

# Permit Fact Sheet

## General Information

Permit Number:	WI-0039039-10-0
Permittee Name:	BURNETT DAIRY COOPERATIVE
Address:	11631 State Hwy 70
City/State/Zip:	Grantsburg WI 54840
Discharge Location:	Discharge locations are found in Section 22: NE¼ NW¼ and SW¼ NW¼ , T38N-R18W
Receiving Water:	Wood River (WBIC 2642900) and the groundwater of the St. Croix River basin and the Wood River in the Wood River Watershed within the St. Croix River Basin, Burnett County
StreamFlow (Q <sub>7,10</sub> ):	The Wood River has a low flow of 14 cfs.
Stream Classification:	The Wood River is a warm water sport community and non-public water supply
Wild Rice Impacts: <i>(no specific wild rice standards exist at this time)</i>	No impacts identified. No wild rice has been inventoried on the Wood River. Wood Lake downstream has a report of wild rice on the south end. The conclusion of no impact is based on the long existence of the permit (over 50 years). (Evaluation completed March 2017)
Discharge Type:	Noncontinuous – Surface water and ridge and furrow. Seasonal – Spray irrigation fields.

## Facility Description

Burnett Dairy manufactures approximately 100,000 lbs. of cheese per day and condensed whey. The facility manufactures condensed whey using ultra filtration, reverse osmosis and polishing processes. The process wastewater is composed of two waste streams "Reclaim Water" and High Strength (HS) Wash Water.

20,000 gal/day of reclaim water is discharged to the 3.6 acre Ridge and Furrow system (**Outfall 003**). A ridge and furrow system is a series of interconnected ditches (furrows) which allows distribution, infiltration, and treatment of wastewater. Ridges between the ditches support a cover crop which takes up nutrients and water and protects the ditches during the winter. The water not used by the cover crop is further treated as it percolates through the soil eventually reaching groundwater.

Approximately 24,000 gal/day of reclaim water and HS wash water is land spread on DNR approved sites (**Outfall 007**).

A mixture of process wastewater that is not irrigated, cooling tower blowdown water and boiler blowdown water is treated by aerated ponds followed by a Dissolved Air Flootation (DAF) system where it mixes with activated sludge, ferric chloride and a flocculant (polymer). Solids are floated to the DAF system surface and removed via skimmer which can be directed to either a storage vessel or returned to the head of the treatment pond as activated sludge. The treated wastewater (effluent) is discharged to the Wood River (**Outfall 006**).

Stored sludge is removed and land spread on DNR approved fields (**Outfall 010**) as fertilizer.

Wastewater from the aerated ponds can be diverted and stored in the holding lagoon until it is irrigated in one of two irrigation fields **Outfall 004**-19.2 acres or **Outfall 005**-11 acres. Both systems are planted with cover crops that take up nutrients and water.

There are six active monitoring wells surrounding the ridge and furrow system and spray irrigation fields to assess any groundwater impacts of the discharges. The well identified as MW-10 is upgradient and considered the background well.

All sanitary wastes are discharged to a septic tank and mound system.

## Substantial Compliance Determination

**Enforcement During Last Permit:** There have been some minor violations of effluent limits, missed samples and late reporting. However, the facility has taken the necessary steps to correct their actions and nothing further is required at this time. All other conditions are being met. The facility has met all of the previously required actions as part of the enforcement process.

After a desk top review of all discharge monitoring reports, land application reports, compliance schedule items, and a site visit on 10/3/2023, by Eric de Venecia, WDNR, the Burnett Dairy Cooperative has been found to be in substantial compliance with their current permit.

**Compliance determination entered by Eric de Venecia on October 13, 2023.**

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/sample Contents and Treatment Description (as applicable)
003	<b>Ridge &amp; Furrow</b> An average of 0.0131 MGD (2019 – 2023 data)	Discharge from Outfall 003 shall be limited to reclaimed water resulting from process water treatment. Representative samples shall be collected prior to discharging to the ridge and furrow site located in the NW1/4, NW1/4, Section 22, T38N - R18W, Burnett County. The total size of the land treatment system is 3.6 acres.
004	<b>Spray Irrigation</b> An average of 73,698 gallons per day during periods of discharge (34 days) of the spray season. (2019 – 2023 data)	Discharge from Outfall 004 shall be limited to pretreated process wastewater. Representative samples shall be collected prior to discharging to the spray irrigation site located in the S1/2, NW1/4, NW1/4 and the N1/2, SW1/4, NW1/4 of Section 22, T38N-R18W, Burnett County. The total size of the land treatment site is 19.2 acres. Spray irrigation is authorized from May 1 to November 30 annually.
005	<b>Spray Irrigation</b> An average of 45,567 gallons per day during periods of discharge (16 days) of the spray season. (2019 – 2023)	Discharge from Outfall 005 shall be limited to pretreated process wastewater. Representative samples shall be collected prior to discharging to the spray irrigation site located in the SE1/4, NW1/4, Section 22, T38N-R18W, Burnett County. The total size of the land treatment site is 11 acres. Spray irrigation is authorized from May 1 to November 30 annually.
006	<b>Surface Water</b> An average of 0.1404 MGD (2019 – 2023)	Discharge from outfall 006 shall be limited to treated process wastewater. Representative samples shall be collected prior to discharge to the Wood River in Burnett County.
007	<b>Land Application – Whey/High Strength</b> An average of 109.3 tons will be land applied 160 days per year. (Estimate from application)	Discharge from Outfall 007 shall be limited to land spreading of whey permeate and/or high strength wash water on Department approved sites.
010	<b>Land Application - Sludge</b> An average of 18,076 gallons per year.	Discharge from Outfall 010 shall be limited to land spreading of sludge from the Dissolved Air Flotation (DAF) separator and

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)
	(Estimate from application)	sludge storage on Department approved sites.

### Changes from Previous Permit:

**Outfall 011** that monitored the salt brine waste stream has been removed this permit term. Brine was approved for beneficial reuse as road deicer agent by local units of government. It was regulated as an industrial liquid waste and received a conditional low hazard solid waste exemption (s. NR 500-538, Wis. Adm. Code and s. 289, Stats). Modifications to the facility have significantly reduced waste salt brine to the point there isn't a large enough volume to transfer for use as a road deicer. If the permittee wishes to reactivate the outfall they must apply for an extension of their low hazard solid waste exemption.

Sample Point Designation For Groundwater Monitoring Systems	
Sample Pt Number & Well Name	Comments
810 (MW-10)	Upgradient well – Used in PAL calculation
811 (MW-4R)	Down gradient well
813 (MW-11)	Down gradient Point of standard well
814 (MW-3R)	Down gradient Point of standard well
815 (MW-2R)	Down gradient well
816 (MW-1R)	Down gradient well

### Changes from Previous Permit:

**Well 812 (MW-7R)** identified as a side-gradient monitoring well for the ridge and furrow system is located close to the facility's sanitary drain fields. The sanitary system is not regulated under this wastewater industrial permit and the well is being influenced by both systems. The information provided by the well is no longer representative of the industrial treatment system and monitoring is not required. The well will need to be abandoned or inspected annually. See the "Groundwater Monitoring Well – Abandonment or Annual Inspection" schedule.

## 1 Surface Water - Monitoring and Limitations

### Sample Point Number: 006- SURFACE WATER DISCHARGE

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	2/Month	24-Hr Comp	
BOD5, Total	Daily Max	29 lbs/day	2/Month	Calculated	

<b>Monitoring Requirements and Limitations</b>					
<b>Parameter</b>	<b>Limit Type</b>	<b>Limit and Units</b>	<b>Sample Frequency</b>	<b>Sample Type</b>	<b>Notes</b>
BOD5, Total	Monthly Avg	14 lbs/day	2/Month	Calculated	
Suspended Solids, Total		mg/L	2/Month	24-Hr Comp	
Suspended Solids, Total	Daily Max	36 lbs/day	2/Month	Calculated	
Suspended Solids, Total	Monthly Avg	18 lbs/day	2/Month	Calculated	
pH Field	Daily Max	9.0 su	2/Month	24-Hr Comp	
pH Field	Daily Min	6.0 su	2/Month	24-Hr Comp	
Chlorine, Total Residual	Daily Max	38 ug/L	5/Week	Grab	
Phosphorus, Total	Rolling 12 Month Avg	1.0 mg/L	2/Month	24-Hr Comp	
Phosphorus, Total	Monthly Avg	4.0 lbs/day	2/Month	Calculated	See the "Total Maximum Daily Load (TMDL) Limitations" subsection of the permit for more information.
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of phosphorus and report on the last day of the month on the DMR. See the "Total Maximum Daily Load (TMDL) Limitations" subsection of the permit.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of phosphorus discharged. See the "Total Maximum Daily Load (TMDL) Limitations" subsection of the permit for more information.
Nitrogen, Ammonia (NH3-N) Total	Daily Max	55 mg/L	2/Month	24-Hr Comp	
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	55 mg/L	2/Month	24-Hr Comp	
Chloride		mg/L	2/Month	24-Hr Comp	Monitoring is required

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					during 2025.
Copper, Total Recoverable	Daily Max	45 ug/L	Monthly	24-Hr Comp	
Copper, Total Recoverable	Daily Max	0.082 lbs/day	Monthly	Calculated	
Hardness, Total as CaCO <sub>3</sub>		mg/L	Quarterly	24-Hr Comp	
Nitrogen, Total Kjeldahl		mg/L	Quarterly	24-Hr Comp	
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hr Comp	
Nitrogen, Total		mg/L	Quarterly	Calculated	Total Nitrogen = Total Nitrogen Kjeldahl (mg/L) + Nitrite +Nitrate Nitrogen (mg/L).
Acute WET	Daily Max	1.0 TUa	See Listed Qtr(s)	24-Hr Comp	See the "Whole Effluent Toxicity (WET) Testing" subsection of the permit for testing schedule.
Chronic WET	Monthly Avg	13 TUc	See Listed Qtr(s)	24-Hr Comp	See the "Whole Effluent Toxicity (WET) Testing" subsection below or in the permit for testing schedule.

## Changes from Previous Permit

Effluent limitations and monitoring requirements were re-evaluated for the proposed permit term and the following changes were made from the previous permit.

- More restrictive **BOD5** and **Total Suspended Solids** technology based effluent limits for daily maximum and monthly average mass limits have been added.
- **Chlorine** monitoring and a daily maximum limit have been added.
- **Copper** daily maximum concentration and mass limits and **Hardness** monitoring have been added.
- Quarterly monitoring for the **Nitrogen Series** (nitrate +nitrite, total Kjeldahl nitrogen and total nitrogen) has been added.
- Annual **Acute** and **Chronic WET testing** are required in rotating quarters, and both now have limits attached to them.

## Explanation of Limits and Monitoring Requirements

More information on categorical and water quality-based limits (WQBEL) are found in the “Water Quality-Based Effluent Limitations for the Burnett Dairy Cooperative (WI-0039039-10-0)” memo dated December 12, 2023 and the “Technology-Based Effluent Limitations for Burnett Dairy Cooperative WPDES Permit No. WI-0039039-10-0” dated December 22, 2023.

**BOD5** – More restrictive technology-based effluent limits (TBELs) based on ch. NR 240, Wis. Adm. Code replace the limits found in the previous permit issuances. Based on federal guidelines in 40 CFR, if the calculated water quality based limits are less restrictive than the applicable TBEL; therefore, the permittee must meet the more restrictive TBEL. The daily maximum limit of 57 lbs/day has been reduced to 29 lb/day and the monthly average limit of 23 lbs/day is now 14 lbs/day.

**Total Suspended Solid** – More restrictive technology-based effluent limits (TBELs) based on ch. NR 240, Wis. Adm. Code replace the limits found in the previous permit issuances. The daily maximum limit of 85 lbs/day has been reduced to 36 lb/day and the monthly average limit of 34 lbs/day is now 18 lbs/day.

**pH** – These are technology-based effluent limits (TBELs) based on ch. NR 240, Wis. Adm. Code.

**Chlorine** - The mean effluent concentration is 60 µg/L. This concentration exceeds the daily maximum limit of 38 µg/L and 1/5<sup>th</sup> of the weekly average limit of 19.1 µg/L, so both limits are applicable. Because the daily maximum limit more stringent, the weekly average is not required this permit term.

**Phosphorus** – Phosphorus requirements are based on the Phosphorus Rules as detailed in NR 102 (water quality standards) and NR 217, Wis. Adm. Code (effluent standards and limitations for phosphorus). Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters. Currently in NR 217 Wis. Adm. Code there are three types of limit calculations used to determine if a phosphorus limit is needed: a technology based effluent limit (TBEL), a water quality-based effluent limit (WQBEL) determined by stream criteria and a WQBEL based on a Total Daily Maximum Daily Load (TMDL) allocation.

In the case of Burnett Dairy Cooperative:

- A TBEL of 1.0 mg/L 12-month rolling average limit is needed if a facility discharges more than the threshold of 60 pounds per month (NR 217 Wis. Adm. Code). In the previous permit term, the facility had a 1 mg/L 12-month rolling average limit. This limit will remain applicable until a more restrictive phosphorus WQBEL is given.
- Based on the size and classification of the stream, the categorical water quality criterion for the Wood River is 75 ug/L. This criterion and instream background phosphorus data are used to calculate the stream criteria-based WQBEL. The calculated WQBEL is 2.3 mg/L as a monthly average. The TBEL is more restrictive, therefore the WQBEL will not be included this permit term.
- The facility lies within the boundaries of the Lake St. Croix Basin total maximum daily load (TMDL) area. The TMDL was developed to address phosphorus water quality impairments. The Lake St. Croix Basin TMDL for total phosphorus was approved by the U.S. Environmental Protection Agency on August 8, 2012. More information about the TMDL can be found at <https://dnr.wisconsin.gov/topic/TMDLs/TMDLReports.html> Based on current criteria, the approved TMDL Waste Load Allocation (WLA) for Total Phosphorus is 760 lbs per year (345 kg/year), which equates to 4 lbs/day monthly average.

Calculation and reporting of the total mass of phosphorus discharged over the past 12 months is required to track progress in meeting the overall TMDL requirements. The 12-month rolling sum equals the sum of the most recent 12 consecutive months of total monthly discharges. This value should be reported on the eDMR on the last day of each month.

Calculations needed to determine compliance with the wasteload allocation are:

- **Total Monthly Discharge (lbs/month)** = monthly average concentration (mg/L) x total flow for the month (MG/month) x 8.34.
- **12-Month Rolling Sum of Total Monthly Discharge (lbs/year)** = the sum of the most recent 12 consecutive months of total monthly discharges. This value should be reported on the eDMR on the last day of each month.

**Ammonia** - Using current acute and chronic ammonia toxicity criteria found in Tables 2C and 4B of NR 105 Wis. Adm. Code and limit calculating procedures (Subchapter IV of 106, Wis. Adm. Code. Ammonia limitations were calculated for the facility. Based on effluent data there is not a reasonable potential for the calculated daily maximum, weekly average or monthly average limits to be exceeded. The permit currently has daily maximum and monthly average limits of 55 mg/L. Consistent with s. NR 106.33(1)(b), Wis. Adm. Code, where there are existing ammonia limits in the permit, the limits must be retained regardless of reasonable potential.

**Chloride** - A chloride effluent limit is not required this permit term. The calculated daily maximum limit (based on Acute Toxicity Criteria (ATC)) is 1,514 mg/L and the weekly average limit (based on Chronic Toxicity Criteria (CTC)) is 5,123 mg/L, for this receiving water, based on NR 106 Wis. Adm Code. These values are greater than the 1-day and 4-day effluent P99 values (1,001 and 746 mg/L respectively). Since the effluent statistical chloride concentrations is/are less than the limits necessary to protect water quality, a limit is not required; however monitoring is required during the 2025 calendar year in order to continue tracking concentrations.

**Copper** - The calculated daily maximum limit (based on Acute Toxicity Criteria (ATC)) is 44.8 µg/L and the weekly average limit (based on Chronic Toxicity Criteria (CTC)) is 143 µg/L, for this receiving water, based on NR 106 Wis. Adm Code. These values were compared to the effluent 1-day and 4-day effluent P99 values (63 and 42 µg/L respectively). The effluent statistical copper concentration for a daily maximum limit is greater than the limit necessary to protect water quality, therefore a limit is required. A daily maximum concentration limit of 45 µg/L and a mass limit of 0.082 lbs/day are applicable this permit term.

**Hardness** - Quarterly hardness monitoring has been included in the permit because of the relationship between hardness and daily maximum limits.

**Nitrogen Series** - (nitrate +nitrite, total Kjeldahl nitrogen and total nitrogen) – In 2011, the Upper Mississippi River Basin Association (UMRBA) completed the report “Upper Mississippi River Nutrient Monitoring, Occurrence, and Local Impacts: A Clean Water Act Perspective”. Among the many recommendations of this report was that the states should expand their NPDES discharge monitoring requirements to include both phosphorus and nitrogen as they have important impacts on the mainstem upper Mississippi River as well as in the Gulf of Mexico. Consequently, the department developed the “Guidance for Total Nitrogen Monitoring in WPDES Permits” document dated October 2019, where quarterly effluent monitoring for total nitrogen (total nitrogen = total Kjeldahl + (nitrite+nitrate)) is required for major municipal and industrial facilities discharging to surface waters. Section 283.55(1)(e) Wis. Stats. allows the department to require the permittee to submit information necessary to identify the type and quantity of any pollutants discharged from the point source, and s. NR 200.065 (1)(h) Wis. Adm. Code allows for this monitoring to be collected during the permit term.

**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>).

Based on historical WET test data and reasonable potential factor (RPF) calculations WET tests and limits are required this permit term. An Acute WET limit of 1.0 TU<sub>a</sub> and a Chronic WET limit of 13 TU<sub>c</sub> are applicable this permit term. A WET Checklist was prepared to determine the number of WET tests that are needed. As toxicity potential increases, more points accumulate, and more monitoring is required to assure toxicity is not occurring over the short (acute) and long (chronic) term. Based on the total points accumulated and Chapter 1.3 of the WET Guidance Document annual WET Tests are required this permit term during the following quarters:

**Additives** – At the time of the issuance of this permit there are eight additives used by the facility to assist production or waste treatment. Two of the additives, Hydribio 1967 and Hydricare 3144 were reviewed. The maximum requested dosage rates (4 lbs/day and 0.5 gal/day respectively) are lower than the calculated use restriction. The additives are approved at the requested maximum dose.

The maximum additive use for Bromicide Tablets is restricted by the total chlorine limit. The use of Hydriclear 1006 (ferric chloride) was included in the evaluation of phosphorus treatment.

The remaining additives (Hydricare 3121, Hydricare 3248HW, Hydricare 3150, and Hydrifloc 9880) are not expected to be present in the effluent discharge, therefore, don't need an additive review.

The permittee shall maintain a record of the dosage rate of all additives used on a monthly basis. The additives may be changed during the permit term following the procedures in the 'Additives' subsection of the Standard Requirements in the permit.

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

**Sampling Frequencies** - The "[Monitoring Frequencies for Individual Wastewater Permits](#)" guidance document (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. Permitted monitoring frequencies fall below the standard monitoring frequencies outlined in the guidance document. Section NR 205.066(1) Wis. Adm. Code allows sampling frequency to be set on a case-by-case basis. The permittee demonstrates a history of consistent compliance with existing permit limits. Data submitted during the previous permit term continues to show consistent compliance with permit limitations, and the set monitoring frequencies are consistent with requirements of state code. The current monitoring frequencies shall continue this permit term. If performance levels begin to vary during the permitted term, the department may re-evaluate current sampling frequencies and implement more frequent monitoring via permit modification or at permit reissuance.

## 2 Land Treatment – Monitoring and Limitations

### Sample Point Number: 003- RIDGE AND FURROW

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate	Quarterly Avg	0.023 MGD	Daily	Total Daily	
BOD5, Total		mg/L	Monthly	Grab	
Nitrogen, Total Kjeldahl		mg/L	Monthly	Grab	
Chloride		mg/L	Monthly	Grab	
Nitrogen, Total		mg/L	Monthly	Grab	
Nitrogen, Max Applied On Any Zone		lbs/ac/yr	Annual	Total Annual	

### Changes from Previous Permit:

Effluent limitations and monitoring requirements were re-evaluated for the proposed permit term and the following changes were made from the previous permit.



**Total nitrogen** and the **maximum nitrogen applied on any zone** have been added to the permit to be consistent with other land treatment facilities.

## Explanation of Limits and Monitoring Requirements

All requirements for land treatment of industrial wastewater are determined in accordance with NR 214 Wis. Adm. Code. All categorical limits are based on NR 214.12(15) Wis. Adm. Code. More information on the limitations can be found in the “Burnett Dairy Cooperative – Land Treatment System Evaluation Report, WPDES Permit # WI-0039039” memo dated October 20, 2023.

**Sampling Frequencies** - The “[Monitoring Frequencies for Individual Wastewater Permits](#)” guidance document (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. The department has determined at this time that the facility meets the guidance and no changes in the monitoring frequency is required this permit term.

### Sample Point Number: 004- SPRAY IRRIGATION - SITE 1

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate	Monthly Avg - LT	89,000 gpd	Daily	Total Daily	The limit is in effect May through November annually.
Flow Rate	Monthly Avg - LT	0 gpd	Daily	Total Daily	The limit is in effect December through April annually.
BOD5, Total		mg/L	2/Month	Grab	
Nitrogen, Total Kjeldahl		mg/L	2/Month	Grab	
Chloride		mg/L	2/Month	Grab	
Nitrogen, Total		mg/L	2/Month	Grab	
Nitrogen, Max Applied On Any Zone	Annual Total	165 lbs/ac/yr	Annual	Total Annual	
Chloride		lbs/ac/yr	Annual	Total Annual	Record the maximum amount applied to any zone during the year.

### Changes from Previous Permit:

Effluent limitations and monitoring requirements were re-evaluated for the proposed permit term and the following changes were made from the previous permit.

- A limit of zero has been added to **Flow Rate** for the non-growing season.

- **BOD<sub>5</sub>, Total Nitrogen, Maximum nitrogen applied on any zone and the maximum chloride applied on any zone** have been added to the permit to be consistent with other land treatment facilities.

## Explanation of Limits and Monitoring Requirements

All requirements for land treatment of industrial wastewater are determined in accordance with NR 214 Wis. Adm. Code. All categorical limits are based on NR 214.12(13) Wis. Adm. Code. More information on the limitations can be found in the “Burnett Dairy Cooperative – Land Treatment System Evaluation Report, WPDES Permit # WI-0039039” memo dated October 20, 2023.

**Spray season** – During previous permit terms the spray irrigation season included the months of May 1<sup>st</sup> through October 31<sup>st</sup>. An additional month has been added to the spray season and is now May 1<sup>st</sup> through November 30<sup>th</sup>. The date has been extended to account for favorable weather conditions and unfrozen ground into late fall.

**Flow Limit** – The facility has a flow rate of 89,000 gpd during growing season (May – November). To provide an accurate picture of the loading to the field, days without a discharge need to be recorded as well. A limit of zero has been added during the months of December through April. This limit signifies that discharges are not allowed during the non-growing season. All dates with a no flow must be recorded on the Discharge Monitoring Forms (DMR).

**Sampling Frequencies** - The “[Monitoring Frequencies for Individual Wastewater Permits](#)” guidance document (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. The department has determined at this time that the facility meets the guidance and no changes in the monitoring frequency is required this permit term.

## Sample Point Number: 005- SPRAY IRRIGATION - SITE 2

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate	Monthly Avg - LT	51,000 gpd	Daily	Total Daily	The limit is in effect May through November annually.
Flow Rate	Monthly Avg - LT	0 gpd	Daily	Total Daily	The limit is in effect December through April annually.
BOD <sub>5</sub> , Total		mg/L	2/Month	Grab	
Nitrogen, Total Kjeldahl		mg/L	2/Month	Grab	
Chloride		mg/L	2/Month	Grab	
Nitrogen, Total		mg/L	2/Month	Grab	
Nitrogen, Max Applied On Any Zone	Annual Total	165 lbs/ac/yr	Annual	Total Annual	
Chloride		lbs/ac/yr	Annual	Total Annual	Record the maximum amount applied to any zone

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					during the year.

## Changes from Previous Permit:

Effluent limitations and monitoring requirements were re-evaluated for the proposed permit term and the following changes were made from the previous permit.

- A limit of zero has been added to **Flow Rate** for the non-growing season.
- **BOD<sub>5</sub>, Total Nitrogen, Maximum nitrogen applied on any zone** and the **maximum chloride applied on any zone** have been added to the permit to be consistent with other land treatment facilities.

## Explanation of Limits and Monitoring Requirements

All requirements for land treatment of industrial wastewater are determined in accordance with NR 214 Wis. Adm. Code. All categorical limits are based on NR 214.12(13) Wis. Adm. Code. More information on the limitations can be found in the “Burnett Dairy Cooperative – Land Treatment System Evaluation Report, WPDES Permit # WI-0039039” memo dated October 20, 2023.

**Spray season** – During previous permit terms the spray irrigation season included the months of May 1<sup>st</sup> through October 31<sup>st</sup>. An additional month has been added to the spray season and is now May 1<sup>st</sup> through November 30<sup>th</sup>. The date has been extended to account for favorable weather conditions and unfrozen ground into late fall.

**Flow Limit** – The facility has a flow rate of 51,000 gpd during growing season (May – November). To provide an accurate picture of the loading to the field, days without a discharge need to be recorded as well. A limit of zero has been added during the months of December through April. This limit signifies that discharges are not allowed during the non-growing season. All dates with a no flow must be recorded on the Discharge Monitoring Forms (DMR).

**Sampling Frequencies** - The “[Monitoring Frequencies for Individual Wastewater Permits](#)” guidance document (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. The department has determined at this time that the facility meets the guidance and no changes in the monitoring frequency is required this permit term.

## 3 Groundwater – Monitoring and Limitations

### 3.1 Groundwater Monitoring System for Ridge and Furrow & Spray Irrigation Sites

**Location of Monitoring system:** The system wells surround the perimeters of the land treatment system.

**Wells to be Monitored:** 810 (MW-10), 811 (MW-4R), 813 (MW-11), 814 (MW-3R), 815 (MW-2R), 816 (MW-1R)

**Well Used To Calculate PALs:** 810 (MW-10)

**Point of Standards Application Well(s):** 814 (MW-3R), 813 (MW-11),

Parameter	Units	Preventative Action Limit	Enforcement Standard	Frequency
Depth To Groundwater	feet	*****	N/A	Quarterly
Groundwater Elevation	feet MSL	*****	N/A	Quarterly
Nitrogen, Nitrite + Nitrate (as N) Dissolved	mg/L	3.6	10	Quarterly
Chloride Dissolved	mg/L	125	250	Quarterly
pH Field	su	7.3	N/A	Quarterly
Nitrogen, Organic Dissolved	mg/L	2.8	N/A	Quarterly
Nitrogen, Total Kjeldahl Dissolved	mg/L	*****	N/A	Quarterly
Nitrogen, Ammonia Dissolved	mg/L	0.97	9.7	Quarterly
Solids, Total Dissolved	mg/L	320	N/A	Quarterly
COD, Filtered	mg/L	35	N/A	Quarterly

### Changes from Previous Permit:

Effluent limitations and monitoring requirements were re-evaluated for the proposed permit term and the following changes were made from the previous permit.

- The information provided by monitoring for the parameters **Alkalinity**, **Iron** and **Manganese** is no longer needed and were removed from the permit.
- Preventative Action Limits (PAL) were re-evaluated and adjusted for **Nitrite + Nitrate**, **Organic Nitrogen**, **Total Dissolved Solids** and **filtered COD**.

### Explanation of Limits and Monitoring Requirements

Groundwater limits and requirements are determined in accordance with ch NR 140 Wis. Adm. Code. Indicator parameter Preventative Action Limit (PAL) values are established per ch NR 140.20 Wis. Adm. Code. For more information, please refer to the “Burnett Dairy Cooperative – Land Treatment System Evaluation Report, WPDES Permit # WI-0039039” memo dated October 20, 2023.

The PALs and Enforcement Standard (ES) limits will remain the same except for four parameters, **Nitrite + Nitrate**, **Organic Nitrogen**, **Total Dissolved Solids** and **filtered COD**.

#### Changes to Permit Issuance - 10

Parameter	Permit Issuance - 09		Permit Issuance - 10	
	Preventive Action Limit	Enforcement Standard	Preventive Action Limit	Enforcement Standard
Nitrogen, Nitrite + Nitrate (as N) Dissolved	2.0 mg/L	10 mg/L	3.6 mg/L	10 mg/L
Nitrogen, Organic Dissolved	7.3 mg/L	N/A	2.8 mg/L	N/A
Solids, Total Dissolved	287 mg/L	N/A	320 mg/L	N/A

COD, Filtered	42 mg/L	N/A	35 mg/L	N/A
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ACL - An exemption (Alternate Concentration Limit (ACL)) to the published standard has been granted in accordance with ch NR 140.28 for Nitrite+Nitrate (3.6 mg/L PAL).

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

##### Sample Point Number: 007- LANDSPREAD LIQ WASTE/PERMEATE

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Hydraulic Application Rate	Annual Total	27,000 gal/acre	Annual	Total Annual	
Flow Rate		gpd	Daily	Total Daily	
Nitrogen, Total Kjeldahl		mg/L	Monthly	Grab	
Chloride		mg/L	Monthly	Grab	
Phosphorus, Total		mg/L	Monthly	Grab	
Phosphorus, Water Extractable		% of tot P	Annual	Grab	
Potassium, Total Recoverable		mg/L	Monthly	Grab	

#### Changes from Previous Permit:

Effluent limitations and monitoring requirements were re-evaluated for the proposed permit term and the following changes were made from the previous permit.

**Water Extractable Phosphorus** has been added this permit term to be consistent with other land application facilities.

#### Explanation of Limits and Monitoring Requirements

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

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

## Sample Point Number: 010- SLUDGE

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Hydraulic Application Rate		gal/acre	Annual	Total Annual	
Flow Rate		gpd	Daily	Total Daily	
pH Field		su	Annual	Grab	
Nitrogen, Total Kjeldahl		mg/L	Monthly	Grab	
Chloride		mg/L	Monthly	Grab	
Nitrogen, Ammonium (NH4-N) Total		mg/L	Annual	Grab	
Phosphorus, Total		mg/L	Annual	Grab	
Phosphorus, Water Extractable		% of tot P	Annual	Grab	
Potassium, Total Recoverable		mg/L	Annual	Grab	

### Changes from Previous Permit:

Effluent limitations and monitoring requirements were re-evaluated for the proposed permit term and the following changes were made from the previous permit.

**Water Extractable Phosphorus** has been added this permit term to be consistent with other land application facilities.

### Explanation of Limits and Monitoring Requirements

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

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

## 5 Schedules

### 5.1 Land Treatment Management Plan

A management plan is required for the land treatment system.

Required Action	Due Date
Land Treatment Management Plan: Submit an update to the management plan to optimize the land treatment system performance and demonstrate compliance with Wisconsin Administrative Code NR 214.	07/01/2024

### 5.2 Land Treatment Annual Report

Required Action	Due Date
<b>Submit Annual Land Treatment Report #1:</b> Submit the Annual Land Treatment Report by January 31st for the previous calendar year.	01/31/2025
<b>Submit Annual Land Treatment Report #2:</b> Submit the Annual Land Treatment Report by January 31st for the previous calendar year.	01/31/2026
<b>Submit Annual Land Treatment Report #3:</b> Submit the Annual Land Treatment Report by January 31st for the previous calendar year.	01/31/2027
<b>Submit Annual Land Treatment Report #4:</b> Submit the Annual Land Treatment Report by January 31st for the previous calendar year.	01/31/2028
<b>Submit Annual Land Treatment Report #5:</b> Submit the Annual Land Treatment Report by January 31st for the previous calendar year.	01/31/2029
<b>Land Treatment Annual Report:</b> In the event that this permit is not reissued prior to the expiration date, the permittee shall continue to submit an Annual Land Treatment Report by January 31st for the previous calendar year.	

### 5.3 Groundwater Monitoring Well - Abandonment or Annual Inspection

Required Action	Due Date
Abandonment or Inspection: Complete abandonment of monitoring well 812 (MW-7R) or commence annual monitoring. If abandonment is chosen, the well shall be abandoned in accordance with s. NR 141.25, Wisconsin Administrative Code. (Note: Documentation of well abandonment must be submitted to the Department within 60 days of well abandonment.) the schedule will cease after abandonment.  If monitoring is chosen, the permittee shall annually inspect the monitoring well and repair or maintain as needed. Permittee shall submit documentation of the inspection to the Department by December 31 of each year.	12/31/2024
Abandonment or Inspection Report: Complete abandonment or submit annual inspection report.	12/31/2025
Abandonment or Inspection Report: Complete abandonment or submit annual inspection report.	12/31/2026
Abandonment or Inspection Report: Complete abandonment or submit annual inspection report.	12/31/2027
Abandonment or Inspection Report: Complete abandonment or submit annual inspection report.	12/31/2028

Abandonment or Inspection Report: In the event that this permit is not reissued prior to the expiration date, the permittee shall continue to determine if the well shall be abandoned or complete an annual inspection by December 31 each year.	
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## Explanation of Schedules

**Land Treatment Management Plan** A management plan is a required to update the plan that will outline changes to the land treatment system that will further optimize the efficiencies of the system.

**Land Treatment Annual Report** - Annual reports are a standard requirement that summarizes the use of the Land Treatment system.

**Groundwater Monitoring Well - Abandonment or Annual Inspection** – Well 812 no longer provides data that assists in determining groundwater quality. The well should be abandoned or an annual inspection is required.

## Attachments:

Water Flow Schematic updated Jan. 2024

“Water Quality-Based Effluent Limitations for the Burnett Dairy Cooperative (WI-0039039-10-0)” memo dated December 12, 2023

“Technology-Based Effluent Limitations for Burnett Dairy Cooperative WPDES Permit No. WI-0039039-10-0” dated December 22, 2023

“Burnett Dairy Cooperative – Land Treatment System Evaluation Report, WPDES Permit # WI-0039039” memo dated October 20, 2023

## Expiration Date:

March 31, 2029

## Justification Of Any Waivers From Permit Application Requirements

N/A

**Prepared By:** Sheri Snowbank      **Wastewater Specialist**

**Date:** January 4, 2024

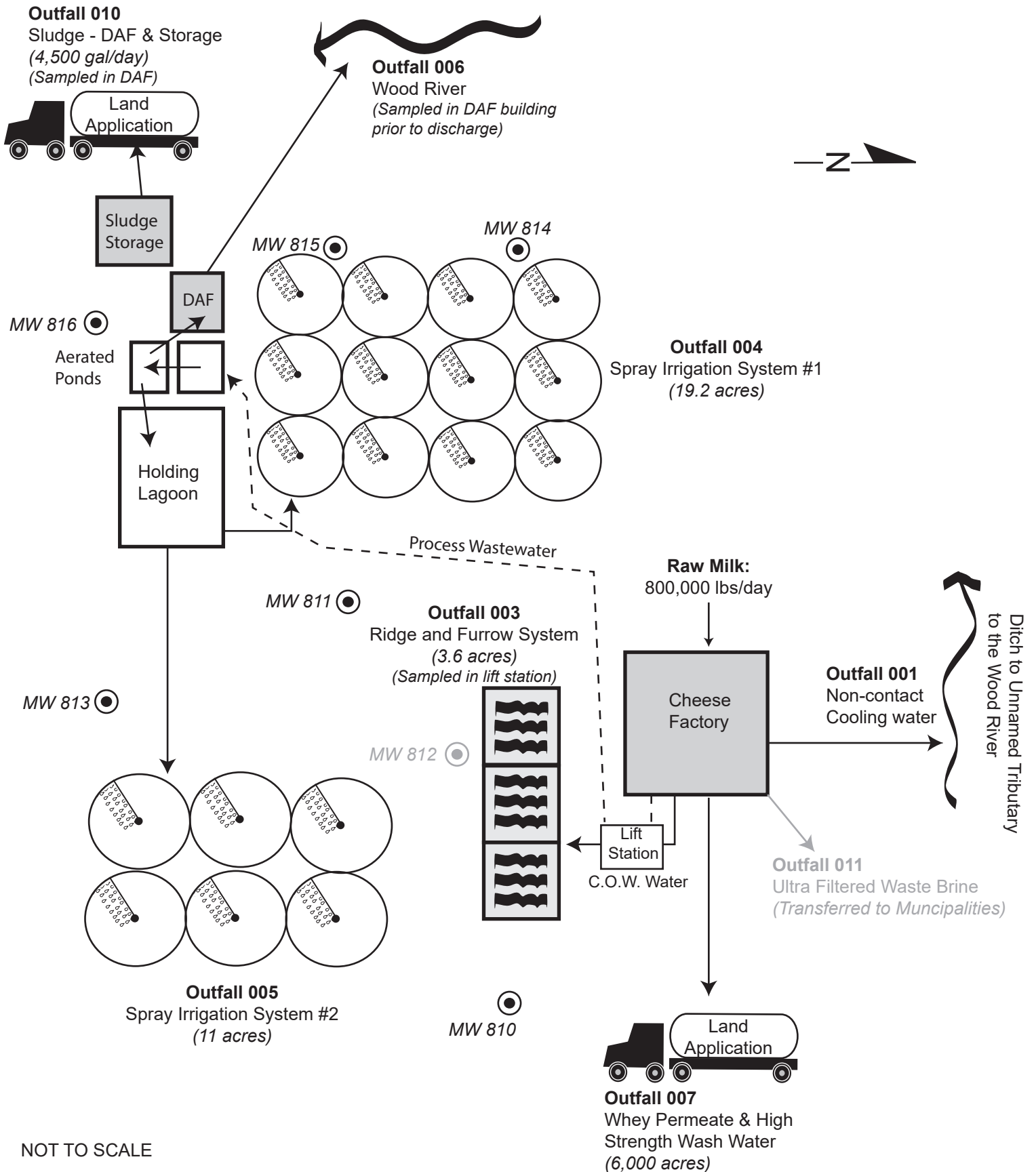
**Date updated based on Factcheck comments:** No corrections requested (February 2, 2024)

**Date updated based on public notice comments:**

*Notice of reissuance was published in the Burnett County Sentinel, PO Box 397, Grantsburg, WI 54840-0397.*



# Burnett Dairy Coop Wastewater Treatment System



**CORRESPONDENCE/MEMORANDUM**

DATE: December 12, 2023

TO: Sheri Snowbank – NOR/Spooner Service Center

FROM: Michael Polkinghorn – NOR/Rhineland Service Center



SUBJECT: Water Quality-Based Effluent Limitations for the Burnett Dairy Cooperative  
 WPDES Permit No. WI-0039039-10-0

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from the Burnett Dairy Cooperative in Burnett County. This industrial facility discharges to the Wood River, located in the Wood River Watershed in the St. Croix River Basin. This discharge is included in the Lake St. Croix Basin Total Maximum Daily Load report as approved by EPA on 08/08/2012. 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 006:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	12-Month Rolling Average	Footnotes
Flow Rate						1
BOD <sub>5</sub>	57 lbs/day			23 lbs/day		1, 2
TSS	85 lbs/day			34 lbs/day		1, 2
pH	9.0 s.u.	6.0 s.u.				1, 2
Ammonia Nitrogen	55 mg/L			55 mg/L		1
Phosphorus				4.0 lbs/day	1.0 mg/L	1, 3
Chlorine (Total Residual)	38 µg/L					
Copper (Total Recoverable)	45 µg/L 0.082 lbs/day					
Hardness (Total as CaCO <sub>3</sub> )						4
Chloride						1, 5
Hydricare 3248HW						6
Hydribio 1967						7
Hydricare 3121						6
Hydricare 3144						8
Hydricare 3150						6
Hydriclear 1006 (ferric chloride)						6
Hydrifloc 9880						6
Bromicide Tablets						6
TKN, Nitrate+Nitrite, and Total Nitrogen						9
Acute WET	1.0 TUa					10, 12

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	12-Month Rolling Average	Footnotes
Chronic WET				13 TUc		11, 12

Footnotes:

1. No changes from the current permit.
2. These are technology-based effluent limits (TBELs) based on ch. NR 240, Wis. Adm. Code. These limits are not addressed in this evaluation and may need to be adjusted based on current production.
3. The concentration limit is a state technology treatment standard as described in subch. II of NR 217, Wis. Adm. Code. The mass limit is based on this facility's phosphorus wasteload allocation (WLA) from the Lake St. Croix Basin Total Maximum Daily Load (LSCB TMDL) to address phosphorus impairments in the TMDL area.
4. Hardness monitoring is recommended because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.
5. Monitoring at a frequency to ensure that 11 samples are available at the next permit issuance.
6. An additive review is not necessary for any additives where either the toxicity is well documented and understood, can be controlled by a WQBEL, or are not believed to be present in the discharge.
7. This additive is approved at the requested maximum dosage rate of 4.0 lbs/day.
8. This additive is approved at the requested maximum dosage rate of 0.5 gal/day.
9. 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 facilities with total nitrogen greater than 40 mg/L. Total nitrogen is the sum of nitrate (NO<sub>3</sub>), nitrite (NO<sub>2</sub>), and total Kjeldahl nitrogen (TKN) (all expressed as N).
10. Annual acute whole effluent toxicity (WET) tests are recommended during the reissued permit term. 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.
11. Annual chronic WET tests are recommended during the reissued permit term. The Instream Waste Concentration (IWC) to assess chronic test results is 8%. 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%, 30%, 10%, 3% & 1% and the dilution water used in WET tests conducted on Outfall 006 shall be a grab sample collected from the Wood River upstream of the confluence of Outfall 006.
12. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).

Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are not required due to the non-continuous nature of the discharge.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Michael Polkinghorn at (715) 360-3379 or Michael.Polkinghorn@wisconsin.gov and Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (3) – Narrative, discharge area map, & thermal table.

PREPARED BY: Michael A. Polkinghorn – Water Resources Engineer

E-cc: Eric de Venecia, Wastewater Engineer – NOR/Superior Service Center  
Michelle BalkLudwig, Regional Wastewater Supervisor – NOR/Spooner Service Center  
Diane Figiel, Water Resources Engineer – WY/3  
Kari Fleming, Environmental Toxicologist – WY/3  
Nathaniel Willis, Wastewater Engineer – WY/3

**Water Quality-Based Effluent Limitations for  
Burnett Dairy Cooperative**

**WPDES Permit No. WI-0039039-10-0**

Prepared by: Michael A. Polkinghorn

**PART 1 – BACKGROUND INFORMATION**

**Facility Description**

Burnett Dairy Cooperative (Burnett Dairy) manufactures approximately 100,000 pounds of cheese per day and condensed whey. The facility manufactures condensed whey using ultra filtration reverse osmosis and polishing processes. A mixture of process wastewater that is not irrigated, cooling tower blowdown water, and boiler blowdown water is treated by aerated ponds followed by a flocculation tank (where the chemicals ferric chloride and a flocculant (polymer) are added), followed by dissolved air flotation (DAF) where it mixes with activated sludge which breaks down the organic matter. The water is then pumped into the clarifier portion of the DAF where remaining solids are settled out. Effluent is discharged by a 6” force main pipe on a noncontinuous basis via Outfall 006 to the Wood River, approx. 3,963 ft south of Highway 70 and 1,148 ft west of County Road Y.

Attachment #2 is a discharge area map of Outfall 006.

**Existing Permit Limitations**

The current permit, expired on 09/30/2023, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	12-Month Rolling Average	Footnotes
Flow Rate						1
BOD <sub>5</sub>	57 lbs/day			23 lbs/day		2
TSS	85 lbs/day			34 lbs/day		2
pH	9.0 s.u.	6.0 s.u.				2
Ammonia Nitrogen	55 mg/L			55 mg/L		
Phosphorus				4.0 lbs/day	1.0 mg/L	3
Chloride						1
Copper (Total Recoverable)						1
Temperature						1
Acute WET						4
Chronic WET						4

## Footnotes:

1. Monitoring only.
2. These are technology-based effluent limits (TBELs) based on ch. NR 240, Wis. Adm. Code. These limits are not addressed in this evaluation and may need to be adjusted based on current production.
3. The concentration limit is a state technology treatment standard as described in subch. II of NR 217, Wis. Adm. Code. The mass limit is based on this facility's phosphorus wasteload allocation (WLA) from the Lake St. Croix Basin Total Maximum Daily Load (LSCB TMDL) to address phosphorus impairments in the TMDL area.
4. The current permit required 2x acute and chronic whole effluent toxicity (WET) tests. The IWC for chronic WET was 3%.

**Receiving Water Information**

- Name: Wood River
- Waterbody Identification Code (WBIC): 2642900
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q<sub>10</sub> and 7-Q<sub>2</sub> values are from USGS for Station SC17 (NE ¼, NE ¼, Section 28, T38N – R18W, approx. 1.2 mi SW of Alpha WI) where Outfall 006 is located.
  - 7-Q<sub>10</sub> = 14.0 cubic feet per second (cfs)
  - 7-Q<sub>2</sub> = 19.0 cfs
  - Harmonic Mean Flow = 32.1 cfs using a drainage area of 73 mi<sup>2</sup>

The Harmonic Mean has been estimated based on average flow and the 7-Q<sub>10</sub> using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).

  - o Outfall 006 has been historically treated as a direct discharge to the Wood River in Burnett Dairy's permit where all calculated WQBELs are based on the protection of its water quality standards. In this case Outfall 006 is actually found to discharge to a wetland for approx. 250 ft before reaching the Wood River. The water quality standards of the wetland should be protected in addition to the Wood River once an appropriate fish and aquatic life classification is determined. The Wood River will continue to be treated as the immediate receiving water in this evaluation but this will be reevaluated at the next permit reissuance with a future fish survey to determine if an appropriate classification for the wetland.
- Hardness = 114 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data (n = 2, September 2019 – June 2021) from chronic WET tests.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%.
- Source of background concentration data: Metals data from the Wood River at Grantsburg WI is used for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen and phosphorus are described later.
- Multiple dischargers: The Village of Grantsburg discharges domestic wastewater roughly 5.6 mi downstream of Outfall 006. 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: There are no known impairments to the Wood River. Outfall 006 is inside of

the LSCB TMDL which addresses phosphorus impairments within the TMDL area.

**Effluent Information**

- Flow rate(s):
  - Maximum monthly average = 0.187 MGD million gallons per day (MGD)
  - The maximum monthly average flow of 0.187 MGD is used in place of a 365-day maximum annual average flow to account for the noncontinuous nature of the discharge. For reference, the actual average flow from October 2018 – August 2023 was 0.139 MGD excluding days discharge did not occur. This flow becomes 0.0800 MGD including days discharge did not occur in the average.
- Hardness = 147 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data (n = 4, January 2023 – March 2023) from 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).
- Water source: Three private high capacity wells.
- Total phosphorus wasteload allocation (WLA): 345 kg/yr = 759 lbs/yr = 2.1 lbs/day (see Table A.3 of the TMDL report document, “Lake St. Croix Nutrient Total Maximum Daily Load, May 2012, page 70”).
- Additives: Burnett Dairy utilizes 8 additives total in Outfall 006 and are listed below. The need for limits or use restrictions for these additives are evaluated in Part 6 of this evaluation.
  - o Buckman Laboratories Hydricare 3248HW – Scale/corrosion inhibitor
  - o Chlorine – Reclamation water treatment
  - o Hydrite Chemical Hydribio 1967 – Sludge reduction
  - o Hydrite Chemical Hydricare 3121 – Boiler polymer
  - o Hydrite Chemical Hydricare 3144 – Oxygen scavenger
  - o Hydrite Chemical Hydricare 3150 – Condensate return line treatment
  - o Hydrite Chemical Hydriclear 1006 (ferric chloride) – Phosphorus treatment
  - o Hydrite Chemical Hydrifloc 9880 – Polymer
  - o Italmatch Chemicals Bromicide Tablets – Fungicide
- 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 current permit required monitoring for chloride, copper, and temperature.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled “MEAN EFFL. CONC.”. Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.
- Monthly copper monitoring during 2021 was required during the current permit term but sampling during June and July of that year was not done. Therefore, additional historic data (n = 2, November 2017 – December 2017) is used to better determine the need for copper limits in the reissued permit.

**Chloride Effluent Data**

Statistics	Conc. (mg/L)
1-day P <sub>99</sub>	1,001
4-day P <sub>99</sub>	746
30-day P <sub>99</sub>	610
Mean	541
Std	155

Attachment #1

Sample size	90
Range	227 – 936

**Copper Effluent Data**

Sample Date	Conc. (µg/L)	Sample Date	Conc. (µg/L)	Sample Date	Conc. (µg/L)
		02/03/2021	25	08/26/2021	11
11/29/2017	16	03/17/2021	47	09/21/2021	17
12/14/2017	19	04/20/2021	41	11/22/2021	25
01/20/2021	27	05/03/2021	37	12/06/2021	18
1-day P <sub>99</sub> = 63 µg/L					
4-day P <sub>99</sub> = 42 µg/L					

The following table presents the average concentrations and loadings at Outfall 006 from October 2018 – August 2023 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

**Parameter Averages with Limits**

Parameter	Average Concentration	Average Mass
BOD <sub>5</sub>		24 lbs/day
TSS		11 lbs/day
pH field	6.3 s.u.	
Ammonia Nitrogen	1.04 mg/L	
Phosphorus	0.10 mg/L	0.11 lbs/day

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

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

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

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

**Acute Limits based on 1-Q<sub>10</sub>**

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



Attachment #1

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

Where:

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

Q<sub>s</sub> = average minimum 1-day flow which occurs once in 10 years (1-day Q<sub>10</sub>)

if the 1-day Q<sub>10</sub> flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q<sub>10</sub>).

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q<sub>10</sub> method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for Burnett Dairy and the limits are set based on two times the ATC.

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 = 11.2 cfs, (1-Q<sub>10</sub> (estimated as 80% of 7-Q<sub>10</sub>)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD. mg/L	ATC	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P <sub>99</sub>	1-day MAX. CONC.
<b>Chlorine</b>		19.0	<b>38</b>	<b>7.6</b>	<b>60</b>		<b>60</b>
Arsenic		340	680	136	<0.989		<0.989
Cadmium	147	16.1	32	6.4	<0.19		<0.19
Chromium	147	2,478	4,956	991	2.3		2.3
<b>Copper</b>	147	22.4	<b>44.8</b>			<b>63</b>	<b>47</b>
Lead	147	156	311.2	62.2	<4.3		<4.3
Nickel	147	652	1303.2	261	24		24
Zinc	147	169	338	68	24		24
Chloride (mg/L)		757	1,514			1,001	936

\* The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q<sub>10</sub> flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

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

RECEIVING WATER FLOW = 3.5 cfs (¼ of the 7-Q<sub>10</sub>), 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 <sub>99</sub>
<b>Chlorine</b>		7.28		95	<b>19.1</b>	<b>60</b>	

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SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P <sub>99</sub>
Arsenic		152		1,993	399	<0.989	
Cadmium	114	2.73		35.7	7.1	<0.19	
Chromium	114	147		1,924	384.7	2.3	
Copper	114	11.6	0.668	143			42
Lead	114	31.7	0.101	414	82.9	<4.3	
Nickel	114	58.2	1.39	746	149	24	
Zinc	114	134.8	1.7	1,745	349	24	
Chloride (mg/L)		395	4.0		5,123		746

**Monthly Average Limits based on Wildlife Criteria (WC)**

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

**Monthly Average Limits based on Human Threshold Criteria (HTC)**

RECEIVING WATER FLOW = 8.0 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370		10,628	2,126	<0.19
Chromium	3818000		109,672,199	21,934,440	2.3
Lead	140	0.101	4,019	804	<4.3
Nickel	43,000	1.39	1,235,138	247,028	24

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

RECEIVING WATER FLOW = 8.0 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3		382	76.4	<0.989

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

**Conclusions and Recommendations**

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

Chloride – Considering available effluent data from October 2018 – August 2023, the 1-day P<sub>99</sub> and 4-day P<sub>99</sub> concentrations are 1,001 and 746 mg/L respectively. These effluent concentrations are below the calculated chloride WQBELs: **therefore, chloride limits are not recommended during the reissued permit term. Chloride monitoring is recommended to ensure that 11 sample results are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code.**

Chlorine – Considering available effluent data from January 2023, the mean effluent concentration is 60 µg/L. This concentration exceeds the daily maximum chlorine WQBEL and 1/5<sup>th</sup> of the weekly average chlorine WQBEL, so both limits would be recommended. **Because the daily maximum WQBEL is more stringent, the weekly average WQBEL is not recommended. Therefore, the daily maximum limit of 38 µg/L is recommended during the reissued permit term.**

Copper – Considering available effluent data from November 2017 – December 2021, the 1-day P<sub>99</sub> and 1-day maximum concentrations are 63 and 47 µg/L respectively. These concentrations both exceed the calculated daily maximum copper WQBEL; **therefore, the daily maximum limit of 45 µg/L is recommended during the reissued permit term. The acute mass limitation of 0.082 lbs/day is based on the concentration limit and the peak daily flow rate of 0.220 MGD (45 µg/L \* 0.220 MGD \* 8.34/1000) in accordance with s. NR 106.07(2)(b), Wis. Adm. Code.**

**Quarterly hardness monitoring is also recommended because of the relationship between hardness and daily maximum limits based on ATC.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Sampling at Well WX172 (07/25/2023) produced a PFOS result of 0.95 ng/L and a PFOA result of 1.3 ng/L. These results are less than one fifth of the respective criteria for each substance. Based on the type of discharge and the known levels of PFOS/PFOA in the source water, **PFOS and PFOA monitoring is not recommended during the reissued permit term.** The Department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

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

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. The current permit has year round daily maximum and monthly average limits. These limits are re-evaluated at this time due to the following changes:

- The maximum expected effluent pH has changed.
- The need for weekly and monthly average limits.

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

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

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

Where:

A = 0.411 and B = 58.4 for a Warm Water Sport fishery, and  
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 90 sample results were reported from October 2017 – August 2018. The maximum reported value was 6.7 s.u. (Standard pH Units). The

effluent pH was 6.7 s.u. or less 99% of the time. The 1-day P<sub>99</sub>, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 6.7 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 6.7 s.u. Therefore, a value of 6.7 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 6.7 s.u. into the equation above yields an ATC = 45.48 mg/L.

**Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method**

In accordance with s. NR 106.32(2), Wis. Adm. Code, daily maximum ammonia limits are based on the mass balance approach using the 1-Q<sub>10</sub> low flow if the two times the ATC limit is not sufficiently protective of fish and aquatic life. The more restrictive calculated limits shall apply.

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-Q<sub>10</sub> (estimated as 80 % of 7-Q<sub>10</sub>) and the 2×ATC approach are shown below.

**Daily Maximum Ammonia Nitrogen Determination**

Method	Limit (mg/L)
2×ATC	91
1-Q <sub>10</sub>	1,804

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

This limit is greater than the current daily maximum limit of 55 mg/L. If Burnett Dairy would like to request an increase to the existing permit limits an assessment of their effluent data consistent with the requirements of ss. NR 207.04(1)(a) and (c), Wis. Adm. Code, must be provided. This evaluation is on a parameter by parameter basis and includes consideration of operations, maintenance and temporary upsets. Without a demonstration of need for a higher limit in accordance with s. NR 207.04, Wis. Adm. Code, the current limits must be continued in the reissued permit. The Department would be unable to increase the limit due to the lack of need as shown via the antidegradation rule (ch. NR 207, Wis. Adm. Code) because the highest reported concentration was 9.8 mg/L during the previous permit term.

**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 (CTC) for ammonia, because those limits relate to the assimilative capacity of the receiving water. The previous weekly and monthly average ammonia nitrogen limits are based on an effluent flow of 0.100 MGD where this evaluation uses an effluent flow of 0.187 MGD. Those limits will be updated considering this change only.

Weekly average and monthly average limits for ammonia nitrogen are based on CTC in ch. NR 105, Wis. Adm. Code. The 30-day CTC for ammonia in waters classified as a WWSF 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

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

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

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

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q<sub>10</sub> (4-Q<sub>3</sub>, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q<sub>5</sub> (estimated as 85% of the 7-Q<sub>2</sub> if the 30-Q<sub>5</sub> is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 °C, 25% of the flow is used if the Temperature < 11 °C, and 50% of the flow is used if the Temperature ≥ 11 °C but < 16 °C.

Section NR 106.32 (3), Wis. Adm. Code, provides a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 °C, during the winter and spring months. Burbot, an early spawning species, are believed to be present in the Wood River as determined in the previous limit evaluation (March 2018). So “ELS Absent” criteria apply from October – December, and “ELS Present” criteria will apply from January – September for the Wood River.

Background values for temperature, pH, ammonia are set equal to what was used in the previous limit evaluation (March 2018). These values are shown in the table below, with the resulting criteria and effluent limitations.

**Weekly & Monthly Ammonia Nitrogen Limits – WWSF Community**

		Spring	Summer	Fall	Winter
		April – May	June – Sept.	Oct. – Dec.	Jan. – March
<b>Effluent Flow</b>	Qe (MGD)	0.187	0.187	0.187	0.187
<b>Background Information</b>	7-Q <sub>10</sub> (cfs)	14.0	14.0	14.0	14.0
	7-Q <sub>2</sub> (cfs)	19.0	19.0	19.0	19.0
	Ammonia (mg/L)	0.04	0.04	0.03	0.08
	Temperature (°C)	12	22	5	2
	pH (s.u.)	7.58	7.66	7.49	7.25
	% of Flow used	50	100	25	25
	Reference Weekly Flow (cfs)	7.0	14	3.5	3.5
	Reference Monthly Flow (cfs)	8.1	16	4.0	4.0
<b>Criteria mg/L</b>	4-day Chronic				
	Early Life Stages Present	10.1	5.8		13.1
	Early Life Stages Absent			17.9	
	30-day Chronic				
	Early Life Stages Present	4.1	2.3		5.2
Early Life Stages Absent			7.1		
<b>Effluent Limitations mg/L</b>	Weekly Average				
	Early Life Stages Present	254	283		170
	Early Life Stages Absent			234	
	Monthly Average				
	Early Life Stages Present	116	129		77
Early Life Stages Absent			106		

**Effluent Data**

The following table evaluates the statistics based upon ammonia data reported from October 2018 – August 2023, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Burnett Dairy permit for the respective month ranges. That need is determined by calculating 99<sup>th</sup> upper percentile (or P<sub>99</sub>) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

<b>Ammonia Nitrogen Effluent Data</b>	
Statistics	Conc. (mg/L)
1-day P <sub>99</sub>	8.35
4-day P <sub>99</sub>	4.66
30-day P <sub>99</sub>	2.09
Mean*	1.04
Std	1.91
Sample size	90
Range	<0.127 - 9.842

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

Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits. The permit currently has year round daily maximum and monthly average limits. **Where there are existing ammonia nitrogen limits in the permit, the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:**

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

**PART 4 – PHOSPHORUS**

**Technology-Based Effluent Limit**

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

**Because Burnett Dairy currently has a 12-month rolling average limit of 1.0 mg/L, this limit should be included in the reissued permit.** This limit remains applicable unless a more stringent phosphorus WQBEL is given. In addition, the need for a phosphorus WQBEL 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.

The Lake St. Croix TMDL report was written to ensure that phosphorus water quality criteria are attained in Lake St. Croix and are not necessarily protective of phosphorus water quality of other surface waterbodies in the TMDL area. Therefore, the need for a phosphorus WQBEL as described in s. NR

217.13, Wis. Adm. Code, must be considered in addition to any limits required by the TMDL report.

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 Wood River.

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 the Wood River.

Qs = 100% of the 7-Q<sub>2</sub> of 19.0 cfs.

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

Qe = effluent flow rate = 0.187 MGD = 0.289 cfs.

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

Section NR 217.13(2)(d), Wis. Adm. Code, specifies that the background phosphorus concentration used in the limit calculation formula shall be calculated as a median using the procedures specified in s. NR 102.07(1)(b) to (c), Wis. Code. All representative data from the most recent 5 years shall be used, but data from the most recent 10 years may be used if representative of current conditions. A previous evaluation resulted in a WQBEL of 4.3 mg/L using a background concentration of 0.0405 mg/L and an effluent flow of 0.1 MGD. Section NR 217.13(2)(d), Wis. Adm. Code, states that the determination of upstream concentrations shall be evaluated at each permit reissuance. Additional data were considered in estimating the background phosphorus concentration.

A review of all available in stream total phosphorus data stored in the Surface Water Integrated Monitoring System database for the Wood River shows there are no updated samples from the previous limit evaluation (March 2018) to present. Therefore, the background phosphorus value of 0.0405 mg/L will continue to be used in this evaluation. This value is a median (n = 4, June 2002 – October 2002) of samples taken at the Wood River at the Big Wood Lake outlet (SWIMS ID: 073128) and is approx. 1.5 mi upstream of Outfall 006. Substituting a median value of 0.0405 mg/L into the limit calculation equation above, the calculated limit is 2.3 mg/L.

**Effluent Data**

The following table summarizes effluent total phosphorus monitoring data from October 2018 – August 2023.

**Total Phosphorus Effluent Data**

Statistics	Conc. (mg/L)
1-day P <sub>99</sub>	0.49
4-day P <sub>99</sub>	0.27
30-day P <sub>99</sub>	0.15

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Mean	0.10
Std	0.10
Sample size	87
Range	0.011 - 0.63

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

**Reasonable Potential Determination**

The discharge does not have reasonable potential to cause or contribute to an exceedance of the water quality criterion because the 30-day P<sub>99</sub> of reported effluent total phosphorus data is less than the calculated WQBEL. **Therefore, a phosphorus WQBEL is not recommended during the reissued permit term.**

**TMDL Limits**

The LSCB TMDL established a WLA for the City of St. Croix Falls of 345 kg/yr (759 lbs/yr) and 2.1 lbs/day. The monthly average limit of 4.0 lbs/day was determined in the WQBEL evaluation (March 2018). The multiplier of 1.90 was chosen utilizing the parameters of CV = 0.6 and a weekly or less effluent monitoring scheme as described in the Department guidance document, “*TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs Edition No. 3*”.

The TMDL-based WQBEL will be re-evaluated if the annual WLA is not being met as described in the prior stated guidance. This is done by comparing the 12-month rolling sums of monthly mass phosphorus discharges directly against the annual WLA from the current permit term. A review of the reported 12-month rolling sums during October 2018 – August 2023 show all available 51 sums are less than 759 lbs/yr, with the maximum sum of 38 lbs/yr (May 2020). **Therefore, Burnett Dairy is meeting their annual WLA and the TMDL-based WQBEL of 4.0 lbs/day as a monthly average is recommended to continue in the reissued permit.**

**PART 5 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL**

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

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from October 2018 – August 2023.

The table below summarizes the maximum temperatures reported during monitoring from January 2021 – December 2021 along with the calculated limits. Effluent temperature sampling was not conducted during June, July, and October so effluent data are used for those months from the previous limit evaluation (March 2018). The full temperature limits calculation is included as attachment #3.



**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	43	43	NA	120
FEB	33	43	NA	120
MAR	53	53	NA	120
APR	62	62	NA	120
MAY	65	65	NA	120
JUN	73	75	NA	120
JUL	79	82	NA	120
AUG	80	80	NA	120
SEP	69	69	NA	120
OCT	68	68	NA	120
NOV	48	48	NA	120
DEC	49	49	NA	120

\* NA denotes “not applicable” when the calculated weekly average limit is greater than or equal to 120 °F.

The lowest calculated temperature for Burnett Dairy with effluent flow data from the current permit term is 120 °F as a daily maximum and the maximum effluent temperature sample is 82 °F. There is no reasonable potential to exceed any of the calculated temperature limits. In addition, at temperatures above approximately 103° F, conventional biological treatment systems do not function properly and experience upsets. There is no indication that this has ever occurred in this treatment system. **Therefore, temperature limits or monitoring are not recommended during the reissued permit term.**

**PART 6 – WHOLE EFFLUENT TOXICITY (WET)**

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

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC<sub>50</sub> (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.

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- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC<sub>25</sub> (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 8% shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

Q<sub>e</sub> = annual average flow = 0.187 MGD = 0.289 cfs.

f = fraction of the Q<sub>e</sub> withdrawn from the receiving water = 0.

Q<sub>s</sub> = ¼ of the 7-Q<sub>10</sub> = 14 cfs ÷ 4 = 3.5 cfs.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.
- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 006 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 006. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations. Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005. Therefore, available WET tests from June 2005 to present are included in the table below:

**WET Data History**

Date Test Initiated	Acute Results LC <sub>50</sub> %				Chronic Results IC <sub>25</sub> %				Footnotes or Comments
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	<i>C. dubia</i>	Fathead Minnow	Pass or Fail?	Use in RP?	
01/22/2008	>100	>100	Pass	No	>100	>100	Pass	No	1
01/29/2008	70	68	Fail	No	3	17	Fail	No	1
04/22/2008	93.9	34.6	Fail	No	22	16	Fail	No	1, Retest
05/27/2008	>100	56	Fail	No	48	35	Pass	No	1, Retest
11/10/2009	<6.25	8.45	Fail	No	3.22	14.11	Fail	No	1
06/22/2010	77	60	Fail	No	10	24	Pass	No	1, 2
10/25/2010	>100	>100	Pass	Yes	47.8	>100	Pass	Yes	
10/24/2011	>100	>100	Pass	Yes					
11/16/2011	>100	>100	Pass	Yes	53	>100	Pass	Yes	

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06/25/2012	>100	>100	Pass	Yes					
09/17/2014	>100	>100	Pass	Yes					
05/24/2016	>100	>100	Pass	Yes					
01/23/2018	>100	>100	Pass	Yes					
09/03/2019	57.4	>100	Fail	Yes	8.3	4.2	Pass	Yes	
12/18/2019	>100	>100	Pass	Yes					Retest
01/01/2020	>100	>100	Pass	Yes					Retest
06/01/2021	>100	>100	Pass	Yes	>100	>100	Pass	Yes	

Footnotes:

1. *Data Not Representative.* A company was hired in 2009 to convert the lagoons to be operated as an activated sludge-based system but were negligent with providing training of operating the system to the operators. This delay in training and lack of operator knowledge resulted in lagoon degradation and bacteria kill-off where the lagoon had to be drained and bacteria reseeded. After the training on the new system was eventually received, toxicity detects continued relating to overdosing of polymer. The facility conducted jar testing of multiple polymers until proper dosing and optimization was achieved. These operational changes are expected to affect the overall effluent toxicity so these WET results are not considered representative of the current discharge.
  2. *Data Not Representative.* These WET results are believed to be related to when the facility had a blower down to one of the lagoons during summer 2010 as they were waiting for a replacement. This scenario led to elevated BOD<sub>5</sub>/COD<sub>5</sub> concentrations in the same lagoon such additional chemical was used to make up the loss of treatment. The blower was replaced after these tests and operations returned to more representative conditions. Therefore, these WET results are not considered representative of the current discharge.
- According to s. NR 106.08, Wis. Adm. Code, WET reasonable potential is determined by multiplying the highest toxicity value that has been measured in the effluent by a safety factor, to predict the likelihood (95% probability) of toxicity occurring in the effluent above the applicable WET limit. The safety factor used in the equation changes based on the number of toxicity detects in the dataset. The fewer detects present, the higher the safety factor, because there is more uncertainty surrounding the predicted value. WET limits must be given, according to s. NR 106.08(6), Wis. Adm. Code, whenever the applicable Reasonable Potential equation results in a value greater than 1.0.

Acute Reasonable Potential = [(TU<sub>a</sub> effluent) (B)]

**Acute WET Limit Parameters**

TU <sub>a</sub> (maximum) 100/LC <sub>50</sub>	B (multiplication factor from s. NR 106.08(5)(c), Wis. Adm. Code, Table 4)
100/57.4 = 1.74	6.2 Based on 1 detect

[(TU<sub>a</sub> effluent) (B)] = 11 > 1.0

Chronic Reasonable Potential = [(TU<sub>c</sub> effluent) (B)(IWC)]

**Chronic WET Limit Parameters**

TU <sub>c</sub> (maximum) 100/IC <sub>25</sub>	B (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
100/4.2 = 23.8	3.0	8%

Based on 3 detects

$$[(TU_c \text{ effluent}) (B)(IWC)] = 5.7 > 1.0$$

Therefore, reasonable potential is shown for both acute and chronic WET limits using the procedures in s. NR 106.08(6), Wis. Adm. Code, and representative data from October 2010 – June 2021.

Expression of WET limits

**Acute WET limit = 1.0 TU<sub>a</sub> as a daily maximum.**

**Chronic WET limit = [100/IWC] TU<sub>c</sub> = 13 TU<sub>c</sub> 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**

	<b>Acute</b>	<b>Chronic</b>
<b>AMZ/IWC</b>	Not applicable. <b>0 Points</b>	IWC = 8%. <b>0 Points</b>
<b>Historical Data</b>	11 tests used to calculate RP. 1 test failed. <b>0 Points</b>	4 tests used to calculate RP. No tests failed. <b>0 Points</b>
<b>Effluent Variability</b>	Aeration and mixing are insufficient to handle influent loading. Replacing aeration diffusers will be gradual over the reissued permit term and not all at once. Facility will closely monitor for any negative trends in effluent quality. If violations become chronic, then more immediate options including replacement of all compromised diffusers may need to be evaluated.  A few BOD <sub>5</sub> violations occurred infrequently over current permit term due to accidental spills in the production area and improper notification of WW/maintenance staff. Facility SOPs are being developed to more effectively identify and react to spills before an effluent violation occurs. <b>0 Points</b>	Same as acute.  <b>0 Points</b>
<b>Receiving Water Classification</b>	WWSF community. <b>5 Points</b>	Same as acute. <b>5 Points</b>

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	Acute	Chronic
<b>Chemical-Specific Data</b>	Reasonable potential for limits for copper based on ATC; ammonia nitrogen limit carried over from the current permit. Chromium, chlorine, nickel, zinc, and chloride detected. No additional compounds of concern. <b>8 Points</b>	No reasonable potential for limits based on CTC; ammonia nitrogen limit carried over from the current permit. Chromium, chlorine, copper, nickel, zinc, and chloride detected. No additional compounds of concern. <b>3 Points</b>
<b>Additives</b>	1 biocide and 8 water quality conditioners added. Permittee has proper P chemical SOPs in place: Yes. <b>11 Points</b>	All additives used more than once per 4 days. <b>11 Points</b>
<b>Discharge Category</b>	Dairy and cheesemaker. <b>20 Points</b>	Same as acute. <b>20 Points</b>
<b>Wastewater Treatment</b>	Secondary or better. <b>0 Points</b>	Same as acute. <b>0 Points</b>
<b>Downstream Impacts</b>	No impacts known. <b>0 Points</b>	Same as acute. <b>0 Points</b>
<b>Total Checklist Points:</b>	<b>44 Points</b>	<b>39 Points</b>
<b>Recommended Monitoring Frequency (from Checklist):</b>	Annual acute tests recommended.	Annual chronic tests recommended.
<b>Limit Required?</b>	Limit = 1.0 TU <sub>a</sub>	Limit = 13 TU <sub>c</sub>
<b>TRE Recommended? (from Checklist)</b>	No.	No.

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, **annual acute and chronic WET tests are recommended in the reissued permit.** Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).
- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, both acute and chronic WET limits are required. **The acute WET limit shall be expressed as 1.0 TU<sub>a</sub> as a daily maximum in the effluent limits table of the permit. The chronic WET limit shall be expressed as 13 TU<sub>c</sub> as a monthly average in the effluent limits table of the permit.** A minimum of annual acute and chronic monitoring is required because both acute and chronic WET limits are required. Federal regulations in 40 CFR Part 122.44(i) require that monitoring occur at least once per year when a limit is present.

**PART 6 – 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

Attachment #1

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* (2019) (<http://dnr.wi.gov/topic/wastewater/Guidance.html>).

**Additive Parameters**

Additive Name	Manufacturer	Purpose of Additive including where added	Use Frequency (days/wk)	Max Quantity Used	Equivalent Effluent Conc. (mg/L)	Potential Use Restriction (mg/L unless noted otherwise) <sup>1</sup>
Hydricare 3248HW <sup>2</sup>	Buckman Laboratories	Scale/corrosion inhibitor in cooling tower	7	2 lbs/day	NA	Not expected to be present in discharge.
Hydribio 1967 <sup>1</sup>	Hydrite Chemical	Sludge reduction	7	4 lbs/day	2.6	DM = 590 WA = 430
Hydricare 3121 <sup>2</sup>	Hydrite Chemical	Boiler polymer	7	1 gal/day	NA	Not expected to be present in discharge.
Hydricare 3144 <sup>1</sup>	Hydrite Chemical	Oxygen scavenger	7	0.5 gal/day	3.1	DM = 140 WA = 100
Hydricare 3150 <sup>2</sup>	Hydrite Chemical	Condensate return line treatment	7	0.25 gal/day	NA	Not expected to be present in discharge.
Hydriclear 1006 (ferric chloride) <sup>3</sup>	Hydrite Chemical	Phosphorus treatment	6	280 gal/day	NA	SOP
Hydrifloc 9880 <sup>2</sup>	Hydrite Chemical	Polymer	6	5 gal/day	NA	Not expected to be present in discharge.
Bromicide Tablets <sup>2</sup>	Italmatch Chemicals	Fungicide	7	0.4 lbs/day	NA	WQBEL

1. Calculated based on toxicity data provided.
2. An additive review is not necessary for any additives where either the toxicity is well documented and understood, can be controlled by a WQBEL, or are not believed to be present in the discharge.
3. Potential toxicity caused by additives utilized for chemical phosphorus treatment are evaluated in Part 6 of this evaluation instead of an additive review.

Hydribio 1967 – This additive is used to reduce the sludge volume in the facility. Secondary acute and chronic values are determined based on acute toxicity test data provided by Burnett Dairy. The secondary acute value is 588 mg/L and is set directly as a daily maximum limit of 590 mg/L using two significant figures. The secondary chronic value is 32.7 mg/L based on the default secondary acute to chronic ratio of 18 and the calculated weekly average limit is 430 mg/L rounded to two significant figures using the same conservation of mass equation as with toxic substances in Part 2 of this evaluation.

Burnett Dairy has requested the use of this additive at a maximum dosage rate of 4.0 lbs/day. Assuming none of the additive is lost to the environment from the application point to Outfall 006 and an effluent flow of 0.187 MGD, the equivalent effluent concentration is approx. 2.6 mg/L. This effluent concentration is below 1/5<sup>th</sup> of the daily maximum and weekly average limits. At the requested maximum dosage rate, limits or use restrictions are not recommended. **Therefore, this additive is approved at the requested maximum dosage rate of 4.0 lbs/day.**

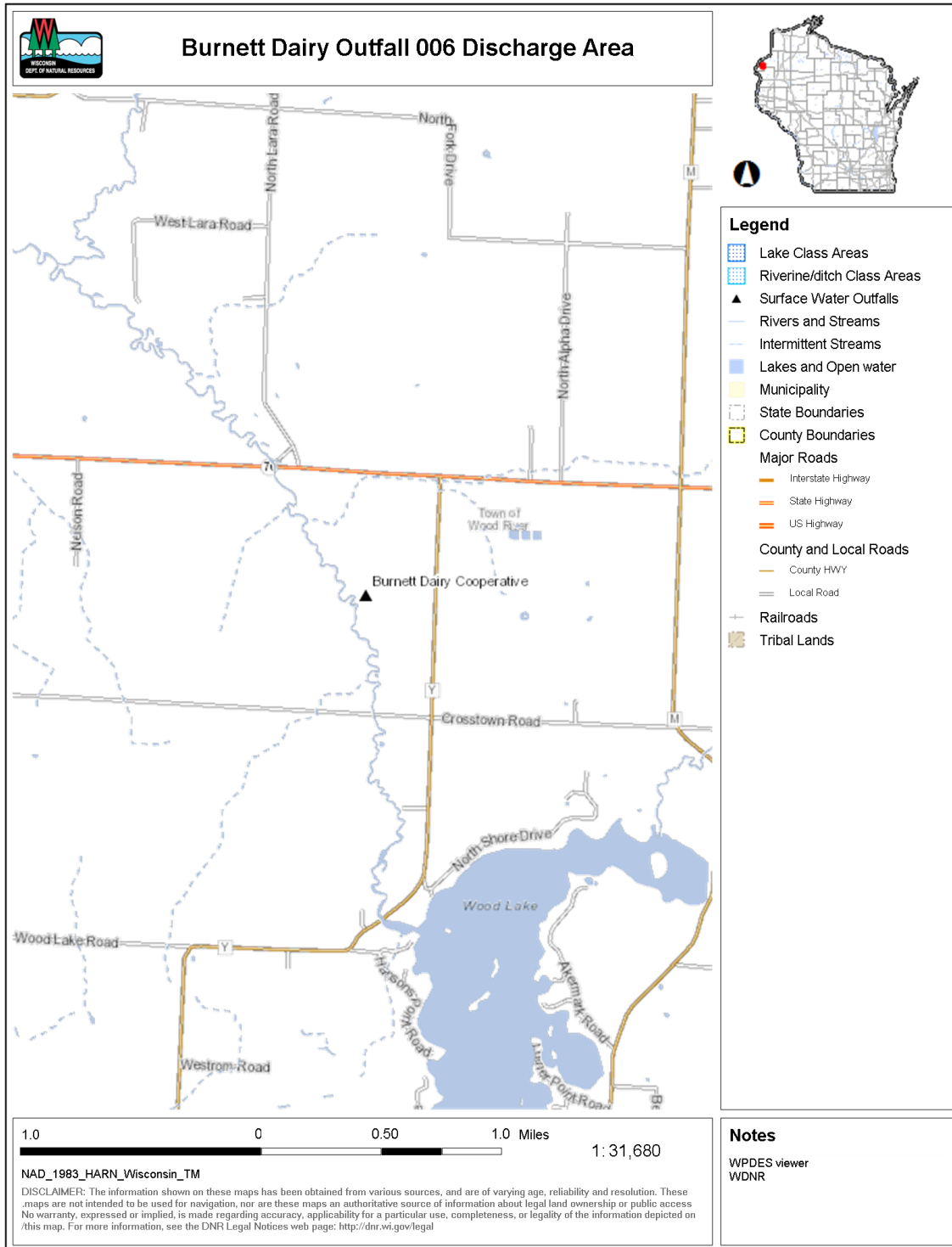
Hydricare 3144 – This additive is used as an oxygen scavenger. Secondary acute and chronic values are determined based on acute toxicity test data provided by Burnett Dairy. The secondary acute value is

Attachment #1

139.23 mg/L and is set directly as a daily maximum limit of 140 mg/L using two significant figures. The secondary chronic value is 7.74 mg/L based on the default secondary acute to chronic ratio of 18 and the calculated weekly average limit is 100 mg/L rounded to two significant figures using the same conservation of mass equation as with toxic substances in Part 2 of this evaluation.

Burnett Dairy has requested the use of this additive at a maximum dosage rate of 0.5 gal/day. Assuming none of the additive is lost to the environment from the application point to Outfall 006, an effluent flow of 0.187 MGD, and an additive density of 1.17 g/cm<sup>3</sup>, the equivalent effluent concentration is approx. 3.1 mg/L. This effluent concentration is below 1/5<sup>th</sup> of the daily maximum and weekly average limits. At the requested maximum dosage rate, limits or use restrictions are not recommended. **Therefore, this additive is approved at the requested maximum dosage rate of 0.5 gal/day.**

**The Department should be notified if the facility wishes to use any new additive, any approved additive at a greater dosage rate(s) or use frequency(ies) than currently approved, or if updated toxicity information for an additive is available from the chemical manufacturer. An additional additive review evaluation will be needed in any case.**





### Temperature Limits for Receiving Waters with Unidirectional Flow

(calculation using default ambient temperature data)

<b>Facility:</b>	Burnett Dairy	<b>7-Q<sub>10</sub>:</b>	14.0	cfs	<b>Temp Dates</b>		<b>Flow Dates</b>	
<b>Outfall(s):</b>	006	<b>Dilution:</b>	25%		<b>Start:</b>	01/20/21	10/01/18	
<b>Date Prepared:</b>	10/17/2023	<b>f:</b>	0		<b>End:</b>	12/14/21	08/31/23	
<b>Design Flow (Q<sub>e</sub>):</b>	0.187	MGD	<b>Stream type:</b> Small warm water sport or forage fis					
<b>Storm Sewer Dist.</b>	0	ft	<b>Qs:Q<sub>e</sub> ratio:</b>	12.1	:1			
			<b>Calculation Needed?</b>	YES				

Month	Water Quality Criteria			Receiving Water Flow Rate (Q <sub>s</sub> ) (cfs)	Representative Highest Effluent Flow Rate (Q <sub>e</sub> )		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	T <sub>a</sub> (default) (°F)	Sub-Lethal WQC (°F)	Acute WQC (°F)		7-day Rolling Average (Q <sub>esl</sub> ) (MGD)	Daily Maximum Flow Rate (Q <sub>ea</sub> ) (MGD)		Weekly Average (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	33	49	76	14.00	0.166	0.185	0	43	43	NA	120
FEB	34	50	76	14.00	0.175	0.193	0	33	43	NA	120
MAR	38	52	77	14.00	0.184	0.184	0	53	53	NA	120
APR	48	55	79	14.00	0.181	0.215	0	62	62	NA	120
MAY	58	65	82	14.00	0.168	0.188	0	65	65	NA	120
JUN	66	76	84	14.00	0.187	0.187	0			NA	120
JUL	69	81	85	14.00	0.179	0.199	0			NA	120
AUG	67	81	84	14.00	0.166	0.198	0	80	80	NA	120
SEP	60	73	82	14.00	0.172	0.220	0	69	69	NA	120
OCT	50	61	80	14.00	0.164	0.190	0			NA	120
NOV	40	49	77	14.00	0.166	0.189	0	48	48	NA	120
DEC	35	49	76	14.00	0.164	0.182	0	49	49	NA	120

DATE: December 22, 2023

TO: Sheri Snowbank – NOR/Spooner Service Center

FROM: Michael Polkinghorn – NOR/Rhineland Service Center



SUBJECT: Technology-Based Effluent Limitations for Burnett Dairy Cooperative  
 WPDES Permit No. WI-0039039-10-0

**Technology-Based Effluent Limitations (TBELs) Recommended for Outfall 006:**

Parameter	Daily Maximum	Daily Minimum	Monthly Average
BOD <sub>5</sub> , Total	29 lbs/day		14 lbs/day
TSS	36 lbs/day		18 lbs/day
pH	9.0 s.u.	6.0 s.u.	

**PART 1 – BACKGROUND INFORMATION**

Burnett Dairy Cooperative (Burnett Dairy) manufactures approximately 100,000 pounds of cheese per day and condensed whey. The facility manufactures condensed whey using ultra filtration reverse osmosis and polishing processes. A mixture of process wastewater that is not irrigated, cooling tower blowdown water, and boiler blowdown water is treated by aerated ponds followed by a flocculation tank (where the chemicals ferric chloride and a flocculant (polymer) are added), followed by dissolved air flotation (DAF) where it mixes with activated sludge which breaks down the organic matter. The water is then pumped into the clarifier portion of the DAF where remaining solids are settled out. Effluent is discharged by a 6” force main pipe on a noncontinuous basis via Outfall 006 to the Wood River, approx. 3,963 ft south of Highway 70 and 1,148 ft west of County Road Y.

Correspondence with Burnett Dairy has stated the equipment in all the product process lines have commenced construction after 05/28/1974. Specifically the cheese and condensed whey process lines received upgrades in 2001.

**PART 2 – INDUSTRIAL CATEGORIES**

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

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

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

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

- The state or federal rules do not specify a date for the definition for a new source. Therefore, it is necessary to review available federal guidance. The Boornazian memo (September 28, 2006)

specifies a new source date for 40 CFR Part 405 Subparts A – L of May 28, 1974. The Department relies on the Boornazian memo to establish date of applicability for NSPS.

- State rules incorrectly list best available treatment (BAT) standards for BOD, TSS, and pH. BAT applies to priority pollutants and nonconventional pollutants and does not apply to BOD, TSS or pH.
- The federal standard rule lists revised BCT standards requirements. All BCT limitations are set to be the same as the best practicable control technology (BPT) standards. State rules in ch. NR 240, Wis. Adm. Code, do not list standards for BCT.

### **PART 3 – LEVELS OF CONTROL**

The cheese, sweet cream, whey cream, and condensed whey product process lines have construction commenced after May 28, 1974. Therefore, BPT, BCT, BAT, and NSPS standards for the “Natural and Processed Cheese”, “Fluid Products”, and “Condensed Whey” subcategories are applicable as specified in 40 CFR Part 405 Subparts F, B, and K, respectively, and ch. NR 240, Wis. Adm. Code.

### **PART 4 – CURRENT PRODUCTION LEVELS**

The current levels of production for each subcategory are provided by Burnett Dairy via the process flow diagram included as attachment #1. The material amount for the applicable subcategories are in units of lbs/day expressed as maximum annual averages.

#### **Natural & Processed Cheese**

<b>Process</b>	<b>Material</b>	<b>Material Used (lbs/day)</b>
Cheese	Milk (3.7% Fat)	1,260,000

#### **Fluid Products**

<b>Process</b>	<b>Material</b>	<b>Material Used (lbs/day)</b>
Sweet Cream	Milk (3.7% Fat)	45,000
Whey Cream	Whey (Fluid)	10,260

#### **Condensed Whey**

<b>Process</b>	<b>Material</b>	<b>Material Used (lbs/day)</b>
WPC	Whey (Fluid)	1,110,740

## PART 5 – BOD INPUT

The BOD<sub>5</sub> 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.

### Natural & Processed Cheese

Process	Material Used (lbs/day)	BOD Factor <sup>1</sup> (lbs/100 lbs)	Adjusted Total BOD Input <sup>2</sup> (lbs/day)
Cheese	1,260,000	10.39	130,914
<b>Total</b>			<b>130,914</b>

### Fluid Products

Process	Material Used (lbs/day)	BOD Factor <sup>1</sup> (lbs/100 lbs)	Adjusted Total BOD Input <sup>2</sup> (lbs/day)
Sweet Cream	45,000	10.39	4,676
Whey Cream	10,260	4.72	484
<b>Total</b>			<b>5,160</b>

### Condensed Whey

Process	Material Used (lbs/day)	BOD Factor <sup>1</sup> (lbs/100 lbs)	Adjusted Total BOD Input <sup>2</sup> (lbs/day)
WPC	1,110,740	4.72	52,427
<b>Total</b>			<b>52,427</b>

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 & 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 cheese product process line commenced construction after May 28<sup>th</sup>, 1974. Therefore, the NSPS limitations of 40 CFR Part 405.65 would apply.

According to the overall facility flow diagram included as attachment #2, the overall dairy process wastewater is diverted to other non-surface water outfalls before the remainder is discharged to Outfall 006. These outfalls include land spreading (Outfall 007), ridge and furrow (Outfall 003), and spray irrigation (Outfalls 004 and 005). Because the proportionality of the overall dairy process wastewater discharged varies significantly between outfalls, actual flow data from October 2018 – August 2023 for the non-surface water outfalls is added on a daily basis, and an overall average combined flow is calculated to compare to the maximum annual average mass discharge of the overall dairy process wastewater. The overall average flow of the overall dairy process wastewater to all non-surface water outfalls was approx. 22,065 gal/day during October 2018 – August 2023. The maximum annual average flow of the overall dairy process wastewater is approx. 103,957 gal/day (867,000 lbs/day / 8.34 lbs/gal). Therefore, approx. 79% of the overall dairy process wastewater is discharged to Outfall 006 on average, so the calculated limits shown below are 79% of the total limits if 100% of the overall dairy process wastewater were discharged to Outfall 006.

Total BOD Input (lbs/day)	NSPS Effluent Limitations				Calculated Limits			
	BOD (lbs/1,000 lbs)		TSS (lbs/1,000 lbs)		BOD (lbs/day) <sup>1</sup>		TSS (lbs/day) <sup>1</sup>	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max
130,914	0.08	0.16	0.10	0.20	8.3	16.5	10.3	20.6

Footnotes:

1. The limits (lbs/day) = total BOD input (lbs/day) / 1000 \* NSPS limitations \* 0.79

**PART 7 – TBEL CALCULATIONS FOR FLUID PRODUCTS**

**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 sweet and whey cream product process lines commenced construction after May 28<sup>th</sup>, 1974. Therefore, the NSPS limitations of 40 CFR Part 405.25 would apply. Approx. 79% of the overall dairy process wastewater is discharged to Outfall 006 on average, so the calculated limits shown below are 79% of the total limits if 100% of the overall dairy process wastewater were discharged to Outfall 006.

Total BOD Input (lbs/day)	NSPS Effluent Limitations				Calculated Limits			
	BOD (lbs/1,000 lbs)		TSS (lbs/1,000 lbs)		BOD (lbs/day) <sup>1</sup>		TSS (lbs/day) <sup>1</sup>	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max
5,160	0.37	0.74	0.46	0.93	1.5	3.0	1.9	3.8

Footnotes:

1. The limits (lbs/day) = total BOD input (lbs/day) / 1000 \* NSPS limitations \* 0.79

**PART 8 – 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.

**New Source Performance Standards (NSPS)**

The WPC 54 product process line commenced construction after May 28<sup>th</sup>, 1974. Therefore, the NSPS limitations of 40 CFR Part 405.115 would apply. Approx. 79% of the overall dairy process wastewater is discharged to Outfall 006 on average, so the calculated limits shown below are 79% of the total limits if 100% of the overall dairy process wastewater were discharged to Outfall 006.

Total BOD Input (lbs/day)	NSPS Effluent Limitations				Calculated Limits			
	BOD (lbs/1,000 lbs)		TSS (lbs/1,000 lbs)		BOD (lbs/day) <sup>1</sup>		TSS (lbs/day) <sup>1</sup>	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max
52,427	0.11	0.22	0.14	0.28	4.5	9.1	5.8	11.6

Footnotes:

1. The limits (lbs/day) = total BOD input (lbs/day) / 1000 \* NSPS limitations \* 0.79

**PART 8 – FINAL CALCULATED LIMITS**

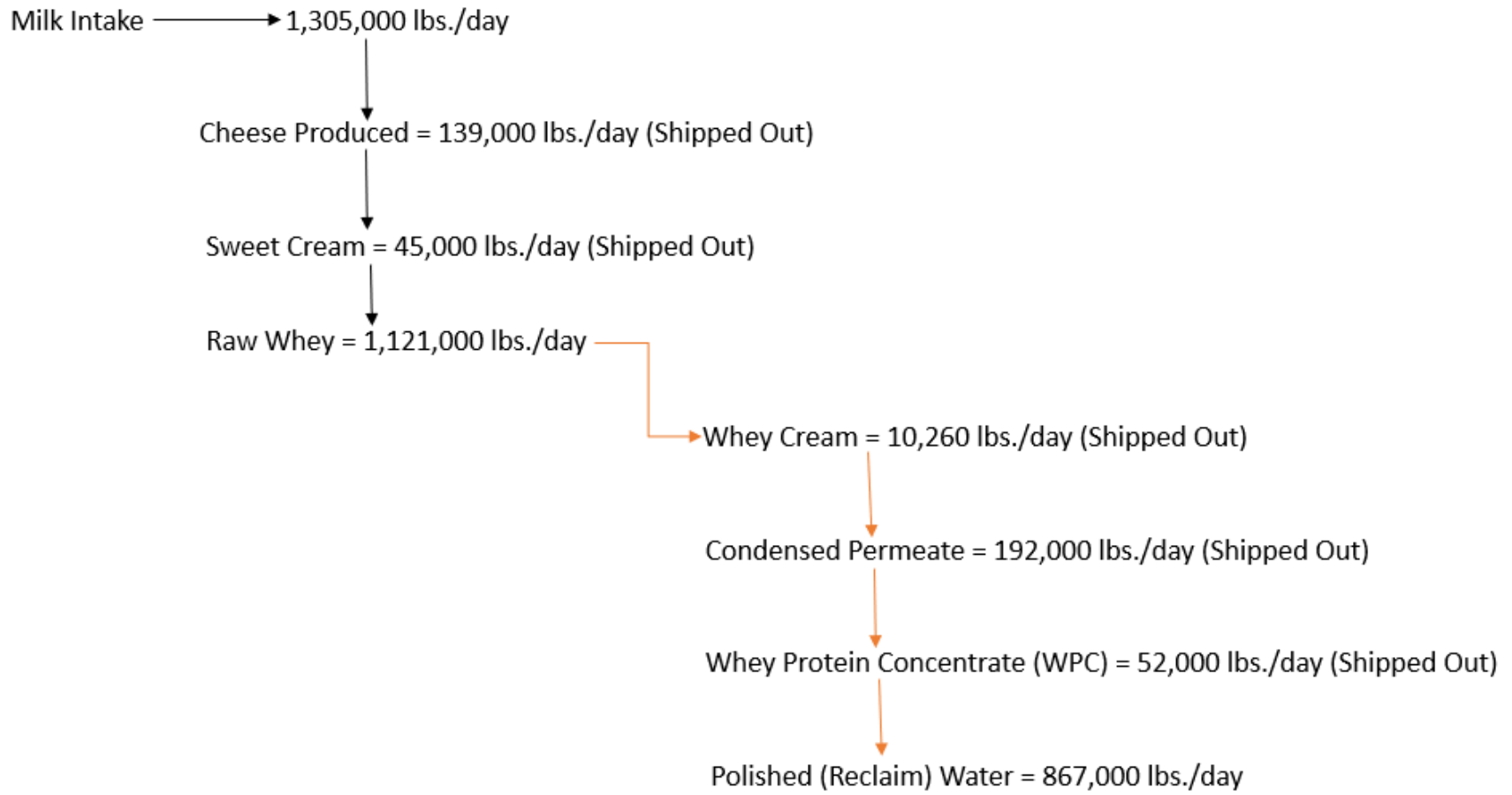
Per s. NR 240.06(4) Wis. Adm. Code, the total discharge limits shall be the total of the amounts calculated from the BOD input in each of the final product subcategories and all of the other subcategories with intermediate products in Parts 6 – 8 of this evaluation. For each production line, the most restrictive calculated set of limits are used in the calculation of the final total discharge limits.

**Outfall 006**

Final Calculated Effluent Limitations			
Parameter & Units	Daily Maximum	Daily Minimum	Monthly Average
BOD <sub>5</sub>	29 lbs/day		14 lbs/day
TSS	36 lbs/day		18 lbs/day
pH	9.0 s.u.	6.0 s.u.	

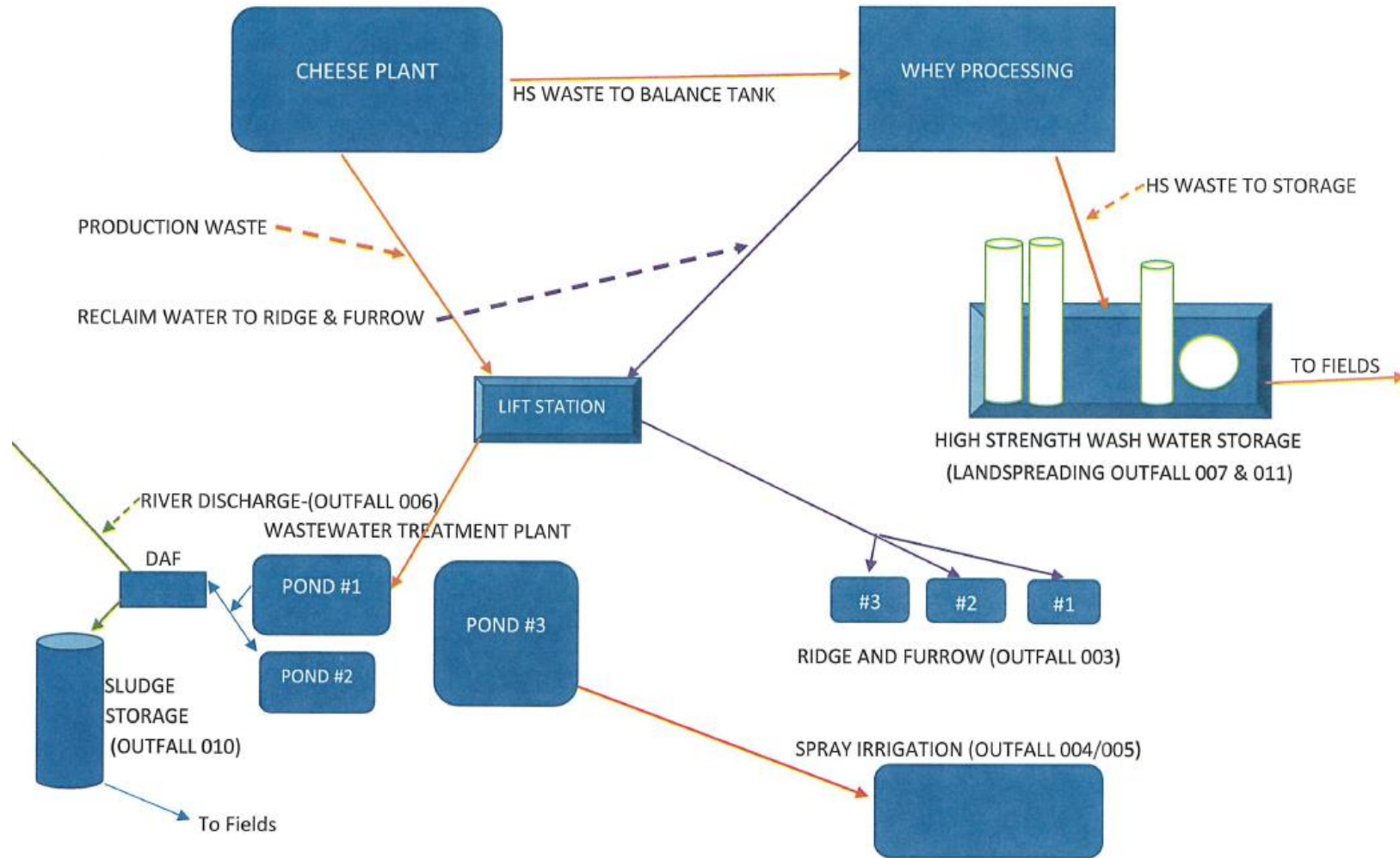
Any concentration and mass-based limits for BOD<sub>5</sub> and TSS recommended in the WQBEL memo dated December 2023 are also recommended to be included in the reissued permit along with the mass-based limits recommended in this evaluation.

**Cheese Production/Bi-Product Flow**






Facility Flow Diagram



DATE: October 20, 2023

FILE REF: 5173

TO: File

FROM: Woody Myers - WCR SUBJECT: Burnett Dairy Cooperative - Land Treatment System Evaluation Report,  
WPDES Permit # WI-0039039**Site Information**

Burnett Dairy Cooperative (the Dairy) is a cheese manufacturing plant that is regulated as an industrial facility located at 11631 STH 70, Grantsburg, Burnett County. Wastewater is currently treated and discharged to surface water and groundwater via infiltration by way of a ridge & furrow (R&F) system and spray irrigation fields located in the N ½ of the NW ¼ of Section 22, T38N, R18W, Town of Wood River. One groundwater monitoring system covers the land treatment systems in three outfalls.

**Land Treatment Effluent & Groundwater Evaluation Summary**

**Table 1 Land Treatment Effluent Parameters and Limits  
Outfall 003 Ridge & Furrow**

Parameter	Current Permit WI-0039039-09-1		Proposed Permit WI-0039039-10	
	Limits and Units	Limit Type	Limits and Units	Limit Type
Flow Rate	0.023 MGD	Quarterly Avg	0.023 MGD	Quarterly Avg
BOD <sub>5</sub>	- mg/l		- mg/l	
Nitrogen, Total Kjeldahl	- mg/l		- mg/l	
Chloride	- mg/l		- mg/l	
<b>*Nitrogen, Total</b>	Not Required		- mg/l	
Nitrogen, Max Applied to Any Zone	Not Required		lbs/ac/yr	

\* Proposed permit changes

**Table 2 Land Treatment Effluent Parameters and Limits  
Outfall 004 Spray Irrigation Site 1**

Parameter	Current Permit WI-0039039-09-1		Proposed Permit WI-0039039-10	
	Limits and Units	Limit Type	Limits and Units	Limit Type
Flow Rate <b>*(May to Nov)</b>	89,000 gpd	Monthly Avg LT	89,000 gpd	Monthly Avg LT
Flow Rate <b>*(Dec to Apr)</b>	Not Listed		0 gpd	
BOD <sub>5</sub>	- mg/l		- mg/l	
Nitrogen, Total Kjeldahl	- mg/l		- mg/l	
Chloride	- mg/l		- mg/l	
<b>*Nitrogen, Total</b>	Not Required		<b>- mg/l</b>	
Nitrogen, Max Applied to Any Zone	165 lbs/ac/yr	Annual Total	165 lbs/ac/yr	Annual Total
<b>*Chloride, Max Applied to Any Zone</b>	Not Required		<b>- lbs/ac/yr</b>	<b>Annual Total</b>

\* Proposed permit changes

**Table 3 Land Treatment Effluent Parameters and Limits  
Outfall 005 Spray Irrigation Site 2**

Parameter	Current Permit WI-0039039-09-1		Proposed Permit WI-0039039-10	
	Limits and Units	Limit Type	Limits and Units	Limit Type
Flow Rate <b>*(May to Nov)</b>	51,000 gpd	Monthly Avg LT	51,000 gpd	Monthly Avg LT
Flow Rate <b>*(Dec to Apr)</b>	Not Listed		0 gpd	
BOD <sub>5</sub>	- mg/l		- mg/l	
Nitrogen, Total Kjeldahl	- mg/l		- mg/l	
Chloride	- mg/l		- mg/l	
<b>*Nitrogen, Total</b>	Not Required		<b>- mg/l</b>	
Nitrogen, Max Applied to Any Zone	165 lbs/ac/yr	Annual Total	165 lbs/ac/yr	Annual Total
<b>*Chloride, Max Applied to Any Zone</b>	Not Required		<b>- lbs/ac/yr</b>	<b>Annual Total</b>

\* Proposed permit changes

**Table 4 Groundwater Monitoring Wells**

Well	Current Permit WI-0039039-09-1		Proposed Permit WI-0039039-10	
	Well Location	Well Designation	Well Location	Well Designation
801 MW-1	Down-gradient	Point of Standard	Abandoned May 13, 2020	
802 MW-2	Down-gradient	Point of Standard	Abandoned May 13, 2020	
803 MW-3	Down-gradient	Point of Standard	Abandoned May 13, 2020	
810 MW-10	Up-gradient	Background	Up-gradient	Background
811 MW-4R	Up-gradient	Non-Point of Standard	Up-gradient	Non-Point of Standard
<b>812 MW-7R</b>	Mid-gradient	Non-Point of Standard	<b>*Discontinue</b>	
813 MW-11	Down-gradient	Point of Standard	Down-gradient	Point of Standard
814 MW-3R	Down-gradient	Point of Standard	Down-gradient	Point of Standard
815 MW-2R	Down-gradient	Non-Point of Standard	Down-gradient	Non-Point of Standard
816 MW-1R	Down-gradient	Non-Point of Standard	Down-gradient	Non-Point of Standard

\* Proposed permit changes

**Table 5 Groundwater Quality Standards**

Parameter	Current Permit WI-0039039-09-1		Proposed WI-0039039-10	
	PAL	ES	PAL	ES
Depth to Groundwater	N/A	N/A	N/A	N/A
Groundwater Elevation	N/A	N/A	N/A	N/A
Nitrogen, Nitrite + Nitrate	2.0 mg/l	10.0 mg/l	<b>*3.6 mg/l</b>	10.0 mg/l
Chloride, Dissolved	125 mg/l	250 mg/l	125 mg/l	250 mg/l
pH, Field	5.3-7.3 su	N/A	5.3-7.3 su	N/A
Nitrogen, Organic	7.3 mg/l	N/A	<b>*2.8 mg/l</b>	N/A
Nitrogen Total Kjeldahl	N/A	N/A	N/A	N/A
Nitrogen, Ammonia	0.97 mg/l	9.7 mg/l	0.97 mg/l	9.7 mg/l
Alkalinity, (CaCO <sub>3</sub> )	127 mg/l	N/A	<b>*Discontinue</b>	
Total Dissolved Solids	287 mg/l	N/A	<b>*320 mg/l</b>	N/A
COD, Filtered	42 mg/l	N/A	<b>*35 mg/l</b>	N/A
Iron, Dissolved	0.15 mg/l	0.3 mg/l	<b>*Discontinue</b>	
Manganese, Dissolved	0.06 mg/l	0.3 mg/l	<b>*Discontinue</b>	

\* Proposed permit changes

### Geology

The bedrock under this facility is comprised of the Chengwatana Volcanic Group. This group consists of light to dark basalt flow with interflow of breccia and tuff (*Bedrock Geology of Wisconsin, Regional Map Series Northwest Sheet*, Wisconsin Geological and Natural History Survey (WGNHS), 1987). Bedrock is anticipated to be between 100 and 200 feet below ground surface (bgs) (*Depth to Bedrock in Wisconsin*, WGNHS, 1973). The regolith consists of material ranging from coarse sand to silt. Surface soil primarily consists of the Grettum sandy loam Perchlake and Crex loamy fine sand (USDA NRCS Web Soil Survey).

### Hydrogeology

Calculated groundwater elevation ranges between 920 and 930 feet above mean sea level (msl). Depth to groundwater was reported to be between 6 and 22 feet bgs. Groundwater flow direction was calculated

to be predominately to the west with slight variation. Regional groundwater is to the west in this area of Burnett County (*Generalized Water-Table Elevation Map of Burnett County, Wisconsin, Map, WGNHS, 1998*). The site is bound on the west by an un-named creek and is 3,800 feet east of Wood River. There are 13 wells (municipal, other than municipal, private and high-capacity) within a 1,500-foot range of this facility's groundwater discharge.

**Land Treatment Effluent Quality and Loading Rates**

Outfalls 003, 004 and 005 are the discharges associated with the groundwater monitoring network. The following table is the average flow (hydraulic loading), total Kjeldahl nitrogen, BOD<sub>5</sub> (R&F only) and chloride loading summations for the land treatment systems.

**Table 6 Land Treatment Loading Averages  
Outfall 003 Ridge & Furrow**

Year	Flow (MGD)	Kjeldahl Nitrogen (mg/l)	BOD <sub>5</sub> (mg/l)	Chloride (mg/l)
2023 <sup>#</sup>	0.013	23.33	4.2	6
2022	0.011	26.08	3.7	6
2021	0.012	25.31	4.5	8
2020	0.015	16.55	11.1	10
2019	0.015	24.67	13.5	10
2018	0.019	24.25	2.4	18

# Indicates partial year

**Table 7 Land Treatment Loading Averages  
Outfall 004 Spray Irrigation**

Year	Flow (gpd)	Kjeldahl Nitrogen (mg/l)	Chloride (mg/l)
2023 <sup>#</sup>	70,400	13.90	386
2022	76,611	31.00	343
2021	23,812	27.80	253
2020	13,292	6.97	201
2019	65,961	12.61	267
2018	66,941	17.76	351

# Indicates partial year

**Table 8 Land Treatment Loading Averages  
Outfall 005 Spray Irrigation**

Year	Flow (gpd)	Kjeldahl Nitrogen (mg/l)	Chloride (mg/l)
2023 <sup>#</sup>			
2022	48,464	52.0	554
2021	Not Utilized		
2020	8,585	2.9	174
2019	Not Utilized		
2018	Not Utilized		

# Indicates partial year

## Groundwater Monitoring System and Sampling Frequency

All of the groundwater samples were analyzed for the dissolved phase in the samples. Established groundwater quality standards are found in Table 1 Public Health Groundwater Quality Standards s. NR 140.10 Wis. Adm. Code, and Table 2 Public Welfare Groundwater Standards s. NR 140.12 Wis. Adm. Code. The thresholds of these standards are the Enforcement Standard (ES) and the Preventative Action Limit (PAL).

**Table 9 Groundwater Monitoring Well Data**

Sample Point	Well Name	Elevation (feet above msl)				Length (feet)		Well Type
		Casing Top	Ground Surface	Screen Top	Screen Bottom	Screen Length	Well Depth	
801	MW-1	Abandoned May 13, 2020						
802	MW-2	Abandoned May 13, 2020						
803	MW-3	Abandoned May 13, 2020						
810	MW-10	943.15	940.3		919.6		20.7	WT
811	MW-4R	935.25	932.9	926.5	916.5	10.0	16.4	WT
812	MW-7R	946.29	944.3	926.1	916.1	10.0	28.2	WT
813	MW-11	939.45	937.1	926.9	916.9	10.0	20.2	WT
814	MW-3R	933.42	930.9	925.4	915.4	10.0	15.5	WT
815	MW-2R	935.56	933.2	925.7	915.7	10.0	17.5	WT
816	MW-1R	944.25	941.9	929.4	919.4	10.0	22.5	WT

All measurements in feet

WT-Water table Observation P-Piezometer O-Other

## Effluent Quality

The effluent concentrations discharged to the R&F were low compared to most other R&F systems. The effluent concentration discharged to the two spray irrigation systems is moderate for the Kjeldahl nitrogen and moderate to high for chloride.

## Background Groundwater Quality

Nitrite + nitrate was observed in the background groundwater monitoring well MW-10 as high as 4.7 mg/l. The concentration was variable over the evaluated period. All of the other parameters were relatively low in concentration.

## Down-gradient Groundwater Quality

Groundwater monitoring well MW-7R is side-gradient to the R&F and is inside of its design Management zone (DMZ). The well had frequent ES exceedances and consistent PAL exceedances of nitrite + nitrate.

Groundwater monitoring well MW-2R had several PAL exceedances for chloride. The observed exceedances were sporadic. There were no other exceedances.

## Land Treatment System Impact to Groundwater Quality

Concentrations and trends in the groundwater monitoring data were compared to the loading data for the land treatment system. There are no correlations between the effluent loading levels and the groundwater monitoring results that can be confirmed. The moderately high chloride effluent concentrations may be the cause of the chloride results in the groundwater monitoring well MW-2R.

**Proposed Groundwater Monitoring Requirements Permit WI-0039039-10**

**Table 10 Groundwater Quality Sampling Frequency and Limits  
Outfalls 003, 004 and 005**

Sample Point	Well Name	Sample Frequency	Well Designation
810	MW-10	Quarterly	Background
811	MW-4R	Quarterly	Non-Point of Standard
812	MW-7R		<b>*Discontinue</b>
813	MW-11	Quarterly	Point of Standard
814	MW-3R	Quarterly	Point of Standard
815	MW-2R	Quarterly	Non-Point of Standard
816	MW-1R	Quarterly	Non-Point of Standard
Parameter	PAL	ES	Source
Depth to Groundwater	N/A	N/A	Measured
Groundwater Elevation	N/A	N/A	Measured
Nitrogen, Nitrite + Nitrate	<b>*3.6 mg/l (ACL)</b>	10.0 mg/l	Calculated, NR 140 Table 1
Chloride, Dissolved	125 mg/l	250 mg/l	NR 140 Table 2
pH, Field	5.3-7.3 su	N/A	Calculated
Nitrogen, Organic	<b>*2.8 mg/l</b>	N/A	Calculated
Nitrogen Total Kjeldahl	N/A	N/A	Measured
Nitrogen, Ammonia	0.97 mg/l	9.7 mg/l	NR 140 Table 1
Alkalinity (CaCO <sub>3</sub> )			<b>*Discontinue</b>
Total Dissolved Solids	<b>*320 mg/l</b>	N/A	Calculated
COD, Filtered	<b>*35 mg/l</b>	N/A	Calculated
Iron, Dissolved			<b>*Discontinue</b>
Manganese, Dissolved			<b>*Discontinue</b>

\* Proposed permit changes

**Groundwater Limits**

Groundwater Alternative concentration Limits (ACLs) and indicator parameter PALs for the current permit term were calculated using monitoring data from MW-10 sample results between (March 28, 2018 – June 14, 2023).

**Indicator Parameter PALs**

Indicator Parameter PALs are developed following the procedures described in s. NR 140.20(2), Wis. Adm. Code. Indicator parameters do not have Enforcement Standards. The PAL for an indicator parameter is a benchmark for evaluating site specific trends. When significant increases in the trends are observed, the facility and the department’s response action under s. NR 140.24 Wis. Adm. Code should be to investigate the cause of the increasing concentration. The indicator PALs for this facility were calculated using the following equation.

$$\sum [\text{Background groundwater quality mean} + \text{Minimum Increase (NR 140.20 Table 3)}]$$

**Alternative Concentration Limits**

ACLs can be developed and provided for a groundwater monitoring system utilizing the procedures described in s. NR 140.28, Wis. Adm. Code. ACLs are calculated using the results from samples collected at the background monitoring well(s) during the current permit term for the next permit term.

$$\sum [\text{Background groundwater quality mean} + \text{Standard Deviation of Results} \times 2] = \text{ACL}$$

## **Conclusions**

The groundwater monitoring wells are placed adequately to evaluate background and down-gradient groundwater quality with respect to determining compliance with the land treatment systems and groundwater limits.

Total nitrogen was added to the effluent parameters for the three outfalls (003, 004 and 005) to be consistent with requirements in ch. NR214 Wis. Adm. Code for calculating nitrogen mass loading annually.

The spray irrigation period has been increased to include the month of November under the conditions in ss. NR 214.14 (3) (a) and NR 214.14 (3) (f) Wis. Adm. Code.

The calculation of chloride mass applied to each of the spray irrigation fields has been added to aid in evaluation of chloride applied to the fields. No limit has been set with the parameter at this time.

Groundwater monitoring well MW-7R is side-gradient of the ridge & furrow and is in close proximity to the facility's sanitary drain fields. This well is within the design management zone for both systems. Given the sanitary system is not a regulated part of the wastewater industrial permitting and is being influenced by both systems, sampling of MW-7R is no longer required and should be abandoned if the Dairy will no longer sample this well per s. NR 141.25 Wis. Adm. Code.

An ACL was evaluated and calculated to account for nitrite + nitrate entering the land treatment system area from up-gradient. Based on the background groundwater quality data, the PAL for nitrite + nitrate has been increased from 2.0 to 3.6 mg/l.

The indicator parameters of organic nitrogen, TDS and COD were increased to 2.8, 320 and 35 mg/l respectively based on background groundwater quality.

## **Compliance Schedule Recommendations**

The ss. NR 214.13 (5)(e) and NR 214.14 (5)(d) Wis. Adm. Code requires a land treatment management plan for facilities with land disposal systems. The facility should review their plan within 90 days of permit reissuance and any revisions should be submitted to the department for approval.

The groundwater monitoring well latitude/longitude need to be provided in decimal degrees. These should be provided to the department within 90 days after the permit reissuance.

Groundwater monitoring well MW-7R either needs to be abandoned per s. NR 141.25 Wis. Adm. Code, sampled or inspected annually.