

Permit Fact Sheet

General Information

Permit Number:	WI-0055174-09-0
Permittee Name:	VV Supremo Arena
Address:	6415 Hwy H
City/State/Zip:	Arena WI 53503
Discharge Location:	A Ridge and Furrow System and a Spray Irrigation system south of Arena, Wisconsin – SW ¼ SW ¼ Section 31 T8N-R5E
Receiving Water:	Groundwaters of the Lower Wisconsin River Basin
StreamFlow (Q _{7,10}):	N/A
Stream Classification:	N/A
Discharge Type:	Existing, Year-round

Facility Description

VV Supremo Cheese in Arena, Wisconsin produces a brine culture semi-soft cheese five days a week. VV Supremo Cheese uses approximately 31,000,000 pounds of milk per year and to produce approximately 3,855,000 pounds of cheese. Whey and cream are separated using a centrifuge type separator. Cream is sold to a creamery and approximately 95% of the whey is pumped to a storage silo and sold to whey processing plants. Annual cumulative wastewater discharge has ranged from 3.2 – 3.7 MG/yr during the past five years. Wastewater is generated from cleanup of tanks, vats, equipment, and floors following cheese making and packaging operations. Wastewater drains to three underground solids removal/equalization tank that are 1,000-gallons, 2,000-gallons and 4,000-gallons in size. Untreated wastewater is discharged to either a 4-acre ridge and furrow treatment system or a 2.35-acre sprayfield. The ridge and furrow system consists of 32 cells that are each 1/8 acre in size. A groundwater monitoring system consisting of four monitoring wells is located around the perimeter of the ridge and furrow treatment system. No monitoring wells surround the sprayfield.

Substantial Compliance Determination

After a desktop review of all discharge monitoring reports, groundwater monitoring reports, compliance schedule items, and site visits on August 30, 2023 and May 13, 2024, this facility has been found to be in substantial compliance with their current permit.

Compliance determination entered by Zach Watson on August 28, 2024.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)
002	Did not land apply	Discharge of liquid wastewaters to department approved land application sites. Representative samples shall be collected prior to discharge to land application sites. Sampling is not needed if

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)
		outfall is not utilized.
003	0.87 MG/yr in 2023	Spray Irrigation: Seasonal discharge of dairy wastewater to a 2.35-acre Spray Irrigation Field located across from the production facility on the north side of CTH H (NW ¼ SW ¼ Section 31, T8N-R5E). The sample is collected from the 2,000 gallon lift and pump station or from the discharge pipe prior to the treatment system.
004	2.38 MG/yr in 2023	Ridge and Furrow: Year-round discharge of dairy wastewater to a 4-acre Ridge & Furrow system located south of the production facility and CTH H (SW ¼ SW ¼ Section 31 T8N-R5E). The sample is collected from the 2,000 gallon lift and pump station or from the discharge pipe prior to the treatment system.

Sample Point Designation For Groundwater Monitoring Systems			
System	Sample Pt Number	Well Name	Comments
Ridge & Furrow	801	MW-1 (801)	Background non-point of standards
	802	MW-2 (802)	Background non-point of standards
	803	MW-3 (803)	Downgradient non-point of standards
	804	MW-4 (804)	Downgradient point of standards
	805	MW-5 (805)	New downgradient point of standards

1 Land Treatment – Monitoring and Limitations

Sample Point Number: 003 - Spray Irrigation Field

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		gpd	Daily	Total Daily	
Hydraulic Application Rate	Monthly Avg	7,000 gal/ac/day	Monthly	Calculated	Limit effective May through October.
Hydraulic Application Rate	Monthly Avg	3,500 gal/ac/day	Monthly	Calculated	Limit effective November and April.
Hydraulic Application Rate	Monthly Avg	0 gal/ac/day	Monthly	Calculated	Limit effective December through March.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nitrogen, Total Kjeldahl		mg/L	Monthly	Grab	
Chloride		mg/L	Monthly	Grab	
BOD5, Total		mg/L	Monthly	Grab	
Phosphorus, Total		mg/L	Monthly	Grab	
pH Field		su	Monthly	Grab	
Nitrogen, Max Applied On Any Zone	Annual Total	300 lbs/ac/yr	Annual	Total Annual	
Chloride	Annual Total	170 lbs/ac/yr	Annual	Total Annual	

Changes from Previous Permit:

Reporting of the chloride mass load to the treatment system in lbs/ac/yr has been added to the monitoring requirements. Monitoring frequency increased to monthly for BOD5, Phosphorus and pH.

Explanation of Limits and Monitoring Requirements

Reporting of the chloride mass load to the treatment system in lbs/ac/yr has been added to the monitoring requirements so that this value is entered into the department data system.

Monitoring frequency for BOD5, Phosphorus and pH increased to monthly to be consistent with total Kjeldahl nitrogen and chloride.

Sample Point Number: 004 - Ridge & Furrow System

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		gpd	Daily	Total Daily	
Hydraulic Application Rate	Monthly Avg	5,000 gal/ac/day	Monthly	Calculated	
Nitrogen, Total Kjeldahl		mg/L	Monthly	Grab	
Chloride		mg/L	Monthly	Grab	
BOD5, Total		mg/L	Monthly	Grab	
Phosphorus, Total		mg/L	Monthly	Grab	
pH Field		su	Monthly	Grab	
Nitrogen, Max	Annual Total	400 lbs/ac/yr	Annual	Total	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Applied On Any Zone				Annual	
Chloride		lbs/ac/yr	Annual	Total Annual	

Changes from Previous Permit:

Reporting of the chloride mass load to the treatment system in lbs/ac/yr has been added to the monitoring requirements.

BOD5 added to monitoring requirements.

Monitoring frequency increased to monthly for Phosphorus and pH.

Nitrogen, Max Applied on any Zone limit reduced from 600 lbs/ac/yr to 400 lbs/ac/yr.

Explanation of Limits and Monitoring Requirements

Reporting of the chloride mass load to the treatment system in lbs/ac/yr has been added to the monitoring requirements so that this value is entered into the department data system.

BOD5 added for consistency in monitoring requirements between the ridge and furrow and spray irrigation system.

Monitoring frequency for Phosphorus and pH increased to monthly to be consistent with other parameters.

Nitrogen, Max Applied on any Zone limit reduced from 600 lbs/ac/yr to 400 lbs/ac/yr to be consistent with department guidance document “Establishing Nitrogen Limitations in WPDES Permits at Industrial Land Treatment Facilities” 3400-2024-05.

2 Groundwater – Monitoring and Limitations

2.1 Groundwater Monitoring System for Ridge & Furrow

Location of Monitoring system: Surrounding the Ridge and Furrow Land Treatment System

Groundwater Monitoring Well(s) to be Sampled: MW-1 (801), MW-2 (802), MW-3 (803), MW-4 (804), MW-5 (805)

Groundwater Monitoring Well(s) Used to Evaluate Background Groundwater Quality: MW-1 (801), MW-2 (802)

Groundwater Monitoring Well(s) Used for Point of Standards Application: MW-4 (804), MW-5 (805)

Parameter	Units	Preventative Action Limit	Enforcement Standard	Frequency
Depth To Groundwater	feet	N/A	N/A	Quarterly
Groundwater Elevation	feet MSL	N/A	N/A	Quarterly
Chloride Dissolved	mg/L	125	250	Quarterly
Nitrogen, Nitrite + Nitrate (as N) Dissolved	mg/L	2.0	10	Quarterly
Nitrogen, Ammonia Dissolved	mg/L	0.97	9.7	Quarterly

Nitrogen, Organic Dissolved	mg/L	2.2	N/A	Quarterly
COD	mg/L	35	N/A	Quarterly
Solids, Total Dissolved	mg/L	495	N/A	Quarterly
Manganese Dissolved	ug/L	60	300	Quarterly
Iron Dissolved	ug/L	150	300	Quarterly
pH Field	su	8.4	N/A	Quarterly
Dissolved Oxygen	mg/L	N/A	N/A	Quarterly
Specific Conductance Field	umhos/cm	N/A	N/A	Quarterly

Changes from Previous Permit:

Dissolved Oxygen and Specific Conductance were added to the monitoring requirements.

ACL for chloride and nitrite+nitrate removed and replaced by NR 140 Wis. Adm. Code standards.

Indicator parameter PALs updated using results from January 1, 2019 – December 31, 2023.

Explanation of Limits and Monitoring Requirements

Dissolved Oxygen and Specific Conductance were added to the monitoring requirements to aid in review of the impact from the treatment system on local groundwater quality.

ACL for chloride and nitrite+nitrate removed and replaced by NR 140 Wis. Adm. Code standards because the background concentrations for those parameters are not elevated.

More information provided in the Groundwater Evaluation for VV Supremo Arena dated May 23, 2024, prepared by Zach Watson, Hydrogeologist.

3 Land Application – Monitoring and Limitations

Sample Point Number: 002 - Landspreading Liquid

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		gpd	Monthly	Measure	
BOD5, Total		mg/L	Monthly	Grab	
Nitrogen, Total Kjeldahl		mg/L	Monthly	Grab	
Chloride		mg/L	Monthly	Grab	
Phosphorus, Total		mg/L	Quarterly	Grab	
Phosphorus, Water Extractable		% of Tot P	Quarterly	Grab	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Potassium, Total Recoverable		Percent	Quarterly	Grab	

Changes from Previous Permit:

Phosphorus, Water Extractable and Potassium, Total Recoverable were added to the monitoring requirements.

Explanation of Limits and Monitoring Requirements

Requirements for land application of industrial sludge are determined in accordance with ch. NR 214, Wis. Adm. Code. The monitoring and spreading limitations for this outfall are typical of that required for high strength dairy wastes.

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.

Potassium, Total Recoverable: Potassium is an important macro nutrient for plant growth. Addition of potassium to the soil can improve root growth (drought tolerance), maintain turgor (reduce water loss), aid in photosynthesis and food formation, etc. As part of the Wisconsin’s nutrient management plan (NMP) requirements (Wisconsin NRCS 590 Standard), a producer must account for all fertilizers they have used over the NMP cycle. Potassium data provides the producer the amount of potassium available for the intended crop, as the absence of potassium may limit crop growth and uptake of nitrogen and phosphorus. In addition, potassium data allows the department to verify that sludges applied are done so as beneficial reuse as required by ss. NR 214.02(1), Wis. Adm. Code. The department may require in a WPDES permit those industrial wastes (industrial liquid waste, by-product solids, and industrial sludge) be monitored for any other pollutant (potassium) that may be present (references: ss. NR 214.17(5)(b) and NR 214.18(5)(b), Wis. Adm. Code).”

4 Schedules

4.1 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
Land Application Management Plan: Submit an updated land application management plan to optimize the land application system performance and demonstrate compliance with Wisconsin Administrative Code NR 214.	09/30/2029

4.2 Land Treatment Management Plan

A management plan is required for the land treatment system.

Required Action	Due Date
Land Treatment Management Plan: Submit an updated land treatment management plan to optimize the land treatment system performance and demonstrate compliance with Wisconsin	09/30/2029

Administrative Code NR 214.	
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Explanation of Schedule

The permittee submitted updated Land Treatment and Land Application Management Plans in 2024. Updated Land Treatment and Land Application Management Plans are required to be submitted in 2029, one year prior to permit expiration, for the development of the next permit.

4.3 Chloride Source Reduction Measures (SRMs) for Groundwater Discharges

Required Action	Due Date
Chloride Reduction Plan: The permittee shall continue to submit annual chloride reduction plans and progress reports (CRP). The CRP is an initial step toward controlling chloride and ensuring compliance with chloride limits based on applicable groundwater standards. The CRP shall evaluate all applicable source reduction measures (SRMs) and establish appropriate implementation activities for the SRMs. The CRP shall include a schedule for implementing the selected SRMs.	02/28/2026
Annual Progress Report: Submit progress report in implementing the chloride reduction plan (CRP).	02/28/2027
Second Annual Progress Report: Submit progress report in implementing the chloride reduction plan (CRP).	02/28/2028
Third Annual Progress Report: Submit progress report in implementing the chloride reduction plan (CRP).	02/28/2029
Fourth Annual Progress Report: Submit progress report in implementing the chloride reduction plan (CRP).	02/28/2030

Explanation of Schedule

The current loading rates of chloride to the ridge and furrow have resulted in exceedances of the ch. NR 140 preventive action limit for chloride at a downgradient point of standards monitoring well (MW-4 (804)). The permittee will need to submit chloride reduction plans to demonstrate their efforts towards reducing the amount of chloride discharged into the land treatment systems.

4.4 Groundwater Monitoring Well Installation

Required Action	Due Date
Plans and Specifications: Submit plans and specifications for installation of monitoring well MW-5 (805) for the Ridge and Furrow Treatment System.	06/30/2025
Installation: Complete well installation in accordance with ch NR 141, Wisconsin Administrative Code. (Note: Documentation of well construction must be submitted to the Department within 60 days of well installation.)	12/31/2025

Explanation of Schedules

The groundwater evaluation alleges that MW-3 (803), a downgradient monitoring well, is unimpacted by the ridge and furrow due to the local groundwater flow paths and an additional downgradient monitoring well, MW-5 (805), shall be installed to better characterize the impact from the ridge and furrow treatment system on local groundwater quality.

The impact on local groundwater quality from the spray irrigation field is currently unmonitored due to the lack of a groundwater monitoring system. permittee needs to install a groundwater monitoring system surrounding the spray irrigation field to assess the impact of the treatment system on local groundwater quality.

Attachments:

NR 140 Groundwater Evaluation Report October 14, 2024

Expiration Date:

December 31, 2029

Prepared By: Zachary Watson Hydrogeologist Date: August 28, 2024

Revised post Fact Check dated: October 14, 2024

Revised post Public Notice dated:

CORRESPONDENCE/MEMORANDUM

DATE: October 14, 2024

FILE REF: FIN 5264

TO: File

FROM: Zach Watson Hydrogeologist - SCR

SUBJECT: Groundwater Evaluation for VV Supremo Arena WI-0055174-08

General Information and Treatment System Description

VV Supremo Cheese in Arena, Wisconsin produces a brine culture semi-soft cheese 5 days a week. VV Supremo Cheese uses approximately 31,000,000 pounds of milk per year and to produce approximately 3,855,000 pounds of cheese. Whey and cream are separated using a centrifuge type separator. Cream is sold to a creamery and approximately 95% of the whey is pumped to a storage silo and sold to whey processing plants. Annual cumulative wastewater discharge has ranged from 3.2 – 3.7 MG/yr during the past five years. Wastewater is generated from cleanup of tanks, vats, equipment, and floors following cheese making and packaging operations. Wastewater drains to three underground solids removal/equalization tank that are 1,000-gallons, 2,000-gallons and 4,000-gallons in size. Untreated wastewater is discharged to either a 4-acre ridge and furrow treatment system or a 2.35-acre sprayfield. The ridge and furrow system consists of 32 cells that are each 1/8 acre in size. A groundwater monitoring system consisting of four monitoring wells is located around the perimeter of the ridge and furrow treatment system. No monitoring wells surround the sprayfield.

Table 1 – Monitoring Requirements and Limitations – Spray Irrigation (Outfall 003)

Parameter	Current and Proposed Permit WI-0055174-08 and WI-0055174-09		
	Limit Type	Limits and Units	Sample Frequency
Flow Rate		gpd	*Daily
Hydraulic Application Rate	Monthly Average	7,000 gal/ac/day	Monthly
Hydraulic Application Rate	Monthly Average	3,500 gal/ac/day	Monthly
Hydraulic Application Rate	Monthly Average	0 gal/ac/day	Monthly
Nitrogen, Total Kjeldahl		mg/l	Monthly
Chloride		mg/l	Monthly
BOD5 Total		mg/l	*Monthly
pH Field		su	*Monthly
Phosphorus, Total		mg/l	*Monthly
Nitrogen, Max Applied on Any Zone	Annual Total	300 Lbs/ac/yr	Annual
*Chloride	Annual Total	170 Lbs/ac/yr	Annual

***Recommended changes from current permit**

Table 2 – Monitoring Requirements and Limitations – Ridge and Furrow (Outfall 004)

Parameter	Current and Proposed Permit WI-0055174-08 and WI-0055174-09		
	Limit Type	Limits and Units	Sample Frequency
Flow Rate		gpd	*Daily
Hydraulic Application Rate	Monthly Average	5,000 gal/ac/day	Monthly
Nitrogen, Total Kjeldahl		mg/l	Monthly
Chloride		mg/l	Monthly
*BOD5 Total		mg/l	Monthly
pH Field		su	*Monthly
Phosphorus, Total		mg/l	*Monthly
Nitrogen, Max Applied on Any Zone	Annual Total	*400 Lbs/ac/yr	Annual
*Chloride	Annual Total	lbs/ac/yr	Annual

***Recommended changes from current permit**

Table 3 – Ridge and Furrow Groundwater Monitoring System

Sample Point	Well Name	Current Permit and Proposed WI-0055174-08 and WI-0055174-09	
		Well Location	Well Designation
801	MW-1	Background	Non-Point of Standards
802	MW-2	Background	Non-Point of Standards
803	MW-3	Downgradient	Non-Point of Standards
804	MW-4	Downgradient	Point of Standards
*805	MW-5	Downgradient	Point of Standards

***Recommended changes from current permit**

Table 4 – Ridge and Furrow Groundwater Standards

Parameter	Current Permit WI-0055174-08		Proposed Permit WI-0055174-09	
	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
Nitrite+nitrate	2.8 mg/l (ACL)	10 mg/l	*2.0 mg/l	10 mg/l
Chloride	140 mg/l (ACL)	250 mg/l	*125 mg/l	250 mg/l
pH Field	6.5 – 8.5 su	N/A	*6.4 – 8.4 su	N/A
COD	33 mg/l	N/A	*35 mg/l	N/A
Ammonia	0.97 mg/l	9.7 mg/l	0.97 mg/l	9.7 mg/l
Organic Nitrogen	2.2 mg/l	N/A	*2.2 mg/l	N/A
Total Dissolved Solids	510 mg/l	N/A	*495 mg/l	N/A
Dissolved Iron	150 µg/l	300 µg/l	150 µg/l	300 µg/l
Dissolved Manganese	60 µg/l	300 µg/l	60 µg/l	300 µg/l

***Recommended changes for upcoming permit**

Geology

The bedrock underlying the treatment system is the Cambrian-aged St. Lawrence and Tunnel City Formations. These formations are comprised of dolomitic sandstones and siltstones. Depth to bedrock at monitoring wells MW-1 and MW-2 was 11 and 31 feet below ground surface, respectively. Depth to bedrock at monitoring wells MW-3 and MW-4 was not encountered during construction. The surface soils are primarily silt loams.

Hydrogeology

Depth to water ranges from approximately 20 feet (MW-3) to 110 feet (MW-1) below ground surface. Groundwater elevations remained stable during the permit term ranging from 735 – 760 feet above mean sea level. Regional groundwater flow is generally towards Mill Creek and then to the north towards the Wisconsin River. Groundwater flow at the site is to the north northwest (**Figure 1**).

Land Treatment Effluent Quality and Loading Rates

The sprayfield treatment system is operated by using a spreader tank pulled by a tractor. This treatment system is more accurately characterized as a landspreading field than a spray irrigation field. Given the lack of groundwater monitoring and the means of application, landspreading limits should apply to this field. Annual average discharge to the ridge and furrow treatment system ranged from 6,522 – 9,785 gal/ac/day during the past five years. Annual average discharge to the sprayfield ranged 902 – 2,376 gal/ac/day from 2021 – 2023. The annual average concentration of chloride discharged to the land treatment systems ranged 236 – 294 mg/l from 2019 – 2022 and then increased to an average concentration of 521 mg/l in 2023 (**Figure 2**). Similarly, the annual average concentration of total kjeldahl nitrogen ranged from 26 – 42 mg/l in 2019 – 2022 and then increased to an average concentration of 77 mg/l in 2023 (**Figure 3**). Annual average concentrations of phosphorus ranged 9 – 13 mg/l from 2019 – 2022 and increased in 2023 to an average of 33 mg/l (**Figure 4**). The sampling and reporting of BOD was erratic throughout the current permit and the results ranged from 50 – 7,070 mg/l.

Table 5 – Land Treatment Hydraulic Loading

Year	Ridge and Furrow		Sprayfield	
	Hydraulic Application Rate (MG/yr)	Average Hydraulic Application Rate (gal/ac/day)	Hydraulic Application Rate (MG/yr)	Average Hydraulic Application Rate (gal/ac/day)
2019	3.57	9,785	N/A	N/A
2020	3.53	9,683	N/A	N/A
2021	3.31	9,073	0.40	1,091
2022	2.61	7,164	0.33	902
2023	2.38	6,522	0.86	2,376

Table 6 – Annual Average Effluent Concentrations

Year	Average BOD Concentration (mg/l)	Average Total Kjeldahl Nitrogen Concentration (mg/l)	Average Chloride Concentration (mg/l)	Average Phosphorus Concentration (mg/l)
2019	N/A	42	294	13
2020	N/A	32	245	9
2021	686	34	236	9
2022	1,913	26	258	11
2023	3,928	77	521	33

Table 7 – Land Treatment Nutrient Loading Rates

Year	Ridge and Furrow		Sprayfield	
	Nitrogen Loading Rate (lbs/ac/yr)	Chloride Loading Rate (lbs/ac/yr)	Nitrogen Loading Rate (lbs/ac/yr)	Chloride Loading Rate (lbs/ac/yr)
2019	313	2,188	N/A	N/A
2020	236	1,803	N/A	N/A
2021	235	1,629	17	121
2022	141	1,404	11	109
2023	382	2,585	85	575

Background Groundwater Quality

Background groundwater quality is defined by the results from samples collected at MW-1 and MW-2. The results for chloride are stable and low at less than 20 mg/l (**Figure 5**). Similarly, the results for nitrite+nitrate are low and most often below 1 mg/l (**Figure 6**). Ammonia, dissolved iron and dissolved manganese are consistently non-detect in the samples collected at MW-1 and MW-2. Overall, the groundwater at MW-1 and MW-2 appear to be unimpacted by any potential upgradient/anthropogenic sources.

Downgradient Groundwater Quality

The results for chloride at MW-3 are low and similar to those observed at MW-1 and MW-2. Chloride is elevated and variable at MW-4. The results at MW-4 ranged from 10 – 200 mg/l during the current permit term where a sharp increase was observed from 2019 – 2022 followed by a recent decrease. The results for nitrite+nitrate are elevated and variable at both MW-3 and MW-4. The results for nitrite+nitrate at MW-4

exhibited an increasing trend from 2016 – 2021 and have generally decreased since. The results for nitrite+nitrate at MW-3 were as high as 18 mg/l in 2016 and steadily decreased to around 4 mg/l in 2019. The concentration of nitrite+nitrate has steadily increased since 2019 to approximately 10 mg/l presently. The results for ammonia, dissolved iron and dissolved manganese at MW-3 and MW-4 are generally non-detect. However, there were two results at MW-3 for dissolved manganese that exceeded the NR 140 PAL of 60 µg/l.

Table 8 – Monitoring Well Groundwater Standard Exceedances (October 1, 2019 – December 31, 2023)

Well Name	Parameter	ES Exceedances	PAL/ACL Exceedances
MW-3	Dissolved Manganese	0/17	2/17
	Nitrite+nitrate	1/17	17/17
MW-4	Chloride	0/17	5/17
	Nitrite+nitrate	4/17	15/17
	Total Dissolved Solids	N/A	11/17

Shown above are the number of exceedances over the number of samples analyzed for that parameter. Meaning that 1/17 is one exceedance for the parameter in the 17 samples that were analyzed for that parameter.

Treatment System Impact to Groundwater Quality

The impact of the sprayfield discharge is not currently monitored as there is no groundwater monitoring system surrounding this sprayfield. A groundwater monitoring system should be installed to monitor the impact from the sprayfield on local groundwater quality. The concentration of chloride and nitrogen discharged to the land treatment systems increased sharply throughout 2023. The impact from this elevated discharge has yet to be observed at downgradient monitoring wells. The results for chloride at MW-4 show significant variability over the past ten years and are likely attributable to the discharge to the ridge and furrow treatment system. Monitoring well MW-3 does not appear to be impacted by the ridge and furrow treatment system based upon the results for chloride where they are consistently below 20 mg/l. Given that chloride is the presumptive tracer for the wastewater discharged to the land treatment system and the chloride results are so low at MW-3, it is unlikely that the high concentrations of nitrite+nitrate observed at MW-3 are attributable to the discharge to the ridge and furrow treatment system. Therefore, it is assumed that the nitrite+nitrate results at MW-3 are related to some other source. The overall groundwater flow paths at the downgradient side of the ridge and furrow treatment system may have a more northerly component than north westerly. The chloride loading rates that are in the range of 1,500 – 2,500 lbs/ac/yr are detrimental to local groundwater quality and the loading rates for chloride should be reduced to prevent further impacts to local groundwater quality.

Indicator Parameter PALs

Indicator Parameter PALs are developed following the procedures described in s. NR 140.20(2), Wis. Adm. Code and “Calculating Preventive Action Limits and Evaluating Groundwater Quality Exemptions for Groundwater Dischargers”. 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 source of the compound. The indicator PALs for this facility were calculated using whichever of the two following methods provides a greater PAL.

- \sum [Background groundwater quality + (Standard Deviation of results x 3)]
- \sum [Background groundwater quality + Minimum Increase (NR 140.20 Table 3)]

Indicator parameter PALs for the current permit term were calculated using monitoring data from MW-1 and MW-2 during the prior permit term. The indicator parameter PALs for use in the upcoming permit WI-0055174-09 are presented in **Table 4** and were calculated using results from MW-1 and MW-2 (January 1, 2019 – December 31, 2023). The indicator parameter PALs were weighted equally between MW-1 and MW-2.

Alternative Concentration Limits

Alternative concentration Limits (ACLs) can be developed and provided for a groundwater monitoring system to replace the PAL or ES (s. NR 140.28, Wis. Adm. Code). ACLs are provided if the conditions at the background monitoring well(s) indicate that it is appropriate. The methodology and considerations for developing and providing ACLs are outlined in the guidance document “Calculating Preventive Action Limits and Evaluating Groundwater Quality Exemptions for Groundwater Dischargers”. ACLs for chloride and nitrite+nitrate are not provided in the upcoming permit term as the background concentrations for these parameters are low.

Conclusions, Recommendations and Schedule Requirements

- Remove section 1.2.1.10 “Nitrogen Loading Contingent on Groundwater Results” from the permit. Reduce the nitrogen loading limit for the Ridge and Furrow from 600 lbs/ac/yr to 400 lbs/ac/yr.
- Remove the ACLs for chloride and nitrite+nitrate in the monitoring requirements and limitations for groundwater as the concentrations of these parameters at the background monitoring wells are low.
- VV Supremo Arena should install an additional downgradient monitoring well that is east of MW-4 and north of the ridge and furrow to further delineate groundwater flow paths and the impact from high chloride loads to the ridge and furrow treatment system.
- VV Supremo Arena should install a groundwater monitoring system of at least three wells surrounding the sprayfield to assess the sprayfield’s impact on local groundwater quality. If VV Supremo Arena does not desire installation of a groundwater monitoring system, the sprayfield should be limited to an annual chloride loading limit of 170 lbs/ac/yr.
- VV Supremo Arena should continue to submit annual chloride reduction reports to update the department on their progress at reducing the overall load of chloride sent to their land treatment systems.

Figure 1 – Water Table Flow Map – July 31, 2023



Water Table Flow Map VV Supremo Arena July 31, 2023



Site Location

VV Supremo Arena
6415 Hwy H
Arena, WI 53503

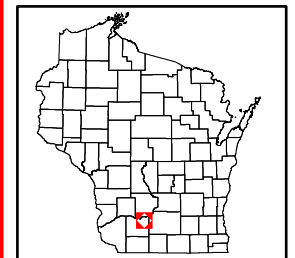
Legend

- Water Table Contour (7/31/23 - 2' FAMSL)
- Monitoring Well
- Groundwater Flow Direction

Notes

Water table contours generated using elevation data collected on July 31, 2023. Water table elevations and contours are presented in feet above mean sea level.

Created By: watsoz
Date: 2/26/2024



0 75 150 225 300 375 450 Feet

1:2,800

DISCLAIMER: This map is a user generated static output from the Wisconsin Department of Natural Resources. The contents herein are for reference purposes only and may or may not be accurate, current, or otherwise reliable. No liability is assumed for the data delineated herein either expressed or implied by the Wisconsin DNR or its employees. All land application must meet NR 113, NR 204, and NR 214 Wis. Adm. Code.

Figure 2 – Land Treatment Total Kjeldahl Nitrogen

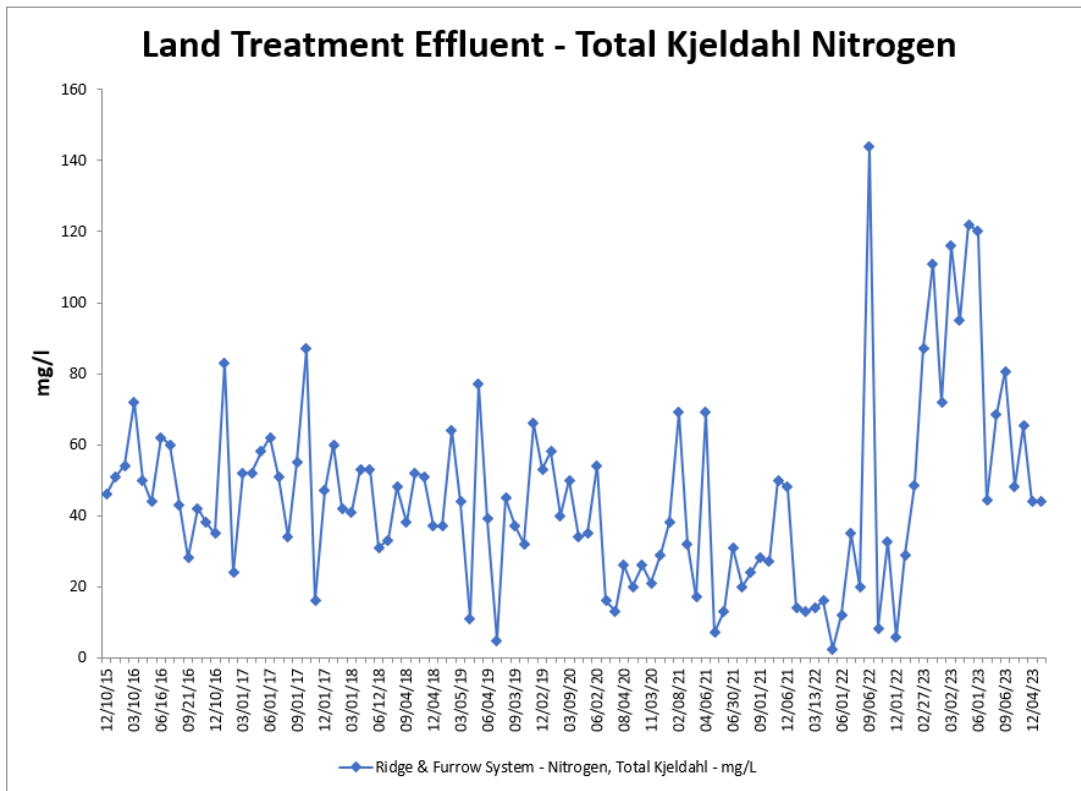


Figure 3 – Land Treatment Total Kjeldahl Nitrogen

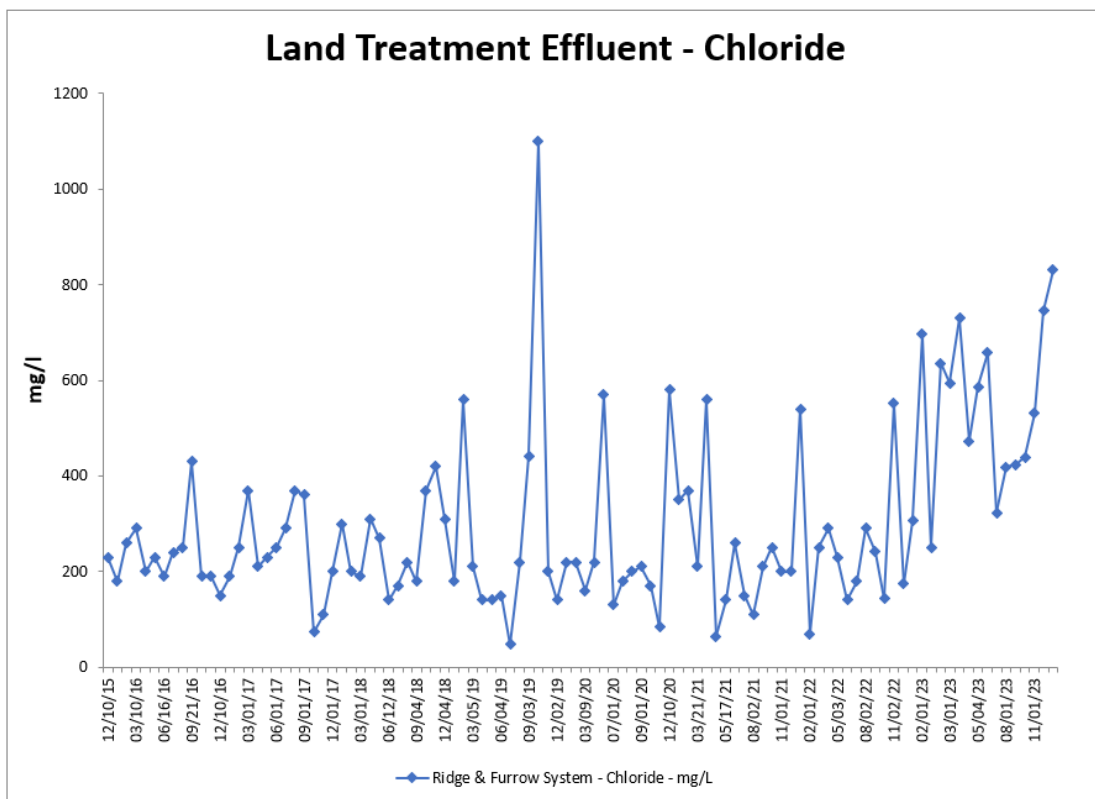


Figure 4 – Land Treatment Phosphorus

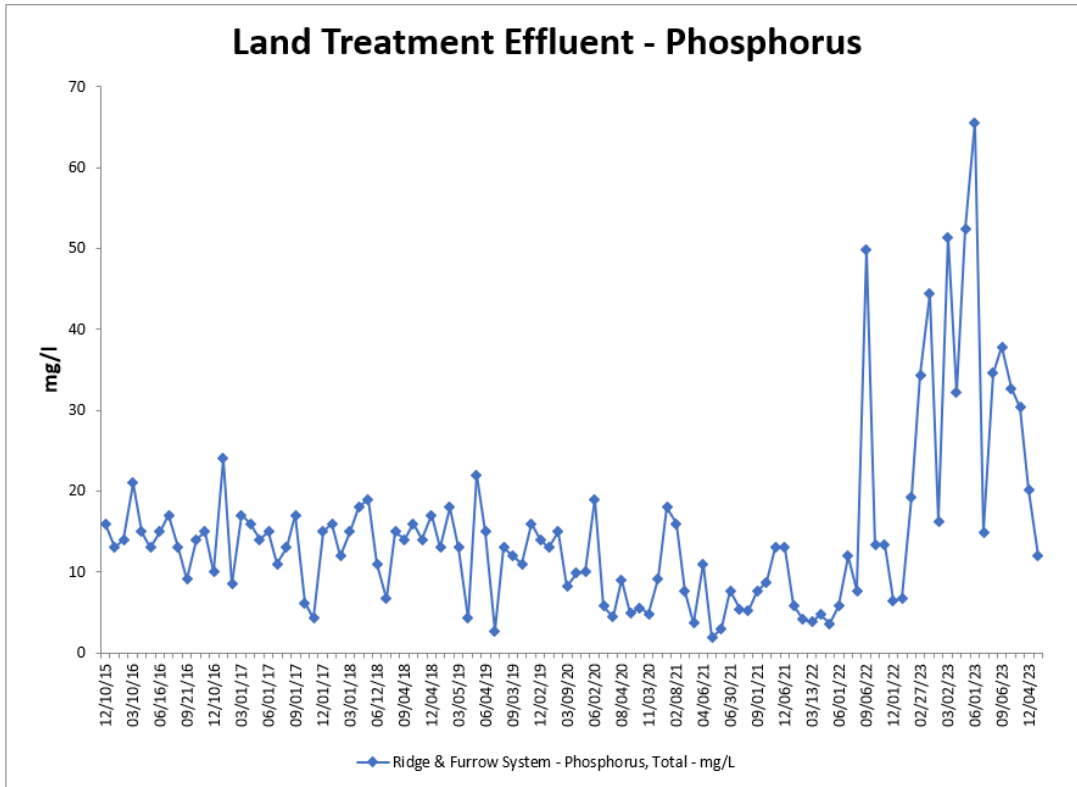


Figure 5 – Land Treatment Hydraulic Application Rate

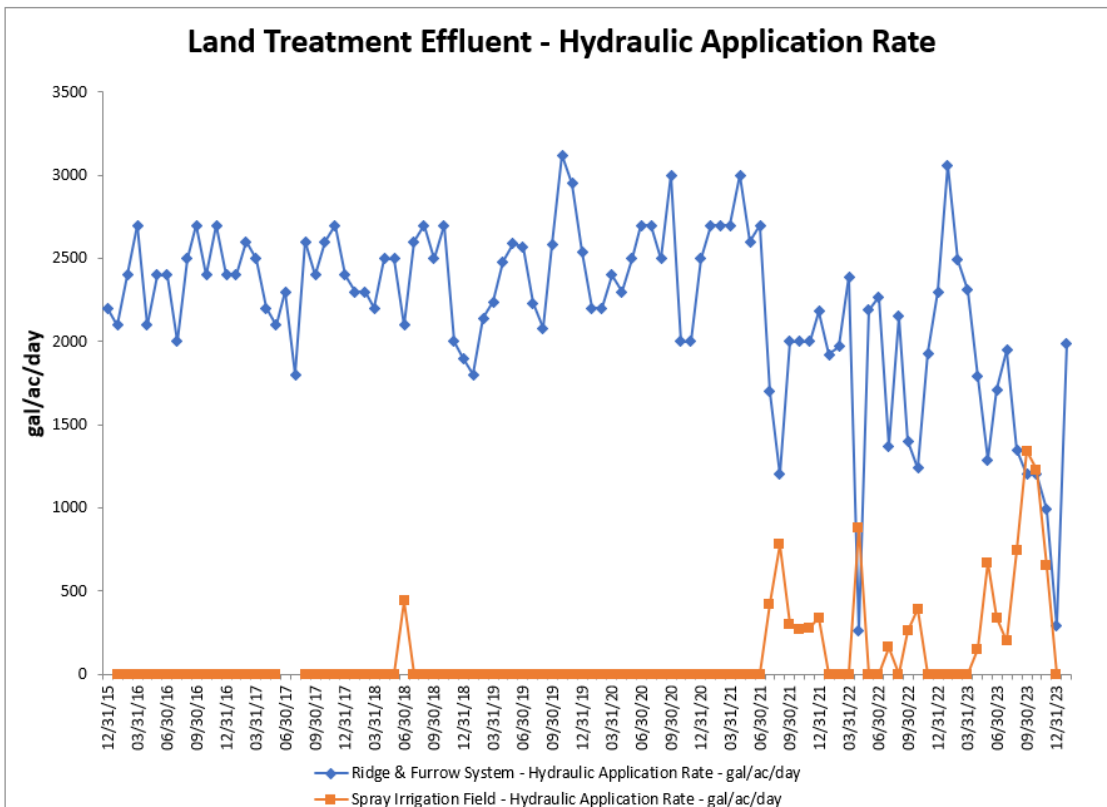


Figure 6 – Groundwater Monitoring Wells Groundwater Elevation

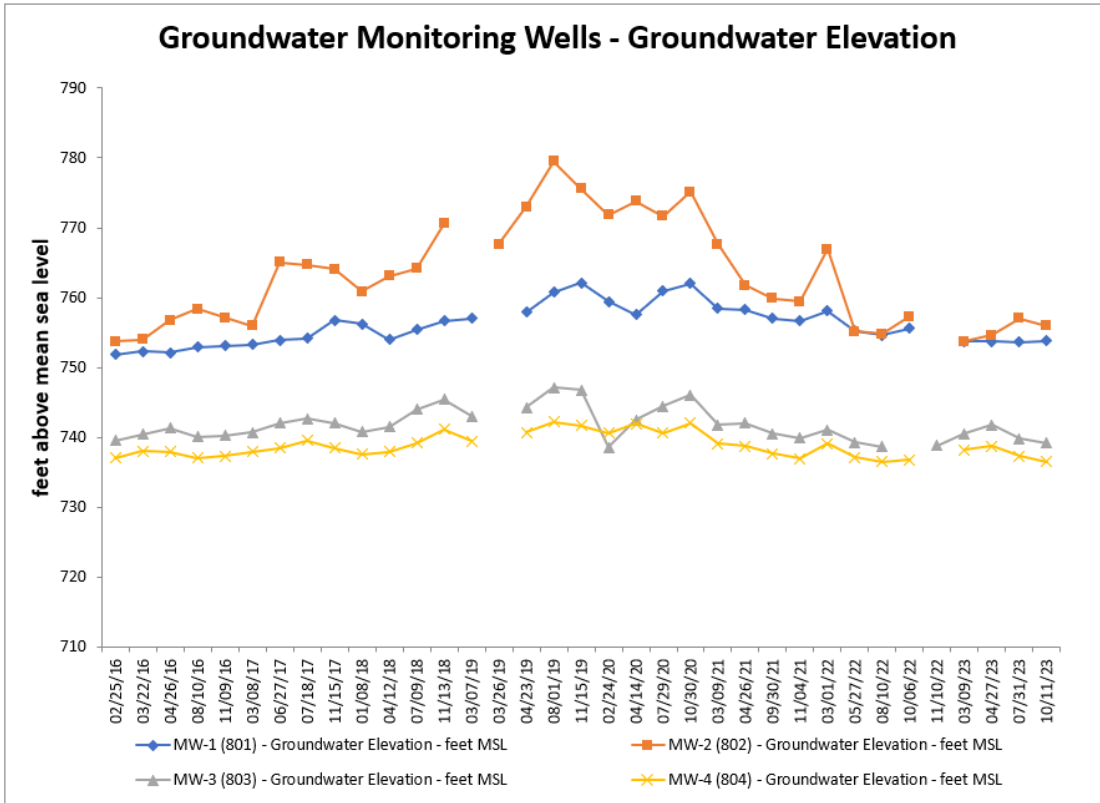


Figure 7 – Groundwater Monitoring Wells Chloride

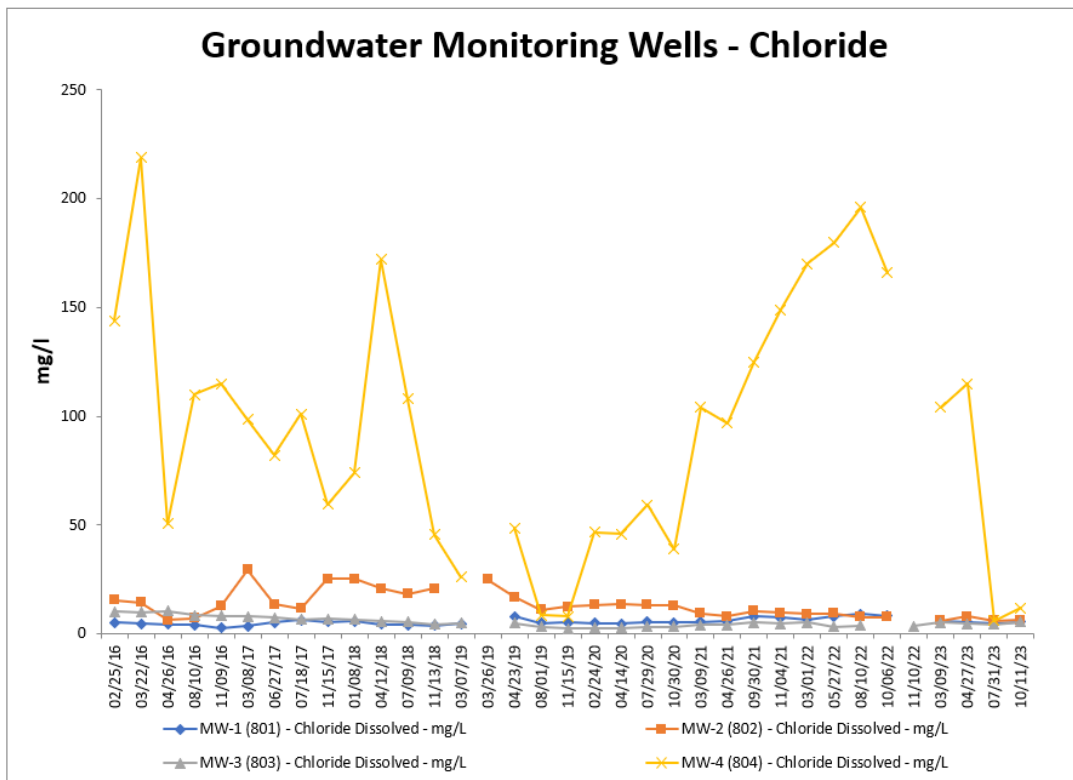


Figure 8 – Groundwater Monitoring Wells Nitrite+nitrate

