

Permit Fact Sheet

General Information

Permit Number:	WI-0041904-09-0
Permittee Name:	Sartori Company-West Main Building
Address:	P O Box 258
City/State/Zip:	Plymouth WI 53073-1602
Discharge Location:	Via municipal storm sewer at the facility located at 12 West Main Street, Plymouth and approx. 700 feet north of the Mullet River.
Receiving Water:	Mullet River (Mullet River Watershed, Sheboygan River Basin) in Sheboygan County
StreamFlow (Q _{7,10}):	6 cfs
Stream Classification:	Warm Water Sport Fishery
Discharge Type:	Existing, Continuous

Facility Description

Sartori Cheese receives raw milk from local dairy farms and produces Italian cheeses and co-products of cream and whey concentrate at its 12 West Main facility. Whey from the cheese making process is piped through a whey cooling plate and then through a reverse osmosis (RO) system that removes water from the whey. The water is then processed through a polisher. Some polished water is used for whey plant clean in place (CIP) processes. CIP water and cheese plant sanitation water is discharged to the Plymouth Utilities wastewater treatment plant. Polished water not used for CIP is discharged to the Mullet River. Sartori discharges NCCW (sourced from Plymouth Utilities) and RO Polisher Water, as well as sump pump water from elevator pits to a municipal storm sewer approximately 700 feet north of the Mullet River. Concentrated whey and whey cream is sold off or land applied on WDNR approved sites. High strength salty whey is hauled to area wastewater treatment plants, approved manure pits or land application sites. Sanitary wastewater, Boiler Blowdown, and Water Softener Regeneration backwash is discharged to the Plymouth WWTP via the sanitary sewer.

There has been no discharge at Outfall 001 since 2022 due to Sartori exploring options to meet chlorine limits and there will be no discharge for the foreseeable future. However, the facility would like to retain the option to resume normal discharge when the chlorine issue is resolved. Data for some parameters have still been collected and analyzed before it is sent to sanitary. Outfall 001 has been inactivated. Department approval is required prior to use.

Substantial Compliance Determination

After a facility inspection on November 29, 2023 conducted by DNR Wastewater Engineer, Curt Nickels, this facility has been found to be in substantial compliance with their current permit, WI-0041904-08-1

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)
001	0.146 MGD (2021 available data) 0.0 MGD (2022 - current)	EFFLUENT: Noncontact cooling water (excluding boiler blowdown and bleed off), reverse osmosis polisher water and uncontaminated elevator pit water. Flow measurements shall be taken with a flow meter located in the cream compressor room. Effluent samples shall be collected from the manhole on the east side of the building, at the combined flow sampling station, with a portable 24-hr flow proportional composite sampler prior to discharge to the Mullet River. INACTIVE: DEPARTMENT APPROVAL REQUIRED TO ACTIVATE OUTFALL 001. APPROVAL MUST BE RECEIVED PRIOR TO USE.
002	1,208,450 gallons of liquid waste per year (WPDES Application submitted in Dec 2023).	LAND APPLICATION: Liquid waste is being hauled to a WWTP for further processing. If land application occurs, a land management plan is required 90 days prior to land application. Landspreading of salty whey, process wastewater, concentrated whey not sold as product, and off-spec whey product or milk on sites approved by the Department of Natural Resources, either directly to approved sites or via manure storage structures. A representative sample shall be collected from the hauling vehicle for each waste type that is landspread during the quarter and the test results shall be recorded in the daily log. If landspreading does not occur in the quarter, sampling is not required.

1 Surface Water - Monitoring and Limitations

Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Total Daily	
BOD5, Total	Daily Max	20 mg/L	Weekly	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	10 mg/L	Weekly	24-Hr Flow Prop Comp	
BOD5, Total	Daily Max	85 lbs/day	Weekly	Calculated	
BOD5, Total	Monthly Avg	42 lbs/day	Weekly	Calculated	
Suspended Solids, Total		mg/L	Weekly	24-Hr Flow Prop Comp	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Suspended Solids, Total	Daily Max	44 lbs/day	Weekly	Calculated	
Suspended Solids, Total	Monthly Avg	27 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 DMR. See 'TMDL Calculations' 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 DMR. See 'TMDL Calculations' section.
pH Field	Daily Min	6.0 su	5/week	Grab	
pH Field	Daily Max	9.0 su	5/week	Grab	
Chlorine, Total Residual	Daily Max	38 ug/L	5/week	Grab	
Chlorine, Total Residual	Weekly Avg	38 ug/L	5/week	Grab	
Chlorine, Total Residual	Monthly Avg	38 ug/L	5/week	Grab	
Phosphorus, Total	Monthly Avg	0.8 mg/L	Weekly	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	1.0 lbs/day	Weekly	Calculated	
Phosphorus, Total	6-Month Avg	0.35 lbs/day	Weekly	Calculated	
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of phosphorus and report on the last day of the month on the DMR. See 'TMDL Calculations' section.
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

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					the DMR. See 'TMDL Calculations' section.
Temperature Maximum		deg F	Monthly	Grab	Monitoring only. See 'Effluent Temperature Monitoring' section.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitoring only from January 1 - December 31, 2027.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See 'WET Testing' section.

Changes from Previous Permit

Flow- Sample type changed from Continuous to Total Daily.

BOD5- Technology Based Effluent Limits (TBEL) mass limits added to the permit. Sample frequency increased to weekly.

Total Suspended Solids (TSS) TMDL Limits- Mass based TSS limits of 44 lbs/day as a daily max and 27 lbs/day as a monthly average have been added to the permit to comply with requirements of the Northeast Lakeshore TMDL. Effluent concentration (mg/L) shall be monitored and reported one time per week upon permit reissuance and will be used to calculate amounts reported for mass-based limits. An additional reporting requirement for lbs/month will be used to calculate the facility's 12-month rolling sum of total monthly discharge, which can be compared directly to the facility's designated WLA. Sample frequency increased to weekly.

pH- Sample frequency increased to 5/week.

Chlorine- Weekly average limit added to the reissued permit. Sample frequency increased to 5/week.

Phosphorus TMDL Limits- Mass based phosphorus limits of 0.35 lbs/day as a six-month average and 1.0 lbs/day as a monthly average have been added to the permit to comply with requirements of the Northeast Lakeshore TMDL. Effluent concentration (mg/L) shall be monitored and reported one time per week upon permit reissuance and will be used to calculate amounts reported for mass-based limits. An additional reporting requirement for lbs/month will be used to calculate the facility's 12-month rolling sum of total monthly discharge, which can be compared directly to the facility's designated WLA. Sample frequency increased to weekly.

Temperature- Sample type changed from Continuous to Grab.

Explanation of Limits and Monitoring Requirements

Categorical Limits

Refer to the Technology Based Effluent Limitations (TBELs) memo for Sartori Company – West Main Building prepared by Nicole Krueger dated April 6, 2023, used for this reissuance.

BOD5: The BOD5 input is the 5-day biochemical oxygen demand of raw materials that enter the process. Chapter NR 240, Wis. Adm. Code, specifies effluent guidelines for discharges from dairy product categories of point sources and subcategories. Sartori falls under the Fluid Products, Natural and Processed Cheese, and Condensed Whey subcategories

as defined in s. NR 240.02, Wis. Adm. Code. These guidelines are based on federal effluent guidelines in 40 CFR Part 405 Subparts B, F, and K.

TSS: The permittee is also subject to TSS mass limits in accordance with ch. NR 240, Wis. Adm. Code however the TMDL TSS mass allocations are more restrictive than the calculated TBEL. Therefore, the TMDL-based TSS limits of 27 lbs/day as a monthly average and 44 lbs/day as a daily maximum are added to the permit instead of the TBELs.

pH: Any discharge subject to limitations or standards in this part must remain within the pH range of 6.0 to 9.0 su.

Water Quality Based Limits and WET Requirements

Refer to the Water Quality-Based Effluent Limitations (WQBELs) memo for the Sartori Company – West Main Building prepared by Nicole Krueger, dated April 2, 2023, used for this reissuance.

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

After evaluation, an increase in sampling frequency is warranted to capture changes in treatment due to potential changes in treatment (chlorine and phosphorus removal) and to align with sampling frequencies of similarly sized facilities with similar effluent quality throughout the state. In addition, EPA recommends a minimum of 4/month monitoring frequency when deriving TMDL-based permit limits. The proposed permit will include an increased monitoring frequency for parameters with existing limits including **BOD5, TSS, pH, Chlorine, and Phosphorus.**

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 daily maximum and monthly average limits whenever practicable.

Phosphorus- Phosphorus requirements are based on the Phosphorus Rules that became effective 12/1/2010 as detailed in NR 102 Water Quality Standards and NR 217 Effluent Standards and Limitations for Phosphorus. Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters. The code categorically limits industrial dischargers of more than 60 pounds of phosphorus per month and municipal dischargers of more than 150 pounds of phosphorus per month to 1.0 mg/L unless an alternative limit is approved. NR 217 also specifies WQBELs (water quality based effluent limits) for discharges of phosphorus to surface waters of the state from publicly and privately owned wastewater facilities, noncontact cooling water discharges which contain phosphorus, concentrated animal feeding operations that discharge through alternative treatment facilities and a facility/site that is regulated under NR 216 where the standards in NR151 and 216 are not sufficient to meet phosphorus criteria. WQBELs for phosphorus are needed whenever the discharge contains phosphorus at concentrations or loadings that will cause or contribute to an exceedance of the water quality standards. This WPDES permit contains a total phosphorus effluent limitation of 0.8 mg/L, expressed as a monthly average, to ensure that the concentration of phosphorus is limited by the discharge. For mass limits based on the Northeast Lakeshore TMDL, see discussion below.

Total Residual Chlorine- Sections NR 106.07(4) and NR 205.067(7), Wis. Adm. Code require WPDES permits contain daily maximum and monthly average limitations for industrial dischargers whenever practicable and necessary to protect water quality. Available data from the current permit term (07/23/2019 – 12/02/2022) indicates the discharge contains concentrations of chlorine above the applicable WQBELs based on ATC and CTC. Therefore, a daily maximum effluent limit of 38 µg/L was added to the permit for reissuance, in addition to retaining weekly and monthly average limits. Sartori is currently exploring options to meet chlorine limits at Outfall 001.

Northeast Lakeshore Total Maximum Daily Load (TMDL): The permitted facility is located within the Northeast Lakeshore Total Maximum Daily Load (NEL TMDL), which was approved by EPA October 30, 2023. The TMDL establishes Waste Load Allocations (WLAs) for point source dischargers and determines the maximum amounts of phosphorus and total suspended solids that can be discharged and still protect water quality. The final effluent limits and monitoring expressed in the permit were derived from and comply with the applicable water quality criterion and are consistent with the assumptions and requirements of the EPA-approved WLAs in the TMDL, which are 98 lbs/yr for phosphorus and 5,212 lbs/yr for TSS for the permitted facility.

The approved TMDL expresses WLAs as lbs/year and lbs/day (maximum annual load divided by 365 days). As outlined in Section 4.6 of the department's 2023 TMDL Implementation Guidance for Wastewater Permits, TMDL limits must be given in the permit that are consistent with the TMDL WLA permit limits derived from the TMDL and need to be expressed as specified by 40 CFR 122.45 (d), s. NR 212.76 (4), and s. NR 205.065 (7), Wis. Adm. Code, unless determined to be impracticable. Impracticability has already been determined for phosphorus limits as laid out in the phosphorus impracticability agreement that was approved by USEPA in 2012 (see NPDES MOA Addendum dated July 12, 2012 at <https://prodoasint.dnr.wi.gov/swims/downloadDocument.do?id=167886175>).

For phosphorus, continuously discharging facilities covered by the NEL TMDL are given monthly average mass limits. If the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits (averaging period of May through October and November through April) are also included. The equivalent effluent concentration of 0.21 mg/L was calculated for the facility, thus, TMDL based mass limits are expressed as a six-month average and a monthly average equal to three times the six-month average limits.

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

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

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

Chloride- Acute and chronic chloride toxicity criteria for the protection of aquatic life are included in Tables 1 and 5 of ch. NR 105, Wis. Adm. Code. Subchapter VII of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for chloride. Considering available effluent data from the permit reissuance application, the single chloride data point of 10 mg/L is less than 1/5th of the most stringent calculated limits. Therefore, no effluent limits are needed. Chloride monitoring is added to the reissued permit for the year 2027 to ensure that 11 sample results are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code. Monthly Chloride sampling has been added to the permit for 2027.

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. Based on information available at the time the proposed permit was drafted, the department has determined the permittee does not need to sample for PFOS or PFOA as part of this permit reissuance. The department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

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

2 Land Application - Sludge/By-Product Solids (industrial only)

Sample Point Number: 002- Landspreading Liquid Waste

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Solids, Total		mg/L	Quarterly	Grab	If landspreading does not occur in the quarter, sampling is not required.
Chloride		mg/L	Quarterly	Grab	If landspreading does not occur in the quarter, sampling is not required.
Nitrogen, Total Kjeldahl		mg/L	Quarterly	Grab	If landspreading does not occur in the quarter, sampling is not required.
Nitrogen, Organic Total		mg/L	Quarterly	Grab	If landspreading does not occur in the quarter, sampling is not required.
Nitrogen, Ammonia (NH ₃ -N) Total		mg/L	Quarterly	Grab	If landspreading does not occur in the quarter, sampling is not required.
Phosphorus, Total		mg/L	Quarterly	Grab	If landspreading does not occur in the quarter, sampling is not required.
Potassium, Total Recoverable		mg/L	Quarterly	Grab	If landspreading does not occur in the quarter, sampling is not required.

Changes from Previous Permit:

Monitoring requirements added to permit and required if landspreading occurs in the quarter.

Explanation of Limits and Monitoring Requirements

Requirements for land application of industrial sludge are determined in accordance with ch. NR 214, Wis. Adm. Code.

3 Schedules

3.1 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
Land Application Management Plan: Submit a management plan to optimize the land application system performance and demonstrate compliance with Wisconsin Administrative Code NR 214.	90 Days prior to land application

Explanation of Schedules

A compliance schedule is included in the permit to submit a Land Application Management Plan for the permittee to outline how sludge would be land applied if the permittee decides to land apply under their permit instead of hauling material to a WWTP for further processing. The plan is required to be submitted for approval 90 days prior to land application.

Special Reporting Requirements

None.

Other Comments:

None.

Attachments:

Water Quality-Based Effluent Limitations for Sartori Company- West Main Building Memo dated April 2, 2024 and prepared by Nicole Krueger.

Technology-Based Effluent Limitations for Sartori Company – West Main Building dated April 9, 2024 and prepared by Nicole Krueger.

Expiration Date:

June 30, 2029

Justification Of Any Waivers From Permit Application Requirements

No waivers were requested or granted from permit application requirements.

Prepared By: Melanie Burns, Wastewater Specialist

Date: April 17, 2024

Post Fact Check: May 14, 2024: Sampling point description and facility descriptions were updated. Flow Rate and Temperature Sample Types were corrected to reflect equipment used for samples.

Post Public Notice:

CORRESPONDENCE/MEMORANDUM

DATE: 04/02/2024

TO: Melanie Burns – SER

FROM: Nicole Krueger – SER *Nicole Krueger*

SUBJECT: Water Quality-Based Effluent Limitations for Sartori Company – West Main Building
 WPDES Permit No. WI-0041904-09

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 Sartori Company in Sheboygan County. This industrial facility discharges to the Mullet River, located in the Mullet River Watershed in the Sheboygan River Basin. This discharge is included in the Northeast Lakeshore Basin TMDL as approved by EPA. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD ₅	20 mg/L			10 mg/L		3
TSS	44 lbs/day			27 lbs/day		3,4
pH	9.0 s.u.	6.0 s.u.				1
Residual Chlorine	38 µg/L		38 µg/L	38 µg/L		5
Chloride						6
Phosphorus Interim TMDL				0.8 mg/L 1.0 lbs/day	0.35 lbs/day	4
Temperature						2
Acute WET						7

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. The need for mass categorical limits based on ch. NR 240, Wis. Adm. Code are addressed in a separate memo and are based on current production.
4. The TSS and phosphorus mass limits are based on the Total Maximum Daily Load (TMDL) for the NE Lakeshore Basin to address phosphorus water quality impairments within the TMDL area. The TMDL was approved by EPA on October 2023.
5. 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.
6. Monitoring at a frequency to ensure that 11 samples are available at the next permit issuance.
7. 2 tests/permit term acute WET tests are recommended. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).

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

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

PREPARED BY: Nicole Krueger, Water Resources Engineer – SER

E-cc: Curt Nickels, Wastewater Engineer – SER
Bryan Hartsook, Regional Wastewater Supervisor – SER
Diane Figiel, Water Resources Engineer – WY/3
Nate Willis, Wastewater Engineer – WY/3

Attachment #1
**Water Quality-Based Effluent Limitations for
Sartori Company – West Main Building**

WPDES Permit No. WI-0041904-09

Prepared by: Nicole Krueger

PART 1 – BACKGROUND INFORMATION

Facility Description

Sartori Cheese receives raw milk from local dairy farms and produces Italian cheeses and co-products of cream and whey concentrate at its 12 West Main facility. Whey from the cheese making process is piped through a whey cooling plate and then through a reverse osmosis (RO) system that removes water from the whey. The water is then processed through a polisher. Some polished water is used for whey plant clean in place (CIP) processes. CIP water and cheese plant sanitation water is discharged to the Plymouth Utilities wastewater treatment plant. Polished water not used for CIP is discharged to the Mullet River. Sartori discharges approximately NCCW (sourced from Plymouth Utilities) and RO Polisher Water, as well as sump pump water from elevator pits, to a municipal storm sewer approximately 700 feet north of the Mullet River. Concentrated whey and whey cream is sold off or land applied on WDNR approved sites. High strength salty whey is hauled to the Sheboygan WWTP. Sanitary wastewater, Boiler Blowdown, and Water Softener Regeneration backwash is discharged to the Plymouth WWTP via the sanitary sewer.

There has been no discharge at Outfall 001 since 2022 due to Sartori exploring options to meet chlorine limits and there will be no discharge for the foreseeable future. However, the facility would like to retain the option to resume normal discharge when the chlorine issue is resolved. Data for some parameters have still been collected and analyzed before it is sent to sanitary.

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

Existing Permit Limitations

The current permit, expiring on 05/31/2024, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD ₅	20 mg/L			10 mg/L		2
TSS						1
pH	9.0 s.u.	6.0 s.u.				2
Residual Chlorine	38 µg/L			38 µg/L		3
Phosphorus Interim Final				0.8 mg/L 0.225 mg/L	0.075 mg/L 0.094 lbs/day	4
Temperature						1
Acute WET						5

Footnotes:

1. Monitoring only.
2. 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.
3. 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.
4. The final phosphorus limits became effective April 1, 2023.
5. Acute WET testing is required twice during the permit term.

Receiving Water Information

- Name: Mullet River
- Waterbody Identification Code (WBIC): 53400
- 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-Q₁₀ and 7-Q₂ values are from USGS for Station SH37 at Highway PP, where Outfall 001 is located.
 7-Q₁₀ = 6.0 cfs (cubic feet per second)
 7-Q₂ = 11 cfs
 Harmonic Mean Flow = 18.86 cfs using a drainage area of 58.8 mi²
 The Harmonic Mean has been estimated based on average flow and the 7-Q₁₀ 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-Q₁₀ (cfs)	9.4	9.4	16	40	18	11	8.5	6.8	7.1	8.2	12	11
7-Q₂ (cfs)	20	22	45	70	6	23	15	14	14	18	26	25

- Hardness = mg/L as CaCO₃. This value represents the geometric mean of data from
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from the Mullet River at County Hwy PP is used for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: There are several other dischargers to the Mullet River, however they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: The immediate receiving water is 303(d) listed as impaired for total phosphorus which is addressed in the NE Lakeshore Basin TMDL.

Effluent Information

- Flow rate:

Attachment #1

Maximum annual average = 0.152 MGD (Million Gallons per Day)

For reference, the actual average flow from 05/01/2019 – 12/31/2022 was 0.093 MGD.

- Hardness = 336 mg/L as CaCO₃. This value represents the geometric mean of data from the permit reissuance application from 09/07/2018 – 11/02/2018.
- 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: Water source from Plymouth Utilities (groundwater).
- Additives: None.
- Effluent characterization: This facility is categorized as a secondary industry, 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 Chlorine Data

	Chlorine µg/L
1-day P ₉₉	772
4-day P ₉₉	448
30-day P ₉₉	253
Mean	170
Std	161
Sample size	47
Range	<20 – 650

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

Effluent Copper Data

Sample Date	Copper µg/L
10/10/2023	<3.4
11/07/2023	<3.4
11/10/2023	<3.4
11/13/2023	<3.4

The following table presents the average concentrations and loadings at Outfall 001 from 05/01/2019 – 12/31/2023 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter Averages with Limits

	Average Measurement	Average Mass Discharged
BOD ₅	1.8 mg/L*	
pH field	7.28 s.u.	
Phosphorus	0.09 mg/L*	0.22 lbs/day
Ammonia Nitrogen	mg/L*	

Attachment #1

	Average Measurement	Average Mass Discharged
Chlorine	170 µg.L	

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

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

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

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P₉₉) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q₁₀

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Code, (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q₁₀ receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

$$\text{Limitation} = \frac{(\text{WQC}) (Q_s + (1-f) Q_e) - (Q_s - f Q_e) (C_s)}{Q_e}$$

Where:

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

Q_s = average minimum 1-day flow which occurs once in 10 years (1-day Q₁₀)
 if the 1-day Q₁₀ flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q₁₀).

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

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

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q₁₀ method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for Sartori and the limits are set based on two times the acute toxicity criteria.

The following tables list the calculated WQBELs for this discharge along with the results of effluent sampling for all the detected substances. All concentrations are expressed in terms of micrograms per Liter (µg/L), except for hardness and chloride (mg/L).

Attachment #1

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 4.8 cfs, (1-Q₁₀ (estimated as 80% of 7-Q₁₀)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P ₉₉	1-day MAX. CONC.
Chlorine		19.0		38.1			772	650
Arsenic		340	10	680	136	<8.3		
Cadmium	336	41.4	0.2	83	16.6	<1.3		
Chromium	301	4446	3	8892	1778	<2.5		
Copper	336	48.7	10	97	19.5	<3.4		
Lead	336	345	3	690	138	<5.9		
Nickel	268	1080	20	2161	432	<2.6		
Zinc	333	345	20	689	138	<11.6		
Chloride (mg/L)		757		1514	303	10		

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

** The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q₁₀ flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 1.5 cfs (1/4 of the 7-Q₁₀), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P ₉₉
Chlorine		7.28		53.7			448
Arsenic		152	10	1059	212	<8.3	
Cadmium	175	3.82	0.2	26.9	5.4	<1.3	
Chromium	301	326	3	2384	477	<2.5	
Copper	345	29.9	10	157	31.3	<3.4	
Lead	345	92.7	3	665	133	<5.9	
Nickel	268	120	20	759	152	<2.6	
Zinc	333	345	20	2415	483	<11.6	
Chloride (mg/L)		395		2914	583	10	

* 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 = 4.71 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	0.2	7784	1557	<1.3
Chromium (+3)	3818000	3	80359618	16071924	<2.5
Lead	140	3	2887	577	<5.9
Nickel	43000	20	904645	180929	<2.6

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 4.71 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	10	79.5	15.9	<8.3

In addition to evaluating the need for limits for each individual substance for which HCC exist, s. NR 106.06(8), Wis. Adm. Code, requires the evaluation of the cumulative cancer risk. Because no effluent limits are needed based on HCC, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

Conclusions and Recommendations

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

Chlorine – Available data from the current permit term (07/23/2019 – 12/02/2022) indicates the discharge contains concentrations of chlorine above the applicable QBELs based on ATC and CTC. Therefore, **a daily maximum effluent limit of 38 µg/L needed for permit reissuance**, in addition to weekly and monthly average limits. Sartori is currently exploring options to meet chlorine limits at Outfall 001.

The calculated weekly average limit of 54 µg/L is less restrictive than the daily maximum limit of 38 µg/L, therefore **the weekly average limit is recommended to be equal to 38 µg/L**.

Sections NR 106.07(4) and NR 205.067(7), Wis. Adm. Code require WPDES permits contain daily maximum and monthly average limitations for industrial dischargers whenever practicable and necessary to protect water quality. **Therefore a monthly average limit of 38 µg/L is required** to meet expression of limits requirements in addition to the daily max and weekly average limits.

Chloride – Considering available effluent data from the permit reissuance application, the single chloride data point of 10 mg/L is less than 1/5th of the most stringent calculated limits. **Therefore, no effluent limits are needed.** Chloride monitoring is recommended to ensure that 11 sample results are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code.

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the type of discharge, the effluent flow rate, **PFOS and PFOA monitoring is not recommended.** The Department may re-evaluate the need for sampling at the next

permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

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

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. Given the fact that Sartori Company does not currently have ammonia nitrogen limits, the need for limits is evaluated at this time.

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 47 sample results were reported from 08/28/2019 – 12/01/2023. The maximum reported value was 8.14 s.u. (Standard pH Units). The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.19 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 8.14 s.u. Therefore, a value of 8.14 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 8.6 s.u. into the equation above yields an ATC = 6.4 mg/L.

Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method

In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are calculated using the the 1-Q₁₀ 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-Q₁₀ (estimated as 80 % of 7-Q₁₀) and the 2×ATC approach are shown below.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	13
1-Q ₁₀	137

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

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

Attachment #1

Weekly and monthly average limits based on chronic toxicity criteria for ammonia are also calculated to determine the weekly and monthly average limits to meet the requirements of s. NR 106.07(4), Wis. Adm. Code.

Weekly average and monthly average limits for ammonia nitrogen are based on chronic toxicity criteria in ch. NR 105, Wis. Adm. Code.

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as a Warm Water Sport Fish Community is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

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

Where:

pH = the pH (s.u.) of the receiving water,

E = 0.854,

C = the minimum of 2.85 or $1.45 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Present), or

C = $1.45 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Absent), and

T = the temperature (°C) of the receiving water – (Early Life Stages Present), or

T = the maximum of the actual temperature (°C) and 7 – (Early Life Stages Absent)

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q₁₀ (4-Q₃, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q₅ (estimated as 85% of the 7-Q₂ if the 30-Q₅ is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 °C, 25% of the flow is used if the Temperature < 11 °C, and 50% of the flow is used if the Temperature ≥ 11 °C but < 16 °C.

Section NR 106.32 (3), Wis. Adm. Code, provides a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 °C, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the Mullet River. So “ELS Absent” criteria apply from October through March, and “ELS Present” criteria will apply from April through September for a warmwater sport fish classification.

The “default” basin assumed values are used for Temperature, pH and background ammonia concentrations, because minimum ambient data is available. These values are shown in the table below, with the resulting criteria and effluent limitations.

Weekly and Monthly Ammonia Nitrogen Limits – WWSF

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
Effluent Flow	Qe (MGD)	0.152	0.152	0.152
Background Information	7-Q ₁₀ (cfs)	6.0	6.0	6.0
	7-Q ₂ (cfs)	11	11	11
	Ammonia (mg/L)	0.04	0.05	0.105
	Average Temperature (deg C)	12	19	4
	Maximum Temperature (deg C)	14	21	10
	pH (s.u.)	8.22	8.24	8.21

Attachment #1

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	3.0	6.0	1.5
	Reference Monthly Flow (cfs)	4.7	9.4	2.3
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	4.38	2.87	
	Early Life Stages Absent			5.92
	30-day Chronic			
	Early Life Stages Present	1.75	1.15	
	Early Life Stages Absent			2.37
Effluent Limitations mg/L	Weekly Average			
	Early Life Stages Present	60	75	
	Early Life Stages Absent			43
	Monthly Average			
	Early Life Stages Present	36	45	
	Early Life Stages Absent			25

Effluent Data

Two samples for ammonia nitrogen are available from the previous ten years:

Effluent Ammonia Data

Sample Date	Ammonia mg/L
04/16/2014	<0.025
01/16/2020	0.056

Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits. **No limits or monitoring are recommended.**

PART 5 – PHOSPHORUS

Technology-Based Effluent Limit

Subchapter II of Chapter NR 217, Wis. Adm. Code, requires industrial facilities that discharge greater than 60 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 Sartori Company currently has a limit of 1.0 mg/L, this limit should be included in the reissued permit. This limit remains applicable unless a more stringent WQBEL is given.

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

TMDL

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).

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:

$$\begin{aligned} \text{TP Equivalent Effluent Concentration} &= \text{WLA} \div (\text{365 days/yr} * \text{Flow Rate} * \text{Conversion Factor}) \\ &= 98 \text{ lbs/yr} \div (\text{365 days/yr} * 0.152 \text{ MGD} * 8.34) \\ &= 0.21 \text{ mg/L} \end{aligned}$$

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

$$\begin{aligned} \text{TP 6-Month Average Permit Limit} &= \text{WLA} \div \text{365 days/yr} * \text{multiplier} \\ &= (98 \text{ lbs/yr} \div \text{365 days/yr}) * 1.3 \\ &= 0.35 \text{ lbs/day} \end{aligned}$$

$$\begin{aligned} \text{TP Monthly Average Permit Limit} &= \text{TP 6-Month Average Permit Limit} * 3 \\ &= 0.35 \text{ lbs/day} * 3 \\ &= 1.0 \text{ lbs/day} \end{aligned}$$

The multiplier used in the six-month average calculation was determined according to the implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 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 monthly but EPA recommends a monitoring frequency of at least 4/month when deriving TMDL-based permit limits. Therefore, a multiplier based on weekly monitoring is used to calculate the 6-month average and monthly average limits; 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 0.28 mg/L and 0.83 mg/L, respectively, at the maximum annual average flow of 0.152 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.

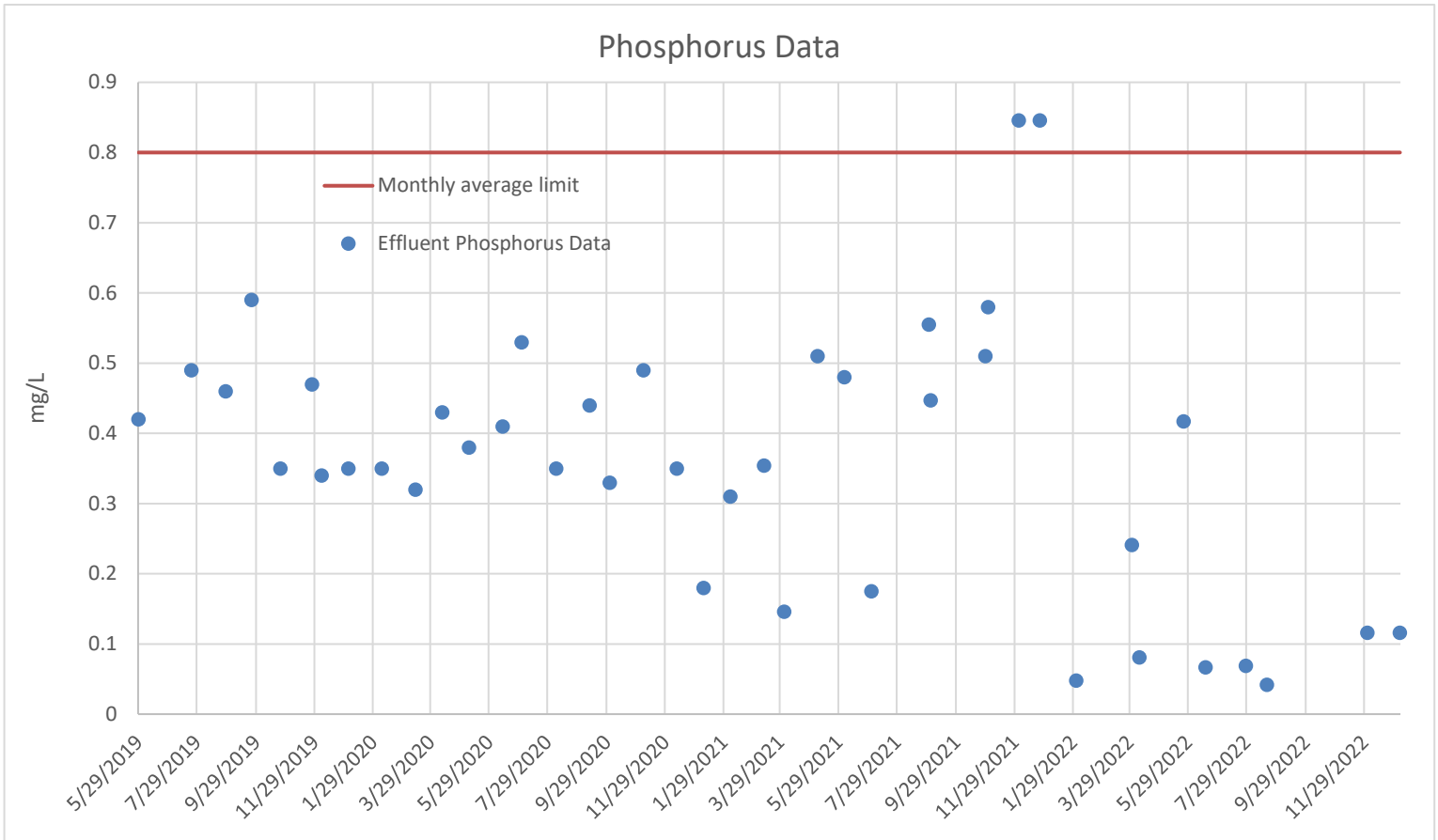
Effluent Data

The following table lists the statistics for effluent phosphorus levels from 05/29/2019 – 01/05/2023. The mass data was calculated using the flow rate reported on the same day as the concentrations.

Effluent Phosphorus		
	Concentration (mg/L)	Mass Discharge (lbs/day)
1-day P ₉₉	1.02	2.22
4-day P ₉₉	0.65	1.20
30-day P ₉₉	0.45	0.64
Mean	0.37	0.40
Std	0.19	0.46
Sample Size	41	37
Range	0.042 - 0.846	0.009 - 1.01

An interim limit is needed when a compliance schedule is included in the permit to meet the TMDL limits. This limit should reflect a value which the facility is able to currently meet; however, it should also consider the receiving water quality, keeping the water from further impairment. It's recommended that the interim limit be set equal to 0.8 mg/L expressed as a monthly average which is equivalent to the interim limit in the current permit.

The phosphorus data from the current permit term is graphed below compared to the recommended interim limit:



The current permit term has an interim limit of 0.8 mg/L as a monthly average and final limits of 0.225 mg/L as a monthly average and 0.075 mg/L and 0.094 lbs/day as a six-month average which became effective on 04/01/2023 based on s. NR 217.13, Wis. Adm. Code. These limits are more restrictive than the calculated TMDL-based limits. However, Sartori has not discharged to surface water since December 2022.

These limits may be relaxed per antidegradation requirements per s. NR 207.12(3)(b)2., Wis. Adm. Code because new information (the NE Lakeshore TMDL) is now available that was not available at the time of the previous reissuance. The less stringent limits are not subject to antidegradation requirements in s. NR 207.04, Wis. Adm. Code, because Sartori has not discharged since these limits have become effective so there will not be a lowering of water quality.

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 WLA's 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).

Attachment #1

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.

Sartori is an industrial facility and is therefore subject to daily maximum and monthly average TSS limits derived from TSS annual WLAs.

$$\begin{aligned} \text{TSS Monthly Average Permit Limit} &= \text{WLA} \div 365 \text{ days/yr} * \text{multiplier} \\ &= (5,212 \text{ lbs/yr} \div 365 \text{ days/yr}) * 1.90 \\ &= 27 \text{ lbs/day} \end{aligned}$$

$$\begin{aligned} \text{TSS Daily Maximum Permit Limit} &= \text{WLA} \div 365 \text{ days/yr} * \text{daily multiplier} \\ &= (5,212 \text{ lbs/yr} \div 365 \text{ days/yr}) * 3.11 \\ &= 44 \text{ lbs/day} \end{aligned}$$

The multiplier used in the weekly average and monthly average calculation was determined according to implementation guidance. The default coefficient of variation of 0.6 was used because there are very limited detected results. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies TSS monitoring as monthly but EPA recommends a monitoring frequency of at least 4/month when deriving TMDL-based permit limits. Therefore, a multiplier based on weekly monitoring is used to calculate the daily maximum and monthly average limits; if a different monitoring frequency is used, the stated limits should be reevaluated.

Daily maximum and monthly average mass effluent limits are recommended for this discharge. The limits are equivalent to concentrations of 35 mg/L and 21 mg/L, respectively, at the maximum annual average for industries flow of 0.152 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 06/04/2021 – 05/24/2022.

Total Suspended Solids Effluent Data

	TSS mg/L	TSS lbs/day
Mean*	1.2	0.50
Std	10.3	2.97
# of detects	7	7
# of nondetects	42	42
Range	<2 – 31.8	0 – 7.69

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

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

PART 7 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

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

Due to the amount of upstream flow available for dilution in the limit calculation ($Q_s:Q_e > 20:1$), the lowest calculated limitation is 120° F (s. NR 106.55(6)(a), Wis. Adm. Code). The table below summarizes the maximum temperatures reported during monitoring from 07/23/2019 – 12/01/2023.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
JAN	87	87	NA	120
FEB	68	86	NA	120
MAR	87	87	NA	120
APR	66	85	NA	120
MAY	84	84	NA	120
JUN	75	84	NA	120
JUL	80	84	NA	120
AUG	84	84	NA	120
SEP	83	83	NA	120
OCT	66	85	NA	120
NOV	85	85	NA	120
DEC	84	84	NA	120

Reasonable Potential

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

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

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

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

Based on the available effluent data no effluent limits are recommended for temperature. The complete thermal table used for the limit calculation is attached. **Temperature monitoring is recommended to continue in the reissued permit.**

PART 8 – WHOLE EFFLUENT TOXICITY (WET)

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

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC₅₀ (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC₂₅ (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of **14%** shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

Q_e = annual average flow = 0.152 MGD = 0.235 cfs

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

Q_s = ¼ of the 7-Q₁₀ = 6.0 cfs ÷ 4 = 1.5 cfs

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

Attachment #1

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

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

WET Data History

Date Test Initiated	Acute Results LC ₅₀ %				Chronic Results IC ₂₅ %				Footnotes or Comments
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	<i>C. dubia</i>	Fathead Minnow	Pass or Fail?	Use in RP?	
05/01/2007	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
08/14/2007	>100	>100	Pass	No	>100	>100	Pass	No	1
08/23/2016	>100	>100	Pass	Yes	90.4	>100	Pass	Yes	
02/28/2018	>100	>100	Pass	Yes					
10/26/2021	>100	>100	Pass	Yes	>100	>100	Pass	Yes	

Footnotes:

1. *Qualified or Inconclusive Data.* Data quality concerns were noted during testing which calls into question the reliability of the test results.
- 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.**

$$\text{Acute Reasonable Potential} = [(TU_a \text{ effluent}) (B)(AMZ)]$$

$$\text{Chronic Reasonable Potential} = [(TU_c \text{ effluent}) (B)(IWC)]$$

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

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

$$\text{Chronic Reasonable Potential} = [(TU_c \text{ effluent}) (B)(IWC)]$$

Chronic WET Limit Parameters

TU _c (maximum) 100/IC ₂₅	B (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
100/90.4 = 1.1	6.2 Based on 1 detect	14%

Attachment #1
 $[(TUC \text{ effluent}) (B)(IWC)] = 0.96 < 1.0$

Therefore, **no reasonable potential is shown for a chronic WET limit** using the procedures in s. NR 106.08(6) and representative data from 05/01/2007 – 10/26/2021.

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

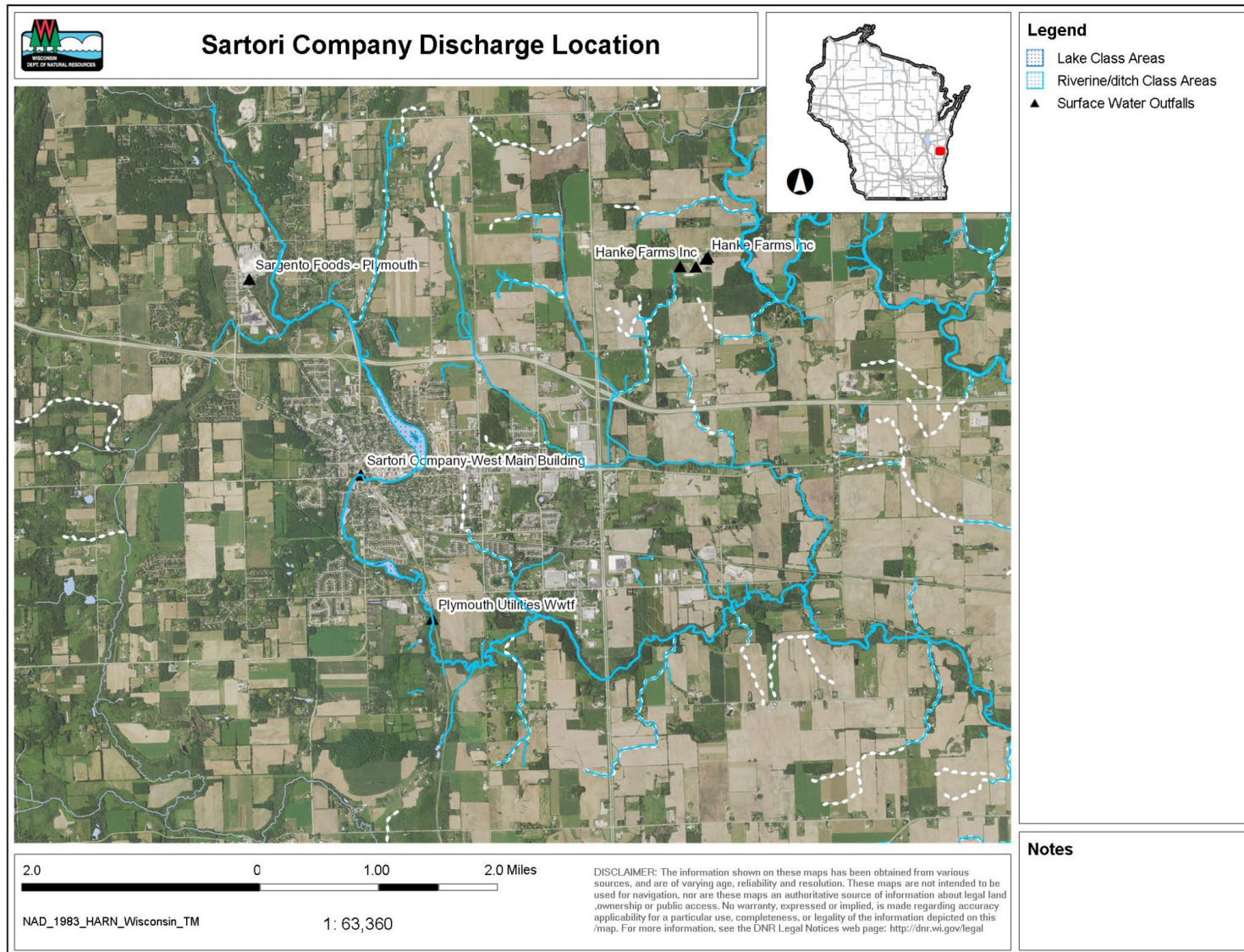
WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. 0 Points	IWC = 14 %. 0 Points
Historical Data	4 tests used to calculate RP. No tests failed. 0 Points	3 tests used to calculate RP. No tests failed. 0 Points
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. 0 Points	Same as Acute. 0 Points
Receiving Water Classification	Warmwater sport fish classification. 5 Points	Same as Acute. 5 Points
Chemical-Specific Data	Reasonable potential for limits for chlorine based on ATC; Chloride and ammonia detected. Additional Compounds of Concern: None. 7 Points	Reasonable potential for limits for chlorine based on CTC; Chloride and ammonia detected. Additional Compounds of Concern: None. 7 Points
Additives	Zero additives used. 0 Points	Zero additives used. 0 Points
Discharge Category	NCCW and COW water. 5 Points	Same as Acute. 5 Points
Wastewater Treatment	Reverse osmosis. 0 Points	Same as Acute. 0 Points
Downstream Impacts	No impacts known 0 Points	Same as Acute. 0 Points

Attachment #1

	Acute	Chronic
Total Checklist Points:	17 Points	17 Points
Recommended Monitoring Frequency (from Checklist):	2 tests during permit term	No tests recommended
Limit Required?	No	No
TRE Recommended? (from Checklist)	No	No

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, 2 tests/permit term acute 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).



Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

Facility:	Sartori	7-Q₁₀:	6.00	cfs	Temp Dates	Flow Dates
Outfall(s):	001	Dilution:	25%		Start:	07/23/19 05/01/19
Date Prepared:	3/14/2024	f:	0		End:	12/01/23 12/31/23
Design Flow (Q_e):	0.15 MGD	Stream type:	Small warm water sport or forage fish			
Storm Sewer Dist.	0 ft	Qs:Q_e ratio:	6.4	:1		
		Calculation Needed?	YES			

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs) (cfs)	Representative Highest Effluent Flow Rate (Q _e)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Q _{esl})	Daily Maximum Flow Rate (Q _{ea})		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)		(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	9.40	0.130	0.136	0	87	87	NA	120
FEB	34	50	76	9.40	0.125	0.131	0	68	86	NA	120
MAR	38	52	77	16.00	0.147	0.148	0	87	87	NA	120
APR	48	55	79	40.00	0.156	0.162	0	66	85	NA	120
MAY	58	65	82	18.00	0.152	0.174	0	84	84	NA	120
JUN	66	76	84	11.00	0.168	0.180	0	75	84	NA	120
JUL	69	81	85	8.50	0.182	0.193	0	80	84	NA	120
AUG	67	81	84	6.80	0.190	0.218	0	84	84	NA	120
SEP	60	73	82	7.10	0.205	0.219	0	83	83	NA	120
OCT	50	61	80	8.20	0.192	0.205	0	66	85	NA	120
NOV	40	49	77	12.00	0.164	0.699	0	85	85	NA	120
DEC	35	49	76	11.00	0.152	0.207	0	84	84	NA	120

DATE: 04/09/2024

TO: Melanie Burns – SER

FROM: Nicole Krueger – SER *Nicole Krueger*

SUBJECT: Technology-Based Effluent Limitations for Sartori Company – West Main Building
WPDES Permit No. WI-0041904-09

Technology-Based Effluent Limitations (TBELs) Recommended for Outfall 001:

Parameter	Daily Maximum	Daily Minimum	Monthly Average
BOD ₅ , Total	85 lbs/day		42 lbs/day
TSS ¹	44 lbs/day		27 lbs/day
pH	9.0 su	6.0 su	

Footnotes:

1. These are TMDL-based limits for the NE Lakeshore Basin.

PART 1 – BACKGROUND INFORMATION**PART 2 – INDUSTRIAL CATEGORIES**

Chapter NR 240, Wis. Adm. Code, specifies effluent guidelines for discharges from dairy product categories of point sources and subcategories. Sartori falls under the Fluid Products, Natural and Processed Cheese, and Condensed Whey subcategories as defined in s. NR 240.02, Wis. Adm. Code. These guidelines are based on federal effluent guidelines in 40 CFR Part 405 Subparts B, F, and K. The permittee must meet the applicable effluent limit guidelines as described in this chapter. These effluent limit guidelines include:

- Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT) in s. NR 240.10, Wis. Adm. Code.
- Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT) in s. NR 240.11, Wis. Adm. Code.
- If determined to be a new source, new source performance standards (NSPS) in s. NR 240.12, Wis. Adm. Code.

If the calculated limits are less than or equal to the limits in the current permit, then the limits would be set equal to the recalculated limits. If the recalculated limits are less restrictive than the limits from the current permit, they cannot be increased unless the antidegradation and anti-backsliding provisions of ch. NR 207, Wis. Adm. Code, are met.

Section NR 220.13, Wis. Adm. Code, includes provisions that address cases where federal and state rule differ. Section 283.11, Wis. Stats., address compliance with federal standards. In this case, the state rules are consistent with federal rules with a few exceptions. In such cases, the permit will in all cases be based on the state rule notwithstanding the federal regulations. The omissions are described below.

- The state or federal rules do not specify a date for the definition for a new source. Therefore, it is necessary to review available federal guidance. The Boornazian memo (September 28, 2006) specifies a new source date for 40 CFR Part 405 Subparts A – L of May 28, 1974. The Department relies on the Boornazian memo to establish date of applicability for NSPS.
- State rules incorrectly list best available treatment (BAT) standards for BOD, TSS, and pH. BAT applies to priority pollutants and nonconventional pollutants and does not apply to BOD, TSS or pH.
- The federal standard rule lists revised BCT standards requirements. All BCT limitations are set to be the same as the best practicable control technology (BPT) standards. State rules in ch. NR 240, Wis. Adm. Code, do not list standards for BCT.

PART 3 – LEVELS OF CONTROL

All production lines were installed after May 28, 1974. Therefore, the process wastewater from these lines is subject to BPT, BCT, BAT and NSPS standards for the Fluid Products, Natural and Processed Cheese, and Condensed Whey subcategories are applicable as specified in 40 CFR Part 405 Subparts B, F, and K and ch. NR 240.12, Wis. Adm. Code.

PART 4 – CURRENT PRODUCTION LEVELS

The current levels of production for each Subcategory are provided by Sartori.

Fluid Products – Sweet Cream

Material	Material Used (lbs/day)
Raw milk	801,850

Natural and Processed Cheese

Material	Material Used (lbs/day)
Skim milk	774,200

Condensed Whey

Material	Material Used (lbs/day)
Raw Whey	691,250
Separated Whey	635,950

PART 5 – BOD INPUT

The BOD₅ input is the 5-day biochemical oxygen demand of raw materials that enter the process. The current production levels in Part 4 are converted to BOD input equivalents by multiplying the amount of raw material by BOD factors specified in s. NR 240.03(1) or s. NR 240.07 Wis. Adm. Code and 40 CFR Part 405.

Fluid Products

Material	Material Used (lbs/day)	BOD Factor¹ (lbs/100 lbs)	Adjusted Total BOD Input² (lbs/day)
Raw milk	801,850	10.39	83,312
Total			83,312

Natural and Processed Cheese

Material	Material Used (lbs/day)	BOD Factor¹ (lbs/100 lbs)	Adjusted Total BOD Input² (lbs/day)
Skim milk	774,200	7.44	57,600
Total			57,600

Condensed Whey

Material	Material Used (lbs/day)	BOD Factor ¹ (lbs/100 lbs)	Adjusted Total BOD Input ² (lbs/day)
Raw whey	691,250	4.72	32,627
Separated whey	635,950	4.72	30,017
Total			62,644

Footnotes:

1. The BOD Factors are listed in ch. NR 240.07 Wis. Adm. Code, Table 1 for generally accepted published values for protein, fat, and carbohydrate content.
2. Adjusted Total BOD input = BOD input * BOD factor / 100

PART 6 – TBEL CALCULATIONS

pH

Any discharge subject to BPT, BCT, or NSPS limitations or standards in this part must remain within the pH range of 6.0 to 9.0.

New Source Performance Standards (NSPS)

Parts of the production commenced construction after May 28th, 1974 so NSPS limits would apply.

Fluid Products – NSPS limitations of 40 CFR Part 405.20

Total BOD Input (lbs/day)	NSPS Effluent Limitations				Calculated Limits			
	BOD (lbs/1,000 lbs)		TSS (lbs/1,000 lbs)		BOD (lbs/day) ¹		TSS (lbs/day) ¹	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max
83,312	0.37	0.74	0.463	0.925	31	62	39	77

Footnotes:

1. The limits (lbs/day) = total BOD input (lbs/day) / 1000 * NSPS limitations

Natural and Processed Cheese – NSPS limitations of 40 CFR Part 405.60

Total BOD Input (lbs/day)	NSPS Effluent Limitations				Calculated Limits			
	BOD (lbs/1,000 lbs)		TSS (lbs/1,000 lbs)		BOD (lbs/day) ¹		TSS (lbs/day) ¹	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max
57,600	0.08	0.16	0.10	0.20	4.6	9.2	5.8	12

Footnotes:

1. The limits (lbs/day) = total BOD input (lbs/day) / 1000 * NSPS limitations

Condensed Whey – NSPS limitations of 40 CFR Part 405.110

Total BOD Input (lbs/day)	NSPS Effluent Limitations				Calculated Limits			
	BOD (lbs/1,000 lbs)		TSS (lbs/1,000 lbs)		BOD (lbs/day) ¹		TSS (lbs/day) ¹	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max
62,644	0.11	0.22	0.138	0.276	6.9	14	8.6	17

Footnotes:

1. The limits (lbs/day) = total BOD input (lbs/day) / 1000 * NSPS limitations

PART 7 – FINAL CALCULATED LIMITS

Per s. NR 240.06(4) Wis. Adm. Code, the total discharge limits shall be the total of the amounts calculated from the BOD input in each of the final product subcategories and all of the other subcategories with intermediate products in Part 6 of this memo.

For each production line, the most restrictive calculated set of limits are used in the calculation of the final total discharge limits.

Subcategory	Monthly average BOD (lbs/day)	Daily maximum BOD (lbs/day)	Monthly average TSS (lbs/day)	Daily maximum TSS (lbs/day)
Fluid Products	31	62	39	77
Natural and Processed Cheese	4.6	9.2	5.8	12
Condensed Whey	6.9	14	8.6	17
Total	42	85	53	106

Final Calculated Effluent Limitations			
Parameter & Units	Daily Maximum	Daily Minimum	Monthly Average
BOD ₅	85 lbs/day		42 lbs/day
TSS	106 lbs/day		53 lbs/day
pH	9.0 su	6.0 su	

The Department has determined that calculated TBELs for TSS are greater than the TMDL-based limits calculated in the 04/02/2024 WQBEL memo. **Therefore, the TMDL-based TSS limits of 27 lbs/day as a monthly average and 44 lbs/day as a daily maximum are recommended instead of the TBELs.**

The daily maximum and monthly average concentration limits in the WQBEL memo dated 04/02/2024 are also recommended to be included in the reissued permit along with the mass concentrations that are recommended in this TBEL memo.