | 152 | | 173 | 34.6 | <14 | | |
| Cadmium | 175 | 3.82 | 0.20 | 4.31 | 0.86 | <0.3 | | |
| Chromium | 277 | 304 | | 346 | 69.1 | <1.3 | | |
| Copper | 277 | 24.8 | 12.3 | 26.4 | | | | |
| Lead | 277 | 75.0 | 9.9 | 83.8 | 16.8 | <3.5 | | |
| Nickel | 268 | 120 | 20 | 134 | 26.8 | 5.8 | | |
| Zinc | 277 | 293 | 28.3 | 329 | 65.9 | 42 | | |
| Chloride (mg/L) | | 395 | 31.1 | 444 | | | 297 | **564** |

* 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 = 4.4 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 | 0.20 | 1254 | 251 | <0.3 |
| Chromium (+3) | 3818000 | | 12949474 | 2589895 | <1.3 |
| Lead | 140 | 9.9 | 451 | 90.2 | <3.5 |
| Nickel | 43000 | 20 | 145795 | 29159 | 5.8 |

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

RECEIVING WATER FLOW = 4.4 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

| SUBSTANCE | HCC | MEAN BACK-GRD. | MO'LY AVE. LIMIT | 1/5 OF EFFL. LIMIT | MEAN EFFL. CONC. |
|---|---|---|---|---|---|
| Arsenic | 13.3 | | 45.1 | 9.02 | <14 |

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**

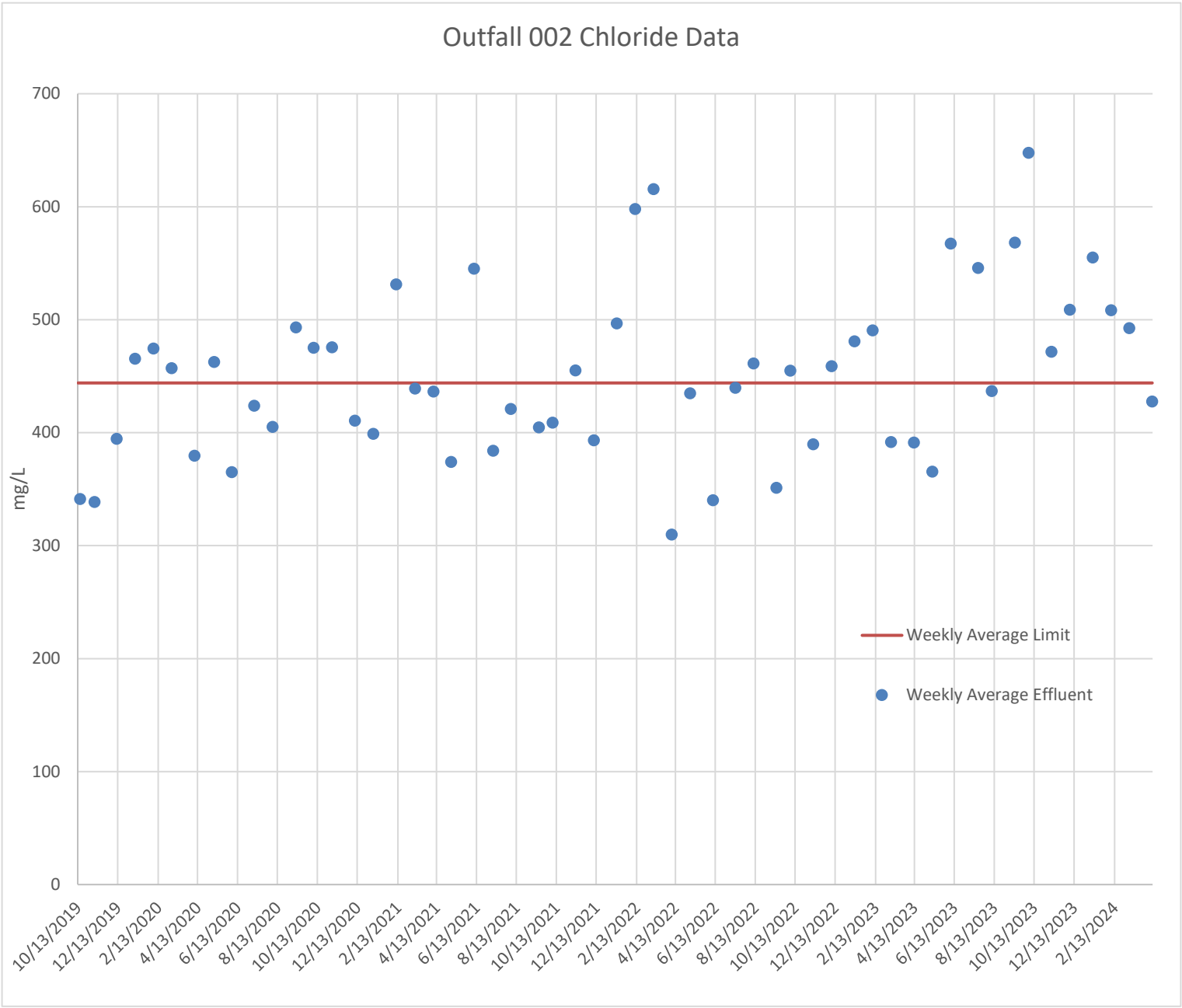
Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are required for chlorine.

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, a daily maximum limit of 21µg/L is required. Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required.

Chloride – Considering available effluent data from the current permit term (10/13/2019 – 04/10/2024), the 1-day $P_{99}$ chloride concentration is 697 mg/L, and the 4-day $P_{99}$ of effluent data is 564 mg/L for Outfall 002.

**Because the 4-day $P_{99}$ of Outfall 002 exceeds the calculated weekly average WQBEL, an effluent limit is needed in accordance with s. NR 106.05(4)(b), Wis. Adm. Code.** The data from the current permit term is shown below compared to the calculated weekly average limit.

Attachment #1




However, Subchapter VII of ch. NR 106, Wis. Adm. Code, provides for a variance from water quality standards for this substance, and Chilton has requested such a variance. That variance may be granted subject to the following conditions:

1) The permit shall include an "Interim" limitation intended to prevent an increase in the discharge of Chloride;
2) The permit shall specify "Source Reduction Measures" to be implemented during the permit term, with periodic progress reports; and
3) The permit shall include a "Target Limit" or "Target Value" to gage the effectiveness of the Source Reduction Measures, and progress toward the WQBELs.

**Interim Limit for Chloride**
Section NR 106.82(9), Wis. Adm. Code, defines a "Weekly average interim limitation" as either the 4-day $P_{99}$ concentration or 105% of the highest weekly average concentration of the representative data.

**It's recommended that the interim limit is 560 mg/L, rounded to two significant figures.** This is more stringent than the current interim limit of 670 mg/L.

A target limit and permit language for Source Reduction Measures are not recommended as part of this evaluation. These should follow contact with Chilton. Though if the Department and Chilton are unable to reach agreement on all the terms of a Chloride Variance, the calculated limits described earlier should be included in the permit, in accordance with s. NR 106.83(3), Wis. Adm. Code.

**Chloride Monitoring Recommendations**
Four samples per month (on consecutive days) are recommended. This allows for averaging of the results to compare with the interim limit and allows the use of the average in determining future interim limits, and degree of success with chloride reduction measures.

**In the absence of a variance,** Chilton would be subject to the WQBEL of 444 mg/L as a weekly average; the weekly average mass limit of 3,800 lbs/day (444 mg/L × 1.027 MGD × 8.34); and an alternative wet weather mass limit.

**Monitoring only for Outfall 001 is recommended to be continued** to ensure that samples are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code.

Mercury – The permit application did not require monitoring for mercury because Chilton 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 04/02/2020 – 04/05/2023 was 0.09 mg/kg, with a maximum reported concentration of 0.21 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 types of indirect dischargers contributing to the collection system, **PFOS and PFOA monitoring is recommended at a 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:

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

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 1674 sample results were reported from 10/02/2019 – 04/30/2024. The maximum reported value was 8.5 s.u. (Standard pH Units). The effluent pH was 8.2 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 8.2 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 8.2 s.u. Therefore, a value of 8.2 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 8.2 s.u. into the equation above yields an ATC = 5.7 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 | 11 |
| 1-$Q_{10}$ | 6.3 |

The 1-$Q_{10}$ method yields the most stringent limits for Chilton.

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**

| 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 |

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| Effluent pH s.u. | Limit mg/L | Effluent pH s.u. | Limit mg/L | Effluent pH s.u. | Limit mg/L |
|---|---|---|---|---|---|
| 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 |

Section NR 106.33(2), Wis. Adm. Code, was updated effective September 1, 2016. As a result, seasonal 20 and 40 mg/L thresholds for including ammonia limits in municipal discharge permits are no longer applicable under current rules. As such, the table has been expanded from the table in the current permit to include ammonia nitrogen limits throughout the pH range.

**Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)**
**The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do not change** because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous WQBEL memo are shown in Attachment #3.

**Effluent Data**
The following table evaluates the statistics based upon ammonia data reported from 11/05/2019 – 04/30/2024, with those results being compared to the calculated limits to determine the need to include ammonia limits in Chilton's permit for the respective month ranges. That need is determined by calculating 99$^{th}$ upper percentile (or $P_{99}$) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

**Ammonia Nitrogen Effluent Data**

| Ammonia Nitrogen mg/L | April - May | June - September | October - March |
|---|---|---|---|
| 1-day $P_{99}$ | 0.84 | 0.41 | 2.49 |
| 4-day $P_{99}$ | 0.43 | 0.21 | 1.36 |
| 30-day $P_{99}$ | 0.19 | 0.09 | 0.57 |
| Mean* | 0.08 | 0.03 | 0.21 |
| Std | 0.26 | 0.15 | 0.80 |
| Sample size | 117 | 208 | 389 |
| Range | <0.049 - 1.05 | <0.049 - 0.68 | <0.049 - 3.91 |

*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 any of the calculated ammonia nitrogen limits.

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

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

**Conclusions and Recommendations**

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

**Final Ammonia Nitrogen Limits**

| Effluent pH s.u. | Daily Max Limit mg/L | Effluent pH s.u. | Daily Max Limit mg/L | Effluent pH s.u. | Daily Max 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 |

| Month | Weekly Avg Ammonia Effluent Limit (mg/L) | Monthly Avg Ammonia Effluent Limit (mg/L) |
|---|---|---|
| Jan | 11 | 7.9 |
| Feb | 11 | 8.5 |
| Mar | 11 | **11** |
| Apr | 14 | **14** |
| May | 5.4 | **5.4** |
| Jun | 3.8 | **3.8** |
| Jul | 3.1 | 2.4 |
| Aug | 3.2 | 2.3 |
| Sep | 4.6 | 3.2 |
| Oct | 7.3 | 6.0 |
| Nov | 13 | **13** |
| Dec | 11 | 9.6 |

## 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 Chilton's 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**
Chilton has monitored effluent *E. coli* from 06/13/2022 – 06/28/2023 and a total of 25 results are available. A geometric mean of 126 counts/100 mL was not exceeded, with a maximum monthly geometric mean of 11 counts/100 mL. The maximum reported value was 26 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 Chilton 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.

**Northeast Lakeshore TMDL**
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 pounds per year. This WLA found in Appendix K of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Northeast Lakeshore Region* report are expressed as maximum annual loads (lbs/year). **The WLA for Chilton is 517 lbs/year for Outfall 002.**

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 Northeast Lakeshore Basin 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:

TP Equivalent Effluent Concentration = WLA ÷ (365 days/yr * Flow Rate * Conversion Factor)
= 517 lbs/yr ÷ (365 days/yr * 1.189MGD * 8.34)
= 0.14 mg/L

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.

TP 6-Month Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (517 lbs/yr ÷ 365 days/yr) * 1.17
= 1.7 lbs/day

TP Monthly Average Permit Limit = TP 6-Month Average Permit Limit * 3
= 1.7 lbs/day * 3
= 5.0 lbs/day

The multiplier used in the six-month average calculation was determined according to the implementation guidance. There is not data for Outfall 002, so data from Outfall 001 was used in this evaluation. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 1.1. 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 3/week; if a different monitoring frequency is used, the stated limits should be reevaluated.

Six-month average and monthly average mass effluent limits are recommended for this discharge. The limits are equivalent to concentrations of 0.17 mg/L and 0.50 mg/L, respectively, at the facility design flow of 1.189 MGD.

The TMDL establishes TP wasteload allocations to reduce the loading in the entire watershed including WLAs to meet water quality standards for tributaries in the Northeast Lakeshore Basin. 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 10/01/2019 – 04/30/2024.

**Total Phosphorus Effluent Data – Outfall 001**

| | **Phosphorus mg/L** | **Phosphorus lbs/day** |
|---|---|---|
| 1-day $P_{99}$ | 1.54 | 11.9 |

Attachment #1

| | Phosphorus mg/L | Phosphorus lbs/day |
|---|---|---|
| 4-day $P_{99}$ | 0.84 | 6.47 |
| 30-day $P_{99}$ | 0.46 | 3.51 |
| Mean | 0.30 | 2.27 |
| Std | 0.32 | 2.44 |
| Sample size | 717 | 717 |
| Range | <0.062 - 3.45 | 0 - 21.5 |

**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 WQBEL. 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 1.0 mg/L for permit reissuance along with requirements for optimization of phosphorus removal.** This interim limit is the same as the current technology based limit, but the reissued permit will also include requirements for optimization of phosphorus removal.

## 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 Northeast Lakeshore Region* report are expressed as maximum annual loads (lbs/year). **The annual WLA is 43,491 lbs/year for Outfall 002.**

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.

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

TSS Monthly Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (43,491 lbs/yr ÷ 365 days/yr) * 1.47
= 175 lbs/day

TSS Weekly Average Permit Limit = WLA ÷ 365 days/yr * multiplier
= (43,491 lbs/yr ÷ 365 days/yr) * 2.07
= 247 lbs/day

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 1.1. 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 concentrations of 25 mg/L and 18 mg/L, respectively, at the facility design flow of 1.189 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 10/01/2019 – 04/30/2024.

**Total Suspended Solids Effluent Data – Outfall 001**

| | TSS mg/L | TSS lbs/day |
|---|---|---|
| 1-day $P_{99}$ | 7.2 | 84.6 |
| 4-day $P_{99}$ | 5.1 | 51.4 |
| 30-day $P_{99}$ | 4.0 | 27.6 |
| Mean* | 3.4 | 17.1 |
| Std | 1.2 | 18.5 |
| Sample size | 413 | 717 |
| Range | <2.0 – 9.0 | 0 – 114 |

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

Although the data from Outfall 001 has demonstrated compliance with the TMDL-based limits, there is no TSS data for Outfall 002. **Therefore, a compliance schedule is recommended to be included in the reissued permit to meet the TMDL limits.**

## 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 form 10/01/2019 – 04/30/2024.

The table below summarizes the maximum temperatures reported during monitoring from 08/01/2014 – 12/31/2023.

**Monthly Temperature Effluent Data & Limits**

| Month | Representative Highest Monthly Effluent Temperature | | Calculated Effluent Limit | |
|---|---|---|---|---|
| | Weekly Maximum (°F) | Daily Maximum (°F) | Weekly Average Effluent Limitation (°F) | Daily Maximum Effluent Limitation (°F) |
| JAN | 51 | 52 | 53 | 85 |
| FEB | 47 | 49 | 55 | 84 |
| MAR | 52 | 53 | 57 | 85 |
| APR | 55 | 58 | 62 | 103 |
| MAY | 64 | 66 | 68 | 90 |
| JUN | 69 | 71 | 79 | 88 |
| JUL | 74 | 76 | 83 | 86 |
| AUG | 75 | 77 | 83 | 85 |
| SEP | 72 | 75 | 75 | 85 |
| OCT | 72 | 73 | **62** | 82 |
| NOV | 63 | 67 | **52** | 86 |
| DEC | 57 | 58 | **52** | 83 |

**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

Comparing the representative highest effluent temperature to the calculated effluent limits determines the reasonable potential of exceeding the effluent limits. The months in which limitations are recommended are shown in bold. Based on this analysis, weekly average temperature maximum limits are necessary for the months of **October, November, and December.**

Chilton has submitted a request for consideration of dissipative cooling, referencing a previous dissipative cooling study from December 2018. During the study, it was noted that receiving water low flows were higher than average. **It's recommended that another dissipative cooling study be done during the next permit term when flows are closer to critical conditions.**

It's recommended that the DC study be done in October when the difference between the calculated limit and effluent data is the greatest, if possible.

## PART 6 – WHOLE EFFLUENT TOXICITY (WET)

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

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid $LC_{50}$ (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid $IC_{25}$ (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of **88%** shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

$Q_e$ = annual average flow = 1.189 MGD = 1.840 cfs
f = fraction of the $Q_e$ withdrawn from the receiving water = 0
$Q_s = 7\text{-}Q_{10}$ = 0.25 cfs x 100% = 0.25 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. 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 Outfalls 001 and 002. 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 prior to July 2005 has been excluded in this evaluation.

**WET Data History**

| Date Test Initiated | Outfall 002 Acute Results $LC_{50}$ % | | | | Outfall 001 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? | |
| 10/24/2006 | >100 | >100 | Pass | No | >100 | 97.4 | | Pass | No | 1 |
| 08/21/2007 | | | | | >100 | >100 | | Pass | No | 1 |
| 02/12/2008 | | | | | >100 | >100 | | Pass | No | 1 |
| 02/12/2008 | 93.9 | >100 | Fail | No | | | | | | 1 |
| 04/23/2008 | >100 | >100 | Pass | Yes | | | | | | |
| 05/01/2008 | >100 | >100 | Pass | Yes | | | | | | |
| 05/17/2011 | >100 | >100 | Pass | Yes | >100 | >100 | | Pass | Yes | |
| 11/09/2011 | >100 | >100 | Pass | Yes | | | | | | |
| 01/31/2012 | >100 | >100 | Pass | Yes | | | | | | |
| 08/07/2012 | >100 | >100 | Pass | Yes | >100 | >100 | | Pass | Yes | |
| 01/08/2013 | >100 | >100 | Pass | Yes | >100 | >100 | | Pass | Yes | |
| 11/18/2014 | >100 | >100 | Pass | Yes | >100 | >100 | | Pass | Yes | |
| 10/09/2018 | | | | | >100 | >100 | | Pass | Yes | |
| 09/24/2019 | >100 | >100 | Pass | Yes | >100 | >100 | | Pass | Yes | |
| 06/16/2020 | | | | | >100 | >100 | | Pass | Yes | |
| 03/09/2021 | >100 | >100 | Pass | Yes | >100 | >100 | | Pass | Yes | |
| 12/06/2022 | >100 | >100 | Pass | Yes | 93 | >100 | >100 | Pass | Yes | |
| 12/05/2023 | | | | | >100 | >100 | | Pass | Yes | |

Footnotes:

1. *Data Not Representative.* After the detect on 02/12/2008, it was requested the facility do 2/yearly acute sampling for Outfall 002 which was subject to drop after two years of nondetects.

- 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)(AMZ)]
  Chronic Reasonable Potential = [(TUc effluent) (B)(IWC)]

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

**Outfall 002**
Acute Reasonable Potential = 0 < 1.0, reasonable potential is not shown, and a limit is not required.

**Outfall 001**
Chronic Reasonable Potential = [($TU_c$ effluent) (B)(IWC)]

**Chronic WET Limit Parameters**

| **TUc** (maximum) $100/IC_{25}$ | **B** (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4) | IWC |
|---|---|---|
| 100/93 = 1.1 | 6.2 Based on 1 detect | 88% |

[(TUc effluent) (B)(IWC)] = 5.9 > 1.0

Therefore, **reasonable potential is shown for chronic WET limits** using the procedures in s. NR 106.08(6) and representative data from 05/17/2011 – 12/05/2023.

Expression of WET limits
**Chronic WET limit = [100/IWC] $TU_c$ = 1.1 $TU_c$ expressed as a monthly average for Outfall 001**

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 Outfall 002** | **Chronic Outfall 001** |
|---|---|---|
| **AMZ/IWC** | Not Applicable.<br><br>**0 Points** | IWC = 88%.<br><br>**15 Points** |
| **Historical Data** | 10 tests used to calculate RP.<br>No tests failed.<br><br>**0 Points** | 10 tests used to calculate RP.<br>No tests failed.<br><br>**0 Points** |
| **Effluent Variability** | Little variability, no violations or upsets, consistent WWTF operations.<br><br>**0 Points** | Same as Acute.<br><br>**0 Points** |
| **Receiving Water Classification** | Warmwater sport fish<br><br>**5 Points** | Same as Acute.<br><br>**5 Points** |

Attachment #1

| | Acute Outfall 002 | Chronic Outfall 001 |
|---|---|---|
| **Chemical-Specific Data** | No reasonable potential for limits for based on ATC; Ammonia nitrogen limit carried over from the current permit. Copper, nickel, zinc, chloride, and ammonia detected. Additional Compounds of Concern: None.<br><br>**3 Points** | Reasonable potential for limits for chloride based on CTC; Ammonia nitrogen limit carried over from the current permit. Copper, nickel, zinc, and ammonia detected. Additional Compounds of Concern: None.<br><br>**8 Points** |
| **Additives** | 1 Biocide (chlorine) and 2 Water Quality Conditioners (sulfur dioxide and ferrous chloride) added. Permittee has proper P chemical SOPs in place: No<br><br>**20 Points** | All additives used more than once per 4 days.<br><br>**20 Points** |
| **Discharge Category** | 5 Industrial Contributors.<br><br>**9 Points** | Same as Acute.<br><br>**9 Points** |
| **Wastewater Treatment** | Secondary or Better<br><br>**0 Points** | Same as Acute.<br><br>**0 Points** |
| **Downstream Impacts** | No impacts known.<br><br>**0 Points** | Same as Acute.<br><br>**0 Points** |
| **Total Checklist Points:** | **37 Points** | **57 Points** |
| **Recommended Monitoring Frequency (from Checklist):** | 1x yearly | 2x yearly |
| **Limit Required?** | No | Yes<br>Limit = 1.1 $TU_c$ |
| **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, 1x yearly acute and 2x 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).
- 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.

If Chilton submits an approvable SOP for ferrous chloride, 15 points would be removed from the acute and chronic checklists. This would result in the recommendation of **2x/permit term acute WET testing for Outfall 002 and annual chronic WET testing for Outfall 001.**

Chilton currently monitors acute WET testing at Outfall 002 and chronic WET testing at Outfall 001. **No changes are recommended at this time to the WET testing parameters at Outfall 001 and Outfall 002 .** Due to the high chloride concentrations, chronic testing is not required at Outfall 002 per s. NR 106.89, Wis. Adm. Code because it is anticipated that chronic WET failures would occur and mask any other toxicants that may be present.

Attachment #2

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

# Chilton WWTF Outfall Location


**Legend**

Permits

Surface Water Outfalls

Basemaps

Hydro

24K Hydro (Cached) Inland

Water Resources

Rivers and Streams

Intermittent Streams

Open Water

Great Lakes water

**Notes**

1:40,000

0 0.5 1 mi

Service layer credits:
WI DNR, Water Division | WI Dept. of Natural Resources, Division of Water

**This map is a product generated by a DNR mapping application**

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*Date Printed: 08/29/2024*

Attachment #3

## 2007 Ammonia Limits Calculations

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

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 simply 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 generally further adjusted to temperature in the following manner. 100% of the flow is used if the Temperature ≥ 16 °C. Only 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. However, in 2004 the City of Chilton commissioned Strand Associates, Inc. to perform a Mixing Zone Study at Outfall 002. That study concluded that mixing of the effluent with the receiving water was rapid and complete, and that the full river flow should be used to determine effluent limitations based on chronic or long-term toxicity. The department concurred with that conclusion via e-mail correspondence. So 100% of the river flow will be used for all months to determine effluent limitations for Ammonia Nitrogen based on chronic toxicity for the upgraded Chilton WWTF.

The rules provide 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 Manitowoc River system. So "ELS Absent" criteria apply from October through March, and "ELS Present" criteria will apply from April through October. No mass limits are recommended, in accordance with s. NR 106.32(5).

As noted earlier, the City of Chilton contracted USGS to provide updated low-flow values for the South Branch of the Manitowoc River in 2003. Included in this work was the derivation of 7-$Q_{10}$ and 7-$Q_2$ values for each month of the year. Those values are tabulated below along with the other input variables used, and the resulting effluent limitations for an upgraded Chilton WWTF. The values shown for Temperature are based on work by the technical advisory committee that is developing thermal water quality standards. The background pH and $NH_3$-N (Ammonia Nitrogen) concentration represent the default assumed values for the basin, used because there is very limited data available from the South Branch of the Manitowoc River in the vicinity of the outfall. It should be noted that the pH values, the background ammonia concentrations, and the monthly low-flow values shown below are identical to the values used to derive the current limits. However, the temperature values have been updated. The current limits were derived using a temperature of 3 °C in winter (Dec. – Feb.), 10 °C in spring (March – May) 25 °C in summer (June – Aug.) and 15 °C in fall (Sept. – Nov.).

Attachment #3

| Month | Background | | | | | $NH_3$-N Limits – mg/L (Full Assimilative Capacity) | |
|---|---|---|---|---|---|---|---|
| | $7\text{-}Q_{10}$ | $7\text{-}Q_2$ | Temp. | pH | $NH_3$-N | Weekly Average | Monthly Average |
| | cfs | cfs | °C | su | mg/L | | |
| January | 0.44 | 3.76 | 1 | 7.97 | 0.16 | 12.74 | 11.01 |
| February | 0.55 | 4.35 | 1 | 7.97 | 0.16 | 13.35 | 12.09 |
| March | 1.02 | 15.8 | 4 | 7.97 | 0.04 | 16.01 | 33.94 |
| April | 3.88 | 37.4 | 9 | 7.97 | 0.04 | 19.66 | 45.74 |
| May | 1.04 | 10.8 | 17 | 8.21 | 0.04 | 5.86 | 8.81 |
| June | 0.59 | 6.66 | 21 | 8.21 | 0.05 | 3.82 | 4.58 |
| July | 0.40 | 3.14 | 23 | 8.21 | 0.05 | 3.10 | 2.43 |
| August | 0.34 | 2.59 | 22 | 8.21 | 0.05 | 3.22 | 2.33 |
| September | 0.30 | 2.64 | 16 | 8.21 | 0.05 | 4.66 | 3.50 |
| October | 0.39 | 4.02 | 9 | 8.21 | 0.05 | 7.62 | 7.10 |
| November | 0.66 | 6.23 | 7 | 7.97 | 0.05 | 13.99 | 15.85 |
| December | 0.50 | 5.45 | 3 | 7.97 | 0.16 | 13.07 | 14.11 |

The weekly average and monthly average effluent limitations tabulated above are all greater than the current permit limits. Consequently, the provisions of ch. NR 207 must be considered. The above limits can be considered representative of the full assimilative capacity of the South Branch of the Manitowoc River at Chilton. Limits which prevent significant lowering of water quality (SLOWQ) are defined as those using no more than one-third of the remaining assimilative capacity. During the months of December, January, February and March, the increase is due entirely to the fact that the full receiving was low-flow values are used in the mass-balance. The 4-Day Criteria and the 30-Day Criteria are unchanged from the criteria used to derive the current limitations. Consequently, limits that prevent SLOWQ can be calculated by taking one-third of the difference from the respective current limit and adding it to the current permit limit. For the remaining months of the year, the situation is more complex. The different temperature values used above changes the criteria, but the increase due to the change in criteria is not subject to antidegradation requirements. The change resulting from a different percentage of the receiving water flow is subject to antidegradation requirements, though. From June through September the same receiving water flow that had been used to calculate the current limit is used. During those months, the increase is due entirely to the revised criteria as a result of using lower temperature values. If the effluent flow rate had not increased from 0.92 MGD to 1.189 MGD, effluent limitations would have increased even more. So the increase during those months is not subject to ch. NR 207 antidegradation requirements, and the limits in the table above will prevent SLOWQ. For the months of April and May, and September through November, it is necessary to calculate effluent limitations with the revised criteria, but the same (percentage of) the receiving water flows that were used to derive the current limits, and the same effluent flow rate of 0.92 MGD. The increase in limits calculated in this manner is not subject to antidegradation limits, so the one-third of the difference between such limits and the limits in the table above can be added to these limits to arrive at limits which prevent significant lowering of water quality. But for both May and September, the limits calculated with the revised criteria and the same receiving water and effluent flow rates are less than the current limits, so the limits that prevent SLOWQ are calculated exactly as for December, January, February and March.

The table below shows the limits that prevent significant lowering of water quality, calculated as described, after rounding to two significant figures.

Attachment #3

| Month | $NH_3$-N Limits that prevent SLOWQ | |
|---|---|---|
| | Weekly Average | Monthly Average |
| January | 11 mg/L | 7.9 mg/L |
| February | 12 mg/L | 8.5 mg/L |
| March | 11 mg/L | **19 mg/L** |
| April | 14 mg/L | **26 mg/L** |
| May | 5.4 mg/L | **6.0 mg/L** |
| June | 3.8 mg/L | **4.6 mg/L** |
| July | 3.1 mg/L | 2.4 mg/L |
| August | 3.2 mg/L | 2.3 mg/L |
| September | 4.6 mg/L | 3.2 mg/L |
| October | 7.3 mg/L | 6.0 mg/L |
| November | 13 mg/L | 13 mg/L |
| December | 11 mg/L | 9.6 mg/L |

The monthly average limits from March through June (shown in **bold font** in the table above) may be deleted because they are redundant, exceeding the weekly average limits for the respective month. Weekly average limits would have to be exceeded in order to exceed the monthly average limits, so there is no need for the monthly average limits.

The Chilton WWTF should be designed to comply with the above limits that prevent SLOWQ, unless the City can demonstrate compliance with s. NR 207.04(1)(d).

Attachment #4

# Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

**Facility:** Chilton WWTF

**Outfall(s):** 001

**Date Prepared:** 8/29/2024

**Design Flow (Qe):** 1.19 MGD

**Storm Sewer Dist.** 0 ft

**7-$Q_{10}$:** 0.25 cfs

Small warm water sport or forage f

**f:** 0

**Stream type:**

**Qs:Qe ratio:** 0.1 :1

**Calculation Needed?** YES

| | Temp Dates | Flow Dates |
|---|---|---|
| **Start:** | 08/01/14 | 10/01/19 |
| **End:** | 12/31/23 | 04/30/24 |

| Month | Water Quality Criteria | | | Receiving Water Flow Rate (Qs) | Representative Highest Effluent Flow Rate (Qe) | | f | Representative Highest Monthly Effluent Temperature | | Calculated Effluent Limit | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ta (default) | Sub-Lethal WQC | Acute WQC | | 7-day Rolling Average (Qesl) | Daily Maximum Flow Rate (Qea) | | Weekly Average | Daily Maximum | Weekly Average Effluent Limitation | Daily Maximum Effluent Limitation |
| | (°F) | (°F) | (°F) | (cfs) | (MGD) | (MGD) | | (°F) | (°F) | (°F) | (°F) |
| JAN | 33 | 49 | 76 | 0.44 | 1.020 | 1.339 | 0 | 51 | 52 | 53 | 85 |
| FEB | 34 | 50 | 76 | 0.55 | 1.181 | 1.912 | 0 | 47 | 49 | 55 | 84 |
| MAR | 38 | 52 | 77 | 1.02 | 1.920 | 3.199 | 0 | 52 | 53 | 57 | 85 |
| APR | 48 | 55 | 79 | 3.88 | 2.405 | 3.301 | 0 | 55 | 58 | 62 | 103 |
| MAY | 58 | 65 | 82 | 1.04 | 1.368 | 2.011 | 0 | 64 | 66 | 68 | 90 |
| JUN | 66 | 76 | 84 | 0.59 | 1.351 | 1.727 | 0 | 69 | 71 | 79 | 88 |
| JUL | 69 | 81 | 85 | 0.40 | 1.825 | 3.248 | 0 | 74 | 76 | 83 | 86 |
| AUG | 67 | 81 | 84 | 0.34 | 1.807 | 2.929 | 0 | 75 | 77 | 83 | 85 |
| SEP | 60 | 73 | 82 | 0.30 | 1.267 | 1.609 | 0 | 72 | 75 | 75 | 85 |
| OCT | 50 | 61 | 80 | 0.39 | 2.051 | 3.317 | 0 | 72 | 73 | **62** | 82 |
| NOV | 40 | 49 | 77 | 0.66 | 1.405 | 1.735 | 0 | 63 | 67 | **52** | 86 |
| DEC | 35 | 49 | 76 | 0.50 | 1.362 | 1.770 | 0 | 57 | 58 | **52** | 83 |

# CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 10/24/2024

TO: Sarah Donoughe – SER

FROM: Nicole Krueger – SER Nicole Krueger

SUBJECT: Biological Oxygen Demand Limits for Chilton Wastewater Treatment Facility
WPDES Permit No. WI-0022799-09

This memo is to evaluate the need for biological oxygen demand ($BOD_5$) limits. The current permit has water quality-based effluent limits (WQBELs) for CBOD of 15 mg/L as a weekly average and 9.6 mg/L as a monthly average.

The department does not recommend CBOD WQBELs in WPDES permits. Total $BOD_5$ is approximately equal to carbonaceous biochemical oxygen demand (CBOD) plus nitrogenous oxygen demand (NBOD). Therefore, any WQBEL for CBOD needs to account for NBOD in order to be protective of water quality which would mean that the CBOD limit would be more restrictive than the BOD WQBELs.

The $BOD_5$ and corresponding dissolved oxygen (DO) limits are evaluated in this memo.

**Receiving Water Information**

- Name: South Branch Manitowoc River
- Waterbody Identification Code (WBIC): 77900
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply.
- The following 7-$Q_{10}$ and 7-$Q_2$ values are from Station M19 from USGS, where Outfall 001 is located.

  7-$Q_{10}$ = 0.25 cfs (cubic feet per second)
  7-$Q_2$ = 1.83 cfs

  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).

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **7-$Q_{10}$ (cfs)** | 0.44 | 0.55 | 1.02 | 3.88 | 1.04 | 0.59 | 0.40 | 0.34 | 0.30 | 0.39 | 0.66 | 0.50 |
| **7-$Q_2$ (cfs)** | 3.76 | 4.35 | 15.8 | 37.4 | 10.8 | 6.66 | 3.14 | 2.59 | 2.64 | 4.02 | 6.23 | 5.45 |

**Effluent Information**

- Design flow rate(s):
  Annual average = 1.19 MGD (Million Gallons per Day)

**$BOD_5$ Limits**

In establishing $BOD_5$ limitations, the primary intent is to prevent a lowering of dissolved oxygen levels in the receiving water below water quality standards as specified in ss. NR 102.04(4)(a) and (b), Wis. Adm. Code. The 26-lb method is the most frequently used approach for calculating $BOD_5$ limits when resources

are not available to develop a detailed water quality model. This simplified model was developed in the 1970's by the Wisconsin Committee on Water Pollution on the Fox, Wisconsin, Oconto, and Flambeau Rivers. Further studies throughout the 1970's proved this model to be relatively accurate. The model has since then been used by the Department on many occasions when resources are not available to perform a site-specific model. The "26" value stems from the following equation:

$$\frac{26\,{}^{\text{lbs}}/_{\text{day}}}{{}^{\text{ft}^3}/_{\text{sec}}} * \frac{1\,\text{day}}{86{,}400\,\text{sec}} * \frac{454{,}000\,\text{mg}}{\text{lbs}} * \frac{1\,\text{ft}^3}{28.32\,\text{L}} = 4.8 = 2.4 * 2\,{}^{\text{mg}}/_{\text{L}}$$

The 4.8 has been calculated by taking 2.4 which is the number one receives when converting 26 lbs of BOD/day/cfs into mg/L, multiplied by 2.0 which is the change in the DO level. A typical background DO level for Wisconsin waters is 7 mg/L, so a 2 mg/L decrease is allowed in order to meet the 5 mg/L standard for warm water streams. The above relationship is temperature dependent and an appropriate temperature correction factor is applied. The 26-lb method is based on a typical 24°C summer value for warm water streams. Adjustments for temperature are made using the following equation:

$$k_t = k_{24}\left(0.967^{(T-24)}\right)$$

Where $k_{24}$ = 26 lbs of BOD/day/cfs

Calculations based on Full Assimilative Capacity at 7Q10 Conditions:

$$Limitation(mg/L) = 2.4\left(DO_{stream} - DO_{std}\right)\left(\frac{\left({}_7Q_{10} + Q_{eff}\right)}{Q_{eff}}\right)\left(0.967^{(T-24)}\right)$$

Where:
$Q_{eff}$ = effluent design flow = 1.19 MGD
$DO_{stream}$ = background dissolved oxygen = 7 mg/L
$DO_{std}$ = dissolved oxygen criteria from s. NR 102.04(4) = 5 mg/L
${}_7Q_{10}$ = 0.25 cfs
T = Receiving water temperature from s. NR 102.25

$BOD_5$ limits are calculated using both an effluent DO of 7 mg/L and 8 mg/L. Using a higher effluent DO results in less stringent $BOD_5$ limits. Both effluent DO situations are shown below for monthly $BOD_5$ limits and seasonal $BOD_5$ limits.

**Effluent DO = 7 mg/L**

| BOD Effluent Limitations (26 LB Method) | | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|---|
| **Background Information:** | 7-$Q_{10}$ (cfs) | 0.44 | 0.55 | 1.02 | 3.88 | 1.04 | 0.59 |
| | River Temperature (°C) | 0.56 | 1.11 | 3.33 | 8.89 | 14.4 | 18.9 |
| **Dissolved Oxygen mg/L:** | Effluent | 7 | 7 | 7 | 7 | 7 | 7 |
| | Background | 7 | 7 | 7 | 7 | 7 | 7 |
| | Mix DO | 7 | 7 | 7 | 7 | 7 | 7 |
| | Criteria | 5 | 5 | 5 | 5 | 5 | 5 |
| **Weekly Ave** | Concentration Limits (mg/L) | 13 | 13 | 15 | 25 | 10 | 7.5 |

| BOD Effluent Limitations (26 LB Method) | | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|---|
| **BOD Effluent Limitations** | Mass (lbs/d) | 130 | 133 | 148 | 245 | 103 | 75 |

| BOD Effluent Limitations (26 LB Method) | | Jul | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|
| **Background Information:** | 7-$Q_{10}$ (cfs) | 0.40 | 0.34 | 0.30 | 0.39 | 0.66 | 0.50 |
| | River Temperature (°C) | 20.6 | 19.4 | 15.6 | 10.0 | 4.44 | 1.67 |
| **Dissolved Oxygen mg/L:** | Effluent | 7 | 7 | 7 | 7 | 7 | 7 |
| | Background | 7 | 7 | 7 | 7 | 7 | 7 |
| | Mix DO | 7 | 7 | 7 | 7 | 7 | 7 |
| | Criteria | 5 | 5 | 5 | 5 | 5 | 5 |
| **Weekly Ave BOD Effluent Limitations** | Concentration Limits (mg/L) | 6.6 | 6.6 | 7.4 | 9.3 | 13 | 13 |
| | Mass (lbs/d) | 65 | 66 | 74 | 92 | 125 | 128 |

| BOD Effluent Limitations (26 LB Method) | | Winter | Summer |
|---|---|---|---|
| **Background Information:** | 7-$Q_{10}$ (cfs) | 0.25 | 0.25 |
| | River Temperature (°C) | 3.3 | 16.5 |
| **Dissolved Oxygen mg/L:** | Effluent | 7 | 7 |
| | Background | 7 | 7 |
| | Mix DO | 7 | 7 |
| | Criteria | 5 | 5 |
| **Weekly Ave BOD Effluent Limitations** | Concentration Limits (mg/L) | 11 | 7.0 |
| | Mass (lbs/d) | 108 | 70 |

**Effluent DO = 8 mg/L**

| BOD Effluent Limitations (26 LB Method) | | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|---|
| **Background Information:** | 7-$Q_{10}$ (cfs) | 0.44 | 0.55 | 1.02 | 3.88 | 1.04 | 0.59 |
| | River Temperature (°C) | 0.56 | 1.11 | 3.33 | 8.89 | 14.4 | 18.9 |
| **Dissolved Oxygen mg/L:** | Effluent | 8 | 8 | 8 | 8 | 8 | 8 |
| | Background | 7 | 7 | 7 | 7 | 7 | 7 |
| | Mix DO | 7.8 | 7.8 | 7.6 | 7.3 | 7.6 | 7.8 |
| | Criteria | 5 | 5 | 5 | 5 | 5 | 5 |
| **Weekly Ave BOD Effluent Limitations** | Concentration Limits (mg/L) | 18 | 19 | 20 | 29 | 14 | 10 |
| | Mass (lbs/d) | 182 | 185 | 196 | 285 | 135 | 103 |

| BOD Effluent Limitations (26 LB Method) | | Jul | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|
| **Background** | 7-$Q_{10}$ (cfs) | 0.40 | 0.34 | 0.30 | 0.39 | 0.66 | 0.50 |

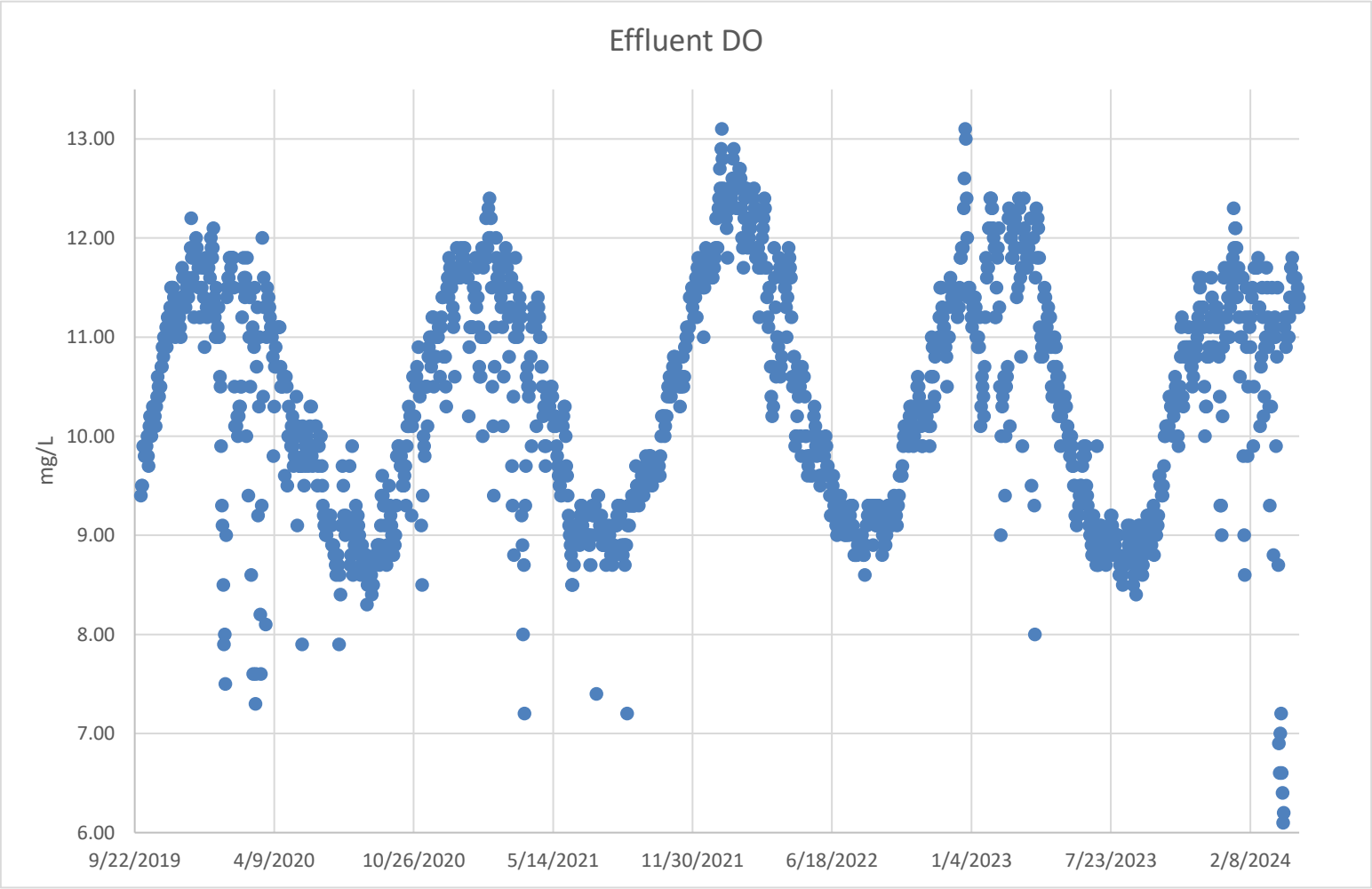
| BOD Effluent Limitations (26 LB Method) | | Jul | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|
| **Information:** | River Temperature (°C) | 20.6 | 19.4 | 15.6 | 10.0 | 4.44 | 1.67 |
| **Dissolved Oxygen mg/L:** | Effluent | 8 | 8 | 8 | 8 | 8 | 8 |
| | Background | 7 | 7 | 7 | 7 | 7 | 7 |
| | Mix DO | 7.8 | 7.8 | 7.9 | 7.8 | 7.7 | 7.8 |
| | Criteria | 5 | 5 | 5 | 5 | 5 | 5 |
| **Weekly Ave BOD Effluent Limitations** | Concentration Limits (mg/L) | 9.2 | 9.4 | 11 | 13 | 17 | 18 |
| | Mass (lbs/d) | 92 | 93 | 105 | 130 | 171 | 178 |

| BOD Effluent Limitations (26 LB Method) | | Winter | Summer |
|---|---|---|---|
| **Background Information:** | 7-$Q_{10}$ (cfs) | 0.25 | 0.25 |
| | River Temperature (°C) | 3.3 | 16.5 |
| **Dissolved Oxygen mg/L:** | Effluent | 8 | 8 |
| | Background | 7 | 7 |
| | Mix DO | 7.88 | 7.88 |
| | Criteria | 5 | 5 |
| **Weekly Ave BOD Effluent Limitations** | Concentration Limits (mg/L) | 16 | 10 |
| | Mass (lbs/d) | 156 | 100 |

DO data shown below in the table and graph was collected during the current permit term which demonstrates that Chilton can meet an effluent minimum DO limit of 7 mg/L or 8 mg/L most of the time.

**Effluent DO Data**

| | DO mg/L |
|---|---|
| 1-day $P_{99}$ | 13.3 |
| 4-day $P_{99}$ | 11.8 |
| 30-day $P_{99}$ | 10.9 |
| Mean | 10.4 |
| Std | 1.15 |
| Sample size | 1674 |
| Range | 6.1 – 13.1 |




Chilton may choose which $BOD_5$ and DO limits to have in their reissued permit.

# Facility Specific Chloride Variance Data Sheet

**Directions: Please complete this form electronically. Record information in the space provided. Select checkboxes by double clicking on them. Do not delete or alter any fields. For citations, include page number and section if applicable. Please ensure that all data requested are included and as complete as possible. Attach additional sheets if needed.**

## Section I: General Information

**A. Name of Permittee:** City of Chilton

**B. Facility Name:** Chilton Wastewater Treatment Facility

**C. Submitted by:** Wisconsin Department of Natural Resources

**D. State:** Wisconsin **Substance:** Chloride **Date completed:** December 5, 2024

**E. Permit #:** WI-0022799-09-0 **WQSTS #:** (EPA USE ONLY)

**F. Duration of Variance** **Start Date:** April 1, 2025 **End Date:** March 31, 2030

**G. Date of Variance Application:** November 1, 2024

**H. Is this permit a:**
☐ **First time submittal for variance**
☒ **Renewal of a previous submittal for variance** *(Complete Section IX)*

**Description of proposed variance:** The City of Chilton Wastewater Treatment Facility (WWTF) discharges to the South Branch of the Manitowoc River in Calumet County. The City of Chilton seeks a variance to the water quality standards for chloride for its WWTF's Outfall 002 (WWTF effluent combined with the discharge from Softener Plant #8).

The Department concludes that the City of Chilton has met the requirements of s. NR 106.83(2), Wis. Adm. Code, and s. 283.15, Wisconsin Statutes. The Department further concludes that requiring the City of Chilton to meet the water quality standard for chloride would result in substantial and widespread adverse social and economic impacts in its service area. Furthermore, the Department concludes that there is no feasible pollutant control technology that can be applied to achieve compliance with the chloride water quality-based effluent limit (WQBEL). The Department therefore proposes that this permit include a discharger-specific variance to the chloride water quality standard for aquatic life.

The proposed variance for chloride for the WWTF's Outfall 002, from the chronic WQBEL of 444 mg/L, to an interim limit of 560 mg/L, is expressed as a weekly average limit. The Department concludes that the interim limit reflects the greatest pollutant reduction achievable by the permittee with the pollutant control technologies currently applied in the permittee's WWTF. The permit requires the permittee to implement Source Reduction Measures (SRMs). The Department considers the highest attainable condition (HAC) of the receiving water to be the interim limit – applied for the term of the variance – combined with the permittee's implementation of SRMs. The term of the proposed variance is five years, concurrent with the term of the proposed WPDES permit. The underlying designated uses and criteria of Wisconsin's chloride water quality standards (WQS) will be retained, and all other applicable WQS will remain in effect with adoption of the proposed variance.

This is the renewal of a previous submittal to EPA for a chloride variance for this permittee. The previous permit for this facility contained an interim chloride limit, target value, and requirements to implement source reduction measures, in accordance with s. NR 106.83(2), Wis. Adm. Code.

**Citation:** An interim chloride effluent limitation under s. NR 106.83(2), Wis. Adm. Code, represents a variance to water quality standards authorized by s. 283.15, Wis. Stats., and 40 CFR §131.14.

**I. List of all who assisted in the compilation of data for this form**

| Name | Email | Phone | Contribution |
|---|---|---|---|
| Sarah Donoughe | Sarah.Donoughe@Wisconsin.gov | 920-366-6076 | Permit Drafter |
| Trevor Moen | Trevor.Moen@Wisconsin.gov | 920-410-5192 | Compliance Engineer |
| Nicole Krueger | Nicole.Krueger@Wisconsin.gov | 414-897-5750 | Parts II D-H and J |

## Section II: Criteria and Variance Information

**A. Water Quality Standard from which variance is sought:** Chloride

**B. List other criteria likely to be affected by variance:** None.

**C. Source of Substance:** Regeneration wastewater from municipal ion exchange softening plant #8, regeneration wastewater from up to approximately 50 point-of-use water softeners, ferrous chloride at wastewater treatment plant (for phosphorus removal), snow melt and wash water from snowplow vehicles inside a shop, and possibly some industrial chemicals

**D. Ambient Substance Concentration:** 31.1 mg/L ☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

E. **If measured or estimated, what was the basis? Include citation.** Ambient chloride was measured in the Manitowoc River at County Hwy JJ from 04/15/1980 – 11/16/1998.

**F. Average effluent discharge rate:** 1.19 MGD (annual average design flow) 0.94 MGD (actual average flow) **Maximum effluent discharge rate:** 3.1 MGD (peak daily design flow)

**G. Effluent Substance Concentration:** 1-day P99 = 697 mg/L; 4-day P99 = 564 mg/L; Average = 450 mg/L ☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

**H. If measured or estimated, what was the basis? Include Citation.** Permit-required monitoring 4/month.

**I. Type of HAC:**
☐ **Type 1: HAC reflects waterbody/receiving water conditions**
☐ **Type 2: HAC reflects achievable effluent conditions**
☐ **Type 3: HAC reflects current effluent conditions**

**J. Statement of HAC:** The Department has determined the highest attainable condition of the receiving water is achieved through the application of the variance limit in the permit, combined with a permit requirement that the permittee implement its Chloride SRM plan. Thus, the HAC at commencement of this variance is 560 mg/L, which reflects the greatest chloride reduction achievable with the current treatment processes, in conjunction with the implementation of the permittee's Chloride SRM plan. The current effluent condition is reflective of on-site optimization measures that have already occurred. This HAC determination is based on the economic feasibility of available compliance options for the Chilton WWTF at this time (see Economic Section below). The permittee may seek to renew this variance in the subsequent reissuance of this permit; the Department will reevaluate the HAC in its review of such a request. A subsequent HAC cannot be defined as less stringent than this HAC.

**K. Variance Limit:** 560 mg/L

**L. Level currently achievable (LCA):** 560 mg/L

**M. What data were used to calculate the LCA, and how was the LCA derived? (***Immediate compliance with LCA is required.)*
The LCA represents the 4-day P99 from the current permit (10/13/2019 – 04/10/2024), rounded to two significant figures.

**N. Explain the basis used to determine the variance limit (which must be ≤ LCA). Include citation.**
Chapter NR 106, Subchapter VII, Wis. Adm. Code, allows for a variance; the imposition of a less restrictive interim limit; a compliance schedule that stresses source reduction and public education; and allowance for a target value or limit to be a goal for reduction.

The variance limit = 4 Day P99. The limit is established in accordance with s. 283.15 (5), Wis. Stats. and ch. NR 106 Subchapter II, Wis. Adm. Code.

**O. Select all factors applicable as the basis for the variance provided under 40 CFR 131.10(g). Summarize justification below:** ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☒ **6**

The use of a reverse osmosis system was evaluated. The cost of the system was estimated to an average cost per household that would result in a MHI of 7.05%. Replacing the current municipal ion-exchange water softening system with a lime softening system was also evaluated, and the estimated cost of doing so would be about 2.54% of the MHI. Without a variance, meeting the water quality standard of 444 mg/L would result in substantial and widespread economic and social impacts.

## Section III: Location Information

**A. Counties in which water quality is potentially impacted:** Calumet; Manitowoc

**B. Receiving waterbody at discharge point:** South Branch of the Manitowoc River

**C. Flows into which stream/river?** Manitowoc River **How many miles downstream?** 8 miles

**D. Coordinates of discharge point (UTM or Lat/Long):** 44° 02' 9.2" N Latitude, 88° 08' 33.7" W Longitude

**E. What is the distance from the point of discharge to the point downstream where the concentration of the substance falls to less than or equal to the chronic criterion of the substance for aquatic life protection?**
Approximately 15 miles downstream, where Mud Creek reaches the Manitowoc River. The 7Q10 here is 9.3 cfs.

**F. Provide the equation used to calculate that distance** *(Include definitions of all variables, identify the values used for the clarification, and include citation):*
The mass balance equation below including the variance limits and design flows from all other variance permittees listed in Part H, needs to result in an instream concentration less than or equal to the chronic toxicity criteria of 395 mg/L:

(interim limit in mg/L x effluent design flow in cfs) + (background concentration in mg/L x background stream flow in cfs)) / (effluent design flow in cfs + background stream flow in cfs) ≤ 395 mg/L

**G. What are the designated uses associated with the direct receiving waterbody, and the designated uses for any downstream waterbodies until the water quality standard is met?**
The receiving water and downstream waters are designated for recreation, nonpublic water supply, and fish and aquatic life uses (warm water sport fish (WWSF) classification).

**H. Identify all other variance permittees for the same substance which discharge to the same stream, river, or waterbody in a location where the effects of the combined variances would have an additive effect on the waterbody:** The flow-weighted effluent chloride concentration based on all of these facilities, including Chilton WWTF, using the current annual average design flow (total flow of 3.47 MGD) is 649 mg/L.

| Permit Number | Facility Name | Facility Location | Variance Limit [mg/L] |
|---|---|---|---|
| WI-0022195 | St. Nazianz WWTF (design flow = 0.20 MGD) | St. Nazianz | Current = 490 mg/L |
| WI-0020443 | Brillion WWTF (design flow = 0.708 MGD) | Brillion | Current = 1100 mg/L<br>Proposed = 780 mg/L |
| WI-0029025 | Potter WWTF (design flow = 0.0434 MGD) | Potter | Current = 450 mg/L<br>Proposed = 450 mg/L |
| WI-0020893 | New Holstein Utilities (design flow = 1.33 MGD) | New Holstein | Current = 480 mg/L<br>Proposed = 420 mg/L |

**I. Please attach a map, photographs, or a simple schematic showing the location of the discharge point as well as all variances for the substance currently draining to this waterbody on a separate sheet**
See attached map "Current Outfall Variances September 2024"

**J. Is the receiving waterbody on the CWA 303(d) list? If yes, please list the impairments below.** ☐ Yes ☐ No ☐ Unknown

| River Mile | Pollutant | Impairment |
|---|---|---|
| 0.00 – 12.64 | Phosphorus | Water Quality Use Restrictions |
| 0.00 – 12.64 | PCBs | Contaminated Sediment & Fish Tissue |
| 0.00 – 12.64 | Unknown | Elevated Water Temperature |

***K.* Please list any contributors to the POTW in the following categories:**

| | |
|---|---|
| Food processors (cheese, vegetables, meat, pickles, soy sauce, etc.) | Briess Malt and Ingredients; Chilton Malting; Milk Products |

| | |
|---|---|
| Metal Plating/Metal Finishing | American Finishing; Worthington Cylinders |
| Car Washes | Sunrise Car Wash; Cruise In Car Wash |
| Municipal Maintenance Sheds (salt storage, truck washing, etc.) | City Garage; Calumet County Highway Department |
| Laundromats | Southside Laundromat |
| Other presumed commercial or industrial chloride contributors to the POTW | None known |

**L. If the POTW does not have a DNR-approved pretreatment program, is a sewer use ordinance enacted to address the chloride contributions from the industrial and commercial users? If so, please describe.**
Yes. The City's ordinance requires chloride testing twice/year for certain industrial and commercial users. Other users may be required to test on an as-needed basis. However, a chloride pretreatment limit is not in effect.

## Section IV: Pretreatment (complete this section only for POTWs with DNR-Approved Pretreatment Programs. See w:\Variances\Templates and Guidance\Pretreatment Programs.docx)

**A. Are there any industrial users contributing chloride to the POTW? If so, please list.**
N/A

**B. Are all industrial users in compliance with local pretreatment limits for chloride? If not, please include a list of industrial users that are not complying with local limits and include any relevant correspondence between the POTW and the industry (NOVs, industrial SRM updates and timeframe, etc)**
N/A

**C. When were local pretreatment limits for chloride last calculated?**
N/A

**D. Please provide information on specific SRM activities that will be implemented during the permit term to reduce the industry's discharge of the variance pollutant to the POTW**
N/A

## Section V: Public Notice

**A. Has a public notice been given for this proposed variance?** ☒ Yes ☐ No
**B. If yes, was a public hearing held as well?** ☒ Yes ☐ No ☐ N/A
**C. What type of notice was given?**
☒ Notice of variance included in notice for permit ☐ Separate notice of variance
**D. Date of public notice:** December 12, 2024 **Date of hearing:** January 27, 2025
**E. Were comments received from the public in regards to this notice or hearing?** *(If yes, see notice of final determination)* ☐ Yes ☐ No

## Section VI: Human Health

**A. Is the receiving water designated as a Public Water Supply?** ☐ Yes ☒ No
**B. Applicable criteria affected by variance:** No human health criteria for chloride.
**C. Identify any expected impacts that the variance may have upon human health, and include any citations:**
None.

## Section VII: Aquatic Life and Environmental Impact

**A. Aquatic life use designation of receiving water:** Warm water sport fish community
**B. Applicable criteria affected by variance:** Chronic toxicity criterion for chloride is 395 mg/L per ch. NR 105, Wis. Adm. Code.

**C. Identify any environmental impacts to aquatic life expected to occur with this variance, and include any citations:**
None.

**D. List any Endangered or Threatened species known or likely to occur within the affected area, and include any citations:** None that would affect the water quality criterion, as the chronic toxicity criterion for chloride is more stringent than all genus mean chronic values for organisms with chloride toxicity data. As a result, no endangered species with data would need more protection than already provided by the existing criterion.

| County | Species | Status |
|---|---|---|
| | | |

**Citation:** U.S. Fish & Wildlife Service – Environmental Conservation Online System (http://www.fws.gov/endangered/) and National Heritage Index (http://dnr.wi.gov/topic/nhi/)

## Section VIII: Economic Impact and Feasibility

**A. Describe the permittee's current pollutant control technology in the treatment process:**
Treatment processes include preliminary treatment using fine screens; secondary treatment using activated sludge technology; phosphorus removal; seasonal disinfection; and sludge stabilization using aerobic digestion. None of these wastewater treatment processes remove chloride.

**B. What modifications would be necessary to comply with the current limits? Include any citations.**
Upgrades to the WWTF would include installing reverse osmosis (RO) to comply with the WQBEL of 450 mg/L. Alternatively, changing the municipal softening system from ion-exchange to lime softening treatment would be expected to result in the WWTF's compliance with the chloride WQBEL.

**C. How long would it take to implement these changes?**
It would not be economically feasible for the City of Chilton to install reverse osmosis treatment at the WWTF, or to change the municipal softening system from ion-exchange to a lime softening system. Affordability is the limiting factor for both of these treatments, and it is unknown how long that will continue to be the case.

**D. Estimate the capital cost** *(Citation)***:** RO Treatment: $1,337,625 (source: WDNR Form 3400-193 Chloride Variance Application from permittee)
Lime Softening: $9,708,855 (source: Chloride Variance Economic Eligibility Tool (Lime Softening))

**E. Estimate additional O & M cost** *(Citation)***:** RO Treatment: $433,985/yr (source: WDNR Form 3400-193 Chloride Variance Application from permittee)
Lime Softening: Cost estimate not available

**F. Estimate the impact of treatment on the effluent substance concentration, and include any citations:**
Reverse osmosis wastewater treatment systems can be operated to achieve levels of chloride below the water quality standard of 395 mg/L. Municipal lime softening systems do not generate chloride waste as do ion-exchange softening systems, thus the concentration of chloride in the WWTF's discharge would be expected to be at levels below the water quality standard with a municipal lime softening system. However, neither of these technologies is economically feasible for the City of Chilton at this time.

**G. Identify any expected environmental impacts that would result from further treatment, and include any citations:**
End-of-pipe RO wastewater treatment technology for chloride produces concentrated brine that can be as much or more of an environmental liability than the untreated effluent. Since the concentrated brine cannot be further treated, the only recourse for the disposal of the brine is transfer to another community, which is often not feasible. Appropriate chloride source reduction activities are preferable environmentally to effluent end-of-pipe treatment in most cases, since the end product of treatment (production of a concentrated brine) does not remove the load of chloride from the environment.

There would be some impacts based on disposal of brine from RO. These include air pollution impacts from trucking brine and increased chloride impacts at the point where brine is discharged.

Lime softening results in the generation of a sludge that would need to be disposed of, and there would be air pollution impacts from the transport of that material.

**H. Is it technically and economically feasible for this permittee to modify the treatment process to reduce the level of the substance in the discharge?** ☐ Yes ☒ No ☐ Unknown

RO treatment of the Chilton WWTF effluent to meet the WQBEL is technically feasible. However, it is not economically feasible. See DNR variance application and screening tool for costs of RO. Use of RO at the WWTF was evaluated; the resulting total cost for sewer user rates was estimated to result in an average cost to households that would be 7.05% of the MHI. An increase of this magnitude would cause substantial and widespread adverse social and economic impacts in the area where the discharge is located.

Lime softening treatment of the City of Chilton's water supply – in lieu of ion-exchange (as currently practiced) – is technically feasible, and would enable the WWTF effluent to meet the chloride WQBEL. However, lime softening is not economically feasible. See the Chloride Variance Economic Eligibility Tool (Lime Softening) screening tool for costs of lime softening. Use of municipal lime softening was evaluated; the resulting cost for sewer user rates was estimated to result in an average cost to households that would be 2.54% of the MHI. An increase of this magnitude would cause substantial and widespread adverse social and economic impacts in the area where the discharge is located.

**I. If treatment is possible, is it possible to comply with the limits on the substance?** ☒ Yes ☐ No ☐ Unknown

**J. If yes, what prevents this from being done? Include any citations.**

The cost of adding RO to the existing WWTF's treatment train, or replacing the current municipal ion-exchange water softening system with a lime softening system, would cause substantial and widespread adverse social and economic impacts in the area where the discharge is located. Implementation of the SRMs in the proposed permit is preferable economically and environmentally to installing either of these treatments.

**K. List any alternatives to current practices that have been considered, and why they have been rejected as a course of action, including any citations:**

Alternative water supply sources were considered since water softening was determined to be a primary source of chloride. The City of Manitowoc draws its water from the relatively 'softer' Lake Michigan; however, it is approximately 24 miles from Chilton to Manitowoc. In projects in which one municipality has supplied water to another, the Department has witnessed costs in the range of $1 million per mile to install the pipeline between the two municipalities. Capital costs in that range exceed those estimated for the addition of RO treatment at the WWTF, thus this option would not be considered to be economically feasible.

The Department has also considered other wastewater treatment options, including hauling or piping wastewater to another POTW. In this situation piping wastewater to another POTW was considered to the City of Manitowoc, approximately 24 miles away. The cost of installing a wastewater pipeline over that distance would be comparable to that identified above for a water pipeline – and that cost would be prohibitive. Hauling wastewater from the City of Chilton to another POTW for treatment – approximately 750,000 gal/day – was deemed to be practicably unfeasible.

The permittee investigated the feasibility of discharging the effluent from the WWTF to a different receiving water (with greater assimilative capacity for chloride), hauling the brine waste from the municipal water softeners to a WWTF that can accept that waste, land application of the brine waste, and using the brine waste for pre-wetting roads for wintertime ice control (see the February 28, 2017, letter from Strand Associates, entitled "Chilton Wastewater Treatment Plant Chloride Analysis"). The first three of these alternatives were determined to be unfeasible. The analysis also indicated that using brine to pre-wet roadways as an anti-icing practice may be operationally feasible, but determined that the amount produced by the softeners far exceeds that typically used by the County on an annual basis; therefore, that alternative was deemed practically unfeasible.

**Citations:** Justification for Variances to Water Quality Standards for Chloride in Wisconsin (07/09/2010 DRAFT); Chilton Wastewater Treatment Plant Chloride Analysis, by Vernon Witthuhn, Jr., P.E., Strand Associates – February 28, 2017

## Section IX: Compliance with Water Quality Standards

**A. Describe all activities that have been, and are being, conducted to reduce the discharge of the substance into the receiving stream. This may include existing treatments and controls, consumer education, promising centralized or remote treatment technologies, planned research, etc. Include any citations.**

As part of implementing the chloride source reduction measures (SRMs) as required per s. NR 106.83(2), Wis. Adm. Code, the permittee conducted the following activities:

**A. SRMs Targeting Municipal Water Softening**

1. Optimized the operation of the municipal ion-exchange softeners.
2. Evaluated the economic feasibility for re-use of the brine wastewater from the municipal softeners, and develop plans to implement re-use options identified to be economically feasible.
3. Evaluated the feasibility of producing softened water with a higher level of hardness.
4. Encouraged water conservation measures.

**B. SRMs Targeting Point-of-Use Water Softening Sources**

1. Educated point-of-use softener owners of the availability of municipally softened water and the impact of chloride on water quality; provide information about increasing softener efficiency and reducing the use of softened water.
2. Developed an inventory of point-of-use water softeners in use in the City, and collect information about the type of regeneration control unit and when each was last tuned-up.
3. Enforced existing ordinance that requires the use of demand initiated regeneration, a high salt efficiency standard and periodic tune-ups for new and replacement point-of-use softeners.

**C. SRMs Targeting Industrial and Commercial Sources**

1. Worked with industrial and commercial contributors to prevent increases in the amount of chloride discharged, and seek reductions from those sources.
2. Evaluated the feasibility of switching to a non-chloride containing chemical, or using biological processes, for phosphorus removal at the wastewater treatment facility.
3. Developed and implemented management practices to reduce/eliminate the discharge of chloride to the sanitary sewer system at municipal/county facilities housing vehicles used for snow plowing and road de-icing/anti-icing.

**See the submitted Annual Chloride Progress Reports for further details.**

**B. Describe all actions that the permit requires the permittee to complete during the variance period to ensure reasonable progress towards attainment of the water quality standard. Include any citations.**

**A. SRMs Targeting Municipal Water Softening**

1. Optimize the operation of the municipal ion-exchange softeners (see the Chloride Source Reduction Plan for more information).
2. Encourage water conservation measures.

**B. SRMs Targeting Point-of-Use Water Softening Sources**

1. Educate point-of-use softener owners of the availability of municipally softened water and the impact of chloride on water quality; provide information about increasing softener efficiency and reducing the use of softened water.
2. Maintain inventory of point-of-use water softeners in use in the City and collect information about the type of regeneration control unit and when each was last tuned-up.
3. Enforce existing ordinance that requires the use of demand initiated regeneration, a high salt efficiency standard and periodic tune-ups for new and replacement point-of-use softeners.

**C. SRMs Targeting Industrial, Commercial and Municipal Sources**

1. Work with industrial and commercial contributors to prevent increases in the amount of chloride discharged, and seek reductions from those sources.

2. Evaluate new industries for the potential to discharge chlorides.

**D. SRMs Targeting Winter Road Maintenance**

1. Assess management practices to reduce/eliminate the discharge of chloride to the sanitary sewer system at municipality/county facilities housing vehicles used for snow plowing and road de-icing/anti-icing.

**Citation: Chloride Source Reduction Plan, City of Chilton**

## Section X: Compliance with Previous Permit *(Variance Reissuances Only)*

**A. Date of previous submittal:** May 21, 2018 **Date of EPA Approval:** May 31, 2018

**B. Previous Permit #:** WI-0022799-08-0 **Previous WQSTS #:** (EPA USE ONLY)

**C. Effluent substance concentration:** 564 mg/L (4-day P99) **Variance Limit:** 670 mg/L (weekly average)

**D. Target Value(s):** 605 mg/L **Achieved?** ☒ **Yes** ☐ **No** ☐ **Partial**

**E. For renewals, list previous steps that were to be completed. Show whether these steps have been completed in compliance with the terms of the previous variance permit. Attach additional sheets if necessary.**

| Condition of Previous Variance | Compliance |
|---|---|
| Annual Chloride Progress Report #1 | ☒ **Yes** ☐ **No** |
| Annual Chloride Progress Report #2 | ☒ **Yes** ☐ **No** |
| Annual Chloride Progress Report #3 | ☒ **Yes** ☐ **No** |
| Annual Chloride Progress Report #4 | ☒ **Yes** ☐ **No** |
| Final Chloride Report | ☒ **Yes** ☐ **No** |
| Annual Chloride Progress Report #6 (*After permit expiration*) | ☒ **Yes** ☐ **No** |

# Chloride Source Reduction Plan

## City of Chilton WPDES Permit No. WI-0020893-10-0 2025 - 2030

**Interim Limit:** 560 mg/L, Weekly Avg **Target Value:** 505 mg/L, Weekly Avg

**Water Quality Based Limits:** 444 mg/L and 3,800 lbs/day, Weekly Avg

| SRM/PMP Activities | Actions | Frequency/Year of the Permit | | | | |
|---|---|---|---|---|---|---|
| | | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
| 1. SRMs Targeting Municipal Water Softening | | | | | | |
| Optimize the operation of the municipal ion-exchange softeners. | Track softener metrics including grains of hardness removed per pound of salt and gallons of water softened per regeneration to optimize softener performance. | x | x | x | x | x |
| | Perform breakthrough analysis for each softener vessel to adjust regeneration cycles for optimum salt use. | x | x | x | x | x |
| | Evaluate the condition of replaceable components of the municipal ion-exchange softeners that are subject to wear to determine the remaining life-expectancy of those items. Replace items as indicated. | x | x | x | x | x |
| | Third-party analysis of resin. Replace if indicated. | | | | x | |
| Encourage water conservation measures. | Seek reductions in water use from residential, commercial, and industrial customers. Encourage conservation in City newsletters. | x | x | x | x | x |
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2. SRMs Targeting Point-of-Use Water Softeners | | | | | | |
| Educate point-of-use softener owners of the availability of municipally softened water and the impact of chloride on water quality; provide information about increasing softener efficiency and reducing the use of softened water. | Send information (e.g., brochures) to customers and post information on the City's web site. | x | x | x | x | x |
| Maintain inventory of point-of-use water softeners in use in the City and collect information about the type of regeneration control unit and when each was last tuned-up. | Maintain point-of-use softener spreadsheet. Send notification letters to users in advance of required five-year inspection. | x | x | x | x | x |
| Enforce existing ordinance that requires the use of demand initiated regeneration, a high salt efficiency standard and periodic tune-ups for new and replacement point-of-use softeners. | Track compliance with ordinance, ch. 12.04(3)(f), City of Chilton Municipal Code. | x | x | x | x | x |
| 3. SRMs Targeting Industrial, Commercial and Municipal Sources | | | | | | |
| Work with industrial and commercial contributors to prevent increases in the amount of chloride discharged and seek reductions from those sources. | Conduct annual meetings and inspections with each industrial and commercial contributor, during which sources of chloride discharged will be identified; potential means of reducing the amount of chloride discharged will be identified; and – where appropriate – plans will be developed to implement additional source reduction measures. Use Industrial Site Visit Questionnaire at each site visit. | x | x | x | x | x |
| Evaluate new industries for the potential to discharge chlorides | Require new industries within the City to complete Industrial User Survey. | As needed | | | | |
| 4. SRMs Targeting Winter Road Maintenance | | | | | | |
| Assess management practices to reduce/eliminate the discharge of chloride to the sanitary sewer system at municipal/county facilities housing vehicles used for snow plowing and road de-icing/anti-icing. | Conduct annual meetings and inspections with City Streets and County Highway departments to discuss best management practices for salt vehicle operation and maintenance. | x | x | x | x | x |