Permit Fact Sheet

General Information

Permit Number	WI-0053902-09-0
Permittee Name and Address	DECATUR CHEESE COOPERATIVE W1668 County Hwy F Brodhead WI 53520
Permitted Facility Name and Address	DECATUR CHEESE COOPERATIVE W1668 County Hwy F Brodhead WI 53520
Permit Term	April 01, 2025 to March 31, 2030
Discharge Location	Spray irrigation fields south of the cheese factory
Receiving Water	Groundwaters of the Lower Sugar River Watershed (SP11)
Stream Flow ($Q_{7,10}$)	N/A
Stream Classification	N/A
Discharge Type	Existing Land Treatment Spray Irrigation System

Facility Description

Decatur Cheese Cooperative produces Havarti, Lacy Swiss, Brick, Farmer, Colby, Longhorn, Butterkase, Queso Blanco and Muenster cheeses. Cheesemaking typically occurs 6 days/week from raw milk delivery from the milk cooperative's producers. Untreated wastewater is generated throughout the cheese making process and is sent year-round to one of three sprayfields (Field B, D and E). The sprayfield utilizes a single spraygun that is moved multiple times per day. In 2023, Decatur sent approximately 2.14 MG of wastewater to their sprayfields. The sprayfield is surrounded by a groundwater monitoring system consisting of six groundwater monitoring wells.

Substantial Compliance Determination

Enforcement During Last Permit: A notice of noncompliance (NON) was sent on January 9, 2023 in response to exceedances of the groundwater quality standards for chloride at downgradient point of standards monitoring wells.

An NON was sent on February 28, 2023 for ice build up on the spray irrigation fields and run off to the adjacent neighbor's property.

After a desktop review of all discharge monitoring reports, groundwater monitoring reports, compliance schedule items, and site visits on February 24, 2023 and May 30, 2024, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Senior Hydrogeologist Zach Watson on January 8, 2025.

Sample Point Descriptions

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
003	Not utilized in prior permit	Land application of untreated cheese production wastewaters to department approved land application sites. Representative samples shall be collected prior to discharge to land application sites. INACTIVE: DEPARTMENT APPROVAL REQUIRED TO ACTIVATE OUTFALL 003 PRIOR TO USE.
004	0.45 MG/yr in 2023	North spray irrigation fields B (1.7-acres) and D (4-acres). Year-round discharge of untreated cheese production wastewater. Spray irrigation land treatment.
006	1.69 MG/yr in 2023	South spray irrigation field E (17-acres). Year-round discharge of untreated cheese production wastewater. Spray irrigation land treatment.
101	2.14 MG/yr in 2023 (Outfalls 004 and 006 combined)	Untreated cheese production wastewaters directed to one of three spray irrigation fields (Field B, D and E). The sprayfields are located south of Highway F at SEC 29 T2N R9E. Composite samples are collected at the pump house. An electromagnetic flow meter adjacent to the irrigation pump meters and records flow to the sprayfield(s). Sprayfield discharge is year-round.

Permit Requirements

Sample Point Designation For Groundwater Monitoring Systems			
System	**Sample Pt Number**	**Well Name**	**Comments**
Spray Irrigation Fields B, D and E	801	MW-1 (801)	Upgradient non-point of standards monitoring well
	802	MW-2 (802)	Downgradient point of standards monitoring well
	803	MW-3 (803)	Downgradient non-point of standards monitoring well
	804	MW-4 (804)	Downgradient point of standards monitoring well
	805	MW-5 (805)	Upgradient background non-point of standards monitoring well
	806	MW-6 (806)	Downgradient point of standards monitoring well

1 In plant - Monitoring and Limitations

1.1 Sample Point Number: 101 - Spray Irrigation Wastewater

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		gpd	Daily	Total Daily	
Chloride		mg/L	Monthly	Composite	
Nitrogen, Total Kjeldahl		mg/L	Monthly	Composite	
BOD5, Total		mg/L	Monthly	Composite	
Phosphorus, Total		mg/L	Monthly	Composite	

1.1.1 Changes from Previous Permit:

The monitoring frequency for BOD and phosphorus were updated to monthly.

1.1.2 Explanation of Limits and Monitoring Requirements

The monitoring frequency for BOD and phosphorus were updated to monthly for consistency between all monitoring parameters. See Groundwater Evaluation dated January 8, 2025 for additional information.

2 Land Treatment – Monitoring and Limitations

2.1 Sample Point Number: 004 - Spray Irrigation Field B and D

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	
Nitrogen, Max Applied On Any Zone	Annual Total	300 lbs/ac/yr	Annual	Total Annual	
Chloride		lbs/ac/yr	Annual	Total Annual	

2.1.1 Changes from Previous Permit:

Annual chloride loading rate in lbs/ac/yr added to monitoring requirements.

2.1.2 Explanation of Limits and Monitoring Requirements

Annual chloride loading rate in lbs/ac/yr added to monitoring requirements to aid review of the land treatment system impact on groundwater quality. See Groundwater Evaluation dated January 8, 2025 for additional information.

2.2 Sample Point Number: 006 - Spray Irrigation Field E

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	
Nitrogen, Max Applied On Any Zone	Annual Total	300 lbs/ac/yr	Annual	Total Annual	
Chloride		lbs/ac/yr	Annual	Total Annual	

2.2.1 Changes from Previous Permit:

Nitrogen, Max Applied on any Zone reduced from 600 lbs/ac/yr to 300 lbs/ac/yr.

Annual chloride loading rate in lbs/ac/yr added to monitoring requirements.

2.2.2 Explanation of Limits and Monitoring Requirements

Nitrogen, Max Applied on any Zone reduced from 600 lbs/ac/yr to 300 lbs/ac/yr to be more consistent with the permittee's loading needs, cover crop nitrogen needs and department guidance document "Establishing Nitrogen Limitations in WPDES Permits at Industrial Land Treatment Facilities" 3400-2024-05. See Groundwater Evaluation dated January 8, 2025 for additional information.

Annual chloride loading rate in lbs/ac/yr added to monitoring requirements to aid review of the land treatment system impact on groundwater quality.

3 Groundwater – Monitoring and Limitations

3.1 Groundwater Monitoring System for Spray Irrigation Fields B, D and E

Location of Monitoring system: Surrounding sprayfields B, D and E

Groundwater Monitoring Well(s) to be Sampled: MW-4 (804), MW-1 (801), MW-2 (802), MW-3 (803), MW-5 (805), MW-6 (806)

Groundwater Monitoring Well(s) Used to Evaluate Background Groundwater Quality: MW-5 (805)

Groundwater Monitoring Well(s) Used for Point of Standards Application: MW-6 (806), MW-2 (802), MW-4 (804)

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	11.3	11.3	Quarterly
Nitrogen, Ammonia Dissolved	mg/L	0.97	9.7	Quarterly
Nitrogen, Organic Dissolved	mg/L	2.2	N/A	Quarterly
Iron Dissolved	ug/L	150	300	Quarterly
Manganese Dissolved	ug/L	60	300	Quarterly
Solids, Total Dissolved	mg/L	1,005	N/A	Quarterly
COD, Filtered	mg/L	34	N/A	Quarterly
pH Field	su	8.1	N/A	Quarterly
Phosphorus, Total Dissolved	mg/L	N/A	N/A	Quarterly
Dissolved Oxygen	mg/L	N/A	N/A	Quarterly
Specific Conductance Field	µmhos/cm	N/A	N/A	Quarterly

3.1.1 Changes from Previous Permit:

Alternative concentration limit (ACL) for chloride removed and replaced with NR 140 Groundwater Quality standards.

ACL for Nitrite+nitrate updated.

Indicator parameter PALs updated for organic nitrogen, total dissolved solids, COD and pH.

Total Dissolved Phosphorus, Dissolved Oxygen and Specific Conductance Field added to monitoring requirements.

3.1.2 Explanation of Limits and Monitoring Requirements

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. See Groundwater Evaluation dated January 8, 2025 for information on additional monitoring parameters, updated ACLs and indicator parameter PALs.

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

4.1 Sample Point Number: 003- Land Application of Wastewater

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		gpd	Quarterly	Measure	
BOD5, Total		mg/L	Quarterly	Grab	
Chloride		mg/L	Quarterly	Grab	
Nitrogen, Total Kjeldahl		mg/L	Quarterly	Grab	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Total		mg/L	Quarterly	Grab	
Phosphorus, Water Extractable		% of Tot P	Quarterly	Grab	
Potassium, Total Recoverable		Percent	Quarterly	Grab	

4.1.1 Changes from Previous Permit:

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

4.1.2 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 (WEP) is the coefficient for determining plant available phosphorus from measured total phosphorus. While Total Phosphorus may be significant, the WEP may show that only a small percentage of the phosphorus 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. Both total phosphorus and WEP are valuable in assessing the phosphorus discharged to the land application fields.

Potassium is an important macro nutrient for plant growth and the absence of potassium may limit crop grown 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.

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 a Land Treatment Management Plan to optimize the land treatment system performance and demonstrate compliance with Wisconsin Administrative Code NR 214.	04/01/2026

5.1.1 Explanation of Schedule

An up-to-date Land Treatment Management plan is a standard requirement in reissued industrial permits per ch. NR 214, Wis. Adm. Code.

5.2 Land Treatment Annual Report

Required Action	Due Date
Submit Annual Land Treatment Report #1: Submit the Annual Land Treatment Report by February 28th for the previous calendar year.	02/28/2026
Submit Annual Land Treatment Report #2: Submit the Annual Land Treatment Report by February 28th for the previous calendar year.	02/28/2027
Submit Annual Land Treatment Report #3: Submit the Annual Land Treatment Report by February 28th for the previous calendar year.	02/28/2028
Submit Annual Land Treatment Report #4: Submit the Annual Land Treatment Report by February 28th for the previous calendar year.	02/28/2029
Submit Annual Land Treatment Report #5: Submit the Annual Land Treatment Report by February 28th for the previous calendar year.	02/28/2030

5.3 Chloride Source Reduction Measures (SRMs) for Groundwater Discharges

Required Action	Due Date
Chloride Reduction Plan: The permittee shall complete and submit for Department review and approval a chloride reduction plan (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: 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.	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

5.3.1 Explanation of Schedule

The current loading rates of chloride to the sprayfields have resulted in exceedances of the ch. NR 140 preventive action limit for chloride at a downgradient point of standards monitoring wells. The permittee will need to submit chloride reduction plans to demonstrate their efforts towards reducing the amount of chloride discharged to the sprayfields.

Attachments

NR 140 Groundwater Evaluation Report – January 8, 2025

Prepared By: Zachary Watson Hydrogeologist Date: January 8, 2025

CORRESPONDENCE/MEMORANDUM

DATE: January 8, 2025 FILE REF: FIN 5264

TO: File

FROM: Zach Watson Hydrogeologist - SCR

SUBJECT: Groundwater Evaluation for Decatur Dairy WI-0053902-08

General Information and Treatment System Description

Decatur Cheese Cooperative produces Havarti, Lacy Swiss, Brick, Farmer, Colby, Longhorn, Butterkase, Queso Blanco and Muenster cheeses. Cheesemaking typically occurs 6 days/week from raw milk delivery from the milk cooperative's producers. Untreated wastewater generated throughout the cheese making process and is sent to a 22.7-acre sprayfield. The sprayfield utilizes a single spraygun that is moved multiple times per day. In 2023, Decatur sent approximately 2.2 MG of wastewater to their sprayfield. The sprayfield is surrounded by a groundwater monitoring system consisting of six groundwater monitoring wells.

Table 1 – Monitoring Requirements and Limitations – Spray Irrigation (Sampling Point 101)

Parameter	Current and Proposed Permit WI-0053902-08 and WI-0053902-09		
	Limit Type	Limits and Units	Sample Frequency
Flow Rate		gpd	Daily
Chloride		mg/l	Monthly
Total Kjeldahl Nitrogen		mg/l	Monthly
BOD5 Total		mg/l	***Monthly**
Phosphorus		mg/l	***Monthly**

***Recommended changes from current permit**

Table 2 – Monitoring Requirements and Limitations – Spray Irrigation (Outfall 004 and 006)

Parameter	Current and Proposed Permit WI-0053902-08 and WI-0053902-09		
	Limit Type	Limits and Units	Sample Frequency
Flow Rate		gpd	***Daily**
Hydraulic Application Rate	Monthly Average	7,000 gal/ac/day	Monthly
Nitrogen, Max Applied on Any Zone	Annual Total	***300 Lbs/ac/yr**	Annual
***Chloride**	**Annual Total**	**Lbs/ac/yr**	**Annual**

***Recommended changes from current permit**

Table 3 – Sprayfield Groundwater Monitoring System

Sample Point	Well Name	Current Permit and Proposed WI-0053902-08 and WI-0053902-09	
		Well Location	Well Designation
801	MW-1	Upgradient	Non-Point of Standards
802	MW-2	Downgradient	Point of Standards
803	MW-3	Downgradient	Non-Point of Standards
804	MW-4	Downgradient	Point of Standards
805	MW-5	Background	Non-Point of Standards
806	MW-6	Downgradient	Point of Standards

Table 4 – Sprayfield Groundwater Standards

Parameter	Current Permit WI-0053902-08		Proposed Permit WI-0053902-09	
	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	24.8 mg/l (ACL)	24.8 mg/l (ACL)	***11.3 mg/l (ACL)**	***11.3 mg/l (ACL)**
Chloride	190 mg/l (ACL)	250 mg/l	***125 mg/l**	250 mg/l
pH Field	6.2 – 8.2 su	N/A	***6.1 – 8.1 su**	N/A
COD	34 mg/l	N/A	34 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	760 mg/l	N/A	***1,005 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
***Dissolved Phosphorus**	**N/A**	**N/A**	**N/A**	**N/A**
***Dissolved Oxygen**	**N/A**	**N/A**	**N/A**	**N/A**
***Specific Conductance Field**	**N/A**	**N/A**	**N/A**	**N/A**

***Recommended changes for upcoming permit**

Geology

The bedrock underlying the sprayfield treatment system is the Cambrian-aged Trempealeau group and the Ordovician-aged Prairie du Chien group. The Trempealeau group is comprised of sandstone. The Prairie du Chien group is primarily dolomite (Green County Bedrock Geology, TRC). Depth to bedrock is approximately 100 – 170 feet below ground surface (Green County Depth to Bedrock, TRC). The surface soils are primarily silt loams (NRCS Soil Map).

Hydrogeology

Regional groundwater flow is to the southeast towards Sylvester Creek (Green County Water Table Map, TRC). Groundwater flow at the site is to the south southeast (**Figure 1**). Depth to water ranges from approximately 10 feet (MW-3) to 60 feet (MW-1) below ground surface. Groundwater elevations decreased slightly during the permit term ranging from 790 – 805 feet above mean sea level (**Figure 2**).

Land Treatment Effluent Quality and Loading Rates

Total discharge to the sprayfield treatment system ranged 1.99 – 2.70 million gallons per year (MG/yr). Field E has received most of the wastewater since 2017 (**Figure 3**). The results for total Kjeldahl nitrogen are variable ranging between 20 – 180 mg/l (**Figure 4**). The average concentration of total Kjeldahl nitrogen ranged between 39 – 85 mg/l from 2019 – 2023. The results for chloride ranged between approximately 100 – 600 mg/l during the past five years (**Figure 5**). The average concentration of chloride has steadily increased from 242 mg/l in 2019 to 356 mg/l in 2023. The average concentration of biological oxygen demand ranged between 1,648 – 3,758 mg/l during the current permit term. The actual hydraulic application rates and subsequent nutrient loading rates are suspect as there were concerns with the movement and management of the sprayfield equipment during the current permit term.

Table 5 – Sprayfield Hydraulic Loading

Year	Hydraulic Application Rate (MG/yr)	Average Hydraulic Application Rate Outfall 004 (gal/ac/day)	Average Hydraulic Application Rate Outfall 006 (gal/ac/day)
2019	1.99	613	871
2020	2.14	712	998
2021	2.70	448	1,196
2022	2.66	743	1,036
2023	2.14	815	1,056

Table 6 – Sprayfield 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	1,648	39	242	22
2020	2,208	52	276	22
2021	3,758	85	318	35
2022	2,923	65	311	31
2023	3,156	70	356	35

Table 7 – Sprayfield Nutrient Loading Rates

Year	Outfall 004		Outfall 006	
	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	17	55	44	220
2020	15	70	61	290
2021	29	100	108	379
2022	34	150	137	617
2023	72	342	104	492

Background Groundwater Quality

Background groundwater quality is defined by the results from samples collected at MW-5. MW-1 is an additional monitoring well that is located upgradient to sidegradient of the sprayfields. The concentration of chloride at MW-5 ranged between 46 – 96 mg/l from June 2019 – December 2023. The concentration of chloride at MW-1, which is much closer to County Highway F, has significantly elevated concentrations of chloride ranging up to 603 mg/l during the past five years. The results for nitrite+nitrate at MW-5 have been relatively stable during the past few years and ranged between 4.9 – 10.8 mg/l from June 2019 – December 2023. Ammonia, dissolved iron and dissolved manganese are consistently non-detect in the samples collected at MW-5.

Downgradient Groundwater Quality

Downgradient groundwater quality is defined by the results from MW-2, MW-3, MW-4 and MW-6. Significantly elevated concentrations of nitrite+nitrate are observed at monitoring wells MW-2, MW-3 and MW-6 (**Figure 7**). However, these concentrations have exhibited a general decline during the past ten years of monitoring. The results for chloride are most often below 25 mg/l at monitoring wells MW-2 and MW-3. The results for chloride at MW-4 have exhibited a rapid increase in concentration from approximately 25 mg/l in 2014 to 433 mg/l in September 2022 (**Figure 6**). Chloride has shown a considerable decrease at MW-6 during the recent monitoring events. Monitoring wells MW-2, MW-3 and MW-6 have mostly non-detect results for ammonia, dissolved iron, dissolved manganese and chemical oxygen demand. The results at MW-4 are significantly different relative to the other monitoring wells for the aforementioned parameters. Beginning in late 2020, the results for chemical oxygen demand, dissolved iron, and dissolved manganese began to significantly increase (**Figure 8**, **9** and **10**).

Exceedance Review

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

Well Name	Parameter	ES Exceedances	PAL/ACL Exceedances
MW-1	Chloride	4/19	9/19
	Manganese	0/19	1/19
	Total Dissolved Solids	0/19	10/19
MW-2	Chloride	0/19	1/19
MW-3	Nitrite + nitrate	2/19	2/19
MW-4	Chloride	7/19	9/19
	Chemical Oxygen Demand	N/A	10/19
	Dissolved Iron	13/19	13/19
	Dissolved Manganese	14/19	15/19
	Organic Nitrogen	N/A	1/19
	Total Dissolved Solids	N/A	10/19
MW-5	Manganese	0/19	2/19
	Total Dissolved Solids	N/A	1/19
MW-6	Chloride	3/19	4/19
	Dissolved Iron	3/19	5/19
	Dissolved Manganese	0/19	2/19
	Total Dissolved Solids	N/A	8/19

Shown above are the number of exceedances over the number of samples analyzed for that parameter. Meaning that 1/19 is one exceedance for the parameter in the 19 samples that were analyzed for that parameter.

Treatment System Impact to Groundwater Quality

The results for chloride at MW-1 indicate that road salting is likely impacting the groundwater nearest to County Highway F. The results for chloride at MW-5 are likely elevated due to road salting. Nitrite+nitrate is also present at elevated concentrations at these upgradient monitoring wells. The results at downgradient monitoring wells for nitrite+nitrate do not correlate well with the results for chloride. The loading rates for nitrogen to the sprayfields were generally less than 150 lbs/ac/yr which is likely below the crop needs for a perennial grass mixture. Therefore, it is assumed that the sprayfield is not a significant source of nitrogen to groundwater.

The results for chloride at MW-4 and MW-6, in addition to the rapidly increasing concentrations of chemical oxygen demand, dissolved iron and dissolved manganese at MW-4, indicate excessive localized loading of the sprayfield. A Notice of Noncompliance was sent to Decatur Dairy on January 9, 2023 regarding the elevated concentrations of chloride at monitoring wells MW-4 and MW-6. An additional Notice of Noncompliance was sent on February 28, 2023 regarding improper management of the sprayfield. Specifically, it was alleged that there was wastewater ice buildup and migration of wastewater beyond the property boundary. Overall, the results from downgradient monitoring wells MW-4 and MW-6 indicate a clear impact from the sprayfield wastewater discharge. The results at MW-4 indicate that there is at least one plume of highly impacted groundwater associated with these sprayfields. Decatur needs to take clear actions that will result in a more even dispersal of wastewater across their sprayfield to remediate and resolve the impacts on local groundwater quality moving forward.

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 Discharges". 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.

- ∑ [Background groundwater quality + (Standard Deviation of results x 3)]
- ∑ [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-0053902-09 are presented in **Tables 4** and were calculated using results from MW-5 (June 1, 2019 – December 31, 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 Discharges". The ACLs for use in the upcoming permit WI-0053902-09 are presented in **Tables 4** and were calculated using results from MW-5 (June 1, 2019 – December 31, 2023). ACLs for nitrite+nitrate are provided in the upcoming permit term as the background concentrations for this parameter are elevated. The ACL for chloride has been removed due to the background concentrations being low. The specific values used in calculation of ACLs for both parameters are provided below in **Table 9**.

Table 9 – Alternative Concentration Limit Calculation

Date	MW-5 Results for Nitrite + Nitrate (mg/l)	MW-5 Results for Chloride (mg/l)
6/12/19	9.4	69.3
8/20/19	10.8	78.1
12/17/19	8.9	46.7
3/17/20	8.0	51.1
5/21/20	7.6	61.5
9/16/20	7.4	91.0
11/19/20	7.3	83.4
3/18/21	6.2	60.3
5/24/21	4.9	90.2
8/25/21	6.0	84.3
12/15/21	7.7	75.8
3/21/22	8.2	76.0
6/27/22	8.6	67.2
9/21/22	8.6	94.2
11/29/22	9.5	63.4
3/28/23	9.7	61.9
6/27/23	9.7	65.5
9/19/23	9.7	89.4
12/4/23	9.2	96.0

Average	8.3	74.0
Standard Deviation	1.5	14.7
Calculated ACL	11.3	103.4

ACL's calculated using the average plus two standard deviations.
Chloride ACL calculation provided for transparency and justification of no ACL.

Conclusions, Recommendations and Schedule Requirements

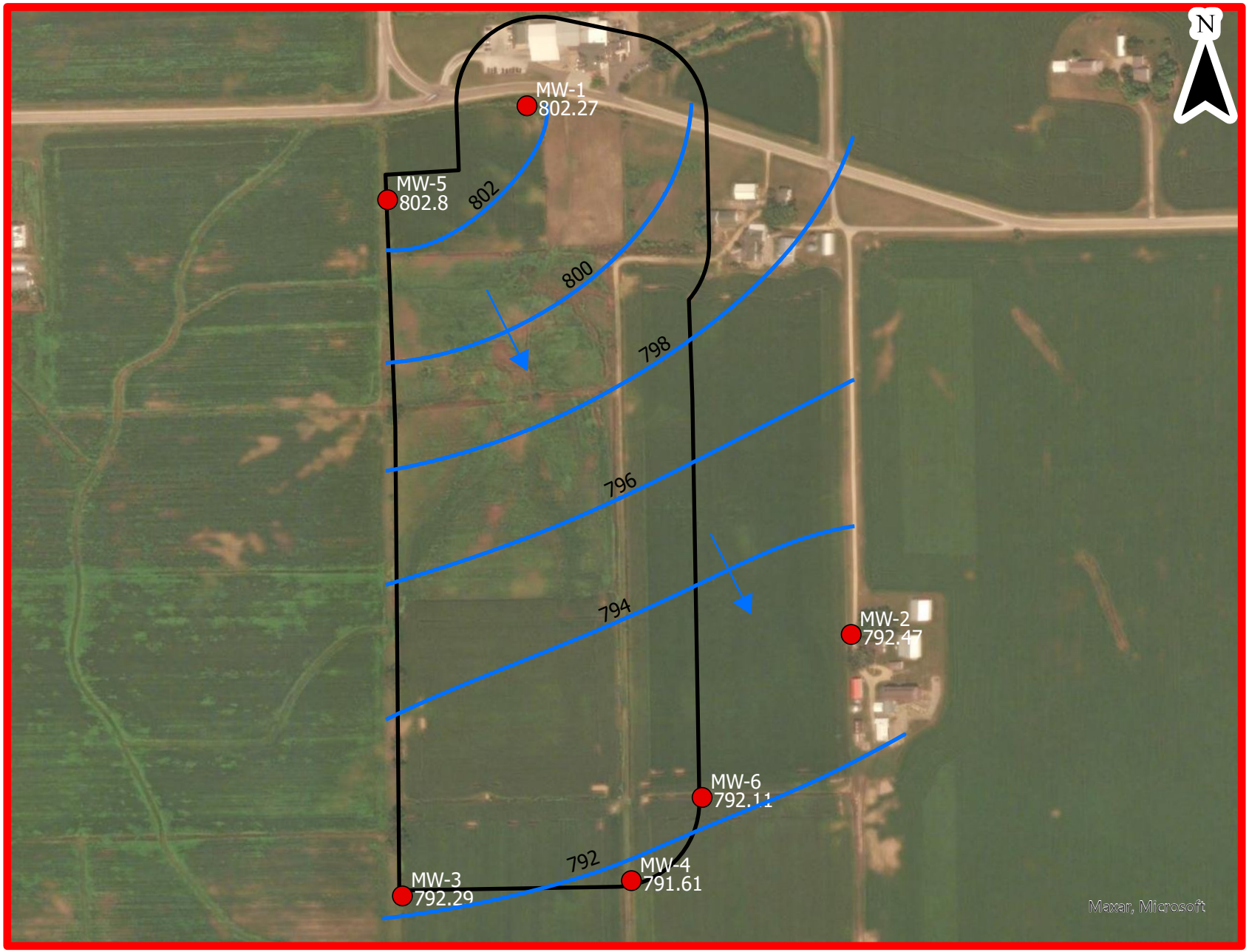
- Add phosphorus, dissolved oxygen, and specific conductance to the monitoring requirements for the groundwater monitoring system to aid the characterization of groundwater quality.
- Increase monitoring frequency of BOD and Phosphorus at the sampling point 101 from quarterly to monthly to aid effluent characterization and consistency between other current monitoring parameters.
- Reduce the nitrogen loading rate for Outfall 006 Field E from 600 lbs/ac/yr to 300 lbs/ac/yr to be more consistent with the crop needs, permittee needs and recent department guidance document "Establishing Nitrogen Limitations in WPDES Permits at Industrial Land Treatment Facilities" 3400-2024-05.
- Decatur Dairy should develop and submit a Chloride Reduction Plan followed by annual chloride reduction progress reports due to their spray irrigation effluent concentrations regularly reporting results over the NR 140 preventive action limit and exhibiting an increasing trend since 2017.
- Decatur Dairy is planning to investigate if there is drain tile located in Fields D and E. It has been proposed that drain tile funnels sprayfield wastewater towards monitoring wells MW-4 and MW-6 and is therefore the cause of the significant impacts to groundwater at these monitoring wells. The

department welcomes such an investigation in determining why the impact on groundwater is so significant.

- Decatur Dairy has recently submitted plans for approval that would eliminate winter wastewater discharge, utilize anerobic and aerobic lagoons for winter storage and treatment, expansion of the sprayfield dimensions, and upgrade to a traveling reel gun. It is expected that these upgrades will result in improvements in groundwater quality.

Figure 1 – Water Table Flow Map - December 15, 2021

Water Table Flow Map
Decatur Dairy
December 15, 2021



Site Location

Decatur Dairy
W1668 County Hwy F
Brodhead, WI 53520

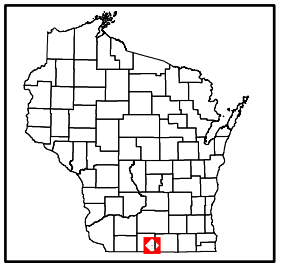
Legend

- DMZ
- Water Table Contour (12/15/21 - 2' FAMSL)
- Monitoring Well
- Groundwater Flow Direction

Notes

Water table contours generated using elevation data collected on December 15, 2021. Water table elevations and contours are presented in feet above mean sea level.

Created By: watsoz
Date: 3/28/2024



0 140 280 420 560 700 840
Feet

1:5,000

Figure 2 – Monitoring Wells - Groundwater Elevation

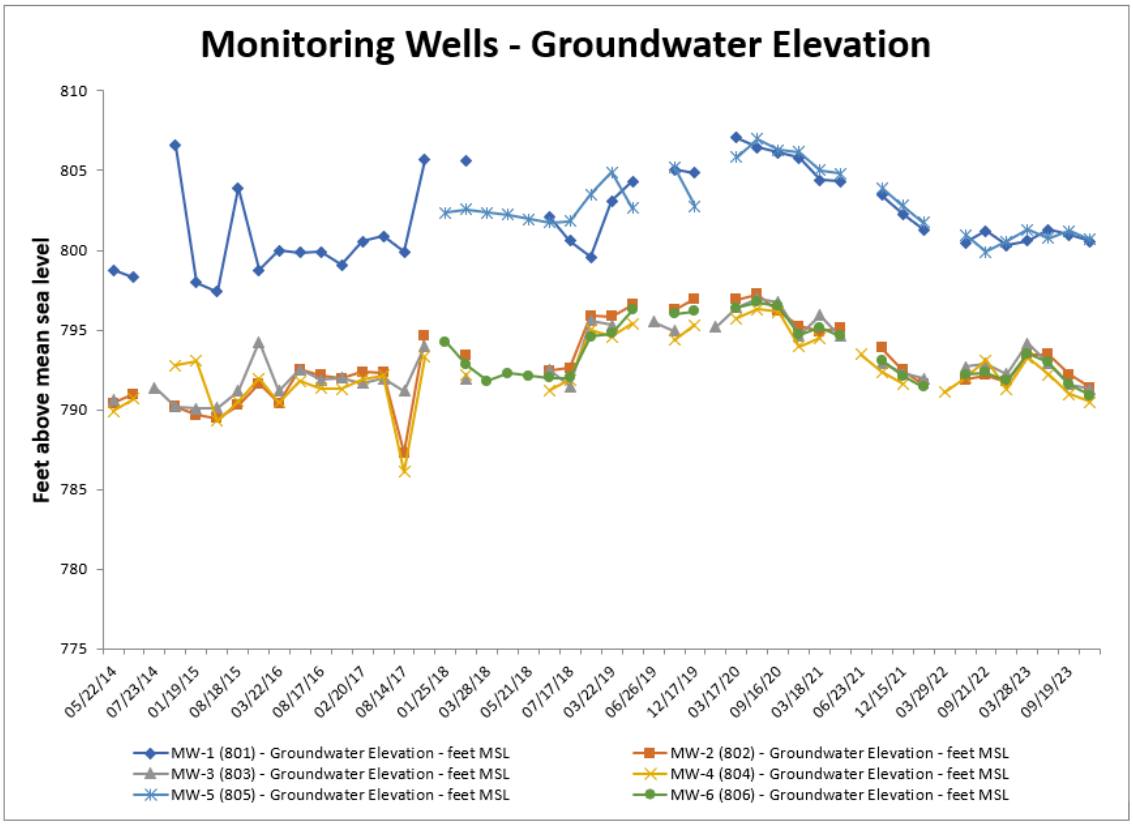


Figure 3 – Decatur Dairy Wastewater Management 2011 - 2022

Figure 4
WASTEWATER MANAGEMENT – DECATUR CHEESE CO-OP
Annual Wastewater Volumes & Chloride Concentrations

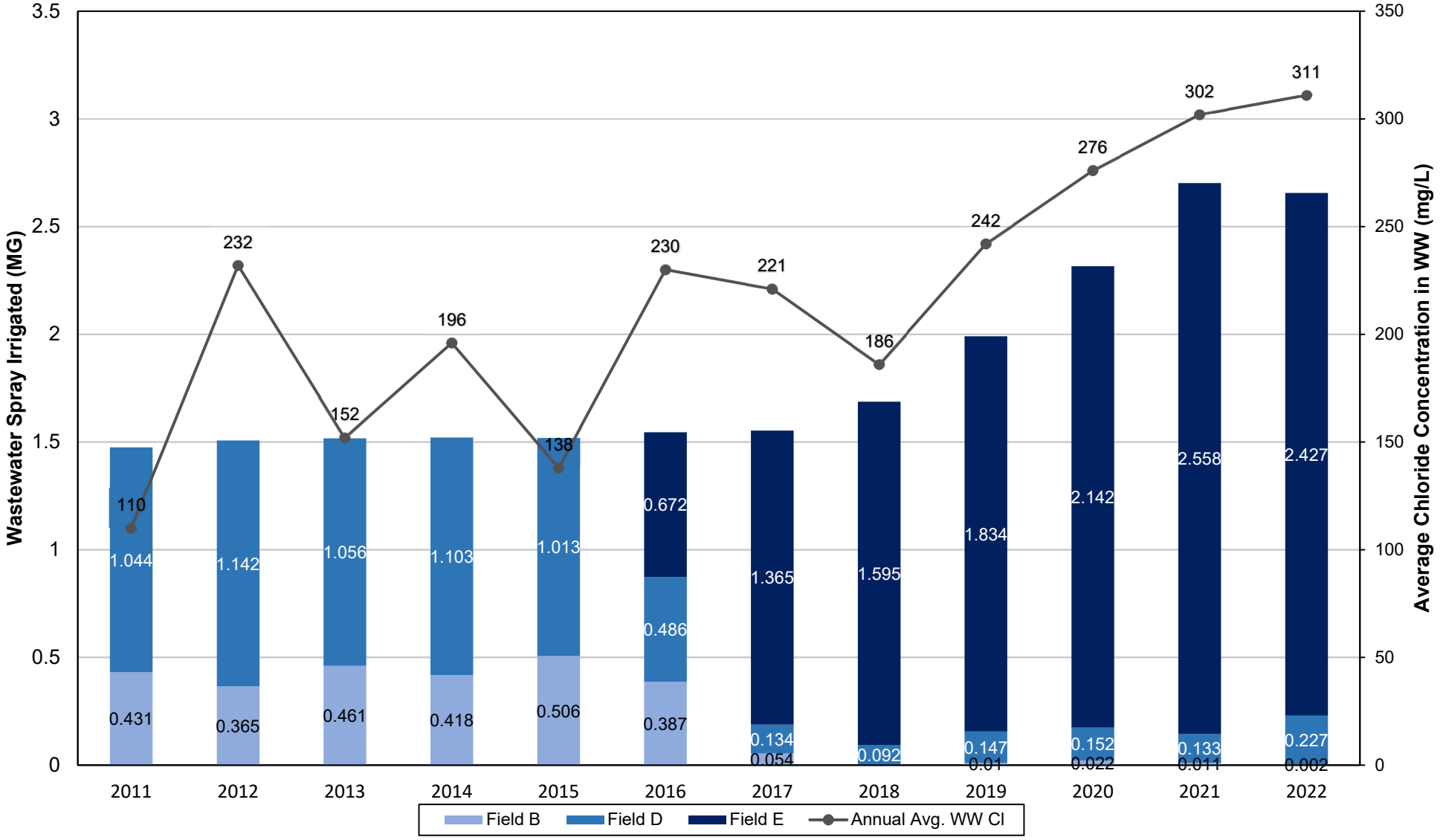


Figure 4 – Sprayfield - Total Kjeldahl Nitrogen

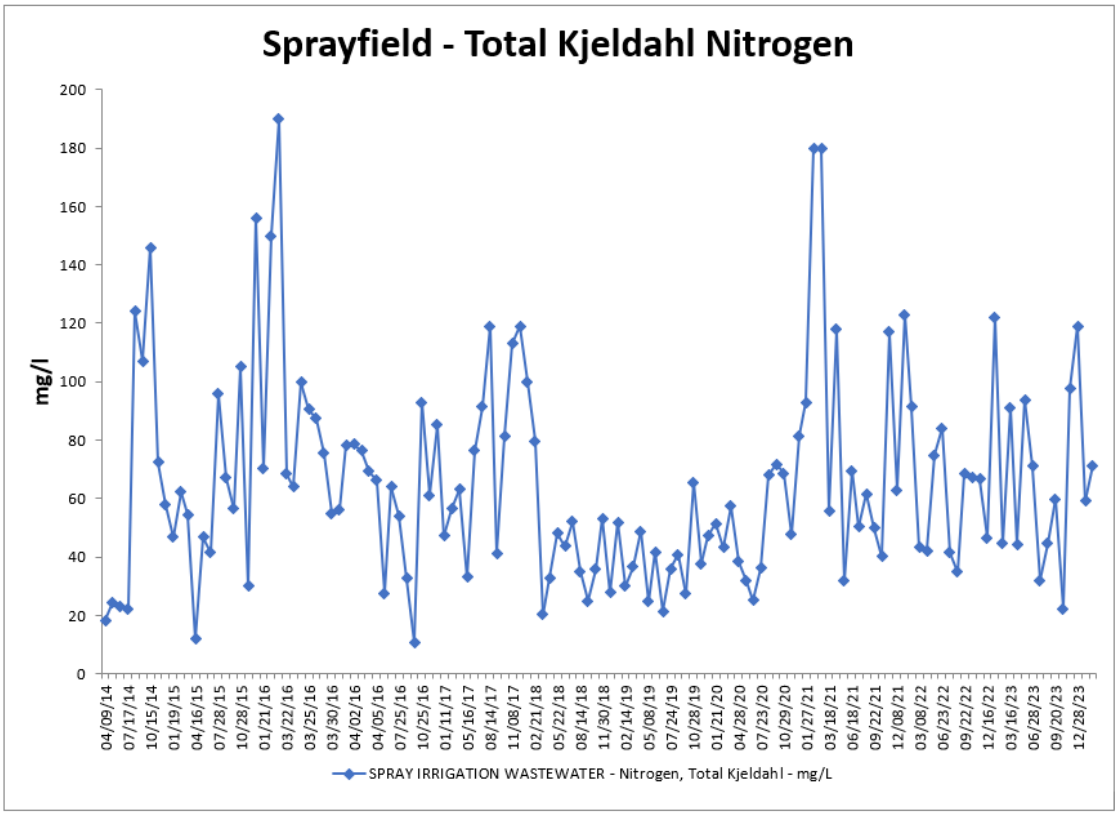


Figure 5 – Sprayfield - Chloride

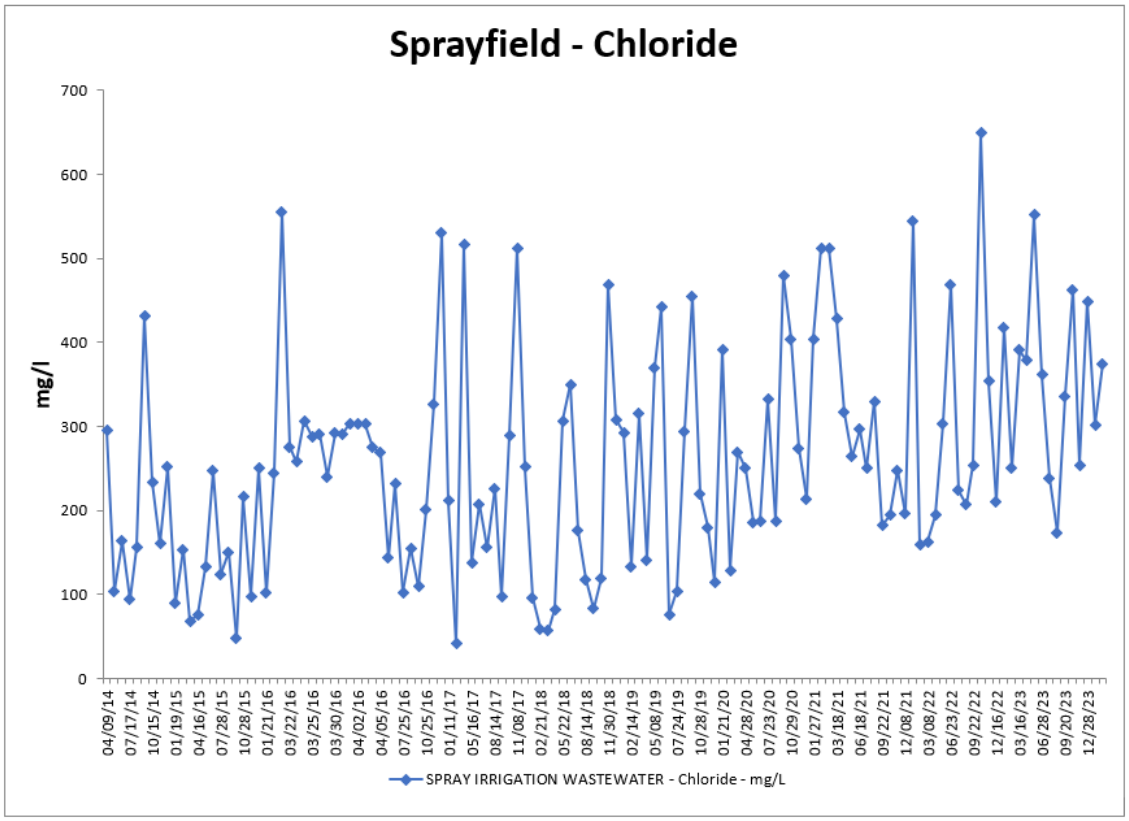


Figure 6 – Monitoring Wells - Chloride

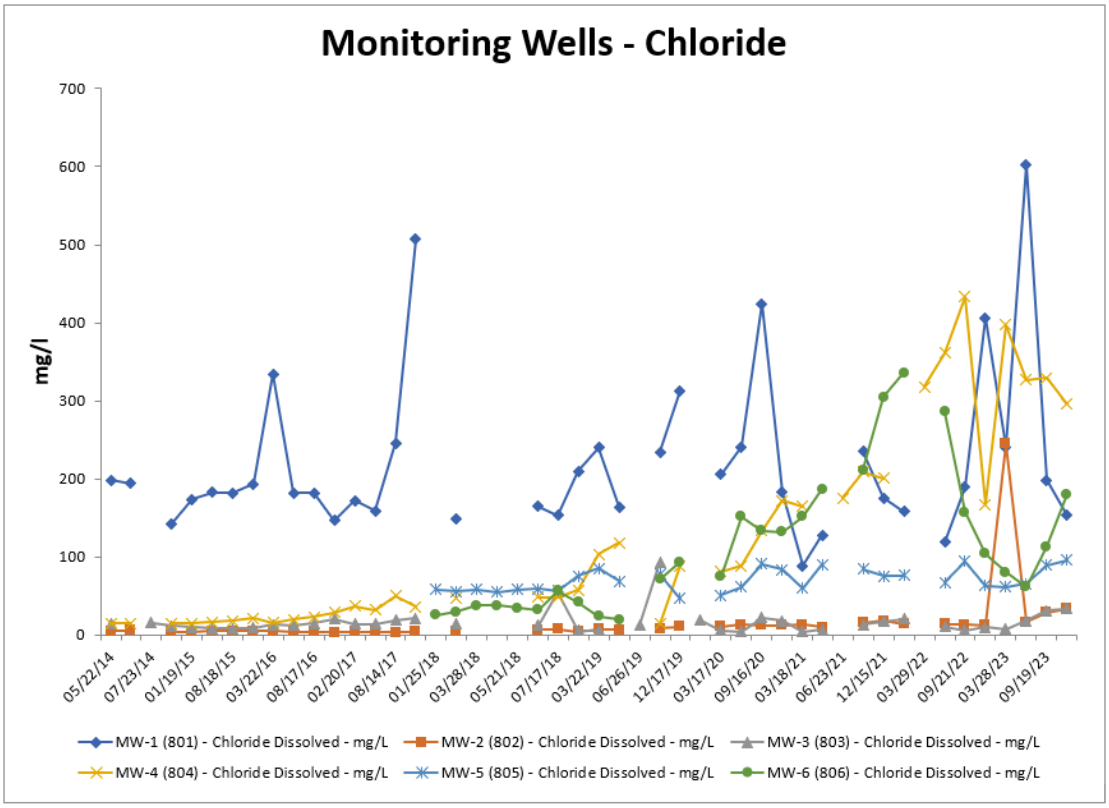


Figure 7 – Monitoring Wells – Nitrite + nitrate

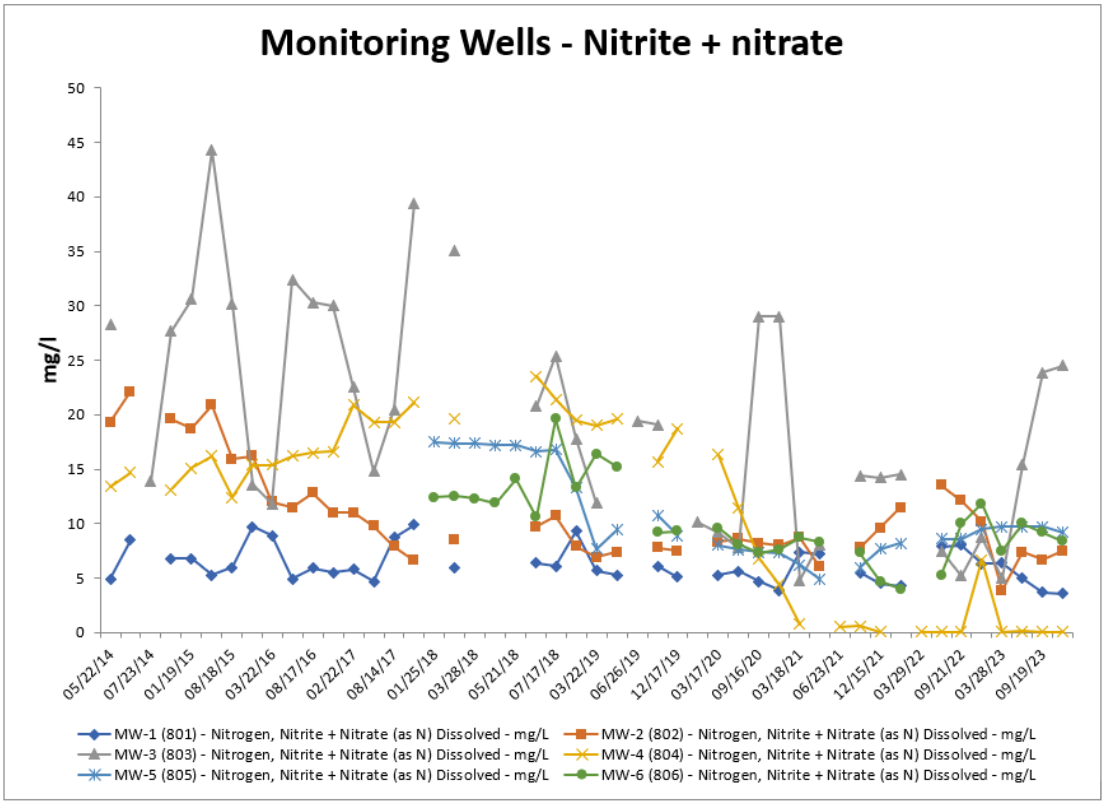


Figure 8 – Monitoring Wells – Chemical Oxygen Demand

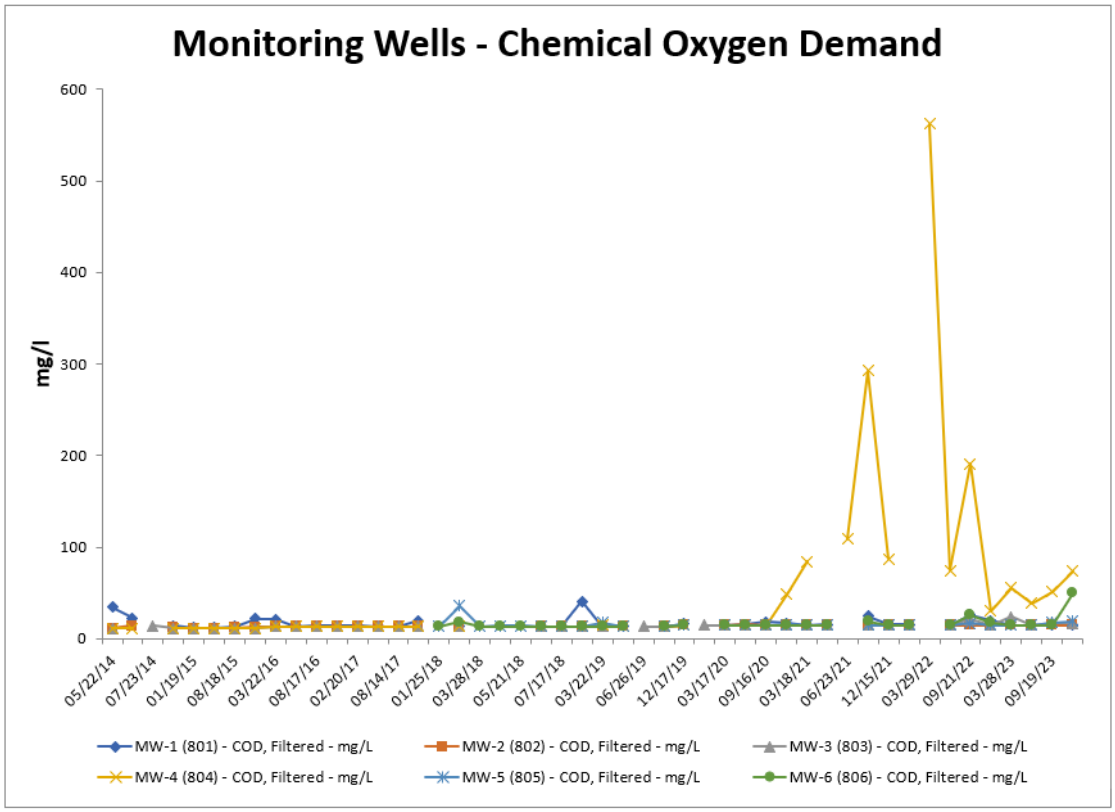


Figure 9 – Monitoring Wells – Dissolved Iron

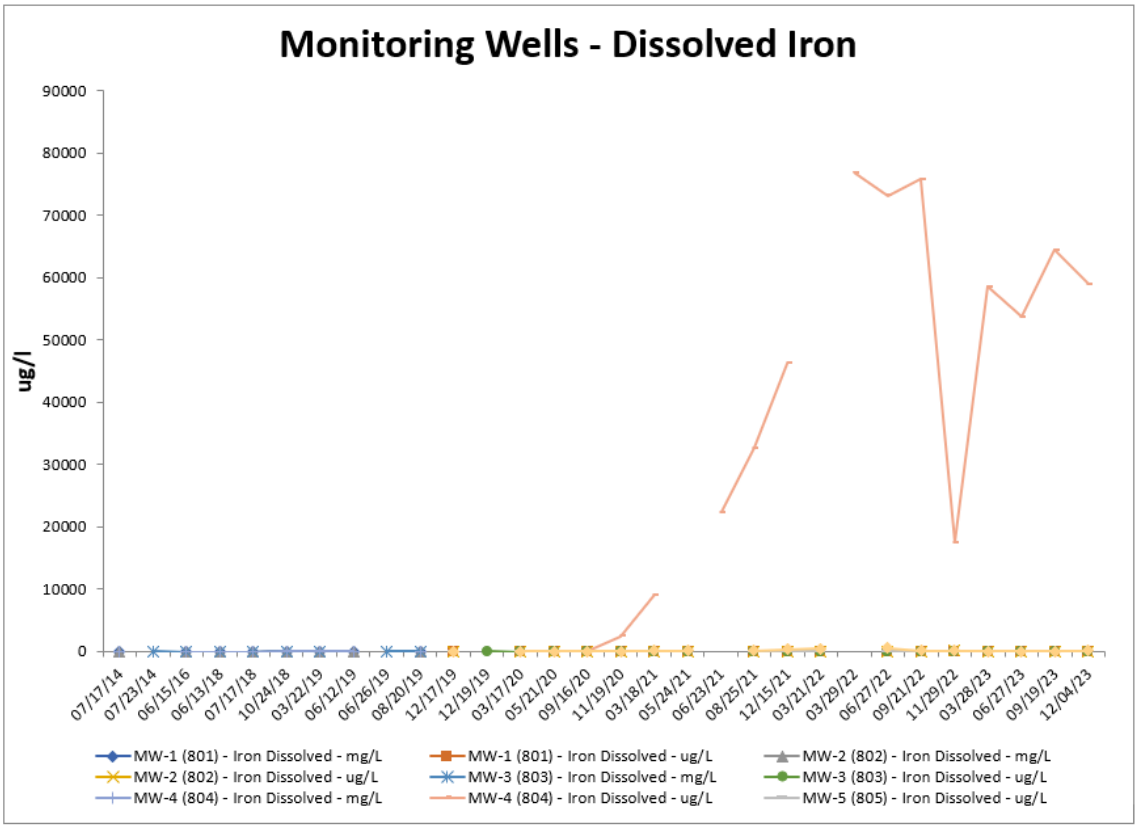


Figure 10 – Monitoring Wells – Dissolved Manganese