

Permit Fact Sheet

General Information

Permit Number:	WI-0051781-10-0
Permittee Name:	Carr Valley Cheese Co., Inc.
Address:	S3797 County Rd G
City/State/Zip:	La Valle WI 53941
Discharge Location:	Spray Irrigation Field, SE ¼ of the NW ¼ of Section 20, T12N, R3E
Receiving Water:	Groundwaters of the Baraboo River Basin, Sauk County
Discharge Type:	Existing, Intermittent

Facility Description

Carr Valley uses approximately 50,000 pounds of milk to produce 5,000 pounds of cheese each production day. The facility operates 12 hours a day five days a week. Excess liquid is pumped to a centrifuge type separator where cream is separated from whey. Cream is sold to a creamery and whey is pumped to a storage tank and sold to a whey processing plant. Untreated wastewater generated during cleanup is gravity fed to a 7,000-gallon storage tank and pumped to a 1.2-acre sprayfield land treatment system to the south of the cheese production facility. Discharge to the sprayfield averages approximately 3,300 gallons per day over the course of the year. Groundwater quality is monitored on a quarterly basis by a groundwater monitoring system of four wells.

Substantial Compliance Determination

Enforcement During Last Permit: Carr Valley had several exceedances of the NR 140 Enforcement Standard for chloride at downgradient monitoring wells MW-3 and MW-4. The facility has completed all previously required actions as part of the enforcement process.

After a desk top review of all discharge monitoring reports, compliance schedule items, and a site visit on November 07, 2022 this facility has been found to be in substantial compliance with their current permit.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)
001	3,300 GPD (Average July 2019 – August 2023)	Land Treatment: Discharge from Outfall 001 shall be limited to process wastewater from cheese making along with boiler blowdown discharged to the 1.2-acre Spray Irrigation Field located in SE 1/4 of the NW 1/4 of Section 20, T12N, R3E, Town of Ironton, Sauk County. Representative effluent grab samples shall be collected from the storage tank. Flow to the spray irrigation field is determined by converting the height of wastewater in the storage tank to gallons.
002	Outfall was not actively in use, no monitoring reported	Land Application: Landspreading of liquid industrial wastewater (Whey and Process wastewater) to approved landspreading sites. This Outfall is inactive and for emergency use only and no monitoring is required while inactive. INACTIVE: DEPARTMENT

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)
		APPROVAL REQUIRED TO ACTIVATE OUTFALL 002 MUST BE RECEIVED PRIOR TO USE.

Sample Point Designation For Groundwater Monitoring Systems			
System	Sample Pt Number	Well Name	Comments
Spray Irrigation Field	801	MW-1 (801)	Background Well, south of the system
	802	MW-2 (802)	Point of Standards Well, northeast of the system
	803	MW-3 (803)	Point of Standards Well, north of the system
	804	MW-4 (804)	Point of Standards Well, northwest of the system

1 Land Treatment – Monitoring and Limitations

Sample Point Number: 001- Spray Irrigation Effluent

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 Applied On Any Zone	Annual Total	288 lbs/ac/yr	Annual	Total Annual	See Annual Loading Calculation section.
Chloride		lbs/ac/yr	Annual	Total Annual	See Annual Loading Calculation section.

Changes from Previous Permit:

Flow Rate: Sample frequency has been changed to daily.

Hydraulic Application Rate: Sample frequency has been changed to monthly.

Total Kjeldahl Nitrogen, Chloride, BOD5, Total Phosphorus, and pH: Sample frequency for these parameters has been changed to monthly.

Nitrogen, Max Applied to Any Zone: The limit has changed.

Chloride: Reporting the total annual chloride load (lbs/ac/yr) has been included in the permit.

Explanation of Limits and Monitoring Requirements

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

Annual loading for nitrogen and chloride will be reported as a total annual on the December eDMRS, while a cumulative annual total will be kept on the Daily Logs. Reporting of the annual chloride load is included to aid in the assessment of the land treatment system's impact on local groundwater.

The nitrogen loading rate limit for the sprayfield has been increased due to the sprayfield consisting of perennial grasses, not hardwood forest as documented in previous permits.

2 Groundwater – Monitoring and Limitations

2.1 Groundwater Monitoring System for Spray Irrigation Field

Location of Monitoring system: Surrounding spray irrigation field

Wells to be Monitored: MW-1 (801), MW-2 (802), MW-3 (803), MW-4 (804)

Well Used To Calculate PALs: MW-1 (801)

Point of Standards Application Well(s): MW-2 (802), MW-3 (803), MW-4 (804)

Parameter	Units	Preventative Action Limit	Enforcement Standard	Frequency
Depth To Groundwater	feet	*****	N/A	Quarterly
Groundwater Elevation	feet MSL	*****	N/A	Quarterly
pH Field	su	8.4	N/A	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	*****	N/A	Quarterly
Nitrogen, Total Kjeldahl Dissolved	mg/L	*****	N/A	Quarterly
Solids, Total Dissolved	mg/L	440	N/A	Quarterly
Chloride Dissolved	mg/L	125	250	Quarterly

COD, Filtered	mg/L	35	N/A	Quarterly
Phosphorus, Total Dissolved	mg/L	*****	N/A	Quarterly

Changes from Previous Permit:

pH: The indicator parameter PAL range for pH has changed.

Nitrogen, Nitrite + Nitrate: The ACL for nitrite + nitrate was removed from the permit as there are no elevated concentrations of nitrite + nitrate at the background monitoring well (i.e., MW-1).

Chloride: The ACL for chloride was removed from the permit as there are no elevated concentrations of chloride at the background monitoring well (i.e., MW-1).

Nitrogen, Ammonia Dissolved: This parameter has been included in the permit.

Nitrogen, Organic Dissolved: Monitoring for this parameter has been included in the permit.

Total Dissolved Solids: The indicator parameter PAL has changed.

Dissolved Phosphorus: Monitoring for this parameter has been included in the permit.

Explanation of Limits and Monitoring Requirements

Refer to the Groundwater Evaluation for Carr Valley Cheese, WPDES Permit memo for detailed calculations, prepared by Zach Watson, Hydrogeologist, dated February 28, 2024 and used for this reissuance.

Groundwater limits and requirements are determined in accordance with ch. NR 140, Wis. Adm. Code. Indicator parameter Preventive Action Limit (PAL) values are established per s. NR 140.20 Wis. Adm. Code. Alternative Concentration Limits as allowed under s. NR 140.28 Wis. Adm. Code, are established on a case by case basis.

Dissolved Phosphorus monitoring has been added to determine if the land treatment system is contributing dissolved phosphorus to groundwater.

3 Land Application - Sludge/By-Product Solids

Sample Point Number: 002- Process Wastewater/Whey

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	
Nitrogen, Ammonia (NH ₃ -N) Total		mg/L	Monthly	Grab	
Phosphorus, Total		mg/L	Annual	Grab	
Phosphorus, Water Extractable		% of Tot P	Annual	Grab	
Potassium, Total Recoverable		mg/L	Annual	Grab	
pH Field		su	Annual	Grab	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
BOD ₅ , Total		mg/L	Annual	Grab	

Changes from Previous Permit:

Monitoring for these parameters has been included in the permit: Nitrogen, Ammonia (NH₃-N) Total; Phosphorus, Total; Phosphorus, Water Extractable; Potassium, Total Recoverable; pH Field; BOD₅, Total

Explanation of Limits and Monitoring Requirements

Requirements for land application of industrial wastewater are determined in accordance with ch. NR 214 Wis. Adm. Code. The monitoring limitations for this outfall are typical of that required for high strength dairy wastes. The permittee does not intend to use this outfall to land apply during the permit term unless operational changes to handling of whey require land application of whey process wastewater. Monitoring of this outfall is only required while it is actively in use.

Sample Point Number: 003- Hauled Sludge

Changes from Previous Permit:

This outfall has been removed from the permit.

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 sludge from the wastewater holding tank (Outfall 001) is removed by a WPDES permitted contract hauler. The permittee is required to detail in the land application management plan the management of wastes from Outfall 003.

4 Schedules

4.1 Chloride Source Reduction Measures (SRMs) for Groundwater Discharges

Required Action	Due Date
Annual Progress Report: Once the chloride reduction plan (CRP) is approved by the Department, the permittee shall submit an annual progress report, under the authority of s. NR 205.07(1)(h), Wis. Adm. Code. If a SRM implementation date of an approved CRP is not met, this may constitute a violation of the permit. Submittal of the first annual progress report is required by the Date Due.	06/30/2025
Second Annual Progress Report: Submit progress report in implementing the chloride reduction plan (CRP).	06/30/2026
Third Annual Progress Report: Submit progress report in implementing the chloride reduction plan (CRP).	06/30/2027
Fourth Annual Progress Report: Submit progress report in implementing the chloride reduction plan (CRP).	06/30/2028
Final Annual Progress Report: Submit progress report in implementing the chloride reduction plan (CRP).	06/30/2029

Explanation of Schedule

Carr Valley had several exceedances of the NR 140 Enforcement Standard for chloride at downgradient monitoring wells MW-3 and MW-4. The facility has completed all previously required actions as part of the enforcement process. Annual progress reports should assess whether these procedural and infrastructural improvements have resulted in compliance with NR 140, Wis. Adm. Code groundwater standards for chloride.

4.2 Land Treatment Annual Report

Required Action	Due Date
Submit Annual Land Treatment Report #1: Submit the Annual Land Treatment Report by January 31st for the previous calendar year.	01/31/2025
Submit Annual Land Treatment Report #2: Submit the Annual Land Treatment Report by January 31st for the previous calendar year.	01/31/2026
Submit Annual Land Treatment Report #3: Submit the Annual Land Treatment Report by January 31st for the previous calendar year.	01/31/2027
Submit Annual Land Treatment Report #4: Submit the Annual Land Treatment Report by January 31st for the previous calendar year.	01/31/2028
Submit Annual Land Treatment Report #5: Submit the Annual Land Treatment Report by January 31st for the previous calendar year.	01/31/2029

Explanation of Schedule

The permittee shall submit a report summarizing loadings and activities associated with the sprayfield.

4.3 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.	06/30/2029

Explanation of Schedule

The permittee shall submit an updated land treatment management plan to the department for approval.

4.4 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
<p>Land Application Management Plan: Submit an update to the management plan to optimize the land application system performance and demonstrate compliance with Wisconsin Administrative Code NR 214.</p> <p>The management plan shall include all Department issued approval maps and Land Application Approval Forms (3400-122) for all approved sites, to comply with s. NR 214.17(4)(a), Wis. Adm. Code. Sites that no longer match approval conditions in the Department issued approval maps and Land Application Approval Forms (3400-122), including those sites without approval maps or forms, in the management plan must be reviewed and potentially reauthorized to comply with ch. NR 214,</p>	06/30/2029

Wis. Adm. Code.

The management plan shall be consistent with the requirements of this permits, ss NR 214.17(3) and (6) and NR 214.18(3) and (6), Wis. Adm. Code. To ensure this consistency, the management plan shall address: 1) the information identified in NR 214.17(6) and NR 214.18(6); 2) record keeping and maintenance (including responsible individuals); 3) a full description of calculations used to determine appropriate application rates and loadings delivered to land application sites; 4) tracking of site loading; 5) procedures for notifying the Department of wastes that deviate from those anticipated; and 6) odor control.

Outfalls 003 has been inactivated and removed from the permit. The Land Application Management Plan shall describe how waste from the outfall is managed.

Explanation of Schedule

The permittee shall submit an updated land application management plan to the department for approval.

Special Reporting Requirements

None.

Other Comments:

None.

Attachments:

NR 140 Groundwater Evaluation Report dated February 28, 2024.

Expiration Date:

June 30, 2029

Justification Of Any Waivers From Permit Application Requirements

No waivers were given or requested from permit application requirements.

Prepared By: BetsyJo Howe, Wastewater Specialist

Date: 3/18/2024

Updated (based on fact check comments): Editorial changes for clarity. 5/3/2024

Updated (based on public notice comments):

CORRESPONDENCE/MEMORANDUM

DATE: February 28, 2024
 TO: File
 FROM: Zach Watson Hydrogeologist - SCR
 SUBJECT: Groundwater Evaluation for Carr Valley Cheese WI-0051781-09

FILE REF: FIN 5425

General Information and Treatment System Description

Carr Valley Cheese Company (Carr Valley) facility is located at S3797 County Highway G in La Valle, Sauk County, Wisconsin. Carr Valley uses approximately 50,000 pounds of milk to produce about 5,000 pounds of cheese each production day. The facility operates five days a week, 12 hours a day year-round, and employs 15 people. Excess liquid is pumped to a centrifuge type separator where cream is separated from whey. Cream is sold to a creamery and approximately 95 percent of the whey is pumped to a storage tank and sold to a whey processing plant. The drippings from the cheese press and the spent whey are higher in salt content. In the past, these drippings were discharged to the plant’s wastewater holding tank. Currently, Carr Valley is using a temporary plastic 275-gallon IBC tote tank outside the plant to store the press drippings and spent salted (chlorinated) whey. The tank will be emptied as needed by a licensed septic service company and reuse options are being explored. The installation of a sludge tank with an infeed system to allow proper, automated disposal of Carr Valley’s main sources of high-chloride wastewater (the press drippings and chlorinated whey) is in progress and expected to be completed sometime in 2024. Wastewater discharge for the facility is carried out on site by a sprayfield land treatment system. Currently, the wastewater discharges to a holding tank located on the southwest corner of the parking lot near the facility. The holding tank has a capacity of 7,000 gallons. The sprayfield system is approximately 1.2 acres in size comprised of perennial grasses and surrounded by woods. Discharge averages approximately 3,300 gallons per day. The system has four zones, the first prior to the splitter box and the remaining three after the splitter box. The first zone receives spray during every wastewater application; flow to the other three zones is controlled by the splitter box. Zone 4 is shut down during colder months due to freezing pipes.

Table 1 – Monitoring Requirements and Limitations – Spray Irrigation (Outfall 001)

Parameter	Current and Proposed Permit WI-0051781-09 and WI-0051781-10		
	Limit Type	Limits and Units	Sample Frequency
Flow Rate		gpd	Daily
Hydraulic Application Rate	Monthly Average	5,000 gal/ac/day *gal/ac/yr	Quarterly and *Annual Total
Nitrogen, Total Kjeldahl		mg/l	*Monthly
Chloride		mg/l	*Monthly
BOD5, Total		mg/l	*Monthly
Phosphorus, Total		mg/l	*Monthly
pH Field		su	*Monthly
Nitrogen, Max Applied on Any Zone	Annual Total	*288 lbs/ac/yr	Annual
*Chloride	Annual Total	lbs/ac/yr	Annual

*Recommended changes from current permit

Table 2 – Sprayfield Groundwater Monitoring System

Sample Point	Well Name	Current Permit and Proposed WI-0051781-09 and WI-0051781-10	
		Well Location	Well Designation
801	MW-1	Background	Non-Point of Standards
802	MW-2	Downgradient	Point of Standards
803	MW-3	Downgradient	Point of Standards
804	MW-4	Downgradient	Point of Standards

Table 3 – Sprayfield Groundwater Standards

Parameter	Current Permit WI-0051781-09		Proposed Permit WI-0051781-10	
	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
pH Field	6.0 – 8.0 su	N/A	*6.4 – 8.4 su	N/A
Nitrite+Nitrate nitrogen	2.8 mg/l (ACL)	10 mg/l	*2.0 mg/l	10 mg/l
*Ammonia	N/A	N/A	*0.97 mg/l	*9.7 mg/l
*Organic Nitrogen	N/A	N/A	N/A	N/A
Total Kjeldahl Nitrogen	N/A	N/A	N/A	N/A
Total Dissolved Solids	520 mg/l	N/A	*440 mg/l	N/A
Chloride	140 mg/l (ACL)	250 mg/l	*125 mg/l	250 mg/l
COD	40 mg/l	N/A	*35 mg/l	N/A
*Phosphorus	N/A	N/A	N/A	N/A

***Recommended changes for upcoming permit**

Geology

The bedrock underlying the treatment system changes from the hilltop to the valley floor with the Ordovician aged Oneota and Rountree formations (dolomite) at the top progressing through the Cambrian-aged Jordan, St. Lawrence and Tunnel City Formations (sandstones and shales) (Geology of Sauk County, Wisconsin 1990). Depth to bedrock is expected to be 0 – 25 feet below ground surface (Depth to Bedrock Map of Sauk County, Wisconsin 2002). Surface soils at the sprayfield are the La Farge silt loam surrounded by the Norden silt loam and Richwood silt loam towards the valley floor (NRCS Soil Map).

Hydrogeology

Regional groundwater flow is to the north towards the Baraboo River (Water-Table Elevation Map of Sauk County, Wisconsin 2002). Groundwater elevations at the site ranged from approximately 950 – 960 feet above mean sea level during the current permit term (**Figure 5**). Groundwater elevations exhibited a steady decline of a few feet at all wells during the permit term. Depth to groundwater water ranges from approximately 15 – 115 feet below top of casing and is shallower at the base of the hill (MW-3) and deepest towards the top of the hill (MW-1). The groundwater flow path appears to be to the north consistent with the regional interpretation (**Figure 1**). Annual precipitation exhibited a declining trend during the current permit term (Reedsburg WWTP USC00477052).

Land Treatment Effluent Quality and Loading Rates

The discharge to the sprayfield averaged approximately 3,300 gallons per day. The discharge rate varies more production day to day than year to year. The concentration of BOD averaged approximately 1,958 mg/l during the current permit term (**Figure 2**). The concentration of total kjeldahl nitrogen averaged approximately 74 mg/l during the permit term. Significant fluctuations in the concentration of total kjeldahl nitrogen occurred in 2020 ranging from 5 – 570 mg/l (**Figure 3**). The concentration of chloride averaged approximately 422 mg/l for the permit term. Significant fluctuations in the concentration of chloride were also observed with concentrations being as high as 1,500 mg/l (**Figure 4**).

Table 4 – Sprayfield Loading Rates

Year	Hydraulic Application Rate (MG/yr)	Average Total Kjeldahl Nitrogen Concentration (mg/l)	Average Chloride Concentration (mg/l)	*Total Kjeldahl Nitrogen Load (lbs/yr)	*Chloride Load (lbs/yr)
2019	0.83	21	210	73	727
2020	1.18	199	500	979	2,460
2021	1.41	61	830	359	4,880
2022	1.22	73	435	371	2,213

*Total Kjeldahl nitrogen and chloride load calculated by using the annual average concentration and the annual total flow rate over a 2-acre field. These loading rates are approximate.

Background Groundwater Quality

Background groundwater quality is defined by the results from samples collected at MW-1. The results for chloride are stable around 2 mg/l. Similarly, the results for ammonia and nitrite+nitrate are low (non-detect or less than 0.5 mg/l). Overall, the groundwater at MW-1 appears to be unimpacted by any potential background/anthropogenic sources.

Downgradient Groundwater Quality

The results for chloride at MW-3 and MW-4 have exhibited an increasing trend during the current permit term. The results for chloride at MW-3 increased from approximately 50 mg/l at the beginning of the permit to as high as 400 mg/l in 2022 (**Figure 6**). The concentration of chloride at MW-4 is more variable than at MW-3 but exhibited a steady increase from the beginning of 2020 to the end of 2022 up to a peak concentration of 500 mg/l. The results for chloride at MW-2 are generally low (i.e., < 5 mg/l). The results for nitrite+nitrate were most often below the PAL at MW-2, MW-3 and MW-4. The results at MW-3 and MW-4 have exhibited a declining trend for nitrite+nitrate over the past ten years (**Figure 7**). There were two results for nitrite+nitrate at MW-4 that exceeded the NR 140 PAL. The results for ammonia are generally non-detect.

Exceedance Review

Monitoring Well Groundwater Standard Exceedances (July 1, 2019 – September 30, 2023)

Well Name	Parameter	ES Exceedances	PAL/ACL Exceedances
MW-2	Chloride	1/17	1/17
MW-3	Chloride	1/17	6/17
	COD	N/A	3/17
	Total Dissolved Solids	N/A	8/17
MW-4	Chloride	10/17	14/17

Well Name	Parameter	ES Exceedances	PAL/ACL Exceedances
	Nitrite+nitrate	0/17	1/17
	Total Dissolved Solids	N/A	16/17

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 times samples were analyzed for that parameter.

Treatment System Impact to Groundwater Quality

The size of the sprayfield has been misreported throughout prior permits and land treatment management plans as either 5 or 10-acres. Carr Valley recently (January 2024) calculated the size of the sprayfield by using the dimensions of the current spray gun configuration and the radius of the spray gun discharge which resulted in a calculated size of 1.24-acres for the sprayfield (**Figure 8**). This change in acreage has resulted in a significant increase in the reported loading of wastewater, chloride and nitrogen to the sprayfield. **Figure 8** also includes Carr Valley’s modified calculation of chloride and nitrogen loading for 2022 and 2023.

The results for chloride at monitoring wells MW-3 and MW-4 have been the primary concern for this permit. A Notice of Noncompliance (NON) was sent to Carr Valley on November 9, 2022 to address the exceedances of the PAL and ES for chloride at MW-3 and MW-4. In that NON, the department alleged that the elevated and increasing trend in the concentration of chloride in the sprayfield discharge was the cause of the exceedances at the monitoring wells. Carr Valley responded by diverting its cheese press drippings and residual whey to a temporary storage tank and begun installation of a permanent storage tank. Following the diversion, the concentration of chloride in the sprayfield discharge has decreased. The initial results from the monitoring wells following this waste diversion are promising. However, it is still possible that the results for chloride at MW-3 and MW-4 are in part due to road salt activities. The results for chloride will continue to be monitored closely.

Carr Valley exceeded their nitrogen loading limit during 2020 – 2022. While the loading of nitrogen to the sprayfield was well above the 100 lbs/ac/yr limit during the past three years, the overall contribution of nitrogen to groundwater appears to be acceptable as there were only two results for nitrite+nitrate above the NR 140 PAL during the permit term. The loading rate for nitrogen is currently based upon the sprayfield being a hardwood forest. The loading rate should be updated to reflect that the sprayfield is comprised of perennial grasses surrounded by a hardwood forest.

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 during the prior permit term. The indicator parameter PALs for use in the upcoming permit WI-0051781-10 are presented in **Tables 3** and were calculated using results from MW-1 (July 1, 2019 – September 30, 2023).

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

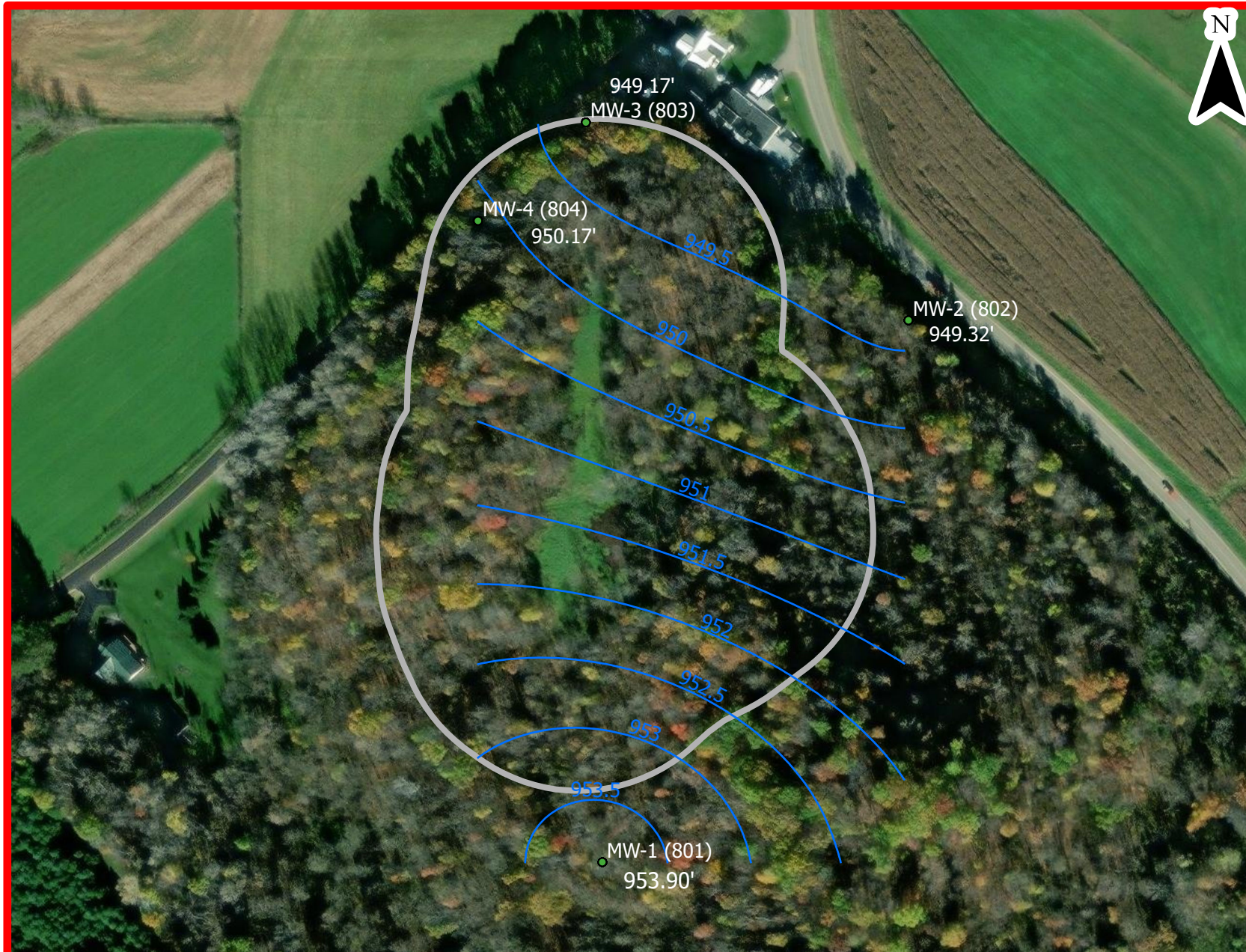
- The monitoring of organic nitrogen and ammonia nitrogen were removed for permit 0051781-09. These parameters should be monitored and are added back to the list of monitoring requirements for groundwater in permit 0051781-10. Phosphorus was also added to the list of monitoring requirements for groundwater to assess if the sprayfield is contributing phosphorus to groundwater.
- The nitrogen loading rate for the sprayfield has been increased from 100 lbs/ac/yr to 288 lbs/ac/yr. The change was made due to the sprayfield consisting of perennial grasses not hardwood forest.
- Carr Valley should conduct an infiltration test on the sprayfield to determine if the 1.2-acre sprayfield can treat the current hydraulic load.
- An NON was sent to Carr Valley on November 9, 2022 for the exceedances of the NR 140 ES for chloride at downgradient monitoring wells MW-3 and MW-4. Carr Valley has made a number of procedural and infrastructure improvements following the issuance of the November 9, 2022 NON. These procedural improvements include the development of a Land Treatment Management Plan and a Chloride Reduction Plan. The infrastructure improvement includes a new centrifugal whey and cream separator and a high-strength waste storage tank. Carr Valley should continue to submit annual Chloride Reduction Plans and Land Treatment Annual Reports to update the progress in optimizing their wastewater treatment processes.

Figure 1 – Water Table Flow Map - June 13, 2023



Water Table Flow Map - Carr Valley Cheese Company Sprayfield

June 13, 2023



Site Location

Carr Valley Cheese Company
S3797 County Rd G
La Valle, WI 53941
0051781-09

Legend

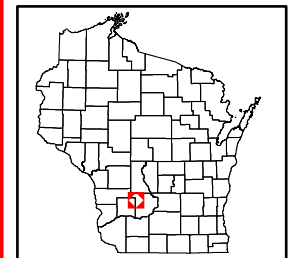
- Monitoring Wells
- Water Table Contour
- ▭ DMZ

Notes

Water table contours generated using elevation data collected on June 13, 2023. Water table contours in feet above mean sea level.

DMZ Boundary is approximated from approximate sprayfield boundaries.

Created By: watsoz
Date: 12/4/2023



0 70 140 210 280 350 420
Feet

1:2,548

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 – Sprayfield BOD

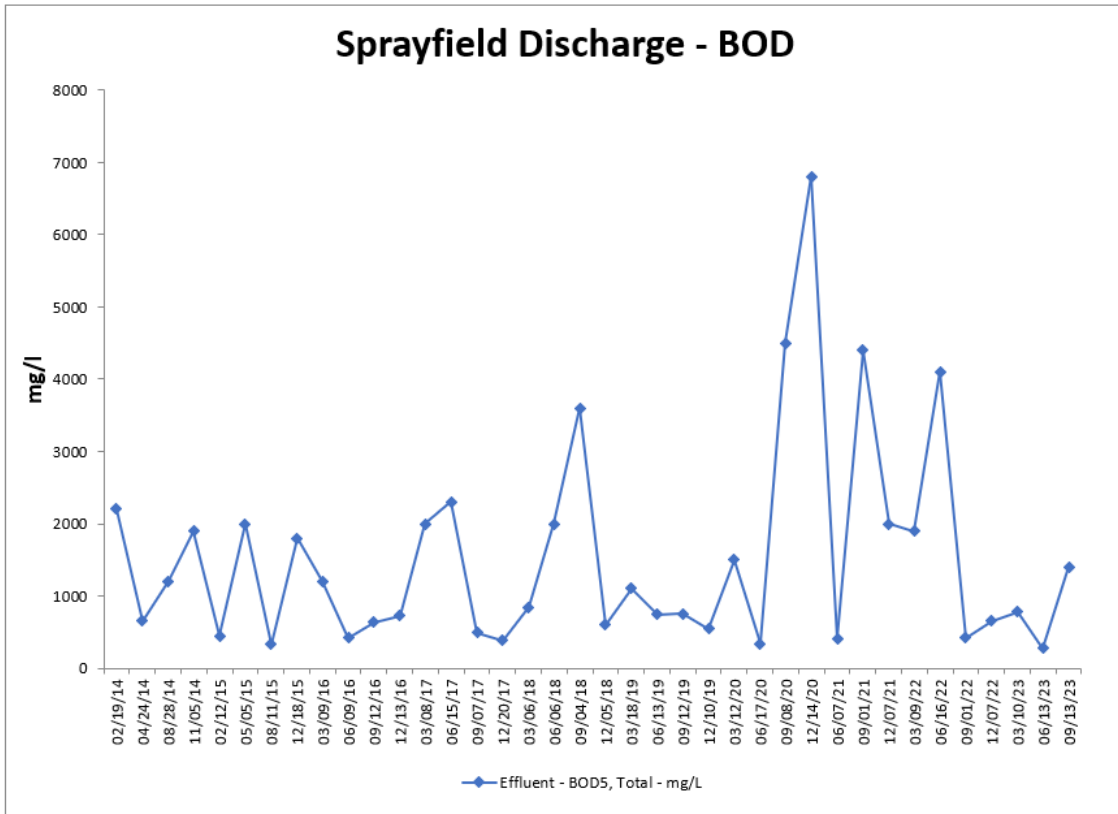


Figure 3 – Sprayfield Total Kjeldahl Nitrogen

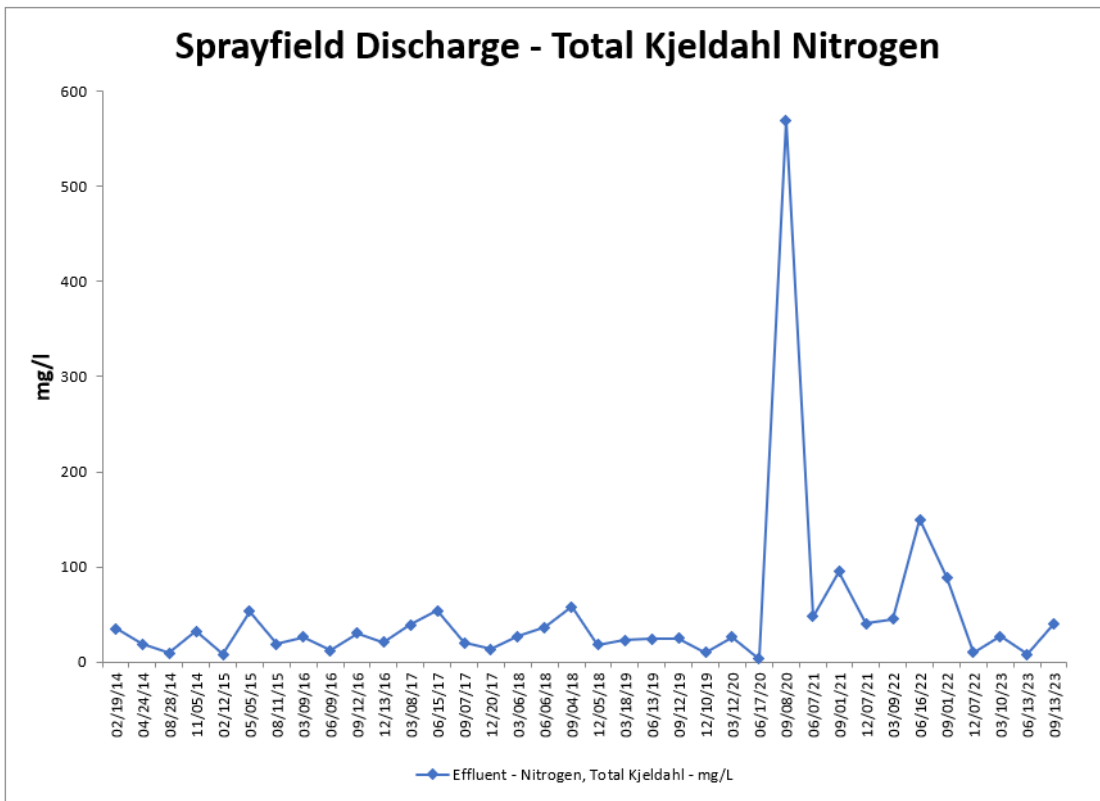


Figure 4 – Spray Irrigation Chloride

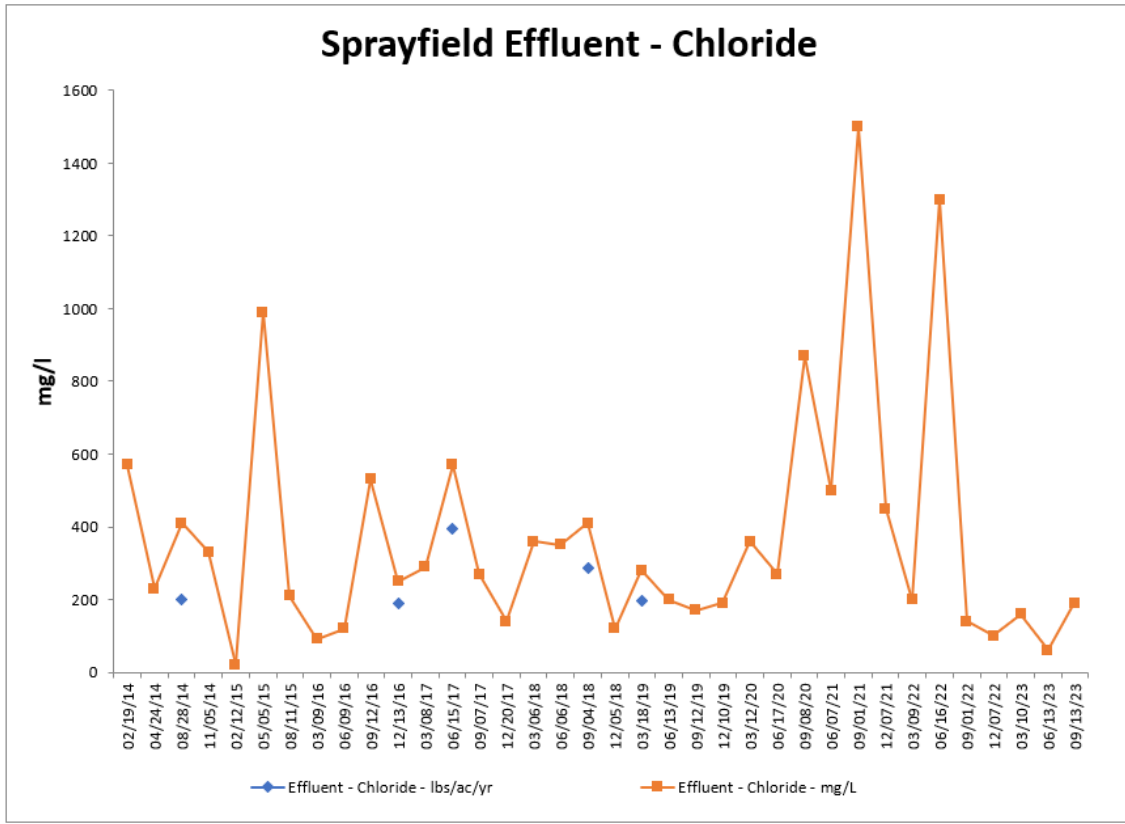


Figure 5 – Monitoring Wells Groundwater Elevation

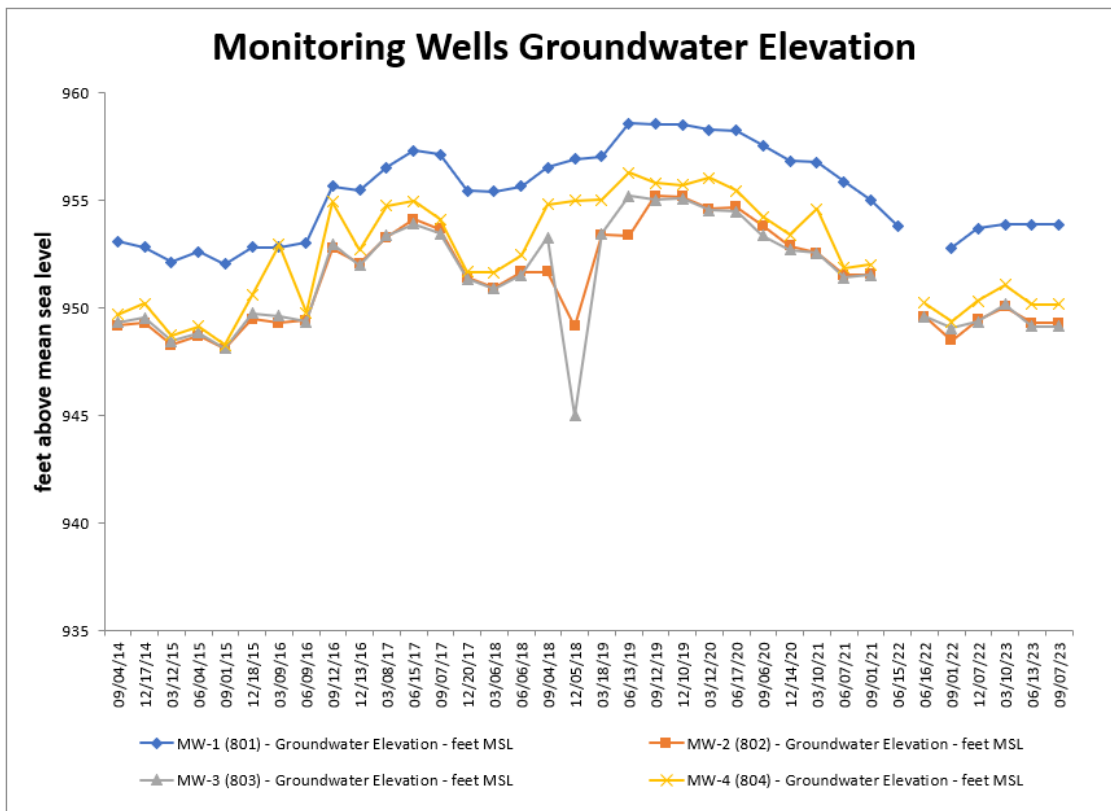


Figure 6 – Monitoring Wells Chloride

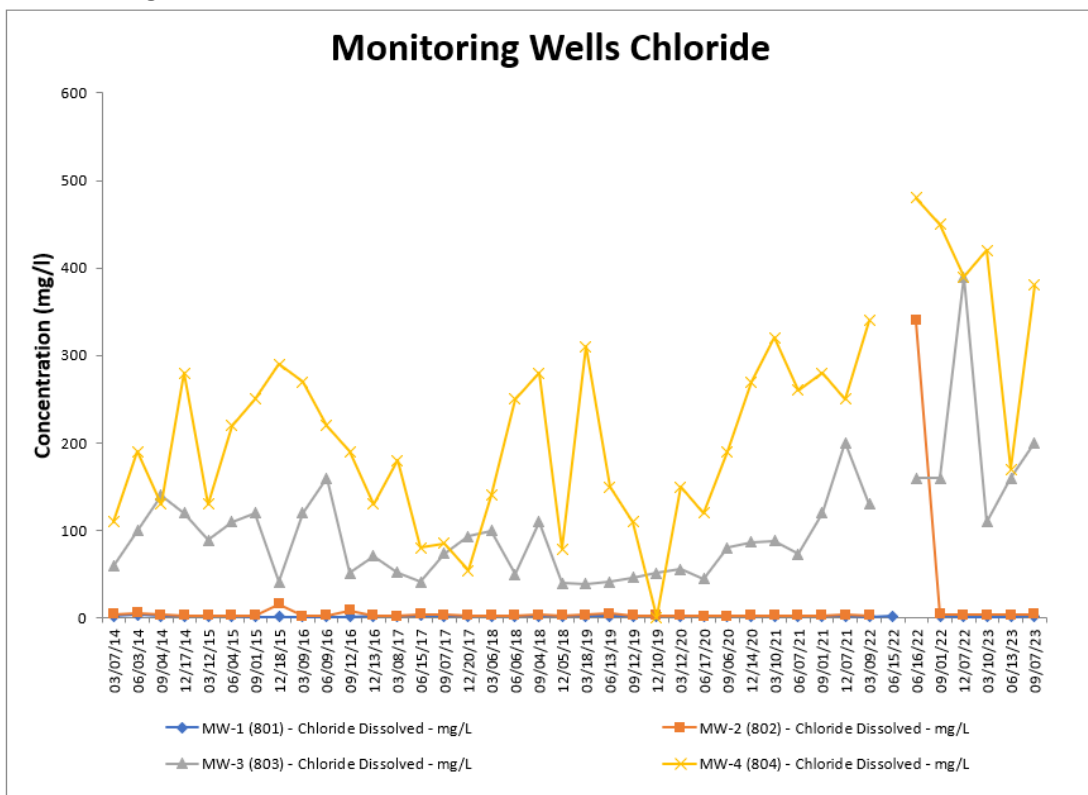


Figure 7 – Monitoring Wells – Nitrite+nitrate

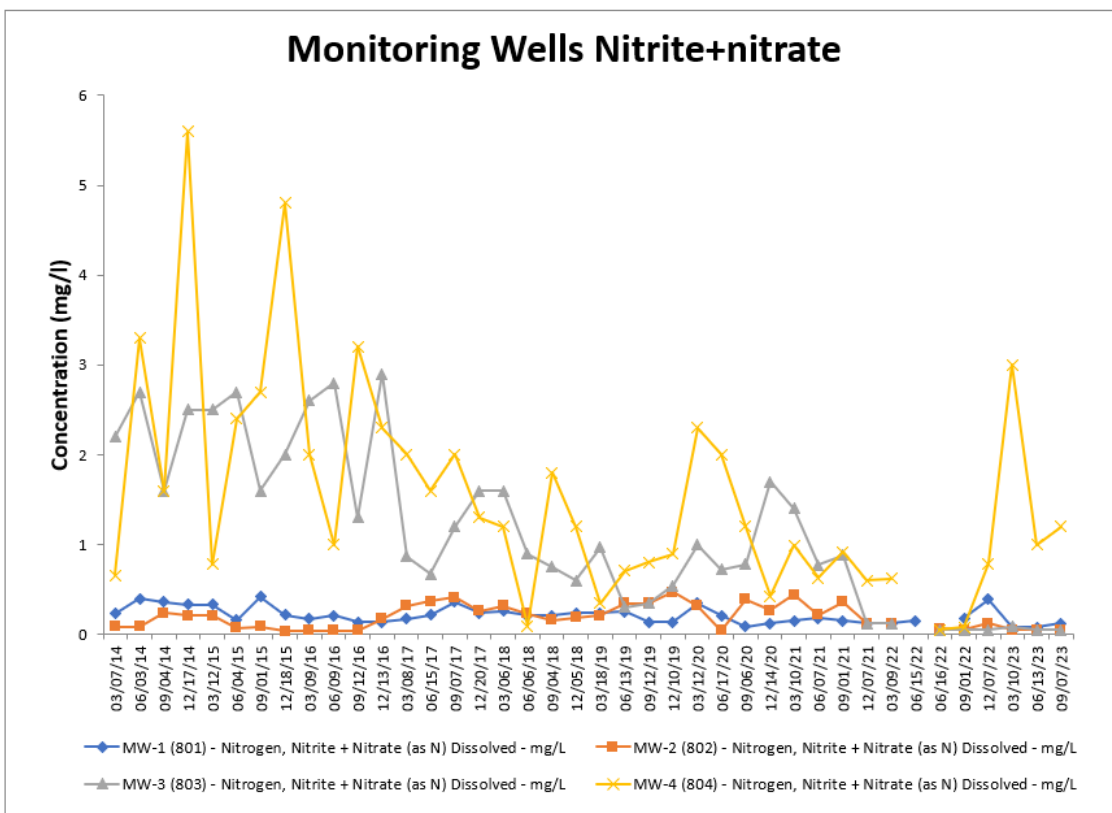
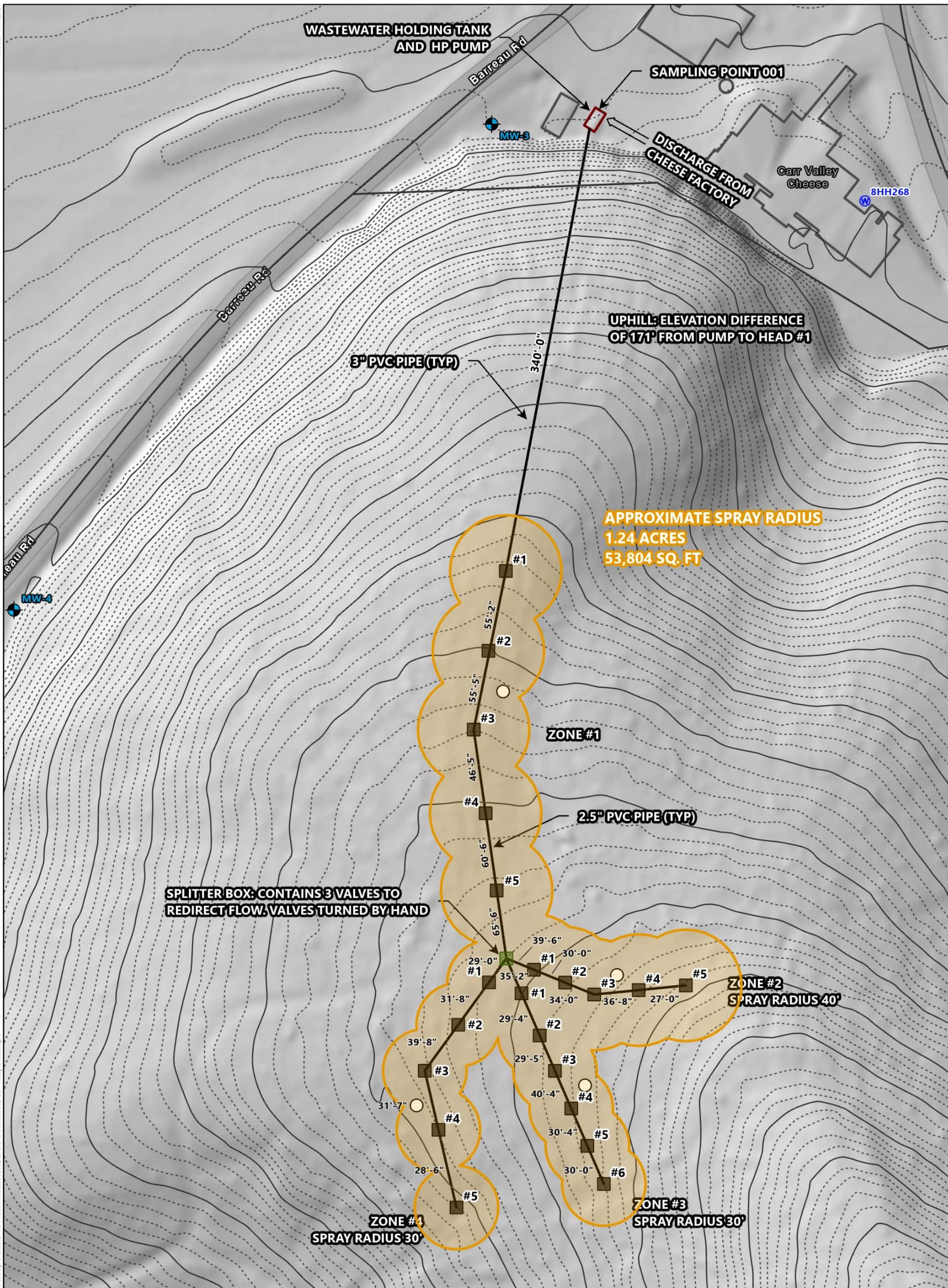


Figure 8 – Carr Valley Sprayfield Dimensions and Updated Loading Rates



All data shown in this exhibit is approximate for display purposes only and does not reflect actual survey data.

Data Sources:
 Wisconsin Department of Natural Resources, Sauk County, Esri Community Maps Contributors, County of Sauk, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS

- Parcel Boundary
- Building Footprint
- Wastewater Holding Tank
- Spray Field Piping
- Two Foot Contours
- Ten Foot Contours
- Splitter Box
- Sprinkler Head
- Wisconsin Potable Well
- Monitoring Well
- Hand Auger Soil Boring (Samples Taken on 10-28-13)
- Approximate Spray Radius

FIGURE 4
 SPRAY IRRIGATION
 LAYOUT DETAIL

CARR VALLEY CHEESE COMPANY, INC.
 LA VALLE, SAUK COUNTY, WISCONSIN

Annual Nitrogen Loading

Calculations of Annual Nitrogen per Cell or Zone (EQ: 4.3.1.2 from WPDES Permit 7/1/2019)

$$\frac{\text{(annual ave. concentration mg/L)} \times \text{(total annual flow million gallons per cell or zone)}}{\text{Acreage of cell or zone}} \times 8.34 = \text{pounds/ac/year}$$

YEAR

2023	20.0	x	0.939	x	8.34	=	126.28 pounds/ac/year
			1.24	Acres			

Annual Chloride Loading

Calculations of Annual Total Chloride per Cell or Zone (EQ: 4.3.1.2
from WPDES Permit 7/1/2019)

	(annual ave. concentrat ion mg/L)	x	(total annual flow million gallons per cell or zone)	x	8.34	=	pounds/ ac/year
				Acreage of cell or zone			
YEAR	2022	435	x	1.16	x	8.34	= 841.7
		5			Acres		
	2023	657	x	0.939	x	8.34	= 4151.2
		1.24			Acres		
2 year Average	=	842 + 4,151			2	=	2496.4

Note: The December 2023 Chloride result was removed from calculations after it was determined that it is not a representative sample result.