

Ellsworth Cooperative Creamery Public Noticed Permit Fact Sheet

General Information

Permit Number	WI-0022942-11-0
Permittee & Facility Address	Ellsworth Cooperative Creamery, 232 N Wallace St, Ellsworth WI 54011
Permit Term	October 01, 2026 to September 30, 2031
Discharge Location	SE1/4 NE1/4 Sec 20, T26N, R17W of Ellsworth Township in Pierce County, Wisconsin
Receiving Water	Isabella Creek in the Trimble River and Isabelle Creek Watershed of Lower Chippewa River Basin in Pierce County
Stream Flow (Q _{7,10})	0 cfs
Stream Classification	Limited aquatic life, non-public water supply, disappearing stream
Discharge Type	Existing, continuous

Facility Description

Ellsworth Cooperative Creamery receives approximately 2,000,000 pounds of milk each day and processes a maximum of 1,950,000 pounds of milk per day into cheddar cheese, whey powder and cream. Excess milk can be transferred to other dairy facilities. Noncontact cooling water is also discharged to the head of the wastewater treatment facility (WWTF). The WWTF consists of a high strength diversion tank, equalization tank, a spill tank, recirculation tank, bio-tower, intermittent clarification, three activated sludge tanks, chemical addition for phosphorus removal (aluminum sulphate and polymer) and final clarification. Ellsworth Cooperative Creamery discharged an average of 0.191 million gallons per day (MGD) of effluent to Isabelle Creek in 2025. Solids removed during the treatment process are stabilized and stored in an aerobic sludge digester. Approximately 129 dry US tons of sludge were land applied on approved agricultural sites in 2025. Sanitary waste is sent for treatment to the Village of Ellsworth WWTF.

Substantial Compliance Determination

Enforcement During Last Permit: Ellsworth COOP Creamery (ECC) was referred to the DOJ September 2023; The case was closed on July 16, 2025. In addition, an NON was sent May 4, 2026, for exceedances which have been addressed. Also addressed where missing data and report issues. After a desktop review of all discharge monitoring reports, land app reports, compliance schedule, and a compliance inspection on March 31, 2026, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Adebowale Adesanwo on 05/15/2026.

Sample Point Descriptions

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)
101	0.179 MGD (2025)	Representative in plant samples of process wastewater and noncontact cooling water (NCCW) shall be collected from the equalization tank discharge piping.
102	0.189 MGD (2025) Sample point removed this permit reissuance & replaced with Sample point 103	Representative in plant samples shall be collected prior to combining the process wastewater with noncontact cooling water.
103	New sample point	Representative samples of non-contact cooling water (NCCW) shall be monitored for flow prior to the diversion tank & equalization tank, prior to being combined with any process wastewater.
001	0.191 MGD (2025)	Representative samples shall be collected prior to or at the effluent lift station wet well prior to discharge to Isabelle Creek. Discharge is limited to process wastewater, NCCW and condensate of whey (COW) water.
003	129 Dry US Tons (2025)	Representative digester sludge samples shall be collected from the digester load out pipe prior to land application.
008	0.006 MG (2025)	Representative samples of rejected antibiotic milk shall be collected directly from the truck prior to discharge to manure pits.
009	2.4 MG (2025)	Representative samples of high strength wastewater shall be collected from the spill tank loadout pipe prior to land application.

Permit Requirements

1 Inplant - Monitoring and Limitations

1.1 Sample Point Number: 101- EQUALIZATION TANK

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 Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Comp	
Phosphorus, Total		mg/L	3/Week	24-Hr Comp	

1.2 Sample Point Number: 103 – NCCW

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	

Changes from Previous Permit:

Requirements at sample point 101 were evaluated for this permit term the following changes were made: 1) an increased BOD, TSS & phosphorus sample frequency from weekly to 3/week, and 2) the flow monitoring frequency changed from continuous to daily for eDMR reporting purposes. Note, inplant sample point 102 has been removed from the permit because NCCW is not added to the waste stream after the sample point 101 location (equalization tank). Sample point 103 has been added to track the flow volume of noncontact cooling water.

Explanation of Limits and Monitoring Requirements

In plant sample point 101 is needed to compare to the effluent sample point 001. This comparison will help determine how effectively and efficiently the treatment plant is reducing the parameters being discharged.

2 Surface Water - Monitoring and Limitations

2.1 Sample Point Number: 001- PRIOR TO DISCHARGE

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Total Daily	
BOD5, Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Daily Max	121.3 lbs/day	3/Week	Calculated	
BOD5, Total	Monthly Avg	53.2 lbs/day	3/Week	Calculated	
Suspended Solids, Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Daily Max	170.3 lbs/day	3/Week	Calculated	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Suspended Solids, Total	Monthly Avg	73.9 lbs/day	3/Week	Calculated	
pH Field	Daily Min	6.0 su	Daily	Grab	See pH section in permit
pH Field	Daily Max	9.0 su	Daily	Grab	See pH section in permit
Dissolved Oxygen	Daily Min	4.0 mg/L	Daily	Grab	See dissolved oxygen (DO) section in permit
Nitrogen, Ammonia Variable Limit		mg/L	3/Week	See Table	Look up the variable ammonia limit from the 'Variable Daily Max Ammonia Limitation' table in the permit and report the variable limit in the Ammonia Variable Limit column on the eDMR.
Nitrogen, Ammonia (NH3-N) Total	Daily Max - Variable	mg/L	3/Week	24-Hr Flow Prop Comp	Report the daily maximum Ammonia result in the Nitrogen, Ammonia (NH3-N) Total column of the eDMR. See Ammonia Limitation Section in the permit.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	7.8 mg/L	3/Week	24-Hr Flow Prop Comp	Limit applies Jan - March
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	6.4 mg/L	3/Week	24-Hr Flow Prop Comp	Limit applies in April
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	8.1 mg/L	3/Week	24-Hr Flow Prop Comp	Limit applies May - Sept
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	3.3 mg/L	3/Week	24-Hr Flow Prop Comp	Limit applies May - Sept
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	11 mg/L	3/Week	24-Hr Flow Prop Comp	Limit applies Oct - Dec
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	5.6 mg/L	3/Week	24-Hr Flow Prop Comp	Limit applies Oct - Dec
E. coli		#/100 ml	Weekly	Grab	Monitoring only May - Sept through Sept 2028. Final limit goes into effect 05/01/2029 per the Effluent Limitations for E. coli Schedule.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Final limit goes into effect 05/01/2029 per the Effluent Limitations for E. coli Schedule.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit Effective May - September beginning 05/01/2029 per the Effluent Limitations for E. coli Schedule. See the E. coli Percent Limit section. below. Enter the result in the DMR on the last day of the month.
Chlorine, Total Residual	Daily Max	19 ug/L	Daily	Grab	Monitoring for chlorine applies at permit effective date. Limits effective 04/01/2030 per the associated schedule. Collect chlorine samples at the same time as those collected for quarterly acute & chronic WET tests.
Chlorine, Total Residual	Weekly Avg	7.3 ug/L	Daily	Grab	
Chlorine, Total Residual	Monthly Avg	7.3 ug/L	Daily	Grab	
Copper, Total Recoverable	Daily Max	21 ug/L	Monthly	24-Hr Flow Prop Comp	Monitoring for copper applies at permit effective date. Limits effective 04/01/2030 per the associated schedule. Collect copper samples at the same time as those collected for monthly hardness monitoring and quarterly acute & chronic WET tests.
Copper, Total Recoverable	Daily Max	0.099 lbs/day	Monthly	Calculated	
Copper, Total Recoverable	Weekly Avg	14 ug/L	Monthly	24-Hr Flow Prop Comp	
Copper, Total Recoverable	Weekly Avg	0.032 lbs/day	Monthly	Calculated	
Copper, Total Recoverable	Monthly Avg	14 ug/L	Monthly	24-Hr Flow Prop Comp	
Hardness, Total as CaCO ₃		mg/L	Monthly	24-Hr Flow Prop Comp	Collect hardness samples at the same time as those for copper.
Chloride	Weekly Avg	400 mg/L	4/Month	24-Hr Flow Prop Comp	Samples shall be collected on four consecutive days each month. See associated schedule on Quarterly Waterway Inspections.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Phosphorus, Total	Monthly Avg	0.6 mg/L	3/Week	24-Hr Flow Prop Comp	This is an interim MDV limit. See the MDV/Phosphorus sections and phosphorus schedules in permit.
Phosphorus, Total		lbs/month	Monthly	Calculated	Report the total monthly phosphorus discharged in lbs/month on the last day of the month on the DMR. See Standard Requirements for 'Appropriate Formulas' to calculate the Total Monthly Discharge in lbs/month.
Phosphorus, Total		lbs/yr	Annual	Calculated	Report the sum of the total monthly discharges (for the months that the MDV is in effect) for the calendar year on the Annual report form.
Temperature Maximum	Daily Max	86 deg F	Daily	Continuous	See temperature section in permit
Nitrogen, Total Kjeldahl		mg/L	Quarterly	24-Hr Flow Prop Comp	Monitoring shall be performed during normal operating conditions. Permittees are not allowed to turn off or otherwise modify treatment systems, production processes, or change other operating or treatment conditions during testing.
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hr Flow Prop Comp	
Nitrogen, Total		mg/L	Quarterly	Calculated	Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Acute WET		TUa	Quarterly	24-Hr Flow Prop Comp	See WET testing section in permit
Chronic WET	Monthly Avg	1.6 TUc	Quarterly	24-Hr Flow Prop Comp	See WET testing section in permit

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: 1) Increase in BOD, TSS and total phosphorus sample frequency from weekly to 3/week, 2) Increase in ammonia monitoring frequency from weekly to 3/week, 3) increase in the pH and DO sample frequency from 3/week to daily, 4) change in effluent ammonia limits (no monthly variable daily max limit, but instead a variable table based on effluent pH), 5) reduction in the BOD and TSS mass limits, 6) addition of chlorine & copper limits and associated compliance schedules, 7) addition of hardness monitoring, 8) addition of quarterly acute and chronic WET testing, and addition of a chronic WET limit, and 9) removal of fecal coliform monitoring and the addition of seasonal *E. coli* limits & a schedule to meet the limits.

Explanation of Limits and Monitoring Requirements

For more information see the following memos: 1) the December 16, 2025 WQBEL memo from Benjamin Hartenbower to Holly Heldstab titled “Water Quality-Based Effluent Limitations for WPDES Permit No. WI-0022942” and 2) the December 16, 2025 TBEL memo from Ben Hartenbower to Holly Heldstab titled “Technology-Based Effluent Limitations for Ellsworth Coop Creamery WPDES Permit No. WI-0022942.

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 whenever practicable.

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. Based on the criteria mentioned and using the guidance referenced, the monitoring frequencies for BOD, TSS, DO, phosphorus, ammonia and pH were all increased to better determine compliance with effluent limitations.

Ammonia: Water quality-based effluent limitations were evaluated for Ammonia Nitrogen based upon water quality criteria in ch. NR 105 (as revised March 2004), including acute toxicity criteria (ATC) and chronic toxicity criteria (CTC). Effluent limitations for ammonia are calculated using the procedures in s. NR 106.32, Wis. Adm. Code. In addition to weekly and monthly average ammonia limits, daily max ammonia limits that vary with effluent pH apply year-round. See table below for more information. Monitoring for pH shall occur on the same day total ammonia (NH₃-N) sampling occurs.

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

Phosphorus – Phosphorus rules became effective December 1, 2010 per NR 217, Wis. Adm. Code, that required the permittee to comply with water quality based effluent limits (WQBELs) for total phosphorous. The final phosphorus WQBELs are 0.225 mg/L monthly average and 0.075 mg/L 6-month average and were to become effective as scheduled

unless a variance was granted. For this permit term, the permittee reapplied for the Multi-Discharger Variance (MDV) for phosphorus as provided for in s. 283.16, Wis. Stats., and approved by USEPA on September 3, 2025 for a 10-year duration. The permittee qualifies for the MDV because it is an existing source and a major facility upgrade is needed to comply with the applicable phosphorus WQBELs, thereby creating a financial burden. The interim effluent limit for total phosphorus is 0.6 mg/L as an average monthly limit. The limit was derived using DMR data from October 2017 to October 2025.

Conditions of the MDV require the permittee to optimize phosphorus removal throughout the proposed permit term, comply with interim limits and make annual payments to participating county(s) by March 1 of each year based on the pounds of phosphorus discharged during the previous year in excess of the specified target value.

The “price per pound” value is \$50.00 adjusted for CPI annually as defined by s. 283.16(8)(a)2, Wis. Stats and takes effect for reissued permits with effective dates starting April 1. This may differ from the “price per pound” that is public noticed; however, the “price per pound” is set upon reissuance and is applicable for the entire permit term. The participating county(s) uses these payments to implement nonpoint source phosphorus control strategies at the watershed level.

Whole Effluent Toxicity (WET) Testing: Whole effluent toxicity (WET) testing requirements and limits (if applicable) are determined in accordance with ss. NR 106.08 and NR 106.09 Wis. Adm. Code, as revised August 2016. (See the current version of the Whole Effluent Toxicity Program Guidance Document and checklist and WET information, guidance and test methods at <http://dnr.wi.gov/topic/wastewater/wet.html>). Acute and chronic WET tests are required quarterly and a monthly average limit of 1.6 TU_c applies to the chronic WET tests.

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.

3 Land Application

3.1 Sample Point Number: 003- DIGESTOR SLUDGE

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Solids, Total		Percent	Annual	Grab	
Nitrogen, Total Kjeldahl		Percent	Annual	Grab	
Nitrogen, Ammonium (NH ₄ -N) Total		Percent	Annual	Grab	
Phosphorus, Total		Percent	Annual	Grab	
Phosphorus, Water Extractable		% of Tot P	Annual	Grab	
Chloride		Percent	Annual	Grab	
pH Field		su	Annual	Grab	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Cadmium Dry Wt		mg/kg	Annual	Grab	
Copper Dry Wt		mg/kg	Annual	Grab	
Lead Dry Wt		mg/kg	Annual	Grab	
Nickel Dry Wt		mg/kg	Annual	Grab	
Zinc Dry Wt.		mg/kg	Annual	Grab	
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:

PFAS –Monitoring is required annually pursuant to NR 214.18(5)(b), Wis. Adm. Code.

Explanation of Limits and Monitoring Requirements

Requirements for land application of industrial sludge are determined in accordance with ch. NR 214 Wis. Adm. Code. Per NR 214.18(5)(b) the department may require metals be monitored in the sludge.

PFAS- The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA has developed a draft risk assessment to determine future land application rates and released this risk assessment in January of 2025. The department is evaluating this new information. Until a decision is made, the “Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS” should be followed.

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.

3.2 Sample Point Number: 008- ANTIBIOTIC MILK

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nitrogen, Total Kjeldahl		mg/L	Monthly	Grab	
Nitrogen, Ammonia (NH ₃ -N) Total		mg/L	Monthly	Grab	
Chloride		mg/L	Monthly	Grab	
Phosphorus, Total		mg/L	Annual	Grab	
Phosphorus, Water Extractable		% of Tot P	Annual	Grab	
Potassium, Total Recoverable		mg/L	Annual	Grab	
pH Field		su	Annual	Grab	
BOD ₅ , Total		mg/L	Annual	Grab	

Changes from Previous Permit:

Limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section.

Explanation of Limits and Monitoring Requirements

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

3.3 Sample Point Number: 009- HIGH STRENGTH WW

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nitrogen, Total Kjeldahl		mg/L	Monthly	Grab	
Nitrogen, Ammonium (NH ₄ -N) Total		mg/L	Annual	Grab	
Chloride		mg/L	Monthly	Grab	
Phosphorus, Total		mg/L	Annual	Grab	
Phosphorus, Water Extractable		% of Tot P	Annual	Grab	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Potassium, Total Recoverable		mg/L	Annual	Grab	
pH Field		su	Annual	Grab	

Changes from Previous Permit:

Limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section.

Explanation of Limits and Monitoring Requirements

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

4 Schedules

4.1 Phosphorus Schedule - Optimization and Compliance Planning

The permittee is required to optimize performance and undertake compliance planning to control phosphorus discharges per the following schedule.

Required Action	Due Date
Optimization and Compliance Alternatives: The permittee shall implement a phosphorus discharge optimization plan to control phosphorus discharges to the greatest extent practicable. Submit a progress report that summarizes the approach to phosphorus removal at the facility, the resulting concentration and mass loading for the last 12-month period, and any changes that were or are needed to optimize removal of phosphorus by the due date. The permittee shall also evaluate alternative phosphorus compliance options such as water quality trading and adaptive management. The progress report submitted on the date due shall also detail any outreach activities undertaken to evaluate these options, any communications with credit generators, brokers/clearinghouse, and any potential water quality trading or adaptive management projects that may lead to compliance with phosphorus WQBELs. Financial alternatives evaluation: If the permittee intends to seek a renewed variance at the end of this permit term, the permittee may complete a financial evaluation to support ongoing variance eligibility. The report must evaluate financial mechanisms that have the potential to make compliance with phosphorus WQBELs economically feasible.	09/30/2027
Progress Report #2: Submit a progress report per the above for the prior calendar year.	09/30/2028
Progress Report #3: Submit a progress report per the above for the prior calendar year.	09/30/2029
Progress Report #4: Submit a progress report per the above for the prior calendar year.	09/30/2030

Final MDV Optimization and Compliance Alternatives Report: Submit a progress report per the above for the prior calendar year. If water quality trading or adaptive management will be used to comply with phosphorus limitations during the next permit term, submit a draft water quality trading plan, adaptive management plan, or executed clearinghouse credit purchase agreement. The financial alternatives evaluation as described above must be submitted by the date due if the facility chooses to seek renewal of the variance.	03/31/2031
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Explanation of Schedule: Per s. 283.16(6)(a), Wis. Stats. the Department may include a requirement that the permittee optimize the performance of a point source in controlling phosphorus discharges, which may be necessary to achieve compliance with applicable effluent limits. This compliance schedule requires the permittee to prepare an optimization plan with a schedule for implementation and submit it for Department approval. The schedule also includes a compliance planning element focused on economically feasible solutions to low-level phosphorus effluent limits such as water quality trading or adaptive management. The permittee shall take the steps called for in the optimization plan and submit annual progress reports on optimizing the removal of phosphorus and establishing a water quality trade or adaptive management project. Should the permittee intend to reapply for a subsequent term of variance coverage, a financial alternatives analysis will need to be completed. Report elements are listed in the schedule, and more information can be found in EPA's March 2024 Financial Capabilities Assessment Guidance, Appendix C.

4.2 Phosphorus Payment per Pound to County

The permittee is required to make annual payments for phosphorus reductions to the participating county or counties in accordance with s. 283.16(8), Wis. Stats, and the following schedule. The price per pound will be set at the time of permit reissuance and will apply for the duration of the permit.

Required Action	Due Date
Annual Verification of Phosphorus Payment to County: The permittee shall make a total payment to the participating county or counties approved by the Department by March 1 of each calendar year. The amount due is equal to the following: [(lbs of phosphorus discharged minus the permittee's target value) times (\$68.40 per pound)] or \$640,000, whichever is less. See the payment calculation steps in the Surface Water section. The permittee shall submit Form 3200-151 to the Department by March 1 of each calendar year indicating total amount remitted to the participating counties to verify that the correct payment was made. The first payment verification form is due by the specified Due Date. Note: The applicable Target Value is 0.2 mg/L as defined by s. 283.16(1)(h), Wis. Stats. The "per pound" value is \$50.00 adjusted for CPI.	03/01/2027
Annual Verification of Payment #2: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2028
Annual Verification of Payment #3: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2029
Annual Verification of Payment #4: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2030
Annual Verification of Payment #5: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2031

Continued Coverage: If the permittee intends to seek a renewed variance, an application for the MDV (Multi Discharger Variance) shall be submitted as part of the application for permit reissuance in accordance with s. 283.16(4)(b), Wis. Stats.	
Annual Verification of Payment After Permit Expiration: In the event that this permit is not reissued prior to the expiration date, the permittee shall continue to submit Form 3200-151 to the Department indicating total amount remitted to the participating counties by March 1 each year.	

Explanation of Schedule: Subsection 283.16(6)(b), Wis. Stats., requires permittees that have received approval for the multi-discharger variance (MDV) to implement a watershed project that is designed to reduce nonpoint sources of phosphorus within the HUC 8 watershed in which the permittee is located. The permittee has selected the “Payment to Counties” watershed option described in s. 283.16(8), Wis. Stats. Under this option the permittee shall make annual payment(s) to participating county(s) that are calculated based on the amount of phosphorus actually discharged during a calendar year in pounds per year less the amount of phosphorus that would have been discharged had the permittee discharged phosphorus at a target value of 0.2 mg/L. The pounds of phosphorus discharged in excess of the target value is multiplied by a per pound phosphorus charge that will equal \$68.40 per pound. This schedule requires the permittee to submit Form 3200-151 to the Department indicating the total amount remitted to the participating county(s).

4.3 E Coli Limit Schedule

This compliance schedule requires the permittee to achieve compliance with the E coli limits by the specified date.

Required Action	Due Date
Action Plan: Submit an action plan for complying with the effluent limitation. If construction is required, include plans and specifications with the submittal.	09/30/2027
Initiate Actions: Initiate actions identified in the plan.	04/30/2028
Complete Actions: Complete actions necessary to achieve compliance with the E coli effluent limitations. Limits become effective 05/01/2029.	04/30/2029

Explanation of Schedule: The compliance schedule for *E coli* provides a schedule for conducting the actions necessary to comply with the new seasonal (May – Sept) limits. The compliance schedule lays out a timeline for the permittee to investigate and implement a plan to comply with the limits by the end of the schedule.

4.4 Chlorine Schedule

This compliance schedule requires the permittee to achieve compliance with the chlorine limits by the specified date.

Required Action	Due Date
Report on Effluent Discharges: Submit a report on effluent discharges of chlorine with conclusions regarding compliance.	09/30/2027
Action Plan: Submit an action plan for complying with the effluent limitation. If construction is required, include plans and specifications with the submittal.	09/30/2028
Initiate Actions: Initiate actions identified in the plan.	09/30/2029
Complete Actions: Complete actions necessary to achieve compliance with the chlorine effluent limitations. Limits become effective 04/01/2030.	03/31/2030

Explanation of Schedule: The compliance schedule for chlorine provides a schedule for conducting the actions necessary to comply with the new limits. The compliance schedule lays out a timeline for the permittee to investigate and implement a plan to comply with the limits by the end of the schedule.

4.5 Copper Schedule

This compliance schedule requires the permittee to achieve compliance with the copper limits by the specified date

Required Action	Due Date
Report on Effluent Discharges: Submit a report on effluent discharges of copper with conclusions regarding compliance.	09/30/2027
Action Plan: Submit an action plan for complying with the effluent limitation. If construction is required, include plans and specifications with the submittal.	09/30/2028
Initiate Actions: Initiate actions identified in the plan.	09/30/2029
Complete Actions: Complete actions necessary to achieve compliance with the copper effluent limitations. Limits become effective 04/01/2030.	03/31/2030

Explanation of Schedule: The compliance schedule for copper provides a schedule for conducting the actions necessary to comply with the new limits. The compliance schedule lays out a timeline for the permittee to investigate and implement a plan to comply with the limits by the end of the schedule.

4.6 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
Land Application Management Plan: Submit an update to the land application management plan to optimize the land application system performance and demonstrate compliance with Wisconsin Administrative Code NR 214.	12/31/2026

Explanation of Schedule: An up-to-date Land Application Management plan is a standard requirement in reissued industrial permits per s. NR 214.17(6)(c) Wis. Adm. Code.

4.7 Quarterly Waterway Maintenance

Required Action	Due Date
Quarterly Waterway Inspection: The permittee shall inspect the effluent waterway once per quarter from point of discharge to 1,000 feet downstream. Document on an 8.5 x 11 inch map the location of the inspection and if/where sinkholes were observed thereby potentially allowing effluent to seep into groundwater. Mark locations of any swallets, sinkholes, fractured bedrock or similar features on the map. This quarterly inspection report/map shall be completed by within 30 days of the inspection, or by the 21st day of the month after the close of the quarter (whichever is sooner) and made available to the department upon request.	
Waterway Maintenance: If swallets, sinkholes or fractured bedrock are observed during the waterway inspection or at other times, the permittee shall report presence of swallets or sinkholes to	

the Department within 24 hours. Permittee shall implement a temporary remedy as soon as possible but not later than seven days from discovery of the problem. The permittee shall implement a permanent remedy within 60 days of discovery.	
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Explanation of Schedule: Because the permittee discharges the treated effluent to an area known to develop sinkholes, this schedule requires them to inspect and maintain the waterway to prevent the direct discharge of effluent to groundwater through potential sinkholes that may form.

Other Comments

None

Attachments

- WQBEL memo from Benjamin Hartenbower to Holly Heldstab titled “Water Quality-Based Effluent Limitations for WPDES Permit No. WI-0022942, dated 12/16/2025
- TBEL memo from Ben Hartenbower to Holly Heldstab titled “Technology-Based Effluent Limitations for Ellsworth Coop Creamery WPDES Permit No. WI-0022942, dated 12/16/2025
- MDV Evaluation Checklist, completed by Matt Claucherty, dated 05/06/2022
- MDV Conditional Approval Letter, completed by Matt Claucherty, dated 05/06/2022

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance

Prepared By: Holly Heldstab, Wastewater Specialist

Date: 08/26/2026

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: December 16, 2025

TO: Holly Heldstab – WCR/Eau Claire

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Water Quality-Based Effluent Limitations for Ellsworth Coop Creamery
WPDES Permit No. WI-0022942

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 Ellsworth Coop Creamery in Pierce County. This industrial discharge is to Isabelle Creek, located in the Trimbelle River and Isabelle Creek Watershed in the Lower Chippewa River Basin. 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: Prior to Discharge

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD ₅	121.3 lbs/day		30 mg/L	20 mg/L, 53.2 lbs/day		3,4
TSS	10.3 lbs/day		30 mg/L	20 mg/L, 73.9 lbs/day		3,4
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		4.0 mg/L				1,4
Ammonia Nitrogen						5
January - March	Variable			7.8 mg/L		
April	Variable			6.4 mg/L		
May - September	Variable		8.1 mg/L	3.3 mg/L		
October - December	Variable		11 mg/L	5.6 mg/L		
<i>E. coli</i>						6
May - September				126 #/100 mL geometric mean		
Chlorine	19 µg/L		7.3 µg/L	7.3 µg/L		7
Copper	21 µg/L, 0.099 lbs/day		14 µg/L, 0.032 lbs/day	14 µg/L		7
Hardness						8
Chloride			400 mg/L			1
Phosphorus						9
LCA Interim				0.8 mg/L		
HAC Interim				0.6 mg/L		
Final WQBEL				0.225 mg/L	0.075 mg/L	
Temperature	86 deg F					1
TKN, Nitrate+Nitrite, and Total Nitrogen						10
Acute WET						11,12
Chronic WET				1.6 TUc		11,13

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. The mass limits are categorical limits based on ch. NR 240, Wis. Adm. Code. These limits are not addressed in this memo and may need to be adjusted based on current production.
4. These limits are based on the Limited Aquatic Life (LAL) community of the immediate receiving water as described in s. NR 104.02(3)(b), Wis. Adm. Code.
5. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values may be included in the permit in place of the single limit of 2.8 mg/L.
These limits apply year-round.

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

6. Additional Final Limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
7. 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.
8. Hardness monitoring is recommended because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.
9. Under the phosphorus MDV, a level currently achievable (LCA) interim limit of 0.8 mg/L should be effective upon permit reissuance. A compliance schedule may be included in the permit until the highest attainable condition (HAC) limit of 0.6 mg/L can be met. The final WQBELs remain at 0.225 mg/L as a monthly average and 0.075 mg/L as a six-month average, as well as a respective mass limit.
10. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, quarterly total nitrogen monitoring is recommended for all Class A dairy product Processors. Total Nitrogen is the sum of nitrate (NO₃), nitrite (NO₂), and total kjeldahl nitrogen (TKN) (all expressed as N).
11. Quarterly Acute and Chronic WET tests are recommended. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Testing should continue after the permit expiration date (until the permit is reissued).
12. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests.
13. The Instream Waste Concentration (IWC) to assess chronic test results is 63%. 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% . The primary control water used in chronic WET tests conducted on Outfall 001 shall be a grab sample collected from Isabelle Creek.

Sample Point 102: Prior to Combining Wastestream

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1,2
Phosphorus				1.0 mg/L	1,3

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. This technology-based phosphorus limit is expressed as a 12-month rolling average in accordance with s. NR 217.04(1)(a), Wis. Adm. Code.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Benjamin Hartenbower at (715) 225-4705 or benjamin.hartenbower@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (2) – Narrative & Map

PREPARED BY:



Benjamin Hartenbower, PE,
Water Resources Engineer

Date: 12/16/2025

E-cc: Adebawale Adesanwo, Wastewater Engineer – WCR/Eau Claire
Geisa Bittencourt, Regional Wastewater Supervisor – WCR/Eau Claire
Diane Figiel, Water Resources Engineer – WY/3
Nate Willis, Wastewater Engineer – WY/3
Kari Fleming, Environmental Toxicologist – WY/3
Michael Polkinghorn, Water Resources Engineer – NOR/Rhineland
Chris Willger, Water Quality Biologist – WCR/Eau Claire

Attachment #1
**Water Quality-Based Effluent Limitations for
 Ellsworth Coop Creamery**

WPDES Permit No. WI-0022942

Prepared by: Benjamin P. Hartenbower

PART 1 – BACKGROUND INFORMATION

Facility Description

The Ellsworth Coop Creamery wastewater treatment facility consists of a spill control diversion tank, a flow equalization tank, a spill tank, a recirculating tank, a bio-tower, intermittent clarification, three activated sludge aeration tanks, final clarification, and chemical addition for phosphorus removal. Effluent is discharged to Isabelle Creek.

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

Existing Permit Limitations

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

Outfall 001: Prior to Discharge

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1, 2
BOD ₅	40 mg/L, 127 lbs/day			20 mg/L, 53.4 lbs/day		3
TSS	40 mg/L, 184 lbs/day			20 mg/L, 77.1 lbs/day		3
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		4.0 mg/L				
Ammonia Nitrogen						2
April	8.8 mg/L			8.8 mg/L		
May - September	11 mg/L		9.1 mg/L	3.6 mg/L		
October & November	8.8 mg/L			8.8 mg/L		
December - March	7.8 mg/L			7.8 mg/L		
Fecal Coliform						2
<i>E. Coli</i>						2
Chloride			400 mg/L			
Phosphorus						4
Interim				1.0 mg/L		
MDV Interim				0.8 mg/L		
Final WQBEL				0.225 mg/L	0.075 mg/L	
Temperature	86 deg F					2
TKN, Nitrate+Nitrite, and Total Nitrogen						2

Footnotes:

Attachment #1

1. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
2. Monitoring only.
3. The mass limits are categorical limits based on ch. NR 240, Wis. Adm. Code.
4. A compliance schedule is in the current permit to meet the MDV Interim Limit by September 1, 2022.

Sample Point 102: Prior to Combining Wastestream

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
Phosphorus				1.0 mg/L	2

Footnotes:

1. Monitoring only.
2. This technology-based phosphorus limit is expressed as a 12-month rolling average in accordance with s. NR 217.04(1)(a), Wis. Adm. Code.

Receiving Water Information

- Name: Isabelle Creek
- Waterbody Identification Code (WBIC): 2445000
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Limited Aquatic Life (LAL), non-public water supply.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: Due to the nature of the receiving water, the 7-Q₁₀, 7-Q₂, and Harmonic Mean are estimated to be zero.
 $7\text{-}Q_{10} = 0$ cubic feet per second (cfs)
 $7\text{-}Q_2 = 0$ cfs
 Harmonic Mean Flow = 0 cfs

Downstream Low Flow: The following 7Q₁₀ and 30Q₅ values are from USGS for Station 05355267, in Isabelle Creek, where the classification changes to Warm Water Sport Fish. These values are used to evaluate potential downstream ammonia impacts.

- $7Q_{10} = 1.0$ cfs
- $30Q_5 = 1.8$ cfs
- Hardness = 138 mg/L as CaCO₃. This value represents the geometric mean of effluent data. Effluent hardness is used in place of receiving water because there is no receiving water flow upstream of the discharge.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Background concentrations are not included because they do not impact the calculated WQBEL when the receiving water low flows are equal to zero.
- Multiple dischargers: Ellsworth Wastewater Treatment Facility also discharges to Isabelle Creek, 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: None.

Effluent Information

- Flow Rate(s):
Annual Average = 0.274 MGD (Million Gallons per Day)
Peak Daily = 0.567 MGD

For reference, the actual average flow from October 2017 to October 2025 was 0.234 MGD.

- Hardness = 138 mg/L as CaCO₃. This value represents the geometric mean four samples collected in January and February 2022 which were reported in the permit application.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Wastewater source: Wastewater generated from dairy products processing.
- Water supply: Ellsworth Waterworks (900 GPD) and Private Well (65,000 GPD)
- Additives: One Biocide and nine Water Quality Conditioners.
- 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 hardness. The permit-required monitoring for Ammonia Nitrogen, Chloride, Phosphorus, and Temperature from October 2017 to October 2025 is used in this evaluation.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2, in the column titled “MEAN EFFL. CONC.”. Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

Effluent Data for Outfall 001

	Chloride (mg/L)
1-day P ₉₉	312
4-day P ₉₉	250
30-day P ₉₉	215
Mean	197
Std	41
Sample size	419
Range	108 - 363

Copper Effluent Data for Outfall 001

Sample Date	Copper µg/L
01/25/2022	<3
02/02/2022	20
02/10/2022	18
02/15/2022	18
mean	14

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

Attachment #1

The following table presents the average concentrations and loadings at Outfall 001 from October 2017 to October 2025 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameters with Effluent Limits

	Average Measurement	Average Mass Discharged
BOD ₅	10 mg/L*	21.6 lbs/day
TSS	10 mg/L*	20 lbs/day
pH	8.2 s.u.	
Dissolved Oxygen	5.89 mg/L	
Ammonia Nitrogen	2.6 mg/L*	
Chloride	197 mg/L	
Phosphorus	1.0 mg/L*	
Temperature	75 deg F	

*Results below the limit of detection (LOD) were included as zeros 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).

Attachment #1

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 the case for Ellsworth Coop Creamery.

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0.00 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		19.03		19	4	40		
Arsenic		339.8		340	68	<1		
Cadmium	138	41.75		42	8	<2		
Chromium (+3)	138	2346.64		2347	469	<3		
Copper	138	21.02		21	4	14		20
Lead	138	145.91		146	29	<1		
Nickel	138	615.95		616	123	<8		
Zinc	138	159.49		159	32	15		
Chloride (mg/L)		757		757			312	363

**Per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016 consideration of ambient concentrations and 1-Q₁₀ 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 = 0.00 cfs, (¼ of 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		7.3	1.5	40	
Arsenic		152.2		152	30	<1	
Cadmium	138	3.17		3.17	0.63	<2	
Chromium (+3)	138	171.94		172	34	<3	
Copper	138	13.63		14	3	14	
Lead	138	38.22		38	8	<1	
Nickel	138	96.41		96	19	<8	
Zinc	138	159.49		159	32	15	
Chloride (mg/L)		395		395			250

Monthly Average Limits based on Wildlife Criteria (WC)

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

Monthly Average Limits based on Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 0.00 cfs, (¼ of Harmonic Mean), as specified in s. NR 106.06(4)(c), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK- GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P ₉₉
Cadmium	880		880	176	<2	
Chromium (+3)	8400000		8400000	1680000	<3	
Lead	2240		2240	448	<1	
Nickel	110000		110000	22000	<8	

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 0.00 cfs, (¼ of Harmonic Mean), as specified in s. NR 106.06(4)(c), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK- GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P ₉₉
Arsenic	40		40	8	<1	

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

Conclusions and Recommendations

Based on a comparison of the calculated limitations and effluent data, effluent limitations are required for Chlorine and Copper. Limits and/or monitoring recommendations are made in the paragraphs below:

Total Residual Chlorine– Available data/information indicates the discharge contains concentrations of chlorine or halogen above the applicable WQBELs. Therefore, a daily maximum limit of 19 µg/L is required. Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required. The weekly average effluent limitation of 7.3 µg/L should be included in the permit because it is more restrictive than the daily maximum limit. Additional limits are discussed in the expression of limits section of this memo.

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 7.3 µg/L is required** to meet expression of limits requirements in addition to the daily maximum limit.

Attachment #1

Copper – Considering available effluent data for Outfall 001, the mean concentration is 14 µg/L, with a maximum concentration of 20 µg/L. The effluent concentration exceeds 1/5 of the calculated daily maximum limit, (21.02 µg/L, based on ATC) and 1/5 of the calculated weekly average limit, (13.63 µg/L, based on CTC); therefore, concentration and mass limits, as well as monthly monitoring, are required for Copper.

The acute mass limit of 0.099 lbs/day is based on the concentration limit and the peak daily flow of 0.567 MGD ($21 \mu\text{g/L} * 0.567 \text{ MGD} * 8.34/1000$) in accordance with s.NR 106.07(2)(a), Wis. Adm. Code.

The weekly mass limitation of 0.032 lbs/day is based on the concentration limit and the annual average flow of 0.274 MGD ($14 \mu\text{g/L} * 0.274 \text{ MGD} * 8.34/1000$) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

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 14 µg/L is required** to meet expression of limits requirements in addition to the daily maximum and weekly average limits.

Hardness monitoring is also recommended because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.

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

Available monitoring sample data from the Ellsworth Waterworks (PWS ID: 64802397) is provided in the table below:

Water Supply PFAS Data

Sample Date	Sample ID	Well #	PFOS (ng/L)	PFOA (ng/L)
05/02/2023	CB04541-09	NV242	<0.3	<0.48
05/02/2023	CB04541-01	AY376	0.53	0.79
05/02/2023	CB04541-05	BG675	0.38	<0.48
04/20/2022	615312001	NV242	<0.966	<0.966
04/20/2022	615309001	AY376	<0.940	<0.940
04/20/2022	615310001	BG675	<0.930	<0.930
Average =			0.152	0.132

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

Based on available information, **PFOS and PFOA monitoring is not recommended.**

PART 3 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR CONVENTIONAL POLLUTANTS

In accordance with s. NR 104.02(3)(b)2, Wis. Adm. Code and based on the Limited Aquatic Life receiving water classification, the limitations for BOD₅ are 30 mg/L weekly average and 20 mg/L monthly average. The limitations for TSS are 30 mg/L weekly average and 20 mg/L monthly average. In order to maintain adequate dissolved oxygen, a dissolved oxygen daily minimum limit of 4.0 mg/L is required.

The BOD₅ and TSS mass limits are categorical limits based on ch. NR 240, Wis. Adm. Code. These limits are not within the scope of this memo and were addressed separately.

PART 4 – 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 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 pH has changed.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

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

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

Where:

A = 0.633 and B = 90.0 for Limited Aquatic Life, and

pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 2551 samples were reported from October 2017 to October 2025. The maximum reported value was 9.10 s.u. (Standard pH Units). The effluent pH was 8.80 s.u. or less 99% of the time. The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.81 s.u. The mean plus the standard deviation multiplied by a factor of 2.326, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 8.79 s.u. Therefore, a value of 8.81 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 8.81 s.u. into the equation above yields an ATC = 2.79 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-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	5.59
1-Q ₁₀	2.79

The 1-Q₁₀ method yields the most stringent limits for Ellsworth Coop Creamery.

Presented below is a table of daily maximum limitations corresponding to various effluent pH values.

Daily Maximum Ammonia Nitrogen Limits – LAL

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

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

The ammonia limit calculation also warrants evaluation of weekly and monthly average limits based on chronic toxicity criteria for ammonia, because those limits relate to the assimilative capacity of the receiving water.

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

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as Limited Aquatic Life 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 = 1.0,

C = $8.09 \times 10^{(0.028 \times (25 - T))}$

T = the temperature of the receiving (°C)

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as a Limited Forage 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 = 1.0

C = the minimum of 3.09 or $3.73 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Present), or

C = $3.73 \times 10^{(0.028 \times (25 - T))}$ – (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 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.

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

Weekly and Monthly Average Ammonia Nitrogen Limits – LAL

		January - March	April	May - September	October - December
Effluent Flow	Qe (MGD)	0.274	0.274	0.274	0.274
Background Information	7-Q ₁₀ (cfs)	0	0	0	0
	7-Q ₂ (cfs)	0	0	0	0
	Ammonia (mg/L)	0.09	0.08	0.05	0.03
	Average Temperature (°C)	4.3	10	18	8.3
	Maximum Temperature (°C)	6.1	10	21	13
	pH (s.u.)	7.35	8.12	8.11	8.22
	% of Flow used	25	25	100	25
	Reference Weekly Flow (cfs)	0.00	0.00	0.00	0.00
	Reference Monthly Flow (cfs)	0.00	0.00	0.00	0.00
Criteria mg/L	4-day Chronic	130.19	44.45	22.86	31.73
	30-day Chronic	52.08	17.78	9.14	12.69
Effluent Limits mg/L	Weekly Average	130	44	23	32
	Monthly Average	52	18	9.1	13

Weekly and Monthly Average Ammonia Nitrogen Limits – LFF (3.0 miles downstream)

		January - March	April	May - September	October - December
Effluent Flow	Qe (MGD)	0.274	0.274	0.274	0.274
Background Information	7-Q ₁₀ (cfs)	0	0	0	0
	7-Q ₂ (cfs)	0	0	0	0
	Ammonia (mg/L)	0.09	0.08	0.05	0.03
	Average Temperature (°C)	4.3	10	18	8.3
	Maximum Temperature (°C)	6.1	10	21	13
	pH (s.u.)	7.35	8.12	8.11	8.22
	% of Flow used	25	25	100	25
	Reference Weekly Flow (cfs)	0.00	0.00	0.00	0.00
	Reference Monthly Flow (cfs)	0.00	0.00	0.00	0.00
Criteria mg/L	4-day Chronic				
	Early Life Stages Present	16	6.5	6.6	5.5
	Early Life Stages Absent	60	20	11	15
	30-day Chronic				
	Early Life Stages Present	6.2	2.6	2.6	2.2
	Early Life Stages Absent	24	8.2	4.2	5.9
Effluent Limitations mg/L	Weekly Average				
	Early Life Stages Present			6.6	
	Early Life Stages Absent	60	20		15
	Monthly Average				
	Early Life Stages Present			2.6	
	Early Life Stages Absent	24	8.2		5.9

Weekly and Monthly Average Ammonia Nitrogen Limits – WWSF (12.75 miles downstream)

		January - March	April	May - September	October - December
Effluent Flow	Qe (MGD)	0.274	0.274	0.274	0.274
Background Information	7-Q ₁₀ (cfs)	1.0	1.0	1.0	1.0
	30-Q ₅ (cfs)	1.8	1.8	1.8	1.8
	Ammonia (mg/L)	0.09	0.08	0.05	0.03
	Average Temperature (°C)	1.7	8.9	18	5.4
	Maximum Temperature (°C)	3.3	8.9	21	10
	pH (s.u.)	7.35	8.12	8.11	8.22
	% of Flow used	25	25	100	25
	Reference Weekly Flow (cfs)	0.25	0.25	1.00	0.25
	Reference Monthly Flow (cfs)	0.45	0.45	1.80	0.45
Criteria mg/L	4-day Chronic				
	Early Life Stages Present	12	5.1	3.5	4.3
	Early Life Stages Absent	20	6.8	3.5	4.9
	30-day Chronic				
	Early Life Stages Present	4.9	2.0	1.4	1.7
	Early Life Stages Absent	8.0	2.7	1.4	1.9
Effluent Limitations mg/L	Weekly Average				
	Early Life Stages Present		8.0	12	
	Early Life Stages Absent	32			7.7
	Monthly Average				
	Early Life Stages Present		4.1	7.1	
	Early Life Stages Absent	16			4.0

Ammonia Decay

The Department must establish limits to protect downstream uses, according to s. NR 106.32(1)(b), Wis. Adm. Code. Ammonia decay may be considered when determining limits at the outfall to protect the downstream classification, according to s. NR 106.32(4)(c), Wis. Adm. Code. Where the calculated limits are more restrictive based on downstream uses, ammonia decay can be considered to determine if these more restrictive limits are needed or if the ammonia will decay before it reaches the point of the classification change.

Ammonia decay rates are dependent on temperature with in-stream nitrification essentially non-existent in the winter. In-stream decay is expected so a first order decay model should be used. Based on the available literature, a decay rate of 0.25 day⁻¹ at 20°C has been suggested as a default rate. A temperature correction factor of $\Theta = 1.08$ is ($kt = k_{20} \Theta^{(T-20)}$). The ammonia nitrogen decay equation is provided below.

$$N_{\text{Limit}} = \left(\frac{N_{\text{down}}}{\text{EXP}(-k_t T)} \right)$$

Where:

- N_{Limit} = Ammonia limit needed to protect downstream use (mg/L)
- N_{down} = Ammonia limit calculated based on downstream classification and flow (mg/L)
- $-k_t$ = Ammonia decay rate at background stream temperature (day⁻¹)
- T = Travel time from outfall to downstream use (day)

Attachment #1

The velocity of receiving water is assumed to be 3.0 miles per day to WWSF and the distance from the point of discharge to the classification change to LFF is approximately 3.0 miles for a travel time of 1.00 day. This equation shows that at the location where the classification changes, 93% of the ammonia is remaining January - March, 89% for April, 81% for May - September, and 90% for October - December. With 12.75 miles to the WWSF classification change, the travel time is 4.25 days and 77% of the ammonia is remaining January - March, 64% for April, 41% for May - September, and 71% for October - December. After decay, the limits are increased as shown in the following tables.

Ammonia Nitrogen Decay Chronic Limits Comparison (LFF)

	LAL		LFF		After Decay	
Months	Weekly Average	Monthly Average	Weekly Average	Monthly Average	Weekly Average	Monthly Average
Applicable	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
January - March	130 mg/L	52 mg/L	60 mg/L	24 mg/L	65 mg/L	26 mg/L
April	44 mg/L	18 mg/L	20 mg/L	8.2 mg/L	23 mg/L	9.2 mg/L
May - September	23 mg/L	9.1 mg/L	6.6 mg/L	2.6 mg/L	8.1 mg/L	3.3 mg/L
October - December	32 mg/L	13 mg/L	15 mg/L	5.9 mg/L	16 mg/L	6.5 mg/L

Ammonia Nitrogen Decay Chronic Limits Comparison (WWSF)

	WWSF		After Decay		Current Limits	
Months	Weekly Average	Monthly Average	Weekly Average	Monthly Average	Weekly Average	Monthly Average
Applicable	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
January - March	32 mg/L	16 mg/L	41 mg/L	21 mg/L		7.8 mg/L
April	8.0 mg/L	4.1 mg/L	13 mg/L	6.4 mg/L		8.8 mg/L
May - September	12 mg/L	7.1 mg/L	28 mg/L	17 mg/L	9.1 mg/L	3.6 mg/L
October - December	7.7 mg/L	4.0 mg/L	11 mg/L	5.6 mg/L		7.8 mg/L

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from October 2017.

Ammonia Nitrogen Effluent Data

	January - March	April	May - September	October - December
1-day P ₉₉	7.4	12.1	52.4	18.7
4-day P ₉₉	4.4	8.5	31.1	13.0
30-day P ₉₉	1.8	4.0	12.9	5.9
Mean*	0.7	0.8	4.8	1.3
Std	2.1	5.4	15.2	7.8
Sample size	201	62	349	212
Range	<0.1 - 14.5	<0.1 - 34.9	<0.1 - 90.9	<0.1 - 77

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

Reasonable Potential

The need to include ammonia limits in the Ellsworth Coop Creamery permit is determined by calculating 99th upper percentile (or P₉₉) values for ammonia during the month ranges and comparing those to the calculated limits. Based on this comparison, daily limits are required throughout the year, weekly average limits are required April – December, and monthly average limits are required May - December.

However, since the permit currently has monthly average limits throughout other parts of the year, **these 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 options are available.

Due to the change in maximum effluent pH, the recommended daily maximum, weekly, and monthly average ammonia nitrogen limits are **2.8 mg/L**.

Final Ammonia Nitrogen Limits

Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
2.8	2.8	2.8

Alternatively, the variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values may be included in the permit in place of the single limit of 2.8 mg/L. If this option is selected, the following weekly and monthly average limits would be required.

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
January - March	Variable		7.8
April	Variable		6.4
May - September	Variable	8.1	3.3
October - December	Variable	11	5.6

PART 5 – 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.

Previously, Ellsworth Coop Creamery would have been exempted from disinfection based on the limited aquatic life or limited forage fish community classification of the receiving water. Section NR 210.06(3)(g), Wis. Adm. Code, states that disinfection decisions may be made based on the hydrologic classifications listed in s. NR 104.02(1), Wis. Adm. Code (not on the water quality classifications - i.e., limited forage fish, limited aquatic life - that are defined in s. NR 104.02(3), Wis. Adm. Code). The hydrologic classification for Isabelle Creek is listed in ch. NR 104, Wis. Adm. Code, as noncontinuous.

Discharges to noncontinuous streams with 7-Q₁₀ values < 0.1 cfs usually result in effluent-dominated situations. The risk of illness is related to the concentration of *E. coli* and therefore dilution is an important consideration when considering risk to human health. Since little to no dilution is present in these situations, disinfection should not be exempted based solely on this hydrological classification.

Because the Ellsworth Coop Creamery requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit. These limits are required May through September.

Effluent Data

Ellsworth Coop Creamery has monitored effluent *E. coli* from May 2021 to October 2025 and a total of 182 results are available. A geometric mean of 126 counts/100 mL was exceeded in 22 of the last 42 months of disinfection, with a maximum monthly geometric mean of 2000 counts/100 mL. Effluent data has exceeded 410 counts/100 mL 29 times (which is 16% of the total sample results). The maximum reported value was 8000 counts/100 mL. Based on this effluent data it appears that the facility can't meet new *E. coli* limits and a compliance schedule is needed in the reissued permit.

Available *E. coli* data indicates that the new limitations are not readily attainable. The permit may include a compliance schedule to meet these limits.

Attachment #1
PART 6 – PHOSPHORUS

Technology-Based Effluent Limit

Subchapter II of Chapter NR 217, Wis. Adm. Code, requires dischargers of 60 pounds of total phosphorus per month to comply with a 12-month rolling average limit of 1.0 mg/L, or an approved alternative concentration limit.

Because Ellsworth Coop Creamery currently has an existing technology-based limit, it remains applicable unless a more stringent WQBEL is given. The TBEL shall be applied to Sample Point 102, in accordance with s. NR 217.04(1)(a)2, Wis. Adm. Code.

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

Water Quality-Based Effluent Limits (WQBEL)

Revisions to administrative rules regulating phosphorus took effect on December 1, 2010. These rule revisions include additions to s. NR 102.06, Wis. Adm. Code, which establish phosphorus standards for surface waters. Subchapter III of NR 217, Wis. Adm. Code, establishes procedures for determining WQBELs for phosphorus, based on the applicable standards in ch. NR 102, Wis. Adm. Code.

Phosphorus criteria in s. NR 102.06, Wis. Adm. Code, do not apply to limited aquatic life waters as described in s. NR 102.06(6)(d), Wis. Adm. Code. These waters were not included in the USGS/WDNR stream and river studies and, therefore, the Department lacked the technical basis to determine and propose applicable criteria. At some time in the future, the Department may adopt phosphorus criteria based on new studies focusing on limited aquatic life waters. *The Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges (2020)* suggests that during the interim, WQBELs should be based on the criteria and flow conditions for the next stream segment downstream (or downstream lake or reservoir, if appropriate), because ss. 217.12 and 217.13, Wis. Adm. Code, state that the Department must set WQBELs to protect downstream waters. The discharge location of the wastewater from Ellsworth Coop Creamery is classified as limited aquatic life downstream from the point of discharge downstream 3.0 miles to where Isabelle Creek is classified for limited forage fishery uses.

Section NR 102.06(3)(a), Wis. Adm. Code, specifically names river segments for which a phosphorus criterion of 0.100 mg/L applies. For other stream segments that are not specified in s. NR 102.06(3)(a), Wis. Adm. Code, s. NR 102.06(3)(b), Wis. Adm. Code, specifies a phosphorus criterion of 0.075 mg/L. The phosphorus criterion of 0.075 mg/L applies for Isabelle Creek, 3.0 miles downstream of the outfall location.

The conservation of mass equation is described in s. NR 217.13(2)(a), Wis. Adm. Code, for phosphorus WQBELs and includes variables of water quality criterion (WQC), receiving water flow rate (Qs), effluent flow rate (Qe), and upstream phosphorus concentrations (Cs) provided below.

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

Where:

WQC = 0.075 mg/L for Isabelle Creek

Qs = 100% of the 7-Q₂ of 0 cfs

Attachment #1

Cs = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code

Qe = effluent flow rate = 0.274 MGD = 0.423 cfs

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

The effluent limit is set equal to the criterion because the receiving water flow is equal to zero.

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from October 2017 to October 2025.

Total Phosphorus Effluent Data	
	Phosphorus mg/L
1-day P ₉₉	9.80
4-day P ₉₉	5.94
30-day P ₉₉	2.49
Mean	1.00
Std	2.49
Sample size	839
Range	<0.013 - 54.3

Reasonable Potential Determination

The discharge has reasonable potential to cause or contribute to an exceedance of the water quality criterion because the 30-day P₉₉ of reported effluent total phosphorus data is greater than the calculated WQBEL. Therefore, **a WQBEL is required.**

Limit Expression

According to s. NR 217.14(2), Wis. Adm. Code, because the calculated WQBEL is less than or equal to 0.3 mg/L, the effluent limit of 0.075 mg/L may be expressed as a six-month average. If a concentration limitation expressed as a six-month average is included in the permit, a monthly average concentration limitation of 0.225 mg/L, equal to three times the WQBEL calculated under s. NR 217.13, Wis. Adm. Code shall also be included in the permit. The six-month average should be averaged during the months of May – October and November – April.

Mass Limits

A mass limit is also required, pursuant to s. NR 217.14(1)(a), Wis. Adm. Code, because the discharge is to a surface water that is upstream of Lake Pepin, which is a phosphorus impaired water. **This final mass limit shall be 0.075 mg/L × 8.34 × 0.274 MGD = 0.18 lbs/day expressed as a six-month average.**

Multi-Discharger Variance Interim Limit

With the permit application, Ellsworth Coop Creamery has re-applied for the phosphorus multi-discharger variance (MDV). Conditions of the phosphorus MDV require the facility to comply with an interim phosphorus limit in lieu of meeting the final WQBEL. The recommended interim limit during the 2nd permit under MDV approval, pursuant to s. 283.16(6)(a)2, Wis. Stats., is **0.6 mg/L as a monthly average.**

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

The table below summarizes the maximum temperatures reported during monitoring from October 2017 to March 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	77	81		86
FEB	80	86		86
MAR	81	89		86
APR	81	87		86
MAY	85	92		86
JUN	90	95		86
JUL	90	95		86
AUG	88	90		86
SEP	86	91		86
OCT	86	90		86
NOV	78	83		86
DEC	83	94		86

Reasonable Potential

Based on the available discharge temperature data, the maximum daily effluent temperature reported was 95°F; therefore, reasonable potential for exceeding the daily maximum limit exists.

Limits and monitoring are 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 63%** shown in the WET Checklist summary below, was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm. Code:

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

Where:

Q_e = annual average flow = 0.274 MGD = 0.423 cfs

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

Q_s = $\frac{1}{4}$ of the 7- Q_{10} = 1.00 cfs $\div$ 4 = 0.25 cfs

(12.75 miles downstream at classification change to WWSF)

- 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 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	Algae (IC ₅₀)	Pass or Fail?	Use in RP?	
05/10/2006	>100	>100	Pass	No						1
10/28/2008	>100	>100	Pass	No						1
11/28/2012	>100	76.1	Fail	No						2
01/16/2013	82	>100	Fail	No						2
04/09/2013	>100	>100	Pass	No						2
05/28/2014	>100	>100	Pass	No						2
09/10/2014	>100	>100	Pass	No						2
04/22/2015	>100	>100	Pass	No						2
06/22/2021	>100	>100	Pass	Yes	>100	12.5		Fail	Yes	

Footnotes:

1. *Tests done by S-F Analytical, July 2008 – March 2011.* The DNR has reason to believe that WET tests completed by SF Analytical Labs from July 2008 through March 31, 2011 were not performed using proper test methods. Therefore, WET data from this lab during this period has been disqualified and was not included in the analysis.
 2. *Data Not Representative.* Since the monthly average chloride limit of 400 mg/L took effect on January 2017, high-strength chloride waste was shipped off-site for disposal. Chloride toxicity was believed to be the cause of previous WET failures. Data prior to January 2017 is no longer representative.
- 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.**

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

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 LC₅₀, IC₂₅ or IC₅₀ ≥ 100%).

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

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

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
100/12.5 = 8.00 TUc	6.2 Based on 1 detect.	63%

Attachment #1
 $[(TU_c \text{ effluent}) (B) (IWC)] = 31.25 > 1.0$

Therefore, reasonable potential is shown a chronic WET limit using the procedures in s. NR 106.08(6), Wis. Adm. Code, and representative data from 2021.

Expression of WET limits

Chronic WET limit = $[100/IWC] TU_c = 1.6 TU_c$ expressed as a monthly average

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

WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. 0 Points	IWC = 63%. 10 Points
Historical Data	One test used to calculate RP. No tests failed. 0 Points	One test used to calculate RP. One test failed. 0 Points
Effluent Variability	Little variability, severe upsets. Ammonia, BODs, Dissolved Oxygen, Temperature, Phosphorus, TSS, and pH exceedances, consistent WWTF operations. NONs sent 2020 and 2021. NOV sent 2022. 10 Points	Same as Acute. 10 Points
Receiving Water Classification	Limited Aquatic Life > 4 miles to WWSF 0 Points	Same as Acute. 0 Points
Chemical-Specific Data	Reasonable potential for Ammonia, Chlorine, and Copper limits based on ATC. (7 pts) Ammonia nitrogen limit carried over from the current permit. Chloride and Zinc detected. (2 pts) Additional Compounds of Concern: None. 9 Points	Reasonable potential for Ammonia, Chlorine, and Copper limits based on CTC. (7 pts) Ammonia nitrogen limit carried over from the current permit. Chloride and Zinc detected. (2 pts) Additional Compounds of Concern: None. 9 Points
Additives	One Biocide (3 pts) and nine Water Quality Conditioners (9 pts) added. Permittee has proper P chemical SOPs in place. 12 Points	All additives are used more frequently than once per 4 days. 12 Points

Attachment #1

	Acute	Chronic
Discharge Category	Dairy Products Processing (20 pts) 20 Points	Same as Acute. 20 Points
Wastewater Treatment	Secondary or Better 0 Points	Same as Acute. 0 Points
Downstream Impacts	Impacts solely due to discharger (20 pts) 20 Points	Same as Acute. 20 Points
Total Checklist Points:	71 Points	81 Points
Recommended Monitoring Frequency (from Checklist):	Quarterly throughout permit term.	Quarterly throughout permit term.
Limit Required?	No	Yes Limit = 1.6 TUc
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, quarterly acute and chronic WET tests are recommended in the reissued permit. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Testing should continue after the permit expiration date (until the permit is reissued).
- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, a chronic WET limit is required. The chronic WET limit shall be expressed as 1.6 TUc as a monthly average in the effluent limits table of the permit.

PART 7 – ADDITIVE REVIEW

Unlike the metals and toxic substances evaluated in Part 2, most additives have not undergone the amount of toxicity testing needed to calculate water quality criteria. Instead, in cases where the minimum data requirements necessary to calculate a WQC are not met, a secondary value can be used to regulate the substance, according to s. NR 105.05, Wis. Adm. Code. Whenever an additive is discharged directly into a surface water without receiving treatment or an additive is used in the treatment process and is not expected to be removed before discharge, a review of the additive is needed. Secondary values should be derived according to s. NR 105.05, Wis. Adm. Code. Guidance related to conducting an additive review can be found in *Water Quality Review Procedures for Additives* (2022)

<https://dnr.wisconsin.gov/topic/Wastewater/Additives.html>

Additive Parameters

Additive Name	Purpose of Additive	Frequency of Use	Max Usage Rate	Max Effluent Concentration (mg/L)	Use Restriction (mg/L)
Aluminum Sulfate	Phosphorus Control	>4 days/week	N/A	N/A	N/A
Aqua Hawk 957	Polymer	>4 days/week	1.5 gallon/day	0	N/A
Aqua Hawk AF-207	Defoamer	>4 days/week	1.0 gallon/day	0	N/A
Accelerator 7	Organic Nitrogen Source	>4 days/week	2.5 lb/day	0	N/A
Aqua Sticker	Biological Sticking Agent	>4 days/week	1.0 lb/day	0	N/A

Attachment #1

Additive Name	Purpose of Additive	Frequency of Use	Max Usage Rate	Max Effluent Concentration (mg/L)	Use Restriction (mg/L)
Quick Zyme L	Fat degrading biocatalyst	>4 days/week	40 oz/day	0	N/A
Quick Zyme P	Protein degrading biocatalyst	>4 days/week	40 oz/day	0	N/A
Vitastim Polar	Bacteria Supplement	>4 days/week	1.0 lb/day	0	N/A
Vitastim Summer Slam	Bacteria Supplement	>4 days/week	1.0 lb/day	0	N/A
Natular G30	Larvicide	>4 days/week	1.0 lb/day	0	N/A

A review is not necessary for the Aluminum Sulfate because a Standard Operating Procedure (SOP) is in place to prevent any discharge to surface water.

A review is not needed for the remaining additives because they are not expected to be present in the effluent following the treatment process.

Date Printed: 11/20/2025 1:40 PM

Notes:



CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: December 16, 2025

TO: Holly Heldstab – WCR/Eau Claire

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Technology-Based Effluent Limitations for Ellsworth COOP Creamery
WPDES Permit No. WI-0022942

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

Parameter	Daily Maximum	Daily Minimum	Monthly Average
BOD ₅ , Total	121.3 lbs/day		53.2 lbs/day
TSS	170.3 lbs/day		73.9 lbs/day
pH	9.0 su	6.0 su	

PART 1 – BACKGROUND INFORMATION

Ellsworth Coop Creamery processes raw milk to produce a variety of dairy products including cheddar cheese, condensed whey, and powdered whey.

PART 2 – INDUSTRIAL CATEGORIES

Chapter NR 240, Wis. Adm. Code, specifies effluent guidelines for discharges from dairy product categories of point sources and subcategories. Ellsworth COOP Creamery would fall under the Natural and Processed Cheese, Condensed Whey, and Dry 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 F, K, and L. 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 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

Condensed Whey production lines which commenced construction prior to May 28, 1974 are not subject to NSPS standards. Therefore, BPT, BCT, and BAT standards for the Condensed Whey subcategory are applicable as specified in 40 CFR Part 405 Subpart K and ch. NR 240, Wis. Adm. Code.

Cheddar Cheese and Dry Whey production lines have processes which construction commenced after May 28, 1974. Therefore, the process wastewater from these lines is subject to BPT, BCT, BAT and NSPS standards for the Natural and Processed Cheese and Dry Whey subcategories are applicable as specified in 40 CFR Part 405 Subparts F and L and ch. NR 240.12, Wis. Adm. Code.

PART 4 – CURRENT PRODUCTION LEVELS

The current levels of production for each Subcategory are provided by Ellsworth COOP Creamery

Natural and Processed Cheese

Process	Material Used (lbs/day)	Flow % Discharged to Surface Water	Material Used for Calculation¹ (lbs/day)	Material Used for Calculation² (lbs/month)
Cheddar Cheese	1,800,000 (Milk, 3.7%)	100%	1,800,000	54,787,500

Condensed Whey

Process	Material Used (lbs/day)	Flow % Discharged to Surface Water	Material Used for Calculation¹ (lbs/day)	Material Used for Calculation² (lbs/month)
Condensed Whey	650,000 (Fluid Whey)	100%	650,000	19,784,375

Dry Whey

Process	Material Used (lbs/day)	Flow % Discharged to Surface Water	Material Used for Calculation¹ (lbs/day)	Material Used for Calculation² (lbs/month)
Dry Whey	650,000 (Fluid Whey)	100%	650,000	19,784,375

Natural and Processed Cheese

Process	Material Used (lbs/month)	BOD Factor¹ (lbs/100 lbs)	Adjusted Total BOD Input² (lbs/month)	Adjusted Total BOD Input (lbs/day)
Cheddar Cheese	54,787,500	10.39	5,692,421	187,020
Total				187,020

Condensed Whey

Process	Material Used (lbs/month)	BOD Factor¹ (lbs/100 lbs)	Adjusted Total BOD Input² (lbs/month)	Adjusted Total BOD Input (lbs/day)
Condensed Whey	19,784,375	11.52	2,279,298	74,885
Total				74,885

Dry Whey

Process	Material Used (lbs/month)	BOD Factor¹ (lbs/100 lbs)	Adjusted Total BOD Input² (lbs/month)	Adjusted Total BOD Input (lbs/day)
Dry Whey	19,784,375	11.52	2,279,298	74,885
Total				74,885

Footnotes:

1. Material used for daily calculations were based on a reasonable measure of actual daily production.
2. Average monthly measure of material used was based on a 7 days/week production level.

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.

BOD Factor for condensed whey process

Fluid Whey Content (%)			BOD Factor¹ (lbs/100 lbs)
Fat	Protein	Carbohydrate	
0.15%	2.6%	12.6%	11.52

1. BOD Factor calculated using fat, protein, and carbohydrate content as specified in s. NR 240.03(1), Wis. Adm. Code.

Natural and Processed Cheese

Process	Material Used (lbs/month)	BOD Factor ¹ (lbs/100 lbs)	Adjusted Total BOD Input ² (lbs/month)	Adjusted Total BOD Input (lbs/day)
Cheddar Cheese	54,787,500	10.39	5,692,421	187,020
Total				187,020

Condensed Whey

Process	Material Used (lbs/month)	BOD Factor ¹ (lbs/100 lbs)	Adjusted Total BOD Input ² (lbs/month)	Adjusted Total BOD Input (lbs/day)
Condensed Whey	19,784,375	11.52	2,279,298	74,885
Total				74,885

Dry Whey

Process	Material Used (lbs/month)	BOD Factor ¹ (lbs/100 lbs)	Adjusted Total BOD Input ² (lbs/month)	Adjusted Total BOD Input (lbs/day)
Dry Whey	19,784,375	11.52	2,279,298	74,885
Total				74,885

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 FOR NATURAL AND PROCESSED CHEESE

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)

The production processes for Cheddar Cheese commenced construction after May 28th, 1974.

Therefore, the NSPS limitations of 40 CFR Part 405.65 would apply.

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
187,020.00	0.080	0.160	0.100	0.200	14.962	29.923	18.702	37.404

Footnotes:

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

PART 7 – TBEL CALCULATIONS FOR CONDENSED WHEY

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.

Best Practicable Treatment (BPT)

Condensed Whey production commenced construction prior to May 28th, 1974 and is the best practicable control technology currently available, so NSPS standards do not apply.

Ellsworth COOP Creamery has a BOD input of greater than 14,160 lbs/day, therefore the BPT limitations of 40 CFR Part 405.112(a) would apply.

Total BOD Input (lbs/day)	BPT 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
74,884.55	0.4	1	0.6	1.5	29.954	74.885	44.931	112.327

Footnotes:

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

Best Conventional Pollutant Control (BCT)

Per 40 CFR Part 405.117, the BCT limitations are set to be the same as BPT standards in 40 CFR Part 405.112.

PART 8 – TBEL CALCULATIONS FOR DRY WHEY

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)

The production processes for Dry Whey commenced construction after May 28th, 1974.

Therefore, the NSPS limitations of 40 CFR Part 405.125 would apply.

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
74,884.55	0.110	0.220	0.138	0.275	8.237	16.475	10.297	20.593

Footnotes:

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

PART 9 – FINAL CALCULATED LIMITS

Per s. NR 240.06(3) Wis. Adm. Code, the total discharge limits shall be the total of the amounts calculated from the BOD input in the final product subcategory and all of the other subcategories with intermediate products in Parts 6, 7 and 8 of this memo.

Subcategory	Monthly average BOD (lbs/day)	Daily maximum BOD (lbs/day)	Monthly average TSS (lbs/day)	Daily maximum TSS (lbs/day)
Natural and Processed Cheese	14.962	29.923	18.702	37.404
Condensed Whey	29.954	74.885	44.931	112.327
Dry Whey	8.237	16.475	10.297	20.593
Total	53.15	121.28	73.93	170.32

Final Calculated Effluent Limitations			
Parameter & Units	Daily Maximum	Daily Minimum	Monthly Average
BOD ₅	121.3 lbs/day		53.2 lbs/day
TSS	170.3 lbs/day		73.9 lbs/day
pH	9.0 su	6.0 su	

These limits are recommended to be included in the reissued permit along with any applicable WQBELs.



5/6/2022

Paul Bauer, CEO
232 N Wallace St
Ellsworth, WI 54011

Subject: Conditional approval of a multi-discharger phosphorus variance
Receiving Stream: Isabella Creek in Pierce County
Permittee: Ellsworth Cooperative Creamery, WPDES WI-0022942

Dear Mr. Bauer:

In accordance with s. 283.16 of the Wisconsin Statutes, you have requested coverage under Wisconsin's multi-discharger phosphorus variance for the Ellsworth Cooperative Creamery in an application dated 4/25/2022. Wisconsin's multi-discharger phosphorus variance was approved by EPA on February 6, 2017. Coverage under the multi-discharger phosphorus variance may only be granted to an existing source that demonstrates a major facility upgrade is necessary to achieve phosphorus compliance and the upgrade will result in economic hardship as defined in the federally approved variance. The water quality criterion for which you are seeking a variance is contained in s. NR 102.06, Wis. Adm. Code.

After review of the application materials, the Department is tentatively approving coverage under the phosphorus multi discharger variance because the applicant has demonstrated that a major facility upgrade would be required to comply with the phosphorus water quality based effluent limitation, and the applicant meets the economic hardship eligibility criteria delineated in the federally approved variance. In addition, the permitted facility has agreed to comply with the interim limitations that will be included in the WPDES permit, and has agreed to reduce the amount of phosphorus entering surface waters by making payments to the counties pursuant to s. 283.16(6)(b)1., Wis. Stats.

Public comment on this decision will be solicited at the time of permit reissuance after which a final decision will be made. The Department appreciates your attention and interest in Wisconsin's multi-discharger phosphorus variance. Should you have further questions regarding this matter, please contact me at (608) 400 - 5596.

Sincerely,

Matt Claucherty, MDV Point Source Coordinator
Bureau of Water Quality

e-cc Ethan Hofland, Ellsworth Cooperative Creamery
 Adebowale Adesanwo, DNR
 Holly Heldstab, DNR
 Tim Elkins, EPA Region 5
 Sydney Weiss, EPA Region 5
 Micah Bennett, EPA Region 5

Multi-Discharger Variance Application Evaluation Checklist

Form 3200-145 (R 5/16)

Page 1 of 4

Notice: This checklist is meant to be a tool to help Department of Natural Resources (DNR) staff review municipal and industrial multi-discharger variance (MDV) applications (Forms 3200-149 and 3200-150). Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31-19.39, Wis. Stats.).

Permittee Name

Ellsworth Cooperative Creamery

WPDES Permit Number

WI- 0 | 0 | 2 | 2 | 9 | 4 | 2

County

Pierce

1. Did the point source apply for the MDV at the appropriate time?	☒ Yes ☐ No. STOP- facility not eligible at this time.	See Questions 1-3.
2. This operation is (check one):	☐ New or relocated outfall. STOP- facility not eligible. ☒ Existing outfall	See Questions 5-6.
3. Is the point source is located in an MDV eligible area?	☒ Yes ☐ No. STOP- facility not eligible.	Apply County information to Appendix H. Additional information provided in Q7 on municipal form & Q7-8 on industrial form.
4. The secondary indicator score for the county (counties) the discharge is located is:	6	See Appendices A-F. If the score is less than 2, stop; the facility is not eligible. See Q23 on municipal form & Q28 on industrial form.
5. Is a major facility upgrade required to comply with phosphorus limits?	☒ Yes ☐ No. STOP- facility not eligible.	See Q8 on municipal form/Q9 on industrial form.
6. List the months where phosphorus limits cannot be achieved during the permit term:	☒ All ☒ Jan ☒ Apr ☒ Jul ☒ Oct ☒ Feb ☒ May ☒ Aug ☒ Nov ☒ Mar ☒ Jun ☒ Sep ☒ Dec	Consider checking with limit calculator. If this does not match information in application, the application should be updated prior to approval.

7. What is the current effluent level achievable?

Outfall Number(s)	Conc. (mg/L)	Method for calculation:	Does this concur with application?	DNR staff should verify the effluent concentration value(s) provided. See Q11 on municipal form & Q12 on industrial form.
001	3.11	☒ 30-day P99 ☐ Other, specify:	☐ Yes ☒ No, why not: application used smaller dataset	

8. What is the appropriate interim limitation(s) for the permit term?

0.6 mg/L as a monthly average, pursuant to s. 283.16(6)(a)2 Wis. Stats.

Target Value = 0.2 mg/L

A compliance schedule is likely not warranted. The interim limit may be revised to meet HAC next permit term.

Provide Rationale:

Using the past three years' total phosphorus effluent data, the 30-day P99 value is 3.11 mg/L. This value is high due to some facility upsets, and should not be used as a representative value for typical discharge concentrations.

Treatment has been demonstrated to achieve 0.6 mg/L on a regular basis.

Note: See description in Section 2.02 of the MDV implementation guidance. Interim limitations should reflect the "highest attainable condition" for the permittee in question pursuant to s. 283.16(7), Wis. Stat.

9. <i>For Industries Only-</i> Where does the phosphorus in the effluent come from? (check all that apply)	☒ Process ☒ Additive Usage ☐ Water supply <i>Can intake credits be given or can the facility use an alternative water supply?</i> ☐ Not feasible ☐ Possibly, but further analysis needed ☐ Not evaluated at this time	See Q14-15 & 19 on industrial form. If the answer is "possibly" or "not evaluated", the schedule section of the MDV permit should contain a requirement to perform this analysis.
10. Has this facility optimized?	☒ Yes ☐ In progress ☐ No	See Q14 on municipal form & Q16 & 20 on industrial form. Facility must optimize and operate at an optimize treatment level (s. 283.16(6)(a), Wis. Stat.) If no will need compliance schedule.
11. Has a facility plan/compliance alternative plan been completed for the facility?	☒ Yes ☐ In progress ☐ No	See Q15 on municipal form & Q17 on industrial form.
12. What is the projected cost for complying with phosphorus? Source:	\$ 2,500,000.00 Capital costs from 2017 final compliance alternatives plan	Facility must submit site-specific compliance costs. If cost projections are used from EIA, the permittee must certify that these costs are reasonable for the facility in question. See "projected compliance costs" in Section 2.02 of the MDV Implementation Guidance for details.

Comments on planning efforts:

The 2017 final compliance alternatives plan was reviewed, as much of the information in the plan is still relevant. The alternatives evaluation indicates that non-treatment alternatives are not viable, and this appears to be the case. Water quality trading was deemed a possibility in the final compliance alternatives plan, though recent conversations with representatives of the facility indicate that no trading partners have been found. The final compliance alternatives plan provides site-specific cost estimates for tertiary treatment technologies, which still, as of 2022, represent typical cost-effective means to achieve the low-level phosphorus WQBEL. Water quality trading should be explored in the coming permit term.

13. Are adaptive management and water quality trading viable?	☐ Yes ☒ Perhaps. Additional analysis required. ☐ No	See Q18-21 on municipal form & Q22-25 on industrial form. If additional analyses required, the applicant may need to complete this analysis during the MDV permit term.
14. Has the point source met the appropriate primary screener?	☒ Yes ☐ No. STOP- facility not eligible.	See Q4 of this form in addition to the "eligibility" guidance in Section 2.01 of the MDV Implementation Guidance.

Comments on economic demonstration:

Pierce County has a secondary indicator score of 6 for cheese manufacturing, which means that only one primary screening factor needs to be met. Pierce County was not shown to incur substantial impacts due to compliance costs at cheese manufacturers, so that screener is not met. Site-specific compliance costs, however, are greater than the \$1,510,000 threshold for substantial impacts to a given facility, which meets one primary screener.

15. What watershed option was selected?

- ☒ County project option. *Complete Section 5.*
- ☐ Binding, written agreement with the DNR to construct a project or implement a watershed plan. *Complete Section 4.*
- ☐ Binding, written agreement with another person that is approved by the DNR to construct a project or implement a watershed plan. *Complete Section 4.*

Section 4. Watershed Plan Review

16. MDV Plan Number:

Note: This is for tracking purposes. Contact Statewide Phosphorus Implementation Coordinator for the plan number.

17. Did the point source complete Form 3200-148?

- ☐ Yes
- ☐ No

18. Is the project area in the same HUC 8 watershed as the point of discharge?

- ☐ Yes
- ☐ No. *STOP- Watershed plan must be updated.*

19. What is the annual offset required?

See Section 2.03 of the MDV implementation guidance. If this value is different from the offset target provided in form 3200-148, the watershed plan should be amended.

20. Does the plan ensure that the annual load is offset annually?

- ☐ Yes
- ☐ No. *STOP- Watershed plan must be updated.*

21. Are projects occurring on land owned/operated by a CAFO or within a permitted MS4 boundary?

- ☐ Yes. *Work with appropriate DNR staff to ensure projects are not working towards other permit compliance.*
- ☐ No.

22. Are other funding sources being used as part of the MDV watershed project?

- ☐ Yes. *Work with appropriate DNR staff to ensure that funding sources can be appropriately used in the plan area.*
- ☐ No.

23. Do you have any concerns about the watershed project?

Note: Coordinate with other DNR staff as appropriate.

- ☐ Yes. *STOP- Watershed plan must be updated.*
- ☐ No.

Comments:

Section 5. Payment to the County(ies)

24. At this time, the appropriate per pound payment is:

\$ 58.85

See "Payment Calculator" document at

[\\central\\water\\WQWT_PROJECTS\\WY_CW_Phosphorus\\MDV.](#)

Section 6. Determination

Based on the available information, the MDV application is:

- ☒ Approved
- ☐ Request for more information
- ☐ Denied

Additional Justification (if needed):

Certification

Preparer Name

Title

Matt Claucherty

Water Resources Management Specialist

Signature of Preparer

Sign

Clear

Date

Matthew Claucherty

5/6/2022

A copy of this completed checklist should be saved in SWAMP, and a notification of the decision should be sent to the Phosphorus Implementation Coordinator.

[Submit to
Coordinator...](#)[Save](#)