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Environmental Standards Division

BRADY ROAD RESOURCE MANAGEMENT FACILITY ANNUAL REPORT - 2022



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BRADY ROAD RESOURCE MANAGEMENT FACILITY ANNUAL REPORT – 2022

EXECUTIVE SUMMARY

The Brady Road Resource Management Facility (BRRMF) is the City of Winnipeg's only active landfill. The site is bordered by the Perimeter Highway on the north, Waverley Street on the east, Brady Road and the R.M. of Macdonald on the west, and Rue des Trappistes on the south. The landfill has been in operation since 1973 and is estimated to have sufficient capacity for over 100 years, assuming current waste diversion practices are continued.

Environment Act Licence No. 3081 R, issued on April 23, 2014, requires the City of Winnipeg to submit an annual report on or before April 15th, detailing activities conducted at BRRMF in the previous year. This report provides a summary of major expenditures and construction, major incidents, waste diversion operations, ground water management, surface water management, leachate management, landfill gas management, and nuisance management for 2022.

Major construction in 2022 included paving the cell access road (north-south road off the main road past Cells 30 - 33) and composting organic waste for the Residential Food Waste Collection Pilot Project. In 2022, there were no disruptions or failures of waste management practices due to equipment breakdown, no major spills occurred, and no alarms were activated.

In 2022, approximately 38% of the 507,807 metric tonnes of material received at the BRRMF were beneficially re-used, composted, or removed from the site for further processing or beneficial re-use. In addition, 41,762 kL of leachate was hauled to the North End Sewage Treatment Plant for treatment.

Monitoring programs for leachate, ground water, surface water, and subsurface gas migration followed the sampling and analysis plans in 2022 and contingency plans were not activated.

Statistical analyses of analytical results obtained for leachate, ground water, and surface water indicate that the BRRMF has not had a negative impact on the ground water and surface water downstream of the site.



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1.0 INTRODUCTION

The Brady Road Resource Management Facility (BRRMF) is located south of the Perimeter Highway, between Brady Road and Waverley Street. Residential land use is present within 500 m of the site to the east and within 120 m north of the site (Waverly West development), other surrounding land use is agricultural. Opened in 1973, the 790-hectare, Class 1 Solid Waste Disposal facility currently holds approximately 12 million metric tonnes of waste, with over 300,000 metric tonnes of waste materials landfilled on an annual basis. The site has capacity for over 100 additional years of waste disposal, assuming current waste diversion practices are continued.

The BRRMF operates in accordance with Environment Act Licence No. 3081 R, which was issued on April 23, 2014. Clause 127 of the license requires the City of Winnipeg to prepare and submit an Annual Report on the activities undertaken at the site during the previous year on or before April 15th of each year. This report contains results and/or comments for each of the clauses of Licence No. 3081 R under which the BRRMF has generated pertinent information during 2022. The report also provides information on the BRRMF proposed activities for 2023.

The layouts of the primary components of the BRRMF are shown on Figure 1. Surface water flows are managed by perimeter ditching and retention ponds. The ground water monitoring network consists of wells in the bedrock, till, and clay layers. The leachate collection system is a network of manholes/risers, drains, and sumps around the perimeter of the landfill cells, which feed into a centralized collection tank/truck fill station. The landfill gas (LFG) management system includes extraction wells, collection piping, and a blower/enclosed flare station.

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2.0 MAJOR ACTIVITIES AND CONSTRUCTION

Major activities and construction undertaken in 2022 included:

- paving the cell access road (north-south road off the main road past Cells 30 - 33)
- composting organic waste for the Residential Food Waste Collection Pilot Project

Major activities and construction planned for 2023 include:

- final design and construction of the new waste cell 34
- planting trees and greenery around the administration building and throughout the landfill to assist in wind breaking and odour mitigation
- additional fencing on the north side of the site to assist with litter capture and control

3.0 MAJOR INCIDENTS

In 2022, there were no disruptions or failures of waste management practices due to equipment breakdown, no major spills occurred, and no alarms were activated.

4.0 WASTE DIVERSION OPERATIONS

In 2022, the BRRMF received 507,807 metric tonnes of material from a variety of sources including residential waste collection, residential food waste collection (pilot project), commercial wastes, wastes from City operations, and materials dropped off at the 4R depots. Composting programs, on-site re-use of materials, and removal of materials from the site for re-use or further processing allowed 190,943 metric tonnes of material to be diverted from the landfill. The remaining 316,864 metric tonnes of material was landfilled. The 38% diversion rate in 2022 is a slight increase from the previous year due to an increase in the amount of compostable materials received.

The 2-year Residential Food Waste Collection Pilot Project concluded at the end of September 2022. The project involved curbside collection of residential food waste from 4,000 households, and included waste audits, surveys, and data gathering activities to help inform decisions towards a city-wide program. The results of the pilot project will be presented to City Council in Q2 of 2023. In 2022, 258 metric tonnes of food waste was composted at the BRRMF; the resulting material was used onsite.

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In 2022, 9,925 metric tonnes of biosolids were mixed with woodchips and clay to create a fabricated soil that will be used as final cover at the BRRMF. No biosolids were landfilled or composted at the biosolids composting facility. In 2023, biosolids composting will occur on an as-needed basis to meet final cover needs.

In 2023, we will continue fabricating soil from biosolids, composting organic materials, and diverting re-useable wastes from the landfill.

A summary of the BRRMF Waste Diversion Operations is provided in Table 1.

	Table 1. 2022 BRRMF Waste Diversion Summary				
	2018	2019	2020	2021	2022
Materials Landfilled					
Commercial Wastes	88,813	93,621	90,755	100,965	97,489
Residential Wastes	172,041	174,050	194,570	184,930	175,964
Wastes from City Operations	66,068	52,571	60,957	29,617	43,411
Wastes from Other Municipalities	20	0	0	0	0
Total Materials Landfilled	326,942	320,242	346,282	315,511	316,864
Materials Diverted from Landfill					
Batteries	49	74	79	84	92
Bicycles	6	9	14	15	18
Biosolids	1,541	1,916	1,219	8,793	9,925
Ceramic	296	331	281	290	249
Clean Fill	281,546	252,113	136,675	104,728	109,640
Compostable Materials	52,742	47,834	53,694	45,338	58,053
Concrete	5,187	6,565	10,145	8,170	9,822
Electronics	570	665	713	607	611
Glass	87	80	79	40	57
Household Hazardous Waste	594	686	826	660	569
Lumber	202	192	91	12	20
Mattresses	na	233	316	395	308
Oil	60	90	124	121	149
Oversized Plastics	52	43	22	15	14
Ozone-Containing Appliances	180	166	190	201	199
Recyclables	471	278	283	232	80
Residential Food Waste Collection	na	na	115	411	258
Scrap Metal	607	635	726	685	621
Tires	165	134	277	140	259
Total Materials Diverted from Landfill	344,354	312,046	205,869	170,936	190,943
Total Materials Received	671,296	632,288	552,151	486,446	507,807
Diversion Rate	51%	49%	37%	35%	38%

Note: biosolids weighed on arrival at the BRRMF scale

5.0 GROUND WATER, SURFACE WATER, LEACHATE, AND LANDFILL GAS MONITORING

5.1 GROUND WATER

The land beneath the BRRMF consists of three layers: the uppermost layer is clay (averaging 12 m in thickness), the second layer is till (averaging 6 m in thickness), and the lowest layer is bedrock. Ground water flows downwards through the clay and till layers into the bedrock aquifer, which flows in a north-east direction. The ground water in all three layers is saline and non-potable. The major ions in the ground water from the clay layer are calcium, magnesium, sulfate and bicarbonate. Sodium and chloride are the major ions in the bedrock aquifer. Ground water in the till layer is generally intermediate in brackishness and shows a gradual change with depth. The ground water monitoring system includes 34 nested wells: 13 bedrock wells, 13 till wells, and 8 clay wells. The locations of the ground water monitoring wells are shown on Figure 2.

As per the BRRMF Operating Plan, ground water is monitored in accordance with the Ground Water Sampling and Analysis Plan (SAP), as specified under Clause 123. Sampling frequency is twice per year for bedrock wells and downgradient till wells, and once per year for clay wells and other till wells distant from the waste areas. As neither Federal nor Manitoba Provincial Governments regulate non-potable ground water quality, the Ontario Ministry of Environment (MOE) guidelines for non-potable groundwater quality are used as the regulatory guideline (MOE, 2011).

In 2022, a total of 51 ground water samples were analyzed – 4 samples from wells upgradient of the site (background water quality), and 47 samples from wells cross gradient and downgradient of the site. There were no deviations from the Ground Water SAP or from normal sample collection and preservation practices, although well 16A was struck by onsite equipment; the original well was decommissioned and a new well was drilled. Results for several parameters were variable between different wells of the same type, and also between spring and autumn results at the same well. The results met the guidelines with the exception of chloride in one till well and most of the bedrock wells, and dissolved selenium was above the guideline in one till sample. The 2022 ground water results are provided in Tables 2.1-2.3.

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Table 2.1 2022 Ground Water Monitoring - Clay Wells

	Units	Criteria*	Downgradient and Crossgradient								
			Upgradient		Downgradient and Crossgradient						
			GWQ25-6N60DR	GWQ25-5N62D	GWQ25-6N63E	GWQ25-6N57DR	GWQ25-6N58DR	GWQ25-6N59DR	GWQ25-6N67E	GWQ25-4N34B	GWQ25-4N34C
			Spring	Spring	Spring	Spring	Spring	Spring	Spring	Spring	
Inorganic Parameters											
Alkalinity - Bicarbonate	mg/L		512	137	575	533	504	389	453	491	613
Alkalinity - Carbonate	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Hydroxide	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Total	mg/L		512	137	575	533	504	389	453	491	613
Dissolved Hardness (CaCO3)	mg/L		1,430	698	1,760	1,600	1,810	1,820	1,400	1,180	1,200
pH	units		6.95	7.52	6.79	6.89	6.73	6.81	6.99	7.53	7.59
Specific Conductivity	(µS/cm)		4,640	8,560	6,600	5,750	6,470	6,050	4,730	5,480	6,020
Turbidity	(ntu)		50.6	32.0	19.7	52.4	57.3	75.0	23.5	69.0	1,493
Total Dissolved Solids	mg/L		3,870	5,140	5,280	4,720	5,200	4,830	3,720	4,740	5,170
Total Suspended Solids	mg/L		589	1,155	240	280	325	333	799	407	3,700
Total Solids	mg/L		4,450	6,290	5,520	5,000	5,520	5,160	4,520	5,140	8,870
Dissolved Chloride (Cl)	mg/L	2,300	425	2,290	980	700	1,110	795	565	565	1,140
Dissolved Sulphate (SO4)	mg/L		2,070	870	2,420	2,410	2,260	2,230	1,870	2,480	1,910
Nutrients											
Ammonia - Dissolved	mg/L N		0.048	1.19	0.601	0.193	0.202	0.093	0.737	0.030	0.041
Nitrate - Dissolved	mg/L N		0.788	0.013	0.034	0.759	0.708	1.070	0.015	0.021	0.061
Total Kjeldahl Nitrogen	mg/L N		0.30	0.70	1.50	0.70	1.10	0.50	1.40	0.30	2.10
Phosphorus - Dissolved	mg/L P		<0.013	<0.013	0.025	0.018	0.026	<0.013	<0.013	0.023	<0.013
Other											
Cyanide - Total (CN)	mg/L	0.066	<0.0010	<0.0010	<0.0010	0.0239	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic Indicators											
Carbonaceous Oxygen Demand	mg/L		54	82	76	62	128	76	50	55	310
Total Organic Carbon	mg/L		8.1	1.4	15.7	13.3	19.2	12.3	8.8	13.6	26.8
Metals											
Arsenic (As)- Dissolved	mg/L	1.9	0.00037	0.01840	0.00066	0.00076	0.00054	0.00075	0.00068	0.01840	0.00085
Barium (Ba)- Dissolved	mg/L	29	0.0139	0.0156	0.0107	0.0118	0.0118	0.0189	0.0104	0.0156	0.0124
Beryllium (Be)- Dissolved	mg/L	0.067	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cadmium (Cd)- Dissolved	mg/L	0.0027	0.000043	<0.0000050	0.000078	0.000088	0.000109	0.000212	0.000094	<0.0000050	0.000038
Calcium (Ca)- Dissolved	mg/L		610	299	740	534	730	722	583	299	345
Chromium (Cr)- Dissolved	mg/L	0.81	0.00019	0.00014	<0.00010	0.00056	<0.00010	0.00080	0.00014	0.00014	0.00020
Copper (Cu)- Dissolved	mg/L	0.087	0.00282	0.00024	0.00142	0.00607	0.00492	0.00619	0.00374	0.00024	0.00477
Iron (Fe)- Dissolved	mg/L		<0.010	2.38	0.020	0.433	<0.010	0.506	<0.010	2.38	<0.010
Lead (Pb)- Dissolved	mg/L	0.025	0.000078	<0.000050	<0.000050	0.000550	0.000116	0.000701	0.000088	<0.000050	0.000095
Magnesium (Mg)- Dissolved	mg/L		206	138	320	232	300	258	217	138	469
Manganese (Mn)- Dissolved	mg/L		0.155	0.0322	2.81	1.55	4.62	2.58	0.0684	0.0322	0.221
Mercury (Hg)- Total	mg/L	0.0028	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Nickel (Ni)- Dissolved	mg/L	0.49	0.000672	0.00072	0.01310	0.01020	0.01440	0.00967	0.00406	0.00072	0.00465
Potassium (K)- Dissolved	mg/L		9.91	37.7	11.9	10.6	11.8	11.3	9.50	37.7	9.16
Selenium (Se)- Dissolved	mg/L	0.063	0.000121	<0.000050	0.003060	0.000475	0.000205	0.000116	0.000104	<0.000050	0.033900
Silver (Ag)- Dissolved	mg/L	0.0015	<0.000010	<0.000010	<0.000010	0.000012	<0.000010	0.000022	<0.000010	<0.000010	<0.000010
Sodium (Na)- Dissolved	mg/L	2,300	319	1,370	607	481	485	502	318	1,370	460
Zinc (Zn)- Dissolved	mg/L	1.1	0.0048	0.0039	0.0082	0.0086	0.0084	0.0085	0.0047	0.0039	0.0044
Field Parameters											
pH	units		7.19	7.31	7.38	7.26	6.99	6.97	7.04	7.13	7.46
Specific Conductivity	(µS/cm)		4,570	8,050	3,280	5,770	6,260	6,600	4,760	4,130	6,050
Polycyclic Aromatic Hydrocarbons											
Naphthalene	mg/L	6.4	*ns								
Benzo(a)pyrene	mg/L	0.00081	*ns								
Anthracene	mg/L	0.0024	*ns								
Petroleum Hydrocarbons											
F1 (C6-C10 Hydrocarbons)	mg/L	0.75	*ns								
F2 (C10-C16 Hydrocarbons)	mg/L	0.15	*ns								
F3 (C16-C34 Hydrocarbons)	mg/L	0.50	*ns								
F4 (C34-C50 Hydrocarbons)	mg/L	0.50	*ns								
Benzene	mg/L	0.43	*ns								
EthylBenzene	mg/L	2.3	*ns								
Toluene	mg/L	18	*ns								
Xylene (Total)	mg/L	4.2	*ns								
Volatile Organic Carbons											
Vinyl chloride	mg/L	0.0017	*ns								
Pesticides											
Diazinon	µg/L		*ns								
Herbicides											
2,4-D	mg/L		*ns								

Note: Criteria from Ontario Ministry of the Environment. (2011, July 1). Soil, Ground Water and Sediment Standards for Use Under Part XV.I of the *Environmental Protection Act*. Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
 Note: Criteria exceedences are highlighted in red.
 * Criteria for total chloride and total metals

*ns - not submitted

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Table 2.2 2022 Ground Water Monitoring - Till Wells

	Units	Criteria*	Upgradient		Downgradient and Crossgradient							
			GWQ25-6N60ER		GWQ25-5N62E		GWQ25-W13A		GWQ25-W14A		GWQ25-W15A	
			Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn
Inorganic Parameters												
Alkalinity - Bicarbonate	mg/L		174	192	492	858	928	174	177	437	764	
Alkalinity - Carbonate	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	
Alkalinity - Hydroxide	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	
Alkalinity - Total	mg/L		174	192	492	858	928	174	177	437	764	
Dissolved Hardness (CaCO ₃)	mg/L		1,470	4,470	2,000	5,950	11,200	4,190	5,300	5,180	8,210	
pH	units		6.81	7.36	7.39	7.29	7.37	7.43	7.43	6.83	6.97	
Specific Conductivity	(µS/cm)		4,200	8,430	8,470	5,340	5,290	8,320	8,320	6,860	6,970	
Turbidity	(ntu)		401	3,390	1,143	>4,800	>4,800	1,480	>4,800	>4,800	>4,800	
Total Dissolved Solids	mg/L		3,910	5,970	5,800	8,860	23,500	6,270	3,770	6,380	2,090	
Total Suspended Solids	mg/L		780	8,280	2,420	26,250	32,350	9,850	15,380	15,800	31,850	
Total Solids	mg/L		4,690	14,300	8,220	35,100	55,900	16,100	19,100	22,200	33,900	
Dissolved Chloride (Cl)	mg/L	2,300	505	2,350	2,330	965	620	1,210	2,210	1,990	1,370	
Dissolved Sulphate (SO ₄)	mg/L		3,590	1,050	786	2,150	1,450	1,020	826	2,100	1,820	
Nutrients												
Ammonia - Dissolved	mg/L N		0.103	0.951	0.639	0.045	0.067	1.07	0.939	0.908	0.807	
Nitrate - Dissolved	mg/L N		0.670	0.080	*na	0.097	*na	0.053	*na	0.038	*na	
Total Kjeldahl Nitrogen	mg/L N		0.4	1.2	*na	1.3	*na	1.3	*na	2.3	*na	
Phosphorus - Dissolved	mg/L P		<0.013	<0.013	0.019	0.024	0.031	<0.013	0.027	<0.013	0.029	
Other												
Cyanide - Total (CN)	mg/L	0.066	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010		<0.0010		
Organic Indicators												
Carbonaceous Oxygen Demand	mg/L		60	152	160	1,550	1,850	264	590	930	1,980	
Total Organic Carbon	mg/L		8.7	17.1	4.1	154.9	*nr	50.0	24.7	47.8	*nr	
Metals												
Arsenic (As)- Dissolved	mg/L	1.9	0.00097	0.00609	0.00140	0.00227	0.00231	0.00352	0.00222	0.00086	0.00098	
Barium (Ba)- Dissolved	mg/L	29	0.0090	0.0116	0.0127	0.0101	0.0127	0.0156	0.0147	0.0167	0.0129	
Beryllium (Be)- Dissolved	mg/L	0.067	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Cadmium (Cd)- Dissolved	mg/L	0.0027	0.000021	0.000007	0.000059	0.000028	0.000024	0.000018	0.000022	0.000081	0.000029	
Calcium (Ca)- Dissolved	mg/L		401	268	335	201	236	210	406	462	717	
Chromium (Cr)- Dissolved	mg/L	0.81	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Copper (Cu)- Dissolved	mg/L	0.087	0.00232	<0.00020	0.00178	0.00656	0.00603	0.00063	0.00131	0.00246	0.00202	
Iron (Fe)- Dissolved	mg/L		<0.010	0.580	<0.010	0.020	<0.010	0.246	<0.010	<0.010	<0.010	
Lead (Pb)- Dissolved	mg/L	0.025	0.000063	<0.000050	<0.000050	0.000074	0.000066	<0.000050	<0.000050	<0.000050	<0.000050	
Magnesium (Mg)- Dissolved	mg/L		151	140	166	446	441	92.2	175	154	263	
Manganese (Mn)- Dissolved	mg/L		1.54	0.0557	0.0798	0.0634	0.0672	0.237	0.441	1.53	1.90	
Mercury (Hg)- Total	mg/L	0.0028	<0.0000050	0.0000105	<0.0000050	0.0000966	0.0000240	<0.0000050	0.0001700	<0.0000050	0.0001600	
Nickel (Ni)- Dissolved	mg/L	0.49	0.00840	0.00126	0.00128	0.00413	0.00356	0.00165	0.00203	0.00727	0.00834	
Potassium (K)- Dissolved	mg/L		7.75	35.3	32.9	4.92	6.66	20.0	24.8	10.6	14.2	
Selenium (Se)- Dissolved	mg/L	0.063	0.000096	<0.000050	<0.000050	0.1570	0.002950	0.000089	<0.000050	0.000100	0.000095	
Silver (Ag)- Dissolved	mg/L	0.0015	<0.000010	<0.000010	0.000013	<0.000010	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	
Sodium (Na)- Dissolved	mg/L	2,300	281	1,200	1,220	330	458	743	1,090	371	592	
Zinc (Zn)- Dissolved	mg/L	1.1	0.0045	0.0014	0.0040	0.0026	0.0035	0.0019	0.0021	0.0041	0.0029	
Field Parameters												
pH	units		7.25	7.45	7.92	7.58	7.73	7.46	8.03	7.35	7.30	
Specific Conductivity	(µS/cm)		4,380	7,760	3,720	7,210	6,340	7,390	7,700	6,940	7,550	
Polycyclic Aromatic Hydrocarbons												
Naphthalene	mg/L	6.4	<0.000050	<0.000050		<0.000050		<0.000050		<0.000050		
Benzo(a)pyrene	mg/L	0.00081	<0.0000050	<0.0000050		<0.0000050		<0.0000050		<0.0000050		
Anthracene	mg/L	0.0024	<0.000010	<0.000010		<0.000010		<0.000010		<0.000010		
Petroleum Hydrocarbons												
F1 (C6-C10 Hydrocarbons)	mg/L	0.75	<0.10	<0.10		<0.10		<0.10		<0.10		
F2 (C10-C16 Hydrocarbons)	mg/L	0.15	<100	<100		<100		<100		<100		
F3 (C16-C34 Hydrocarbons)	mg/L	0.50	<250	<250		<250		<250		<250		
F4 (C34-C50 Hydrocarbons)	mg/L	0.50	<250	<250		<250		<250		<250		
Benzene	mg/L	0.43	<0.00050	<0.00050		<0.00050		<0.00050		<0.00050		
Ethylbenzene	mg/L	2.3	<0.00050	<0.00050		<0.00050		<0.00050		<0.00050		
Toluene	mg/L	18	<0.00050	<0.00050		<0.00050		<0.00050		<0.00050		
Xylene (Total)	mg/L	4.2	<0.00064	<0.00064		<0.00064		<0.00064		<0.00064		
Volatile Organic Carbons												
Vinyl chloride	mg/L	0.0017	<0.0005	<0.0005		<0.0005		<0.0005		<0.0005		
Pesticides												
Diazinon	µg/L		<0.10	<0.10		<0.10		<0.10		<0.10		
Herbicides												
2,4-D	mg/L		<0.0001	<0.0001		<0.0001		<0.0001		<0.0001		

Note: Criteria from Ontario Ministry of the Environment. (2011, July 1). Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
 Note: Criteria exceedences are highlighted in red.

* Criteria for total chloride and total metals

*na - not analysed; instrument malfunction

*nr - no result; sample matrix

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Table 2.2 2022 Ground Water Monitoring - Till Wells

			Downgradient and Crossgradient						
			GWQ25-W16A	GWQ25-6N63F	GWQ25-6N57F	GWQ25-6N58F	GWQ25-6N59F	GWQ25-6N67F	GWQ25-4N34DR
	Units	Criteria*	Autumn	Spring	Spring	Spring	Spring	Spring	Spring
Inorganic Parameters									
Alkalinity - Bicarbonate	mg/L		393	391	355	250	471	400	415
Alkalinity - Carbonate	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Hydroxide	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Total	mg/L		393	391	355	250	471	400	415
Dissolved Hardness (CaCO3)	mg/L		4,910	1,760	2,310	8,370	2,000	1,090	2,050
pH	units		7.08	7.03	7.08	7.23	6.86	7.01	7.05
Specific Conductivity	(µS/cm)		5,330	6,620	6,000	6,140	6,080	4,500	6,180
Turbidity	(ntu)		>4,800	566	2,707	>4,800	349	47.8	1,010
Total Dissolved Solids	mg/L		1,140	4,630	4,470	2,950	4,730	3,350	6,000
Total Suspended Solids	mg/L		16,700	1,183	2,740	14,860	809	957	2,220
Total Solids	mg/L		17,800	5,810	7,210	17,800	5,540	4,310	8,220
Dissolved Chloride (Cl)	mg/L	2,300	1,100	1,480	1,040	1,450	850	655	790
Dissolved Sulphate (SO4)	mg/L		930	1,360	1,980	1,430	2,140	1,490	1,640
Nutrients									
Ammonia - Dissolved	mg/L N		0.979	0.731	0.968	1.28	0.343	0.704	0.338
Nitrate - Dissolved	mg/L N		*na	0.180	0.010	0.051	0.632	0.049	0.466
Total Kjeldahl Nitrogen	mg/L N		*na	1.1	2.2	2.1	0.8	1.3	0.6
Phosphorus - Dissolved	mg/L P		0.028	<0.013	0.023	0.023	0.027	<0.013	<0.013
Other									
Cyanide - Total (CN)	mg/L	0.066	*ns	<0.0010	<0.0010	<0.0050	<0.0010	<0.0010	<0.0010
Organic Indicators									
Carbonaceous Oxygen Demand	mg/L		281	104	196	404	100	45	72
Total Organic Carbon	mg/L		24.2	9.0	19.1	21.5	14.9	4.8	8.8
Metals									
Arsenic (As)- Dissolved	mg/L	1.9	0.00309	0.00262	0.00668	0.00109	0.00051	0.00119	0.00122
Barium (Ba)- Dissolved	mg/L	29	0.0141	0.0141	0.0200	0.0155	0.0118	0.0180	0.0117
Beryllium (Be)- Dissolved	mg/L	0.067	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010
Cadmium (Cd)- Dissolved	mg/L	0.0027	0.000086	0.000019	0.000059	0.000009	0.000076	0.000013	0.000020
Calcium (Ca)- Dissolved	mg/L		498	559	596	410	671	453	466
Chromium (Cr)- Dissolved	mg/L	0.81	<0.00010	0.00059	0.00386	0.00060	<0.00010	0.00015	<0.00010
Copper (Cu)- Dissolved	mg/L	0.087	0.00288	0.00292	0.00430	0.00343	0.00434	0.00293	0.00088
Iron (Fe)- Dissolved	mg/L		<0.010	1.52	3.92	0.484	<0.010	<0.010	<0.010
Lead (Pb)- Dissolved	mg/L	0.025	0.000089	0.000355	0.002040	0.000353	<0.000050	0.000081	<0.000050
Magnesium (Mg)- Dissolved	mg/L		188	327	263	336	249	230	406
Manganese (Mn)- Dissolved	mg/L		0.582	0.256	0.745	0.124	1.870	0.0076	0.0635
Mercury (Hg)- Total	mg/L	0.0028	<0.0000050	0.0000060	0.0000346	0.0000067	0.0000248	<0.0000050	0.0000182
Nickel (Ni)- Dissolved	mg/L	0.49	0.00516	0.00438	0.01030	0.00302	0.00957	0.00264	0.00496
Potassium (K)- Dissolved	mg/L		13.4	11.1	13.6	12.2	10.7	9.02	15.8
Selenium (Se)- Dissolved	mg/L	0.063	0.000817	<0.000050	0.000098	<0.000050	0.000127	0.000069	0.000064
Silver (Ag)- Dissolved	mg/L	0.0015	<0.000010	0.000015	0.000035	0.000017	<0.000010	<0.000010	<0.000010
Sodium (na)- Dissolved	mg/L	2,300	437	553	592	570	566	302	476
Zinc (Zn)- Dissolved	mg/L	1.1	0.0110	0.0045	0.0107	0.0043	0.0053	0.0030	0.0011
Field Parameters									
pH	units		7.78	7.28	7.49	7.32	6.91	7.37	7.49
Specific Conductivity	(µS/cm)		6,020	6,710	5,900	5,200	5,180	4,710	6,030
Polycyclic Aromatic Hydrocarbons									
Naphthalene	mg/L	6.4							<0.000050
Benzo(a)pyrene	mg/L	0.00081							<0.0000050
Anthracene	mg/L	0.0024							<0.000010
Petroleum Hydrocarbons									
F1 (C6-C10 Hydrocarbons)	mg/L	0.75							<0.10
F2 (C10-C16 Hydrocarbons)	mg/L	0.15							<100
F3 (C16-C34 Hydrocarbons)	mg/L	0.50							<250
F4 (C34-C50 Hydrocarbons)	mg/L	0.50							<250
Benzene	mg/L	0.43							<0.00050
Ethylbenzene	mg/L	2.3							<0.00050
Toluene	mg/L	18							<0.00050
Xylene (Total)	mg/L	4.2							<0.00064
Volatile Organic Carbons									
Vinyl chloride	mg/L	0.0017							<0.0005
Pesticides									
Diazinon	µg/L								<0.10
Herbicides									
2,4-D	mg/L								<0.0001

Note: Criteria from Ontario Ministry of the Environment. (2011, July 1). Soil, Ground Water and Sediment Standards for Use Under Part XV.I of the Environmental Protection Act Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

Note: Criteria exceedences are highlighted in red.

* Criteria for total chloride and total metals

*na - not analysed; instrument malfunction

*ns - not submitted

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The 2018-2022 average results are provided in Tables 3.1-3.3. Although the average concentration of some metals are higher in the down and cross gradient samples than in the upgradient samples, they are below the MOE guidelines. The average dissolved chloride concentration often exceeds the MOE guideline of 2,300 mg/L in both upgradient and down and cross gradient samples.

The Piper diagrams provided in Appendix A display tight groupings of ground water sampling data, which is indicative of no significant ground water chemical changes.

Time versus concentration graphs provided in Appendix B show the historical relationship of the analytical parameters at each monitoring location. In general, the analytical results for ground water obtained in 2022 were found to be similar to those obtained in 2018-2021, and are consistent with background levels.

The Contingency Action Plan identified under Clause 125 was not implemented in 2022.

At this time, we have no recommendations for changes to the ground water monitoring program, although we are working on a reassessment of our ground water monitoring test parameters and sampling frequency in 2023.

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Table 3.1 2022 Ground Water Quality Comparison - Clay Wells

	Units	Criteria	2018		2019		2020		2021		2022	
			Average	Downgradient	Average	Downgradient	Average	Downgradient	Average	Downgradient	Average	Downgradient
Inorganic Parameters												
Alkalinity - Bicarbonate	mg/L		539	585	530	546	528	555	519	509	512	462
Alkalinity - Carbonate	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Hydroxide	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Total	mg/L		539	585	530	546	528	555	519	509	512	462
Dissolved Hardness (CaCO3)	mg/L		2,325	3,065	1,720	2,202	1,370	1,777	1,360	1,713	1,430	1,434
pH	units		6.81	6.80	6.89	6.98	6.81	6.91	6.87	6.87	6.95	7.11
Specific Conductivity	(µS/cm)		4,820	6,463	4,800	6,622	4,820	6,523	4,680	6,528	4,640	6,208
Turbidity	(ntu)		116.0	535.4	24.3	42.2	122.0	329.5	26.8	51.8	50.6	227.7
Total Dissolved Solids	mg/L		3,890	5,076	3,880	6,783	3,960	5,376	3,900	4,823	3,870	4,850
Total Suspended Solids	mg/L		280	1,357	268	970	183	1,143	175	2,919	589	905
Total Solids	mg/L		4,170	6,433	4,150	7,753	4,140	6,516	4,070	7,748	4,450	5,753
Dissolved Chloride (Cl)	mg/L	2,300*	474	948	570	1,067	369	1,057	765	1,892	425	1,018
Dissolved Sulphate (SO4)	mg/L		1,750	1,911	1,730	2,160	1,680	2,110	1,730	2,052	2,070	2,056
Nutrients												
Ammonia - Dissolved	mg/L N		0.129	0.646	0.005	0.356	0.012	0.362	0.098	0.604	0.048	0.386
Nitrate - Dissolved	mg/L N		0.635	0.337	0.855	0.356	0.923	0.408	0.654	0.200	0.788	0.335
Total Kjeldahl Nitrogen	mg/L N		0.4	0.9	0.2	0.9	0.2	1.2	1.2	1.6	0.3	1.0
Phosphorus - Dissolved	mg/L P		<0.010	<0.010	<0.013	0.017	0.027	0.027	<0.013	<0.013	<0.013	0.015
Other												
Cyanide - Total (CN)	mg/L	0.066	*nr	*nr	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0034
Organic Indicators												
Chemical Oxygen Demand	mg/L		40	69	32	156	47	97	37	80	54	105
Total Organic Carbon	mg/L		29.1	17.7	10.0	23.0	9.9	37.7	8.7	17.6	8.1	13.9
Metals												
Arsenic (As)- Dissolved	mg/L	1.9*	0.000530	0.000796	0.000480	0.000758	0.000480	0.000876	0.000500	0.000722	0.000370	0.005130
Barium (Ba)- Dissolved	mg/L	29*	0.00870	0.01326	0.00810	0.01083	0.00870	0.01166	0.00870	0.01157	0.01390	0.01340
Beryllium (Be)- Dissolved	mg/L	0.067*	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cadmium (Cd)- Dissolved	mg/L	0.0027*	0.000215	0.000211	0.000211	0.000155	0.000226	0.000141	0.000050	0.000120	0.000043	0.000078
Calcium (Ca)- Dissolved	mg/L		575	713	579	697	405	597	531	652	610	532
Chromium (Cr)- Dissolved	mg/L	0.81*	0.00013	0.00043	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	0.00019	0.00026
Copper (Cu)- Dissolved	mg/L	0.087*	0.0021	0.0086	0.0014	0.0021	0.00187	0.00278	0.00313	0.00329	0.00282	0.00345
Iron (Fe)- Dissolved	mg/L		<0.010	0.115	<0.010	0.058	0.016	0.011	0.013	0.012	<0.010	0.717
Lead (Pb)- Dissolved	mg/L	0.025*	<0.000050	0.000343	<0.000050	<0.000050	<0.000050	<0.000050	0.000106	0.000094	0.000078	0.000203
Magnesium (Mg)- Dissolved	mg/L		216	312	212	334	160	285	202	295	206	259
Manganese (Mn)- Dissolved	mg/L		1.86	2.03	0.86	1.54	1.10	1.47	1.42	1.67	0.16	1.49
Mercury (Hg)- Total	mg/L	0.0028	<0.000005	0.0000612	<0.0000050	0.0000710	<0.0000050	0.0000680	<0.0000050	0.0000852	<0.0000050	<0.0000050
Nickel (Ni)- Dissolved	mg/L	0.49*	0.00724	0.01277	0.00967	0.00972	0.00640	0.00925	0.00696	0.01119	0.00672	0.00719
Potassium (K)- Dissolved	mg/L		10.9	14.0	10.2	11.4	9.8	10.7	9.7	11.4	9.9	17.5
Selenium (Se)- Dissolved	mg/L	0.063*	0.00013	0.00023	0.00014	0.01189	0.00069	0.00048	0.000114	0.00021	0.000121	0.00474
Silver (Ag)- Dissolved	mg/L	0.0015*	<0.000010	<0.000010	0.000010	0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)- Dissolved	mg/L	2,300*	345	582	332	550	267	415	309	509	319	699
Zinc (Zn)- Dissolved	mg/L	1.1*	0.00620	0.01546	0.00450	0.00547	0.00640	0.00611	0.00530	0.00607	0.00480	0.00633
Field Parameters												
pH	units		7.02	7.19	7.44	7.67	7.44	7.34	7.24	7.26	7.19	7.19
Specific Conductivity	(µS/cm)		4,330	5,986	4,050	5,295	4,050	5,010	4,310	5,693	4,570	5,613
Polycyclic Aromatic Hydrocarbons												
Naphthalene	mg/L	6.4	<0.000050	<0.000050	<0.000050		<0.000050		<0.000050		*ns	
Benzo(a)pyrene	mg/L	0.00081	<0.0000050	<0.0000050	<0.0000050		<0.0000050		<0.0000050		*ns	
Anthracene	mg/L	0.0024	<0.000010	<0.000010	<0.000010		<0.000010		<0.000010		*ns	
Petroleum Hydrocarbons												
F1 (C6-C10 Hydrocarbons)	mg/L	0.75	<0.10	<0.10	<0.10		<0.10		<0.10		*ns	
F2 (C10-C16 Hydrocarbons)	mg/L	0.15	<0.10	<0.10	<0.10		<0.10		<0.10		*ns	
F3 (C16-C34 Hydrocarbons)	mg/L	0.50	<0.25	<0.25	<0.25		<0.25		<0.25		*ns	
F4 (C34-C50 Hydrocarbons)	mg/L	0.50	<0.25	<0.25	<0.25		<0.25		<0.25		*ns	
Benzene	mg/L	0.43	<0.00050	<0.00050	<0.00050		<0.00050		<0.00050		*ns	
Ethylbenzene	mg/L	2.3	<0.00050	<0.00050	<0.00050		<0.00050		<0.00050		*ns	
Toluene	mg/L	18	<0.00050	<0.00050	<0.00050		<0.00050		<0.00050		*ns	
Xylene (Total)	mg/L	4.2*	<0.00050	<0.00050	<0.00050		<0.00064		<0.00064		*ns	
Volatile Organic Carbons												
Vinyl chloride	mg/L	1.7	<0.0005	<0.0005	<0.0005		<0.0005		<0.0005		*ns	
Pesticides												
Diazinon	µg/L		<0.10	<0.10	<0.10		<0.10		<0.10		*ns	
Herbicides												
2,4-D	mg/L		<0.00010	<0.00010	<0.00010		<0.00010		<0.0001		*ns	

Note: Criteria from Ontario Ministry of the Environment. (2011, July 1). Soil, Ground Water and Sediment Standards for Use Under Part XV.I of the Environmental Protection Act Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

Note: Where value is expressed as less than (<), the value is halved and used in the calculations, where value is expressed as (>), the value is used in the calculations.

* Criteria for total chloride, total metals and xylene mixture

*nr - No result due to lab error.

*ns - not submitted

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	Units	Criteria	2018		2019		2020		2021		2022	
			Average		Average		Average		Average		Average	
Inorganic Parameters												
Alkalinity - Bicarbonate	mg/L		683	536	604	1,007	572	554	576	539	174	446
Alkalinity - Carbonate	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Hydroxide	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Total	mg/L		683	536	604	1,007	572	554	576	539	174	446
Dissolved Hardness (CaCO3)	mg/L		1,853	2,415	1,510	3,436	1,240	2,435	1,170	3,216	1,470	4,599
pH	units		6.96	7.11	6.93	7.12	6.95	7.13	6.90	7.12	6.81	7.16
Specific Conductivity	(µS/cm)		4,280	6,888	4,270	7,049	4,080	6,694	4,185	6,874	4,200	6,590
Turbidity	(ntu)		215	5,126	247	3,338	186	1,636	150	2,747	401	2,953
Total Dissolved Solids	mg/L		3,345	4,715	3,300	4,297	3,285	4,318	3,285	4,734	3,910	5,994
Total Suspended Solids	mg/L		616	7,528	880	9,199	581	7,044	325	11,398	780	12,110
Total Solids	mg/L		3,958	12,245	4,180	12,768	3,865	11,355	3,615	16,131	4,690	18,101
Dissolved Chloride (Cl)	mg/L	2,300 *	398	1,518	436	1,643	405	1,415	3,200	1,898	505	1,361
Dissolved Sulphate (SO4)	mg/L		1,465	1,308	1,375	1,101	1,405	1,500	1,063	1,340	3,590	1,478
Nutrients												
Ammonia - Dissolved	mg/L N		0.496	0.892	0.386	0.859	0.198	0.758	0.612	0.892	0.103	0.718
Nitrate - Dissolved	mg/L N		0.231	0.086	0.206	0.048	0.588	0.189	0.502	0.412	0.670	0.166
Total Kjeldahl Nitrogen	mg/L N		0.9	1.4	0.7	1.5	0.3	1.3	0.7	1.6	0.4	1.4
Phosphorus - Dissolved	mg/L P		0.012	0.018	<0.013	0.013	0.023	0.030	0.081	1.667	<0.013	0.018
Other												
Cyanide - Total (CN)	mg/L	0.066	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic Indicators												
Chemical Oxygen Demand	mg/L		25	504	43	354	43	252	42	299	60	579
Total Organic Carbon	mg/L		19.9	32.3	9.4	18.1	8.4	47.0	8.1	18.9	8.7	30.8
Metals												
Arsenic (As) - Dissolved	mg/L	1.9*	0.001190	0.002578	0.001110	0.003034	0.000975	0.001805	0.000865	0.002219	0.000970	0.002403
Barium (Ba) - Dissolved	mg/L	29*	0.00827	0.01380	0.00804	0.01161	0.00840	0.01268	0.00800	0.01244	0.00900	0.01415
Beryllium (Be) - Dissolved	mg/L	0.067*	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cadmium (Cd) - Dissolved	mg/L	0.0027*	0.000037	0.000076	0.000057	0.000033	0.000022	0.000050	0.000022	0.000027	0.000021	0.000037
Calcium (Ca) - Dissolved	mg/L		461	432	495	432	495	473	419	439	401	433
Chromium (Cr) - Dissolved	mg/L	0.81*	<0.00010	0.00051	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	0.00016	<0.00010	0.00039
Copper (Cu) - Dissolved	mg/L	0.087*	0.0019	0.0023	0.0014	0.0002	0.0016	0.0013	0.0025	0.0016	0.0023	0.0028
Iron (Fe) - Dissolved	mg/L		<0.010	0.662	0.022	0.530	0.058	0.318	0.014	0.488	<0.010	0.454
Lead (Pb) - Dissolved	mg/L	0.025*	<0.000050	0.000050	<0.000050	<0.000050	<0.000050	0.000064	0.000055	0.000142	0.000063	0.000217
Magnesium (Mg) - Dissolved	mg/L		171	257	195	231	166	214	174	224	151	258
Manganese (Mn) - Dissolved	mg/L		1.09	0.88	1.17	0.85	1.25	0.78	1.28	0.58	1.54	0.53
Mercury (Hg) - Total	mg/L	0.0028	<0.000005	0.0002658	0.0000190	0.0000650	0.0000063	0.0001407	0.0000090	0.0000537	<0.0000050	0.0000376
Nickel (Ni) - Dissolved	mg/L	0.49*	0.00731	0.00545	0.00791	0.00418	0.00763	0.00487	0.00768	0.00445	0.00840	0.00464
Potassium (K) - Dissolved	mg/L		9.0	19.6	8.6	19.6	8.6	16.9	7.8	17.6	7.8	15.7
Selenium (Se) - Dissolved	mg/L	0.063*	0.00010	0.00007	0.00008	0.00025	<0.00050	0.00010	0.000080	0.000082	0.000096	0.010769
Silver (Ag) - Dissolved	mg/L	0.0015*	<0.000010	<0.000010	0.000015	0.000021	0.000013	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na) - Dissolved	mg/L	2,300*	396	784	371	835	318	676	311	717	281	633
Zinc (Zn) - Dissolved	mg/L	1.1*	0.00630	0.00795	0.00360	0.00250	0.00340	0.00380	0.00410	0.00350	0.00450	0.00416
Field Parameters												
pH	units		7.26	7.37	7.59	7.80	7.27	7.34	7.39	7.60	7.25	7.50
Specific Conductivity	(µS/cm)		3,630	6,295	4,650	5,581	3,875	5,768	3,620	6,181	4,380	6,291
Polycyclic Aromatic Hydrocarbons												
Naphthalene	mg/L	6.4	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(a)pyrene	mg/L	0.00081	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Anthracene	mg/L	0.0024	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Petroleum Hydrocarbons												
F1 (C6-C10 Hydrocarbons)	mg/L	0.75	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (C10-C16 Hydrocarbons)	mg/L	0.15	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F3 (C16-C24 Hydrocarbons)	mg/L	0.50	<0.25	0.277	<0.25	<0.25	<0.25	0.25	<0.25	<0.25	<0.25	<0.25
F4 (C24-C50 Hydrocarbons)	mg/L	0.50	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Benzene	mg/L	0.43	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	2.3	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	18	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylene (Total)	mg/L	4.2*	<0.00050	<0.00050	<0.00050	<0.00050	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064
Volatile Organic Carbons												
Vinyl chloride	mg/L	1.7	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Pesticides												
Diazinon	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Herbicides												
2,4-D	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001

Note: Criteria from Ontario Ministry of the Environment. (2011, July 1). Soil, Ground Water and Sediment Standards for Use Under Part XVI of the Environmental Protection Act Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

Note: Where value is expressed as less than (<), the value is halved and used in the calculations, where value is expressed as (>), the value is used in the calculations.

* Criteria for total chloride, total metals and xylene mixture

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			Table 3.3 2022 Ground Water Quality Comparison - Bedrock Wells									
			2018		2019		2020		2021		2022	
	Units	Criteria	Average	Average	Average	Average	Average	Average	Average	Average		
			Upgradient	Downgradient	Upgradient	Downgradient	Upgradient	Downgradient	Upgradient	Downgradient		
Inorganic Parameters												
Alkalinity - Bicarbonate	mg/L		1,454	136	150	154	141	138	137	140	145	145
Alkalinity - Carbonate	mg/L		<3.0	5.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Hydroxide	mg/L		<3.0	17.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Total	mg/L		1,454	155	150	154	141	138	137	140	145	145
Dissolved Hardness (CaCO3)	mg/L		1,544	1,523	998	872	819	811	908	809	865	760
pH	units		7.54	7.67	7.58	7.51	7.47	7.57	7.36	7.49	7.43	7.52
Specific Conductivity	(µS/cm)		10,035	8,255	10,100	8,433	10,105	8,263	10,050	8,400	10,100	8,401
Turbidity	(ntu)		7.6	13.3	11.6	12.4	11.6	8.0	9.6	10.4	6.5	9.5
Total Dissolved Solids	mg/L		6,320	5,043	6,220	4,989	6,245	5,032	6,370	5,263	6,255	5,115
Total Suspended Solids	mg/L		383	416	401	475	359	334	144	221	323	457
Total Solids	mg/L		6,703	5,459	6,625	5,463	6,610	5,366	6,515	5,484	6,580	5,570
Dissolved Chloride (Cl)	mg/L	2,300 *	2,785	2,131	1,855	2,281	2,800	2,393	5,185	3,045	3,100	2,439
Dissolved Sulphate (SO4)	mg/L		941	747	833	680	949	882	512	547	1,003	834
Nutrients												
Ammonia - Dissolved	mg/L N		0.686	1.09	1.44	1.11	1.43	1.12	1.27	1.06	1.32	1.15
Nitrate - Dissolved	mg/L N		0.631	0.046	<0.003	0.035	0.010	0.005	0.013	0.023	0.069	0.017
Total Kjeldahl Nitrogen	mg/L N		1.1	1.2	2.0	1.5	1.7	1.1	1.7	1.3	1.4	1.1
Phosphorus - Dissolved	mg/L P		0.015	<0.010	<0.013	<0.013	<0.013	<0.013	0.017	0.015	0.020	0.013
Other												
Cyanide - Total (CN)	mg/L	0.066	<0.0010	<0.0050	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic Indicators												
Chemical Oxygen Demand	mg/L		80	59	118	81	177	115	185	119	128	105
Total Organic Carbon	mg/L		3.4	2.6	1.9	2.3	1.5	1.1	1.2	1.0	1.2	1.0
Metals												
Arsenic (As) - Dissolved	mg/L	1.9*	0.003140	0.004048	0.000865	0.003519	0.005830	0.006633	0.005455	0.005001	0.003620	0.004445
Barium (Ba) - Dissolved	mg/L	29*	0.01265	0.01900	0.01490	0.02337	0.01250	0.01287	0.01210	0.01260	0.01225	0.01315
Beryllium (Be) - Dissolved	mg/L	0.067*	<0.00010	<0.00010	<0.00010	<0.010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cadmium (Cd) - Dissolved	mg/L	0.0027*	0.000090	0.000052	0.000140	0.000130	0.000006	<0.000005	0.000016	0.000008	0.000007	<0.000005
Calcium (Ca) - Dissolved	mg/L		340	353	326	315	326	295	331	294	359	302
Chromium (Cr) - Dissolved	mg/L	0.81*	0.00064	0.00375	0.00052	0.00645	<0.00010	0.00012	<0.00010	0.00015	<0.00010	<0.00010
Copper (Cu) - Dissolved	mg/L	0.087*	0.00017	0.0036	0.0042	0.0036	<0.0002	0.0003	0.0012	0.0009	0.0002	0.0004
Iron (Fe) - Dissolved	mg/L		0.673	0.786	<0.010	0.516	1.305	0.750	1.310	0.772	0.650	0.421
Lead (Pb) - Dissolved	mg/L	0.025*	0.000106	0.000163	0.000094	0.000186	0.000152	<0.000050	0.000210	0.000085	0.000090	<0.000050
Magnesium (Mg) - Dissolved	mg/L		169	180	166	179	151	160	162	152	166	160
Manganese (Mn) - Dissolved	mg/L		0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Mercury (Hg) - Total	mg/L	0.0028	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.0000096
Nickel (Ni) - Dissolved	mg/L	0.49*	0.00203	0.00176	0.00289	0.00280	0.00136	0.00119	0.00184	0.00145	0.00121	0.00122
Potassium (K) - Dissolved	mg/L		45.4	34.1	49.0	39.8	46.6	36.9	43.2	34.4	45.1	36.3
Selenium (Se) - Dissolved	mg/L	0.063*	<0.000050	0.00011	<0.000050	0.00036	<0.000050	<0.000050	<0.000050	0.00011	<0.000050	0.000061
Silver (Ag) - Dissolved	mg/L	0.0015*	0.000020	0.000010	0.000014	0.000036	0.000020	0.000028	<0.000100	0.000069	<0.000010	<0.000010
Sodium (Na) - Dissolved	mg/L	2,300*	1,750	1,238	1,750	1,129	1,645	1,306	1,675	1,308	1,585	1,285
Zinc (Zn) - Dissolved	mg/L	1.1*	0.01450	0.01103	0.05180	0.01720	0.00465	0.00400	0.00440	0.00421	0.00330	0.00368
Bacteria												
Total Coliforms (MTF)	MPN/100mL		<1	21	<1	2	<1	5	<1	<1	<1	2
Fecal Coliforms (MTF)	MPN/100mL		<1	1	<1	1	<1	<1	<1	<1	<1	<1
E. coli (MTF)	MPN/100mL		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Field Parameters												
pH	units		7.30	7.96	7.77	7.78	8.16	8.09	7.88	7.96	7.59	7.71
Specific Conductivity	(µS/cm)		9,140	6,836	8,215	6,961	9,185	7,403	8,735	6,635	8,155	9,436
Polycyclic Aromatic Hydrocarbons												
Naphthalene	mg/L	6.4	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(a)pyrene	mg/L	0.0081	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Anthracene	mg/L	0.0024	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Petroleum Hydrocarbons												
F1 (C6-C10 Hydrocarbons)	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.20	<0.10	<0.10	<0.10
F2 (C10-C16 Hydrocarbons)	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F3 (C16-C34 Hydrocarbons)	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
F4 (C34-C50 Hydrocarbons)	mg/L		<0.25	<0.25	<0.25	<0.25	0.27	<0.25	<0.25	<0.25	<0.25	<0.25
Benzene	mg/L	0.43	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.00326	<0.000050	<0.000050	<0.000050
Ethylbenzene	mg/L	2.3	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.00758	<0.000050	<0.000050	<0.000050
Toluene	mg/L	18	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.02528	<0.000050	<0.000050	<0.000050
Xylene (Total)	mg/L	4.2*	<0.000050	<0.000050	<0.000050	<0.000050	<0.00064	<0.00064	0.03286	<0.00064	<0.00064	<0.00064
Volatile Organic Carbons												
Vinyl chloride	mg/L	1.7	<0.000050	<0.000050	<0.000050	<0.000050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Pesticides												
Diazinon	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Herbicides												
2,4-D	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001

Note: Criteria from Ontario Ministry of the Environment. (2011, July 1). Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
 Note: Where value is expressed as less than (<), the value is halved and used in the calculations, where

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5.2 SURFACE WATER

Surface water flows at the BRRMF are managed by perimeter ditching and the central access road, which creates a barrier between the impacted water ditches on the north and the clean water ditches on the south; there are also eight surface water retention ponds. The system is designed to run dry for most of the year, as such, grab sampling is performed three times per year: spring run-off, summer run-off, and autumn run-off. The surface water sampling points are shown in Figure 3.

As per the BRRMF Operating Plan, surface water is managed in accordance with the Surface Water Sampling and Analysis Plan (SAP), as specified under Clause 115. Compliance parameters are applied to the upstream and downstream sampling points, with modifications at other locations interior to the site. Sampling for the clean water ponds (SWQ-25-9a and b) is similar to sampling for perimeter ditching. Sampling for impacted water ponds: Active Area Collection Pond (SWQ-25-6), Biosolids Storm Water Pond (SWQ-25-7), Leaf and Yard Waste Storm Water Pond (SWQ-25-8) and dry ponds (SWQ-25-11 a, b, and c) is performed prior to discharge events. The Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Freshwater Aquatic Life are used as the regulatory guideline (CCME, 2019). Weekly field monitoring is performed at the weir from spring thaw to freeze-up.

In 2022, a total of 35 surface water samples were analyzed – three upstream samples, five downstream samples, eleven interior samples, and sixteen pond samples. There were no deviations from the Surface Water SAP or from normal sample collection and preservation practices. Weekly weir data is provided in Table 4 and the 2022 surface water results are provided in Tables 5.1 and 5.2.

The analytical results for some of the pond samples exceeded the guidelines for pH, nitrate, cyanide, arsenic, cadmium, copper, iron, selenium, and zinc; the water was retained in the ponds or hauled for treatment as required. Some of the analytical results for perimeter ditching were highly variable between sample points, and between sample dates at the same location, but were below the CCME guidelines. The concentration of iron exceeded the CCME guideline at the upstream location and at two interior locations, but was below the guideline limit at the downstream locations. Arsenic exceeded the guideline at the upstream, as well as interior and downstream locations, this is due to its natural occurrence in Manitoba soils. Dissolved chloride was lower in 2022 than in previous years due to heavy snowfall in March and April and heavy rainfall in May and June.



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Table 4. 2022 Weekly Weir Data

Date	Flow (m/s)	pH (units)	Conductivity (m/s)	DO (mg/L)	Temp (°C)
9-May-22	*na	7.67	0.40	6.67	15.4
13-May-22	*na	7.97	0.75	7.52	16.7
20-May-22	0.2	8.51	1.16	8.79	10.3
27-May-22	0.1	8.35	1.02	8.27	20.7
3-Jun-22	0.1	7.99	0.56	8.77	19.9
10-Jun-22	0.0	8.20	0.53	8.70	26.7
17-Jun-22	0.1	7.51	0.55	8.44	22.7
24-Jun-22	0.0	7.81	0.71	5.47	25.6
30-Jun-22	0.0	7.70	0.64	8.65	21.3
8-Jul-22	0.0	7.87	5.18	10.4	23.3
15-Jul-22	0.0	8.29	1.46	13.2	26.6
22-Jul-22	0.0	7.63	0.58	7.43	23.3
29-Jul-22	0.0	7.73	1.90	8.82	20.7
5-Aug-22	0.0	7.48	2.00	7.35	20.9
12-Aug-22	0.0	8.42	1.83	12.9	30.7
19-Aug-22	0.0	7.92	1.74	6.34	24.9
26-Aug-22	0.0	7.22	1.29	6.69	22.1
2-Sep-22	0.0	7.57	1.55	8.43	21.6
9-Sep-22	0.0	7.59	1.66	6.83	17.2
16-Sep-22	0.0	7.38	1.46	8.59	16.7
23-Sep-22	0.0	7.62	1.94	8.27	16.6
3-Oct-22	0.0	7.55	2.08	8.38	19.0
7-Oct-22	0.0	7.54	2.04	8.51	15.2
14-Oct-22	0.0	8.03	2.20	9.97	12.2
20-Oct-22	0.0	7.38	*na	9.45	17.2
28-Oct-22	**ns	**ns	**ns	**ns	**ns
1-Nov-22	0.0	7.41	1.27	8.39	12.1
9-Nov-22	0.0	7.46	1.45	9.60	5.30

*na - not analysed due to equipment malfunction

**ns - no sample due to inadequate staffing

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Table 5.1 2022 Surface Water Monitoring - Ponds

			Ponds															
			SW25-6		SW25-7		SW25-8		SW25-9A		SW25-9B		SW25-11A		SW25-11B		SW25-11C	
	Units	Criteria*	11-May-22	2-Aug-22	11-May-22	2-Aug-22	11-May-22	2-Aug-22	11-May-22	2-Aug-22	11-May-22	2-Aug-22	11-May-22	2-Aug-22	11-May-22	2-Aug-22	11-May-22	2-Aug-22
Inorganic Parameters																		
Alkalinity - Bicarbonate	mg/L		1,010	1,140	258	291	931	732	134	380	102	599	540	229	537	646	462	642
Alkalinity - Carbonate	mg/L		<3.0	<3.0	35.3	88.7	<3.0	<3.0	<3.0	<3.0	<3.0	37.8	21.4	37.3	20.0	<3.0	29	41
Alkalinity - Hydroxide	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Total	mg/L		1,010	1,140	293	380	931	732	134	380	102	637	562	267	557	646	491	683
Dissolved Hardness (CaCO3)	mg/L		299	249	220	252	319	223	80	219	58.9	114	271	229	300	220	294	240
pH	units	6.5-9.0	8.09	8.26	8.72	9.00	8.09	8.22	7.78	7.27	7.98	8.90	8.28	8.37	8.45	8.24	8.48	8.40
Specific Conductivity	(µS/cm)		3,840	4,160	1,930	1,810	3,410	2,390	428	1,570	273	704	2,470	2,400	2,430	2,410	2,290	2,410
Turbidity	(ntu)		37.6	34.9	8.03	202	155	19.0	96.6	3.11	164	40.2	26.4	59.9	25.0	41.5	18.1	25.5
Total Dissolved Solids	mg/L		2,300	2,550	1,250	1,330	2,580	1,720	258	941	180	425	1,600	1,620	1,650	1,620	1,540	1,630
Total Suspended Solids	mg/L		52	182	182	440	83	155	116	271	166	755	189	253	169	147	144	154
Total Solids	mg/L		2,350	2,730	1,430	1,770	2,660	1,880	374	1,210	346	1,180	1,790	1,870	1,820	1,770	1,680	1,790
Dissolved Chloride (Cl)	mg/L	640	38.7	482	22.4	216	40.7	291	38.0	213	21.0	75.0	290	288	240	294	197	268
Dissolved Sulphate (SO4)	mg/L		424	563	411	397	325	101	34.0	189	12.7	6.00	413	288	497	288	478	329
Nutrients																		
Ammonia - Dissolved	mg/L N		76.3	64.8	0.018	0.005	21.1	2.95	0.223	0.490	0.427	0.101	14.1	0.426	12.4	0.598	8.89	0.318
Nitrate - Dissolved	mg/L N	13	15.7	5.02	<0.003	<0.003	<0.003	3.26	0.302	3.17	0.464	0.308	2.88	0.720	4.17	0.491	4.97	0.308
Total Kjeldahl Nitrogen	mg/L N		97.5	76.3	5.30	>4.40	48.4	15.0	1.40	1.30	1.30	1.90	22.6	8.50	22.8	8.70	18.0	22.7
Phosphorus - Dissolved	mg/L P		0.236	0.529	0.334	1.38	4.200	4.407	0.216	0.201	0.222	0.108	0.277	2.439	0.312	2.497	0.253	2.80
Other																		
Cyanide - Total (CN)	mg/L	0.0050	0.0077	0.0067	0.0016	0.0012	0.0063	0.0054	<0.0010	0.0015	<0.0010	<0.0010	0.0029	0.0030	0.0031	0.0031	0.0029	0.0031
Organic Indicators																		
Carbonaceous Oxygen Demand	mg/L		415	450	67	356	702	520	67	69	52	66	253		264	296	235	262
Biochemical Oxygen Demand	mg/L		18	13	13	13	18	<4	<4	<4	<4	9	17	8	21	4	17	5
Metals																		
Arsenic (As)- Dissolved	mg/L	0.005	0.0087	0.0210	0.0058	0.0186	0.0245	0.0209	0.0041	0.0034	0.0034	0.0067	0.0088	0.0289	0.0080	0.0277	0.0077	0.0345
Barium (Ba)- Dissolved	mg/L		0.2030	0.1970	0.0687	0.0472	0.0953	0.0775	0.0369	0.1140	0.0266	0.0935	0.1360	0.1190	0.1270	0.1290	0.1230	0.1270
Beryllium (Be)- Dissolved	mg/L		0.00013	0.00035	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cadmium (Cd)- Dissolved	mg/L	0.00009	0.000176	0.000076	0.000015	0.000005	0.000026	0.000035	0.000009	<0.000005	0.000010	<0.000005	0.000063	0.000007	0.000041	0.000007	0.000043	0.000007
Calcium (Ca)- Dissolved	mg/L		122	111	97.6	89.5	134	99.3	33.4	96.5	25.0	43.5	128	93.7	116	97.7	113	103
Chromium (Cr)- Dissolved	mg/L		0.02230	0.02900	0.00035	0.00019	0.00227	0.00188	0.00019	0.00078	0.00030	0.00031	0.00265	0.00141	0.00217	0.00148	0.00187	0.00123
Copper (Cu)- Dissolved	mg/L	0.0040	0.02310	0.01230	0.00492	0.00383	0.00406	0.00965	0.00232	0.00131	0.00247	0.00406	0.01510	0.00694	0.01230	0.00481	0.01280	0.00540
Iron (Fe)- Dissolved	mg/L	0.30	0.468	0.229	0.090	0.024	0.614	0.569	0.035	0.101	0.077	0.036	0.138	0.103	0.090	0.126	0.066	0.070
Lead (Pb)- Dissolved	mg/L	0.0070	0.000924	0.000898	0.000102	0.000111	0.001100	0.001190	0.000065	<0.000050	0.000087	0.000152	0.000424	0.000117	0.000241	0.000172	0.000242	0.000104
Magnesium (Mg)- Dissolved	mg/L		154	178	121	119	152	104	20.3	94.5	13.3	41.7	148	141	139	145	130	150
Manganese (Mn)- Dissolved	mg/L		0.1910	0.1300	0.2330	0.0681	0.3330	0.2800	0.0140	0.1660	0.0053	0.0030	0.1100	0.2720	0.0452	0.2370	0.0212	0.2300
Mercury (Hg)- Dissolved	mg/L	0.000026	0.0000079	0.0000054	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000007	<0.0000050	0.000006	<0.0000050	0.000006	<0.0000050	<0.0000050
Nickel (Ni)- Dissolved	mg/L	0.150	0.0693	0.0873	0.0127	0.0089	0.0323	0.0305	0.0034	0.0088	0.0030	0.0079	0.0333	0.0343	0.0293	0.0339	0.0250	0.0340
Potassium (K)- Dissolved	mg/L		99.1	126	82.6	81.0	500	368	12.2	20.9	9.09	16.4	91.8	197	92.9	193	85.8	159
Selenium (Se)- Dissolved	mg/L	0.0010	0.001290	0.001360	0.000515	0.000415	0.001150	0.001020	0.000182	0.000223	0.000158	0.000269	0.001020	0.000905	0.000798	0.000737	0.000893	0.000887
Sodium (Na)- Dissolved	mg/L		388	525	117	130	100	77	18.5	113	9.52	42.4	174	167	153	175	137	178
Zinc (Zn)- Dissolved	mg/L	0.030	0.0469	0.0201	0.0036	0.0031	0.0179	0.0112	0.0044	0.0072	0.0044	0.0026	0.0188	0.0032	0.0142	0.0060	0.0130	0.0037
Bacteria																		
Total Coliforms (MTF)	MPN/100mL		>2,420	>24,200	816	>2,420	>2,420	>24,200	>2,420	>2,420	>2,420	>2,420	>2,420	1,010	>2,420	>2,420	>2,420	1,200
Fecal Coliforms (MTF)	MPN/100mL		>2,420	1,530	236	291	>2,420	1,480	1,550	517	461	649	>2,420	291	>2,420	93	>2,420	118
E. coli (MTF)	MPN/100mL		1,010	1,350	111	133	>2,420	930	980	649	365	1,200	>2,420	184	>2,420	61	>2,420	113
Field Parameters																		
pH	units	6.5-9.0	8.16	8.11	8.89	8.91	8.25	8.02	8.16	7.02	8.16	8.75	8.45	8.24	8.64	8.03	8.63	8.11
Specific Conductivity	(µS/cm)		3,350	4,030	1,555	1,684	2,600	1,939	438	1,491	228	620	1,990	2,140	2,020	2,020	1,747	2,110
Temperature			19.0	22.7	22.2	23.2	18.6	22.8	20.3	23.0	20.6	22.5	18.4	20.9	17.5	20.3	16.9	20.7

Note: Criteria from Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life. (CCME, 2019)
* Criteria for total chloride and total metals

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			Table 5.2 2022 Surface Water Monitoring - Perimeter Ditch							
			Upstream			Downstream				
			SW25-1			SW25-2			SW25-16	
			Units	Criteria*	11-May-22	3-Aug-22	5-Oct-22	11-May-22	3-Aug-22	5-Oct-22
Inorganic Parameters										
Alkalinity - Bicarbonate	mg/L		114	309	198	207	524	583	132	290
Alkalinity - Carbonate	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Hydroxide	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Total	mg/L		114	309	198	207	524	583	132	290
Dissolved Hardness (CaCO ₃)	mg/L		59.2	140	138	121	186	227	76.1	165
pH	units	6.5-9.0	7.35	7.23	7.06	7.92	7.78	7.62	8.03	7.34
Specific Conductivity	(µS/cm)		252	542	476	812	1,740	2,330	428	1,290
Turbidity	(ntu)		20.5	170	307	84.2	8.58	26.0	27.8	3.57
Total Dissolved Solids	mg/L		145	393	348	508	1,130	1,410	246	777
Total Suspended Solids	mg/L		117	275	660	156	136	112	74.0	139
Total Solids	mg/L		262	668	1,010	664	1,260	1,520	320	916
Dissolved Chloride (Cl)	mg/L	640	12.0	11.0	29.9	81.0	187	244	49.0	237
Dissolved Sulphate (SO ₄)	mg/L		0.5	2.0	<0.40	136	229	179	24.9	62.0
Nutrients										
Ammonia - Dissolved	mg/L N		0.044	0.303	0.176	2.270	0.056	0.090	0.021	0.097
Nitrate - Dissolved	mg/L N	13	<0.003	<0.003	<0.003	1.660	<0.003	<0.003	0.034	0.006
Total Kjeldahl Nitrogen	mg/L N		0.70	2.3	1.3	4.7	5.8	1.0	1.0	1.3
Phosphorus - Dissolved	mg/L P		0.196	0.723	1.150	0.259	1.515	0.878	0.212	0.192
Other										
Cyanide - Total (CN)	mg/L	0.0050	<0.0010	<0.0010	<0.0010	0.0013	0.0026	0.0041	<0.0010	<0.0010
Organic Indicators										
Carbonaceous Oxygen Demand	mg/L		54	150	244	98	167	208	50	61
Biochemical Oxygen Demand	mg/L		<4	<4	14	<4	<4	<4	<4	<4
Metals										
Arsenic (As)- Dissolved	mg/L	0.0050	0.00374	0.00690	0.00392	0.00448	0.01880	0.01300	0.00467	0.00433
Barium (Ba)- Dissolved	mg/L		0.0225	0.0431	0.0345	0.0587	0.1100	0.1550	0.0331	0.0823
Beryllium (Be)- Dissolved	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cadmium (Cd)- Dissolved	mg/L	0.00009	0.000008	<0.0000050	0.000006	0.000020	0.000009	0.000006	0.000018	<0.000005
Calcium (Ca)- Dissolved	mg/L		26.9	55.4	39.9	53.3	72.3	88.4	34.8	65.2
Chromium (Cr)- Dissolved	mg/L		0.00014	0.00023	0.00016	0.00054	0.00070	0.00126	0.00021	0.00013
Copper (Cu)- Dissolved	mg/L	0.0040	0.00148	0.00073	0.00094	0.00728	0.00417	0.00146	0.00246	0.00068
Iron (Fe)- Dissolved	mg/L	0.30	0.063	1.60	0.234	0.042	0.159	0.148	0.036	0.164
Lead (Pb)- Dissolved	mg/L	0.0070	0.000068	0.000073	<0.000050	0.000181	0.000118	<0.000050	0.000058	0.000058
Magnesium (Mg)- Dissolved	mg/L		13.2	30.4	19.5	42.1	93.0	112	18.0	53.4
Manganese (Mn)- Dissolved	mg/L		0.0066	0.5060	0.0806	0.0179	0.658	0.411	0.0062	0.4680
Mercury (Hg)- Dissolved	mg/L	0.0000260	0.0000051	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Nickel (Ni)- Dissolved	mg/L	0.150	0.00217	0.00600	0.00461	0.00914	0.02010	0.02790	0.00310	0.00260
Potassium (K)- Dissolved	mg/L		6.18	7.39	12.5	27.2	89.8	133	10.2	7.08
Selenium (Se)- Dissolved	mg/L	0.0010	0.000160	0.000196	0.000276	0.000347	0.000397	0.000648	0.000208	0.000141
Sodium (Na)- Dissolved	mg/L		5.62	13.0	10.8	42.5	105	138	26.1	109
Zinc (Zn)- Dissolved	mg/L	0.030	0.0027	<0.0010	<0.0010	0.0074	0.0046	0.0023	0.0036	<0.0010
Bacteria										
Total Coliforms (MTF)	MPN/100mL		1,550	>2,420	>24,200	387	1,010	10,500	792	691
Fecal Coliforms (MTF)	MPN/100mL		291	185	750	225	231	190	579	1,010
E. coli (MTF)	MPN/100mL		291	140	1,310	130	115	460	208	530
Field Parameters										
pH	units	6.5-9.0	7.92	6.98	6.95	7.94	7.51	7.60	8.03	7.52
Specific Conductivity	(µS/cm)		225	811	540	709	1,757	2,270	3,980	1,378
Temperature			16.3	21.3	17.9	16.0	21.3	20.5	16.2	20.5
Note: Criteria from Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life. (CCME, 2019) * Criteria for total chloride and total metals										

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**Water and Waste
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Table 5.2 2022 Surface Water Monitoring - Perimeter Ditch

		Interior											
		SW25-12			SW25-14A		SW25-14B		SW25-15A		SW25-15B		
	Units	Criteria*	11-May-22	3-Aug-22	5-Oct-22	11-May-22	2-Aug-22	11-May-22	2-Aug-22	11-May-22	2-Aug-22	11-May-22	2-Aug-22
Inorganic Parameters													
Alkalinity - Bicarbonate	mg/L		126	309	185	163	213	103	195	103	349	109	519
Alkalinity - Carbonate	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	39.6	<3.0	<3.0	<3.0	<3.0
Alkalinity - Hydroxide	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Total	mg/L		126	309	185	163	213	103	234	103	349	109	519
Dissolved Hardness (CaCO3)	mg/L		70.4	234	104	108	317	68.8	105	60.5	136	64.3	453
pH	units	6.5-9.0	7.39	7.38	7.20	7.61	8.24	7.84	8.91	7.60	7.90	7.64	8.11
Specific Conductivity	(µS/cm)		322	1,320	590	546	1,940	286	706	286	1,060	320	1,860
Turbidity	(ntu)		25.7	71.9	7.86	34.9	564	225	18.1	140	10.2	137	>4800
Total Dissolved Solids	mg/L		180	890	334	353	988	205	427	228	667	231	534
Total Suspended Solids	mg/L		108	150	30	99.0	1,720	325	107	100	73	115	8,900
Total Solids	mg/L		288	1,040	364	452	2,710	530	534	328	740	346	9,430
Dissolved Chloride (Cl)	mg/L	640	21.0	160	53.5	54.0	207	21.0	75.0	21.0	101	24.0	213
Dissolved Sulphate (SO4)	mg/L		<0.4	4.2	4.1	2.0	719	1.0	18.0	1.0	108	1.0	282
Nutrients													
Ammonia - Dissolved	mg/L N		0.021	0.078	0.056	0.062	0.226	0.422	0.073	0.320	0.113	0.462	0.342
Nitrate - Dissolved	mg/L N	13	0.027	<0.003	<0.003	0.116	0.018	0.444	0.316	0.504	0.158	0.574	0.195
Total Kjeldahl Nitrogen	mg/L N		0.8	1.6	1.0	1.3	1.1	1.7	1.3	1.1	2.8	1.4	13.6
Phosphorus - Dissolved	mg/L P		0.222	0.531	0.567	0.176	0.696	0.222	0.080	0.234	0.756	0.239	0.930
Other													
Cyanide - Total (CN)	mg/L	0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050
Organic Indicators													
Carbonaceous Oxygen Demand	mg/L		53	106	76	70	210	218	55	54	90	53	1,700
Biochemical Oxygen Demand	mg/L		<4	<4	7	<4	5	<4	6	<4	<4	<4	100
Metals													
Arsenic (As)- Dissolved	mg/L	0.0050	0.00418	0.00423	0.00168	0.00434	0.00460	0.00311	0.00654	0.00314	0.03080	0.00318	0.02150
Barium (Ba)- Dissolved	mg/L		0.0262	0.0595	0.0433	0.0430	0.0420	0.0252	0.0903	0.0263	0.1200	0.0274	0.1350
Beryllium (Be)- Dissolved	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cadmium (Cd)- Dissolved	mg/L	0.00009	<0.000005	<0.000005	<0.000005	0.000011	<0.000005	0.000009	0.000009	0.000011	0.000007	0.000010	<0.000005
Calcium (Ca)- Dissolved	mg/L		32.6	77.8	39.1	40.3	99.3	22.5	48.4	22.8	99.0	23.6	85.0
Chromium (Cr)- Dissolved	mg/L		0.00015	0.00022	0.00011	0.00022	<0.00010	0.00016	0.00032	0.00024	0.00111	0.00020	0.00089
Copper (Cu)- Dissolved	mg/L	0.0040	0.00124	0.00270	0.00071	0.00221	0.00309	0.00227	0.00436	0.00200	0.00674	0.00214	0.00484
Iron (Fe)- Dissolved	mg/L	0.30	0.758	0.358	0.182	0.088	0.026	0.022	0.088	0.049	0.070	0.017	0.336
Lead (Pb)- Dissolved	mg/L	0.0070	0.000056	0.000166	<0.000050	0.000107	0.000091	<0.000050	0.000223	<0.000050	0.000209	<0.000050	0.000208
Magnesium (Mg)- Dissolved	mg/L		15.2	55.4	22.7	27.3	146	13.0	42.8	13.2	138	14.5	111
Manganese (Mn)- Dissolved	mg/L		0.1690	0.8440	0.003	0.048	0.060	0.0044	0.0110	0.0042	0.2340	0.0039	0.6290
Mercury (Hg)- Dissolved	mg/L	0.0000260	0.0000053	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000051
Nickel (Ni)- Dissolved	mg/L	0.150	0.00287	0.00361	0.00265	0.00356	0.00276	0.00279	0.00809	0.00283	0.03090	0.00308	0.02350
Potassium (K)- Dissolved	mg/L		6.89	6.07	17.1	10.8	6.81	9.10	16.4	9.02	147	9.93	110
Selenium (Se)- Dissolved	mg/L	0.0010	0.000155	0.000198	0.000190	0.000232	0.000292	0.000174	0.000192	0.000170	0.000743	0.000157	0.000630
Sodium (Na)- Dissolved	mg/L		12.4	68.8	21.1	24.4	152	9.38	41.9	9.01	166	10.9	129
Zinc (Zn)- Dissolved	mg/L	0.030	0.0025	0.0038	0.0283	0.0129	0.0023	0.0025	0.0030	0.0027	0.0048	0.0034	0.0039
Bacteria													
Total Coliforms (MTF)	MPN/100mL		866	>2,420	1,010	>2,420	>2,420	>2,420	>2,420	770	>2420	1,050	24,200
Fecal Coliforms (MTF)	MPN/100mL		210	197	161	1,730	1,300	387	205	40	1,410	201	8,660
E. coli (MTF)	MPN/100mL		261	88	201	1,990	921	291	199	15	261	228	670
Field Parameters													
pH	units	6.5-9.0	7.69	7.03	6.98	7.71	8.03	8.18	8.64	7.71	7.40	7.74	7.83
Specific Conductivity	(µS/cm)		270	1,050	450	484	1,790	207	679	218	502	244	1,610
Temperature			15.0	18.3	18.2	15.6	22.8	22.7	22.8	15.9	22.3	15.4	22.4

Note: Criteria from Canadian Council of Ministers of the Environment, Canadian Environmental Quality Guidelines Summary Table, Water Quality Guidelines for the Protection of Freshwater Aquatic Life, (CCME, 2019)

* Criteria for total chloride and total metals


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The 2018-2022 results for upstream and downstream locations are provided in Table 6 and time versus concentration graphs showing the historical relationship of the analytical parameters at each monitoring location are provided in Appendix B. The analytical results for surface water are variable between locations and year over year, but are generally higher at the downstream locations, although only arsenic and copper exceeded the CCME guidelines at the downstream location in 2022.

The Contingency Action Plan identified under Clause 125 was not implemented in 2022.

At this time, we have no recommendations for changes to the surface water monitoring program, although we are working on a reassessment of our surface water monitoring test parameters and sampling frequency in 2023.

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			<h3>Table 6. 2022 Surface Water Monitoring - Perimeter Ditch Comparison</h3>									
	Units	Criteria*	2018		2019		2020		2021		2022	
			Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
Inorganic Parameters												
Alkalinity - Bicarbonate	mg/L		174	300	243	447	149	252	185	213	207	438
Alkalinity - Carbonate	mg/L		<3.0	18	<3.0	16	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Hydroxide	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Total	mg/L		174	319	243	462	149	252	185	213	207	438
Dissolved Hardness (CaCO3)	mg/L		248	499	175	188	71	77	105	319	112	178
pH	units	6.5-9.0	7.56	8.84	7.51	8.35	7.35	7.76	7.28	8.00	7.21	7.77
Specific Conductivity	(µS/cm)		615	1,590	573	4,637	344	741	433	1,100	423	1,627
Turbidity	(ntu)		37.2	32.8	279.7	22.1	7.0	12.6	28.4	683.0	165.8	39.6
Total Dissolved Solids	mg/L		370	996	373	1,345	208	424	270	706	295	1,016
Total Suspended Solids	mg/L		116	167	499	149	54	252	52	2,750	351	135
Total Solids	mg/L		486	1,164	871	1,495	262	676	322	3,460	647	1,148
Dissolved Chloride (Cl)	mg/L	640	60.0	220	30	376	13	51	22	89	18	171
Dissolved Sulphate (SO4)	mg/L		57.6	170	16	129	<0.4	55	20	285	0.9	181
Nutrients												
Ammonia - Dissolved	mg/L N		0.041	0.426	0.043	0.688	0.062	0.026	0.013	**na	0.174	0.805
Nitrate - Dissolved	mg/L N	13	0.234	0.500	0.008	0.282	0.006	0.863	<0.003	<0.003	<0.003	0.554
Total Kjeldahl Nitrogen	mg/L N		2.55	6.85	1.63	5.80	0.30	2.10	0.97	2.74	1.43	5.23
Phosphorus - Dissolved	mg/L P		0.085	0.252	0.127	0.567	0.140	0.283	0.077	0.036	0.690	0.884
Other												
Cyanide - Total (CN)	mg/L	0.0050	0.0007	0.0025	<0.0010	0.0019	<0.0010	0.0010	<0.0010	0.0026	<0.0010	0.0027
Organic Indicators												
Chemical Oxygen Demand	mg/L		50	530	143	169	49	154	63	220	149	158
Biochemical Oxygen Demand	mg/L		7	13	6	8	4	13	<4	<4	6	<4
Metals												
Arsenic (As)- Dissolved	mg/L	0.005	0.0028	0.0089	0.0040	0.0134	0.0030	0.0054	0.0045	0.0040	0.0049	0.0121
Barium (Ba)- Dissolved	mg/L		0.0537	0.0702	0.0501	0.0946	0.0276	0.0482	0.0422	0.0514	0.0334	0.1079
Beryllium (Be)- Dissolved	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cadmium (Cd)- Dissolved	mg/L	0.00009	0.000036	0.000057	0.000012	0.000013	0.000013	0.000400	0.000024	0.000010	0.000006	0.000012
Calcium (Ca)- Dissolved	mg/L		47.7	50.4	50.4	64.1	30.7	45.1	37.3	70.8	40.7	71.3
Chromium (Cr)- Dissolved	mg/L		0.00018	0.00042	0.00018	0.00093	0.00014	0.00042	0.00015	0.00013	0.00018	0.00083
Copper (Cu)- Dissolved	mg/L	0.004	0.00229	0.00527	0.00134	0.00210	0.00191	0.00117	0.00159	0.00286	0.00105	0.00430
Iron (Fe)- Dissolved	mg/L	0.3	0.059	0.020	0.163	0.062	0.095	0.082	0.070	0.058	0.632	0.116
Lead (Pb)- Dissolved	mg/L	0.007	0.000285	0.000060	0.000077	<0.000050	0.000096	0.000102	0.000089	<0.000050	0.000055	0.000108
Magnesium (Mg)- Dissolved	mg/L		31.3	32.4	32.4	120.9	20.1	44.8	20.8	61.6	21.0	82.4
Manganese (Mn)- Dissolved	mg/L		0.0101	0.0322	0.0892	0.0660	0.0616	0.0611	0.2550	0.0613	0.1977	0.3623
Mercury (Hg)- Dissolved	mg/L	0.000026	<0.000005	<0.000005	<0.000005	<0.000005	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Nickel (Ni)- Dissolved	mg/L	0.15	0.00262	0.02010	0.00340	0.02620	0.00214	0.00781	0.00263	0.00537	0.00426	0.01905
Potassium (K)- Dissolved	mg/L		10.2	68.4	12.0	73.0	9.2	22.9	9.5	30.3	8.7	83.3
Selenium (Se)- Dissolved	mg/L	0.001	0.000155	0.000429	0.000229	0.000403	0.000188	0.000370	0.000115	0.000411	0.000211	0.000464
Sodium (Na)- Dissolved	mg/L		29.4	124	20	171	8.9	39	13.9	49	9.8	95
Zinc (Zn)- Dissolved	mg/L	0.03	0.0026	0.0047	0.0014	0.0026	0.0037	0.0057	0.0015	0.0058	0.0012	0.0048
Bacteria												
Total Coliforms (MTF)	MPN/100mL		6,710	3,510	2,253	1,950	365	461	>2,420	387	9,390	3,966
Fecal Coliforms (MTF)	MPN/100mL		23	530	118	1,076	3	17	31	3	409	215
E. coli (MTF)	MPN/100mL		6	765	86	972	1	3	12	4	580	235
Field Parameters												
pH	units	6.5-9.0	7.56	8.84	8.18	8.65	8.19	8.02	8.95	9.16	7.28	7.68
Specific Conductivity	(µS/cm)		660	1,619	2,029	1,850	3,780	7,060	413	1,205	525	1,579
Temperature	°C		19.7	7.2	11.3	12.1	9.3	10.4	3.6	6.5	18.5	19.3

Note: Criteria from Canadian Council of Ministers of the Environment, Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life. (CCME, 2019)
* Criteria for total chloride and total metals

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5.3 LEACHATE

The leachate management system is a network of manholes/risers, drains, and sumps around the perimeter of the landfill cells, which feed into a header pipe. The leachate flows via gravity and lift stations into a 300,000L storage tank located at the intersection of Charette Road and the access road, which acts as a truck fill station for hauling to the North End Sewage Treatment Plant for treatment. Leachate can also be pumped from eleven collection manholes and one riser if needed; these sites also serve as sampling points. The locations of the manholes and riser are shown on Figure 1.

As per the BRRMF Operating Plan, leachate is managed in accordance with the Leachate Sampling and Analysis Plan (SAP), as specified under Clause 100. The MOE guidelines for non-potable groundwater quality are used as the regulatory guideline (MOE, 2011).

The total volume of leachate removed from the BRRMF in 2022 was 41,762 kL. There were no occurrences of leachate breakout from the development in 2022. The Contingency Action Plan identified under Clause 125 was not implemented in 2022.

In 2022, twelve leachate samples were analyzed; there were no deviations from the Leachate SAP or from normal sample collection and preservation practices. Monthly leachate elevations are provided in Table 7, and the 2022 leachate results are provided in Table 8. The majority of parameters were highly variable between manholes; some of the samples exceeded the MOE guidelines for chloride, nickel, sodium, zinc, extractables, and hydrocarbons. Leachate is highly variable due to waste composition, amount of precipitation, site hydrology, waste compaction, cover, and interaction of leachate with the environment.

The 2018-2022 average results are provided in Table 9, and Piper diagrams showing the historical relationship of cations and anions at each monitoring location are provided in Appendix A. Many of the parameters measured vary significantly from year to year, although the average results meet the MOE guidelines, with the exception of zinc, which sometimes exceeds the guideline.

We have no recommendations for changes to the leachate monitoring program at this time, although we are working on a reassessment of our leachate monitoring test parameters and frequency in 2023.

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Table 7. 2022 Leachate Levels

	Date	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
Manhole 3	Top of Manhole Elevation (m)	233.66	233.66	233.66	233.66	233.66	233.66	233.66	233.66	233.66	233.66	233.66	233.66
	Depth to Leachate (m)	3.91	3.27	2.08	1.56	2.72	**na	**na	**na	7.22	**na	8.12	2.07
	Manhole Leachate Elevation (m)	229.75	230.39	231.58	232.10	230.94	**na	**na	**na	226.44	**na	225.54	231.59
Manhole 8	Top of Manhole Elevation (m)	236.61	236.61	236.61	236.61	236.61	236.61	236.61	236.61	236.61	236.61	236.61	236.61
	Depth to Leachate (m)	8.71	9.40	6.08	**na	10.96	11.56	10.32	11.51	10.24	9.15	9.35	5.09
	Manhole Leachate Elevation (m)	227.90	227.21	230.53	**na	225.65	225.05	226.29	225.10	226.37	227.46	227.26	231.52
Manhole 13	Top of Manhole Elevation (m)	234.89	234.89	234.89	234.89	234.89	234.89	234.89	234.89	234.89	234.89	234.89	234.89
	Depth to Leachate (m)	4.10	5.02	4.78	4.05	2.96	9.55	10.06	10.69	9.54	9.75	9.62	10.80
	Manhole Leachate Elevation (m)	230.79	229.87	230.11	230.84	231.93	225.34	224.83	224.20	225.35	225.14	225.27	224.09
Manhole 24	Top of Manhole Elevation (m)	235.00	235.00	235.00	235.00	235.00	235.00	235.00	235.00	235.00	235.00	235.00	235.00
	Depth to Leachate (m)	6.27	2.63	6.09	8.80	8.77	8.90	6.81	8.82	9.83	8.76	2.99	2.75
	Manhole Leachate Elevation (m)	228.73	232.37	228.91	226.20	226.23	226.10	228.19	226.18	225.17	226.24	232.01	232.25
Manhole 27	Top of Manhole Elevation (m)	235.71	235.71	235.71	235.71	235.71	235.71	235.71	235.71	235.71	235.71	235.71	235.71
	Depth to Leachate (m)	**na	**na	2.00	**na	2.17	2.08	2.01	2.25	2.08	2.19	2.13	2.14
	Manhole Leachate Elevation (m)	**na	**na	233.71	**na	233.54	233.63	233.70	233.46	233.63	233.52	233.58	233.57
Manhole 31	Top of Manhole Elevation (m)	234.74	234.74	234.74	234.74	234.74	234.74	234.74	234.74	234.74	234.74	234.74	234.74
	Depth to Leachate (m)	4.75	8.00	2.20	2.08	2.17	2.13	1.38	4.40	2.55	1.59	1.48	1.62
	Manhole Leachate Elevation (m)	229.99	226.74	232.54	232.66	232.57	232.61	233.36	230.34	232.19	233.15	233.26	233.12
Manhole 34	Top of Manhole Elevation (m)	235.42	235.42	235.42	235.42	235.42	235.42	235.42	235.42	235.42	235.42	235.42	235.42
	Depth to Leachate (m)	*ns	*ns	1.42	*ns	1.33	1.34	1.28	1.17	1.06	1.24	1.34	1.26
	Manhole Leachate Elevation (m)	*ns	*ns	234.00	*ns	234.09	234.08	234.14	234.25	234.36	234.18	234.08	234.16
Manhole 46	Top of Manhole Elevation (m)	235.04	235.04	235.04	235.04	235.04	235.04	235.04	235.04	235.04	235.04	235.04	235.04
	Depth to Leachate (m)	5.85	5.75	5.84	5.91	**na	**na	**na	**na	5.68	5.33	5.27	5.33
	Manhole Leachate Elevation (m)	229.19	229.29	229.20	229.13	**na	**na	**na	**na	229.36	229.71	229.77	229.71
Manhole 47	Top of Manhole Elevation (m)	234.54	234.54	234.54	234.54	234.54	234.54	234.54	234.54	234.54	234.54	234.54	234.54
	Depth to Leachate (m)	5.49	5.20	5.11	**na	4.74	4.73	4.62	4.78	3.93	4.26	4.40	3.79
	Manhole Leachate Elevation (m)	229.05	229.34	229.43	**na	229.80	229.81	229.92	229.76	230.61	230.28	230.14	230.75
Bio	Top of Manhole Elevation (m)	234.18	234.18	234.18	234.18	234.18	234.18	234.18	234.18	234.18	234.18	234.18	234.18
	Depth to Leachate (m)	5.10	5.15	4.41	2.22	1.60	0.83	4.57	4.01	2.22	1.36	4.14	4.48
	Manhole Leachate Elevation (m)	229.08	229.03	229.77	231.96	232.58	233.35	229.61	230.17	231.96	232.82	230.04	229.70
Riser 1	Top of Riser Elevation (m)	234.97	234.97	234.97	234.97	234.97	234.97	234.97	234.97	234.97	234.97	234.97	234.97
	Depth to Leachate (m)	14.70	13.50	**na	**na	**na	**na	**na	**na	**na	10.35	11.00	4.96
	Riser Leachate Elevation (m)	220.27	221.47	**na	**na	**na	**na	**na	**na	**na	224.62	223.97	230.01

*ns - no sample; frozen

**na - not accessible due to biowaste, snow, flooding or wildlife

Client File No. 5556.00

Manitoba Environment Act Licence No. 3081 R

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Table 8. 2022 Leachate Monitoring

	Units	Criteria*	LQ25-MH3	LQ25-MH8	LQ25-MH13	LQ25-MH24	LQ25-MH27	LQ25-MH31	LQ25-MH34	LQ25-MH46	LQ25-MH47	Leachate Tank	BIO 1	RISER 1
			Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22
Field Parameters														
pH	units		7.43	7.59	6.49	6.86	7.60	8.21	6.76	6.62			8.06	7.84
Turbidity	ntu		30.1	31.3	406	25.2	3.22	30.1	13.7	159	294		58.4	321
Specific Conductivity	uS/cm		14,560	17,760	3,540	12,120	887	16,050	11,500	18,830	>20,000		1,203	2,930
Temperature	°C		13.4	19.2	11.8	10.1	20.9	21.0	19.5	14.0	15.0		19.3	11.0
Inorganic Parameters														
Alkalinity - Bicarbonate	mg/L		5,490	8,300	5,370	2,450	407	3,060	1,830	7,170	14,900		218	849
Alkalinity - Carbonate	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0		<3.0	<3.0
Alkalinity - Hydroxide	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0		<3.0	<3.0
Alkalinity - Total	mg/L		5,490	8,300	5,370	2,450	407	3,060	1,830	7,170	14,900		218	849
Hardness (as CaCO3)	mg/L		494	328	536	599	227	380	255	1,440	11,900		103	296
pH	units		7.10	7.41	7.03	6.94	7.66	7.94	6.84	7.36	6.34		7.67	7.22
Specific Conductivity	uS/cm		13,700	20,300	13,100	6,800	904	15,300	7,110	18,300	33,600		1,090	2,900
Turbidity	ntu		59.0	60.5	181	648	3.28	33.9	108	342	550		44.5	150
Total Dissolved Solids	mg/L		6,660	8,460	7,120	2,660	578	6,870	3,420	11,300	61,200		871	1,620
Total Suspended Solids	mg/L		310	459	490	1,680	36	450	284	190	1,690		55	294
Total Solids	mg/L		6,970	8,920	7,610	4,340	614	7,320	3,710	11,500	62,900		926	1,910
Chloride (dissolved)	mg/L	2,300	1,740	2,190	2,800	790	2.30	1,860	1,380	1,870	4,630		124	333
Sulphate (dissolved)	mg/L		1.0	<0.4	247	680	100	<0.4	23.0	<0.4	1,830		<0.4	157
Other														
Cyanide (CN)	mg/L	0.066	<0.050	0.0330	0.0167	0.0120	0.0019	0.0300	0.0113	<0.050	<0.050		0.0090	0.0023
Nutrients														
Dissolved Ammonia	mg/L		579	593	538	310	0.426	614	197	667	2,060		19.6	41.6
Nitrate Nitrite Nitrogen	mg/L		0.038	0.187	0.180	0.198	0.666	0.335	0.192	0.490	<0.0030		0.700	0.022
Total Kjeldahl Nitrogen	mg/L		nr	nr	660	320	<0.2	972	220	1,180	6,100		28.6	50.4
Phosphorus (Total)	mg/L		2,2469	7,5450	2,7353	2,9143	<0.0012	4,4395	<0.0012	25,761	43,371		2,9430	2,7497
Organic Indicators														
Biological Oxygen Demand	mg/L		185	706	125	129	12	139	45	3,700	47,500		6	159
Chemical Oxygen Demand	mg/L		1,340	2,570	1,380	1,160	71	1,650	430	6,810	>20,000		450	440
Metals														
Total Arsenic (As)	mg/L	1.9	0.008014	0.027589	0.004614	0.008496	<0.000017	0.010497	<0.000017	0.042089	0.055516		0.002263	0.028465
Total Barium (Ba)	mg/L	29	0.59340	0.53641	0.56816	0.35225	0.10754	0.49437	0.42425	0.37531	0.11871		0.03566	0.15887
Total Beryllium (Be)	mg/L	0.067	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003		<0.00003	<0.00003
Total Cadmium (Cd)	mg/L	0.0027	<0.0000070	<0.0000070	<0.0000070	<0.0000070	<0.0000070	<0.0000070	<0.0000070	0.000676	0.000956		<0.0000070	0.000054
Total Calcium (Ca)	mg/L		197.96	131.25	214.71	239.74	90.962	151.98	102.23	578.27	4,765.9		41.093	118.39
Total Chromium (Cr)	mg/L	0.81	0.09981	0.20435	0.04499	0.06645	<0.00004	0.13384	0.02293	0.25781	0.55823		0.00703	0.01038
Total Chromium (Hexavalent)	mg/L	0.14	<0.00050	0.00107	<0.00050	<0.00050	<0.00050	<0.00050	0.00060	<0.00050	<0.00050		<0.00050	<0.00050
Total Copper (Cu)	mg/L	0.087	0.012867	0.007773	0.012378	0.051879	0.013498	0.004853	0.004210	0.055887	0.045251		0.052339	0.007006
Total Iron (Fe)	mg/L		12.128	16.901	27.053	61.502	0.94479	5.7050	19.894	7.3542	334.74		2.1535	11.502
Total Lead (Pb)	mg/L	0.025	0.001041	0.004267	0.014412	0.014998	<0.000065	0.001060	0.001495	0.010696	0.002335		<0.000065	0.001452
Total Magnesium (Mg)	mg/L		433.13	364.54	519.59	192.99	48.914	382.80	244.73	379.47	847.66		26.564	133.82
Total Manganese (Mn)	mg/L		0.23212	0.21752	0.73488	0.97614	0.03759	0.21044	0.21127	1.4916	17.322		0.09931	3.1617
Total Mercury (Hg)	mg/L	0.0028	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0001410		<0.0000050	<0.0000050
Total Nickel (Ni)	mg/L	0.49	0.23191	0.36123	0.23272	0.13229	0.01003	0.26877	0.04572	0.31325	1.41380		0.10232	0.04575
Total Potassium (K)	mg/L		405.09	660.39	394.71	184.12	16.067	436.16	119.910	616.74	1708.8		133.05	46.706
Dissolved Selenium (Se)	mg/L	0.063	0.00092	0.00153	0.00132	0.00080	0.00026	0.00205	0.00060	0.00223	0.01220		0.00134	0.00043
Total Silver (Ag)	mg/L	0.0015	0.000195	0.000117	0.000380	0.000056	0.000016	0.000094	0.000041	0.000084	<0.00010		0.000049	0.000038
Total Sodium (Na)	mg/L	2,300	1,269.9	1,850.4	1,272.2	479.66	33.962	1,329.5	683.48	1,775.3	3,721.6		36.417	251.94
Total Zinc (Zn)	mg/L	1.1	0.05986	0.05358	0.19523	0.33008	0.03240	0.06369	0.05087	0.15956	2.3892		0.13609	0.01611
Extractables														
Benzo (a) Pyrene (PAH)	mg/L	0.00081	<0.0000050	0.0001660	0.0010700	0.0015600	0.0005730	0.0000744	0.0004590	0.000065	<0.0000050		0.0000055	<0.0000050
Anthracene	mg/L	0.0024	0.000154	0.001110	0.00136	0.00796	0.000041	0.000346	0.004710	0.000245	<0.00130		0.000017	<0.000010
4'4' Methylenebis 2 Chloroaniline	ug/L		<0.50	<2.70	<35.0	<1.80	<0.50	<0.60	<1.00	<50.0	<50.0		<1.00	<0.50
Benzo (a) anthracene (PAH)	mg/L	0.0047	0.000017	0.000412	0.001080	0.002600	0.000289	0.000185	0.000897	0.000052	<0.000010		<0.000010	<0.000010
Benzo (b,j) fluoroanthene (PAH)	mg/L		<0.000010	0.000251	0.000957	0.001980	0.001110	0.000111	0.000714	<0.000026	<0.000010		<0.000010	<0.000010
Benzo (g,h,i) Perylene (PAH)	mg/L	0.0002	<0.000020	0.000029	0.000567	0.000509	0.000382	<0.000020	0.000068	<0.000020	<0.000020		<0.000020	<0.000020
Hexachlorobenzene	ug/L	3.1	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.021		<0.0020	<0.0020
Phenanthrene	mg/L	0.58	0.00107	0.00559	0.00688	0.02830	0.00011	0.00208	0.02130	0.00138	<0.000064		<0.000064	<0.00010
Phenol	mg/L	12	0.110	<0.10	<0.10	0.110	0.001	<0.10	0.013	1.06	8.09		<0.0050	0.113

Note: Criteria from Ontario Ministry of the Environment. (2011, July 1). Soil, Ground Water and Sediment Standards for Use Under Part XV.I of the Environmental Protection Act Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
 *Criteria for total chloride and total selenium.
 *nr - no result; lab error

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Table 8. 2022 Leachate Monitoring

	Units	Criteria*	LQ25-MH3	LQ25-MH8	LQ25-MH13	LQ25-MH24	LQ25-MH27	LQ25-MH31	LQ25-MH34	LQ25-MH46	LQ25-MH47	Leachate Tank	BIO 1	RISER 1
			Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22	Sep-22
Petroleum Hydrocarbons														
CCME Petroleum Hydrocarbon Fraction F1	mg/L	0.75	<0.11	<0.60	<0.10	<0.10	<0.10	<0.10	<0.10	0.12	23.7		<0.10	<0.10
CCME Petroleum Hydrocarbon Fraction F2	mg/L	0.15	1.68	1.80	0.79	2.67	<0.10	0.76	0.78	2.00	19.0		<0.10	0.23
CCME Petroleum Hydrocarbon Fraction F3	mg/L	0.50	0.60	1.35	0.98	20.6	<0.25	0.77	<0.25	1.35	0.96		0.25	0.27
CCME Petroleum Hydrocarbon Fraction F4	mg/L	0.50	<0.25	<0.25	<0.25	3.11	<0.25	<0.25	<0.25	<0.25	<0.25		<0.25	<0.25
Volatile Organic Carbons														
Vinyl Chloride	mg/L	0.0017	0.0012	<0.00050	0.0007	0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050		<0.00050	<0.00050
1,4 Dichlorobenzene	mg/L	0.067	0.0114	0.0046	0.0115	0.0038	<0.0010	0.0031	0.0041	0.0023	<0.0010		<0.0010	<0.0010
Chloroform	mg/L	0.022	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050		<0.00050	<0.00050
Trichloroethene	mg/L	0.017	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0020		<0.00050	<0.00050
Tetrachloroethene	mg/L	0.017	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00059		<0.00050	<0.00050
Dioxins and Furans														
2378 TeCDD	ng/L	14										<1.80		
12378 PeCDD	ng/L	14										<0.89		
123478 HxCDD	ng/L	14										<0.57		
123678 HxCDD	ng/L	14										2.10		
123789 HxCDD	ng/L	14										0.92		
1234678 HpCDD	ng/L	14										93.9		
OCDD	ng/L	14										869		
Total TCDDs	ng/L	14										<1.80		
Total PeCDD	ng/L	14										2.08		
Total HxCDD	ng/L	14										14.1		
Total HpCDD	ng/L	14										187		
2378 TeCDF	ng/L	14										<2.30		
12378 PeCDF	ng/L	14										<0.81		
23478 PeCDF	ng/L	14										<0.65		
123478 HxCDF	ng/L	14										0.33		
123678 HxCDF	ng/L	14										0.42		
123789 HxCDF	ng/L	14										<0.32		
234678 HxCDF	ng/L	14										0.61		
1234678 HpCDF	ng/L	14										7.42		
1234789 HpCDF	ng/L	14										<0.54		
OCDF	ng/L	14										20.5		
Total TCDF	ng/L	14										<2.30		
Total PeCDF	ng/L	14										<0.81		
Total HxCDF	ng/L	14										1.03		
Total HpCDF	ng/L	14										7.42		
Polychlorinated Biphenyls														
Aroclor 1016	ug/L		<0.020	<0.10	<1.10	<3.50	<0.020	<0.10	<0.020	<0.030	<0.020		<0.020	<0.020
Aroclor 1221	ug/L		<0.020	<0.10	<1.10	<3.50	<0.020	<0.10	<0.020	<0.030	<0.020		<0.020	<0.020
Aroclor 1232	ug/L		<0.020	<0.10	<1.10	<3.50	<0.020	<0.10	<0.020	<0.030	<0.020		<0.020	<0.020
Aroclor 1242	ug/L		0.359	1.21	<1.10	<3.50	<0.020	0.730	<0.020	<0.030	<0.020		<0.020	<0.020
Aroclor 1248	ug/L		<0.020	<0.10	<1.10	<3.50	<0.020	<0.10	<0.020	<0.030	<0.020		<0.020	<0.020
Aroclor 1254	ug/L		0.020	<0.10	<0.40	<0.10	<0.020	<0.110	<0.020	<0.020	<0.020		<0.020	<0.020
Aroclor 1260	ug/L		<0.020	<0.10	<0.40	<0.10	<0.020	<0.10	<0.020	<0.020	<0.060		<0.020	<0.020
Total PCBs	ug/L	15	0.379	1.21	<2.6	<7.83	<0.060	0.730	<0.060	<0.080	<0.110		<0.060	<0.060
Pesticides and Herbicides														
Diazinon	ug/L		<0.40	<0.10	<0.20	<0.35	<0.15	<0.15	<0.35	<0.30	<0.30		<0.15	<0.10
2, 4-D	ug/L		<0.0050	<0.010	<0.0050	<0.0050	<0.0010	<0.010	<0.0050	<0.010	0.2060		<0.0050	<0.010
Aldrin	ug/L	8.5	<0.0020	<0.0020	<0.0020	<0.0060	<0.0020	<0.0020	<0.0020	<0.0020	<0.020		<0.0020	<0.0020
Hexachlorocyclohexane (Lindane)	ug/L	1.2	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0420		<0.0030	<0.0030
MCPA	ug/L		<0.0050	<0.010	<0.0050	<0.0050	<0.0010	<0.010	<0.0050	<0.010	<0.010		<0.0050	<0.010
Mirex	ug/L		<0.0020	<0.0020	<0.0040	<0.010	<0.0020	<0.650	<0.0020	<0.0060	0.0250		<0.0020	<0.0020
Methoxychlor	ug/L	6.5	<0.0020	<0.0020	<0.0020	<0.010	<0.0020	<0.0020	<0.0020	<0.0060	<0.020		<0.0020	<0.0020
Bacteria														
Total Coliforms	MPN/100mL		15,500	440	>24,200	*nr	691	>24,200	30	2,480	>24,200		>24,200	>2,420
Fecal Coliforms	MPN/100mL		130	<10	<10	*nr	63	80	10	150	>24,200		910	261
E. coli	MPN/100mL		60	<10	10	*nr	34	80	<10	170	>24,200		1,580	206

Note: Criteria from Ontario Ministry of the Environment. (2011, July 1). Soil, Ground Water and Sediment Standards for Use Under Part XV.I of the Environmental Protection Act Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
*nr - Contract lab QC Failure

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Table 9. 2022 Leachate Quality Comparison

			2018	2019	2020	2021	2022
			Average	Average	Average	Average	Average
	Units	Criteria					
Field Parameters							
pH	units		7.28	7.79	7.39	7.80	7.38
Turbidity - NTU	ntu		298	166	77.0	112	125
Specific Conductivity	uS/cm		10,580	8,663	10,160	10,444	10,853
Temperature	°C		13.8	13.9	11.5	19.5	15.9
Inorganic Parameters							
Alkalinity - Bicarbonate	mg/L		4,270	4,059	5,438	5,346	4,549
Alkalinity - Carbonate	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Hydroxide	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0
Alkalinity - Total	mg/L		4,270	4,059	5,438	5,346	4,549
Hardness (as CaCO3)	mg/L		2,106	2,704	2,164	871	1,505
pH - units	units		7.06	7.24	7.33	7.30	7.23
Specific Conductivity	uS/cm		11,131	11,170	11,893	13,656	12,100
Turbidity - NTU	ntu		136	100	78.4	426	198
Total Dissolved Solids	mg/L		6,140	6,348	7,315	8,109	10,069
Total Suspended Solids	mg/L		789	635	374	1,495	540
Total Solids	mg/L		6,924	6,980	7,686	9,610	10,611
Chloride (dissolved)	mg/L	2300 *	1,163	2,183	1,456	1,628	1,611
Sulphate (dissolved)	mg/L		164	205	97	117	276
Other							
Cyanide (CN)	mg/L	0.066	0.021	0.014	0.011	0.015	0.017
Nutrients							
Dissolved Ammonia	mg/L		243	545	642	459	511
Nitrate Nitrogen	mg/L		8.48	1.01	1.75	1.82	0.27
Total Kjeldhal Nitrogen	mg/L		342	699	978	977	1,059
Phosphorus (Total)	mg/L		2.12	7.77	3.49	9.70	8.61
Organic Indicators							
Biological Oxygen Demand	mg/L		1,347	1,493	1,340	2,483	4,791
Chemical Oxygen Demand	mg/L		2,367	2,045	2,049	3,793	1,630
Metals							
Total Arsenic (As)	mg/L	1.9	0.0321	0.0220	0.0179	0.0218	0.0171
Total Barium (Ba)	mg/L	29	0.382	0.391	0.393	0.479	0.342
Total Beryllium (Be)	mg/L	0.067	0.00113	<0.00003	<0.00003	<0.00003	<0.00003
Total Cadmium (Cd)	mg/L	0.0027	0.000452	<0.000007	<0.000007	0.000582	0.000156
Total Calcium (Ca)	mg/L		236	309	297	349	603
Total Chromium (Cr)	mg/L	0.81	0.0756	0.1354	0.1253	0.1673	0.1278
Total Chromium (Hexavalent)	mg/L		<0.010	<0.010	0.00068	0.00067	0.00036
Total Copper (Cu)	mg/L	0.087	0.0291	0.0218	0.0147	0.0647	0.0244
Total Iron (Fe)	mg/L		20.1	7.9	24.3	49.2	45.4
Total Lead (Pb)	mg/L	0.025	0.01057	0.00490	0.00345	0.02170	0.00471
Total Magnesium (Mg)	mg/L		368	469	345	323	325
Total Manganese (Mn)	mg/L		1.129	1.246	1.749	1.723	2.245
Total Mercury (Hg)	mg/L	0.0028	0.000273	0.000016	0.000031	0.000044	0.000015
Total Nickel (Ni)	mg/L	0.49	0.2522	0.2962	0.2481	0.2903	0.2871
Total Potassium (K)	mg/L		364	468	392	401	429
Dissolved Selenium (Se)	mg/L	0.063 *	0.00186	0.00137	0.00176	0.00206	0.00215
Total Silver (Ag)	mg/L	0.0015	0.000336	0.000095	0.000092	0.000151	0.000102
Total Sodium (Na)	mg/L	2,300	1,115	1,365	1,103	1,116	1,155
Total Zinc (Zn)	mg/L	1.1	0.206	0.530	0.263	1.13	0.317

Note: Criteria from Ontario Ministry of the Environment. (2011, July 1). Soil, Ground Water and Sediment Standards for Use Under Part XV.I of the Environmental Protection Act Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

*Criteria for total chloride and total selenium

**dissolved hardness

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Table 9. 2022 Leachate Quality Comparison

			2018	2019	2020	2021	2022
			Average	Average	Average	Average	Average
	Units	Criteria					
Extractables							
Benzo (a) Pyrene (PAH)	mg/L	0.00081	0.00075	0.00117	0.00031	0.00101	0.00036
Anthracene	mg/L	0.0024	0.00133	0.00201	0.00101	0.00144	0.00151
4'4' Methylenebis 2 Chloroaniline	ug/L		<13.7	<5.0	<1.0	<5.0	<50.0
Benzo (a) anthracene (PAH)	mg/L	0.0047	0.00113	0.00252	0.00010	0.00174	0.00050
Benzo (b/j) fluoroanthene (PAH)	mg/L		0.00117	0.00166	0.00081	0.00069	0.00047
Benzo (g,h,i) Perylene (PAH)	mg/L	0.0002	0.00103	0.00070	0.00017	0.00085	0.00015
Hexachlorobenzene	ug/L	3.1	<5.0	<5.0	<0.040	<0.080	0.0028
Phenanthrene	mg/L	0.58	0.00513	0.00748	0.00400	0.00553	0.00607
Phenol	mg/L	12	0.276	0.445	0.183	0.366	0.877
Petroleum Hydrocarbons							
CCME Petroleum Hydrocarbon Fraction F1	mg/L	0.75	0.11	0.31	0.92	2.75	2.45
CCME Petroleum Hydrocarbon Fraction F2	mg/L	0.15	20.2	2.01	0.47	1.91	2.71
CCME Petroleum Hydrocarbon Fraction F3	mg/L	0.50	371.2	12.3	8.45	18.96	2.49
CCME Petroleum Hydrocarbon Fraction F4	mg/L	0.50	56.3	2.04	1.61	2.68	0.40
Volatile Organic Carbons							
Vinyl Chloride	mg/L	0.0017	0.0005	0.0007	0.0009	0.0006	0.0004
1,4 Dichlorobenzene	mg/L	0.067	0.0022	0.0031	0.0038	0.0038	0.0039
Chloroform	mg/L	0.022	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Trichloroethene	mg/L	0.017	0.00029	0.00053	<0.00050	0.00059	<0.00050
Tetrachloroethene	mg/L	0.017	0.00039	<0.00050	0.00056	0.00098	<0.00050
Polychlorinated Biphenyls							
Aroclor 1016	ug/L		<0.40	<8.0	<0.13	<2.0	<3.5
Aroclor 1221	ug/L		<0.40	<8.0	<0.13	<2.0	<3.5
Aroclor 1232	ug/L		<0.40	<8.0	<0.13	<2.0	<3.5
Aroclor 1242	ug/L		<1.5	<3.0	1.3	<2.0	0.4
Aroclor 1248	ug/L		<0.40	<8.0	<0.13	<2.0	<3.5
Aroclor 1254	ug/L		<2.0	<8.0	<0.10	0.15	0.04
Aroclor 1260	ug/L		<2.0	<8.0	<0.20	<0.40	<0.40
Total PCBs	ug/L	15	<2.0	3.3	1.3	<6.0	0.7
Pesticides and Herbicides							
Diazinon	ug/L		<172	1.4	<62	<0.5	<0.4
2,4-D	mg/L		0.002	1.11	0.0041	0.0104	0.0217
Aldrin	ug/L	8.5	<2.25	<50	<0.040	<0.080	<0.020
gamma-Hexachlorocyclohexane (Lindane)	ug/L	1.2	<10	<50	<0.040	<0.080	0.0052
MCPA	mg/L		<0.005	<1.0	0.0005	0.0005	<0.0050
Mirex	ug/L		<5.0	<50	<0.080	<0.040	0.033
Methoxychlor	ug/L	6.5	<5.0	<50	<0.120	<0.030	<0.020
Bacteria							
Total Coliforms	MPN/100mL		15,448	18,210	9,056	309,209	11,836
Fecal Coliforms	MPN/100mL		3,211	5,033	831	77,707	2,581
E. coli	MPN/100mL		4,453	2,817	770	6,354	2,635

Note: Criteria from Ontario Ministry of the Environment. (2011, July 1). Soil, Ground Water and Sediment Standards for Use Under Part XV.I of the Environmental Protection Act Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

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5.4 LANDFILL GAS

5.4.1 COLLECTION AND FLARING SYSTEM

Landfill gas (LFG) produced at the BRRMF is comprised primarily of methane (CH₄) and carbon dioxide (CO₂) in approximately equal amounts. These greenhouse gases contribute to global warming, but CH₄ has a global warming potential 25 times that of CO₂. To reduce emissions, the LFG is collected via a series of pipes beneath the BRRMF, and sent to a flare where the CH₄ is reduced to CO₂ and water vapor. The landfill gas collection and flaring system (LFGCFS) is run by Integrated Gas Recovery Systems Inc. on behalf of the City of Winnipeg.

As per the BRRMF Operating Plan, LFG operations and monitoring are managed through the Landfill Gas Operating Plan, submitted October 23, 2014, as per Clause 110.

During operation in 2022, the LFGCFS operated as was intended. With the exception of the extended shutdown due to the header being compromised in March 2022. During surface emission monitoring, some areas with weak surface cap were noted where gas was escaping.

The 2022 Landfill Gas Collection and Flaring Report, prepared by Integrated Gas Recovery Services Inc., is attached in Appendix C.

5.4.2 SUBSURFACE LANDFILL GAS MONITORING PROGRAM

LFG that is not collected or that cannot escape into the atmosphere may migrate into neighboring land below the ground surface. The purpose of LFG migration monitoring is to detect gas migration before it becomes a safety hazard to neighbouring properties.

As per the BRRMF Operating Plan, subsurface LFG migration is managed in accordance with the Subsurface Landfill Gas Monitoring Program, submitted on October 23, 2014, as specified under Clause 111. Probes are monitored monthly for methane (CH₄), oxygen (O₂), carbon monoxide (CO), and hydrogen sulphide (H₂S).

In 2022, the maximum level of CH₄ measured was 0.2%. The Subsurface Landfill Gas Contingency Plan was not activated, indicating that the LFGCFS is operating effectively.

The 2022 subsurface gas migration probe data is provided in Table 10.



Table 10. 2022 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
1	18-Jan-22	0.0	20.8	0.0	0.0
1	22-Feb-22	*ns	*ns	*ns	*ns
1	14-Mar-22	*ns	*ns	*ns	*ns
1	27-Apr-22	*ns	*ns	*ns	*ns
1	27-May-22	0.0	20.6	1.0	0.0
1	9-Jun-22	0.2	20.6	0.0	0.0
1	5-Jul-22	0.0	20.7	0.0	0.0
1	5-Aug-22	0.0	20.4	0.0	0.0
1	13-Sep-22	0.0	20.8	0.0	0.0
1	7-Oct-22	0.0	21.0	0.0	0.0
1	28-Nov-22	0.0	22.4	0.0	0.0
1	29-Dec-22	*ns	*ns	*ns	*ns
2					
2	18-Jan-22	0.0	20.7	0.0	0.0
2	22-Feb-22	*ns	*ns	*ns	*ns
2	14-Mar-22	*ns	*ns	*ns	*ns
2	27-Apr-22	*ns	*ns	*ns	*ns
2	27-May-22	0.0	20.3	1.0	0.0
2	9-Jun-22	0.2	20.6	0.0	0.0
2	5-Jul-22	0.0	18.9	0.0	0.0
2	5-Aug-22	0.0	20.4	0.0	0.0
2	13-Sep-22	0.0	19.8	0.0	0.0
2	7-Oct-22	0.0	20.6	0.0	0.0
2	28-Nov-22	0.0	22.2	0.0	0.0
2	29-Dec-22	*ns	*ns	*ns	*ns
3					
3	17-Jan-22	0.0	20.8	0.0	0.0
3	22-Feb-22	0.0	21.5	0.0	0.0
3	14-Mar-22	*ns	*ns	*ns	*ns
3	27-Apr-22	*ns	*ns	*ns	*ns
3	27-May-22	0.0	27.0	1.0	0.0
3	20-Jun-22	0.1	19.5	0.0	1.0
3	5-Jul-22	0.0	19.4	0.0	0.0
3	5-Aug-22	0.0	20.3	0.0	0.0
3	13-Sep-22	0.0	21.2	0.0	0.0
3	7-Oct-22	0.0	19.7	0.0	0.0
3	28-Nov-22	0.0	22.4	0.0	0.0
3	29-Dec-22	0.0	21.2	0.0	0.0



Table 10. 2022 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
4	17-Jan-22	0.1	20.5	0.0	0.0
4	22-Feb-22	0.1	21.1	0.0	0.0
4	14-Mar-22	*ns	*ns	*ns	*ns
4	27-Apr-22	*ns	*ns	*ns	*ns
4	31-May-22	0.0	21.7	0.0	0.0
4	20-Jun-22	0.1	19.5	0.0	1.0
4	5-Jul-22	0.0	20.2	0.0	0.0
4	5-Aug-22	0.0	20.3	0.0	0.0
4	13-Sep-22	0.0	20.6	2.0	0.0
4	11-Oct-22	0.0	20.6	0.0	0.0
4	28-Nov-22	0.0	22.2	0.0	0.0
4	29-Dec-22	*ns	*ns	*ns	*ns
5	17-Jan-22	0.0	20.5	0.0	0.0
5	22-Feb-22	0.0	21.5	0.0	0.0
5	14-Mar-22	*ns	*ns	*ns	*ns
5	27-Apr-22	*ns	*ns	*ns	*ns
5	30-May-22	0.0	21.1	0.0	0.0
5	20-Jun-22	0.1	19.3	0.0	0.0
5	5-Jul-22	0.0	20.1	0.0	0.0
5	5-Aug-22	0.0	20.2	0.0	0.0
5	13-Sep-22	0.0	20.3	0.0	0.0
5	11-Oct-22	0.0	19.8	0.0	0.0
5	28-Nov-22	0.0	21.6	0.0	0.0
5	29-Dec-22	*ns	*ns	*ns	*ns
6	10-Jan-22	0.0	20.7	0.0	0.0
6	22-Feb-22	*ns	*ns	*ns	*ns
6	10-Mar-22	*ns	*ns	*ns	*ns
6	2-May-22	0.1	21.6	0.0	0.0
6	24-May-22	0.0	21.2	0.0	0.0
6	20-Jun-22	0.1	20.3	0.0	0.0
6	4-Jul-22	0.0	20.9	0.0	0.0
6	8-Aug-22	0.1	19.5	0.0	0.0
6	9-Sep-22	0.0	21.0	0.0	0.0
6	11-Oct-22	0.0	20.5	0.0	0.0
6	4-Nov-22	0.0	21.2	0.0	0.0
6	28-Dec-22	0.0	21.2	0.0	0.0



Table 10. 2022 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
7	10-Jan-22	0.0	21.7	0.0	0.0
7	22-Feb-22	0.0	23.0	0.0	0.0
7	10-Mar-22	0.1	22.2	0.0	0.0
7	2-May-22	0.1	21.7	0.0	0.0
7	30-May-22	0.0	20.8	0.0	0.0
7	20-Jun-22	0.1	20.8	0.0	0.0
7	4-Jul-22	0.0	19.2	0.0	1.0
7	8-Aug-22	0.1	20.7	0.0	0.0
7	13-Sep-22	0.0	20.1	3.0	0.0
7	11-Oct-22	0.0	19.3	0.0	0.0
7	4-Nov-22	0.0	19.2	0.0	0.0
7	28-Dec-22	0.0	20.6	0.0	0.0
8	10-Jan-22	0.0	21.1	0.0	0.0
8	22-Feb-22	0.0	23.2	0.0	0.0
8	10-Mar-22	0.1	21.7	0.0	0.0
8	2-May-22	0.1	21.1	0.0	0.0
8	24-May-22	0.0	20.2	0.0	0.0
8	20-Jun-22	0.1	20.1	0.0	0.0
8	4-Jul-22	0.0	19.7	0.0	1.0
8	8-Aug-22	0.1	20.6	0.0	0.0
8	13-Sep-22	0.0	20.9	0.0	0.0
8	11-Oct-22	0.0	20.0	0.0	0.0
8	4-Nov-22	0.0	20.0	0.0	0.0
8	21-Dec-22	0.0	22.7	0.0	0.0
9	10-Jan-22	0.0	19.7	0.0	0.0
9	22-Feb-22	0.0	21.6	0.0	0.0
9	10-Mar-22	0.1	20.8	0.0	0.0
9	2-May-22	0.1	19.3	0.0	0.0
9	30-May-22	0.1	20.8	0.0	0.0
9	20-Jun-22	0.1	20.7	0.0	0.0
9	4-Jul-22	0.0	20.9	0.0	0.0
9	8-Aug-22	0.1	20.4	0.0	0.0
9	13-Sep-22	0.0	19.6	0.0	0.0
9	11-Oct-22	0.0	20.0	0.0	0.0
9	4-Nov-22	0.0	20.6	0.0	0.0
9	21-Dec-22	0.0	22.1	0.0	0.0



Table 10. 2022 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
10	10-Jan-22	0.0	20.3	0.0	0.0
10	22-Feb-22	0.0	20.6	0.0	0.0
10	10-Mar-22	0.1	20.6	0.0	0.0
10	2-May-22	0.2	21.1	0.0	0.0
10	30-May-22	0.1	20.8	0.0	0.0
10	21-Jun-22	0.1	21.1	0.0	0.0
10	4-Jul-22	0.0	20.9	0.0	0.0
10	8-Aug-22	0.1	20.4	0.0	0.0
10	13-Sep-22	0.0	20.4	0.0	0.0
10	11-Oct-22	0.0	19.8	0.0	0.0
10	4-Nov-22	0.0	20.4	0.0	0.0
10	21-Dec-22	0.0	20.9	0.0	0.0
P26E	14-Jan-22	0.0	20.7	0.0	0.0
P26E	22-Feb-22	0.0	20.6	0.0	0.0
P26E	14-Mar-22	0.1	21.6	0.0	0.0
P26E	27-Apr-22	*ns	*ns	*ns	*ns
P26E	26-May-22	0.0	21.0	1.0	0.0
P26E	21-Jun-22	0.0	21.3	0.0	1.0
P26E	12-Jul-22	0.0	18.5	0.0	1.0
P26E	8-Aug-22	0.0	20.0	0.0	0.0
P26E	9-Sep-22	0.0	18.6	0.0	0.0
P26E	11-Oct-22	0.0	16.1	0.0	0.0
P26E	28-Nov-22	0.0	21.6	0.0	0.0
P26E	28-Dec-22	0.0	21.9	0.0	0.0
P28E	14-Jan-22	0.0	20.2	0.0	0.0
P28E	22-Feb-22	0.0	20.2	0.0	0.0
P28E	14-Mar-22	*ns	*ns	*ns	*ns
P28E	27-Apr-22	*ns	*ns	*ns	*ns
P28E	26-May-22	0.0	18.1	1.0	1.0
P28E	20-Jun-22	0.1	20.0	0.0	0.0
P28E	5-Jul-22	0.0	19.8	0.0	0.0
P28E	8-Aug-22	0.0	20.0	0.0	0.0
P28E	9-Sep-22	0.0	19.3	0.0	0.0
P28E	11-Oct-22	0.0	21.0	0.0	0.0
P28E	28-Nov-22	0.0	21.5	0.0	0.0
P28E	28-Dec-22	0.0	21.2	0.0	0.0



Table 10. 2022 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
P30E	14-Jan-22	0.0	20.3	0.0	0.0
P30E	22-Feb-22	0.0	20.6	0.0	0.0
P30E	14-Mar-22	0.1	22.5	0.0	0.0
P30E	27-Apr-22	0.0	21.3	0.0	0.0
P30E	24-May-22	0.0	21.1	0.0	0.0
P30E	9-Jun-22	0.2	20.0	0.0	0.0
P30E	4-Jul-22	0.0	21.1	0.0	0.0
P30E	5-Aug-22	0.1	20.8	0.0	0.0
P30E	9-Sep-22	0.0	20.1	0.0	0.0
P30E	7-Oct-22	0.0	20.9	0.0	0.0
P30E	4-Nov-22	0.0	19.7	0.0	0.0
P30E	21-Dec-22	0.0	22.2	0.0	0.0
P34E	14-Jan-22	0.0	21.3	0.0	0.0
P34E	22-Feb-22	*ns	*ns	*ns	*ns
P34E	14-Mar-22	*ns	*ns	*ns	*ns
P34E	27-Apr-22	*ns	*ns	*ns	*ns
P34E	30-May-22	*ns	*ns	*ns	*ns
P34E	9-Jun-22	0.2	20.5	0.0	0.0
P34E	5-Jul-22	0.0	20.1	0.0	1.0
P34E	5-Aug-22	0.0	20.2	0.0	0.0
P34E	9-Sep-22	0.0	20.8	0.0	0.0
P34E	7-Oct-22	0.0	21.0	0.0	0.0
P34E	28-Nov-22	0.0	21.1	0.0	0.0
P34E	28-Dec-22	*ns	*ns	*ns	*ns
P106E	28-Jan-22	0.1	21.8	0.0	0.0
P106E	22-Feb-22	0.0	21.7	0.0	0.0
P106E	14-Mar-22	0.0	21.0	0.0	0.0
P106E	27-Apr-22	0.0	21.7	0.0	0.0
P106E	24-May-22	0.0	21.3	0.0	0.0
P106E	20-Jun-22	0.0	20.9	0.0	0.0
P106E	5-Jul-22	0.1	20.1	0.0	0.0
P106E	5-Aug-22	0.1	20.6	0.0	0.0
P106E	8-Sep-22	0.0	20.8	0.0	0.0
P106E	7-Oct-22	0.1	20.5	0.0	0.0
P106E	4-Nov-22	0.0	20.5	0.0	0.0
P106E	21-Dec-22	0.0	21.2	0.0	0.0

*ns - no sample due to snow cover, flooding, or freezing



Table 10. 2022 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
P107E	28-Jan-22	0.0	21.6	0.0	1.0
P107E	22-Feb-22	0.0	21.7	0.0	0.0
P107E	14-Mar-22	0.0	21.0	0.0	0.0
P107E	27-Apr-22	0.0	20.9	0.0	0.0
P107E	24-May-22	0.0	21.2	0.0	0.0
P107E	20-Jun-22	0.0	20.3	0.0	0.0
P107E	5-Jul-22	0.1	21.0	0.0	0.0
P107E	5-Aug-22	0.1	21.1	0.0	0.0
P107E	9-Sep-22	0.0	20.6	0.0	0.0
P107E	7-Oct-22	0.1	21.0	0.0	0.0
P107E	4-Nov-22	0.0	20.6	0.0	0.0
P107E	21-Dec-22	*ns	*ns	*ns	*ns
P108E	28-Jan-22	0.0	21.6	0.0	1.0
P108E	22-Feb-22	0.0	21.6	0.0	0.0
P108E	14-Mar-22	0.1	21.2	0.0	0.0
P108E	27-Apr-22	0.1	20.9	0.0	0.0
P108E	24-May-22	0.0	21.3	0.0	0.0
P108E	20-Jun-22	0.0	20.3	0.0	0.0
P108E	5-Jul-22	0.0	21.0	0.0	0.0
P108E	5-Aug-22	0.1	20.9	0.0	0.0
P108E	8-Sep-22	0.0	20.7	0.0	0.0
P108E	7-Oct-22	0.0	21.2	0.0	0.0
P108E	4-Nov-22	0.0	20.9	0.0	0.0
P108E	21-Dec-22	0.0	21.5	0.0	0.0
P109E	28-Jan-22	0.0	21.3	0.0	0.0
P109E	22-Feb-22	0.0	21.7	0.0	0.0
P109E	14-Mar-22	0.1	20.9	0.0	0.0
P109E	27-Apr-22	0.1	20.7	0.0	0.0
P109E	24-May-22	0.0	20.9	0.0	0.0
P109E	20-Jun-22	0.1	20.5	0.0	1.0
P109E	4-Jul-22	0.1	15.9	0.0	0.0
P109E	5-Aug-22	0.1	20.5	0.0	0.0
P109E	14-Sep-22	0.0	14.3	0.0	0.0
P109E	11-Oct-22	0.0	15.8	0.0	0.0
P109E	1-Nov-22	0.0	19.0	0.0	0.0
P109E	21-Dec-22	*ns	*ns	*ns	*ns



Table 10. 2022 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
P110E	28-Jan-22	0.0	21.7	0.0	1.0
P110E	22-Feb-22	0.0	21.5	0.0	0.0
P110E	14-Mar-22	0.1	13.0	0.0	0.0
P110E	27-Apr-22	0.1	15.0	0.0	0.0
P110E	27-May-22	0.0	18.1	1.0	1.0
P110E	9-Jun-22	0.2	11.4	0.0	0.0
P110E	5-Jul-22	0.0	15.6	0.0	0.0
P110E	5-Aug-22	0.1	21.1	0.0	0.0
P110E	8-Sep-22	0.0	15.2	0.0	0.0
P110E	7-Oct-22	0.1	15.0	0.0	0.0
P110E	4-Nov-22	0.0	20.2	0.0	0.0
P110E	21-Dec-22	0.0	2.3	8.0	0.0
P111E	28-Jan-22	0.0	22.1	0.0	0.0
P111E	22-Feb-22	0.0	21.7	0.0	0.0
P111E	14-Mar-22	*ns	*ns	*ns	*ns
P111E	27-Apr-22	*ns	*ns	*ns	*ns
P111E	30-May-22	*ns	*ns	*ns	*ns
P111E	9-Jun-22	*ns	*ns	*ns	*ns
P111E	5-Jul-22	0.0	19.7	0.0	0.0
P111E	8-Aug-22	0.1	21.0	0.0	0.0
P111E	9-Sep-22	0.0	21.0	0.0	0.0
P111E	7-Oct-22	0.0	20.7	0.0	0.0
P111E	28-Nov-22	0.0	22.4	0.0	0.0
P111E	21-Dec-22	0.0	23.1	0.0	0.0
P112E	28-Jan-22	0.0	21.5	0.0	0.0
P112E	22-Feb-22	0.0	21.7	0.0	0.0
P112E	14-Mar-22	*ns	*ns	*ns	*ns
P112E	27-Apr-22	*ns	*ns	*ns	*ns
P112E	27-May-22	0.0	21.0	1.0	0.0
P112E	20-Jun-22	0.1	21.0	0.0	0.0
P112E	5-Jul-22	0.0	19.2	0.0	0.0
P112E	8-Aug-22	0.1	19.7	0.0	0.0
P112E	9-Sep-22	0.0	18.1	0.0	0.0
P112E	7-Oct-22	0.0	19.0	0.0	0.0
P112E	1-Nov-22	0.0	20.5	0.0	0.0
P112E	21-Dec-22	0.0	23.1	0.0	0.0

*ns - no sample due to snow cover, flooding, or freezing

6.0 NUISANCE MANAGEMENT

In order to reduce odour, litter, and vector nuisances at the landfill, several best practices and operating procedures are used, such as placement of screens, minimizing the working face of each cell, application of appropriate cover material (daily, intermediate, or final), site landscaping, weekly litter control patrols, and odour monitoring. If necessary, a licensed professional will apply vector control products, ensuring that appropriate chemicals are used and are properly handled. Noise is not a significant issue due to the separation from surrounding homes. Fugitive dust emissions are minimized by spraying site roads with uncontaminated surface water.

In 2022, there were 73 odour complaints; in all cases the source of the odour was investigated. If the source of the odour could be located within the BRRMF, if possible, we immediately covered the odour causing material, moved the tipping face to a more favorable area if available, and used compost or wood chips to reduce the odour and prevent further occurrence. Appendix D provides a summary of nuisance complaints received in 2022.

BRADY ROAD RESOURCE MANAGEMENT FACILITY ANNUAL REPORT – 2022

7.0 CONCLUSION

The diversion operations taking place at the BRRMF have been effective in diverting tens of thousands of metric tonnes of material from the landfill.

The quality of the ground water beneath the site has not been negatively impacted, as demonstrated by the comparison of upstream to downstream ground water quality.

The quality of the surface water measured at the weir is statistically similar to the quality of the surface water upstream of the BRRMF.

Leachate management was successful in 2022 as there were no breakouts of leachate.

The areas where landfill gas is escaping should be repaired.

The BRRMF will continue to operate so as to ensure that the environment is maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for present and future Manitobans.

8.0 REFERENCES

1. Brady Road Resource Management Facility – Manitoba Environment Act Licence No. 3081 R

<https://www.winnipeg.ca/waterandwaste/pdfs/garbage/bradylicence.pdf>

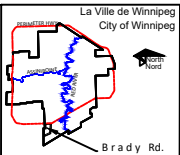
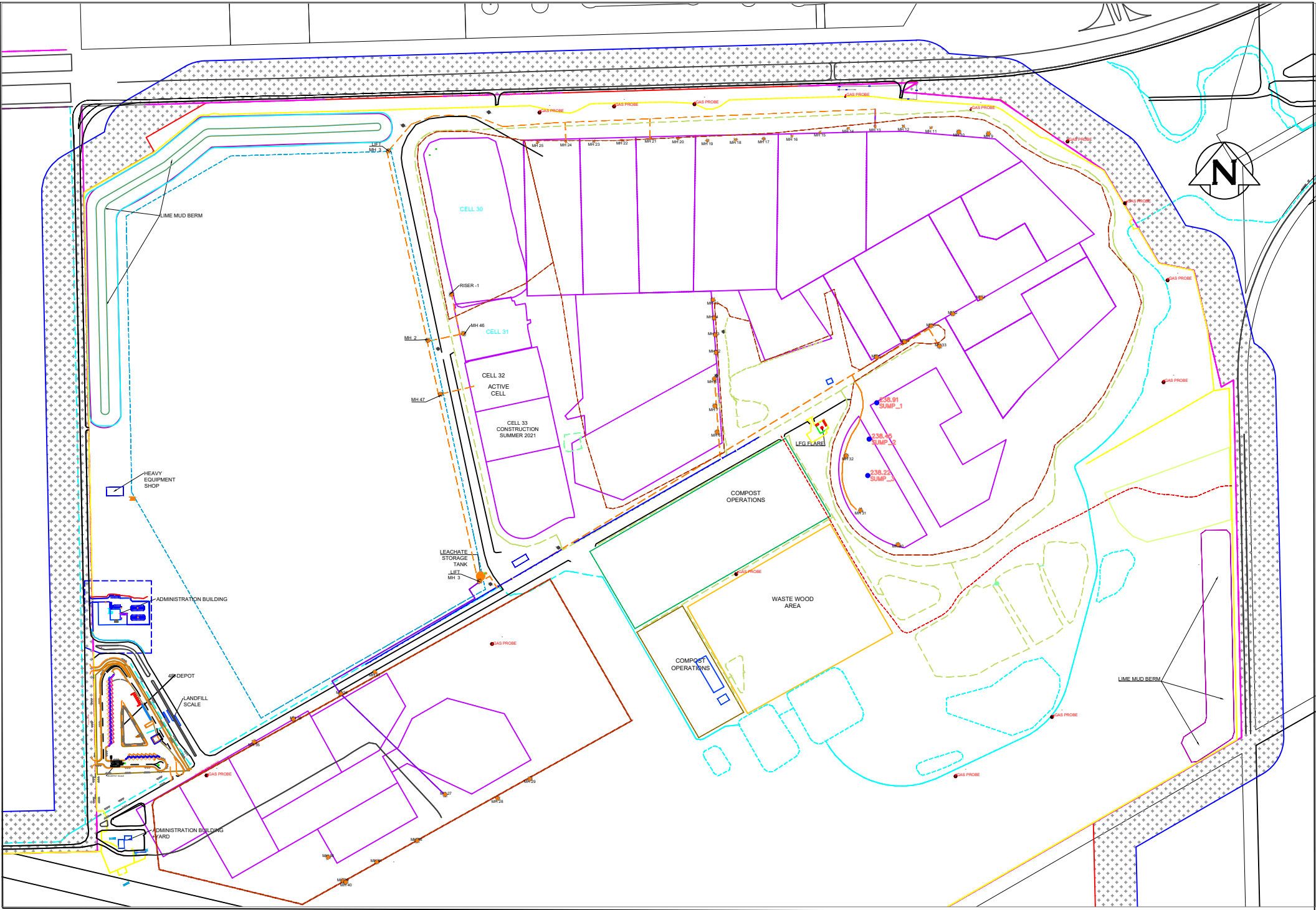
2. Ontario Ministry of the Environment. (2011, July 1). Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.

<https://www.ontario.ca/page/soil-ground-water-and-sediment-standards-use-under-part-xv1-environmental-protection-act>

3. Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life. (CCME, 2019).

<http://ceqg-rcqe.ccme.ca/download/en/221>

**FIGURE 1
BRRMF LAYOUT AND
LEACHATE COLLECTION
SYSTEM**



LEGEND / LÉGENDE

CONTROL ZONE / Zone de contrôle	ADMIN. BUILDING
LANDFILL SITE/ Site d'enfouissement	CONTOURS LINES @ 0.05m.
GW Flow Direction	CL
MANHOLE	CB
GAS PROBE	GW Well/Lysimeter
LEACHATE PROBE	Wastewater System
HYDRANT	Storm Drain System
THERMOCOUPLE	Water Main
GW Well	Railway

Scale in metres / Échelle en mètres



METRIC / MÉTRIQUE
 1:10
 LES NUMÉROS DÉCIMALES INTRINSÈQUES SONT ARRANGÉS EN UN SEUL CARRÉ.

NO.	REVISIONS	DATE	BY	DATE

ORTHOPHOTO Date	FIELD BOOK #
2019-08-20	

WELLS FEATURES SURVEYED	2017	EMMN

DATE	BY	DATE
2021	EM	2021

BRRMF
 ADMINISTRATIVE BUILDING
 Bâtiment Administratif

THE CITY OF WINNIPEG / LA VILLE DE WINNIPEG
 WATER AND WASTE DEPARTMENT
 SOLID WASTE DIVISION

Site No. 25
Brady Rd.
DUMP SITE & DETAIL

SHEET 1 OF 2
 CITY DRAWING NUMBER
 BRRMF_MudPlan_0M5_R6_DWG

WARNING
 THE EXACT BOUNDARY OF REFUSE OR DEBRIS IS DETERMINED ONLY BY DETAILED INVESTIGATION.
 L'ÉTENDUE EXACTE DU DÉBRIS ET DES DÉBRIS N'EST DÉTERMINÉE QUE PAR UNE ENQUÊTE DÉTAILLÉE.

ATTENTION
 L'ÉTENDUE EXACTE DU DÉBRIS ET DES DÉBRIS N'EST DÉTERMINÉE QUE PAR UNE ENQUÊTE DÉTAILLÉE.

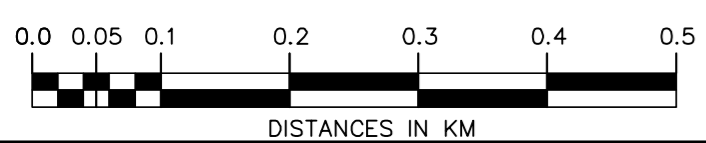
FIGURE 2
GROUND WATER SAMPLING
LOCATIONS

BRADY ROAD LANDFILL



LEGEND

- ▲ OVERBURDEN PIEZOMETER NEST
- GROUNDWATER WELL



B.M. ELEV.	FIELD BOOK #:
POSTED TO LBIS	
1	11/11/25 KB
NO. REVISIONS	DATE BY

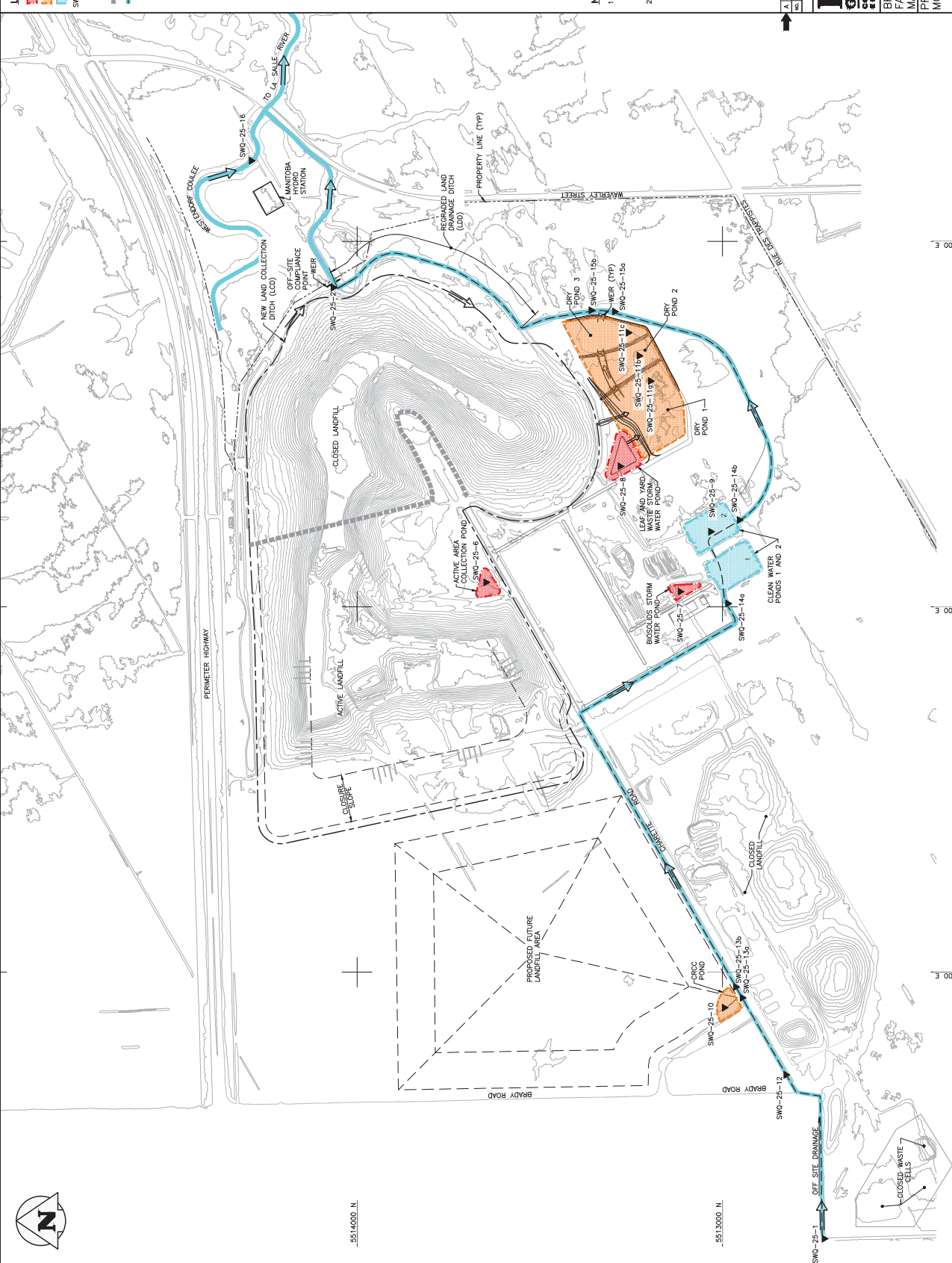
THE CITY OF WINNIPEG
 WATER AND WASTE DEPARTMENT

BRADY ROAD LANDFILL
WELL LOCATIONS

SHEET 1 OF 1

FIGURE 1_R1

FIGURE 3
SURFACE WATER SAMPLING
LOCATIONS



LEGEND:

- IMPACTED WATER POND
- DRY POND
- CLEAN WATER POND
- SURFACE WATER SAMPLING LOCATION
- SURFACE WATER FLOW DIRECTION
- CLOSED LANDFILL BOUNDARY
- LAND DRAINAGE DITCH

SWO-25-16

NOTES:

1. GEOGRAPHY SOURCES ARE CITY OF WINNIPEG, KGS OPERATING AREA AND ADDITIONAL LANDFILL PERIMETER SURVEY BY KGS GROUP 2013.
2. EXACT SURFACE WATER SAMPLING LOCATION TO BE DETERMINED IN FIELD.



KGS GROUP
CONSULTING ENGINEERS

THE CITY OF WINNIPEG
WATER AND WASTEWATER

BRADY ROAD RESOURCE MANAGEMENT
FACILITY SURFACE WATER
MANAGEMENT PLAN
PROPOSED SURFACE WATER
MONITORING LOCATIONS

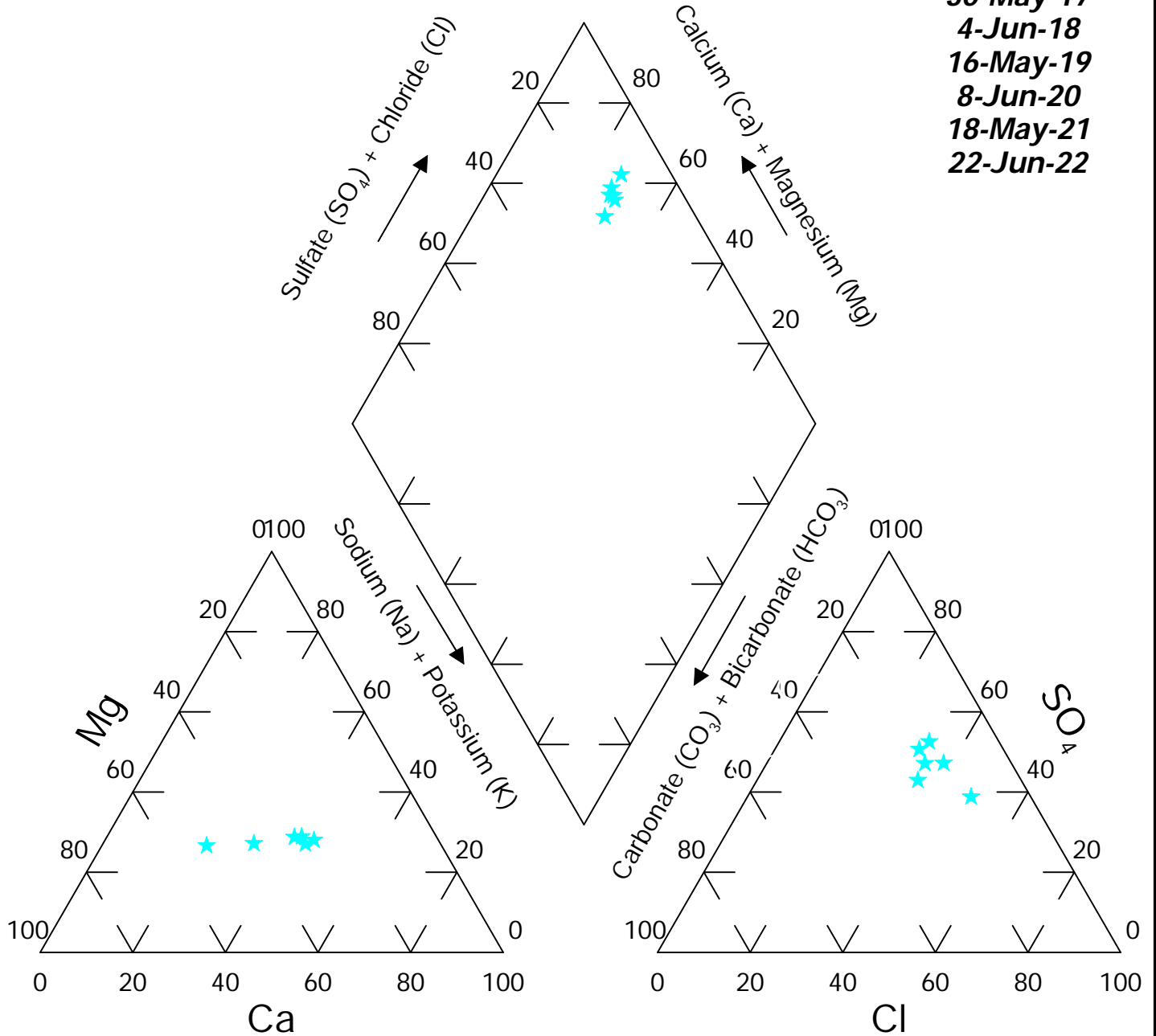
APPENDIX A
2022 PIPER DIAGRAMS

**2022 GROUNDWATER
PIPER DIAGRAMS**

Site: Brady

Location : GWQ25-4N34-CR

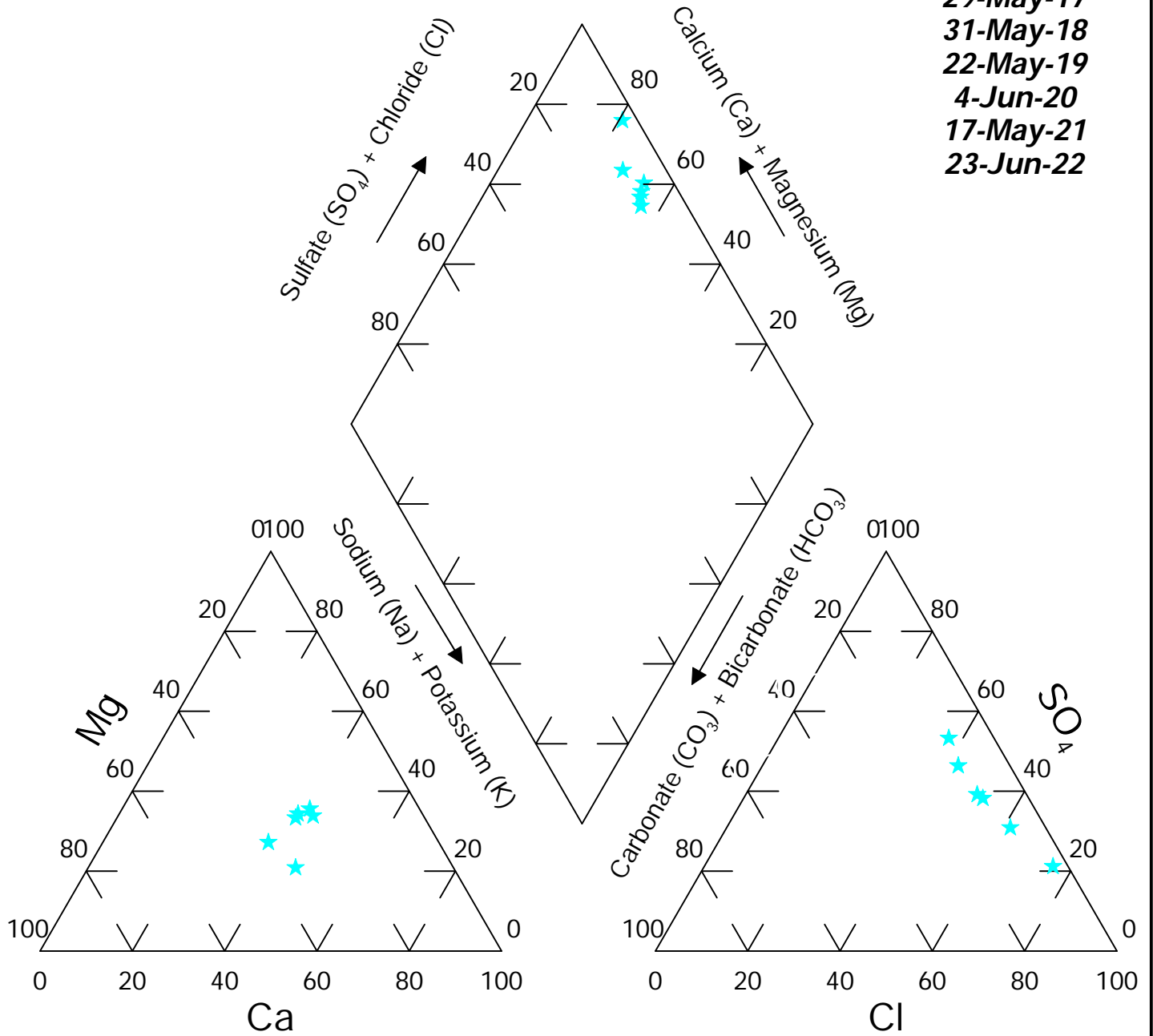
Dates:
30-May-17
4-Jun-18
16-May-19
8-Jun-20
18-May-21
22-Jun-22



Site: Brady

Location : GWQ25-5N62-D

Dates:
 29-May-17
 31-May-18
 22-May-19
 4-Jun-20
 17-May-21
 23-Jun-22



Site: Brady

Location : GWQ25-6N57-DR

Dates:

29-May-17

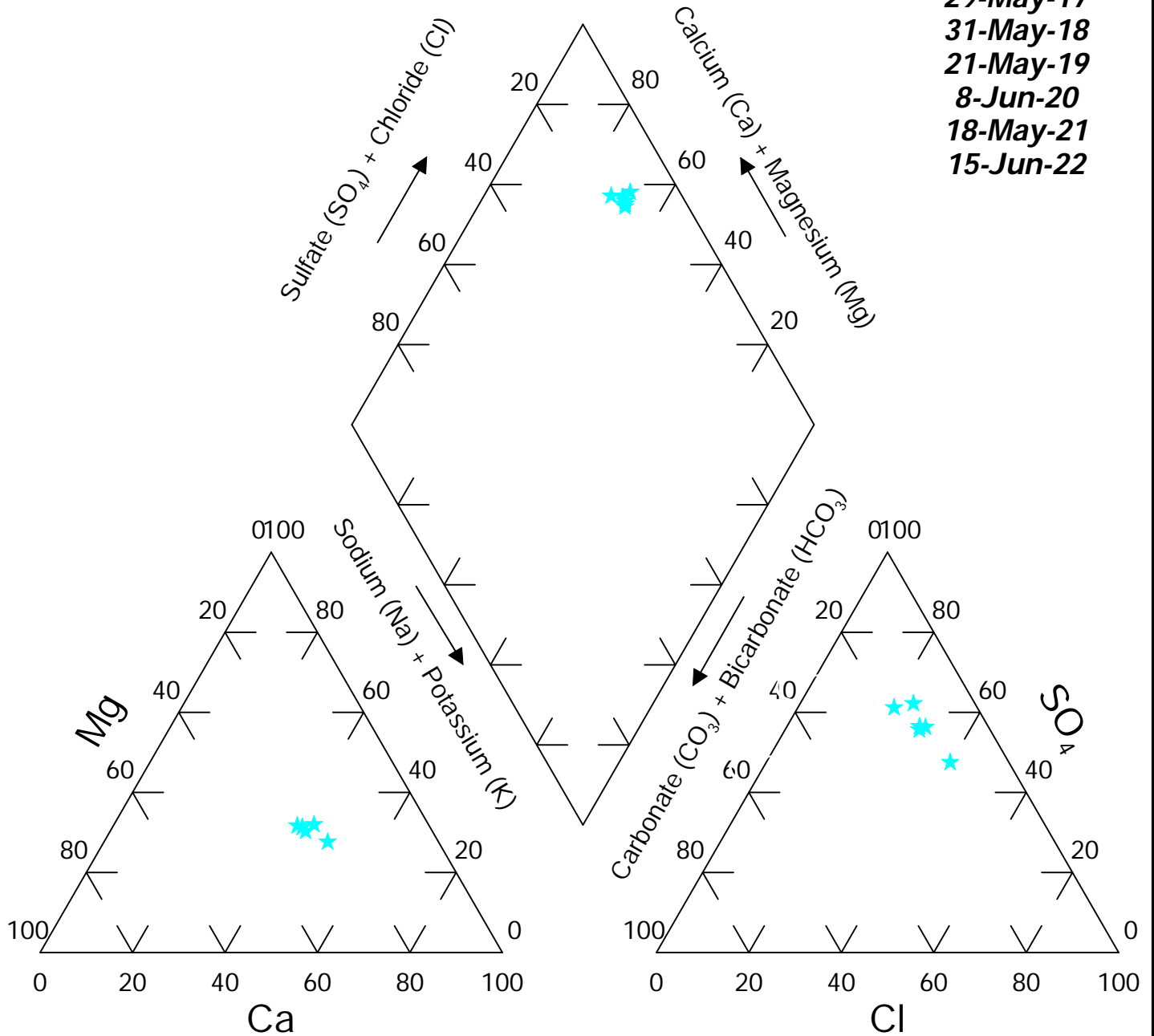
31-May-18

21-May-19

8-Jun-20

18-May-21

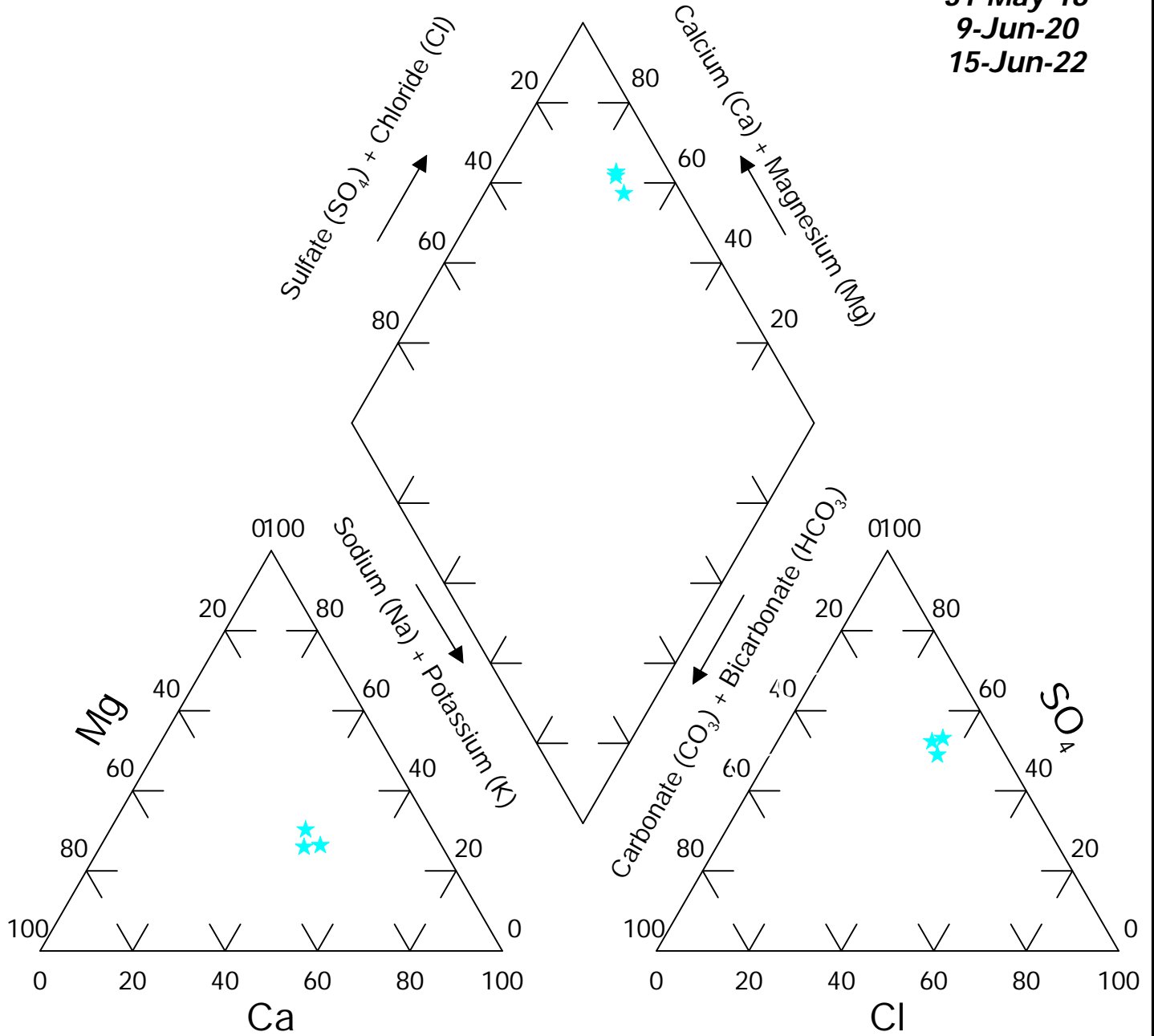
15-Jun-22



Site: Brady

Location : GWQ25-6N58-DR

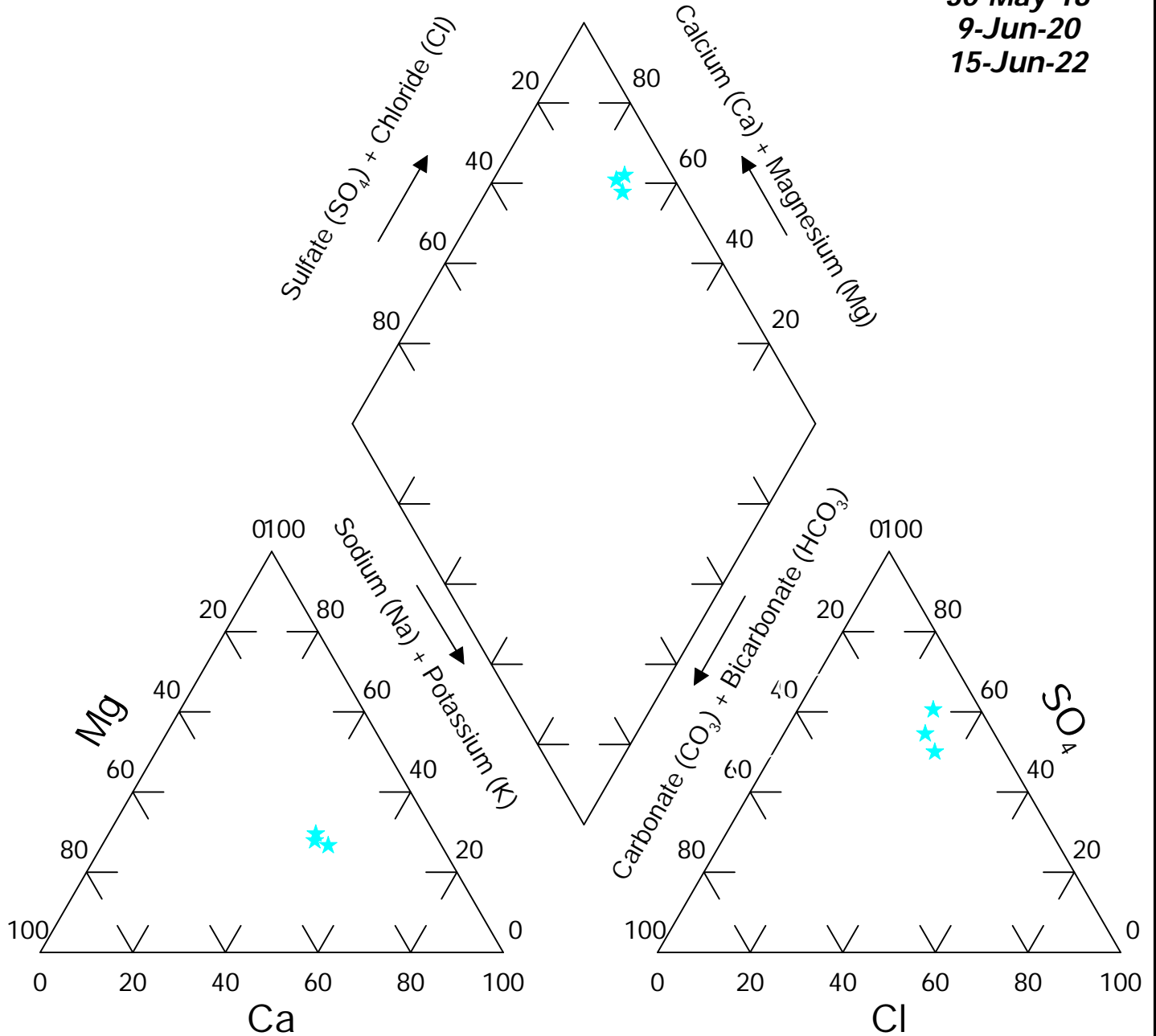
Dates:
31-May-18
9-Jun-20
15-Jun-22



Site: Brady

Location : GWQ25-6N59-DR

Dates:
30-May-18
9-Jun-20
15-Jun-22



Site: Brady

Location : GWQ25-6N60-DR

Dates:

24-May-17

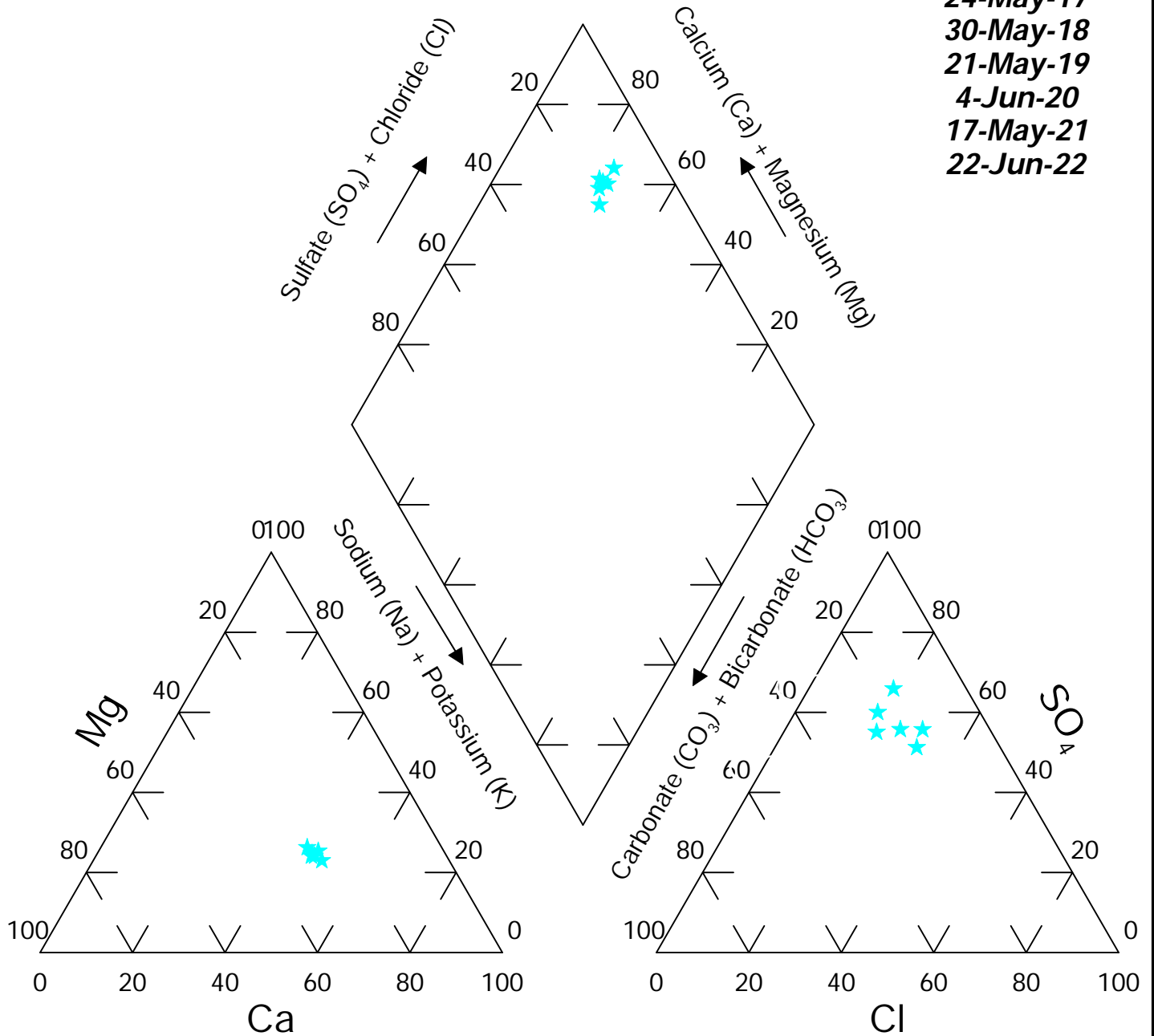
30-May-18

21-May-19

4-Jun-20

17-May-21

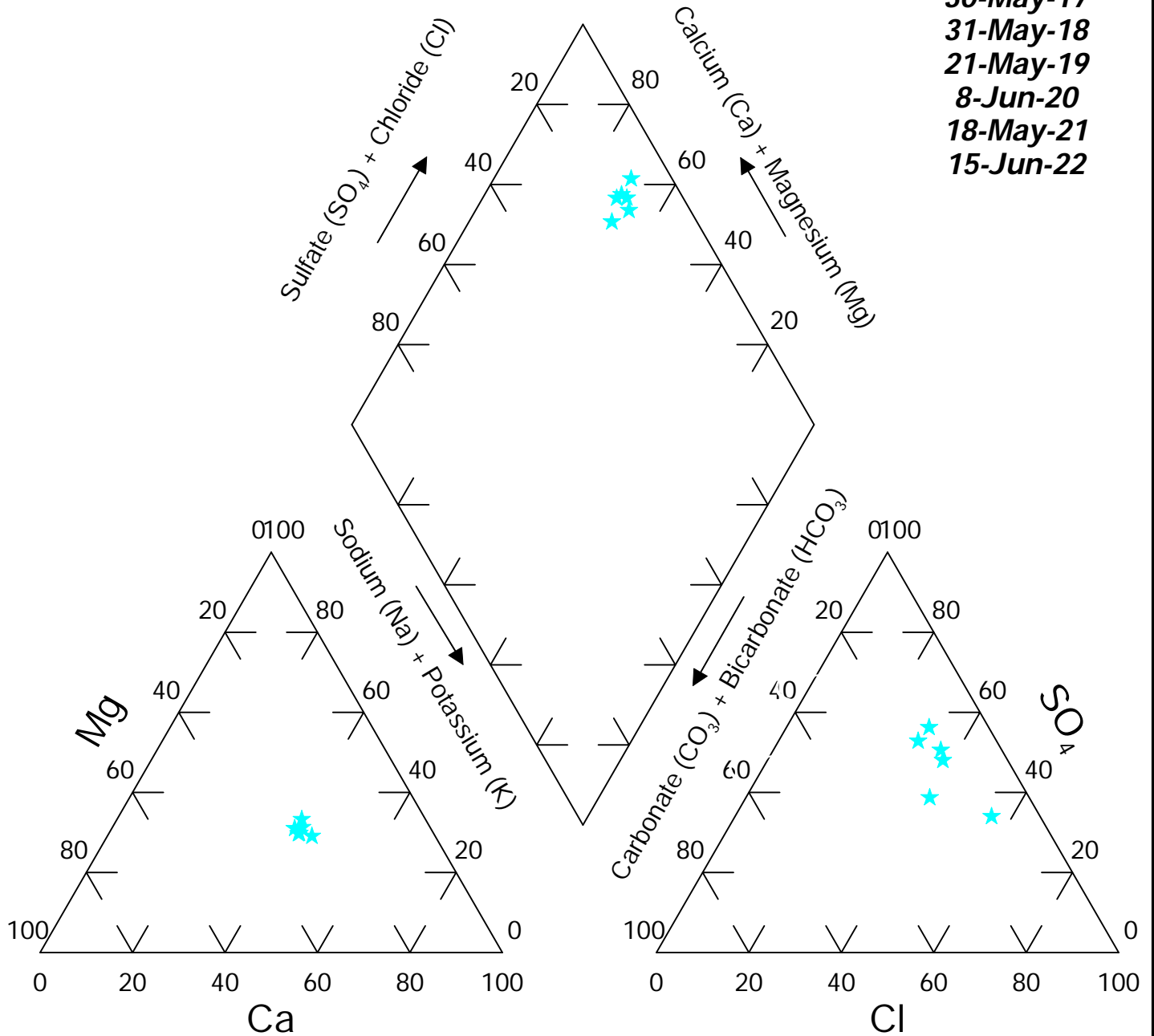
22-Jun-22



Site: Brady

Location : GWQ25-6N63-E

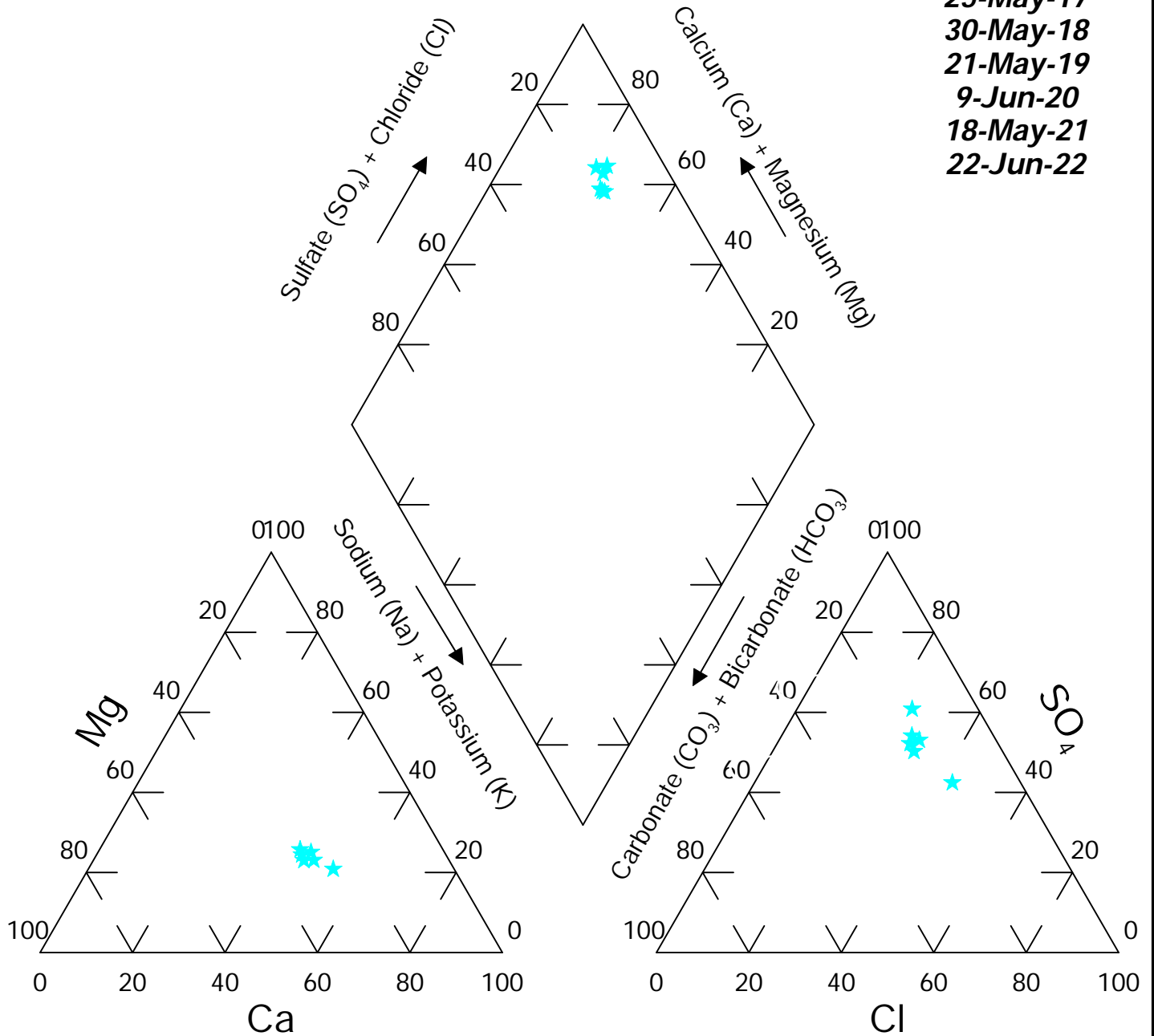
Dates:
 30-May-17
 31-May-18
 21-May-19
 8-Jun-20
 18-May-21
 15-Jun-22



Site: Brady

Location : GWQ25-6N67-E

Dates:
 25-May-17
 30-May-18
 21-May-19
 9-Jun-20
 18-May-21
 22-Jun-22



Site: Brady
Well #: 4N34-D/DR

Dates:

- 25-May-17
- 4-May-18
- 16-May-19
- 8-Jun-20
- 17-May-21
- 12-Jul-22

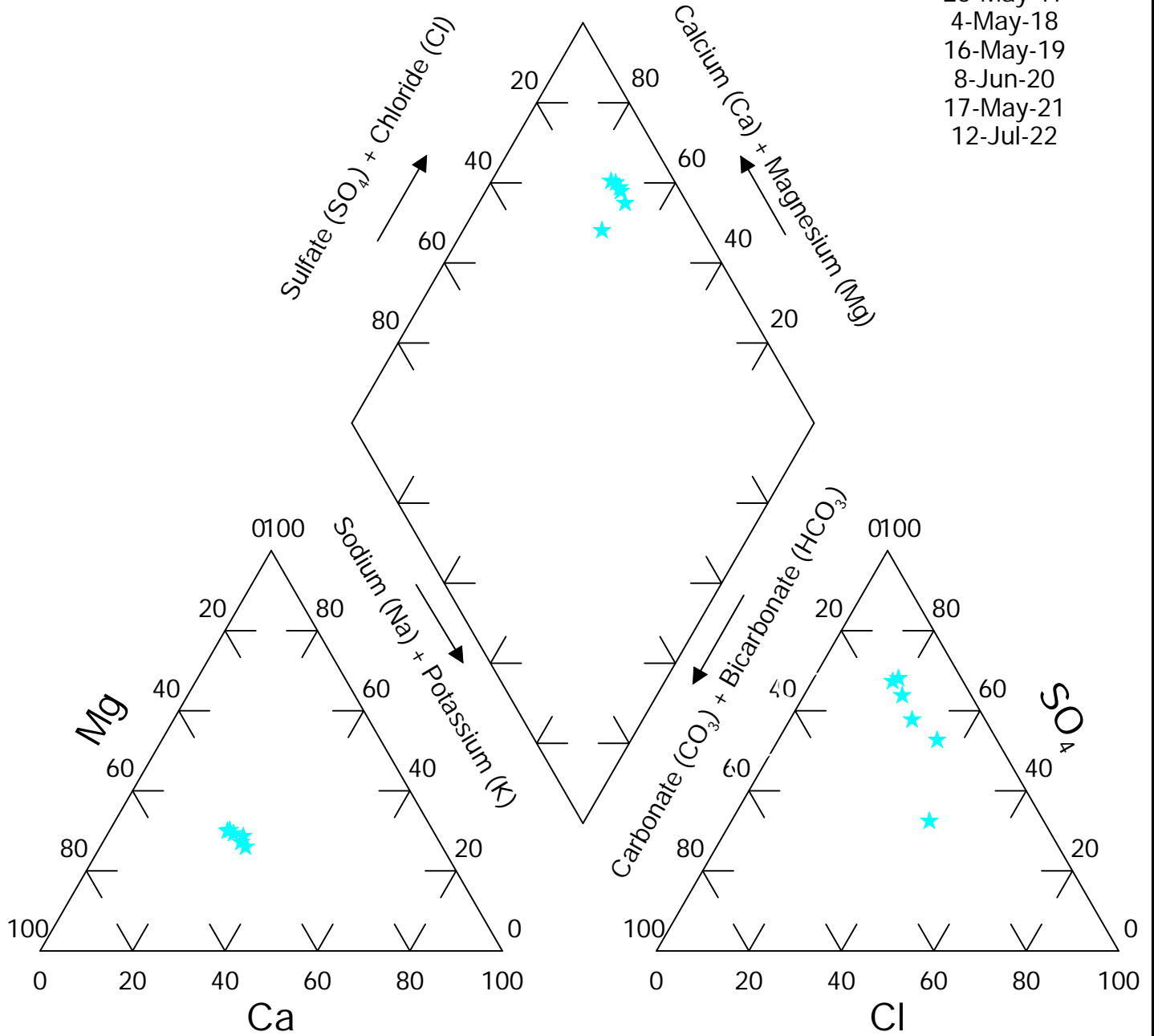


FIGURE: 10P

Site: Brady Well #: 5N62-E

Dates:

- 29-May-17
- 17-Oct-17
- 31-May-18
- 15-Oct-18
- 22-May-19
- 3-Oct-19
- 4-Jun-20
- 13-Oct-20
- 17-May-21
- 5-Oct-21
- 12-Jul-22
- 20-Oct-22

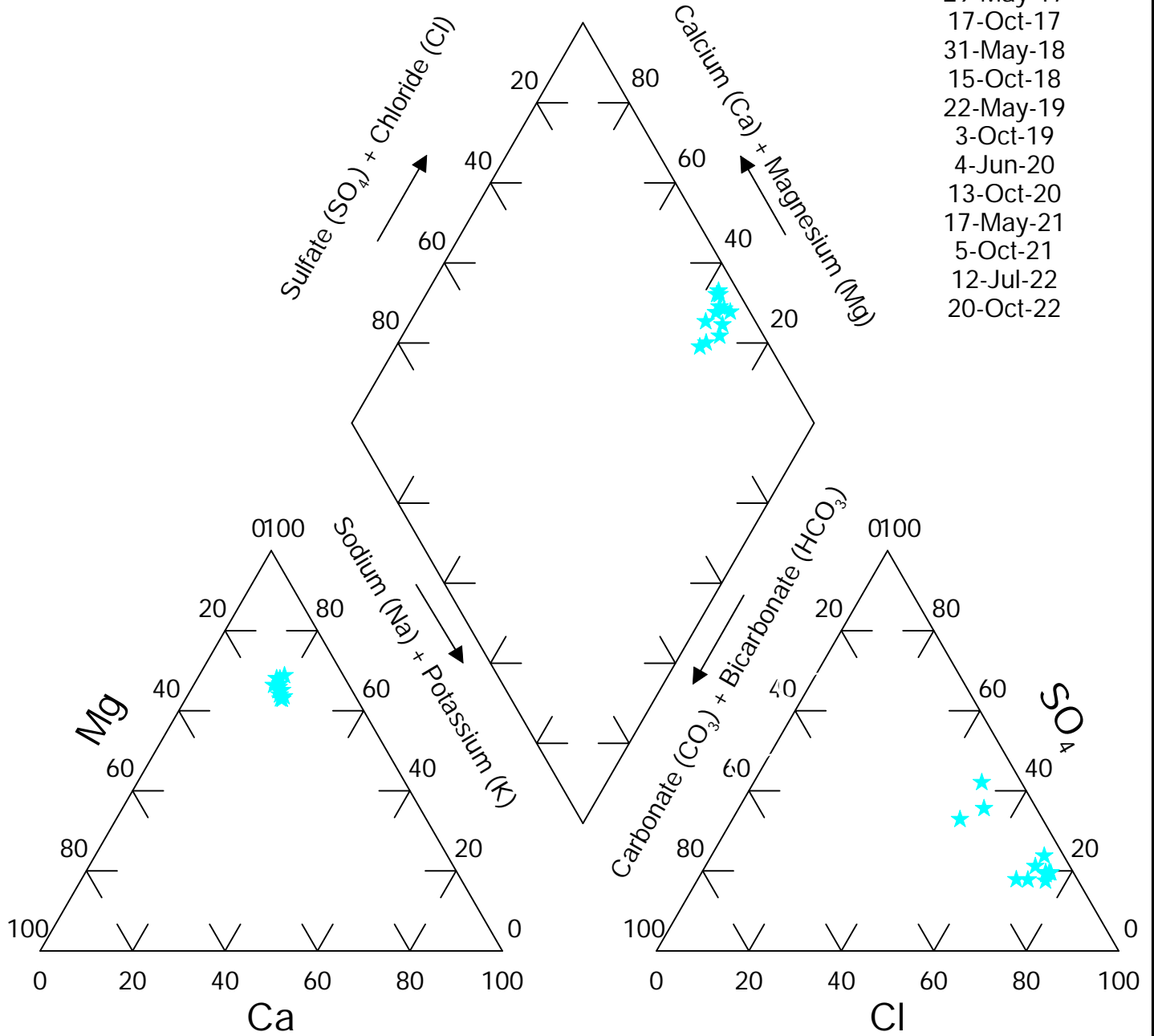


FIGURE: 11P

Site: Brady
Well #: 6N57-F/FR

Dates:
24-May-17
30-May-18
21-May-19
8-Jun-20
19-May-21
15-Jun-22

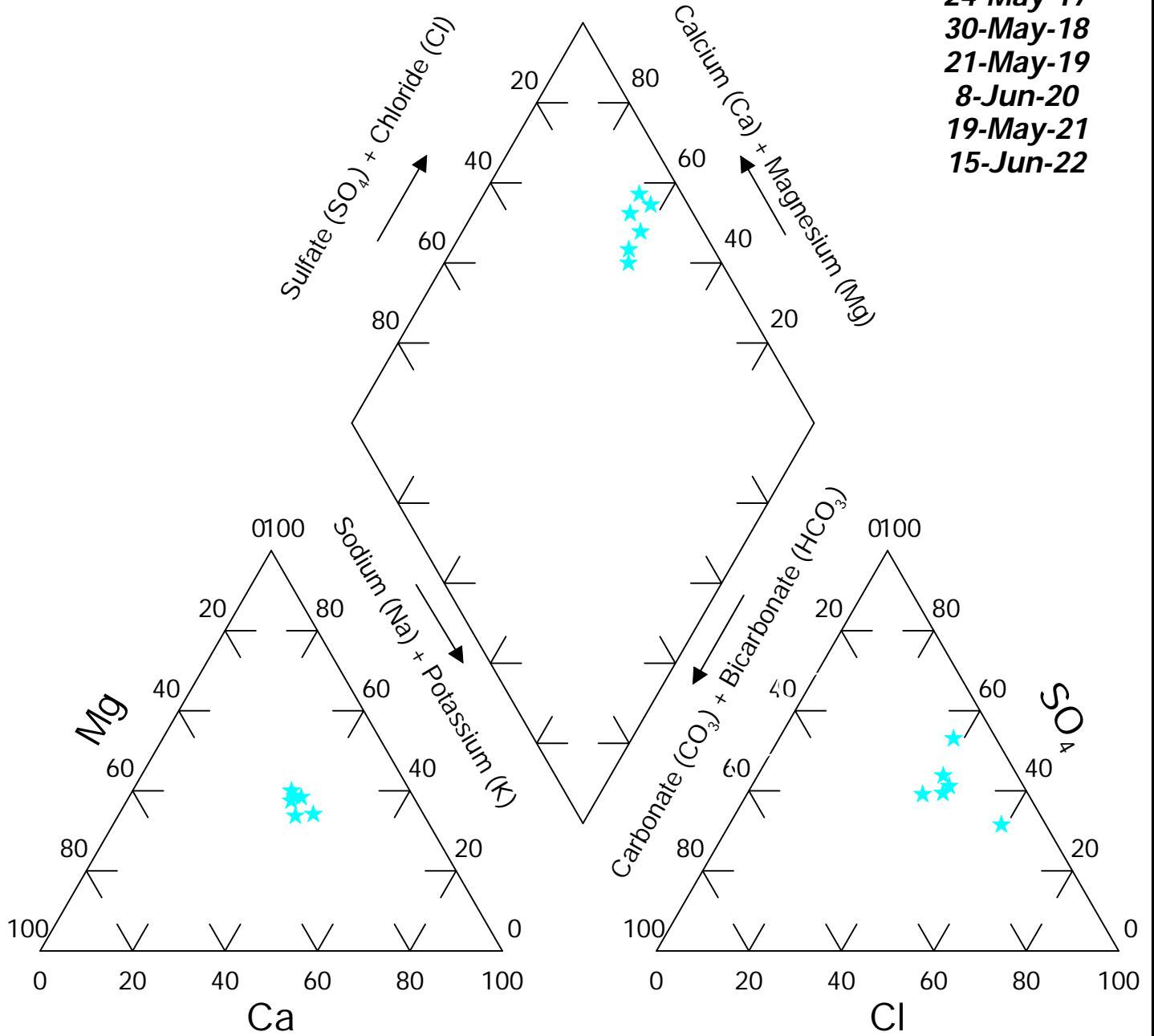
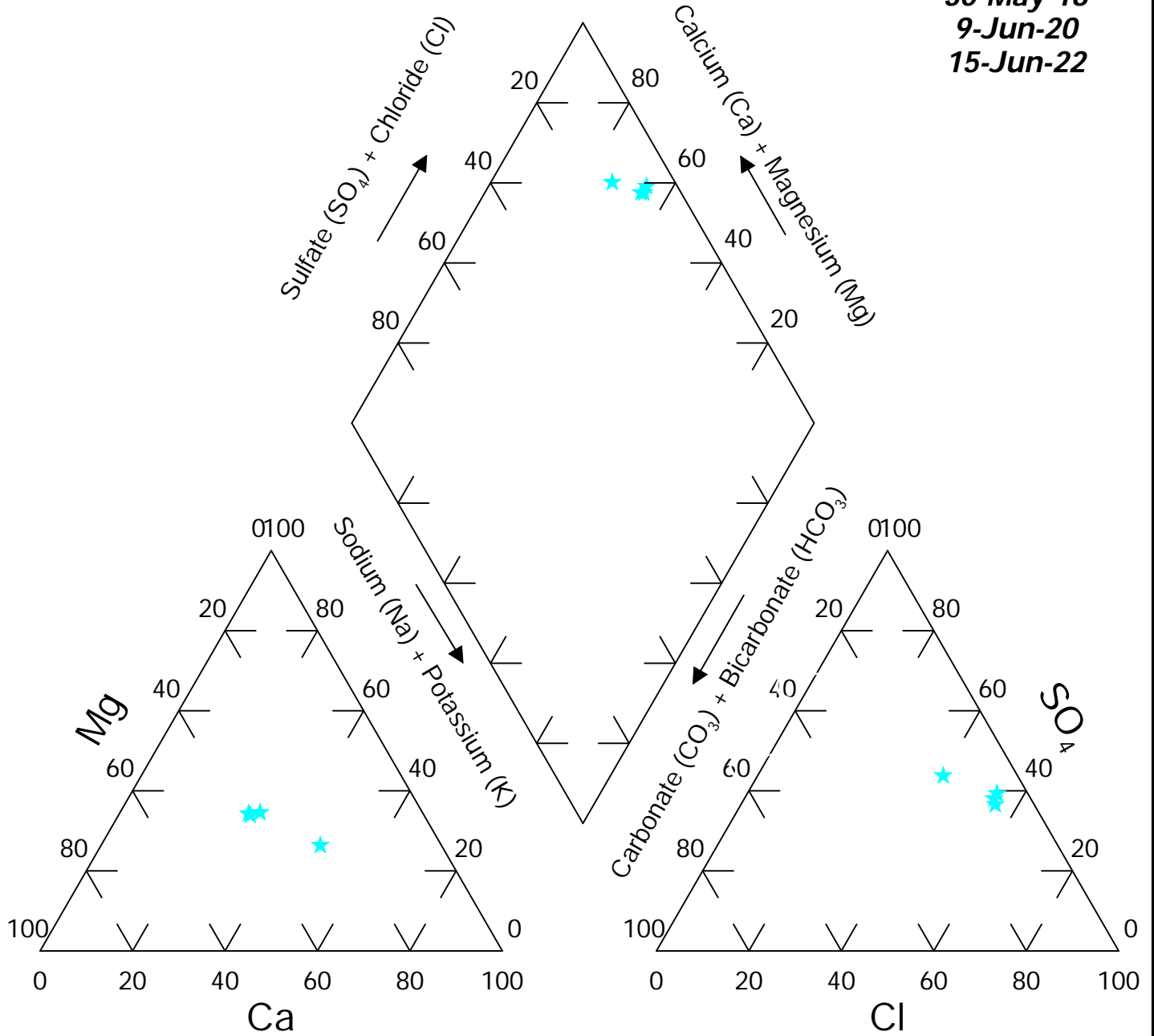


FIGURE: 12P

Site: Brady
Well #: 6N58FR

Dates:
30-May-18
9-Jun-20
15-Jun-22



Site: Brady
Well #: 6N59-F/FR

Dates:
30-May-18
9-Jun-20
15-Jun-22

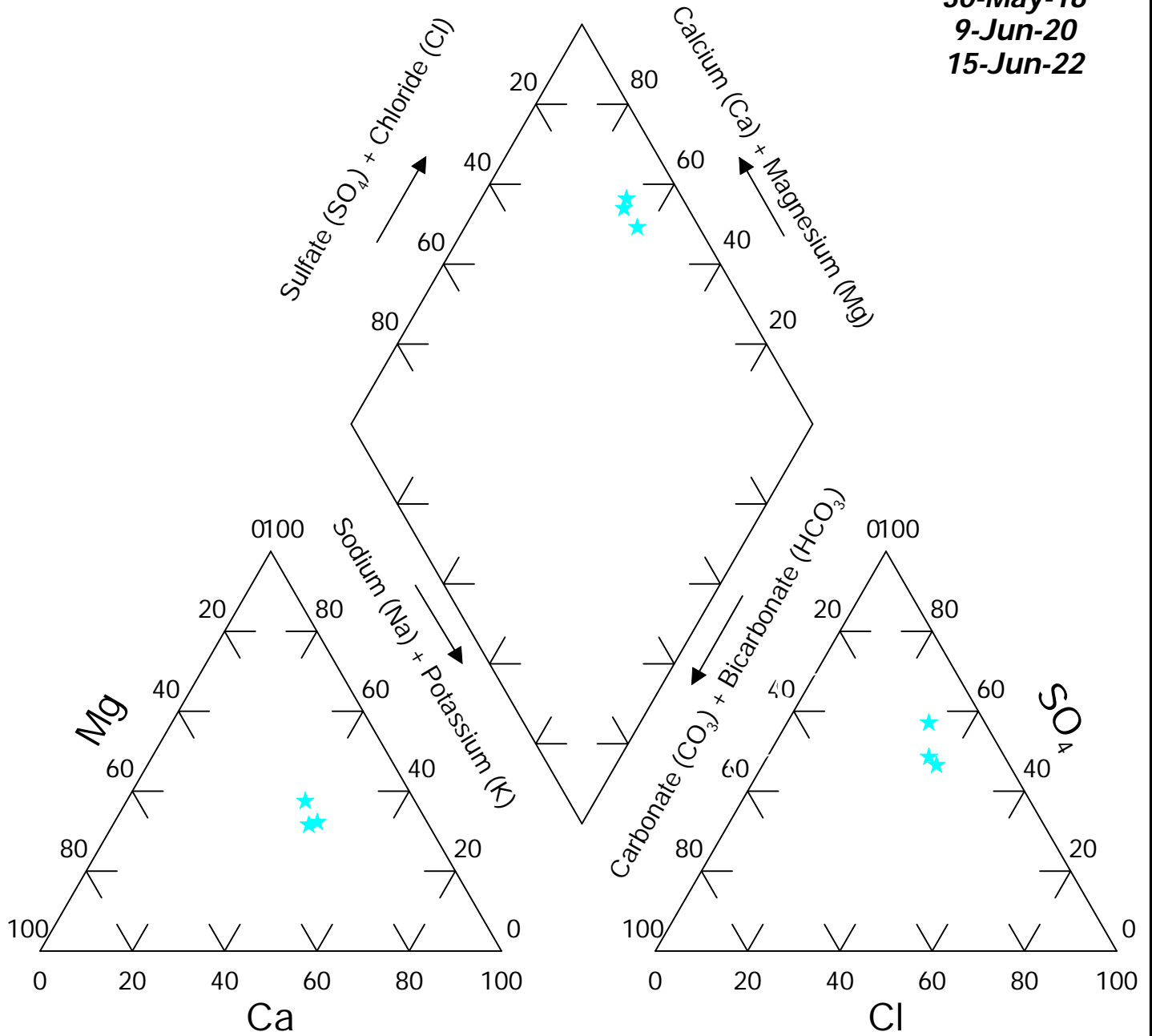


FIGURE: 14P

Site: Brady
Well #: 6N60-E/ER

Dates:
 24-May-17
 17-Oct-17
 30-May-18
 15-Oct-18
 21-May-19
 3-Oct-19
 4-Jun-20
 15-Oct-20
 17-May-21
 5-Oct-21
 12-Jul-22

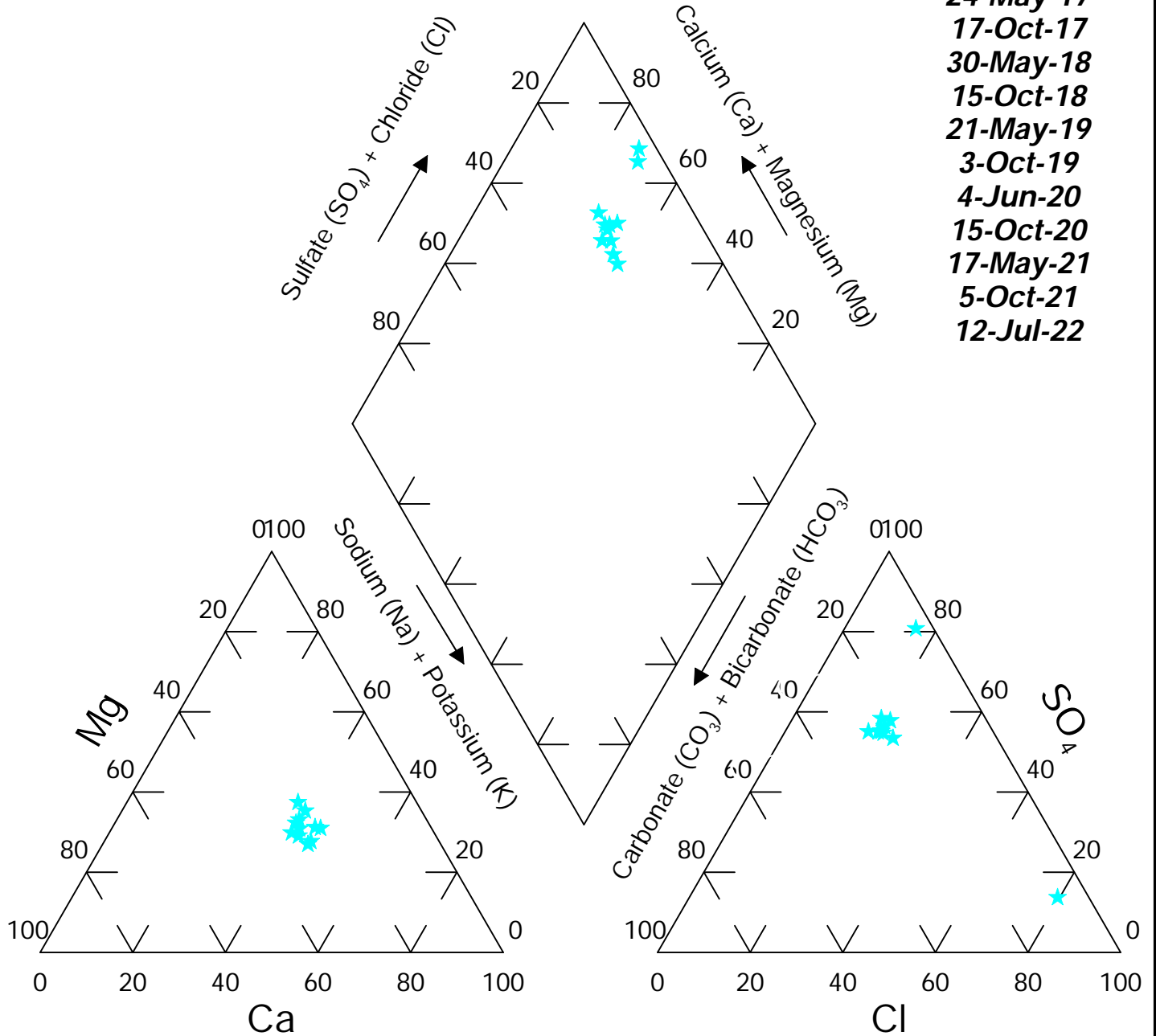


FIGURE: 15P

Site: Brady
Well #: 6N63-F

Dates:
29-May-17
31-May-18
21-May-19
10-Jun-20
18-May-21
15-Jun-22

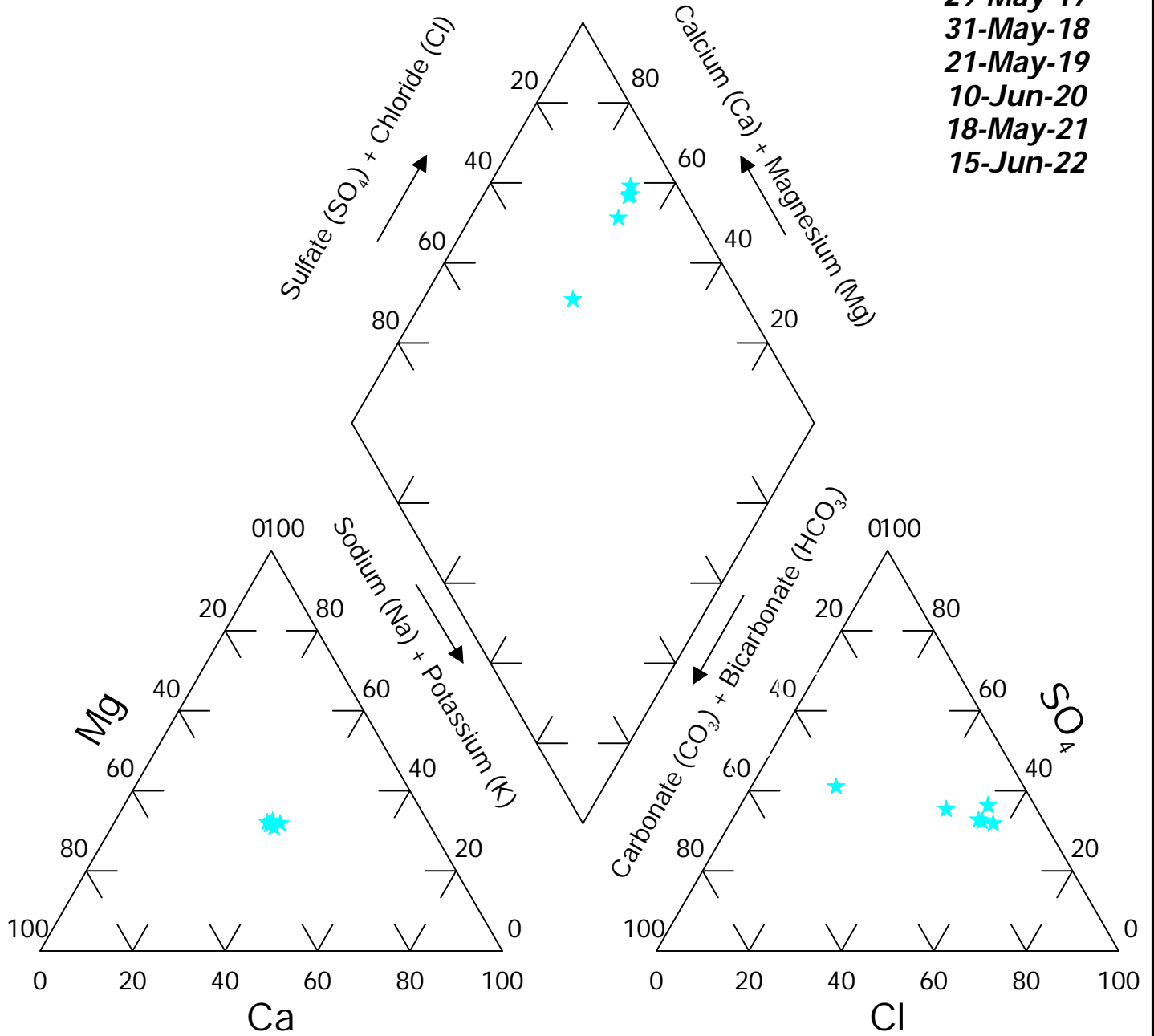


FIGURE: 16P

Site: Brady
Well #: 6N67-F

Dates:
25-May-17
30-May-18
21-May-19
9-Jun-20
18-May-21
22-Jun-22

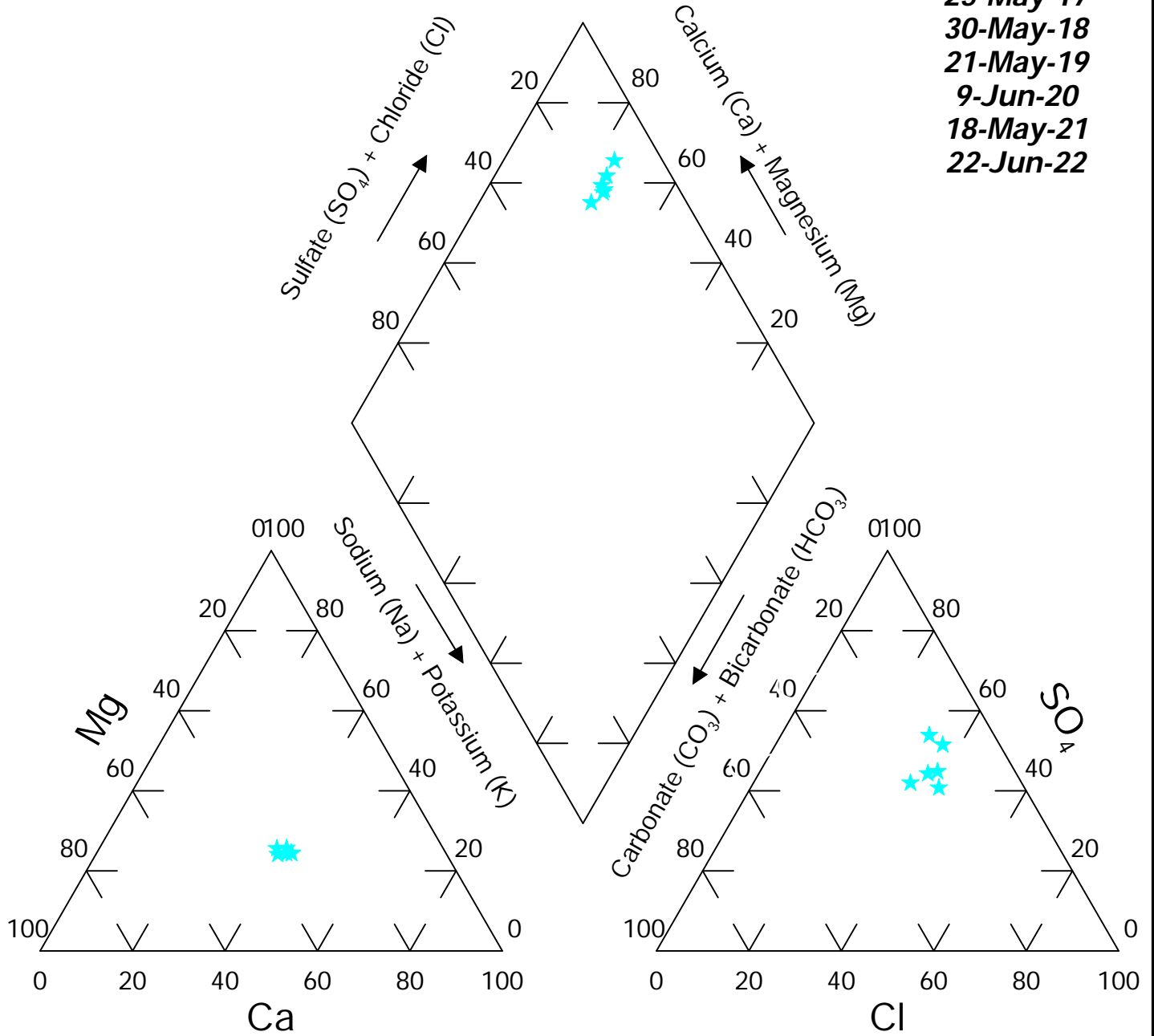
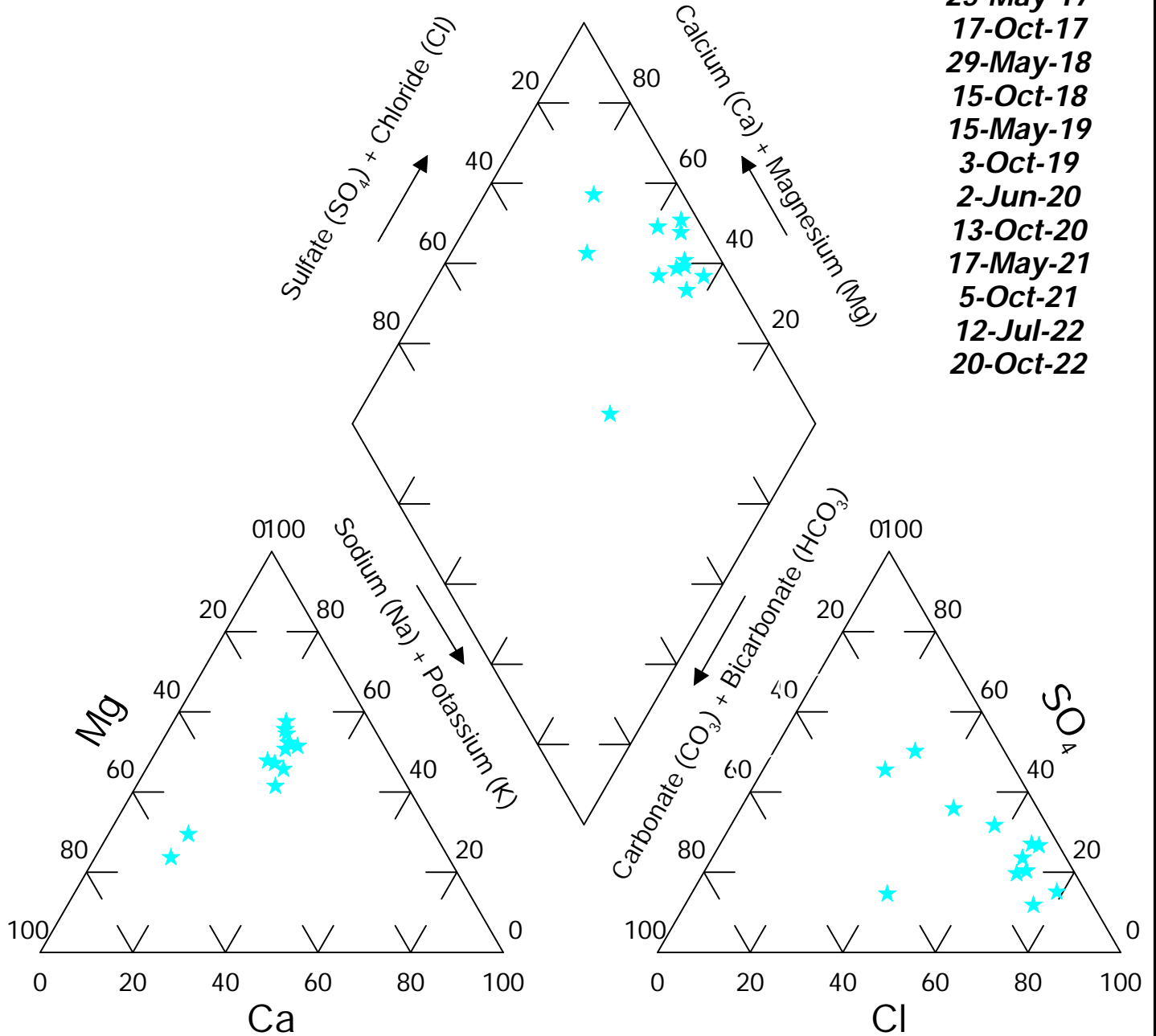


FIGURE: 17P



Site: Brady Well #: 13A

Dates:
 25-May-17
 17-Oct-17
 29-May-18
 15-Oct-18
 15-May-19
 3-Oct-19
 2-Jun-20
 13-Oct-20
 17-May-21
 5-Oct-21
 12-Jul-22
 20-Oct-22



Site: Brady Well #: 14A

Dates:
 25-May-17
 17-Oct-17
 29-May-18
 16-Oct-18
 15-May-19
 3-Oct-19
 3-Jun-20
 15-Oct-20
 17-May-21
 5-Oct-21
 12-Jul-22
 21-Oct-22

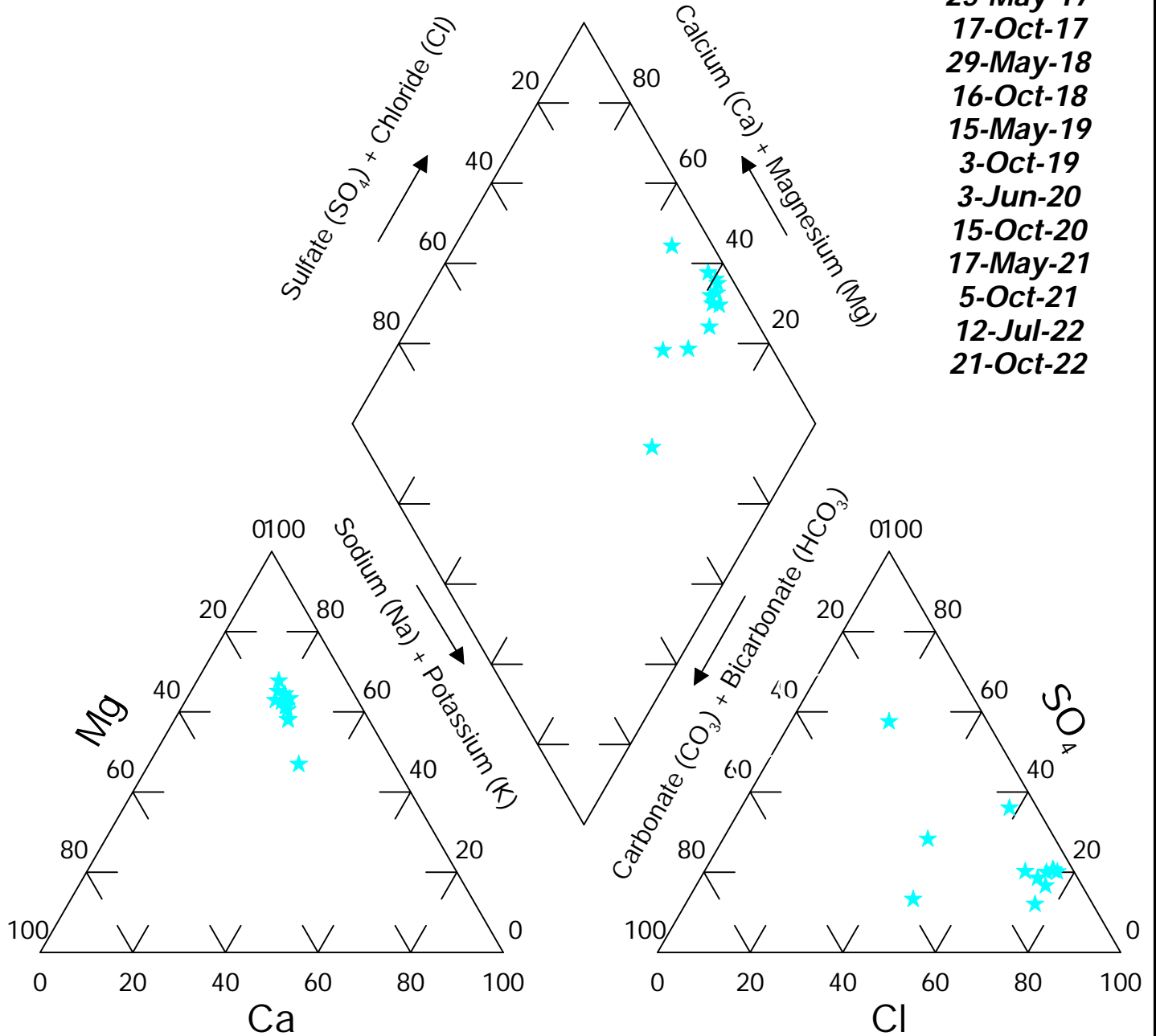
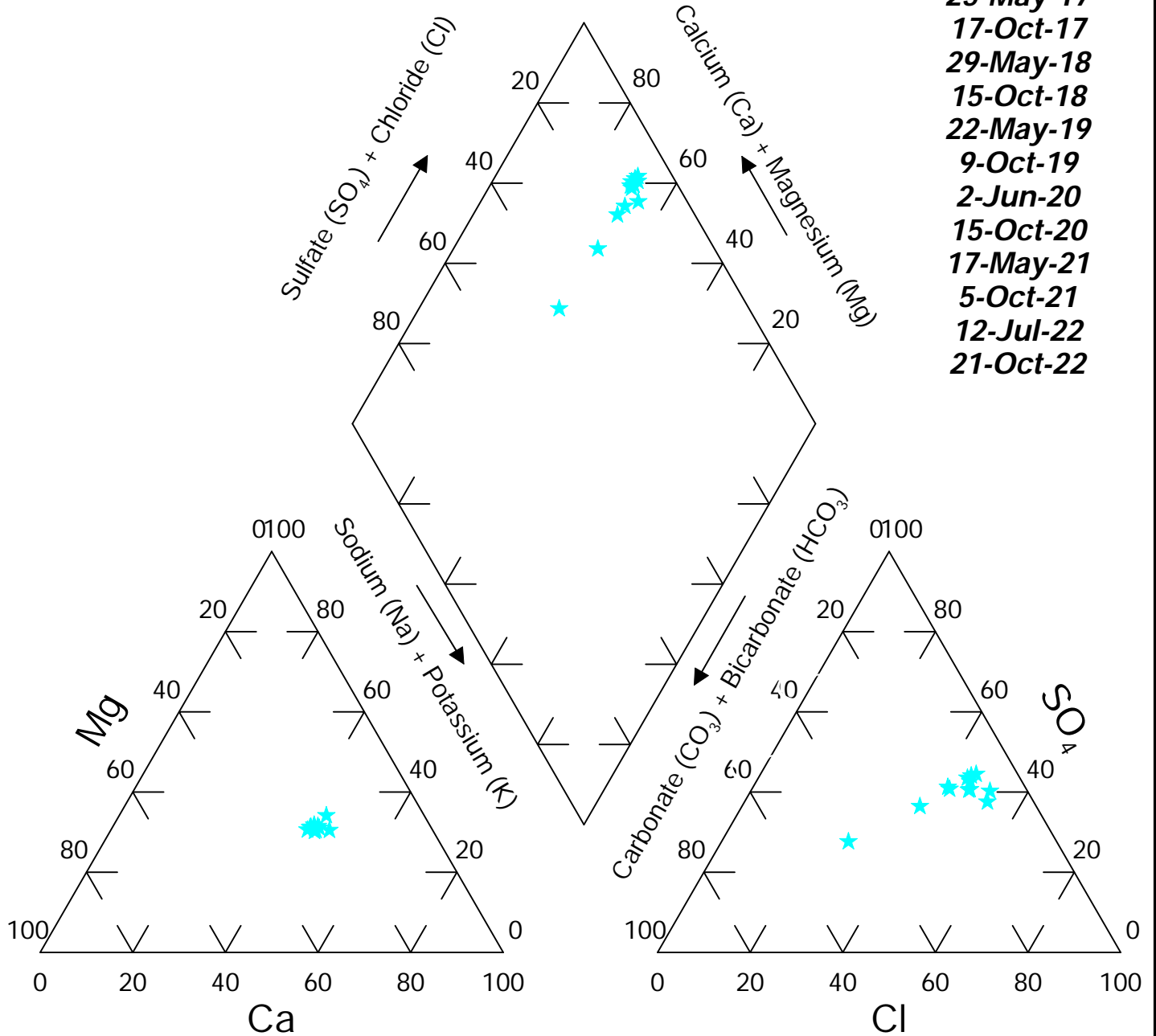


FIGURE: 13P

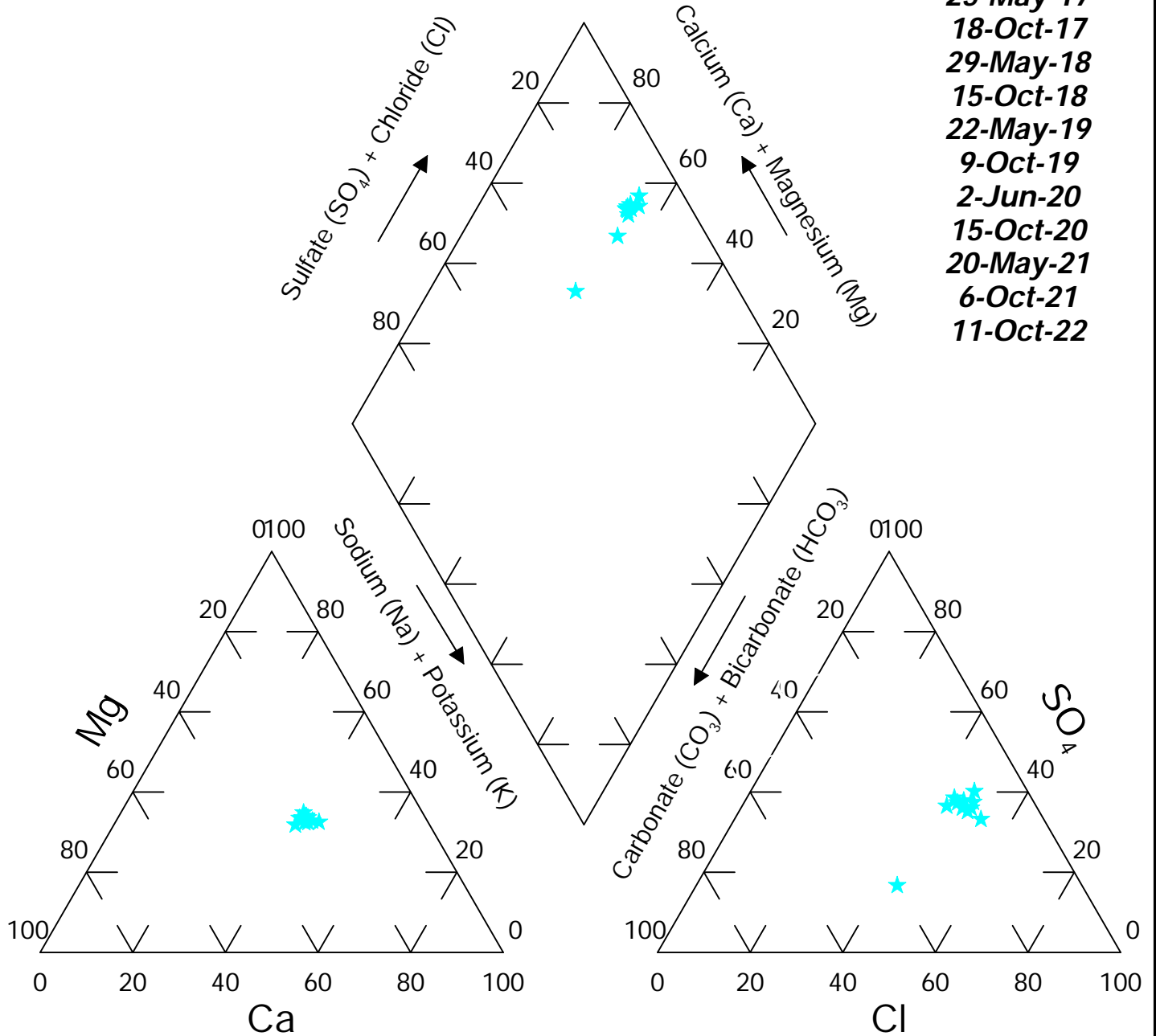
Site: Brady Well #: 15A

Dates:
 25-May-17
 17-Oct-17
 29-May-18
 15-Oct-18
 22-May-19
 9-Oct-19
 2-Jun-20
 15-Oct-20
 17-May-21
 5-Oct-21
 12-Jul-22
 21-Oct-22



Site: Brady Well #: 16A

Dates:
 25-May-17
 18-Oct-17
 29-May-18
 15-Oct-18
 22-May-19
 9-Oct-19
 2-Jun-20
 15-Oct-20
 20-May-21
 6-Oct-21
 11-Oct-22



Site: Brady Well #: W4

Dates:

- 23-May-17
- 19-Oct-17
- 24-May-18
- 16-Oct-18
- 9-May-19
- 7-Oct-19
- 28-May-20
- 20-Oct-20
- 13-May-21
- 29-Sep-21
- 23-Jun-22
- 12-Oct-22

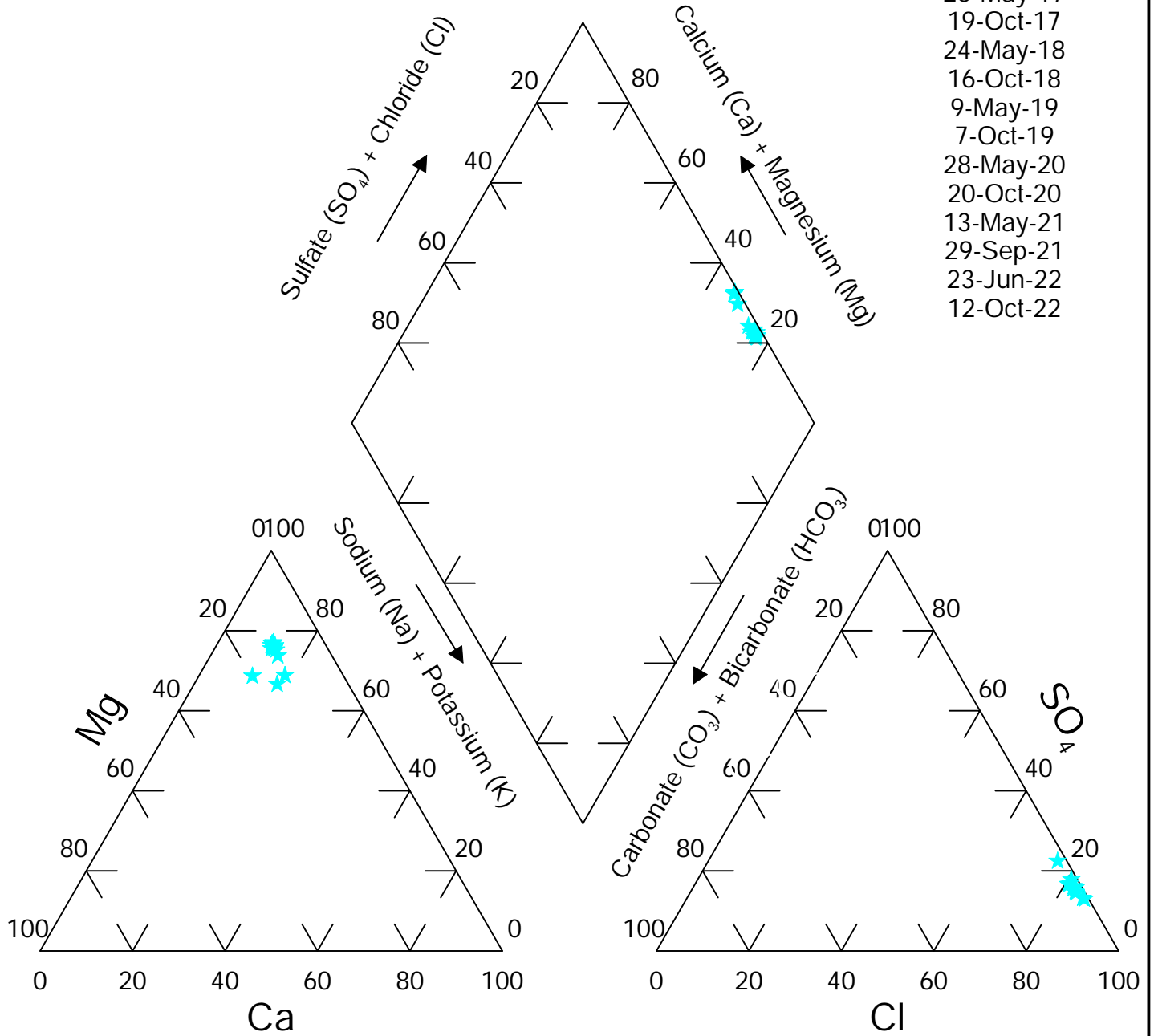


FIGURE: 1P

Site: Brady Well #: W5

Dates:
 23-May-17
 19-Oct-17
 24-May-18
 18-Oct-18
 9-May-19
 7-Oct-19
 28-May-20
 15-Oct-20
 13-May-21
 29-Sep-21
 6-Jul-22
 20-Oct-22

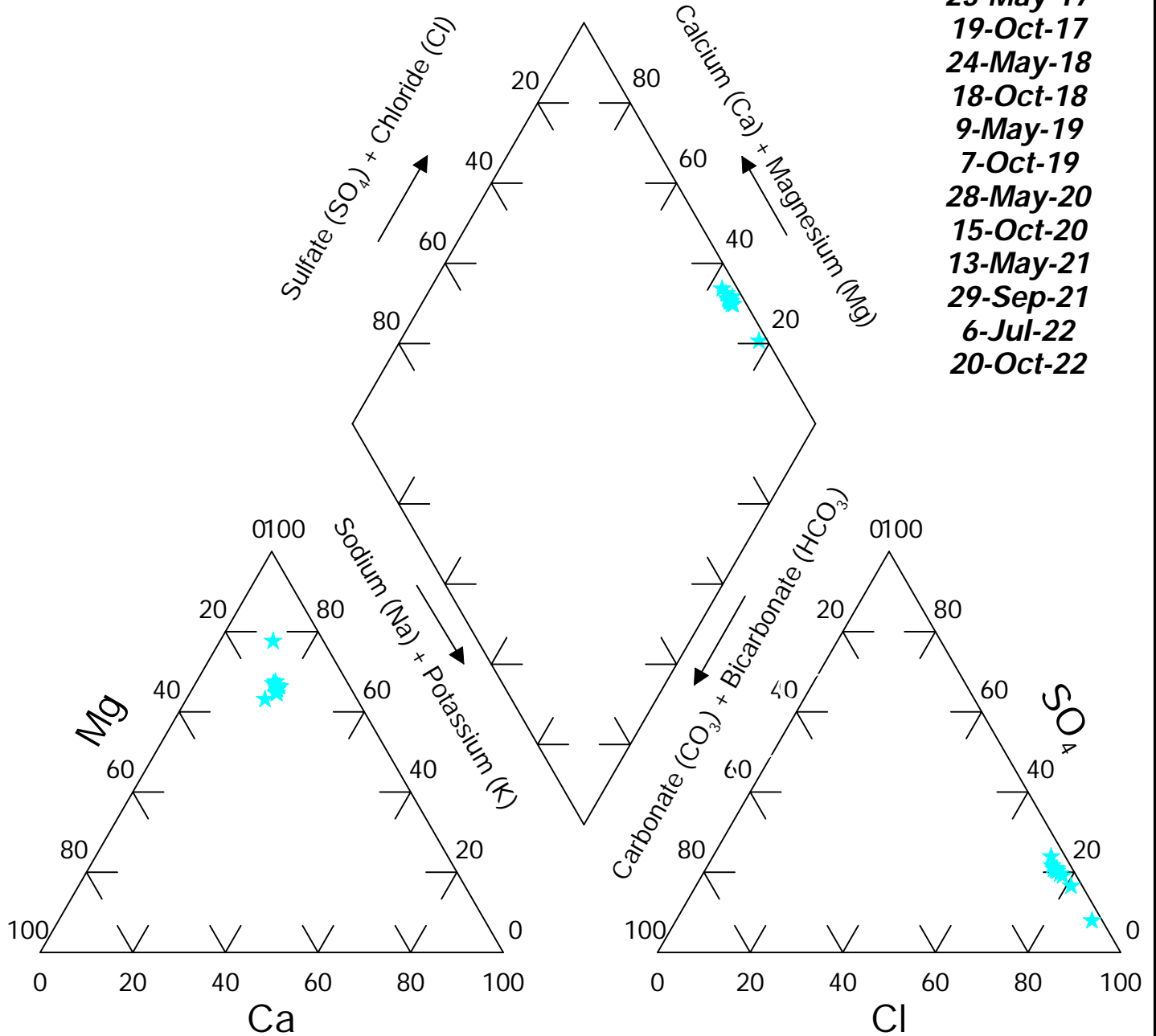


FIGURE: 2P

Site: Brady Well #: W6

Dates:

- 24-May-17
- 17-Oct-17
- 23-May-18
- 18-Oct-18
- 14-May-19
- 13-Nov-19
- 4-Jun-20
- 15-Oct-20
- 13-May-21
- 4-Oct-21
- 7-Jul-22
- 6-Oct-22

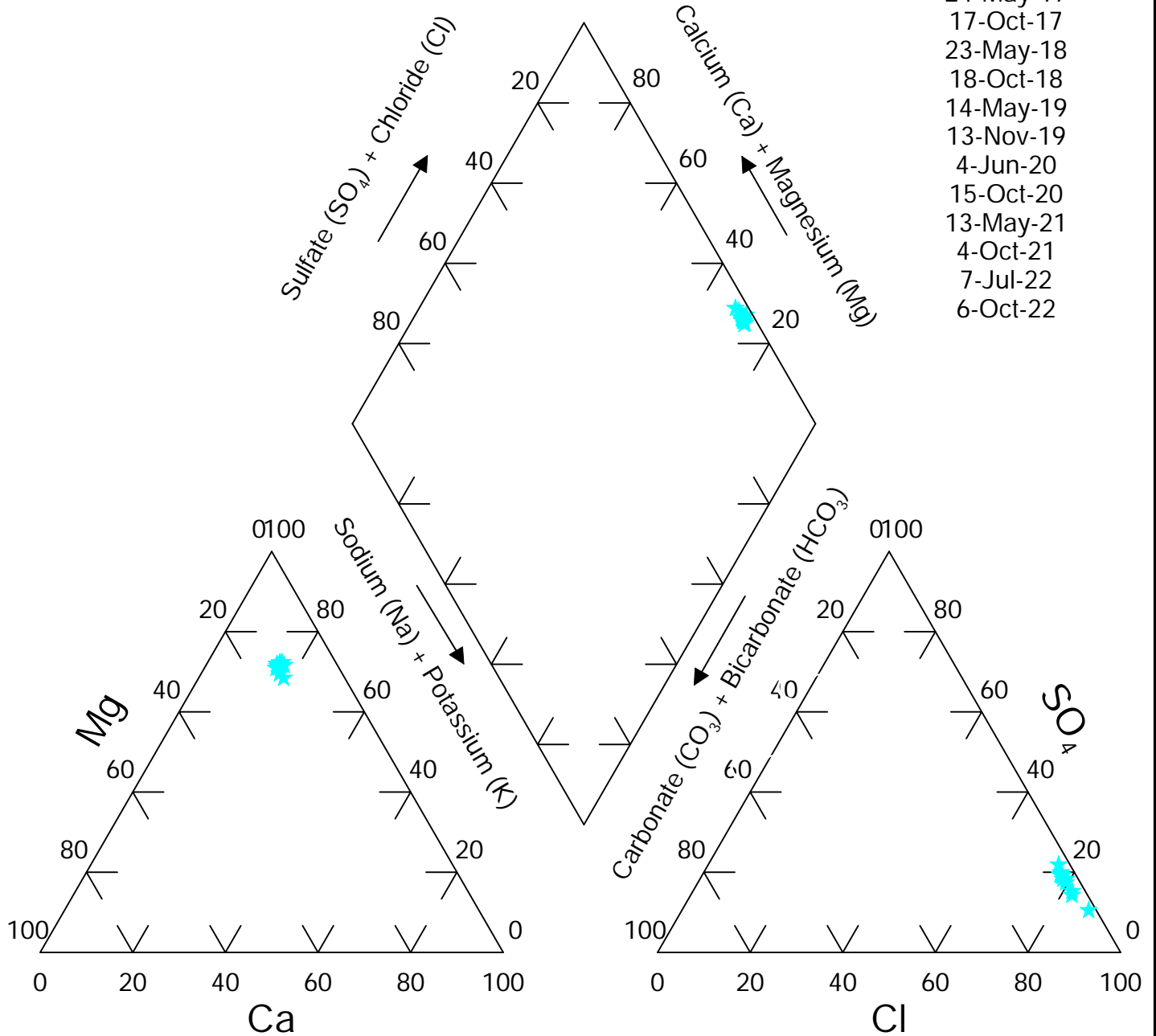


FIGURE: 3P

Site: Brady Well #: W7

Dates:
 24-May-17
 17-Oct-17
 23-May-18
 17-Oct-18
 14-May-19
 13-Nov-19
 4-Jun-20
 20-Oct-20
 13-May-21
 5-Oct-21
 23-Jun-22
 17-Oct-22

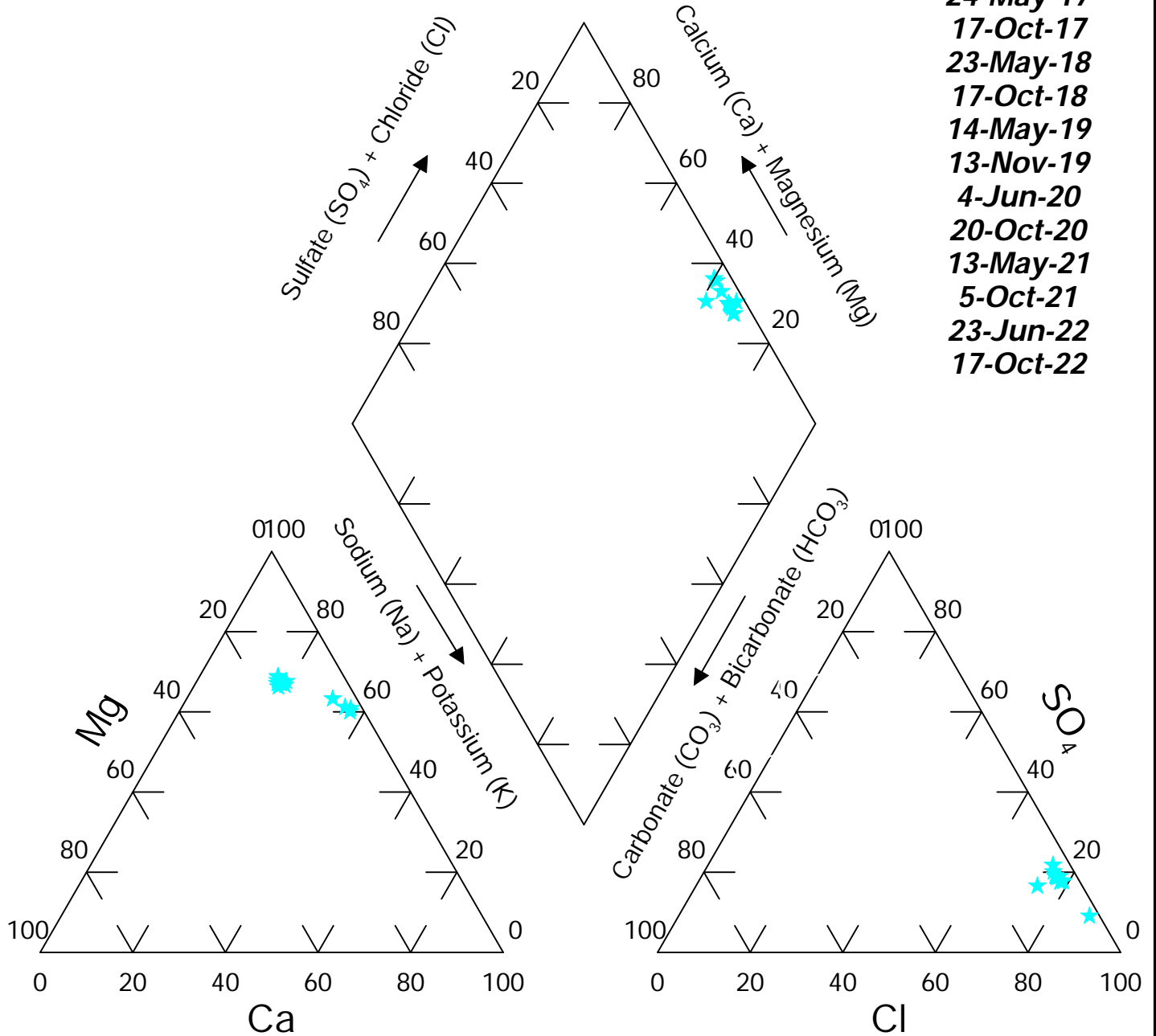


FIGURE: 4P

Site: Brady Well #: W8

Dates:
 24-May-17
 17-Oct-17
 29-May-18
 18-Oct-18
 13-May-19
 13-Nov-19
 4-Jun-20
 20-Oct-20
 13-May-21
 4-Oct-21
 29-Jun-22
 4-Oct-22

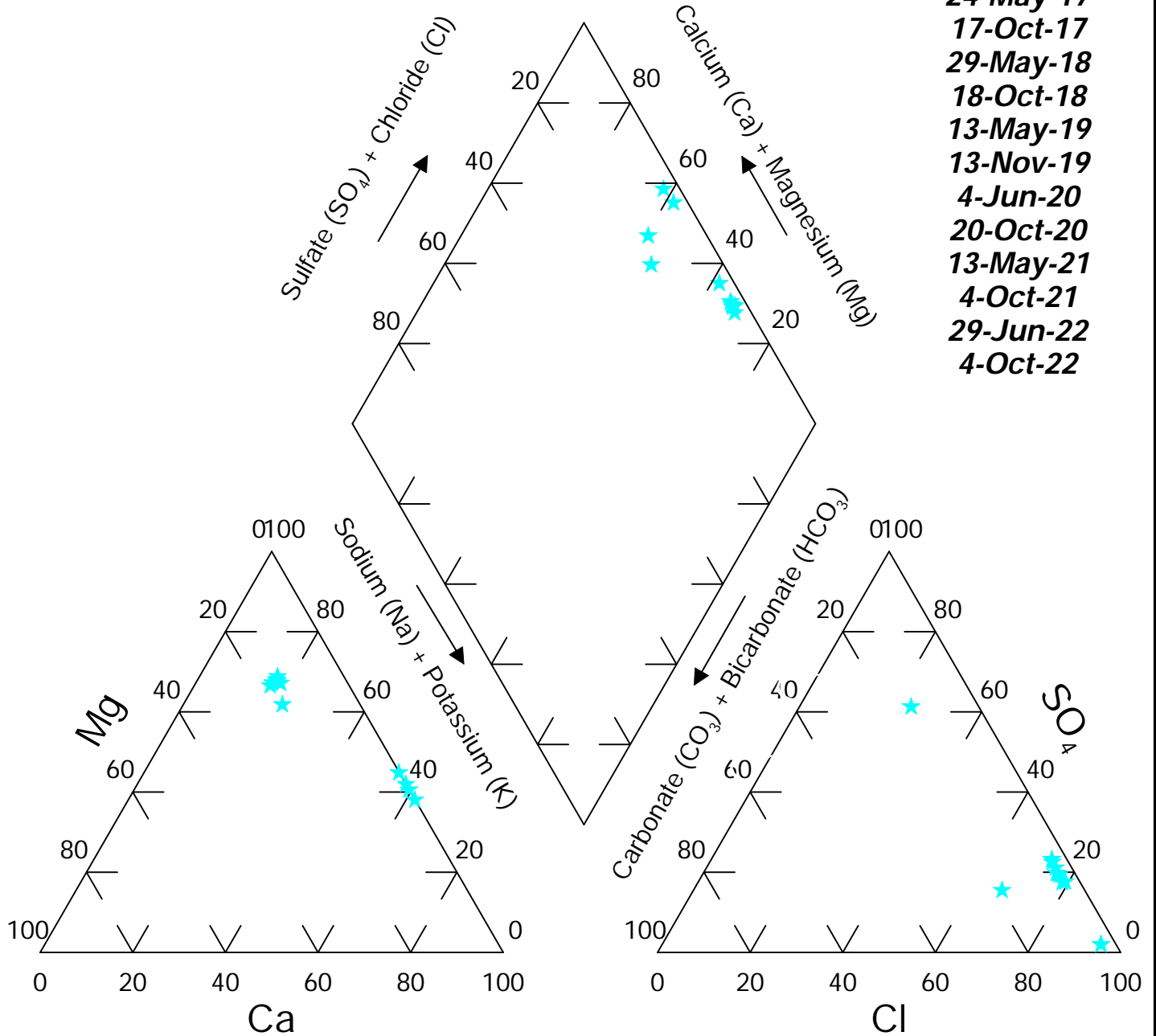


FIGURE: 5P

Site: Brady Well #: W9

Dates:
 23-May-17
 18-Oct-17
 24-May-18
 18-Oct-18
 15-May-19
 8-Oct-19
 4-Jun-20
 20-Oct-20
 12-May-21
 5-Oct-21
 22-Jun-22
 12-Oct-22

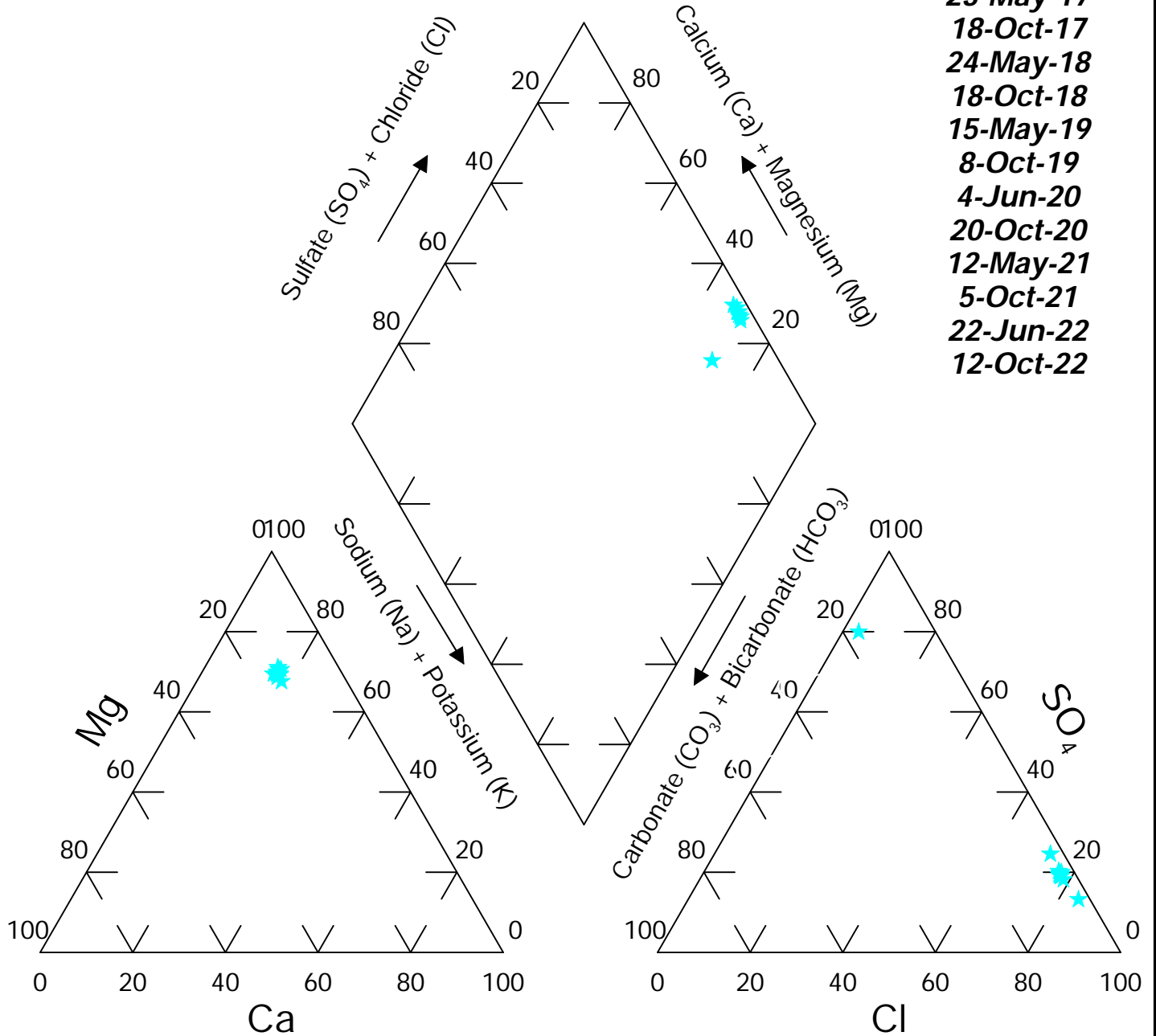


FIGURE: 6P

Site: Brady Well #: W10/W10R

Dates:

- 23-May-17
- 18-Oct-17
- 24-May-18
- 16-Oct-18
- 15-May-19
- 8-Oct-19
- 27-May-20
- 23-Jul-20
- 14-Oct-20
- 12-Mar-21
- 4-Oct-21
- 22-Jun-22
- 6-Oct-22

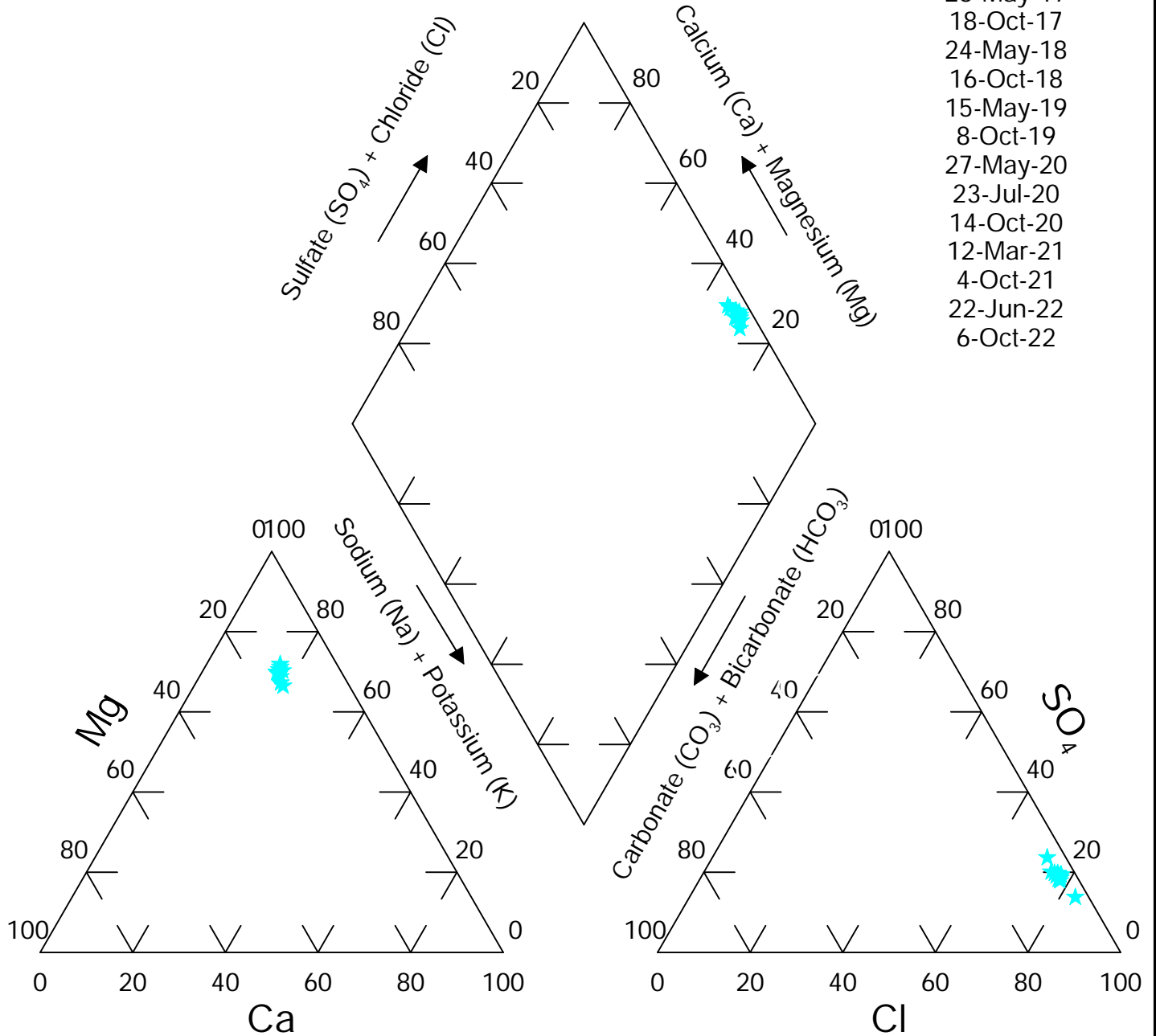


FIGURE: 7P

Site: Brady Well #: W11

Dates:

- 23-May-17
- 18-Oct-17
- 24-May-18
- 17-Oct-18
- 15-May-19
- 8-Oct-19
- 12-May-21
- 4-Oct-21
- 6-Jul-22
- 4-Oct-22

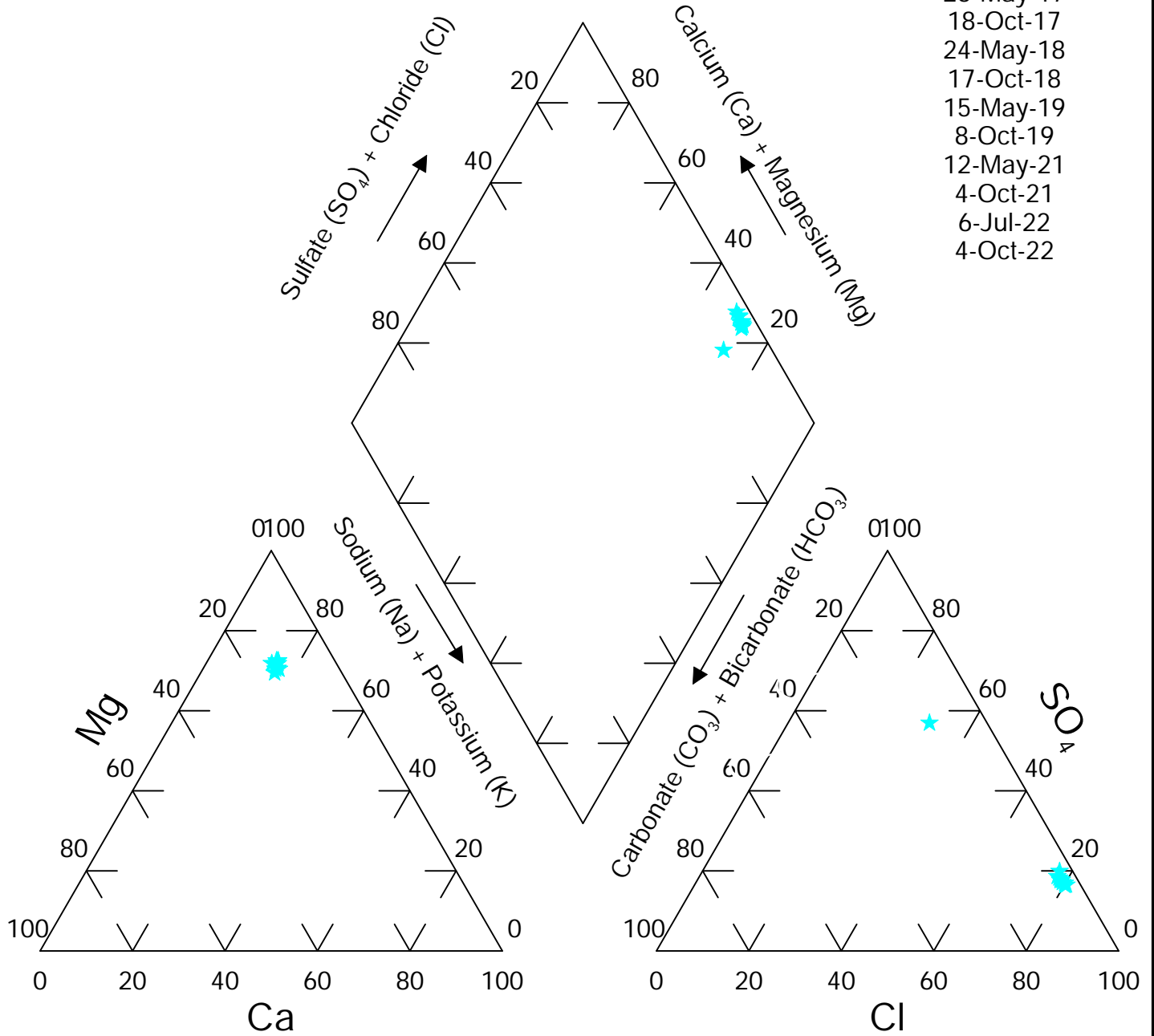


FIGURE: 8P

Site: Brady Well #: W12

Dates:

- 25-May-17
- 17-Oct-17
- 24-May-18
- 17-Oct-18
- 15-May-19
- 14-Oct-19
- 24-May-20
- 14-Oct-20
- 12-May-21
- 4-Oct-21
- 7-Jul-22
- 19-Oct-22

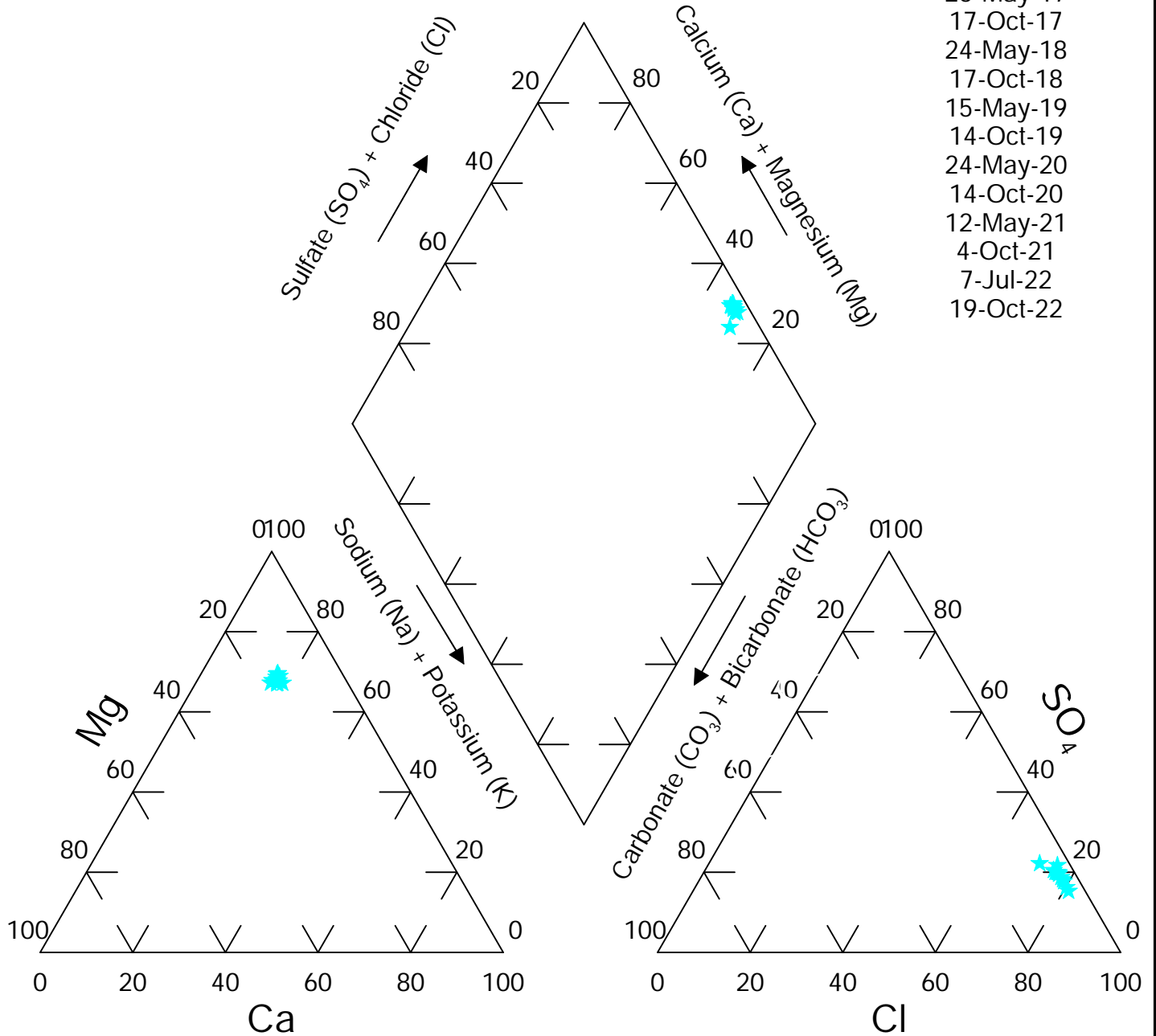


FIGURE: 9P

Site: Brady Location : W13

Dates:
 24-May-17
 16-Oct-17
 28-May-18
 17-Oct-18
 13-May-19
 8-Oct-19
 2-Jun-20
 20-Oct-20
 12-May-21
 29-Sep-21
 7-Jul-22
 4-Oct-22

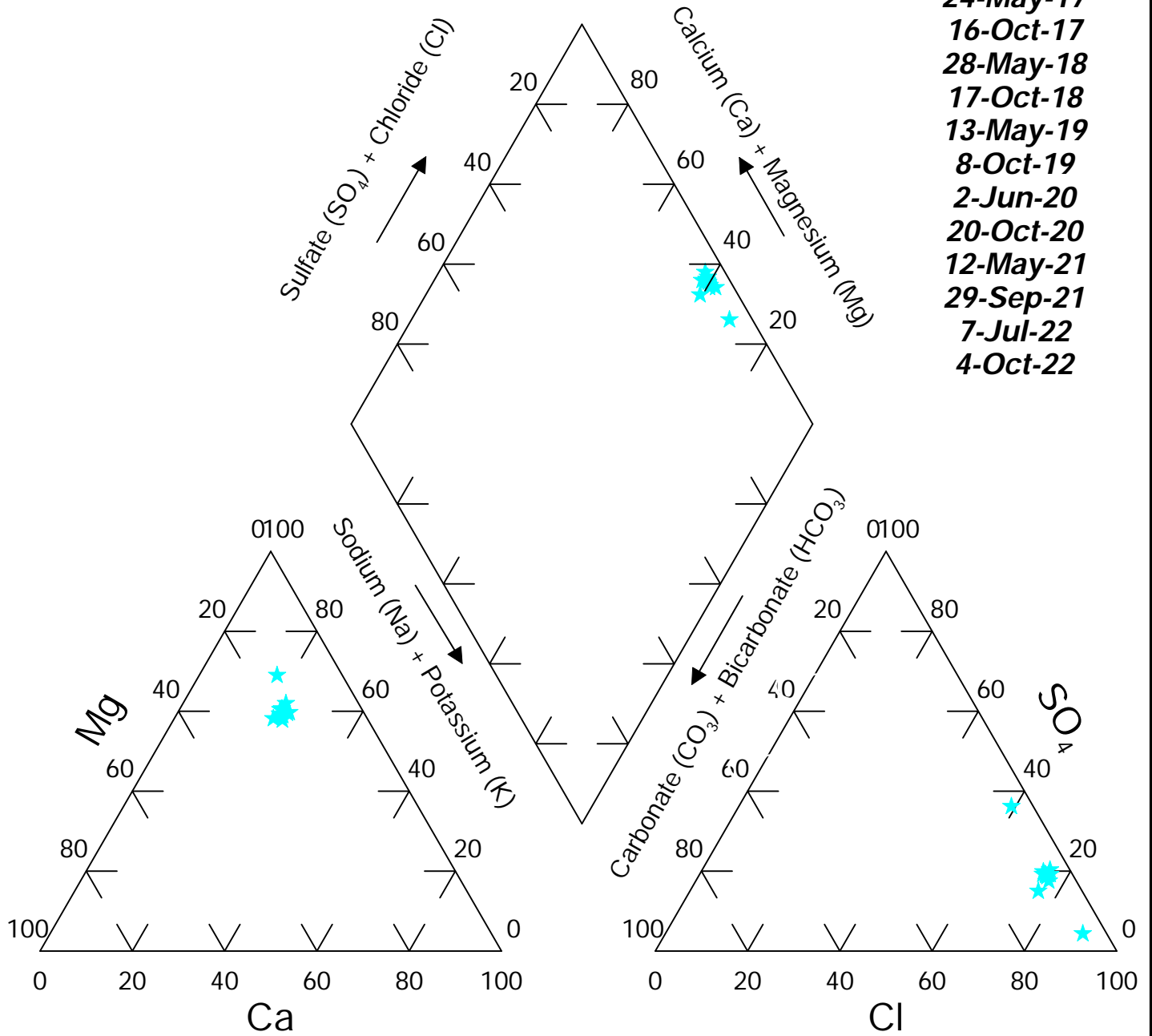


FIGURE: 1z

Site: Brady

Location : GWQ25-W14

Dates:
 25-May-17
 16-Oct-17
 28-May-18
 18-Oct-18
 15-May-19
 13-Nov-19
 3-Jun-20
 15-Oct-20
 12-May-21
 4-Oct-21
 7-Jul-22
 11-Oct-22

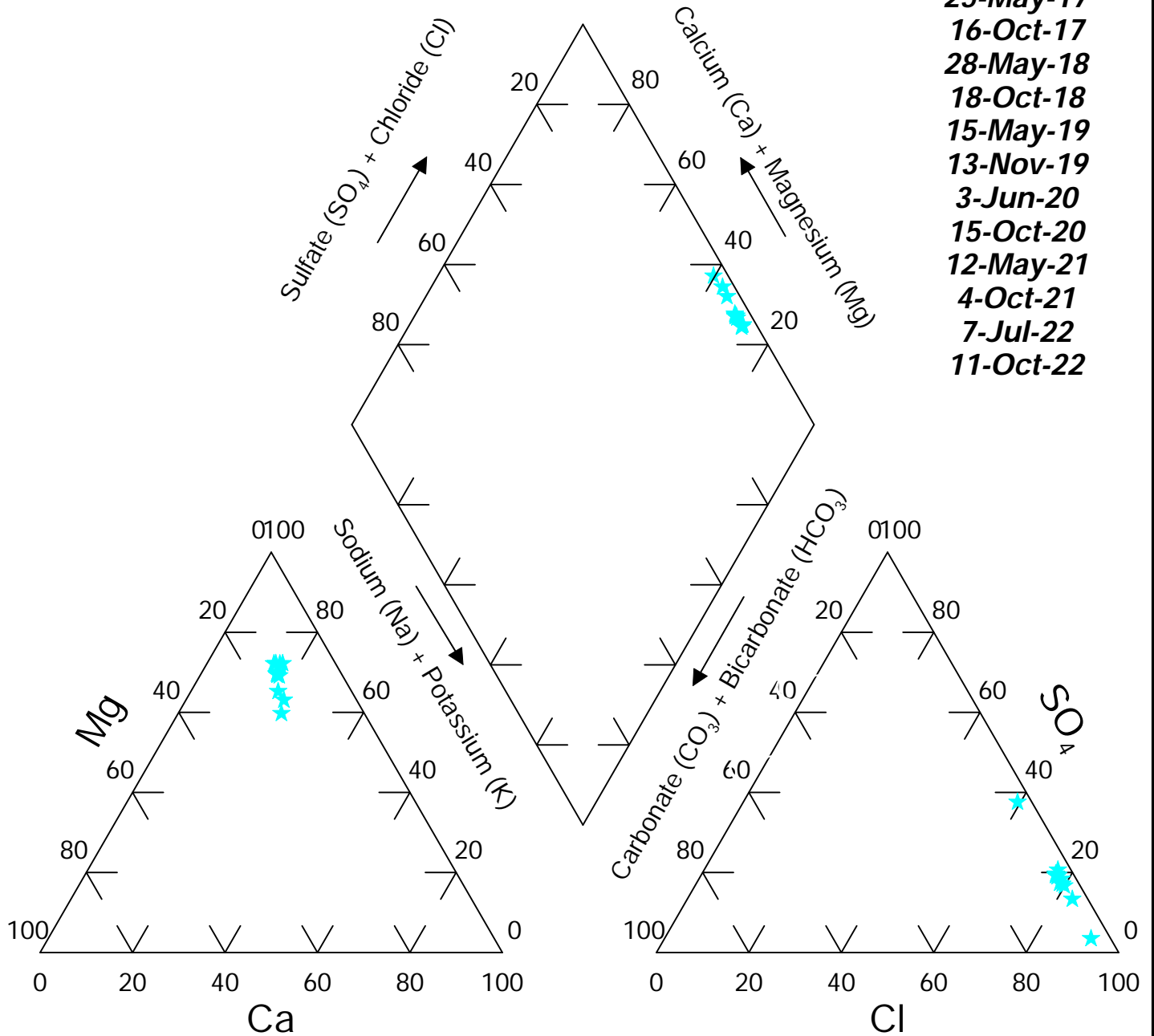


FIGURE: 2z

Site: Brady

Location : GWQ25-W15

Dates:
 25-May-17
 16-Oct-17
 28-May-18
 22-Oct-18
 15-May-19
 13-Oct-19
 2-Jun-20
 20-Oct-20
 12-May-21
 29-Sep-21
 8-Jul-22
 11-Oct-22

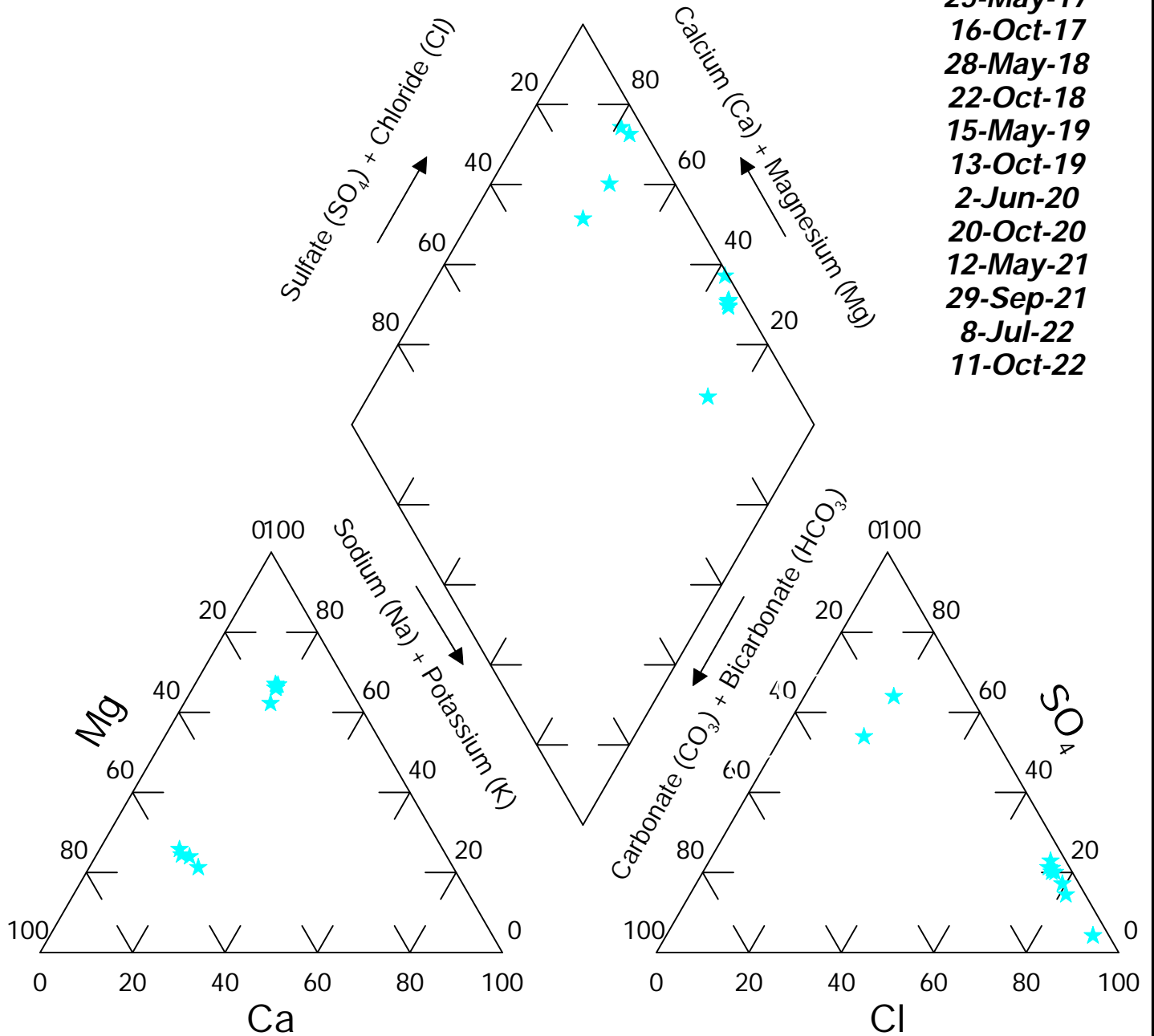


FIGURE: 3z

Site: Brady

Location : GWQ25-W16

- Dates:**
- 25-May-17
 - 16-Oct-17
 - 28-May-18
 - 22-Oct-18
 - 15-May-19
 - 8-Dec-19
 - 2-Jun-20
 - 21-Oct-20
 - 12-May-21
 - 29-Sep-21
 - 30-Jun-22
 - 19-Oct-22

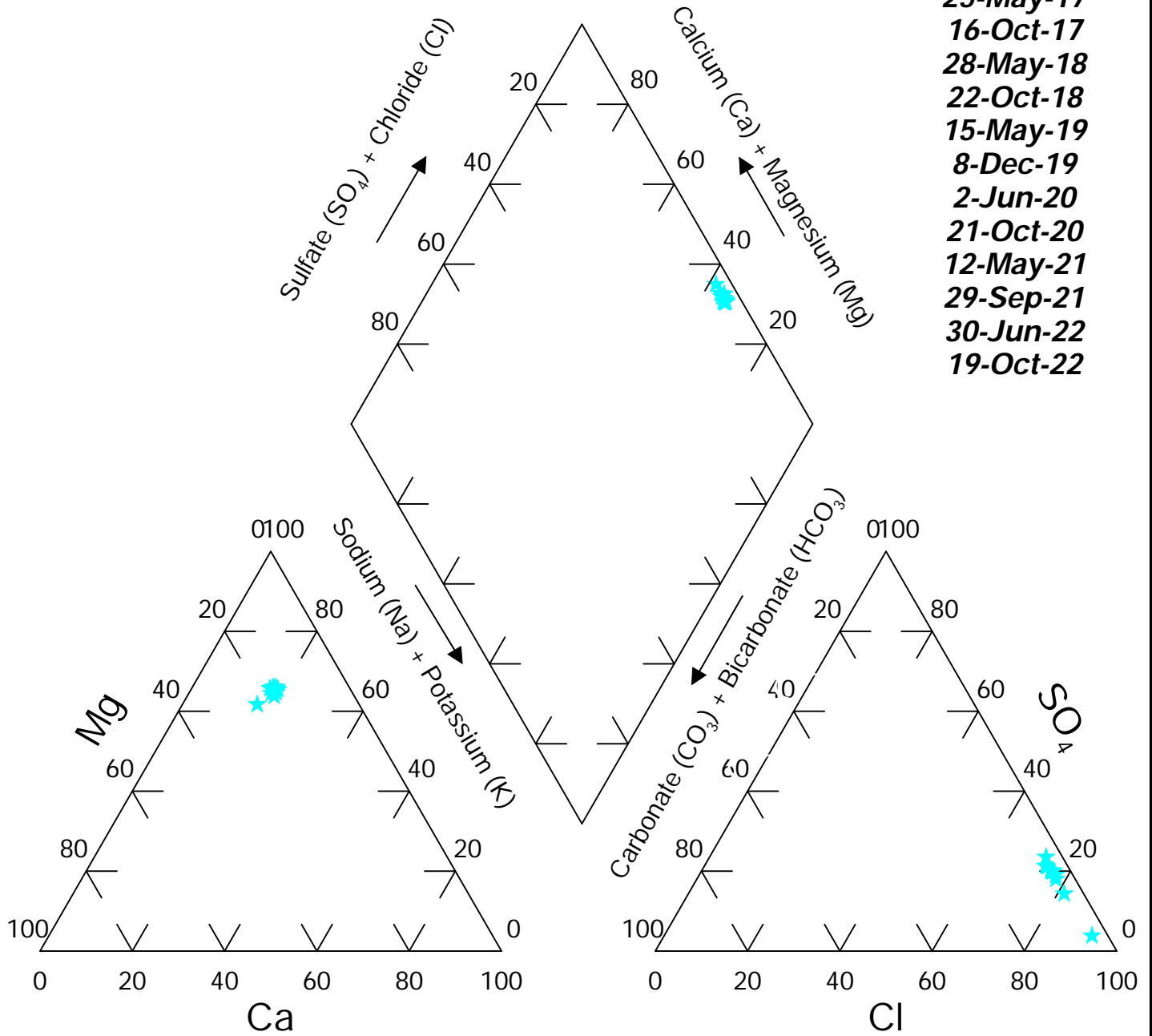


FIGURE: 4z

**2022 LEACHATE
PIPER DIAGRAMS**

Site: Brady
Location: MH3

Dates:
26-Sep-17
31-Jul-18
11-Sep-19
8-Sep-20
10-Aug-21
9-Sep-22

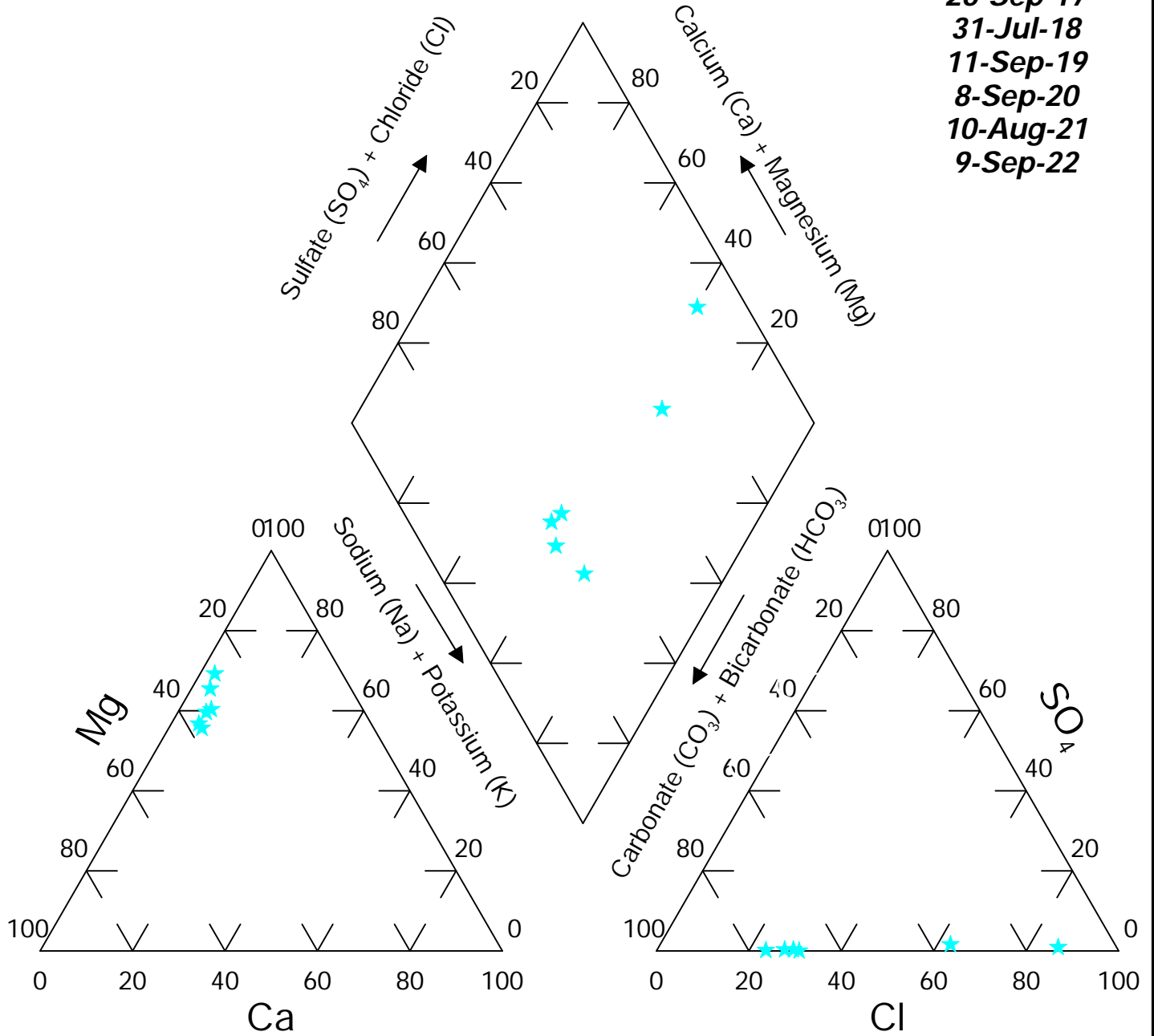


FIGURE: 18P

Site: Brady Location: MH8

Dates:
 26-Sep-17
 31-Jul-18
 11-Sep-19
 9-Sep-20
 10-Aug-21
 8-Sep-22

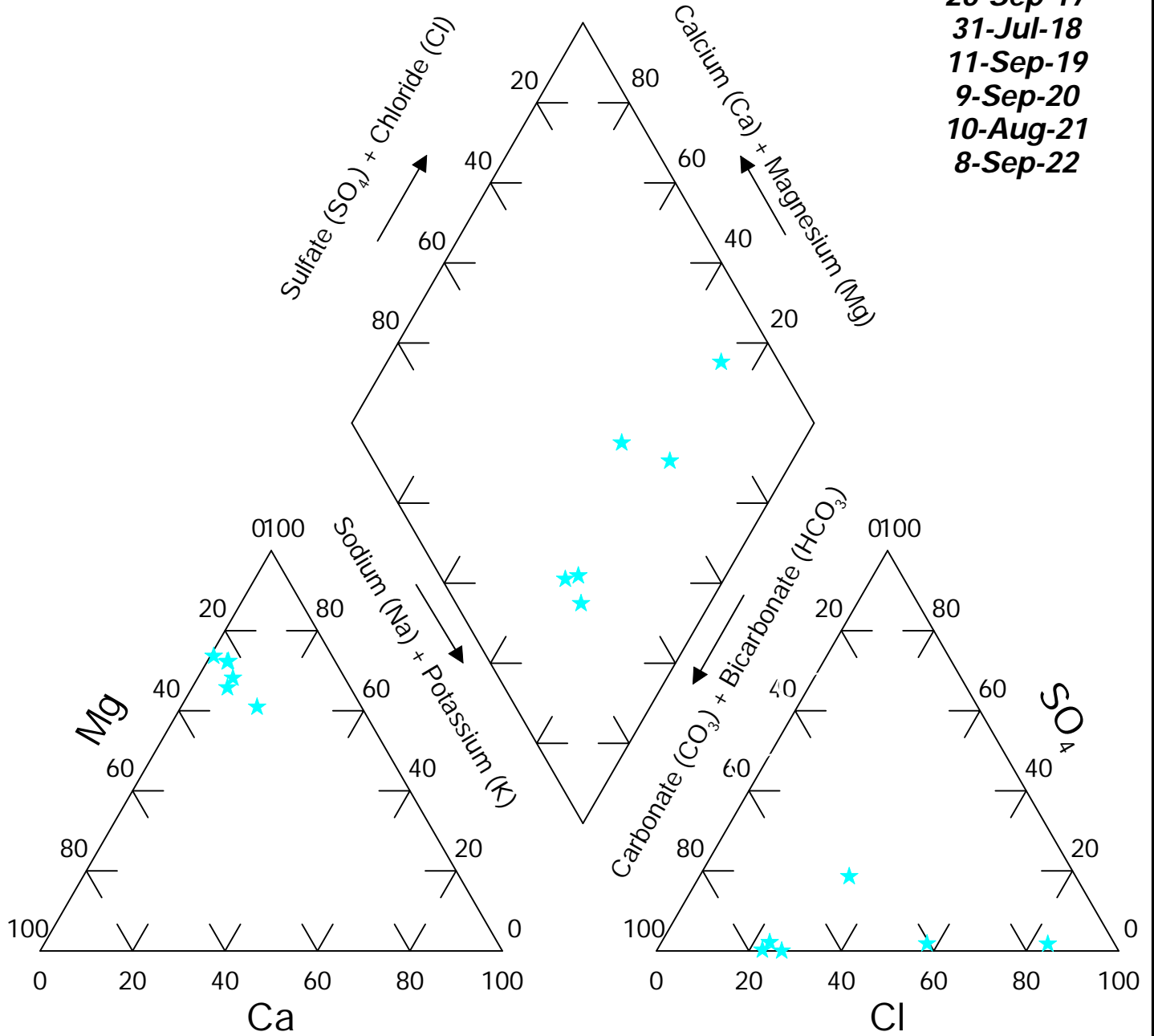


FIGURE: 19P

Site: Brady Location: MH13

Dates:
 26-Sep-17
 31-Jul-18
 12-Sep-19
 8-Sep-20
 10-Aug-21
 8-Sep-22

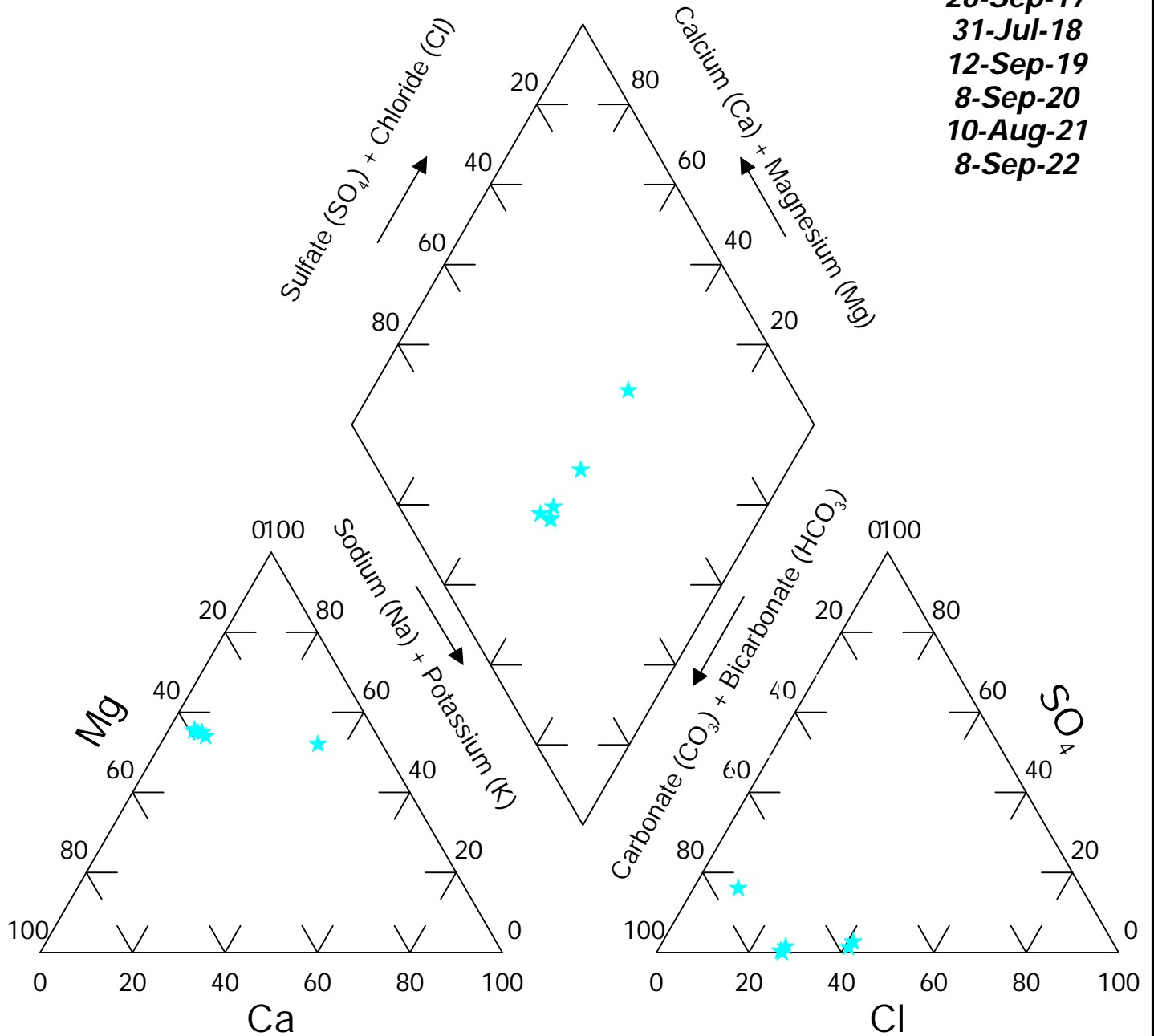


FIGURE: 20P

Site: Brady
Location: MH24

Dates:
26-Sep-17
31-Jul-18
11-Sep-19
8-Sep-20
10-Aug-21
8-Sep-22

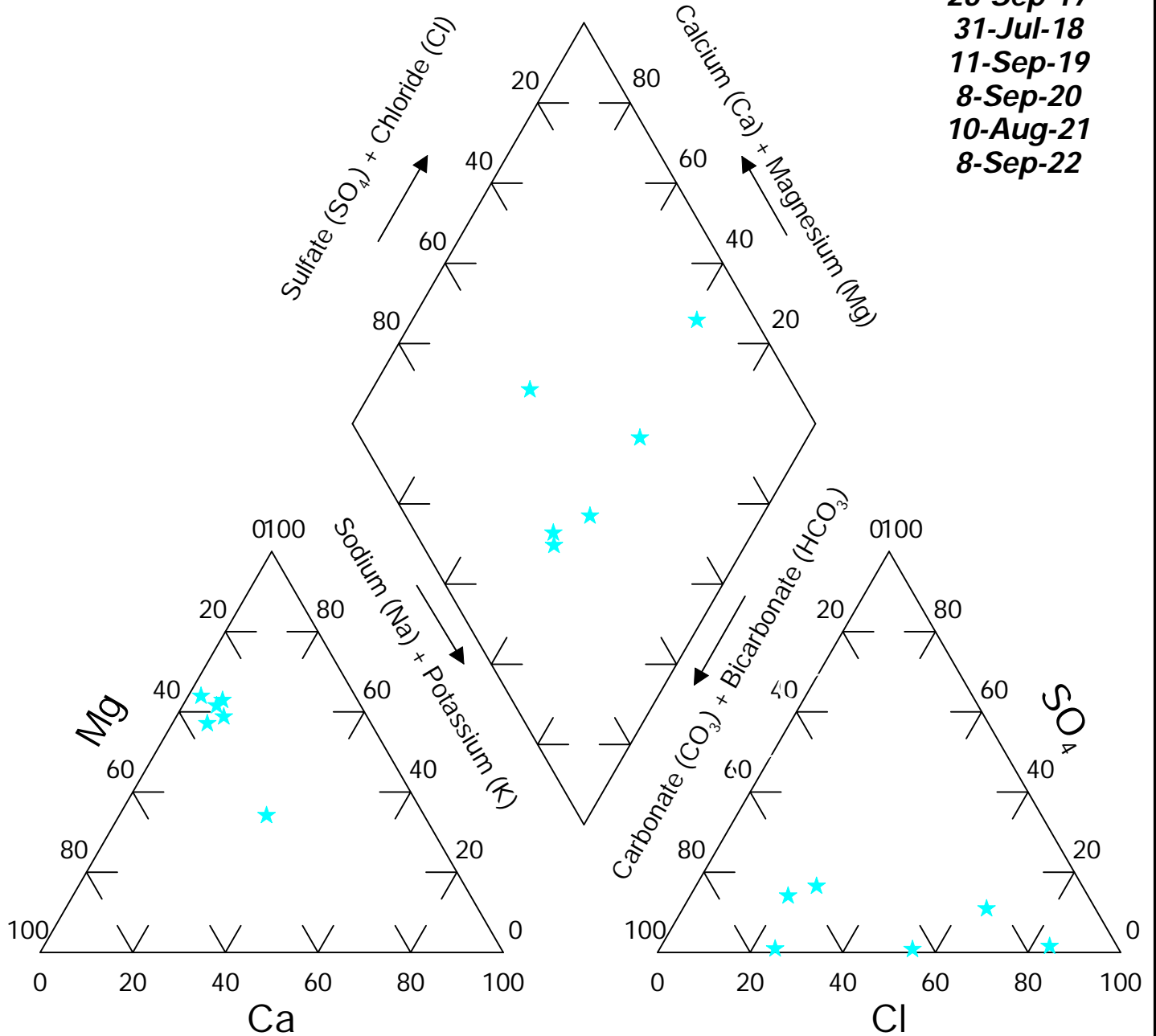


FIGURE: 21P

Site: Brady Location: MH27

Dates:
 26-Sep-17
 31-Jul-18
 11-Sep-19
 8-Sep-20
 10-Aug-21
 8-Sep-22

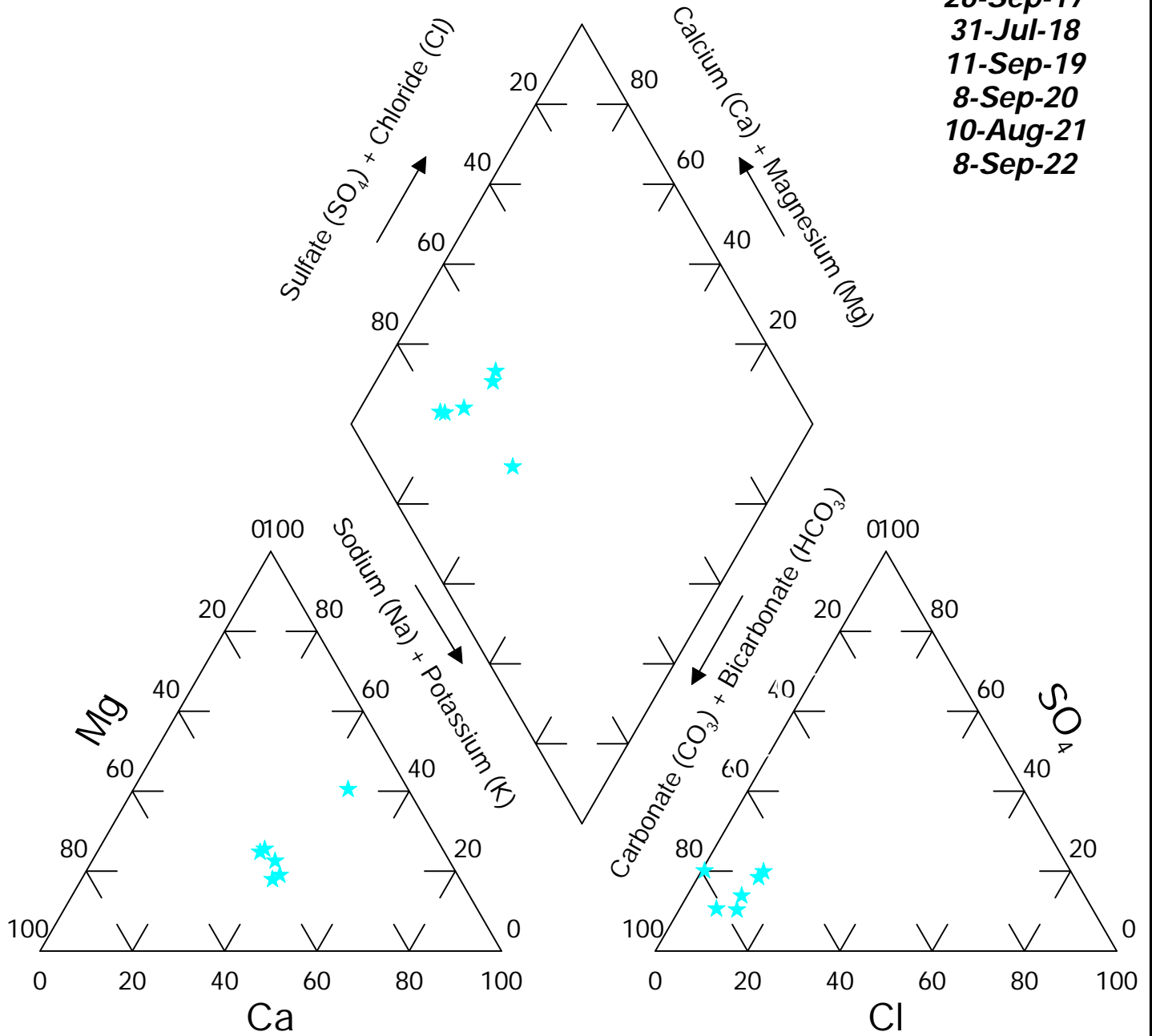


FIGURE: 22P

Site: Brady Location: MH31

Dates:
 26-Sep-17
 31-Jul-18
 11-Sep-19
 8-Sep-20
 10-Aug-21
 8-Sep-22

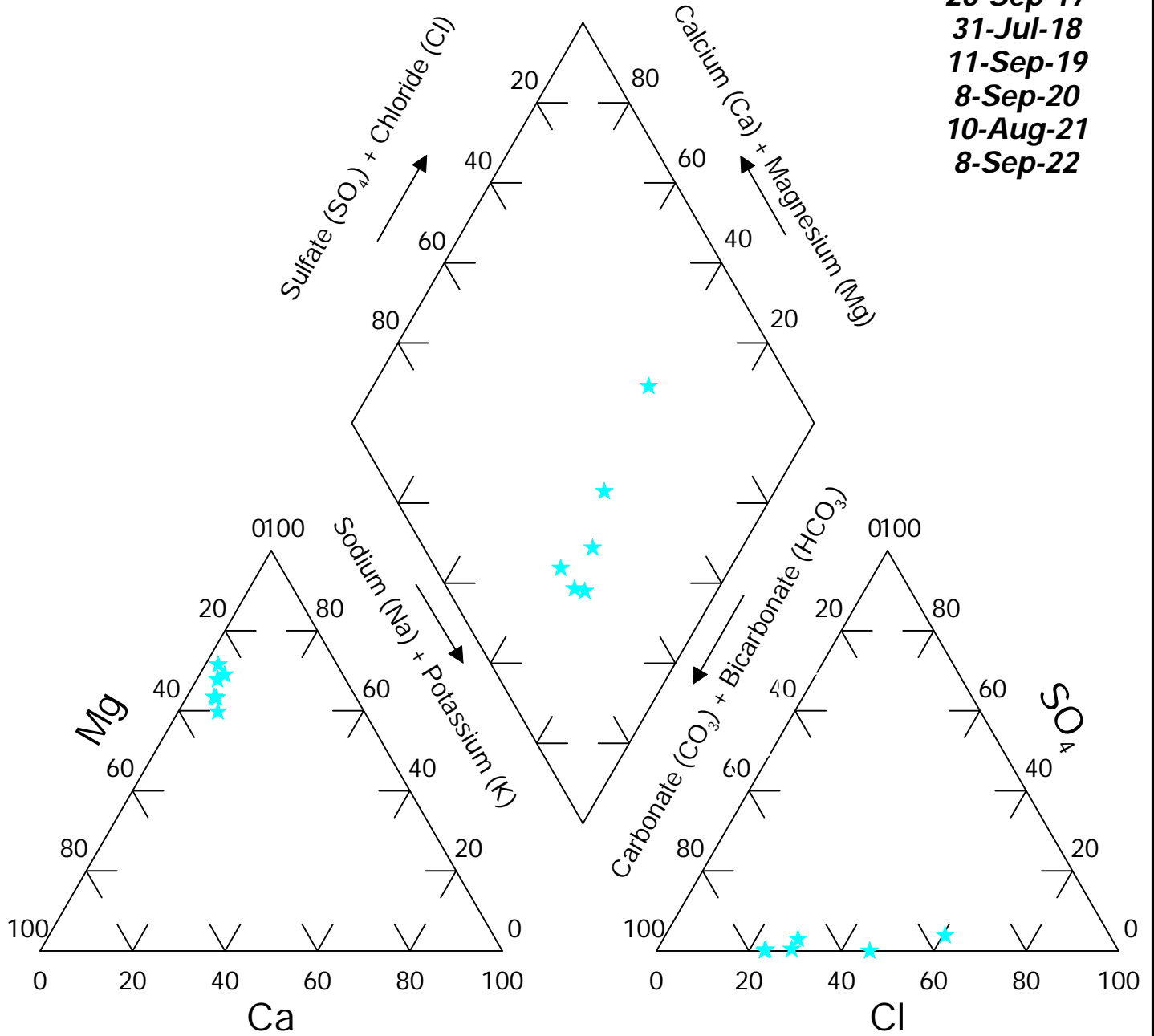


FIGURE: 23P

Site: Brady Location: MH34

Dates:
 26-Sep-17
 31-Jul-18
 11-Sep-19
 8-Sep-20
 10-Aug-21
 8-Sep-22

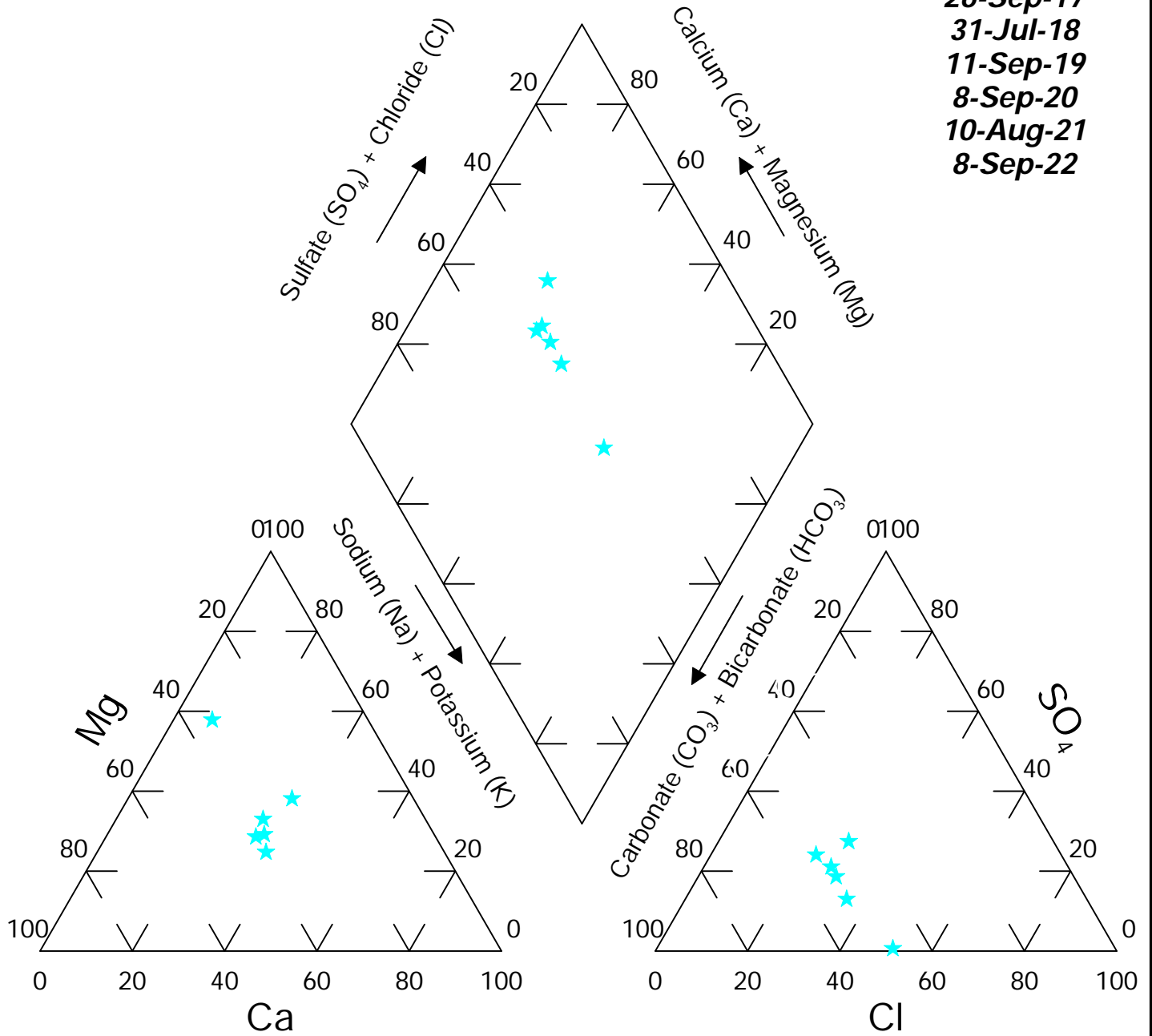


FIGURE: 24P

Site: Brady
Location: MH46

Date:
31-Jul-18
11-Sep-19
8-Sep-20
10-Aug-21
14-Sep-22

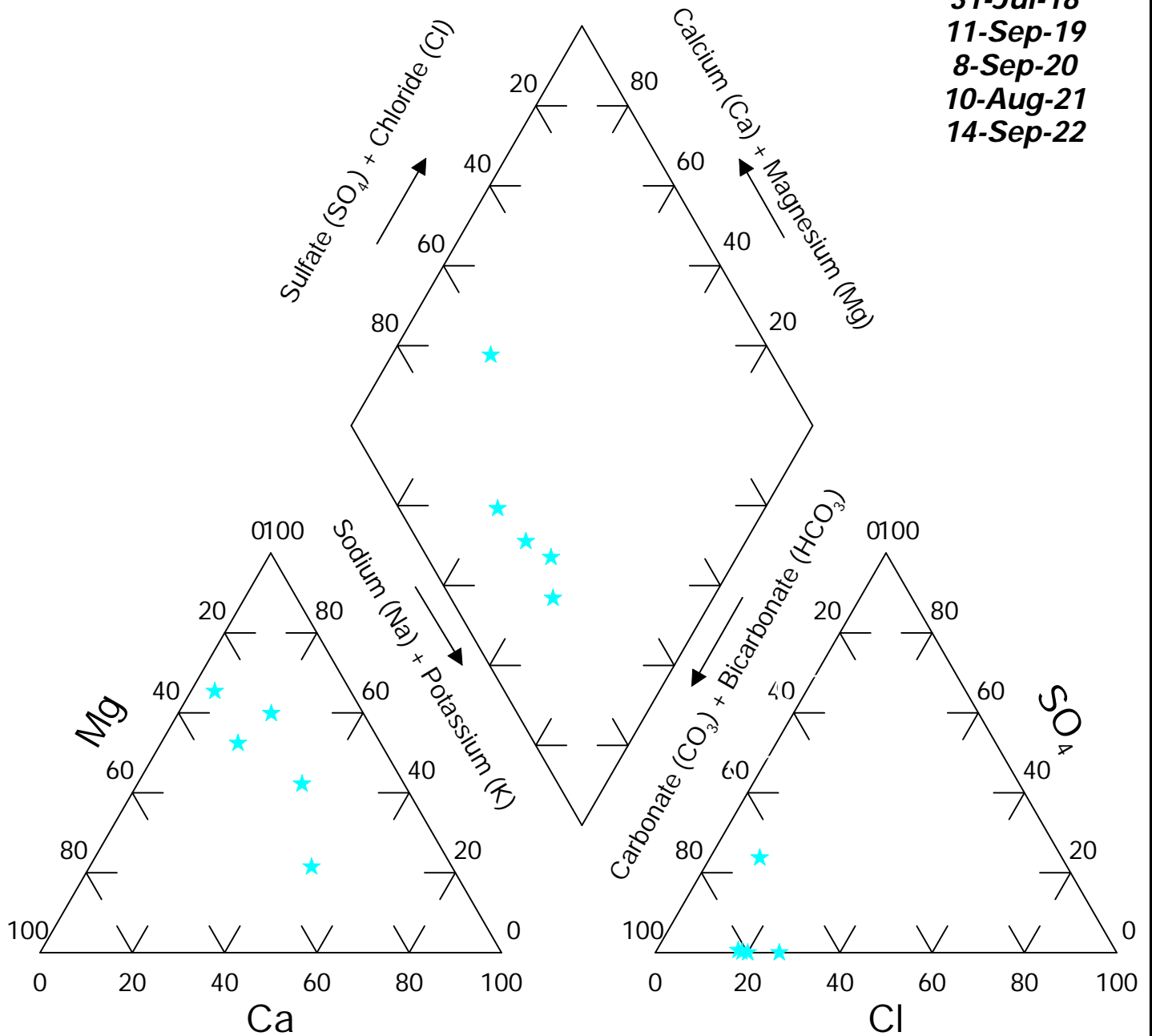


FIGURE: 21P

Site: Brady
Location: MH47

Date:
8-Sep-20
10-Aug-21
14-Sep-22

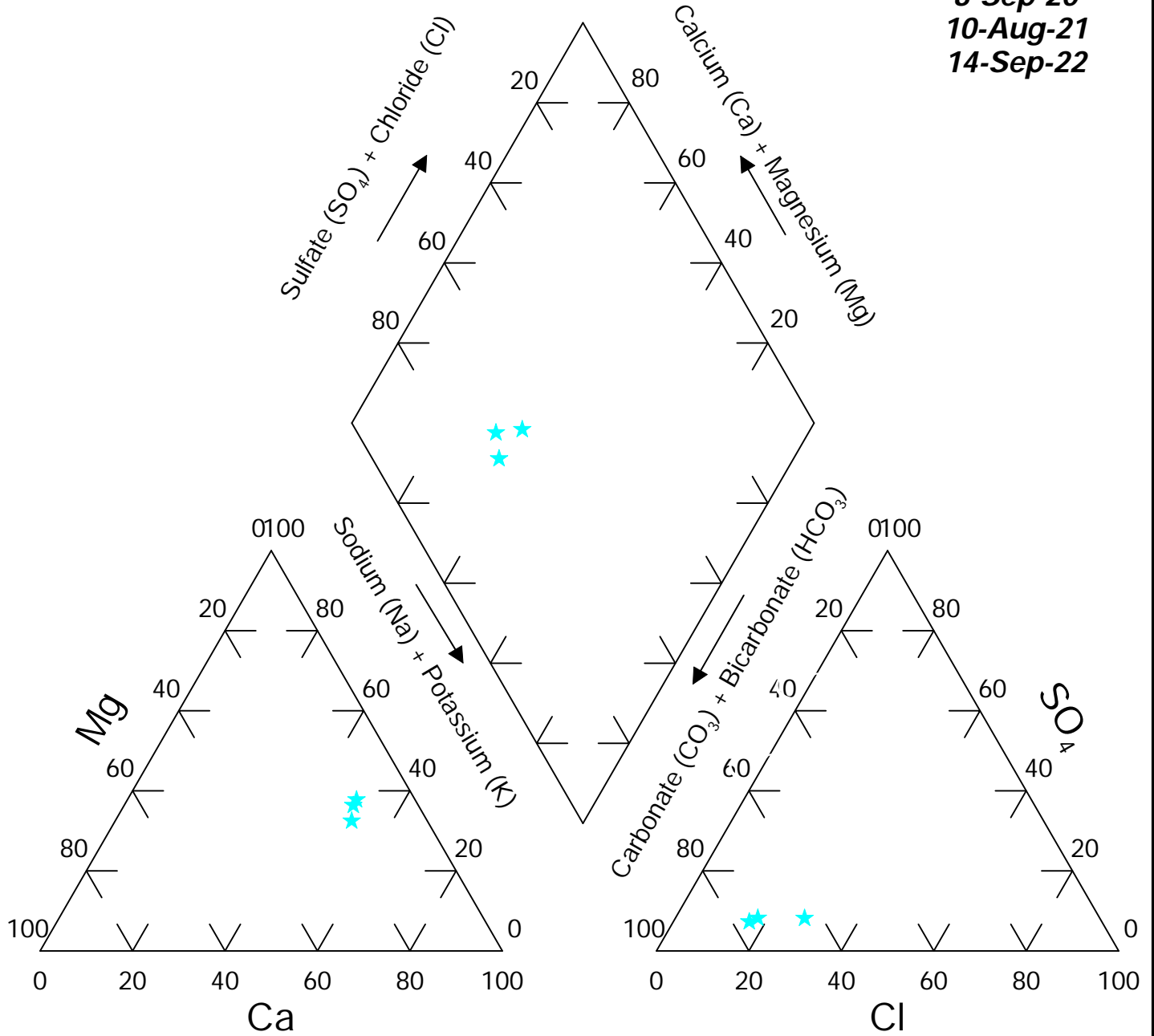


FIGURE: 21P

Site: Brady Location: *Riser 1*

Dates:
 26-Sep-17
 31-Jul-18
 10-Sep-19
 8-Sep-20
 10-Aug-21
 14-Sep-22

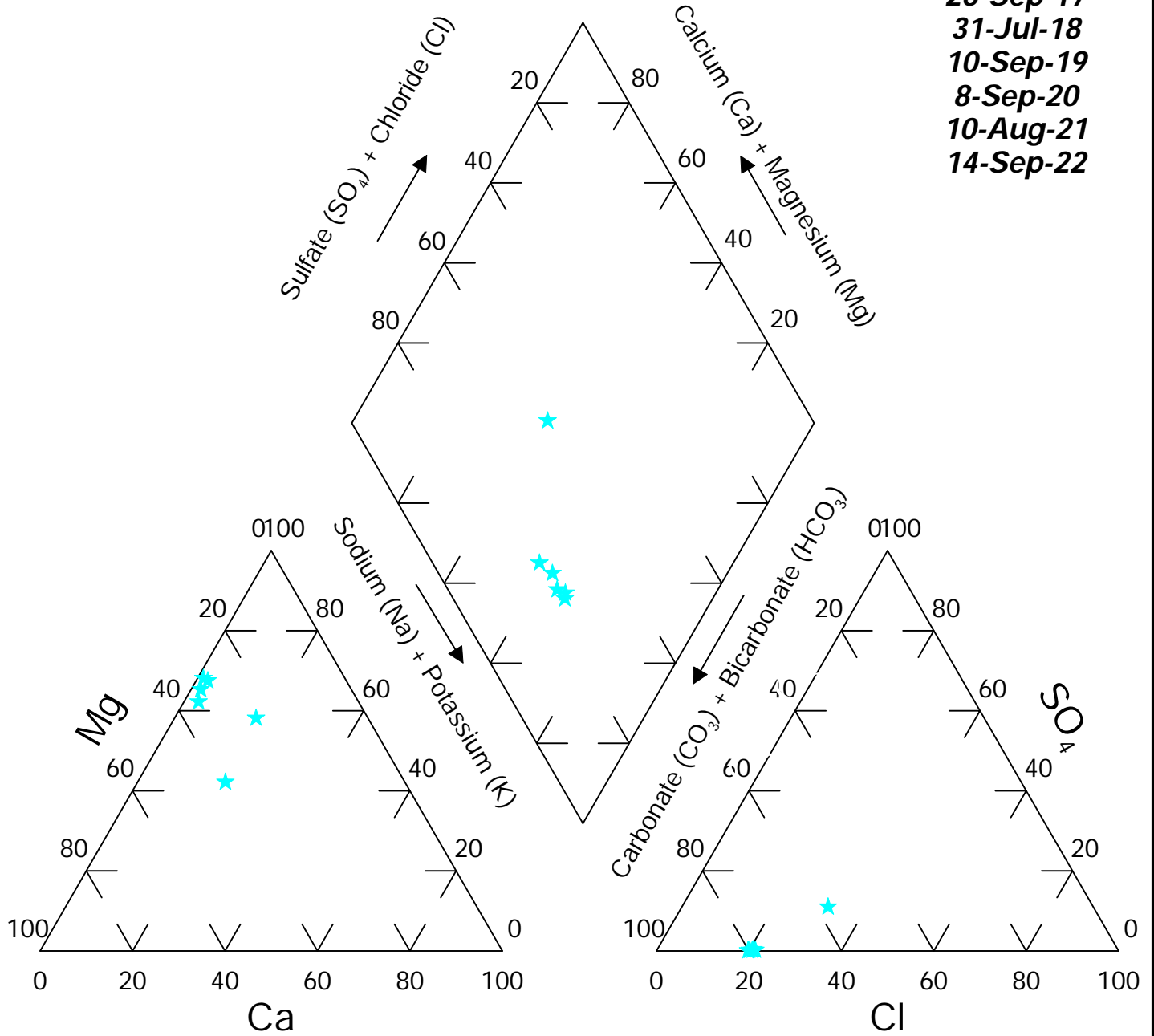


FIGURE: 18P

Site: Brady

Location: MH BIO

Dates:
 26-Sep-17
 31-Jul-18
 10-Sep-19
 8-Sep-20
 10-Aug-21
 8-Sep-22

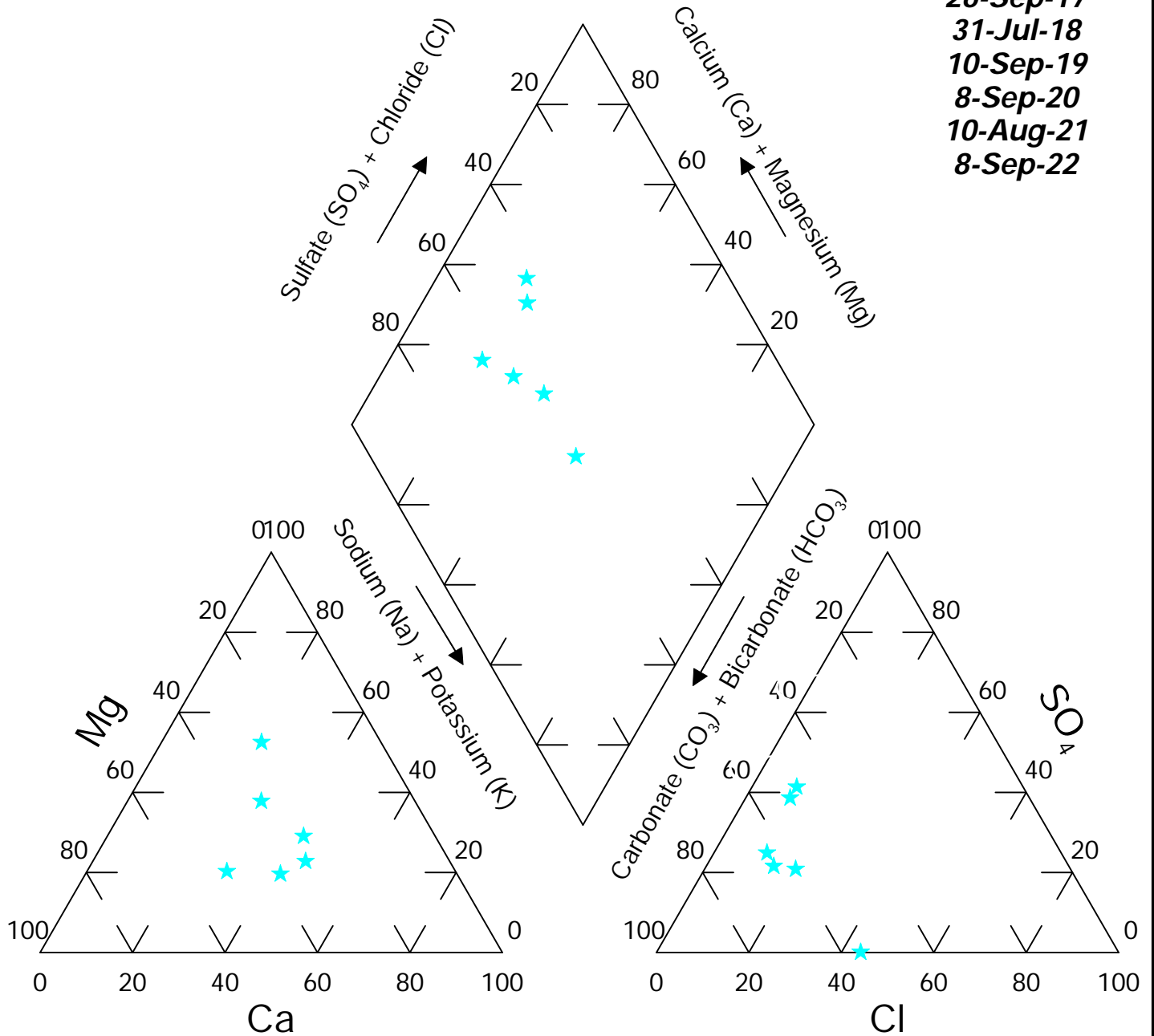
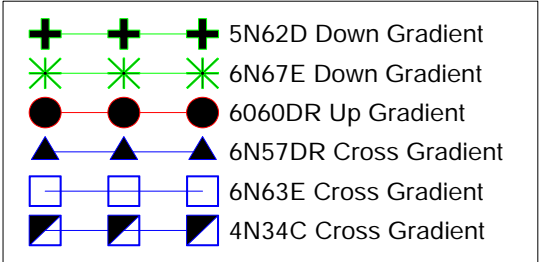
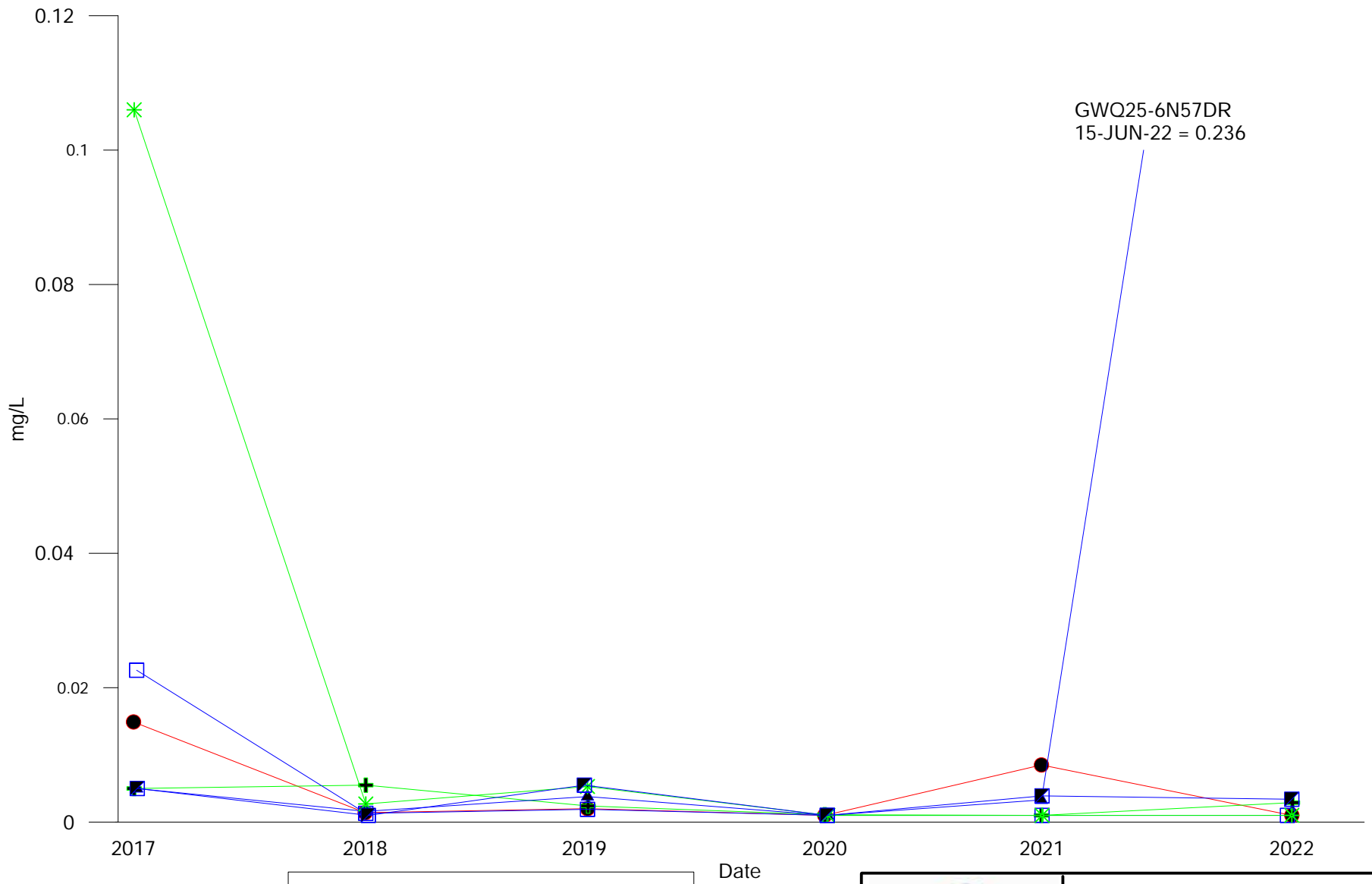


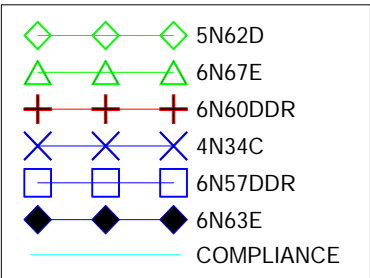
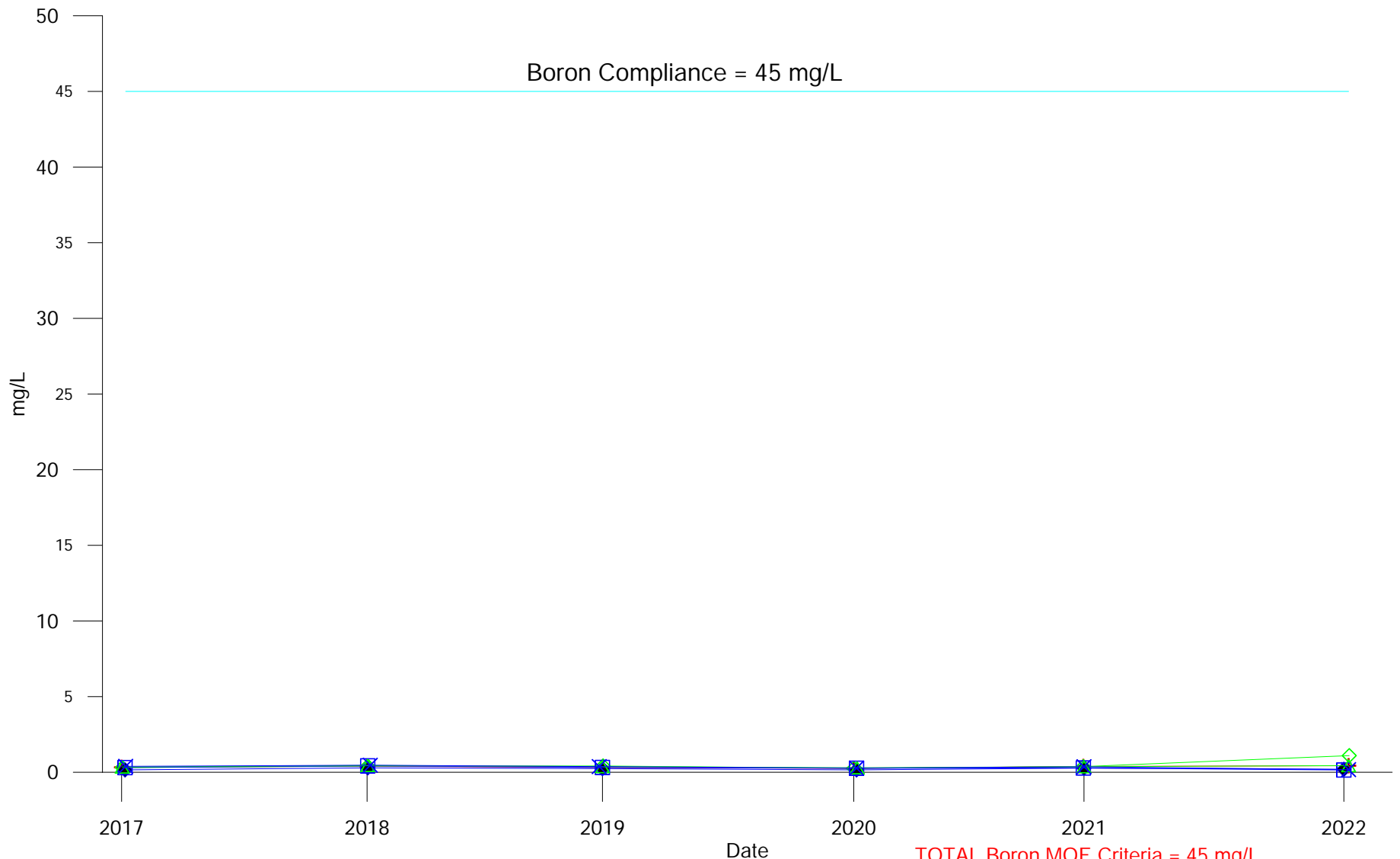
FIGURE: 18P

APPENDIX B
2022 TIME VS
CONCENTRATION GRAPHS

**2022 GROUNDWATER
TIME VS CONCENTRATION GRAPHS**

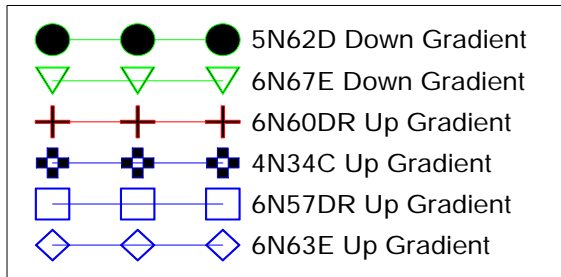
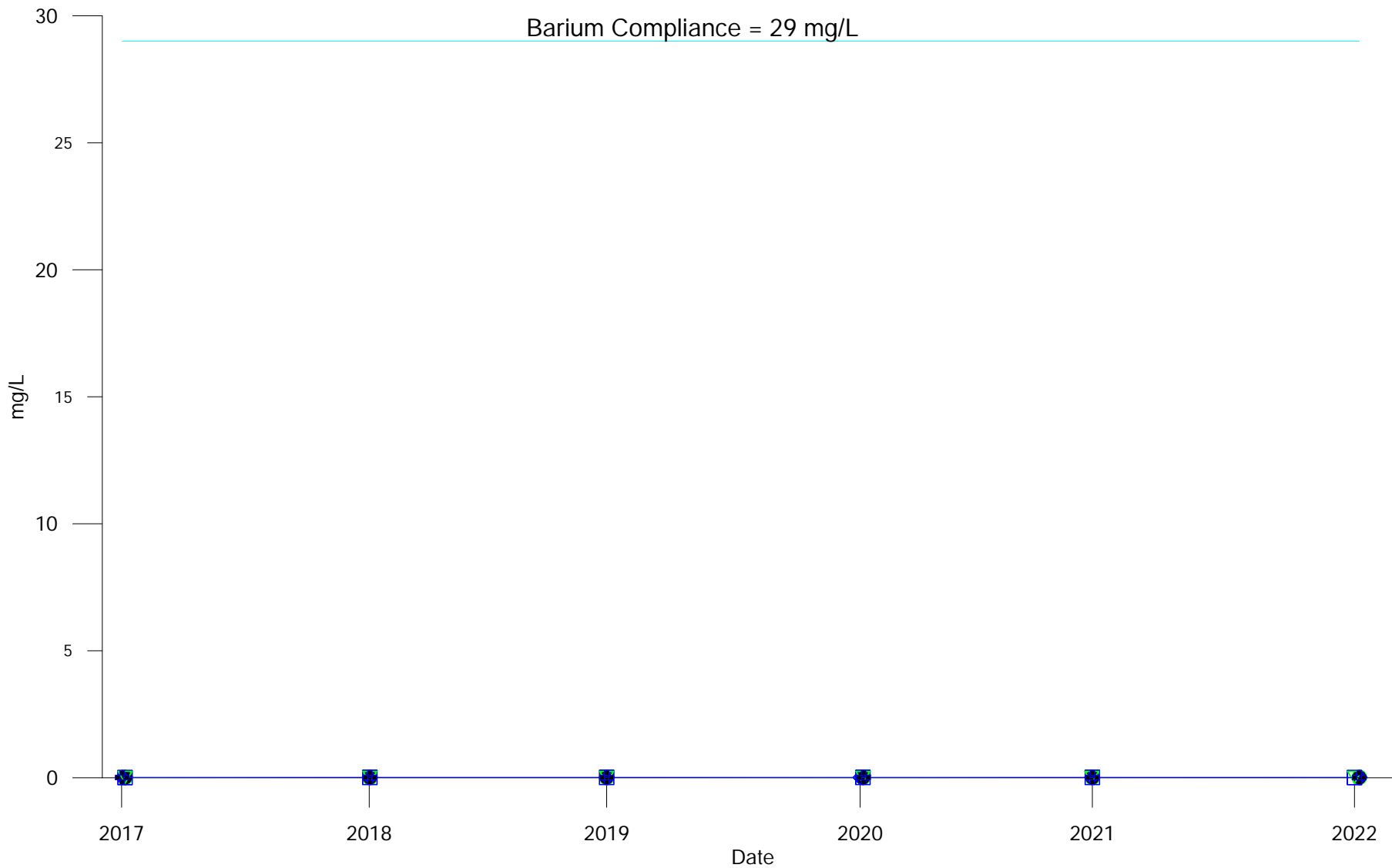


	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Aluminium Clay Wells		
APRIL 2023	FIGURE 15	REV 0



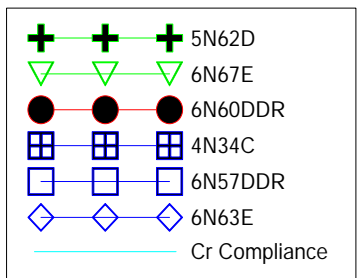
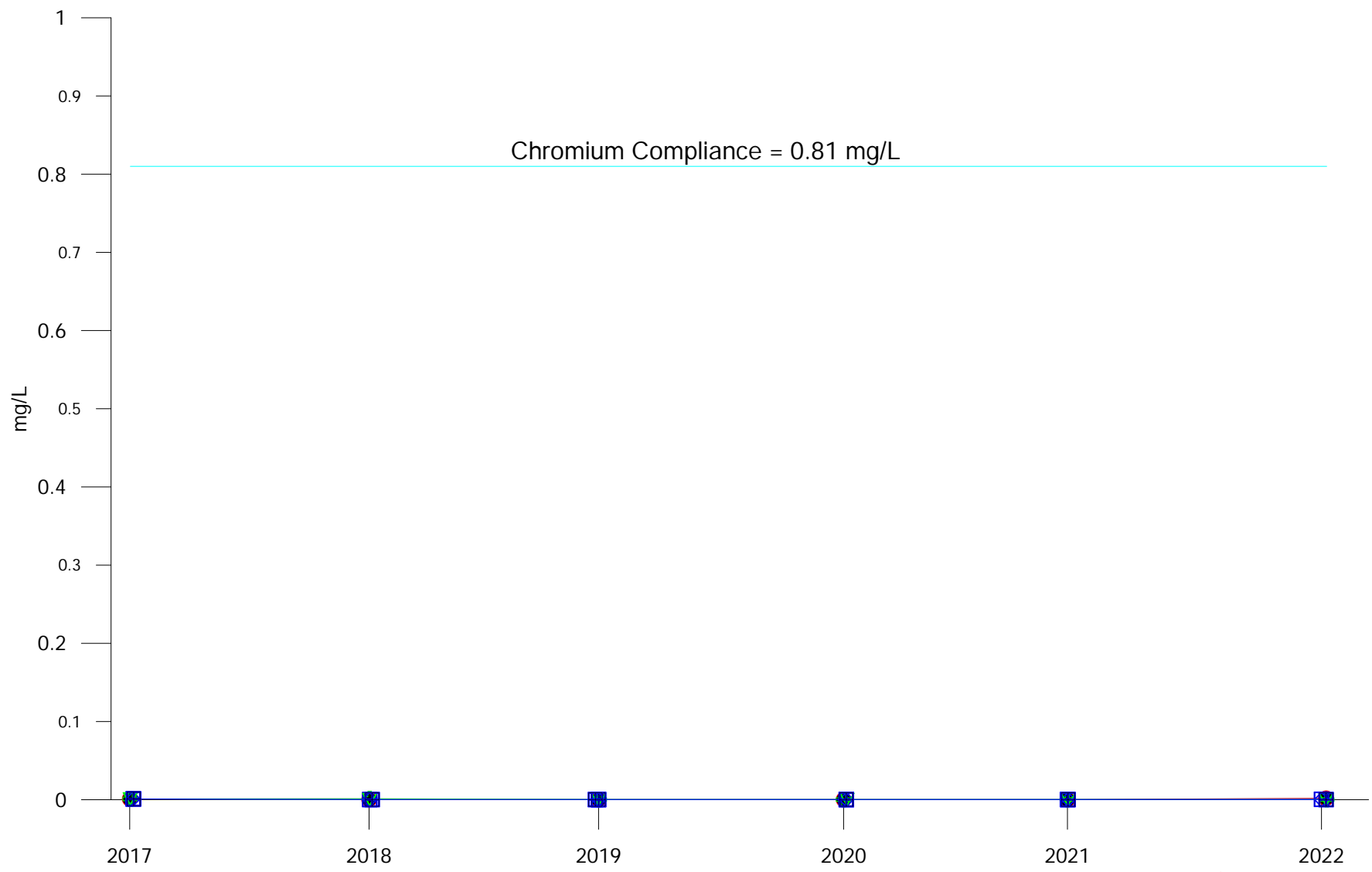
TOTAL Boron MOE Criteria = 45 mg/L

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Boron Clay Wells		
APRIL 2023	FIGURE 16	REV 0



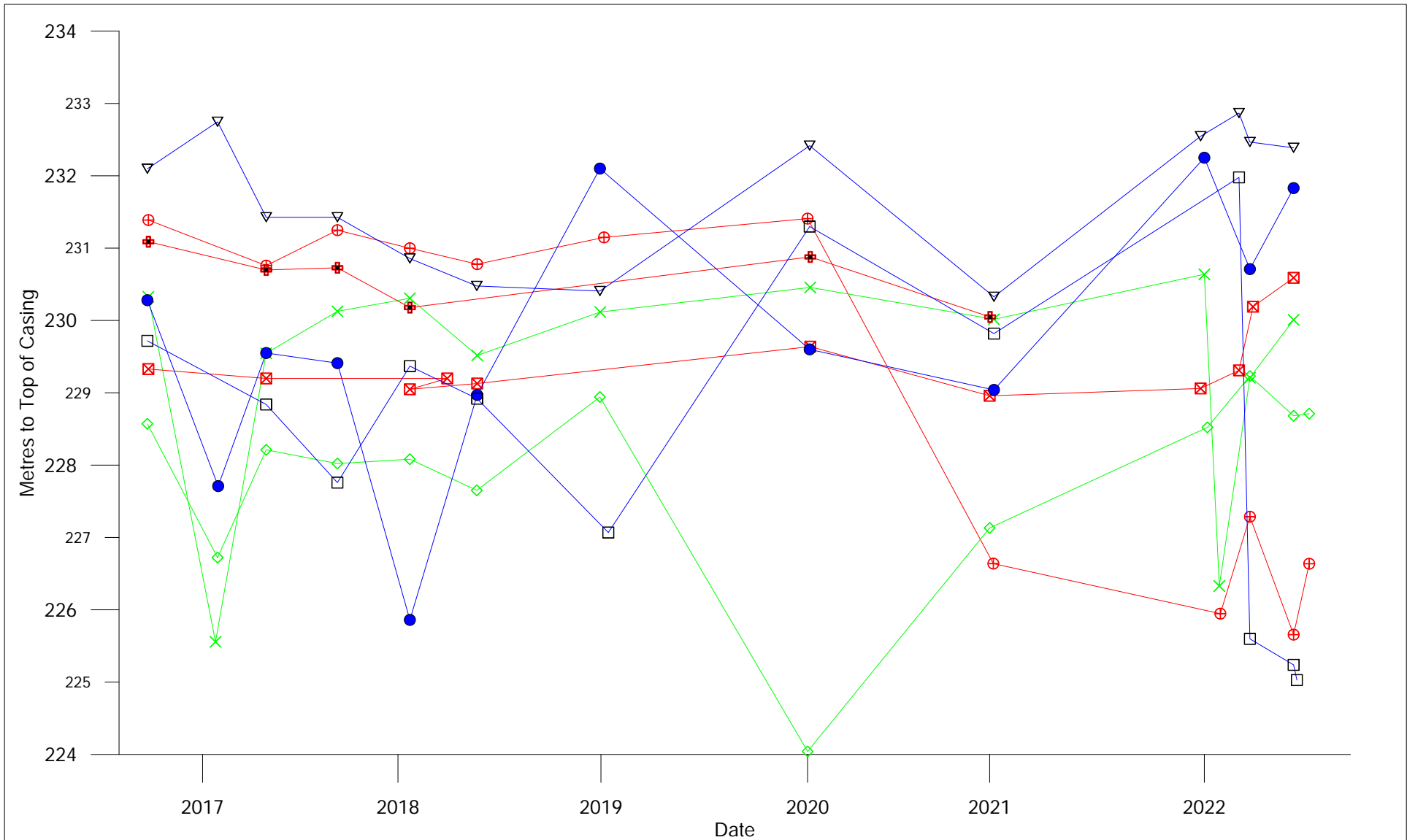
Barium MOE Criteria = 29 mg/L

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Barium Clay Wells		
APRIL 2023	FIGURE 17	REV 0



Chromium MOE Criteria = 0.81 mg/L

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Chromium Clay Wells		
APRIL 2023	FIGURE 18	REV 0



Down gradient

- 5N62D
- 6N67E

Cross gradient

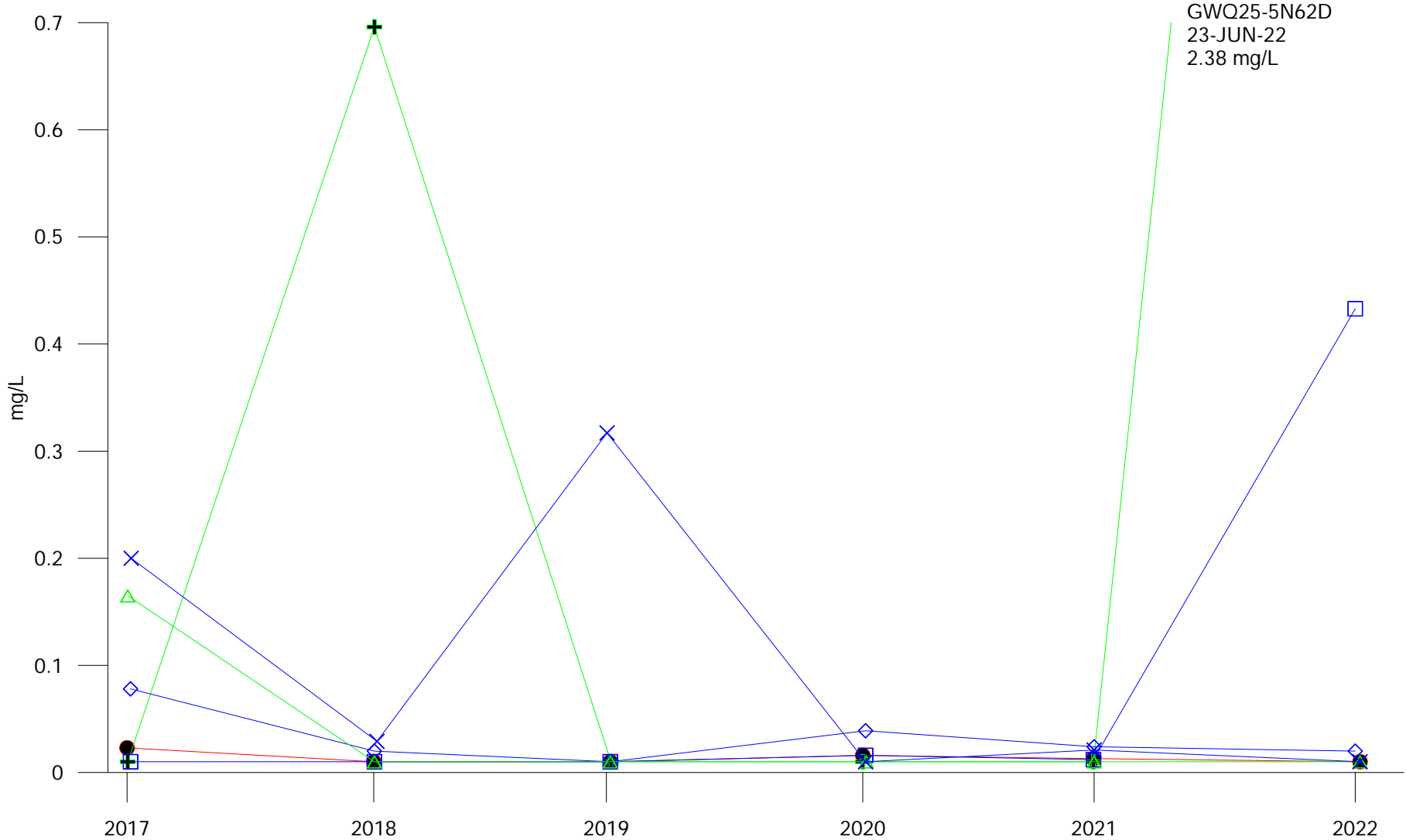
- 4N34CR
- 6N57DR
- 6N63E

Up gradient

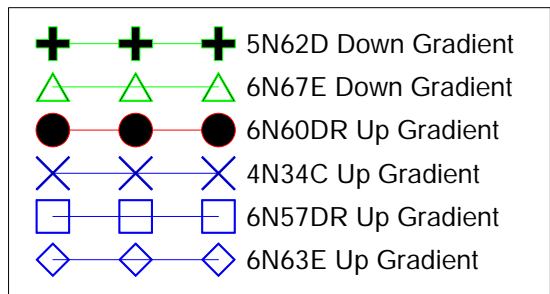
- 6N58DR
- 6N59DR
- 6N60DR



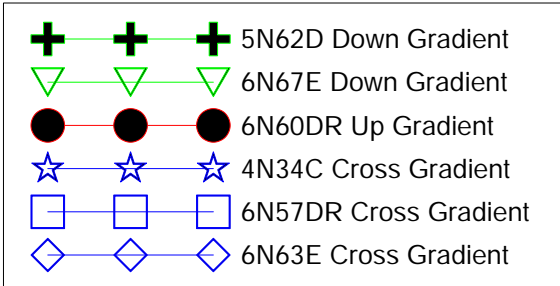
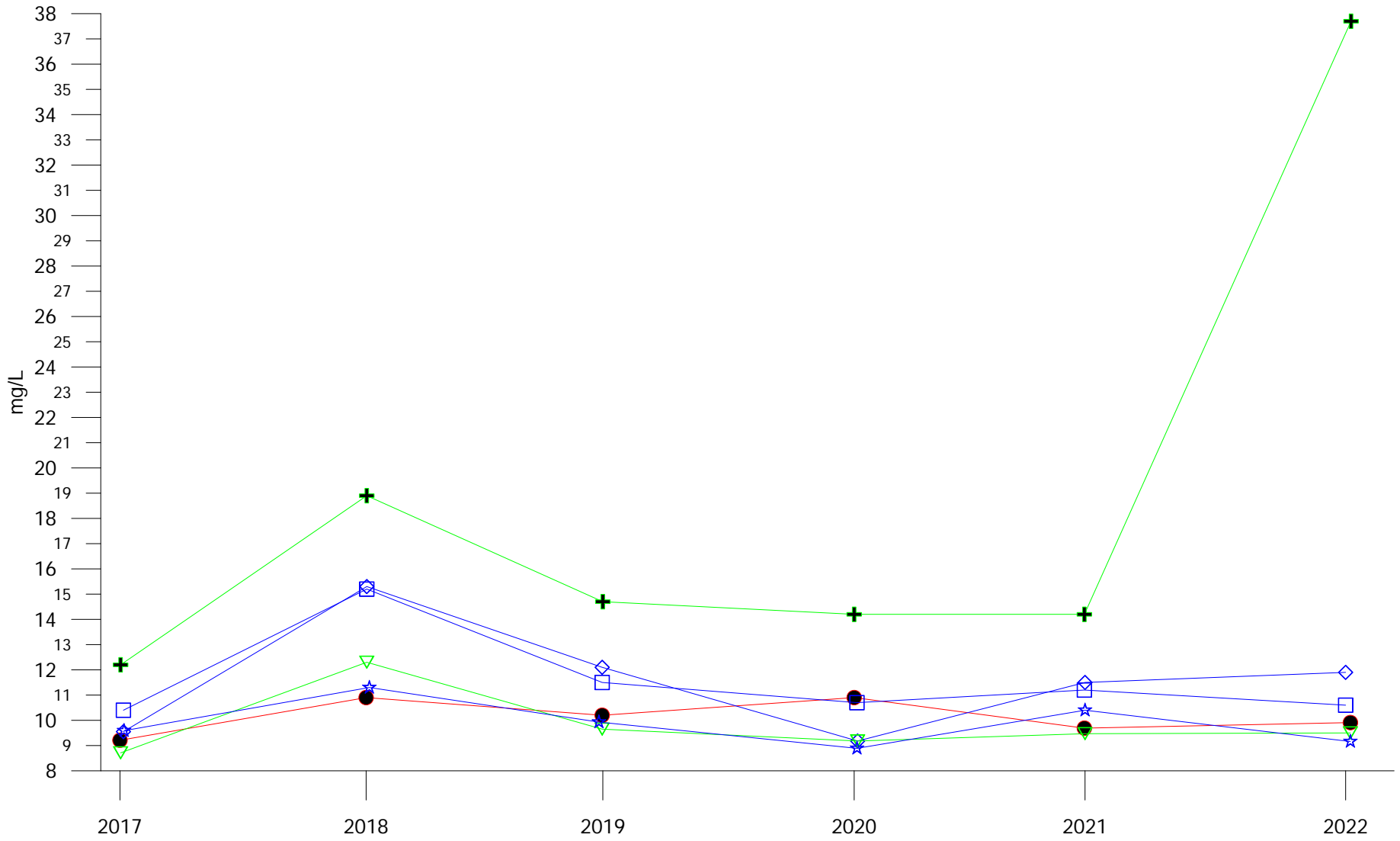
City Of Winnipeg
Solid Waste Services



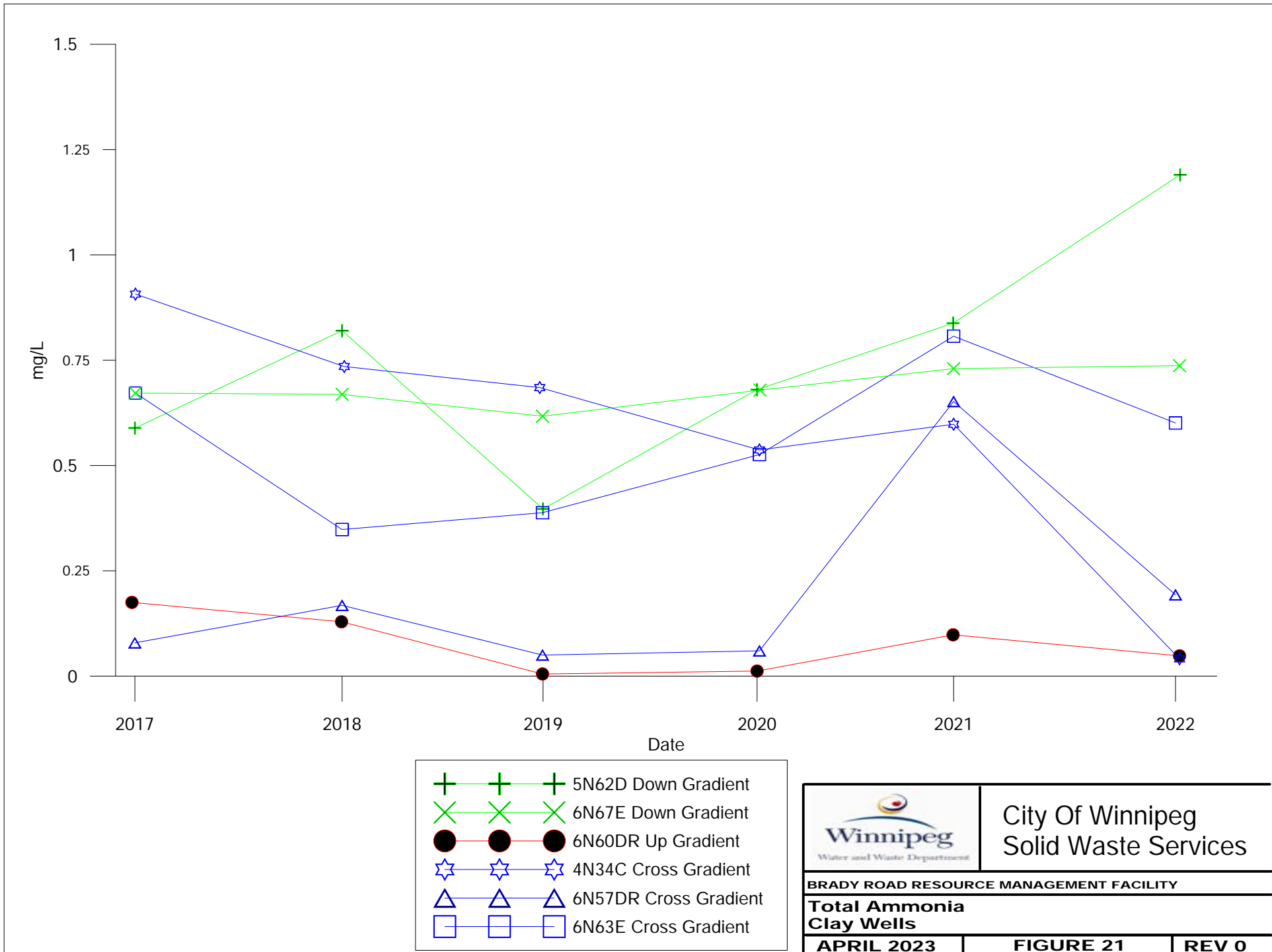
GWQ25-5N62D
23-JUN-22
2.38 mg/L



	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Iron Clay Wells		
APRIL 2023	FIGURE 19	REV 0



	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Potassium Clay Wells		
APRIL 2023	FIGURE 20	REV 0



City Of Winnipeg
Solid Waste Services

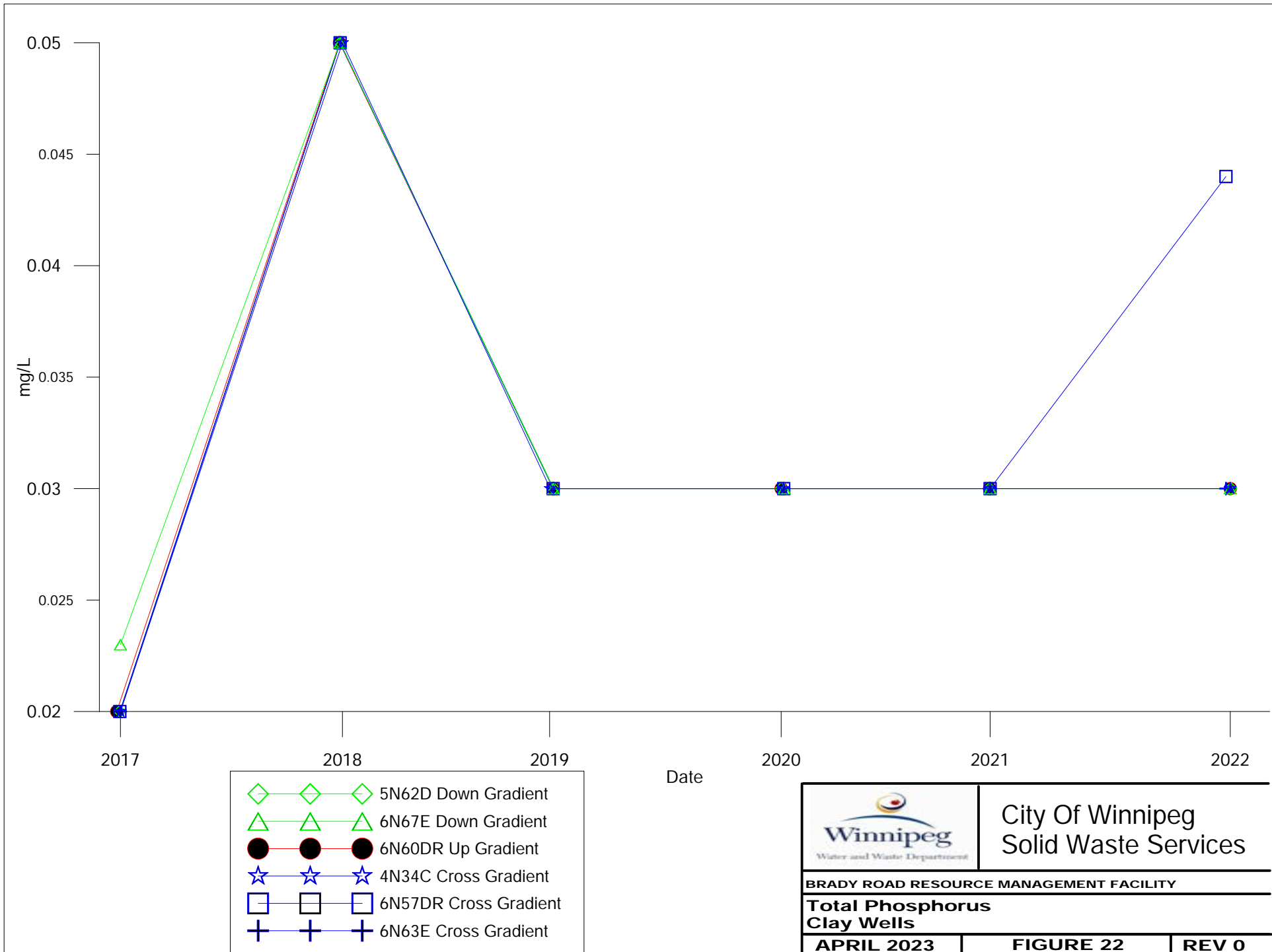
BRADY ROAD RESOURCE MANAGEMENT FACILITY

**Total Ammonia
Clay Wells**

APRIL 2023

FIGURE 21

REV 0



City Of Winnipeg
Solid Waste Services

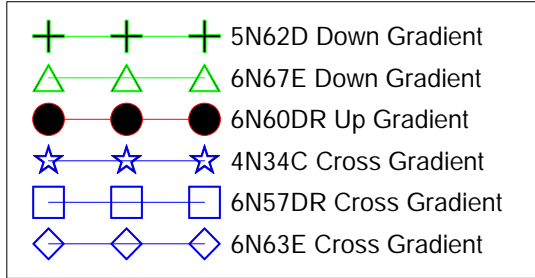
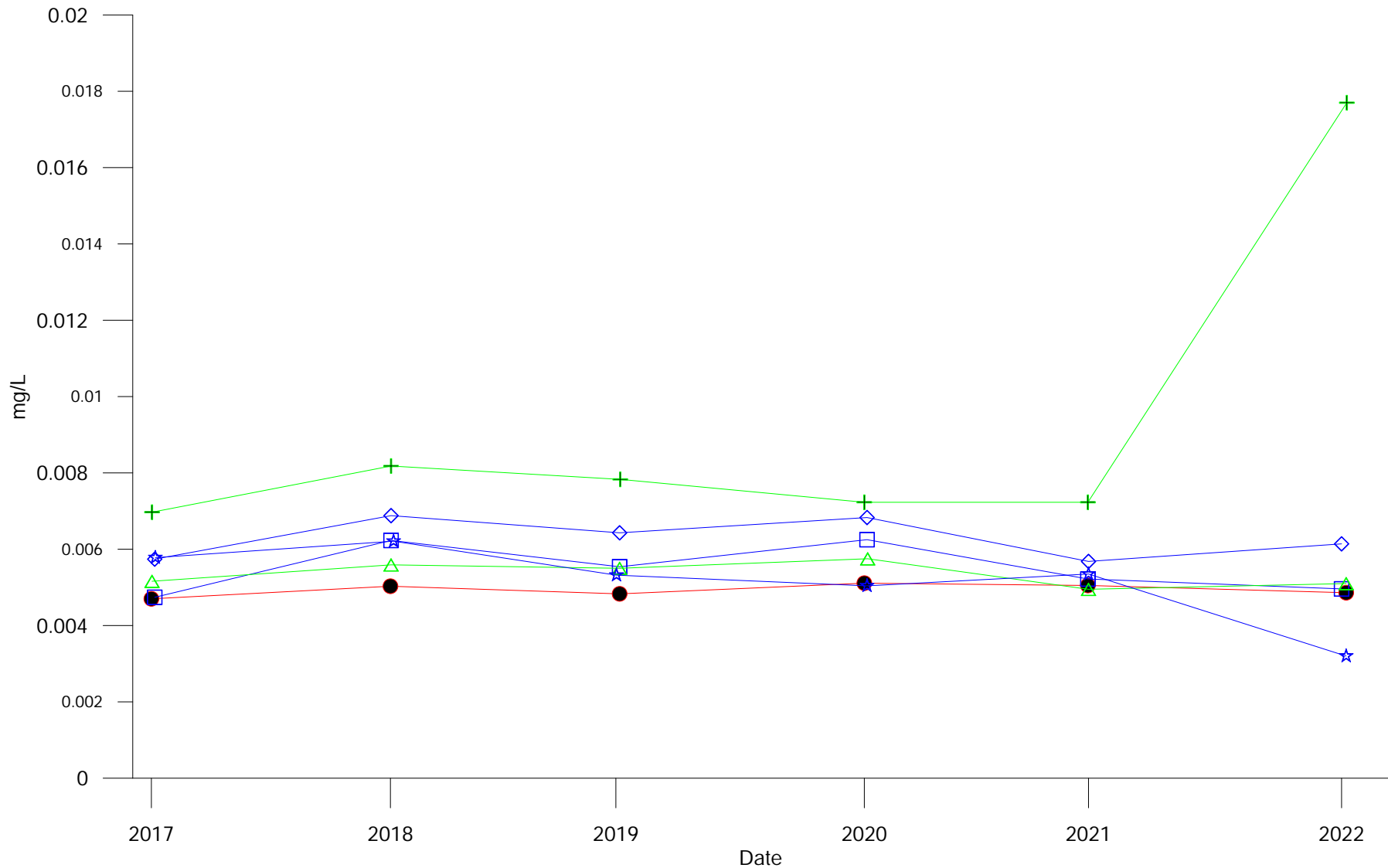
BRADY ROAD RESOURCE MANAGEMENT FACILITY

**Total Phosphorus
Clay Wells**

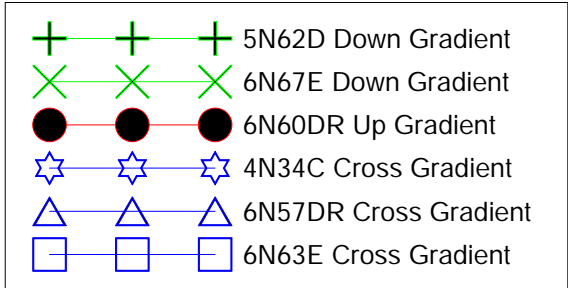
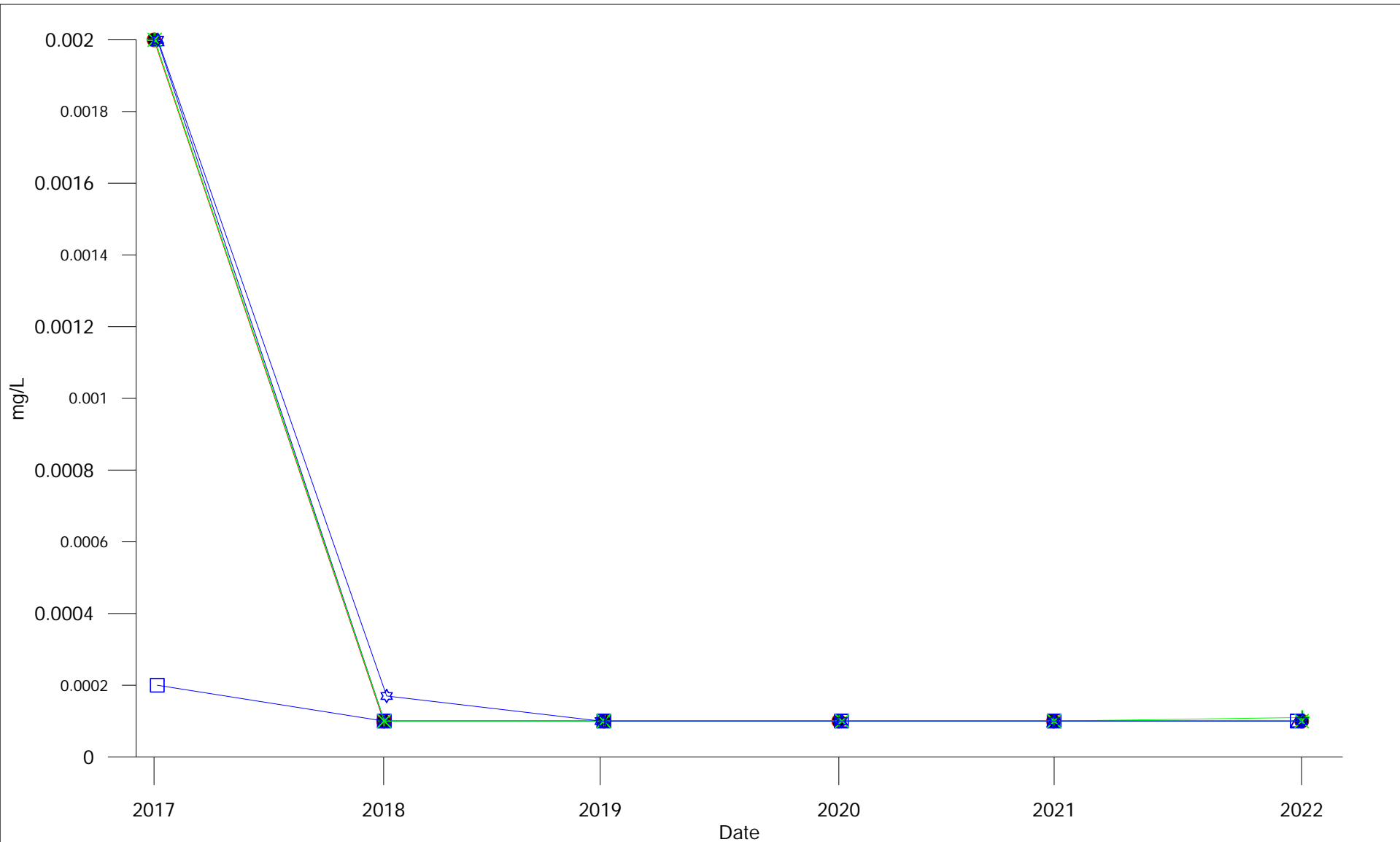
APRIL 2023

FIGURE 22

REV 0



	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Rubidium Clay Wells		
APRIL 2023	FIGURE 23	REV 0



City Of Winnipeg
Solid Waste Services

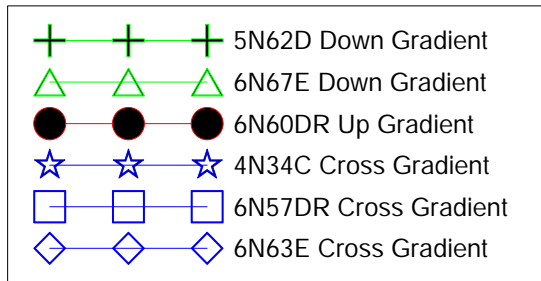
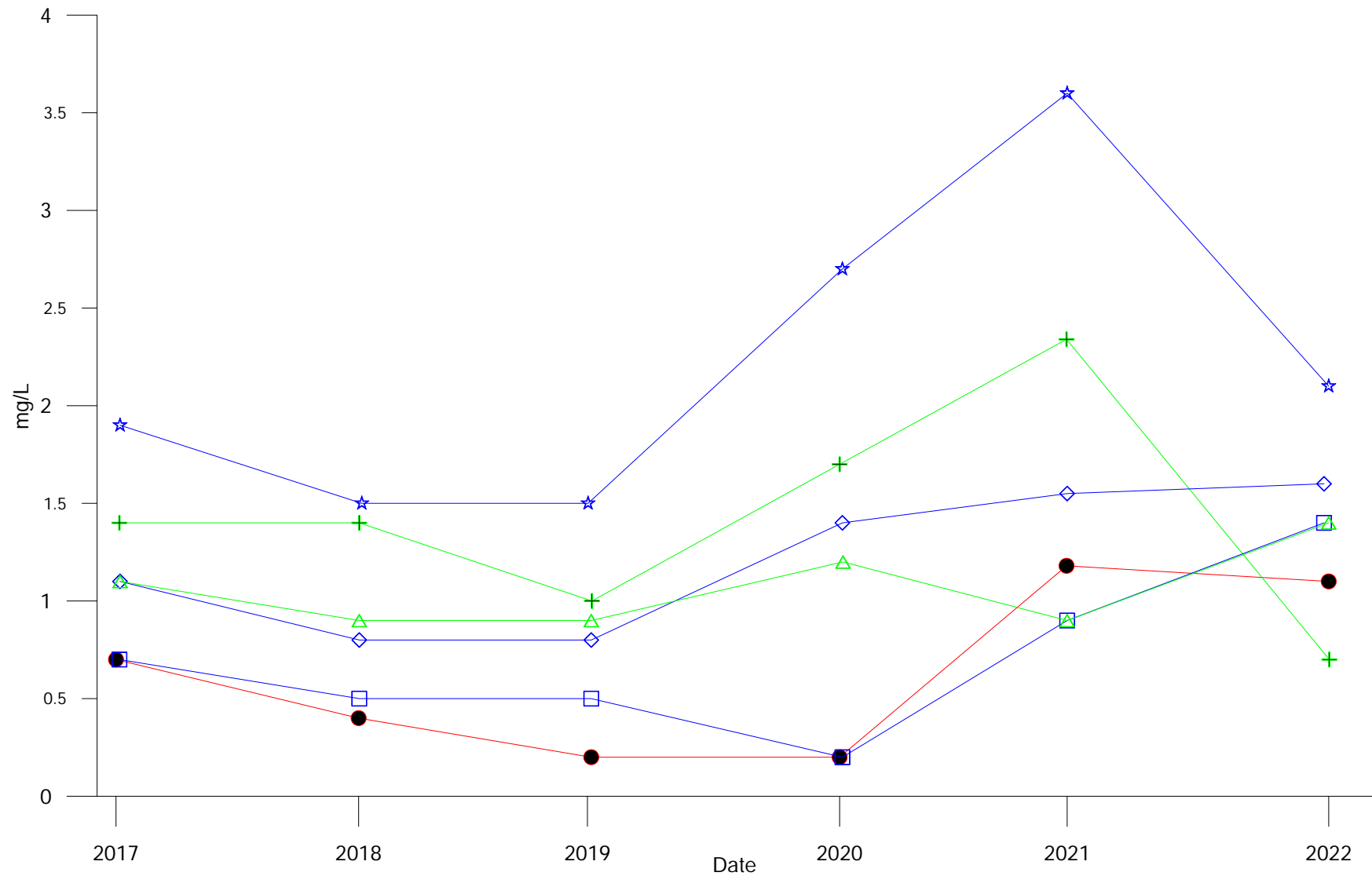
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Tin
Clay Wells

APRIL 2023

FIGURE 24

REV 0



City Of Winnipeg
Solid Waste Services

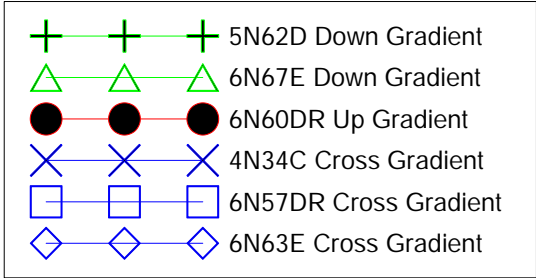
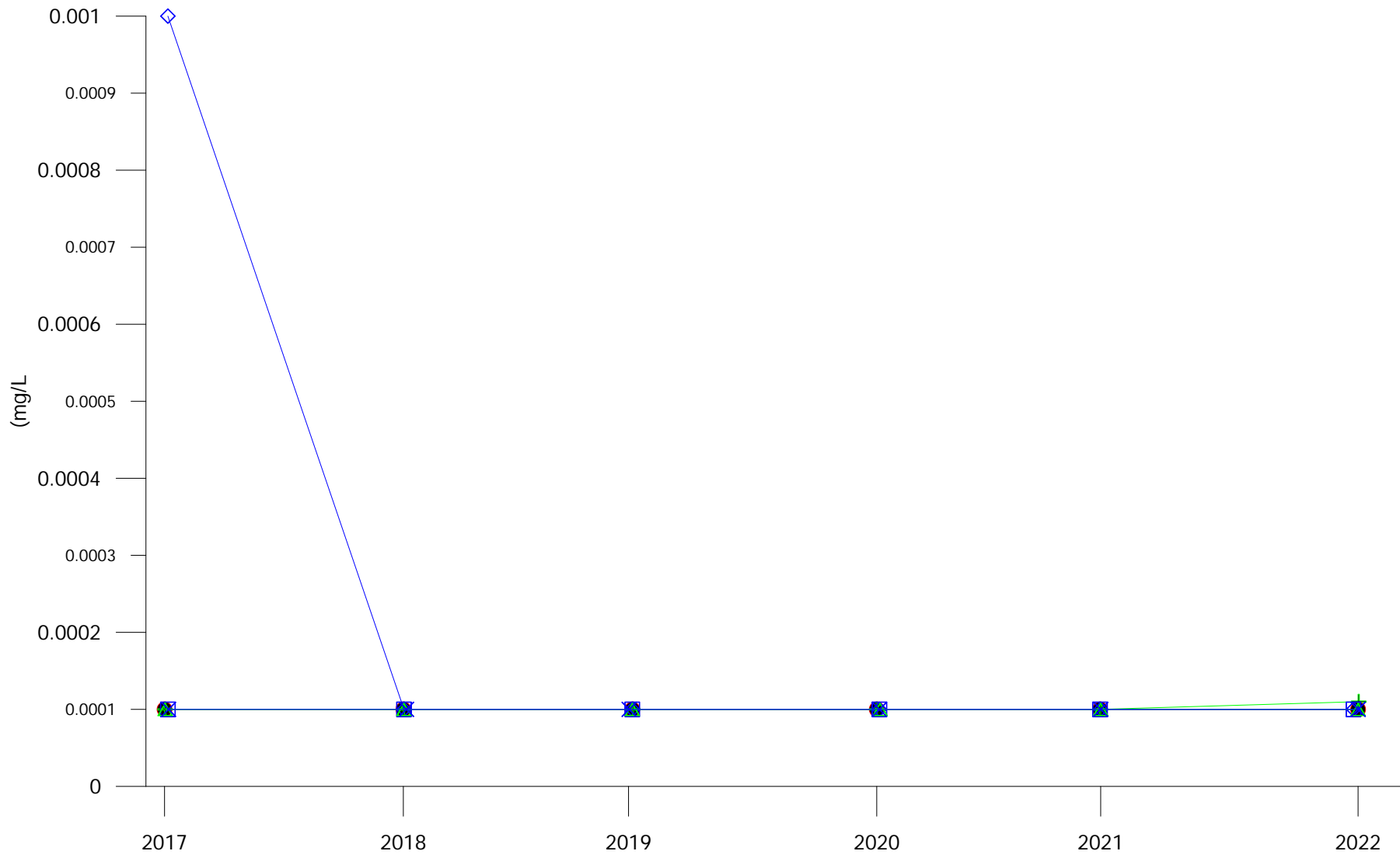
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Total Kjeldahl Nitrogen
Clay Wells

APRIL 2023

FIGURE 25

REV 0



City Of Winnipeg
Solid Waste Services

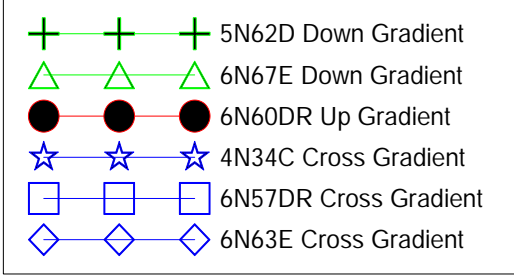
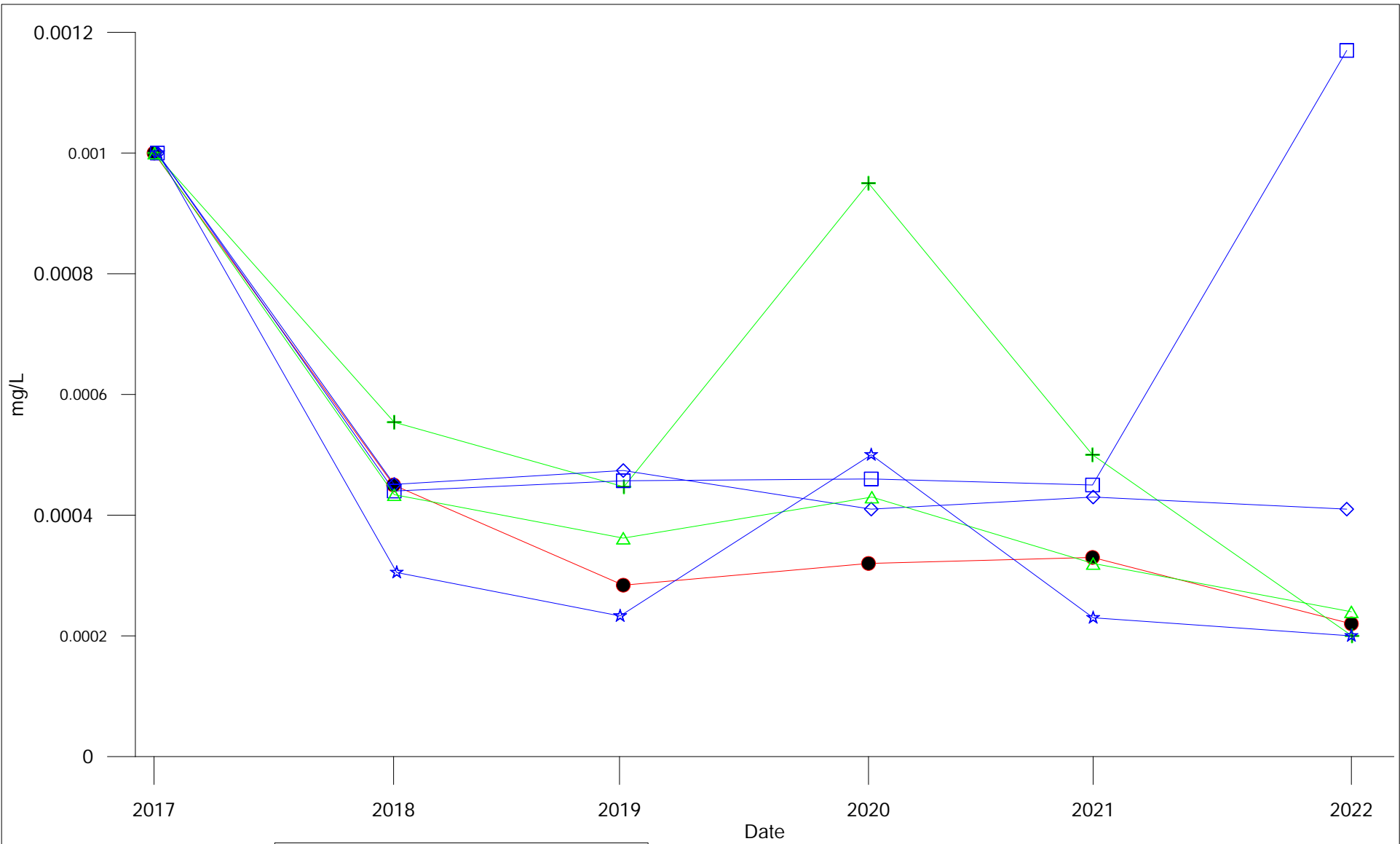
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Tungsten
Clay Wells

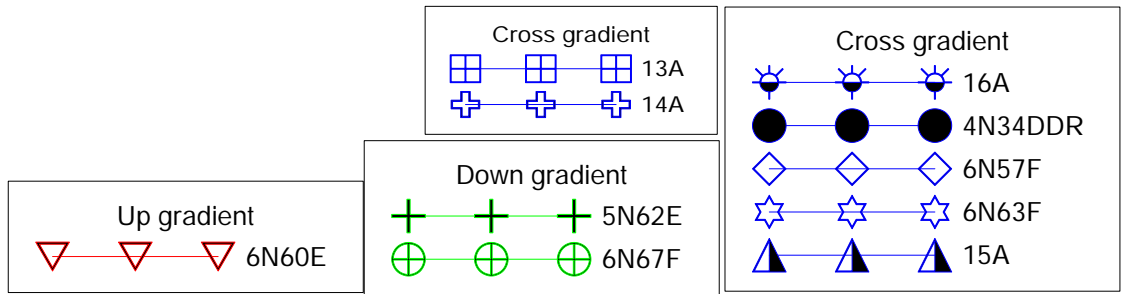
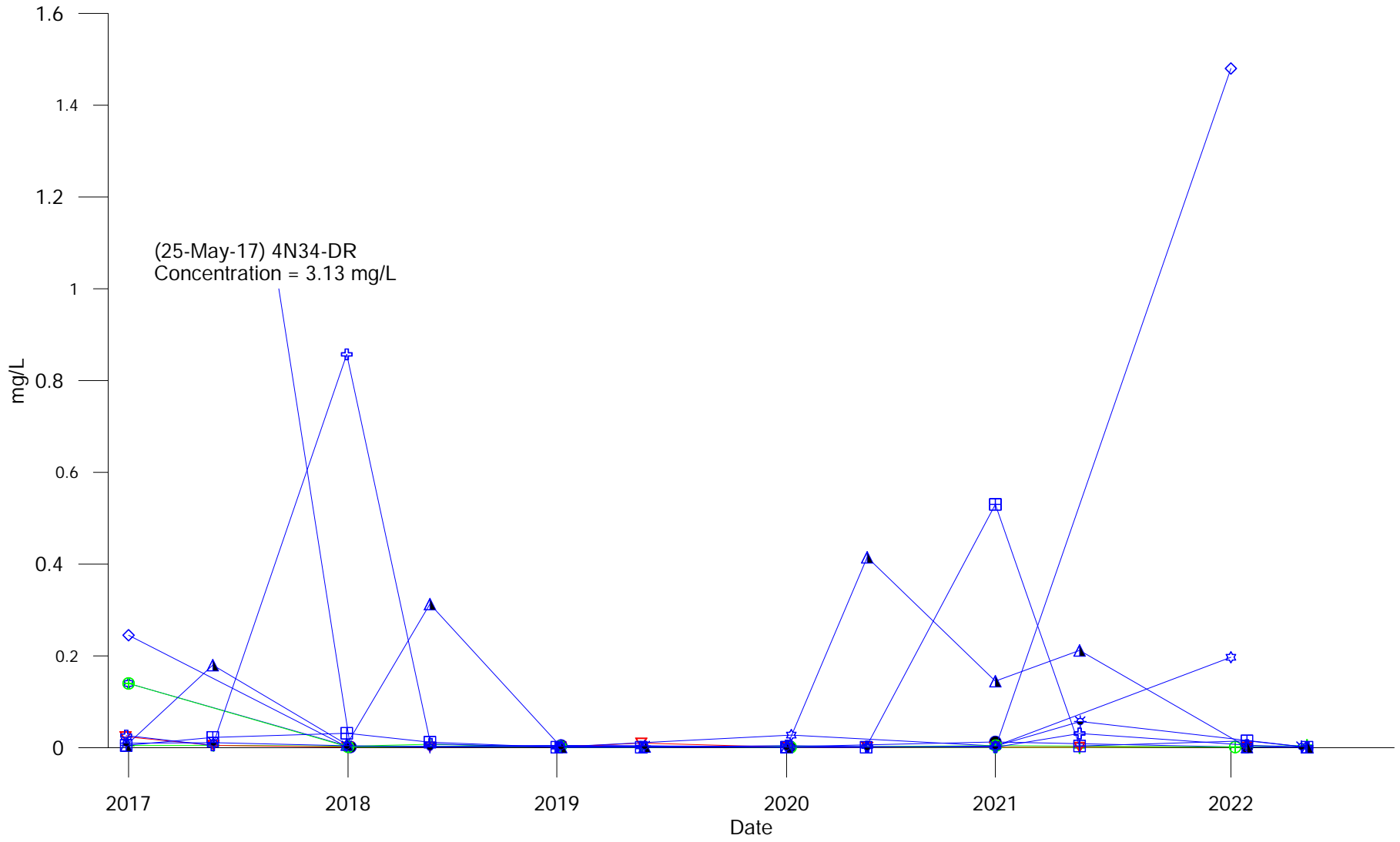
APRIL 2023

FIGURE 26

REV 0

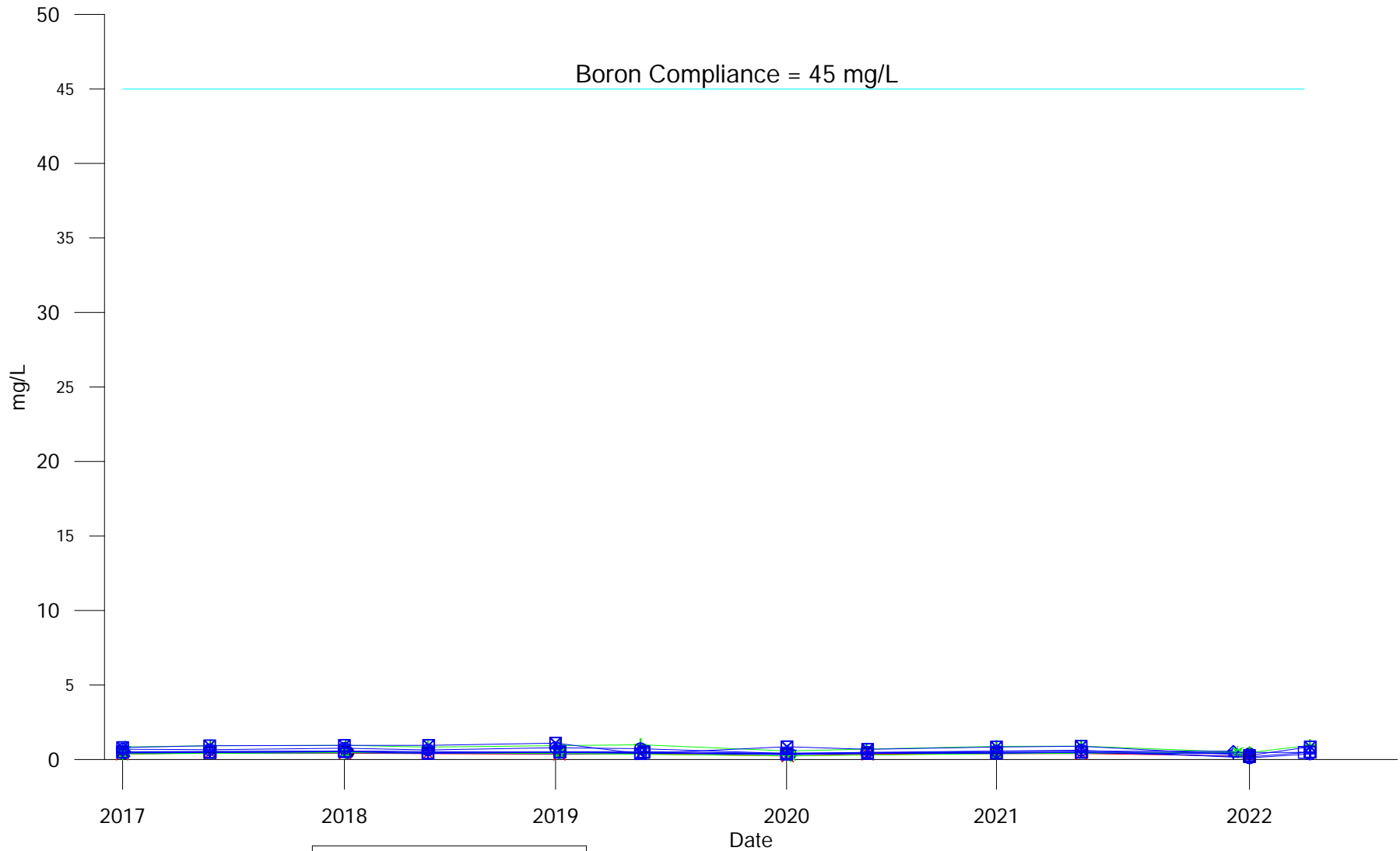


	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Zirconium Clay Wells		
APRIL 2022	FIGURE 27	REV 0



City Of Winnipeg
Solid Waste Services

Boron Compliance = 45 mg/L



Up gradient
 6N60EER

Down gradient
 5N62E
 6N67F

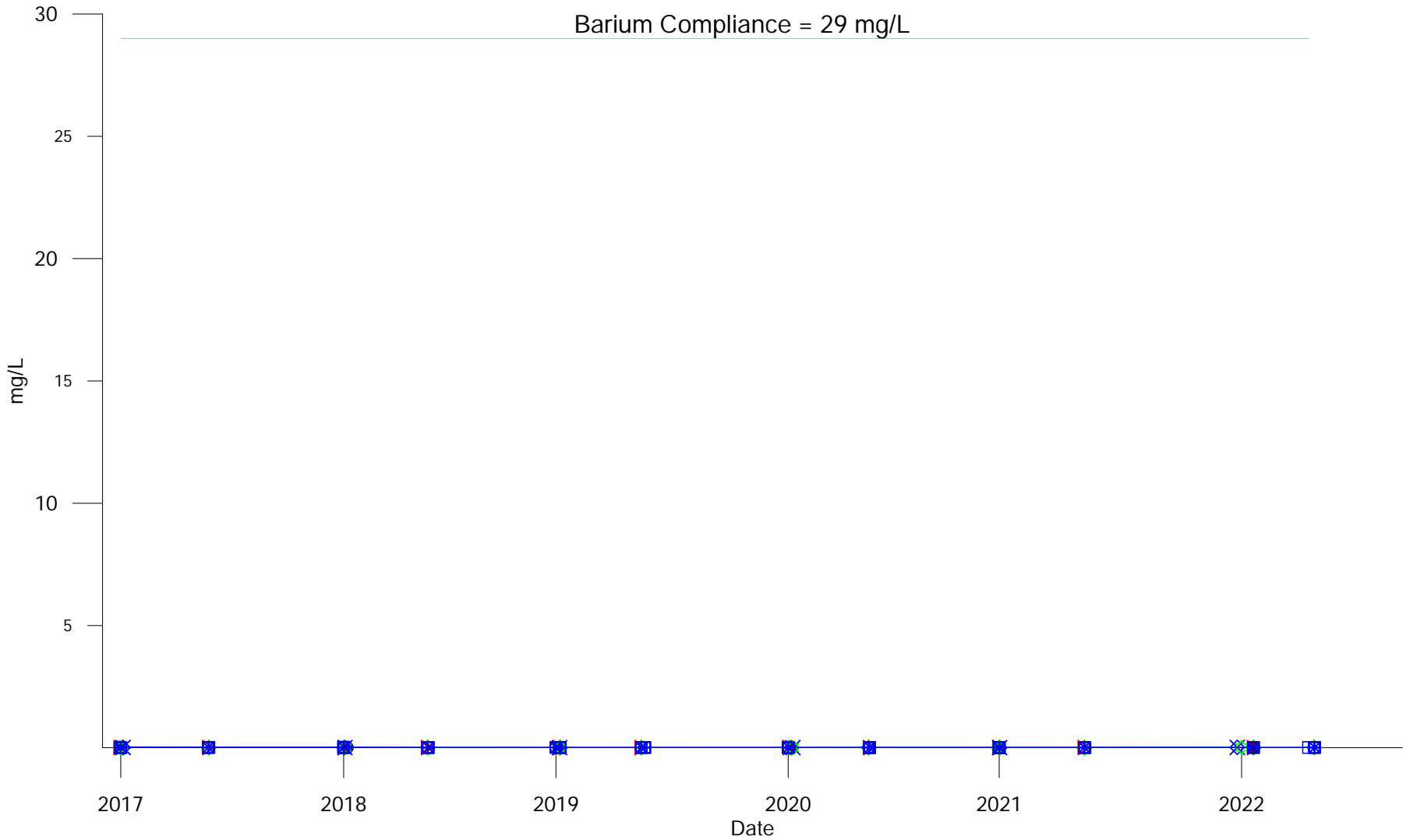
Cross gradient
 13A
 14A

Cross gradient
 15A
 16A
 4N34DDR
 6N57F
 6N63F

Boron MOE Criteria = 45 mg/L

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Boron Till Wells		
APRIL 2023	FIGURE 29	REV 0

Barium Compliance = 29 mg/L



Up gradient

6N60EER

Down gradient

 5N62E
 6N67F

Cross gradient

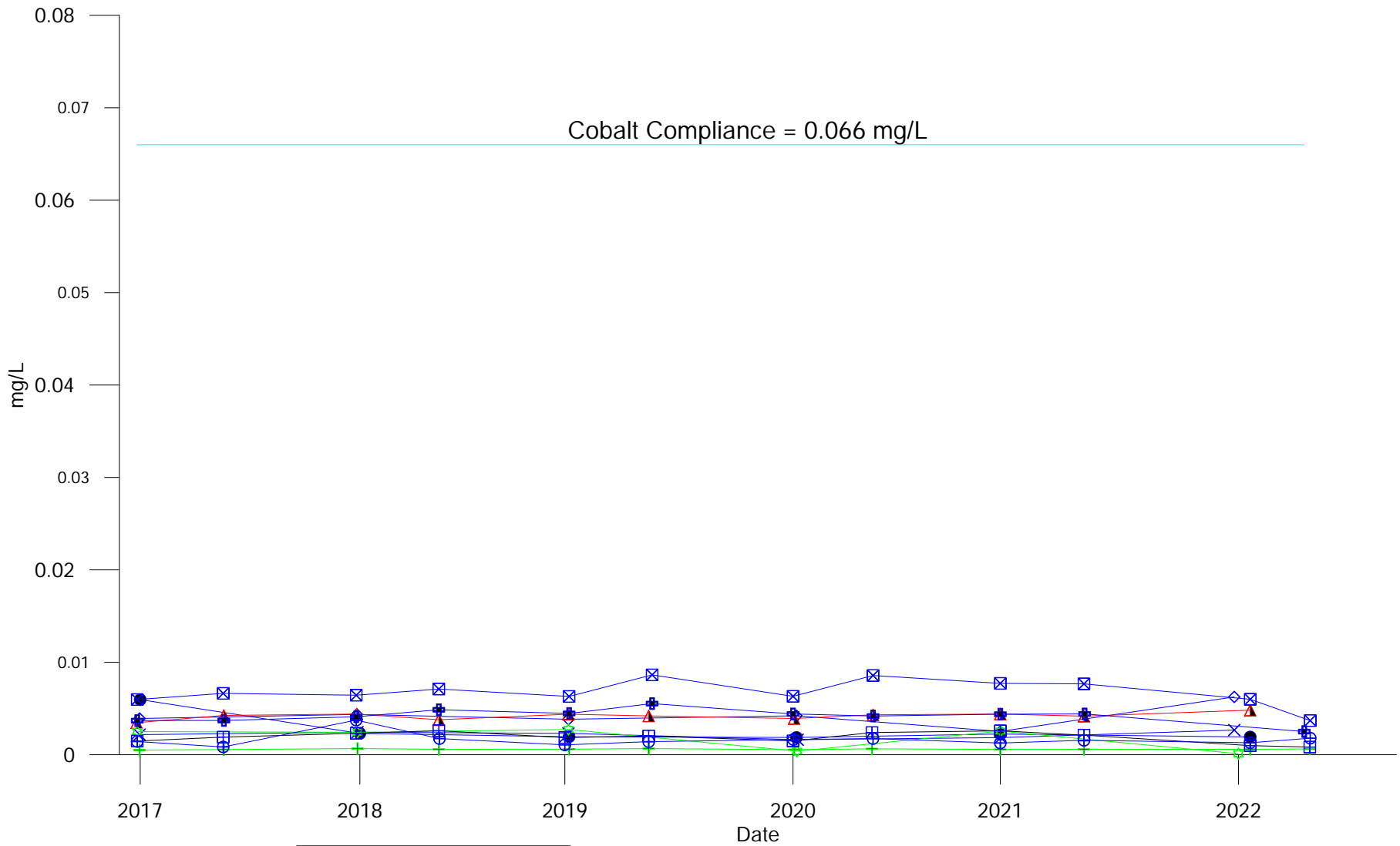
 13A
 14A

Cross gradient

 15A
 16A
 4N34DDR
 6N57F
 6N63F

Barium MOE Criteria = 29 mg/L

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Barium Till Wells		
APRIL 2023	FIGURE 30	REV 0



Up gradient
 6N60EER

Down gradient
 5N62E
 6N67F

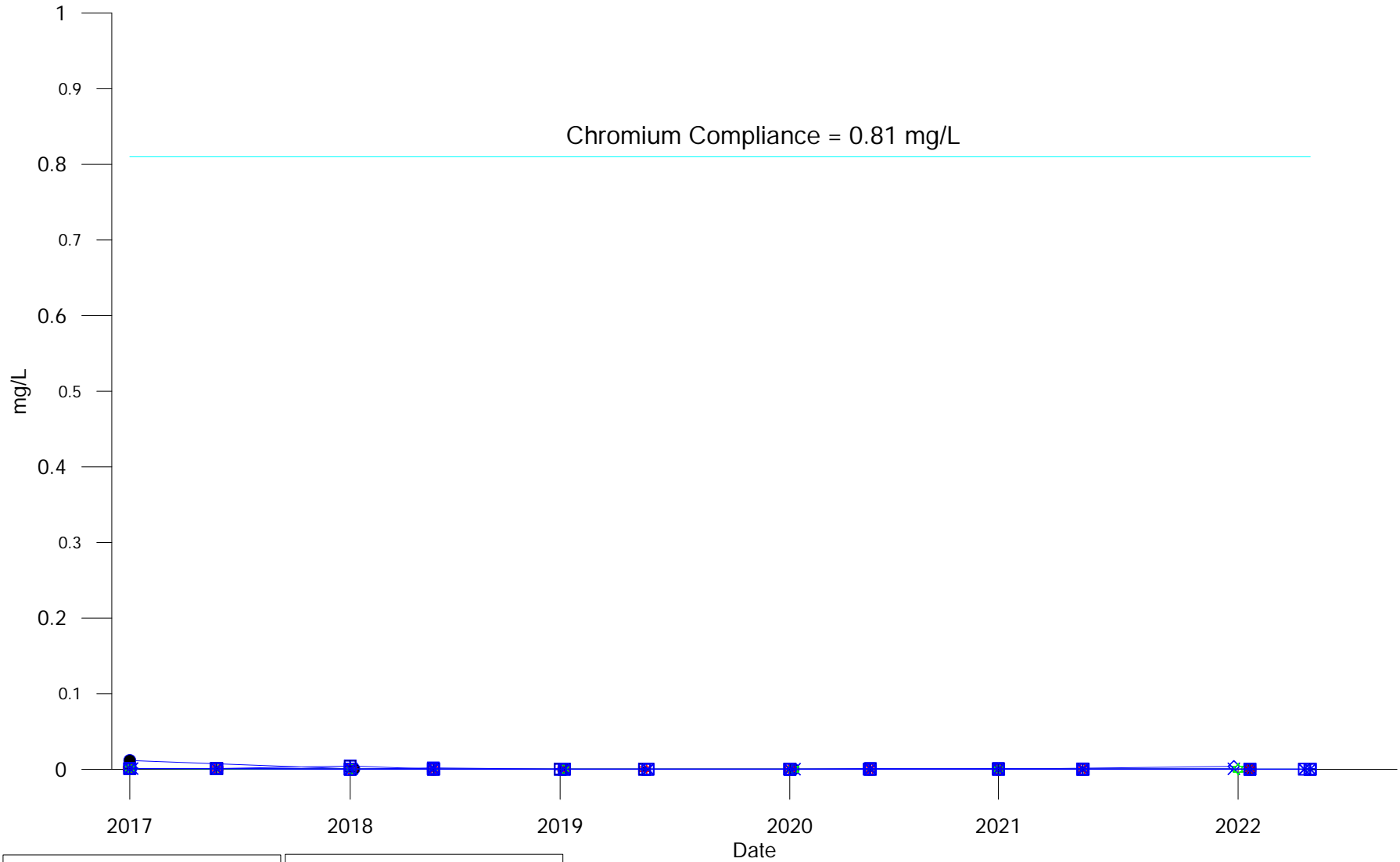
Cross gradient
 13A
 14A

Cross gradient
 15A
 16A
 4N34DDR
 6N57F
 6N63F

Cobalt MOE Criteria = 0.066 mg/L

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Cobalt Till Wells		
APRIL 2023	FIGURE 31	REV 0

Chromium Compliance = 0.81 mg/L



Up gradient
 6N60E

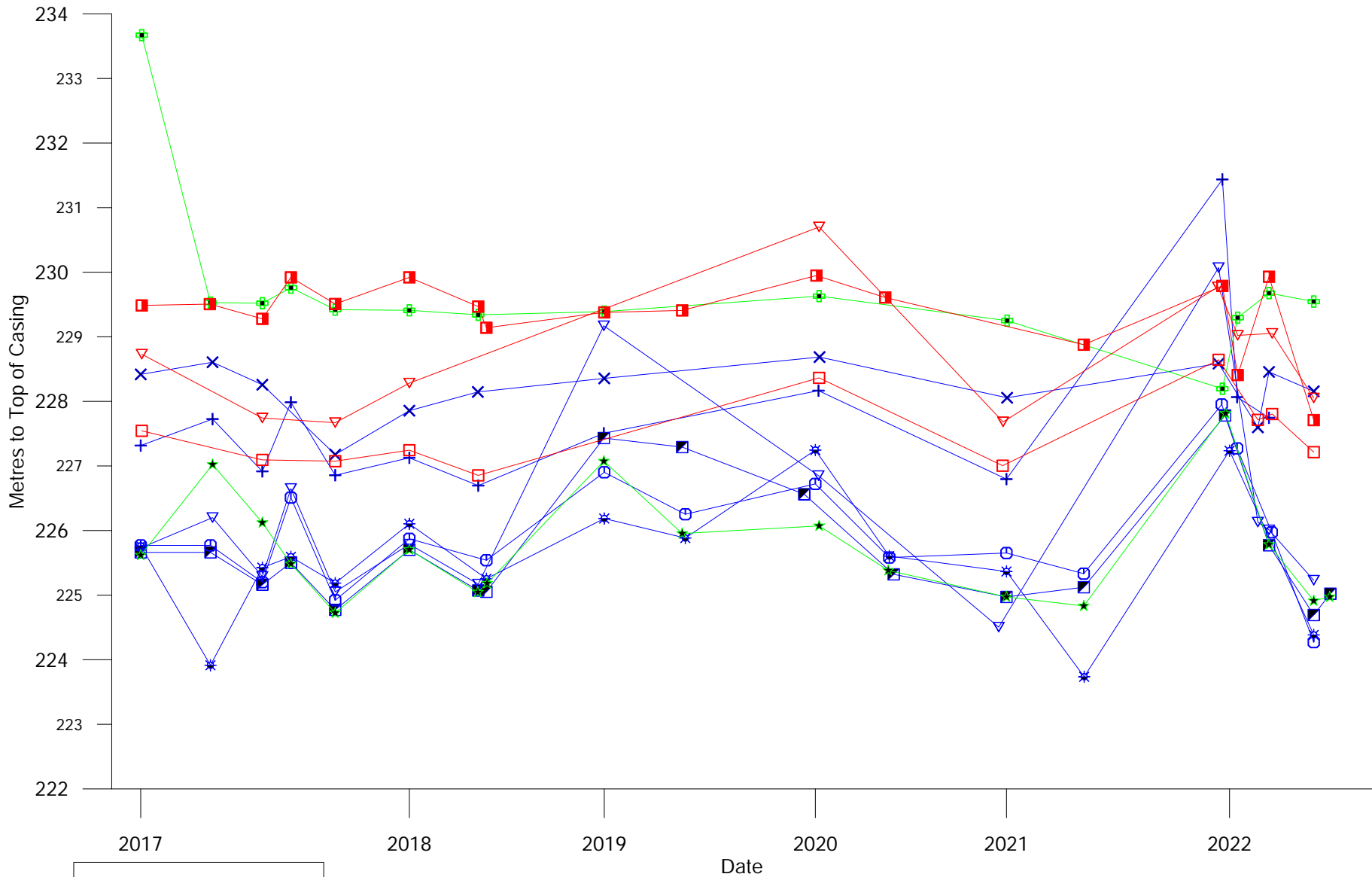
Down gradient
 5N62E
 6N67F

Cross gradient
 13A
 14A

Cross gradient
 15A
 16A
 4N34DDR
 6N57F
 6N63F

Chromium MOE Criteria = 0.81 mg/L

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Chromium Till Wells		
APRIL 2023	FIGURE 32	REV 0

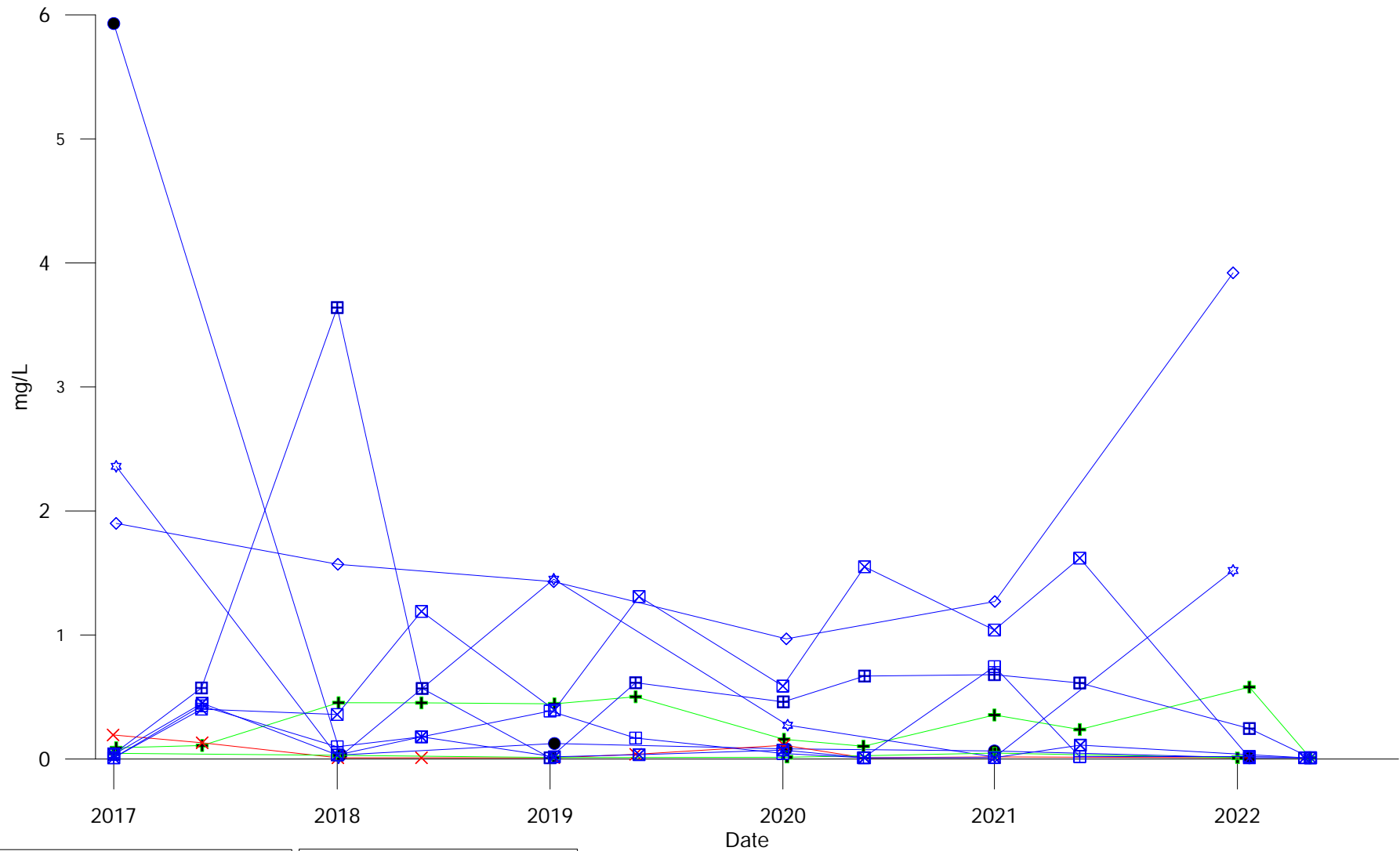


Cross gradient		
		13A
		15A
		6N57FR
		16A
		4N34DR
		6N63F

Up gradient		
		6N58FR
		6N59FR
		6N60ER

Down gradient		
		5N62E
		6N67F

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
GROUNDWATER ELEVATION TILL WELLS		
APRIL 2023	FIGURE GW-1-1	REV 0



Up gradient
 X X X 6N60EER

Down gradient
 + + + 5N62E
 + + + 6N67F

Cross gradient
 □ □ □ 13A
 □ □ □ 14A

Cross gradient
 □ □ □ 15A
 □ □ □ 16A
 ● ● ● 4N34DDR
 ◇ ◇ ◇ 6N57F
 ☆ ☆ ☆ 6N63F



City Of Winnipeg
 Solid Waste Services

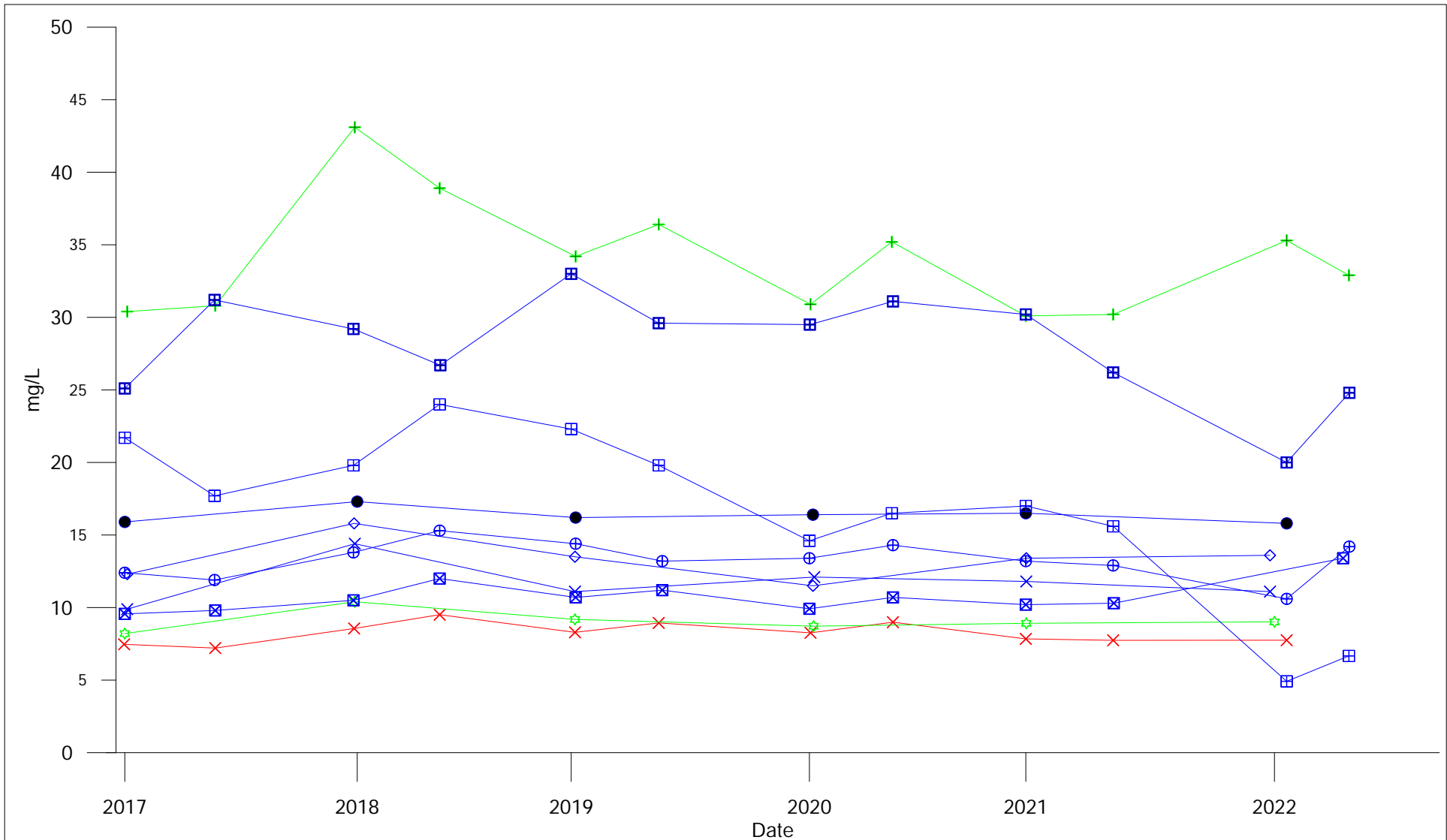
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Iron
 Till Wells

APRIL 2023

FIGURE 33

REV 0



Up gradient
 6N60EER

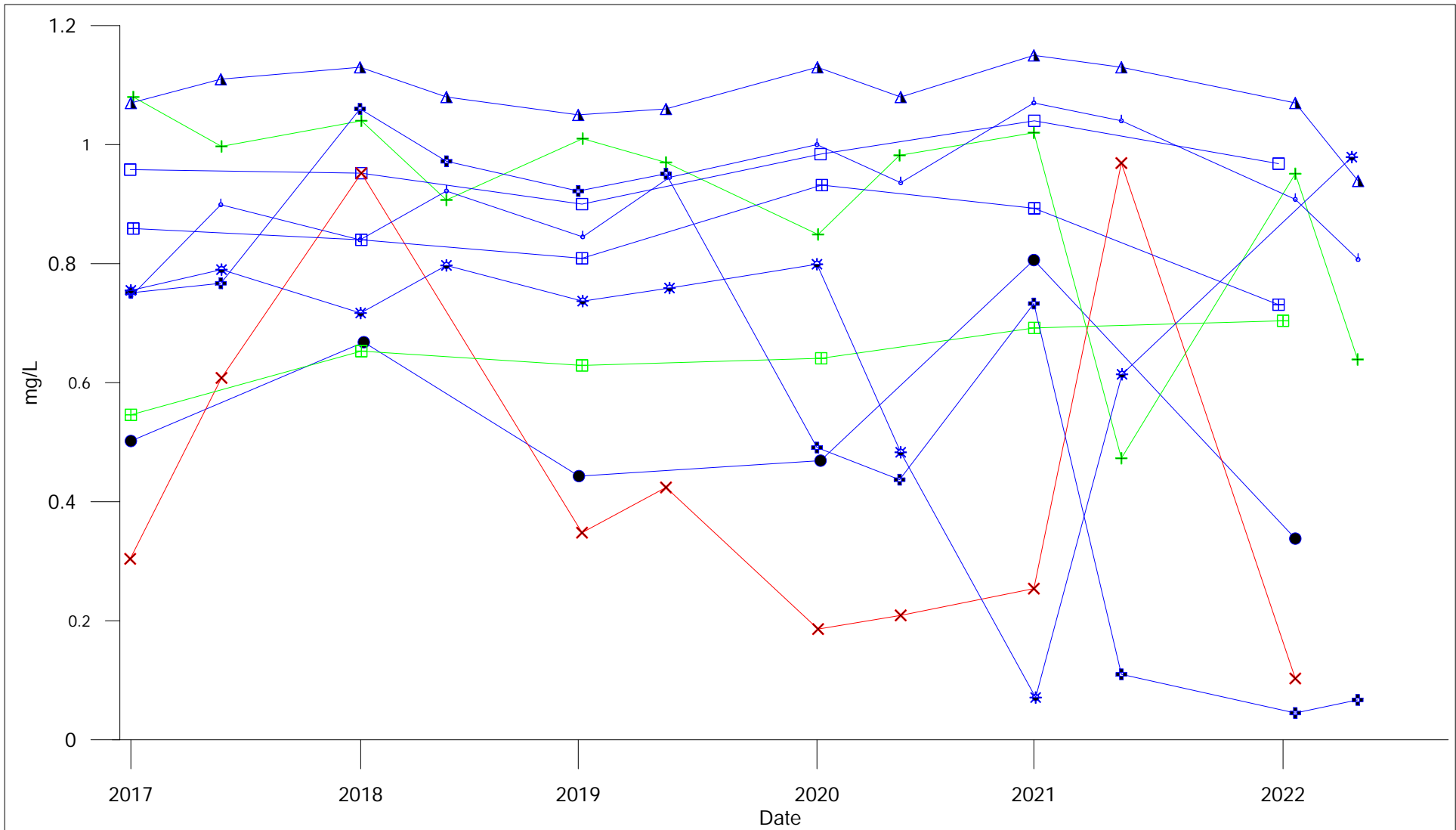
Down gradient
 5N62E
 6N67F

Cross gradient
 13A
 14A

Cross gradient
 15A
 16A
 4N34DDR
 6N57F
 6N63F



City of Winnipeg
 Solid Waste Services



Up gradient
 6N60EER

Cross gradient
 13A
 14A

Down gradient
 5N62E
 6N67F

Cross gradient
 15A
 16A
 4N34DDR
 6N57F
 6N63F



City Of Winnipeg
 Solid Waste Services

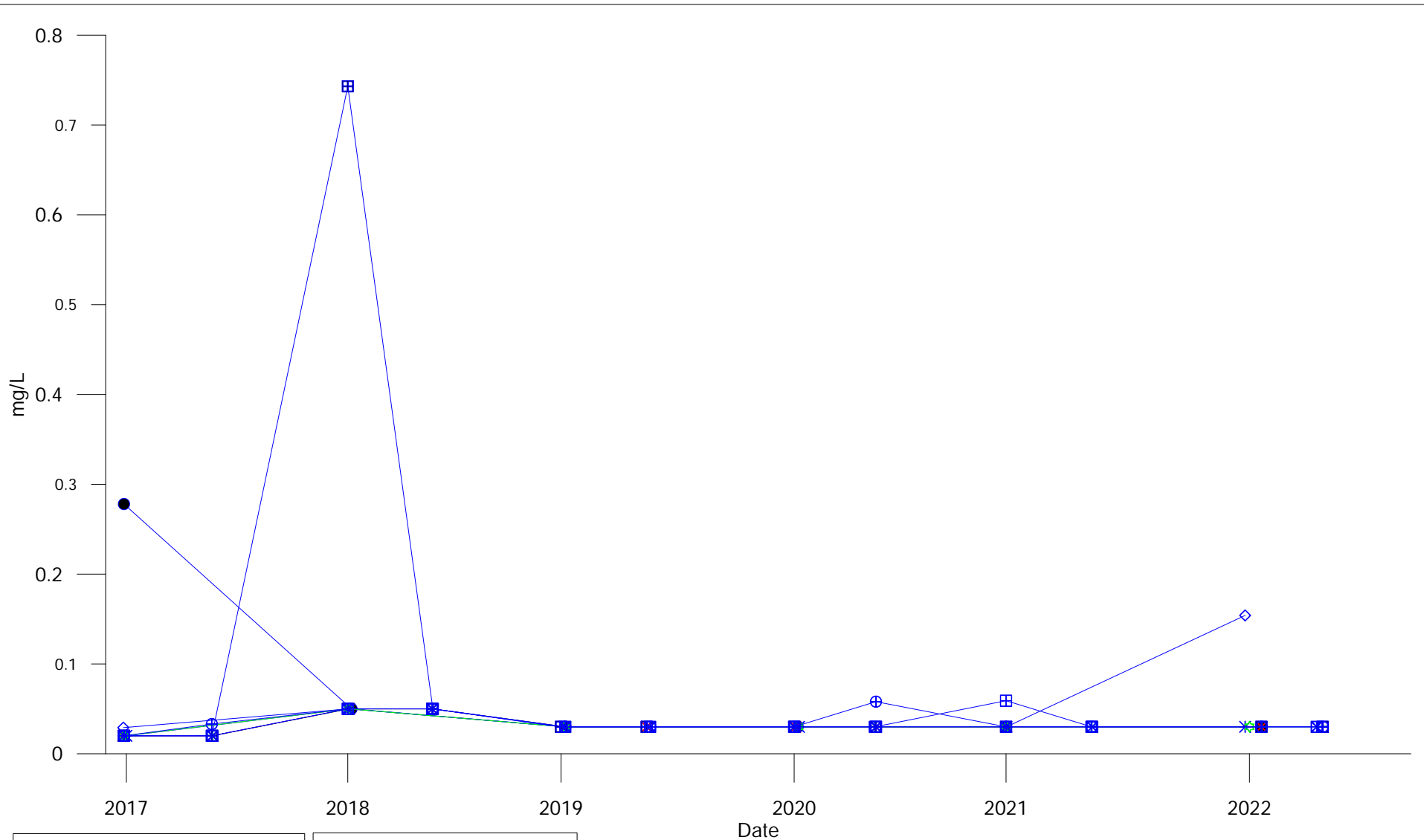
BRADY ROAD RESOURCE MANAGEMENT FACILITY

**Total Ammonia
 Till Wells**

APRIL 2023

FIGURE 37

REV 0



Up gradient
 6N60EER

Down gradient
 5N62E
 6N67F

Cross gradient
 13A
 14A

Cross gradient
 16A
 4N34DDR
 6N57F
 6N63F
 15A

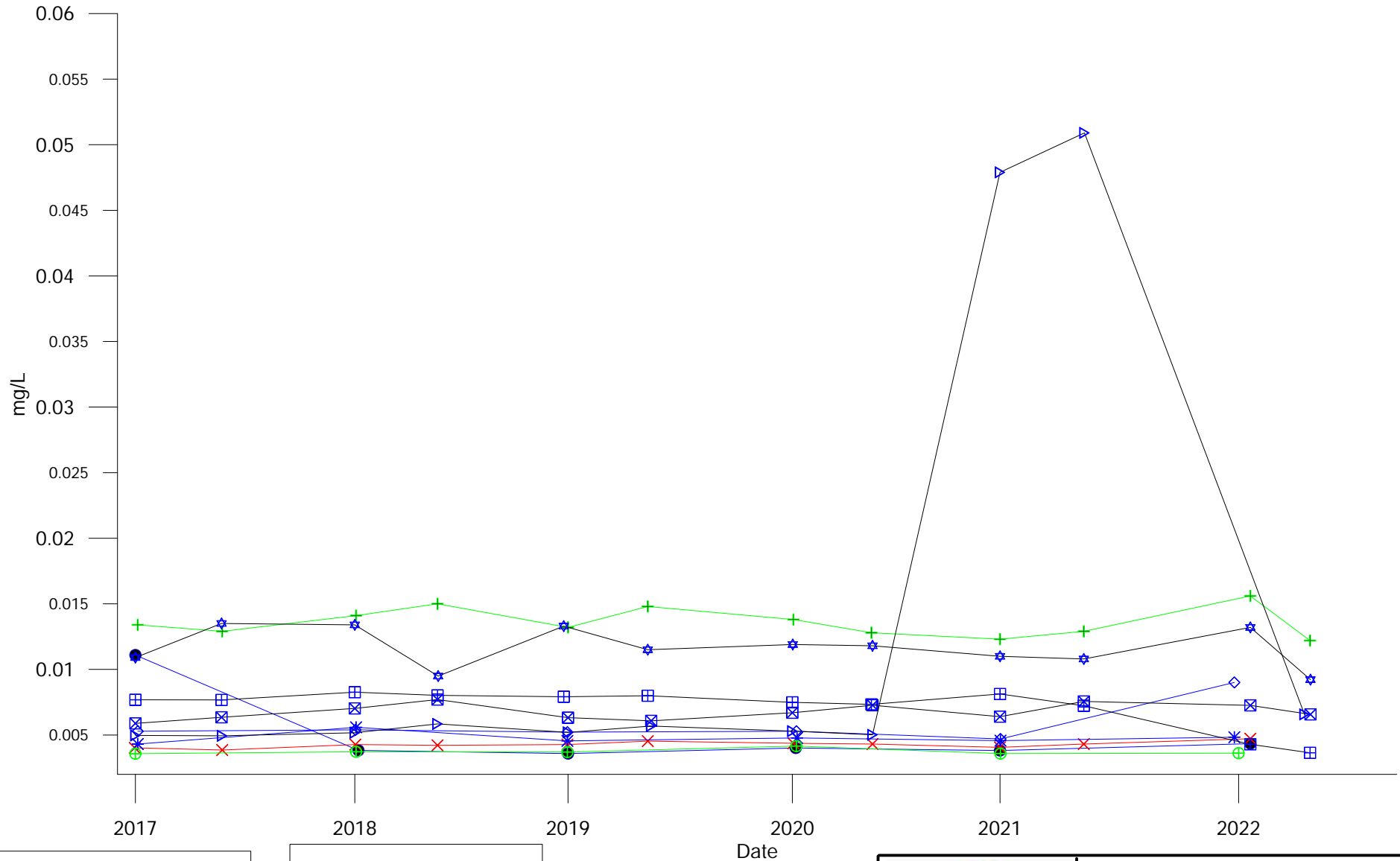


City Of Winnipeg
 Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Phosphorus
 Till Wells

APRIL 2023 | FIGURE 35 | REV 0



Up gradient
 X X X 6N60E

Down gradient
 + + + 5N62E
 ⊕ ⊕ ⊕ 6N67F

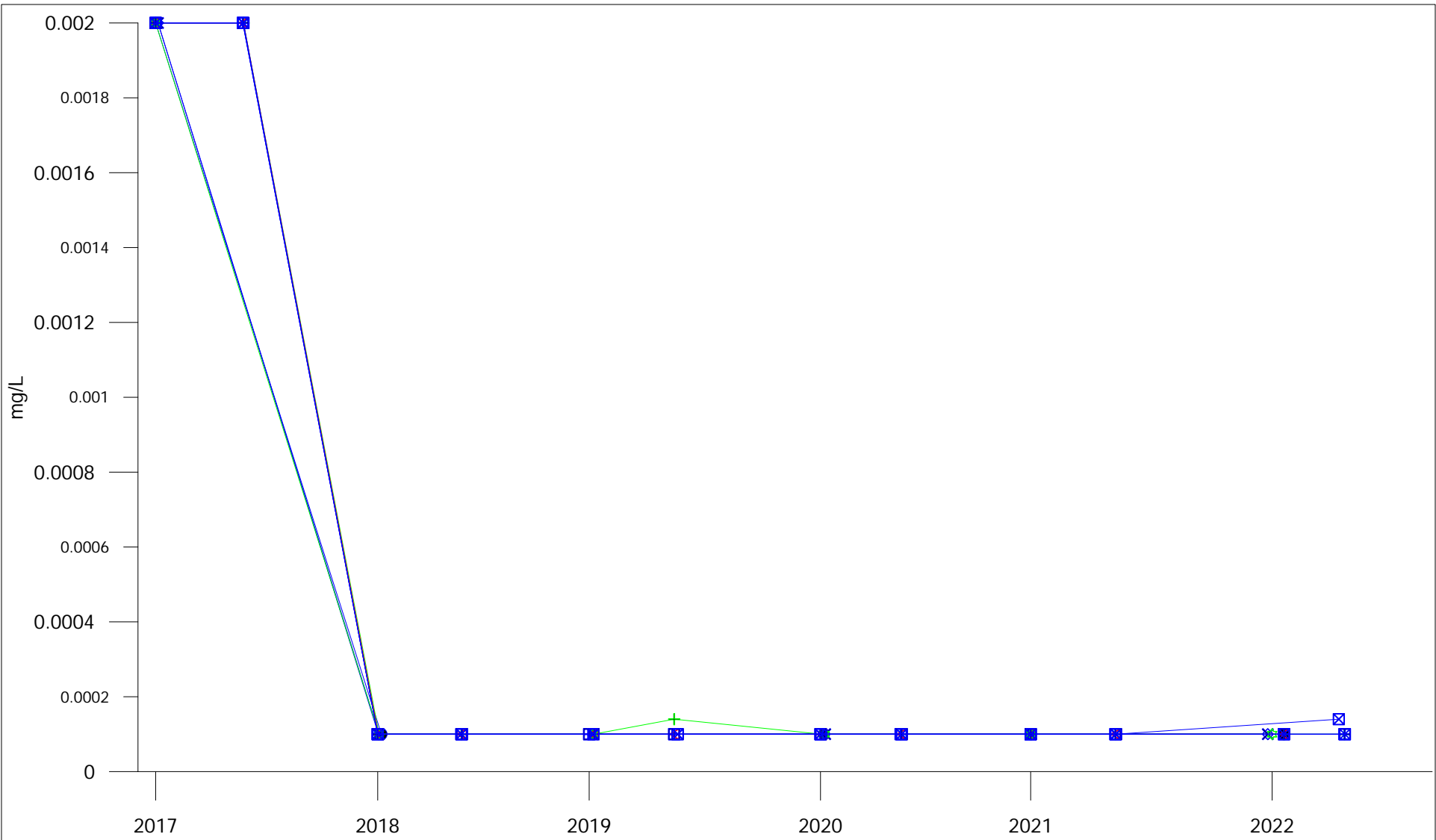
Cross gradient
 ⊠ ⊠ ⊠ 15A
 ▽ ▽ ▽ 16A

Cross gradient
 ● ● ● 4N34DDR
 ◇ ◇ ◇ 6N57F
 * * * 6N63F
 ⊠ ⊠ ⊠ 13A
 ☆ ☆ ☆ 14A



City Of Winnipeg
 Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY
**Dissolved Rubidium
 Till Wells**
 APRIL 2023 | FIGURE 36 | REV 0



Up gradient
 6N60EER

Cross gradient

- 4N34DDR
- 6N57F
- 6N63F
- 13A
- 14A

Down gradient

- 5N62E
- 6N67F

Cross gradient

- 15A
- 16A



City Of Winnipeg
 Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Tin
 Till Wells

APRIL 2022 | FIGURE 38 | REV 0



Up gradient
 × × × 6N60E

Down gradient
 + + + 5N62E
 ⊕ ⊕ ⊕ 6N67F

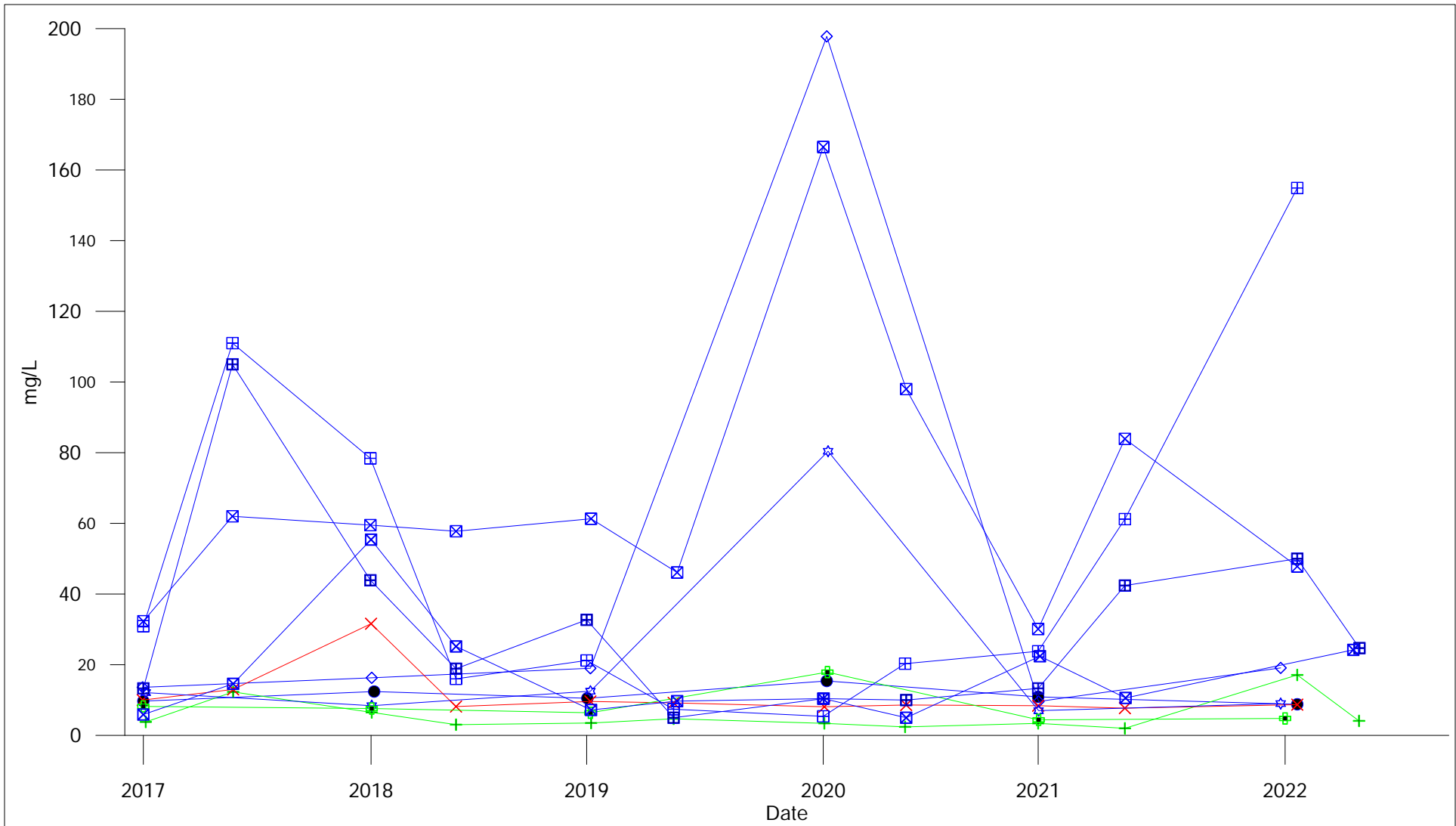
Cross gradient
 ⊞ ⊞ ⊞ 13A
 ⊕ ⊕ ⊕ 14A

Cross gradient
 ☆ ☆ ☆ 15A
 ⊠ ⊠ ⊠ 16A
 ● ● ● 4N34DDR
 □ □ □ 6N57F
 ☆ ☆ ☆ 6N63F



City Of Winnipeg
 Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY
**Total Alkalinity
 Till Wells**
 APRIL 2023 FIGURE 40 REV 0



Up gradient
 X—X—X 6N60E

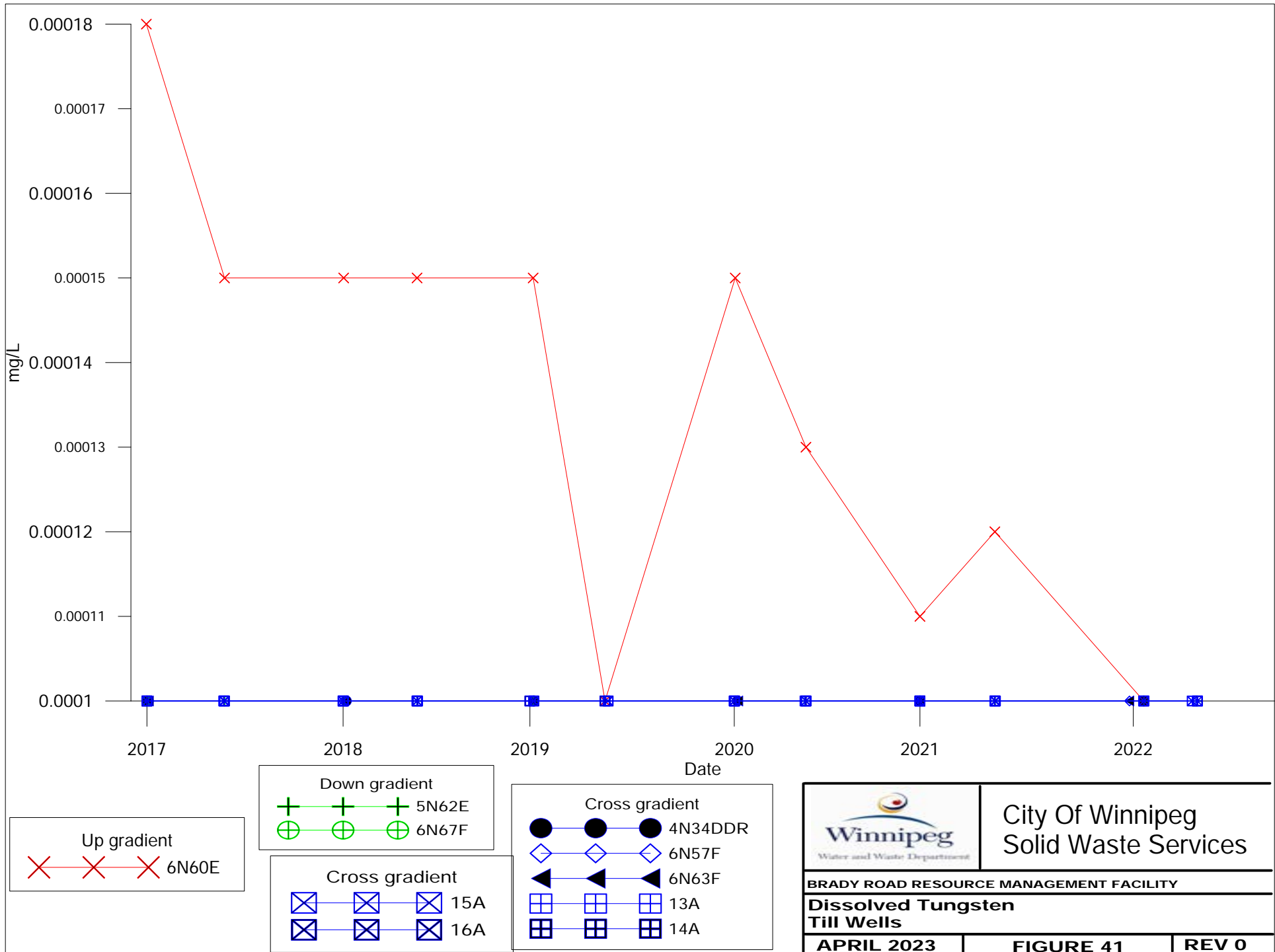
Down gradient
 +—+—+ 5N62E
 +—+—+ 6N67F

Cross gradient
 □—□—□ 13A
 □—□—□ 14A

Cross gradient
 □—□—□ 15A
 □—□—□ 16A
 ●—●—● 4N34DDR
 ◇—◇—◇ 6N57F
 ☆—☆—☆ 6N63F



City Of Winnipeg
 Solid Waste Services



Up gradient
 6N60E

Down gradient
 5N62E
 6N67F

Cross gradient
 15A
 16A

Cross gradient
 4N34DDR
 6N57F
 6N63F
 13A
 14A



City Of Winnipeg
 Solid Waste Services

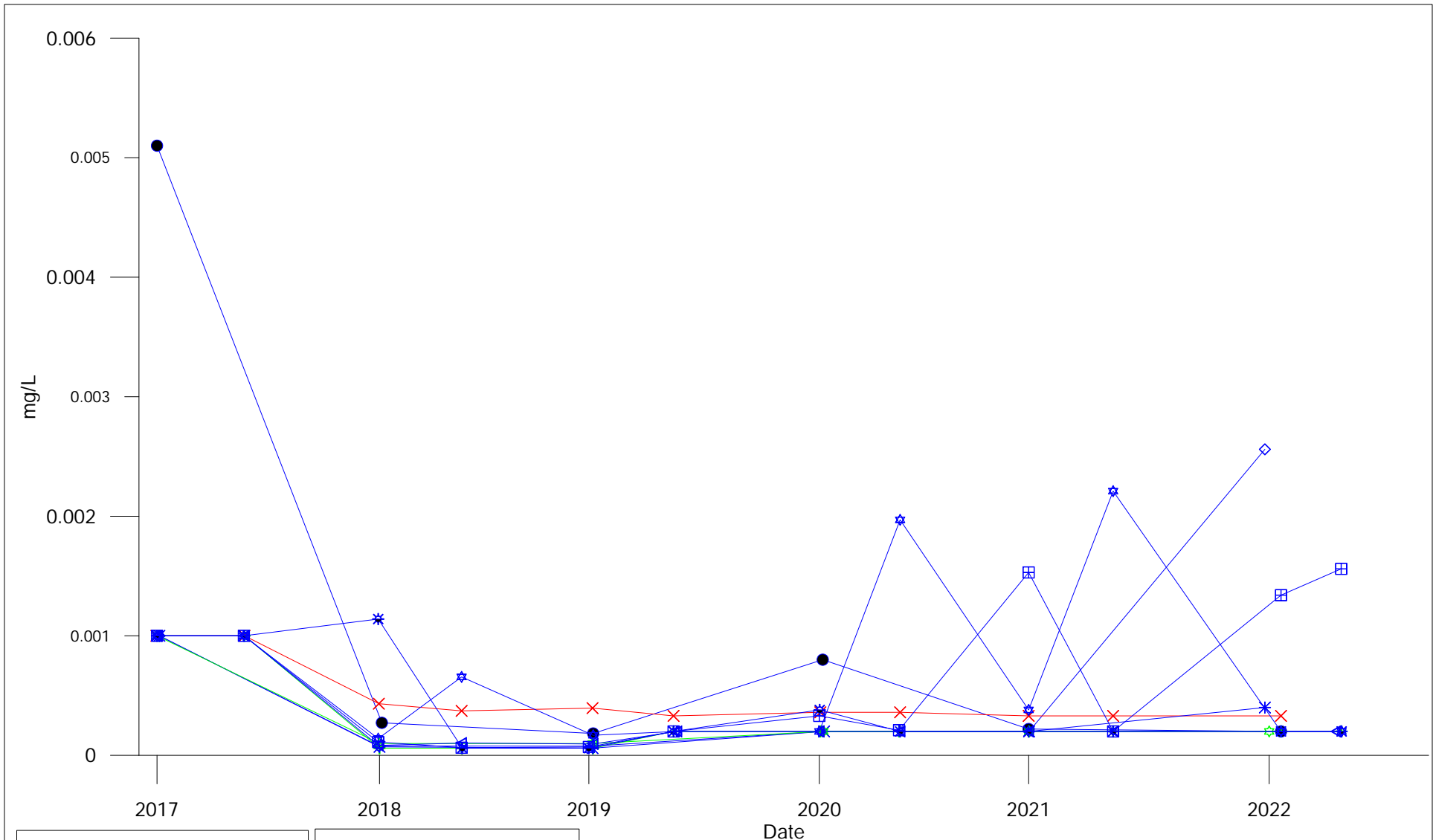
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Tungsten
 Till Wells

APRIL 2023

FIGURE 41

REV 0



Up gradient
 X X X 6N60EER

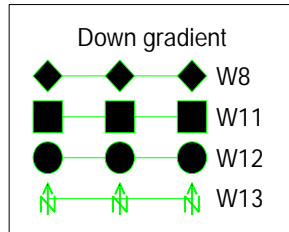
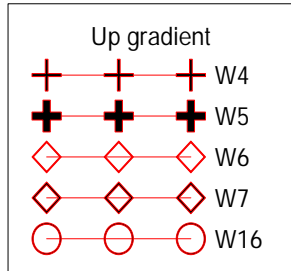
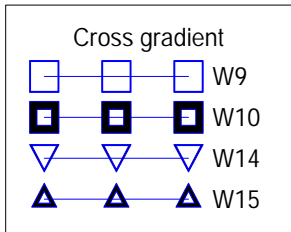
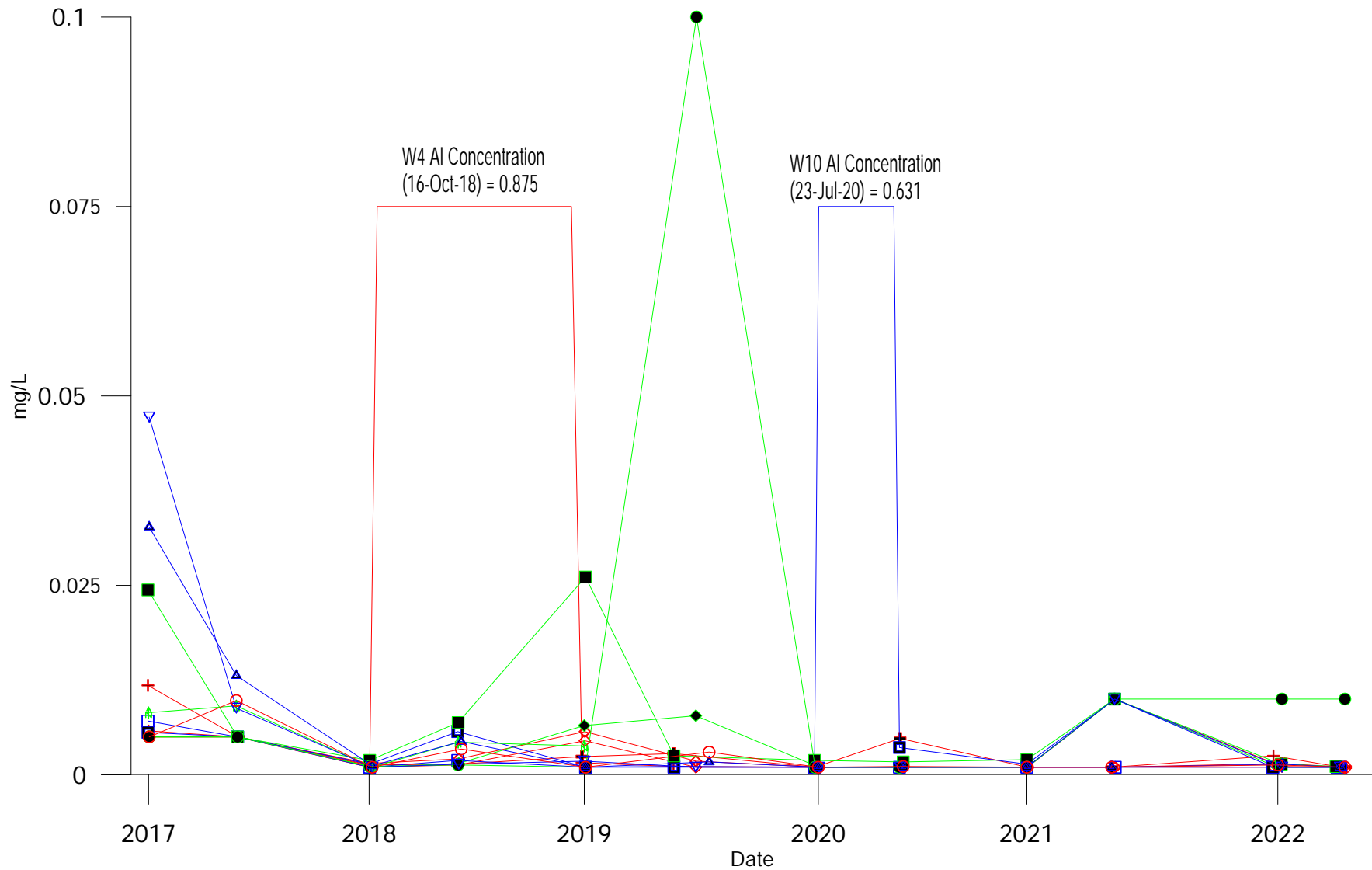
Down gradient
 + + + 5N62E
 ☆ ☆ ☆ 6N67F

Cross gradient
 □ □ □ 13A
 ☆ ☆ ☆ 14A

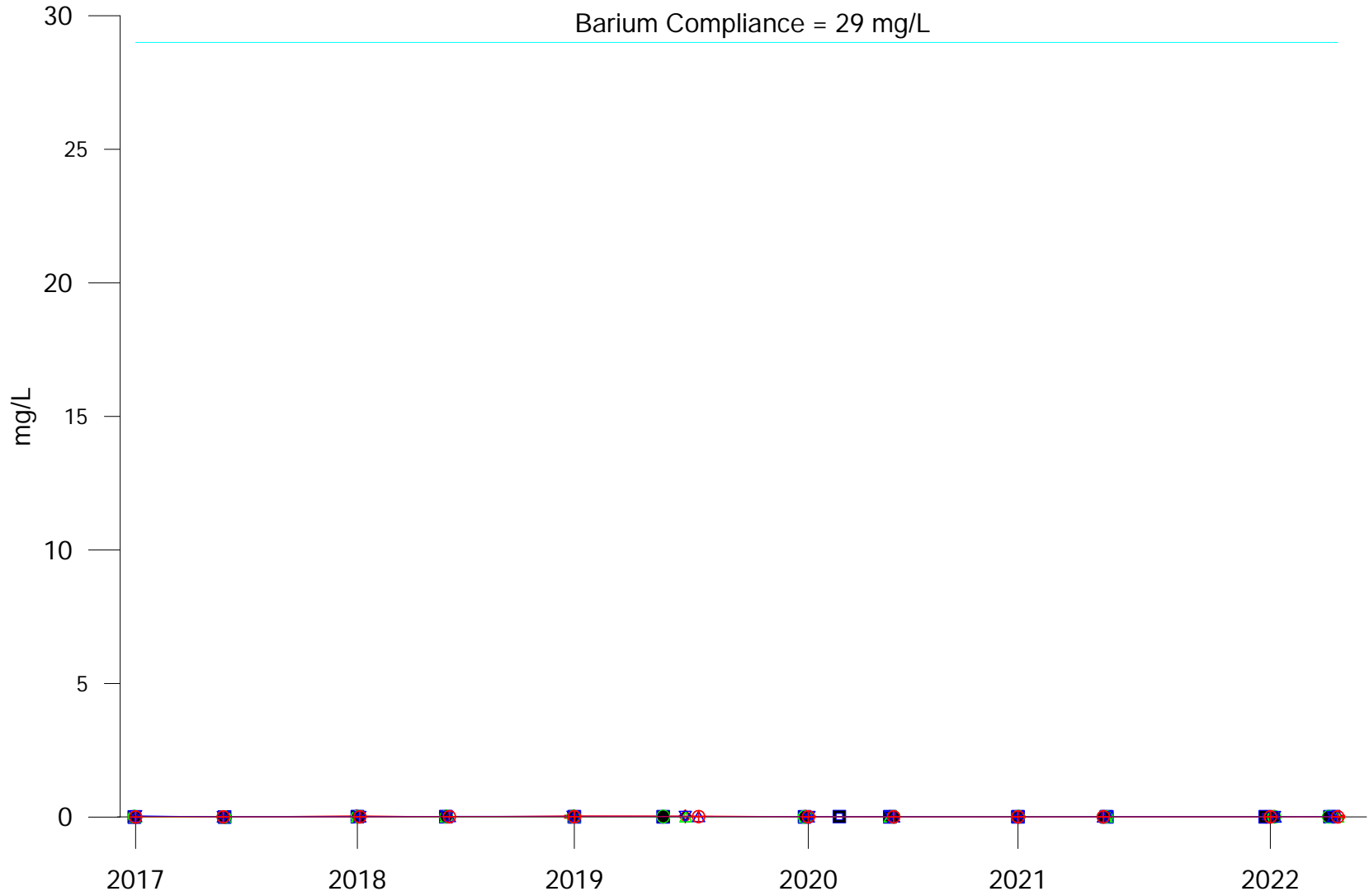
Cross gradient
 ☆ ☆ ☆ 15A
 ◁ ◁ ◁ 16A
 ● ● ● 4N34DDR
 ◇ ◇ ◇ 6N57F
 ✱ ✱ ✱ 6N63F



City Of Winnipeg
 Solid Waste Services



	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Aluminium Concentration Bedrock Wells		
APRIL 2023	FIGURE 1	REV 0



Cross gradient

- W9
- W10
- ▽ W14
- △ W15

Up gradient

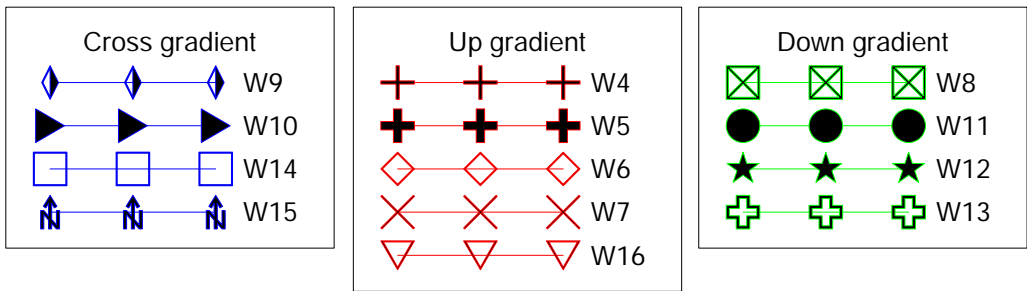
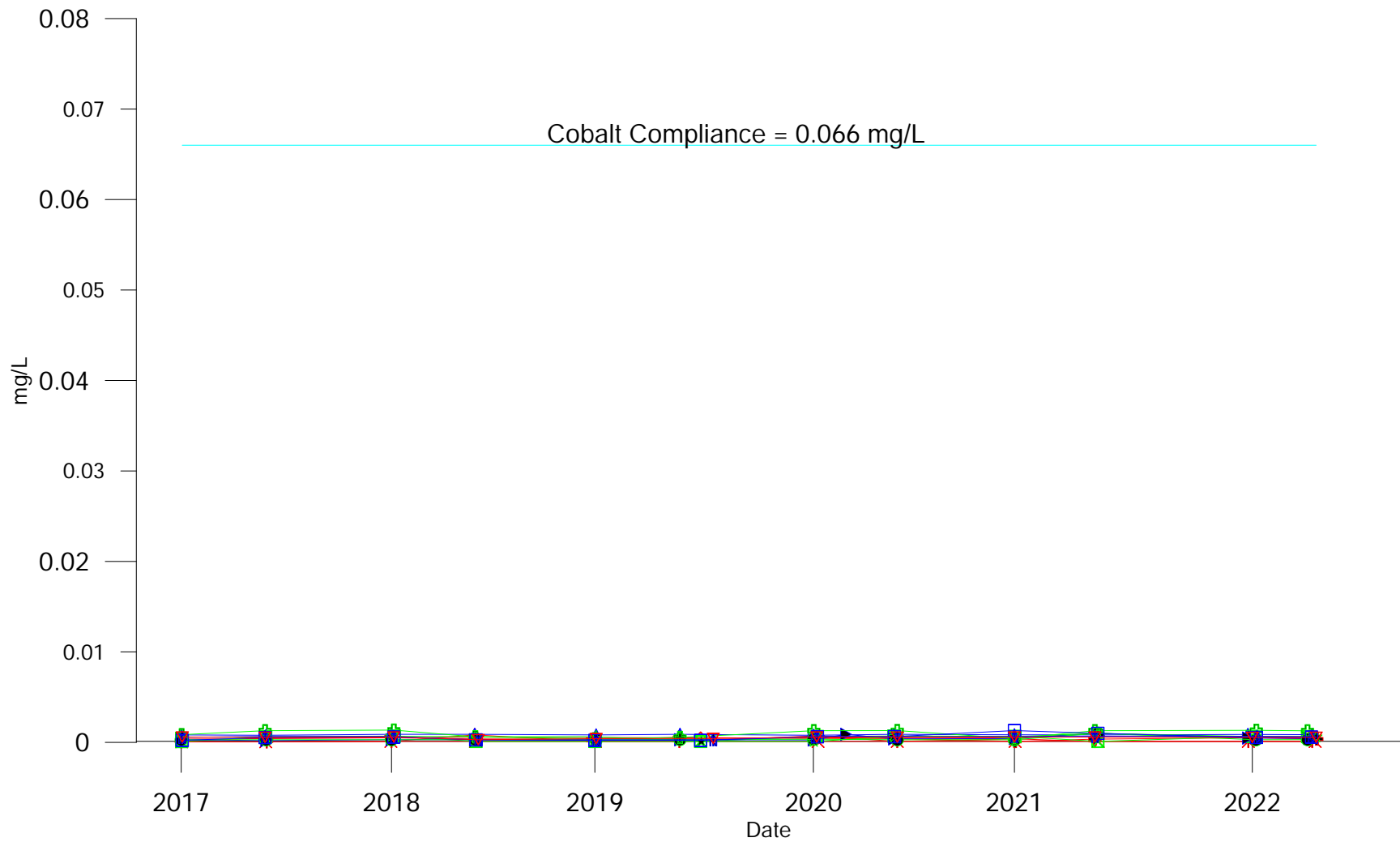
- ⊕ W4
- ⊕ W5
- ◇ W6
- ◇ W7
- ⊕ W16

Down Gradient

- ◆ W8
- W10
- W11
- △ W12
- W13

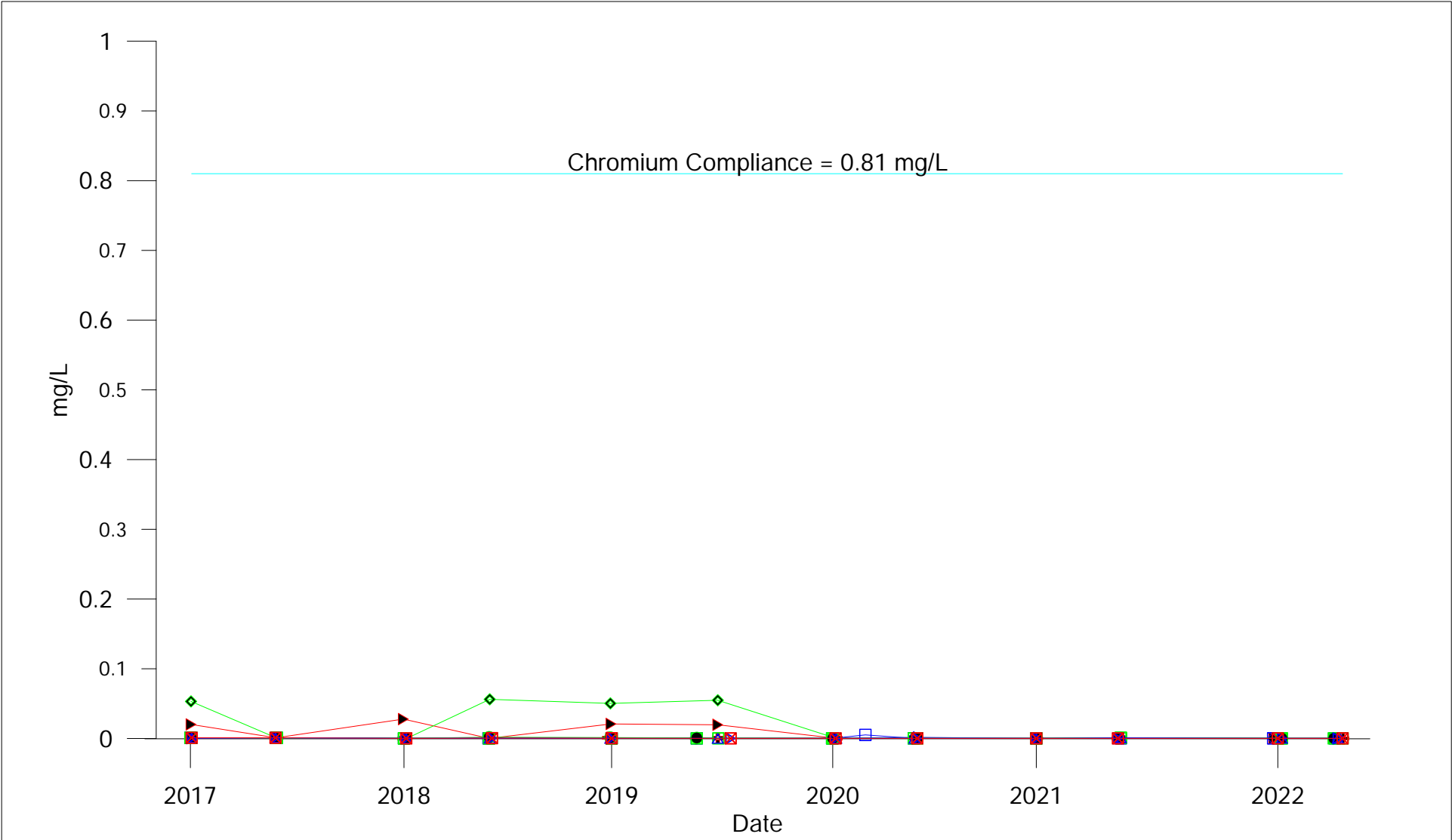
Barium MOE Criteria = 29 mg/L

	City of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Barium Concentration Bedrock Wells		
APRIL 2023	FIGURE 2	REV 0



MOE Cobalt Criteria = 0.066 mg/L

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Cobalt Concentration Bedrock Wells		
APRIL 2023	FIGURE 3	REV 0



Chromium MOE Criteria = 0.81 mg/L

Cross gradient

- ◆ W9
- W10
- △ W14
- ▷ W15

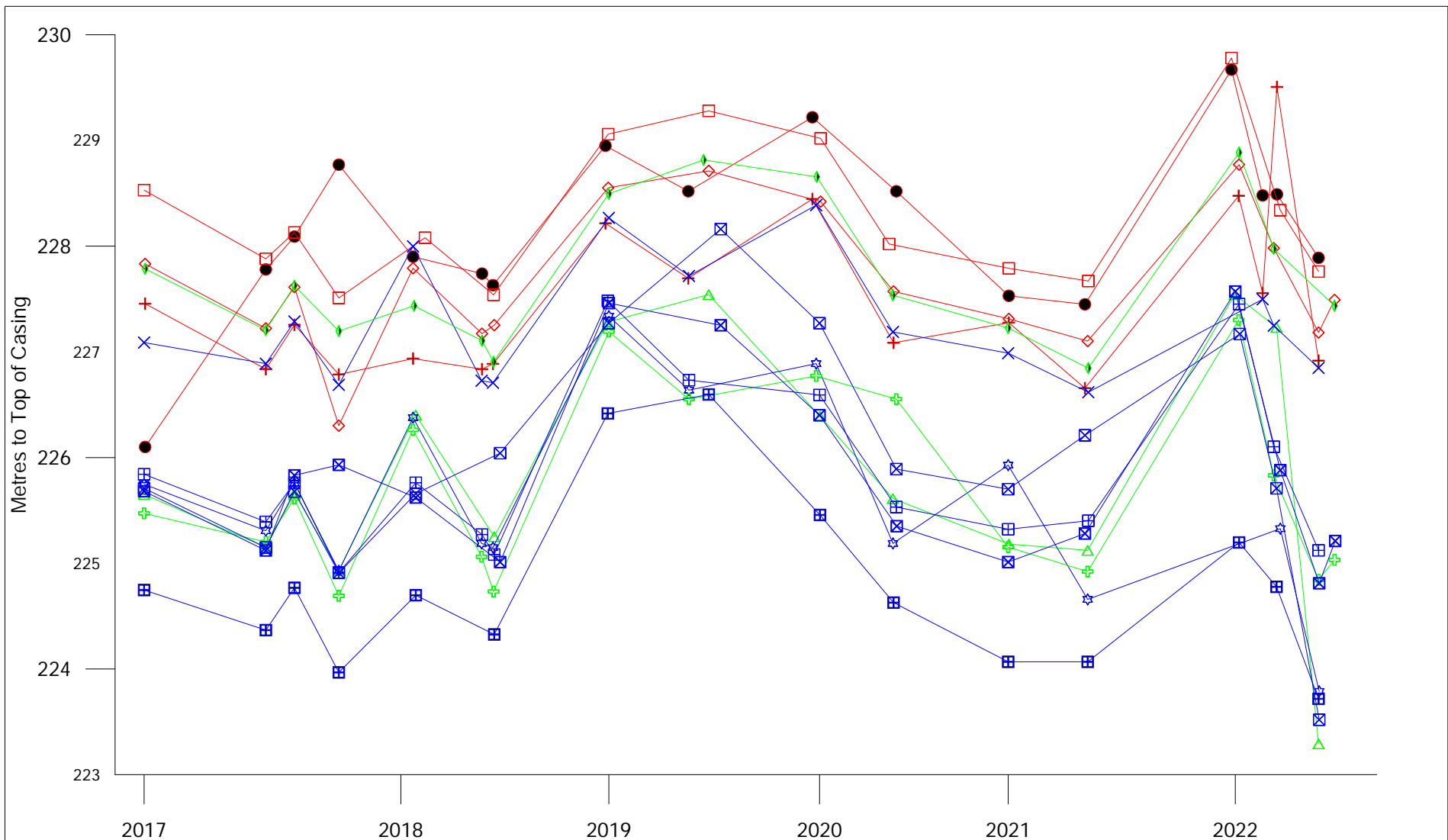
Up gradient

- + W4
- + W5
- + W6
- ▶ W7
- ⊠ W16

Down gradient

- ◇ W8
- W11
- W12
- W13

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Chromium Concentration Bedrock Wells		
APRIL 2023	FIGURE 4	REV 0



Cross gradient

□	□	□	W13
⊞	⊞	⊞	W14
⊠	⊠	⊠	W15
⊡	⊡	⊡	W16

Cross gradient

☆	☆	☆	W10
×	×	×	W9

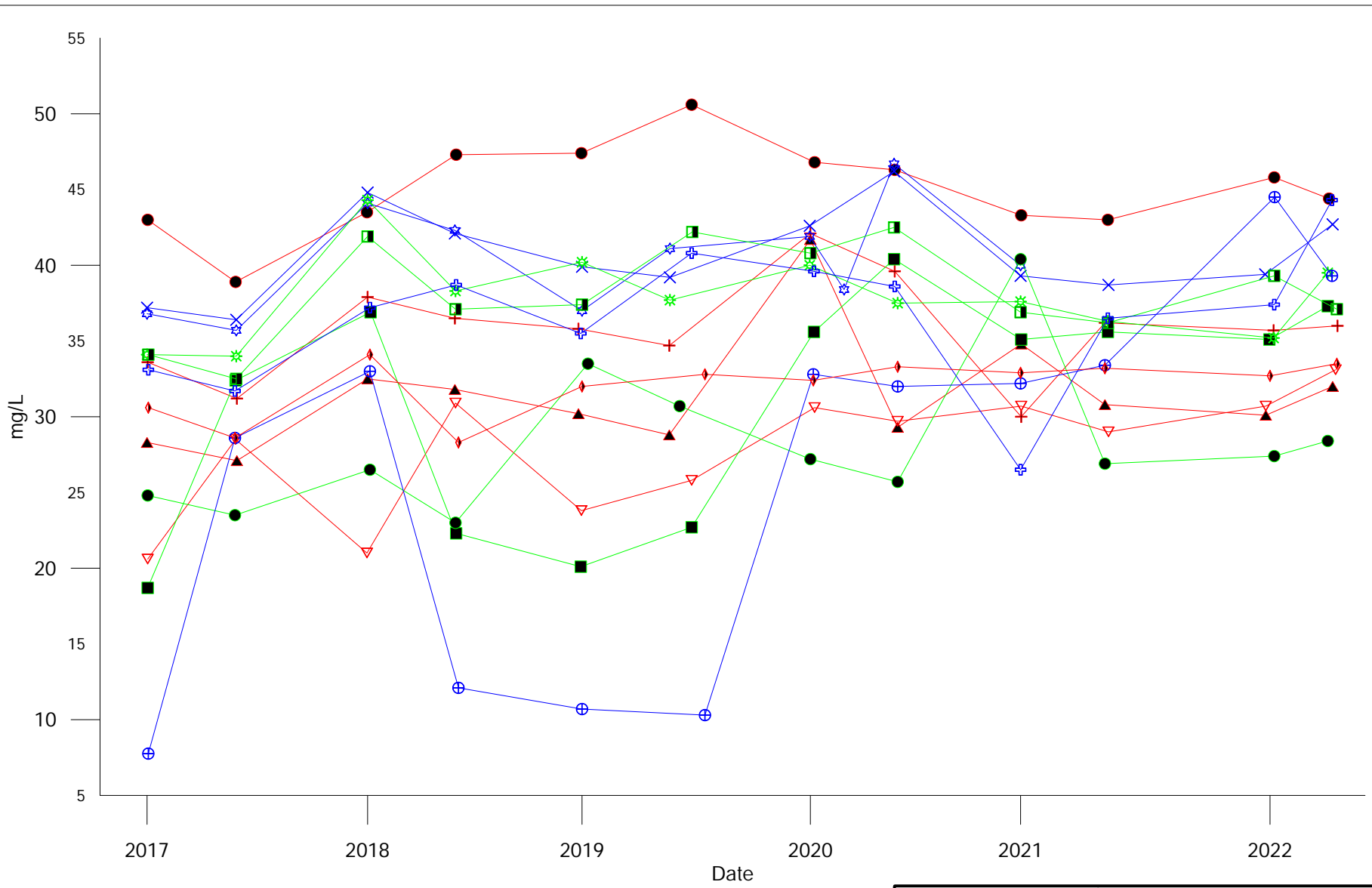
Up gradient

+	+	+	W11
◇	◇	◇	W12
△	△	△	W8

Down gradient

●	●	●	W4
+	+	+	W5
◇	◇	◇	W6
□	□	□	W7

	City Of Winnipeg Solid Waste Services
	BRADY ROAD RESOURCE MANAGEMENT FACILITY GROUNDWATER ELEVATION Bedrock Wells
APRIL 2023	FIGURE GW-2 REV 0



Cross gradient

- W9
- W10
- W14
- W15

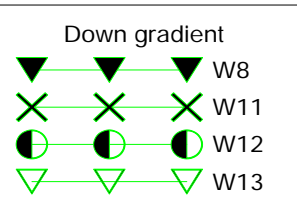
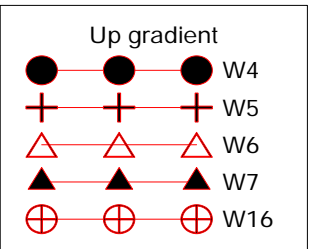
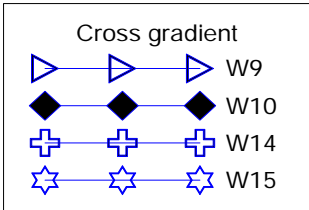
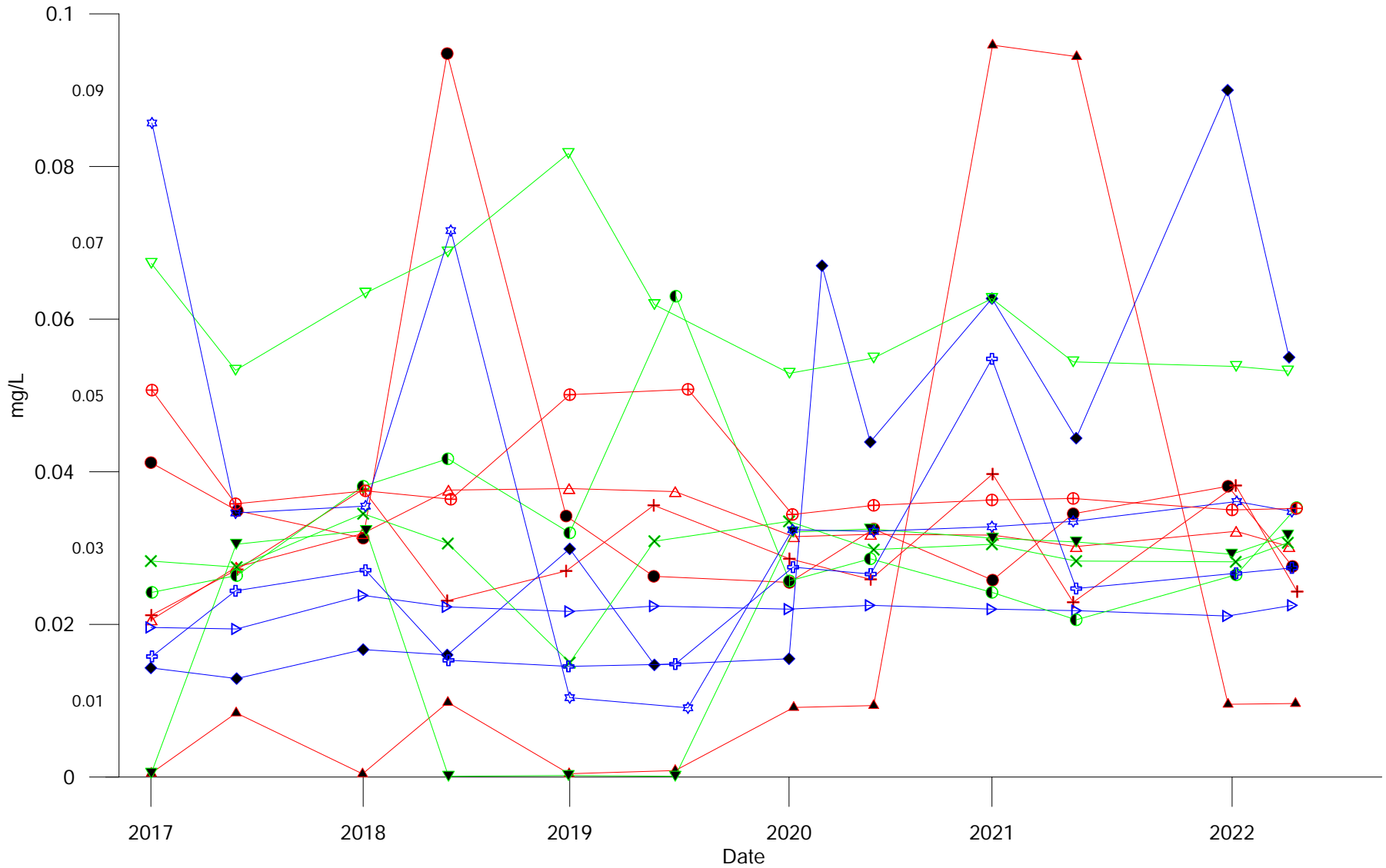
Up gradient

- W4
- W5
- W6
- W7
- W16

Down gradient

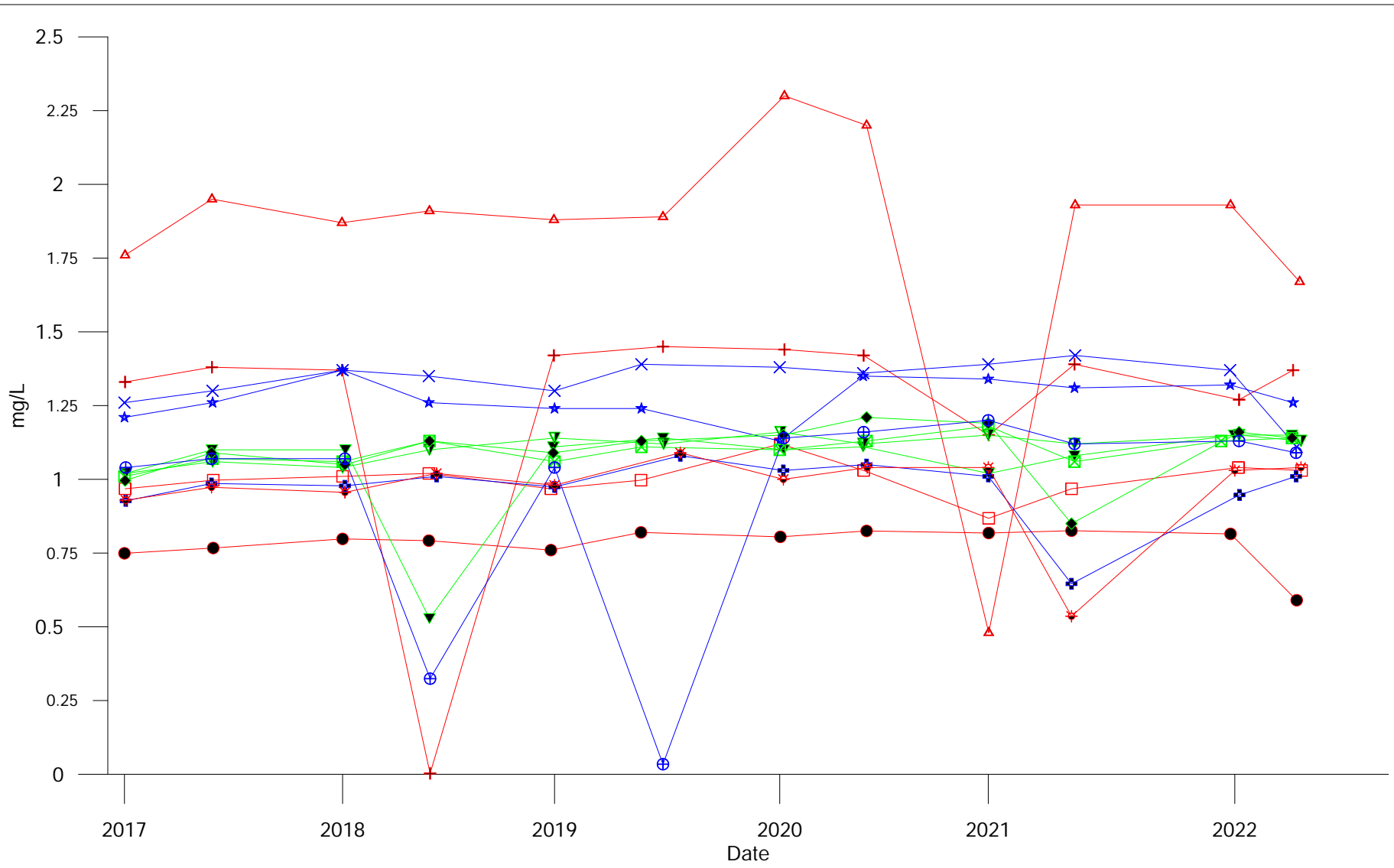
- W8
- W11
- W12
- W13

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Potassium Concentration Bedrock Wells		
APRIL 2023	FIGURE 5	REV 0



City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY		
Dissolved Manganese Concentration Bedrock Wells		
APRIL 2023	FIGURE 7	REV 0



Cross gradient

- W9
- W10
- W14
- W15

Up gradient

- W4
- W5
- W6
- W7
- W16

Down gradient

- W8
- W11
- W12
- W13



City Of Winnipeg
Solid Waste Services

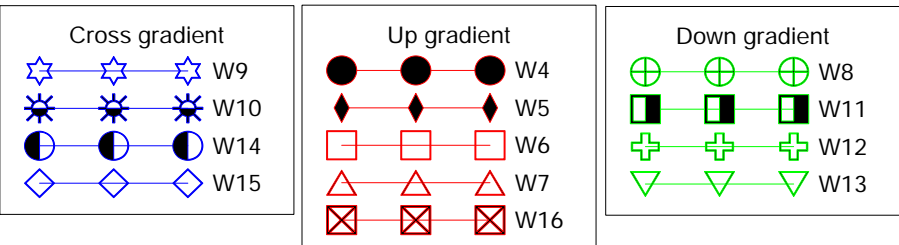
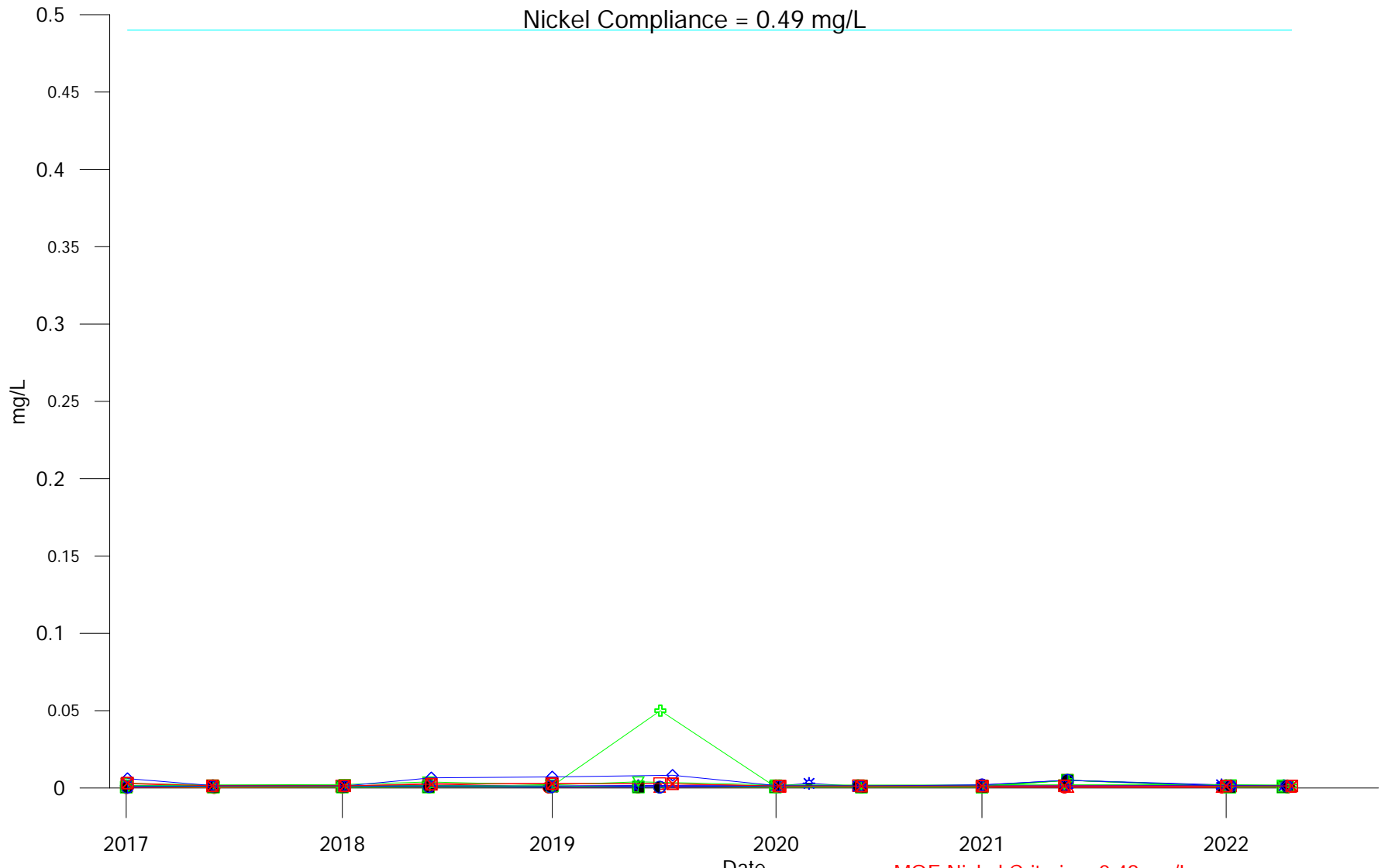
BRADY ROAD RESOURCE MANAGEMENT FACILITY

**Ammonia Concentration
Bedrock Wells**

APRIL 2023

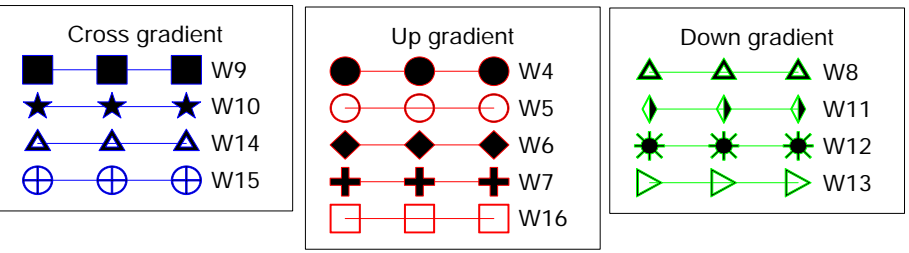
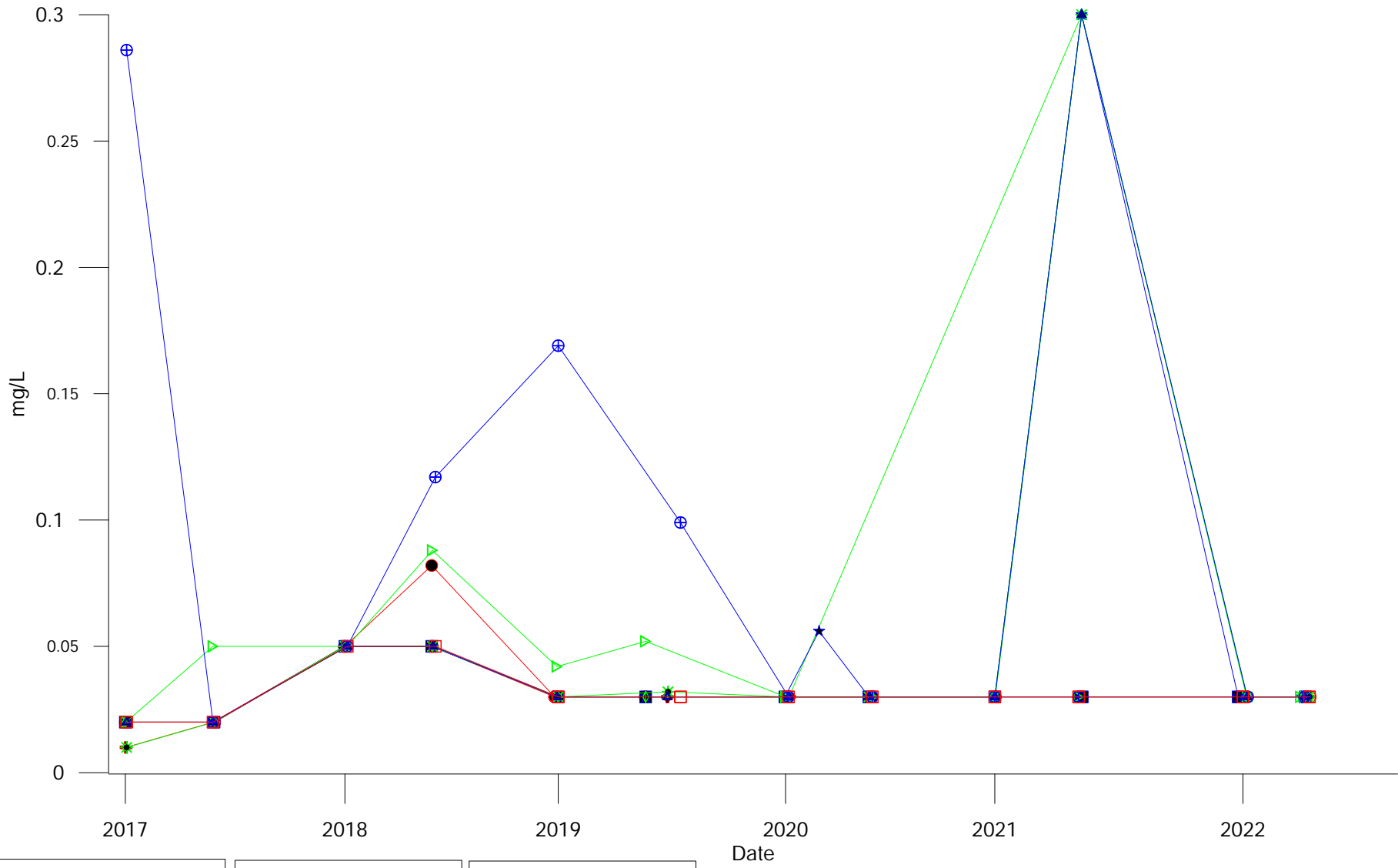
FIGURE 8


REV 0

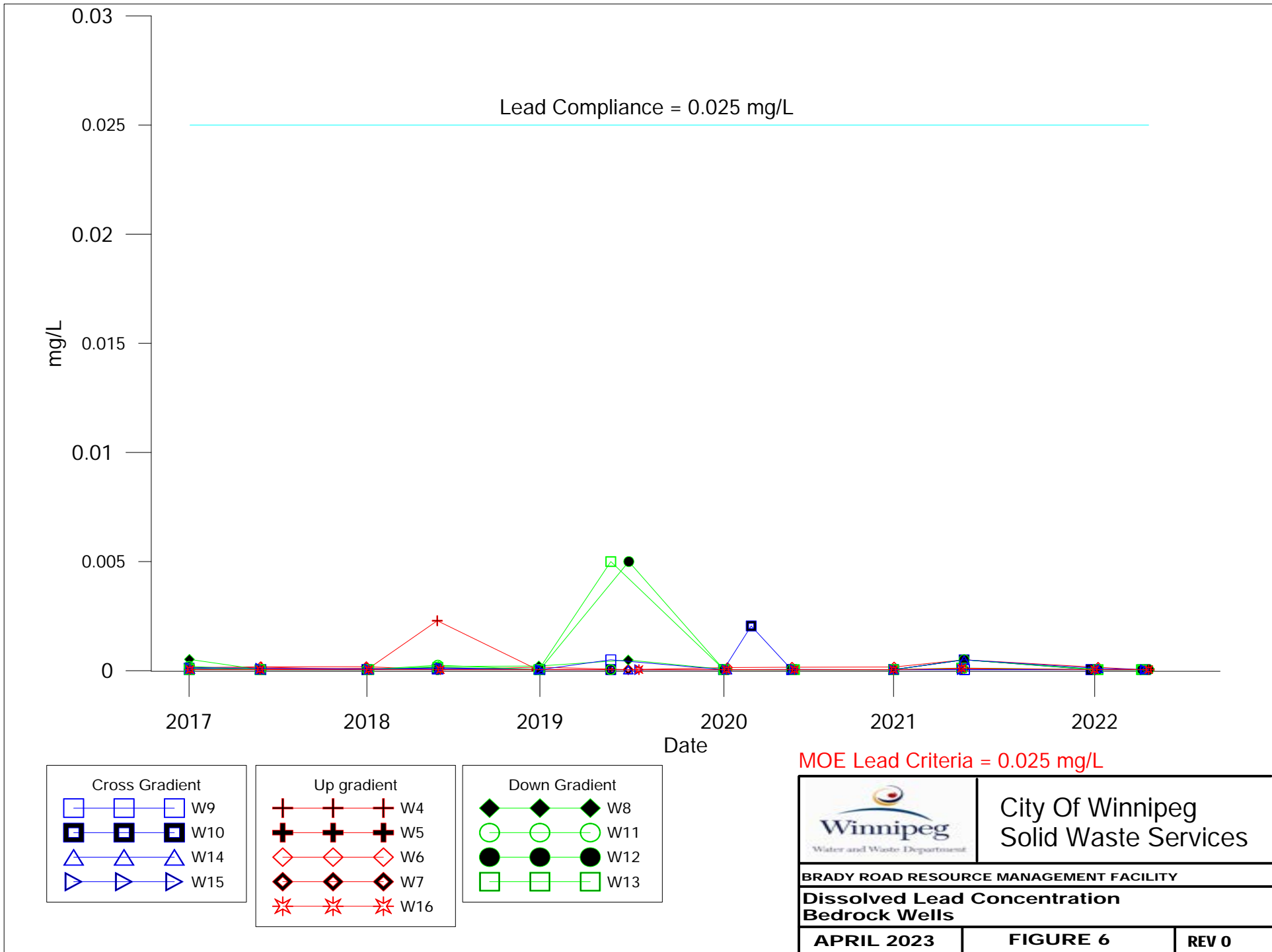


MOE Nickel Criteria = 0.49 mg/L

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Nickel Concentration Bedrock Wells		
APRIL 2023	FIGURE 9	REV 0



		City of Winnipeg Solid Waste Services	
BRADY ROAD RESOURCE MANAGEMENT FACILITY			
Phosphorus Concentration Bedrock Wells			
APRIL 2023	FIGURE 10	REV 0	



Cross Gradient

- W9
- W10
- △ W14
- ▷ W15


Up gradient

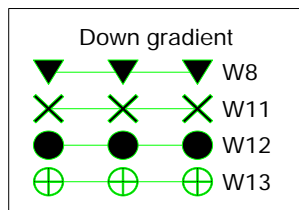
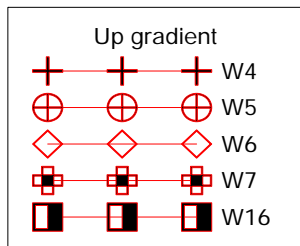
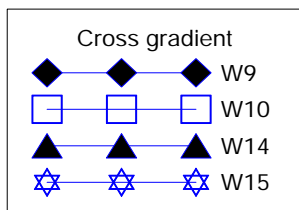
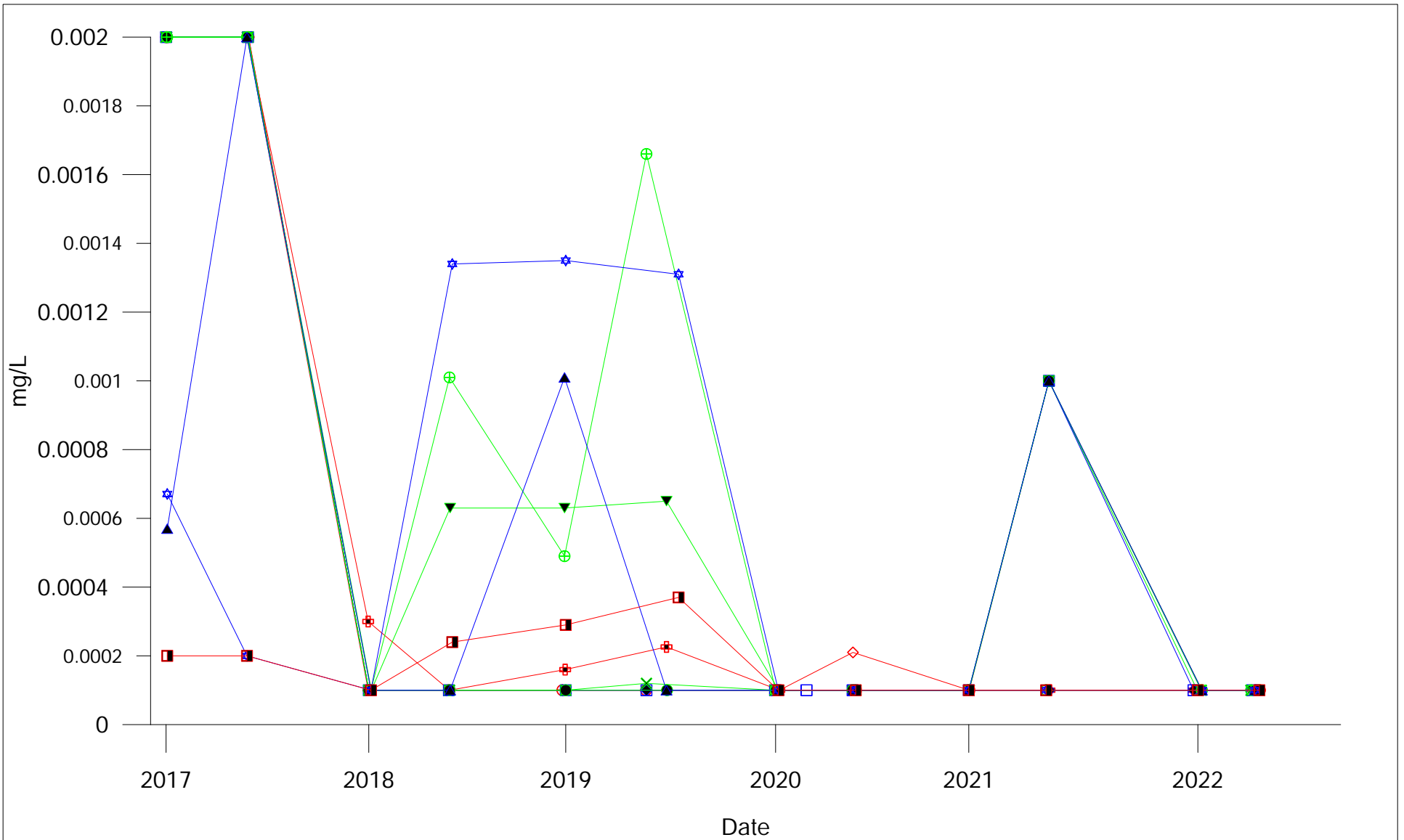
- + W4
- + W5
- ◇ W6
- ◇ W7
- * W16

Down Gradient

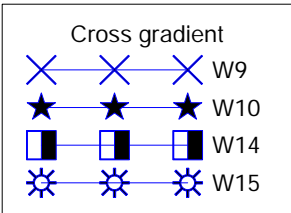
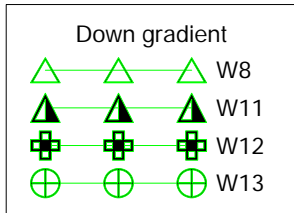
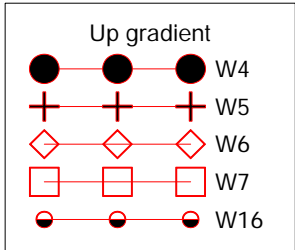
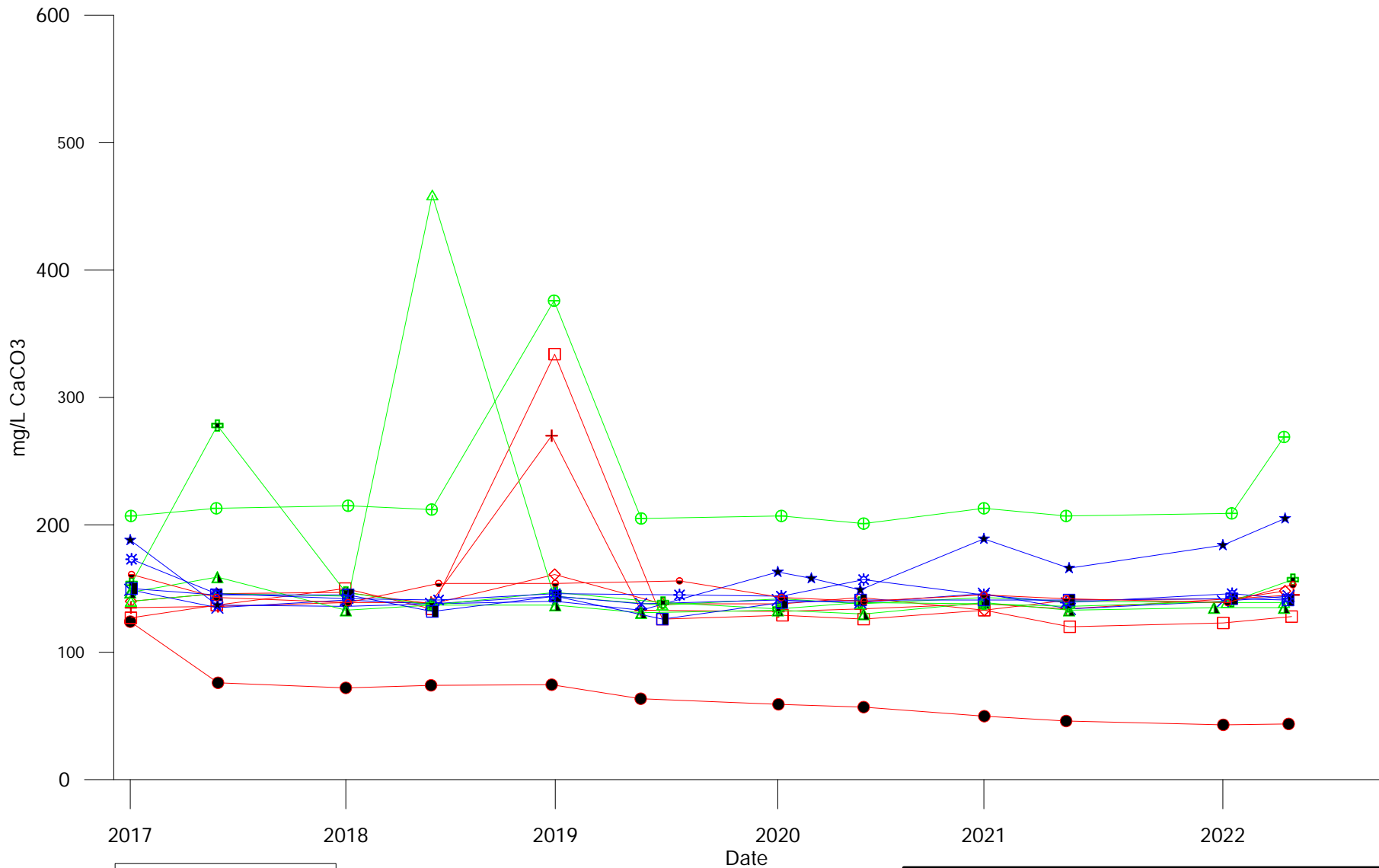
- ◆ W8
- W11
- W12
- W13

MOE Lead Criteria = 0.025 mg/L

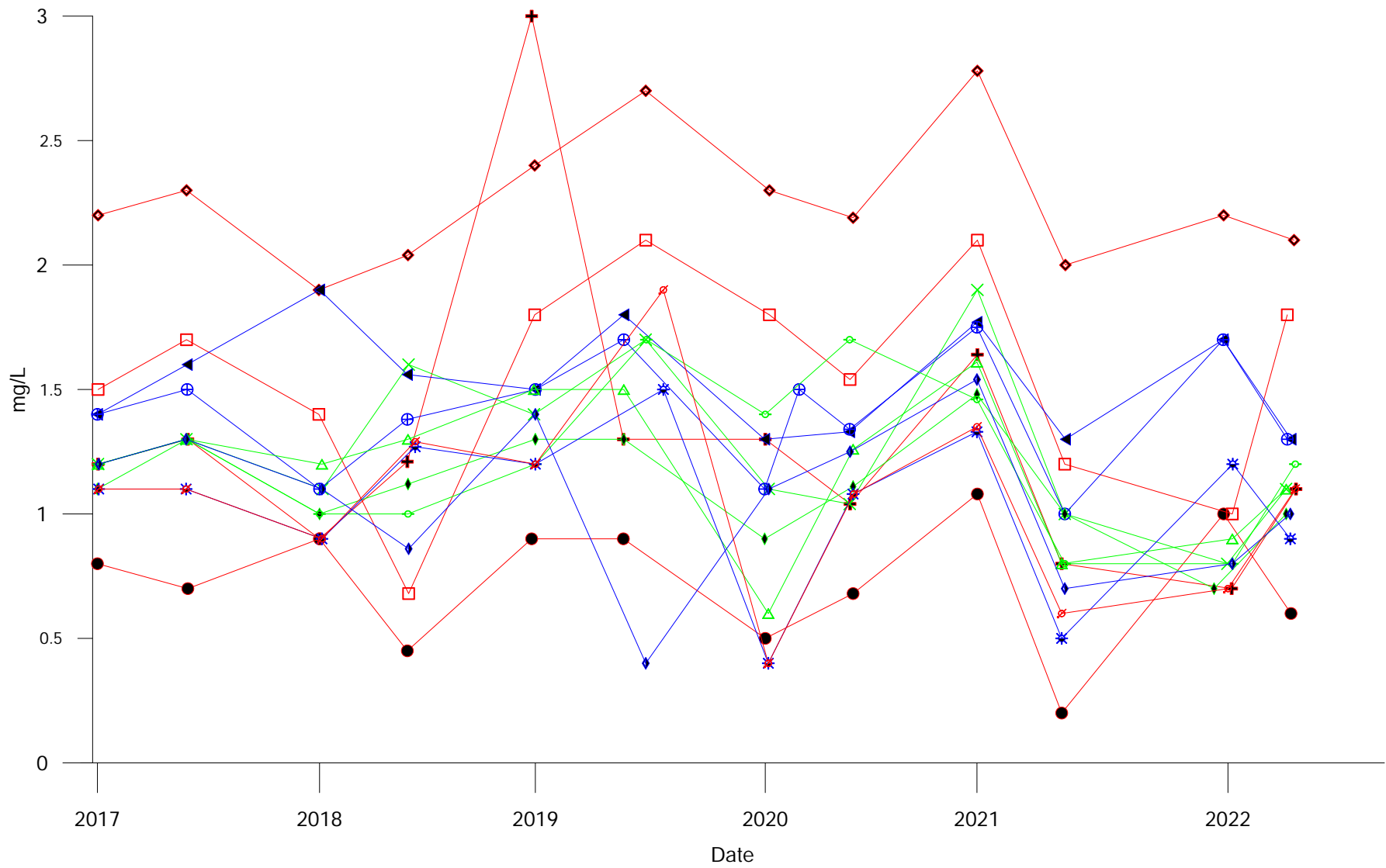
		City Of Winnipeg Solid Waste Services	
BRADY ROAD RESOURCE MANAGEMENT FACILITY			
Dissolved Lead Concentration Bedrock Wells			
APRIL 2023	FIGURE 6	REV 0	



	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Tin Concentration Bedrock Wells		
APRIL 2023	FIGURE 11	REV 0



	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Total Alkalinity Bedrock Wells		
APRIL 2023	FIGURE 12	REV 0



Cross gradient

- ← W9
- ⊕ W10
- ◊ W14
- ⋆ W15

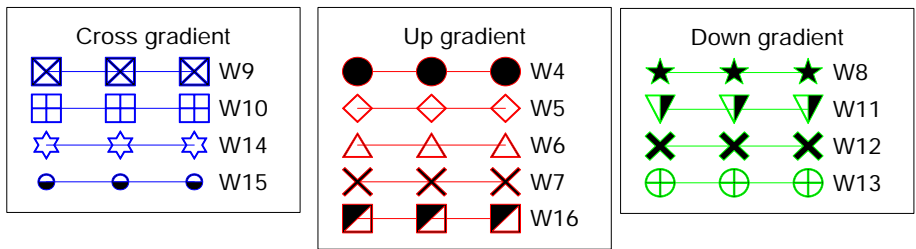
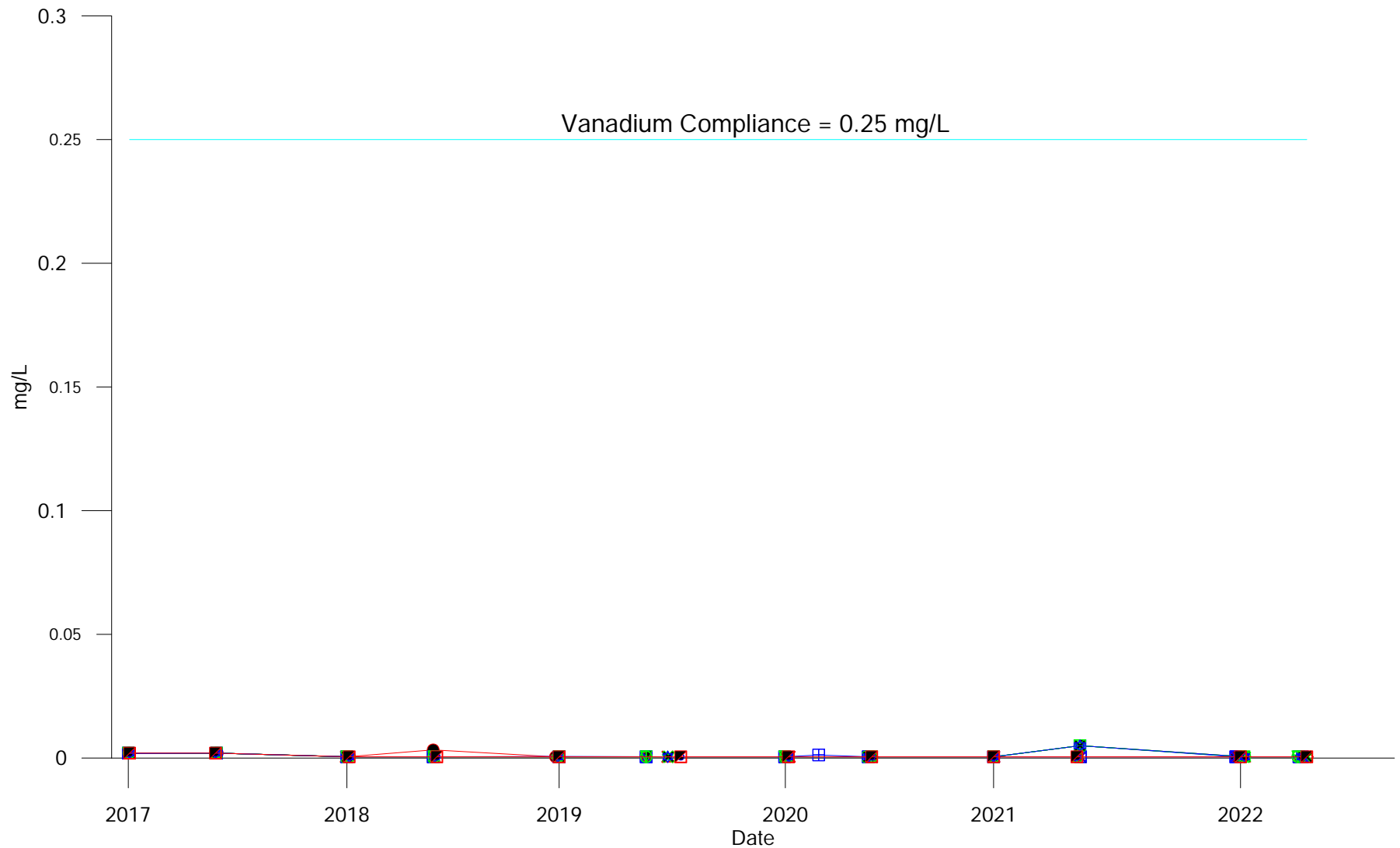
Up gradient

- W4
- ⊕ W5
- W6
- ◊ W7
- ⊘ W16

Down gradient

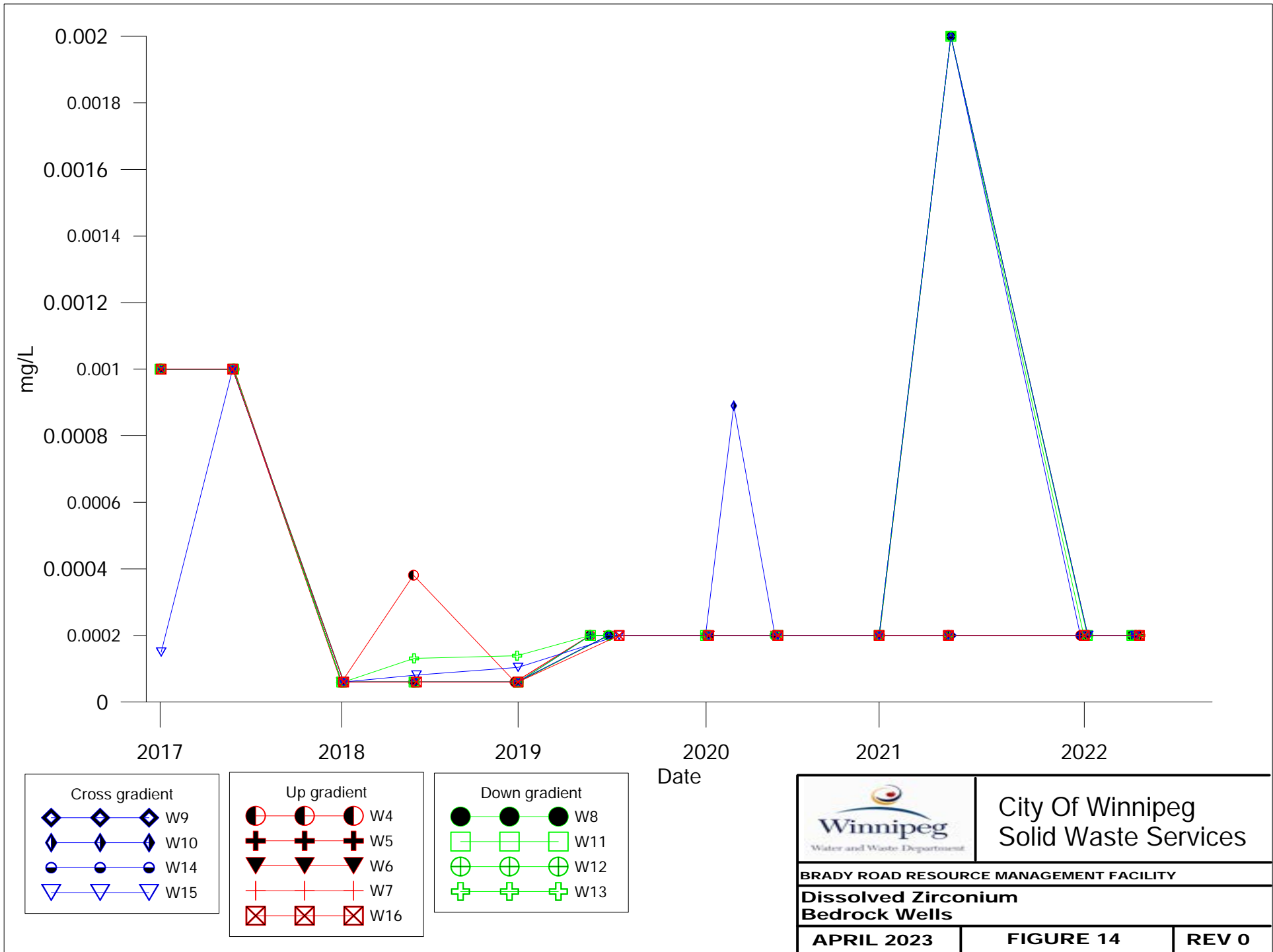
- × W8
- ◆ W11
- W12
- △ W13

		City Of Winnipeg Solid Waste Services	
BRADY ROAD RESOURCE MANAGEMENT FACILITY			
TKN Concentration Bedrock Wells			
APRIL 2023	FIGURE 12	REV 0	



Vanadium MOE Criteria = 0.25 mg/L

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Vanadium Bedrock Wells		
APRIL 2023	FIGURE 13	REV 0



City Of Winnipeg
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BRADY ROAD RESOURCE MANAGEMENT FACILITY

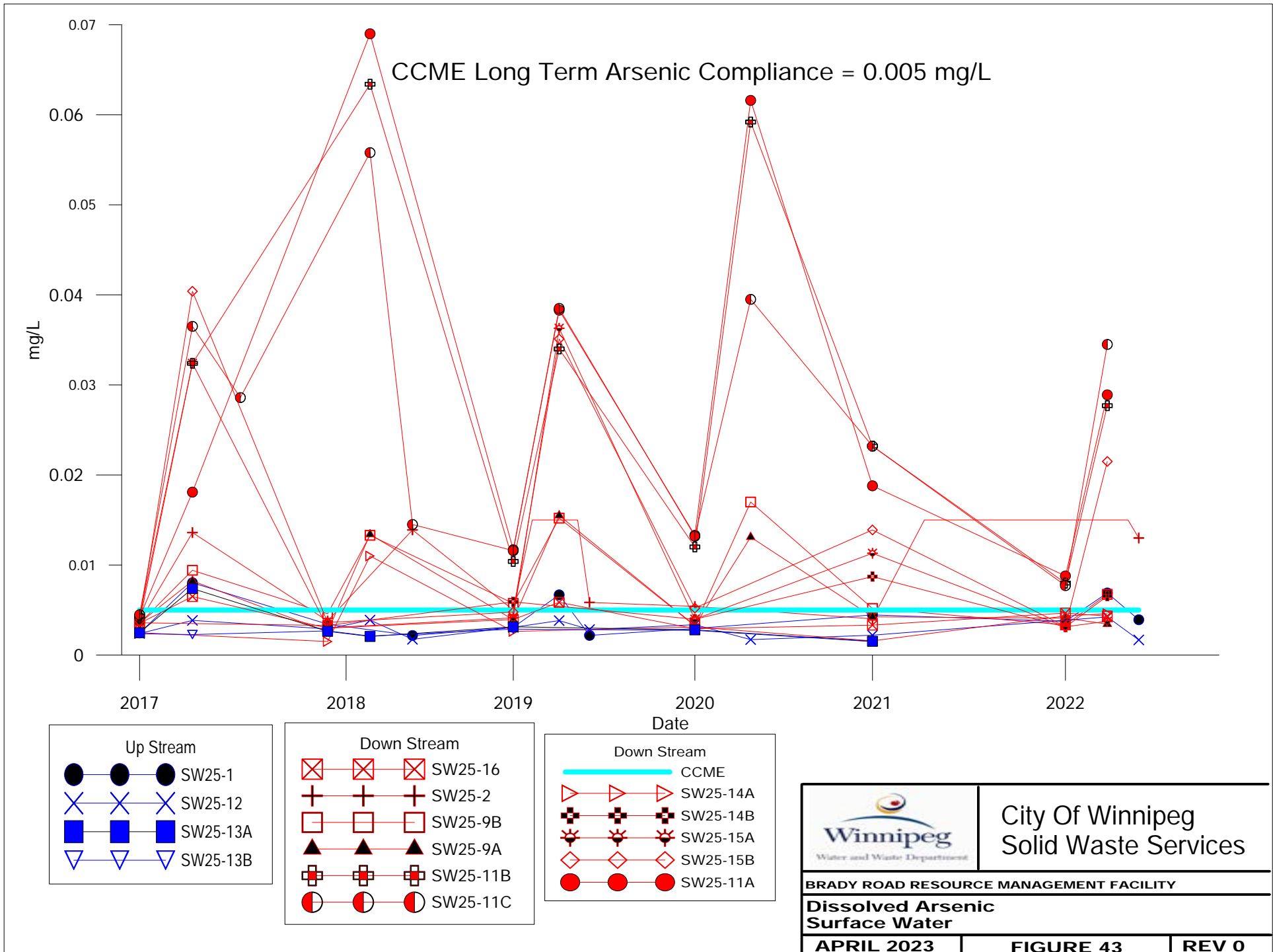
Dissolved Zirconium
Bedrock Wells

APRIL 2023

FIGURE 14

REV 0

**2022 SURFACE WATER
TIME VS CONCENTRATION GRAPHS**



Up Stream

- SW25-1
- × SW25-12
- SW25-13A
- ▽ SW25-13B

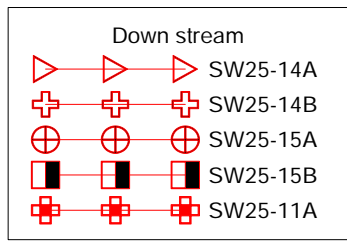
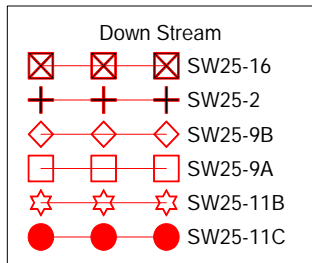
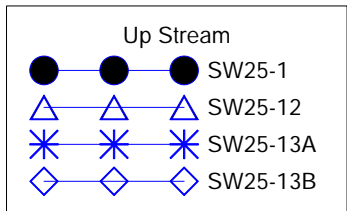
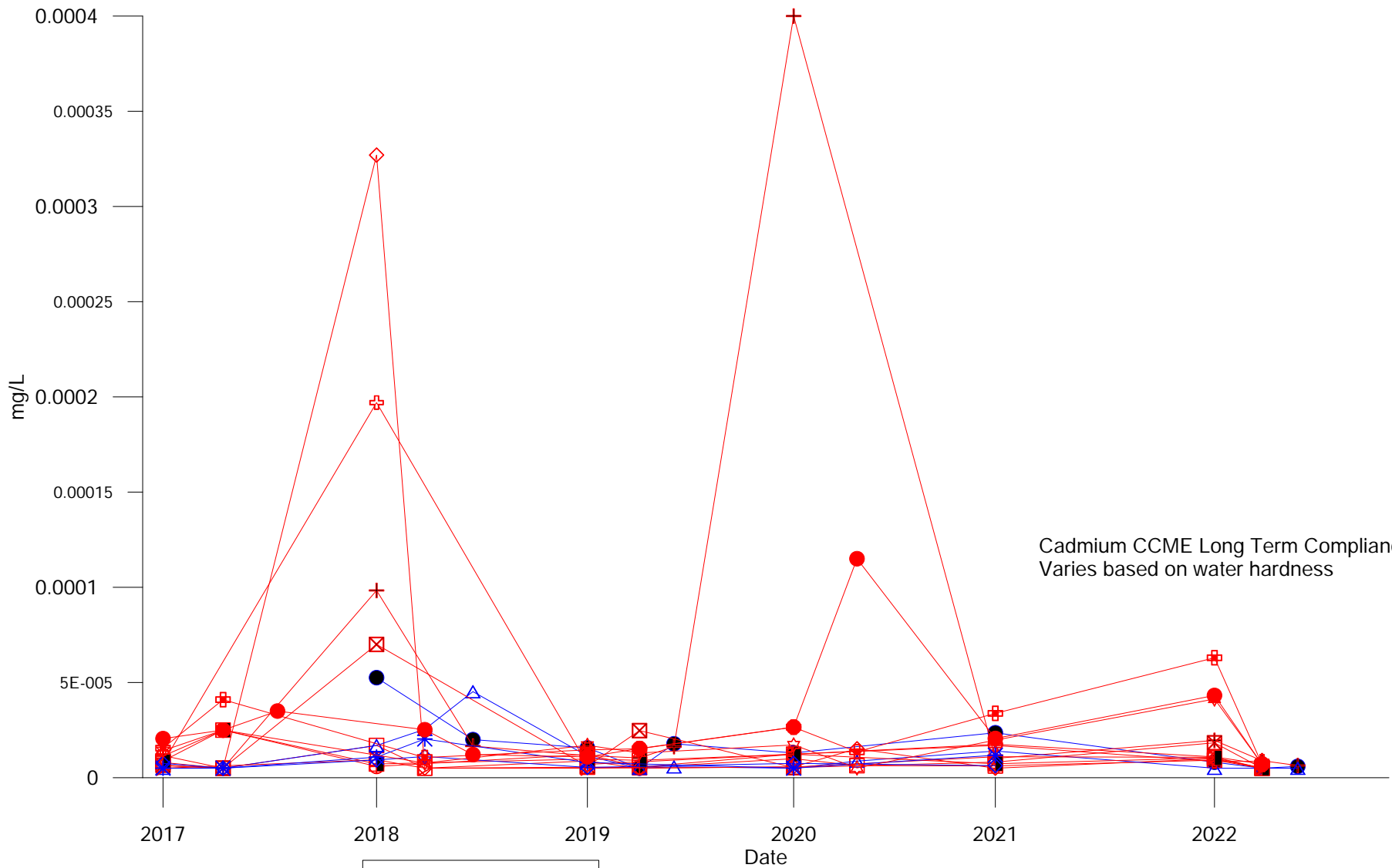
Down Stream

- ⊠ SW25-16
- ⊕ SW25-2
- SW25-9B
- ▲ SW25-9A
- ⊞ SW25-11B
- ◐ SW25-11C

Down Stream

- CCME
- ▷ SW25-14A
- ⊞ SW25-14B
- ⊛ SW25-15A
- ◇ SW25-15B
- SW25-11A

	City of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Arsenic Surface Water		
APRIL 2023	FIGURE 43	REV 0



City Of Winnipeg
Solid Waste Services

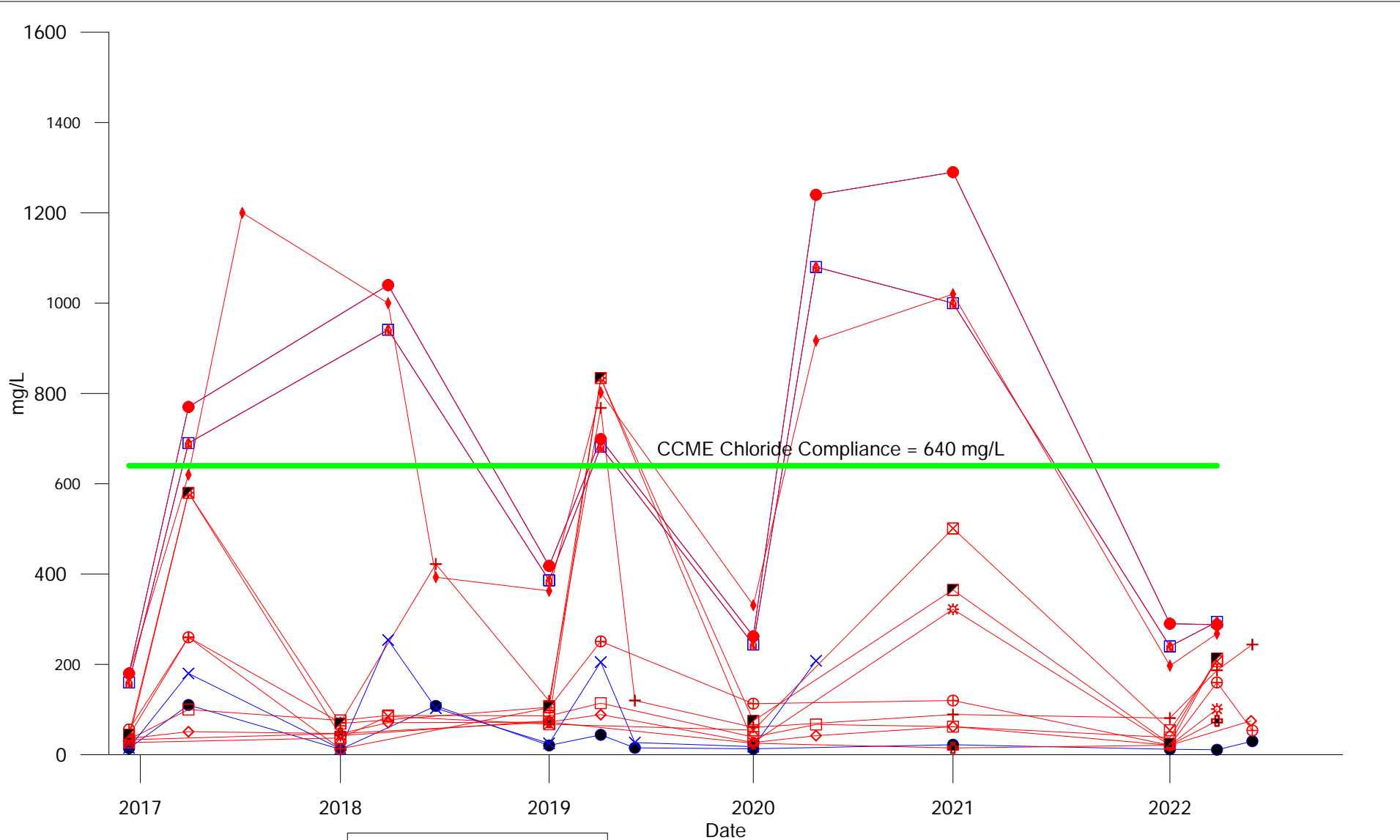
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Cadmium
Surface Water

APRIL 2023

FIGURE 44

REV 0



Up Stream

- SW25-1
- × SW25-12
- + SW25-13A
- SW25-13B

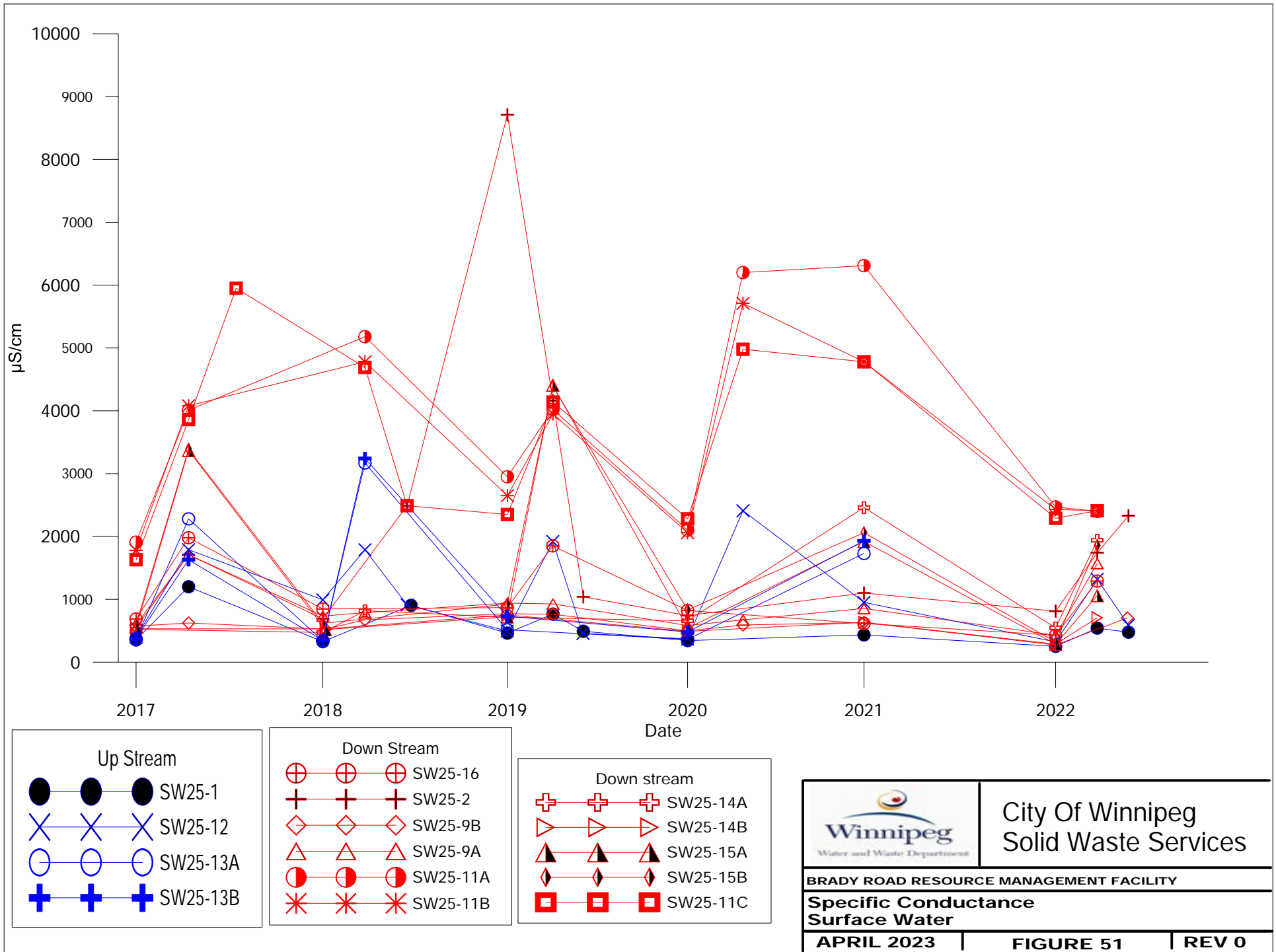
Down Stream

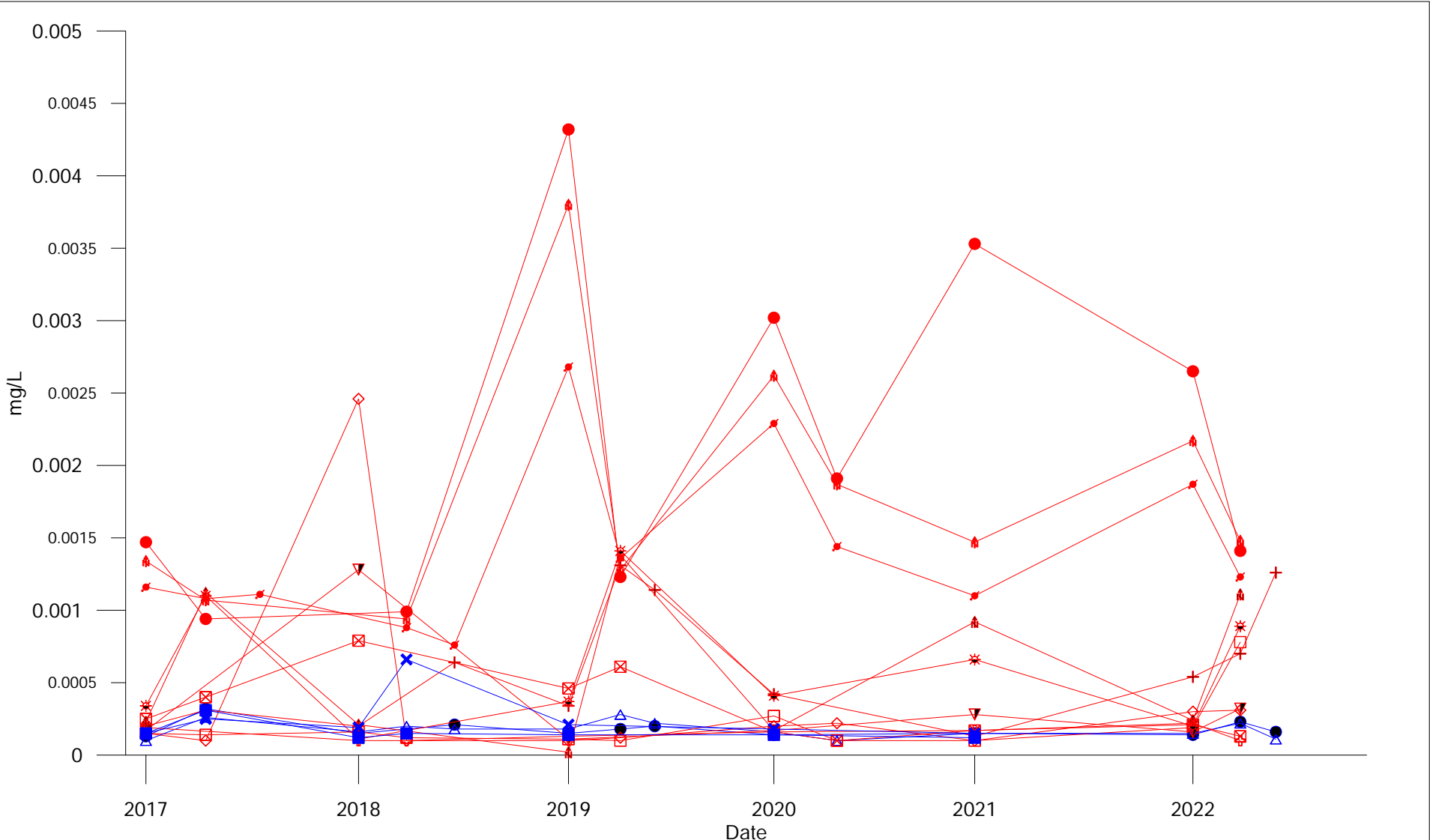
- ⊕ SW25-16
- + SW25-2
- ◇ SW25-9B
- SW25-9A
- SW25-11A
- CCME LIMIT

Down stream

- ⊠ SW25-14A
- ⊞ SW25-14B
- ⊛ SW25-15A
- ⊠ SW25-15B
- ♠ SW25-11B
- ♠ SW25-11C

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Chloride Surface Water		
APRIL 2023	FIGURE 45	REV 0





Up Stream

- SW25-1
- △ SW25-12
- SW25-13A
- × SW25-13B

Down Stream

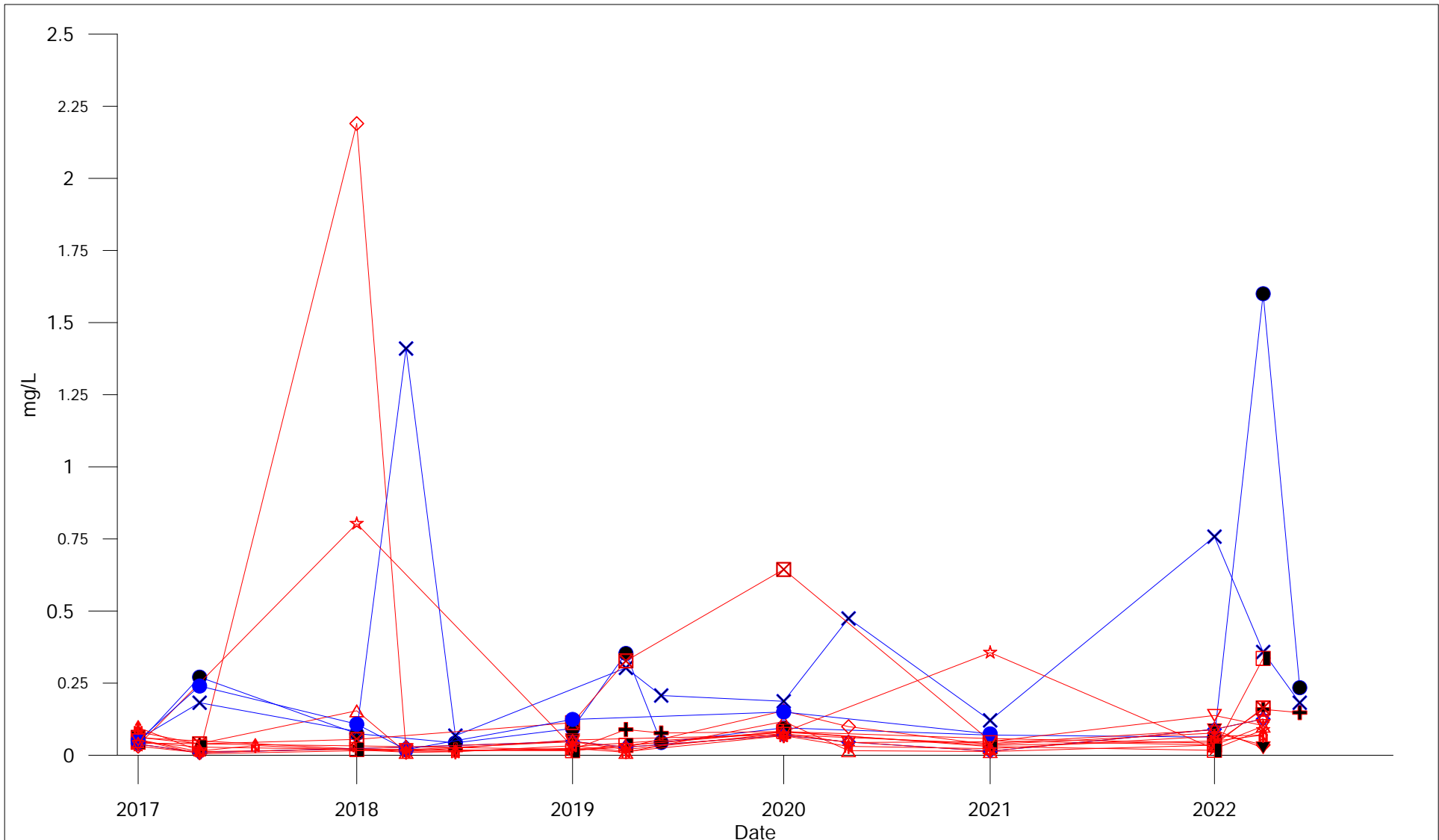
- ⊠ SW25-16
- ⊕ SW25-2
- ◇ SW25-9B
- SW25-9A
- SW25-11A

Down stream

- ⊕ SW25-14A
- ▽ SW25-14B
- ⬆ SW25-15A
- ☀ SW25-15B
- ⬆ SW25-11B
- SW25-11C



City Of Winnipeg
Solid Waste Services



Up Stream

- SW25-1
- × SW25-12
- SW25-13A
- ◇ SW25-13B

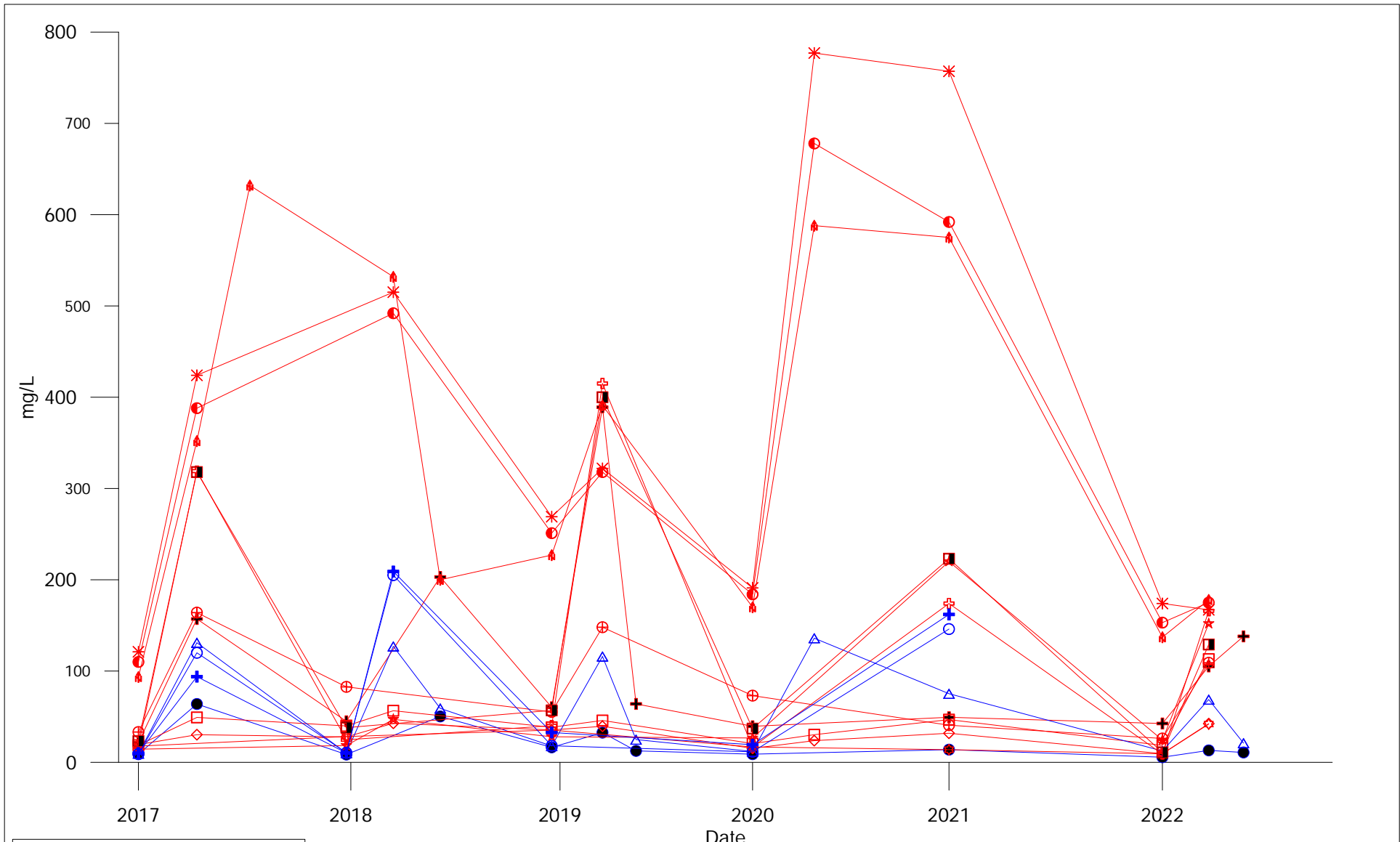
Down Stream

- ⊠ SW25-16
- ⊕ SW25-2
- ◇ SW25-9B
- △ SW25-9A
- ▽ SW25-11A

Down Stream

- ▼ SW25-14A
- ☆ SW25-14B
- ⬆ SW25-15A
- ◻ SW25-15B
- ⊠ SW25-11B
- ⬆ SW25-11C

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Iron Surface Water		
APRIL 2023	FIGURE 47	REV 0



Up Stream	
●	SW25-1
△	SW25-12
○	SW25-13A
+	SW25-13B

Down Stream	
⊕	SW25-16
+	SW25-2
◇	SW25-9B
□	SW25-9A
*	SW25-11A
◐	SW25-11B

Down stream	
☆	SW25-14A
☆	SW25-14B
+	SW25-15A
■	SW25-15B
♠	SW25-11C



City Of Winnipeg
Solid Waste Services

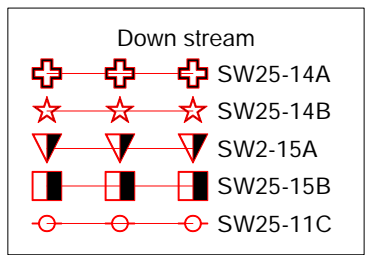
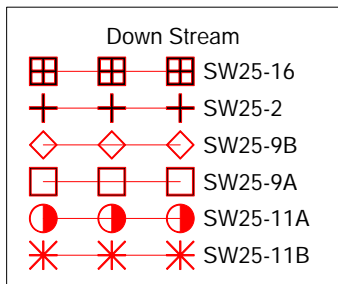
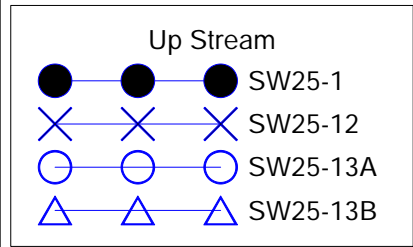
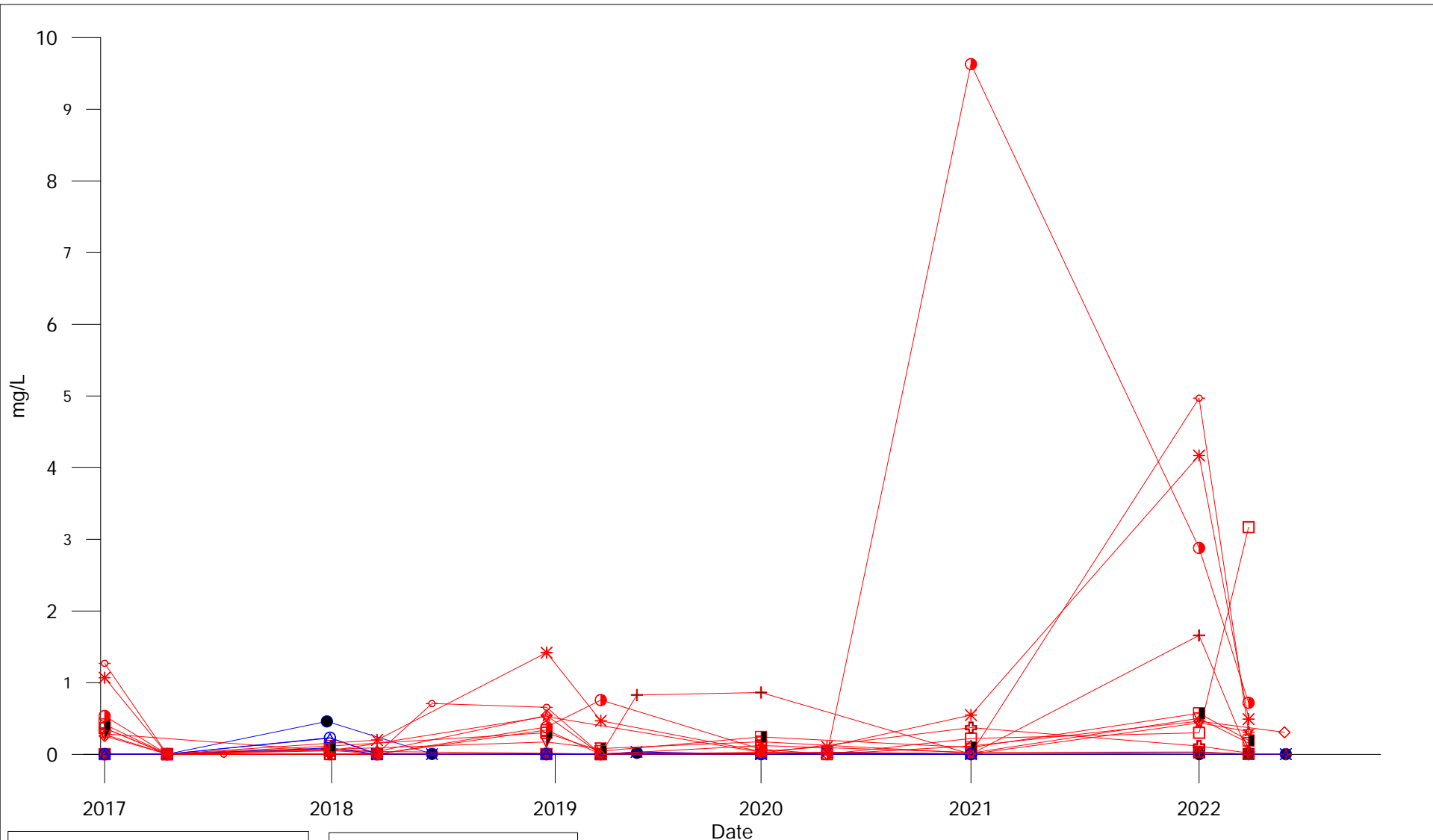
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Sodium
Surface Water

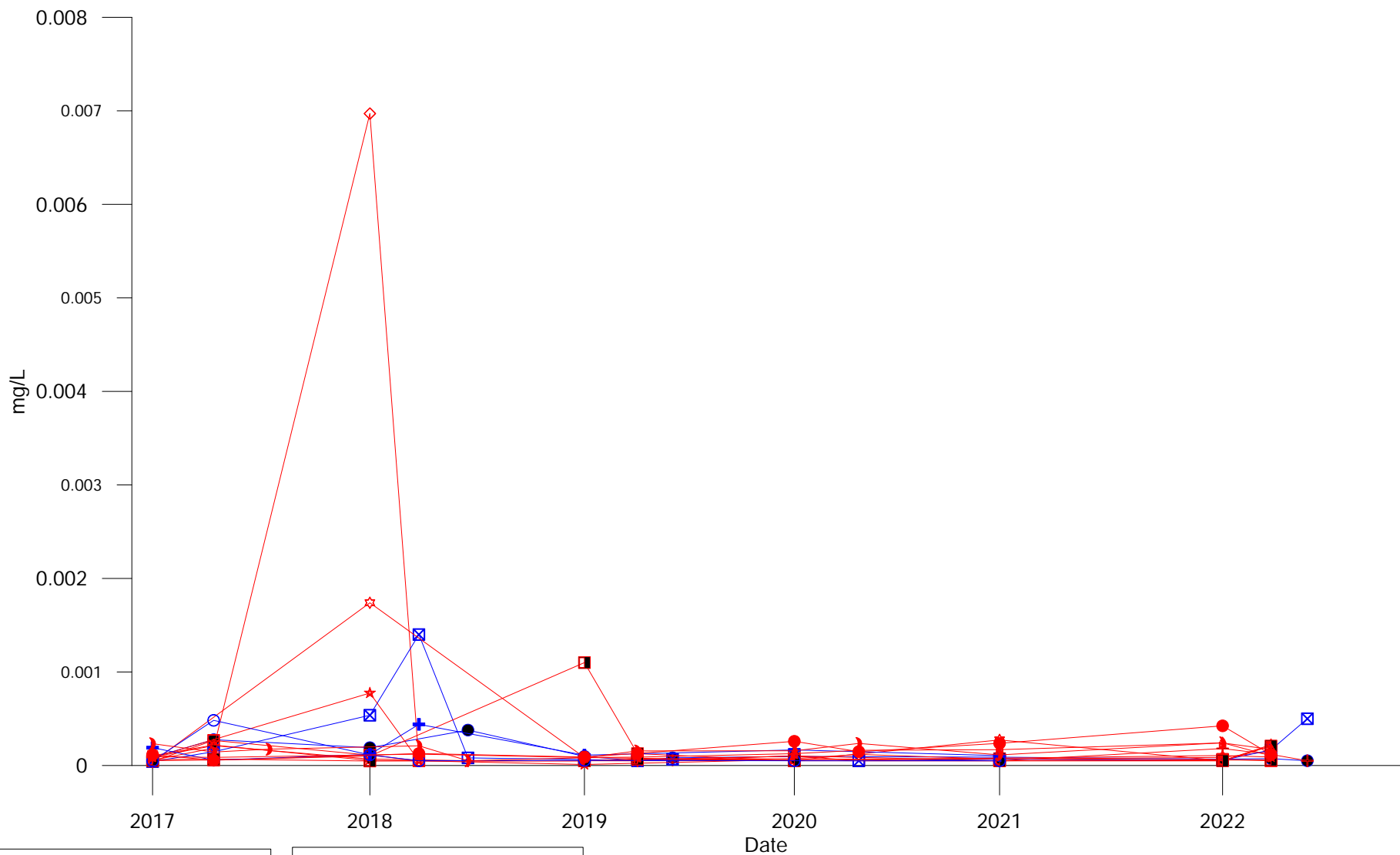
APRIL 2023

FIGURE 50

REV 0



City Of Winnipeg
Solid Waste Services



Up Stream

- SW25-1
- ⊠ SW25-12
- SW25-13A
- ⊕ SW25-13B

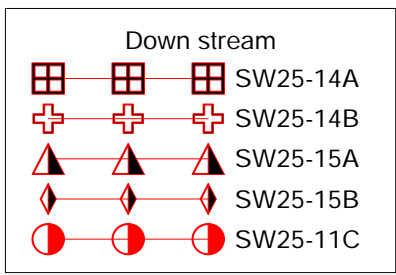
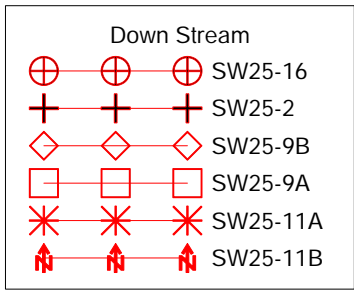
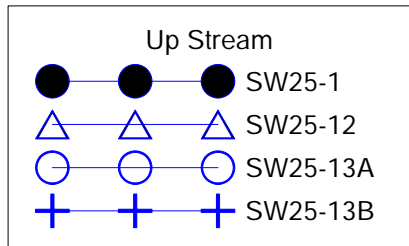
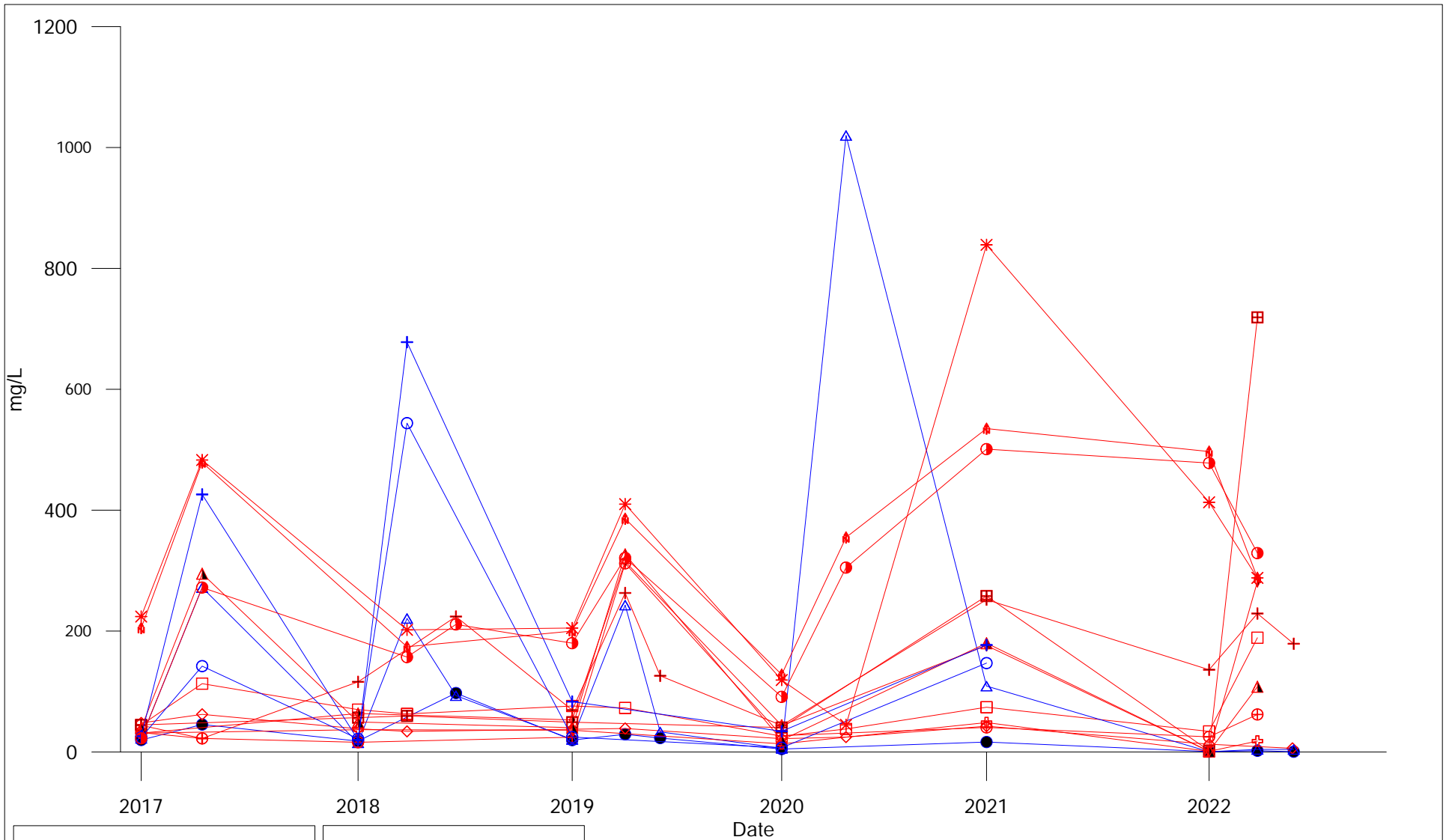
Down Stream

- ◻ SW25-16
- ⊕ SW25-2
- ◇ SW25-9B
- ◻ SW25-9A
- SW25-11A

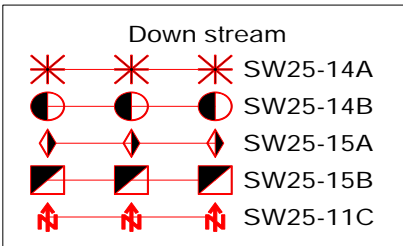
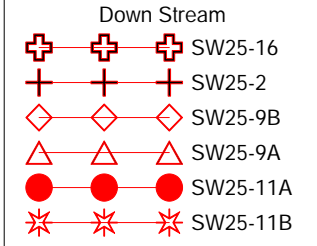
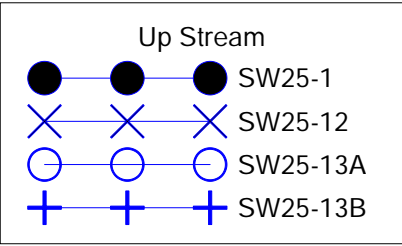
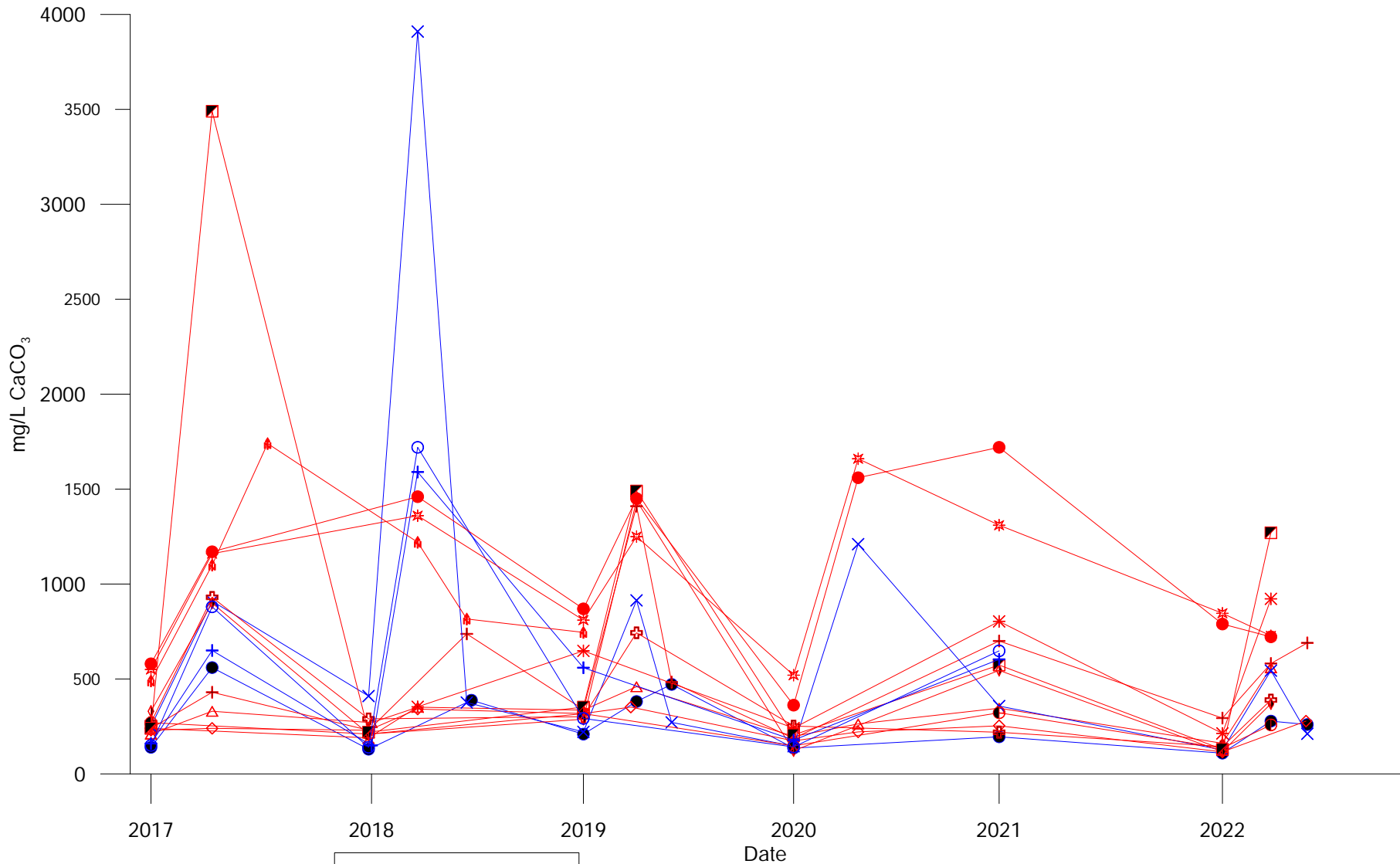
Down stream

- ☆ SW25-14A
- ☆ SW25-14B
- ⊗ SW25-15A
- ◻ SW25-15B
- ⬆ SW25-11B
- ☾ SW25-11C

	City Of Winnipeg Solid Waste Services	
	BRADY ROAD RESOURCE MANAGEMENT FACILITY	
Dissolved Lead Surface Water		
APRIL 2023	FIGURE 48	REV 0



**City Of Winnipeg
Solid Waste Services**



City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

**Total Hardness
Surface Water**

APRIL 2023

FIGURE 53

REV 0

APPENDIX C
2022 LANDFILL GAS
COLLECTION AND FLARING
REPORT



2022 ANNUAL MONITORING REPORT BRADY ROAD RESOURCE MANAGEMENT FACILITY LANDFILL GAS COLLECTION AND FLARING SYSTEM

CITY OF WINNIPEG

April 3, 2023

Project No. 468



A Landfill Gas Utilization Company



2022 ANNUAL MONITORING REPORT LANDFILL GAS COLLECTION AND FLARING SYSTEM CITY OF WINNIPEG

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1.0 INTRODUCTION

The City of Winnipeg operates the Landfill Gas Collection and Flaring System at the Brady Road Resource Management Facility in Winnipeg, Manitoba, which operates under Manitoba Conservation Licence 3081. After a commissioning phase, the system became operational full time in August 2013 after approval to operate was received by the Office of the Fire Commissioner.

Operation of the system including maintenance and monitoring was completed by Comcor Environmental Limited (Comcor) on behalf of its partner Integrated Gas Recovery Services (IGRS).

This report outlines work performed and data collected during the operation of the Landfill Gas Collection and Flaring System in 2022.

2.0 LANDFILL GAS COLLECTION SYSTEM

There are two main components of the LGCFS that require monitoring. These include:

- Landfill Gas Collection Wellfield
- Mechanical System

The purpose and procedures associated with the monitoring of each of these components are discussed separately below. The recommended monitoring frequency is presented in Table 1.

Table 1: Summary of Monitoring Frequency

System Component	Monitoring Frequency
Wellfield Monitoring	Monthly
Remote Mechanical System Monitoring	Weekly
Mechanical System Monitoring	Weekly

2.1 Wellfield System Expansions

No wellfield expansions occurred in 2022.

In November and December 2022, extensive repairs were completed on lateral 7 to repair longstanding vacuum issues on the lateral. Three wells were non-operational due to multiple low points along lateral 7 caused by differential settlement. These low points had filled with water and caused a lack of vacuum at some wells. Tervita was contracted to complete the repairs and vacuum was restored to all three wells successfully.

Figure 1 presents existing wellfield conditions at the site.

2.2 Wellfield System Monitoring

The wellfield system monitoring consists of measuring vacuum/pressure in each well and lateral pipe, the percentage of methane, oxygen and carbon dioxide in the landfill gas, and parts per million of carbon monoxide and hydrogen sulphide at each location. These measurements were



taken using a portable gas meter/analyzer such as a Landtec GEM-5000, or equivalent. Vacuum fluctuations were noted, as it can be an indication of water within the piping system.

Each wellhead was monitored for the velocity of gas using an anemometer. The measured velocities were used to calculate landfill gas flow rates by multiplying the velocity by the pipe cross-sectional area.

The monitoring data collected during the monthly round is beneficial to determine if the wellfield is operating as intended. Changes to the wellhead valve position were made to ensure maximum gas collection from the landfill. The system was monitored and field balanced by a technician experienced in the operation of this type of system.

During 2022, there were no elevated levels of Carbon Monoxide (CO) (>500 ppm). During the 2022 monitoring period, the highest CO level recorded at GW 1-7 was 56 ppm and 68 ppm at GW 2-13. Elevated carbon monoxide within landfill gas can be an indicator of a subsurface fire within the waste. There was no indication of a subsurface fire in 2022.

In February 2022, Comcor observed heavy water surging on the north side of the site and found the North Header to be completely flooded. This blockage caused a complete lack of vacuum on Lateral 8 and the west header piping. Further investigation revealed that the wellfield vacuum was also not present at gravity drain trap GDT4 and the landfill gas wellhead at leachate manhole MH22. It was determined that a pneumatic pump in one of the manholes was not functioning due to the cold weather, causing the header to flood. The pump was replaced and the issue was resolved.

In March 2022, there was a complete site shutdown due to an incident with the header piping between PDT2 and PDT3. While clearing the ditches of snow an excavator came into contact with the south header piping as well as the compressed air and force main lines that accompanied it. The excavator severed the pipes which caused large amounts of water to enter the LFG system. This flooded all South header piping as well as the blowers within the flaring compound. This left the system down for multiple days while the issues were addressed. This section of the header was eventually isolated from the system while repairs were completed. After the repair, water continued to be an issue within the header for multiple weeks before finally being cleared by gravity and pump drain traps.

The wellfield monitoring data and valve positions can be found in Table 2.

Pump counter measurements were recorded on a monthly basis at all active dual-purpose gas/leachate collection wells. During the monthly pump counter measurements, the following items were noted:

- A large number of the pumps were frozen due to the extreme cold and were not functional during most of the winter.
- All pumps on Lateral 2 are non-functional due to a compressed air leak on the main line beginning in February 2022.
- Various counters were replaced as needed.
- The pump counters at PDT4, PDT5, PDT7 and PDT9 were not functioning throughout the 2022 reporting year due to flooding, thus readings were not recorded.

In instances when there was a lack of a functioning pump counter, the pumps were checked on a monthly basis to confirm operation, and were found to be operating as intended at all inspections. Table 3 presents the pump counter measurements recorded at both the pump drain traps and active dual-purpose wells in 2022.

Water level monitoring requirements are for water levels to be measured on a semi-annual basis. In 2022, an additional round was completed to total three events in April, August and December. Table 4 presents the water levels measured in 2022. The percent of open screen available for gas collection at each well is estimated based on water levels.

Based on pump counters and water levels recorded throughout 2022, dual purpose well pumps continue to remove leachate consistently. In 2022, the average open screen percentage of the monitored dual-purpose wells was 48.5%.

Throughout the year pumps at all wells were pulled and checked for operation. Few issues were found with the pumps and they were largely found to be in good condition, with the exception of four wells, where the pumps are currently stuck inside the wells. A full list of wells with stuck pumps will be prepared in Spring 2023.

Winter operations of the dual purpose wells have been a concern since their installations. As an attempt to alleviate freezing in these wells, well insulation was purchased and installed. Although the insulation was successful in the Fall of 2022, by the end of year freezing was beginning to occur in a large number of the wells. For 2023 additional insulation or means to protect the wells should be investigated.

2.3 Surface Emission Monitoring

As required by the City, surface emission monitoring is requested to be carried out on a quarterly basis, weather conditions permitting, by Comcor. In 2022 the surface emissions monitoring was completed twice due to restrictions with weather conditions. This monitoring is performed using a Landtec SEM or similar with integral GPS, marking locations where concentrations of hydrocarbons were greater than 500 ppm. The surface emission monitoring was completed in May and November for the 2022 reporting year. Several areas were noted where there were significant volumes of gas detected, including areas where cap was weak and pipe penetrated the landfill cap. In previous surveys, manholes were identified as significant sources of surface emissions, however since completion of the leachate manhole/sump lid retrofits, only very low emissions were detected. The reports from the two surface emission monitoring events in 2022 have been included in Appendix B.

2.4 Mechanical System Monitoring

The main operational control of the mechanical system is carried out by the Programmable Logic Controller (PLC). The PLC also provides information on the operating status of the system, and records all data electronically which can be downloaded when required. Specific details on these items are included in the Flare Operation and Maintenance Manual. At a minimum the PLC records:

- Landfill gas composition and temperature;
- Flare operating times;



- Blower operating times;
- Landfill gas flow rate;
- Volume of landfill gas collected and flared; and
- Greenhouse Gas Emission Reduction in CO₂ equivalents.

These items were also monitored remotely and were reviewed at minimum on a weekly basis to ensure that all parameters outlined above are being recorded and that all system data indicates that the overall system is operating properly. The system review was carried out by a technician experienced in the operation of such systems.

Comcor staff also carried out the maintenance of the system as outlined by the Operations and Maintenance Manual. Other notable maintenance that was performed in 2022 included:

- Replacement of flare flame scanners; and
- Replacement of the gas analyzer main motor due to failure.

Data for 2022 has been compiled, and is found in Appendix A.

2.4.1 System Pressure Measurements

Monitoring ports at the inlet and outlet to the blower were measured and recorded on a monthly frequency, using a suitably scaled pressure gauge. Gauge fluctuations were noted, as it can be an indication of water within the system.

Data for 2022 has been compiled, and is found in Table 2.

2.4.2 System Gas Measurements

The purpose of the main blower skid gas analyzer system is to monitor the oxygen and methane concentrations of the landfill gas being transferred by the LGFCS to the flare. As a safety precaution, if either the oxygen concentration gets too high, or the methane concentration gets too low, an alarm is sent to the main computer control panel PLC to shut the system down. Having records of the gas concentrations also allows for better analysis of the system and aids in troubleshooting when problems arise.

A pump, located within the gas analyzer system cabinet in the control room, is used to draw a continuous sample of process gas from the header pipe on the blower discharge side. After entering the analyzer, the sample is drawn through a de-mister and a series of filters to remove any particulate or moisture that may affect the monitoring equipment. The methane and oxygen concentrations of the sample are then measured by an infra-red methane analyzer and oxygen analyzer. The methane and oxygen concentrations are displayed on separate LED display screens mounted on the front face of the gas analyzer panel. The gas analyzer system will send signals to the PLC that will trigger a number of system alarms/warnings including low methane and high oxygen.

All system failures and/or alarms are displayed on the main control circuit panel. Any alarms that shut down the system are relayed by the auto messaging to the system operator.

During 2022, the system operated as intended aside from the aforementioned motor failure, with the analyzer data recorded at an interval of five minutes or better and any system alarms were sent to the operator. This data was recorded and summarized into a daily value and can be found in Appendix A.

In addition to the main system analyser, concentrations of methane (CH₄), carbon dioxide (CO₂) and oxygen (O₂) were measured manually, recorded monthly at the blower inlet and blower outlet, and compared to the insitu monitoring devices to ensure accuracy. These measurements were taken using a gas meter/analyzer such as a Landtec GEM-5000+, or equivalent.

2.4.3 System Flow Rate Measurements

Landfill gas velocities and temperatures at each landfill gas extraction well in the wellfield were measured and recorded on a monthly basis using an anemometer, if possible. These velocities were used to calculate landfill gas flow rates by multiplying by the pipe's cross sectional area.

A thermal mass flow meter continuously calculates flows to the flare and this data was recorded on an interval of 5 minutes or less.

The monitoring completed in 2022 is found in Table 2 and a summary of daily plant data can be found in Appendix A.

3.0 FLARE AND GREENHOUSE GAS EMISSIONS

3.1 Flare Emissions

The flare stack is equipped with four thermocouples that measure the temperature in the flare stack. These thermocouples are monitored by the system control panel PLC at intervals of 5 minutes or better. The control system is continuously monitoring the flame conditions and will shut down the LGCFS system immediately if flame is lost.

If the system shuts down for any reason, the fail-safe valve will close and prevent any non-combusted landfill gas from being released to the atmosphere, thereby controlling the emissions from the flare.

3.2 Greenhouse Gas Emissions

The landfill gas is comprised of primarily methane and carbon dioxide in approximately equal amounts. In addition, there are other trace amounts of a large number of compounds. Methane and carbon dioxide are greenhouse gases but methane has a global warming potential 25 times that of carbon dioxide. By combusting the methane in the flare the resultant products are carbon dioxide and water vapour which reduces its global warming potential by approximately 95 percent.

The control panel records both flow and methane gas concentration being collected from the system and being sent to be combusted in the flare. These quantities are measured and recorded at intervals of 5 minutes or less. The data collected can be readily processed to calculate the greenhouse gas emission reduction expressed as carbon dioxide equivalents.

For the Brady Road Landfill, greenhouse gas emissions have been calculated based on operational data and can be found in Appendix A.

4.0 CONDENSATE COLLECTION SYSTEM

The purpose of the Condensate Collection System component of the LGCFs is to remove moisture from the landfill gas and to collect condensate from the collection laterals/header pipes. Collection and removal of the condensate increases the efficiency of the landfill gas collection in the wellfield and minimizes the moisture being passed through the mechanical system.

Condensate and moisture are removed from the system at three main locations. First, relative low points have been provided in the gas collection header to allow any free moisture to drain by gravity out of the underground gas collection system. In the wellfield, this moisture drains into condensate gravity style and pump style drain traps which have pneumatic pumps installed inside the sump. Next, prior to the gas entering the blowers, a condensate moisture separator removes most of the residual water droplets remaining in the gas. At this stage the residual water drains by gravity into the main condensate chamber.

The condensate chamber stores the water until the pump at the bottom of the chamber is activated either manually or automatically through a series of floats. The water is then pumped through a 75 mm diameter HDPE forcemain and is discharged into the leachate collection system.

As of the 2019 expansion work, Viridian VP4 pneumatic pumps are installed in nine manholes (MH3, MH4, MH5, MH8, MH31, MH32, MH33, MH42 and MH43). Leachate collected from these manholes is sent directly to the storage tank located in the southwest corner of the Site. As of the 2020 expansion work, QED AP3 pneumatic pumps were installed in 18 new dual-purpose wells and 57 existing gas wells were retrofitted for leachate collection. Condensate/leachate collected from the dual-purpose wells, pump drain traps, and the condensate chamber can either be sent directly to the storage tank or to MH32. Under normal operating conditions, condensate/leachate will be sent directly to the storage tank. If the storage tank is offline, leachate/condensate can be sent to MH32 by opening the isolation valve located on the condensate line to MH32.

5.0 CONCLUSIONS AND RECOMMENDATIONS

1. During operation in 2022, the Brady Road Resource Management Facility Gas Collection and Flaring System operated as was intended. With the exception of the extended shutdown due to the header being compromised in March 2022.
2. During surface emission monitoring, some areas were noted where gas was escaping. These were identified in areas where surface cap was weak and pipe emanated from the landfill surface. In order to get maximum efficiency from the LGCFs, these issues should be looked at in the future.
3. Continue to investigate and develop a consistent maintenance program for the dual purpose pumps.
4. Add additional insulation or means to protect the dual purpose wells from freezing.



5. The system should continue to operate on a full-time basis and be monitored according to the Operation and Maintenance Manual for the site.

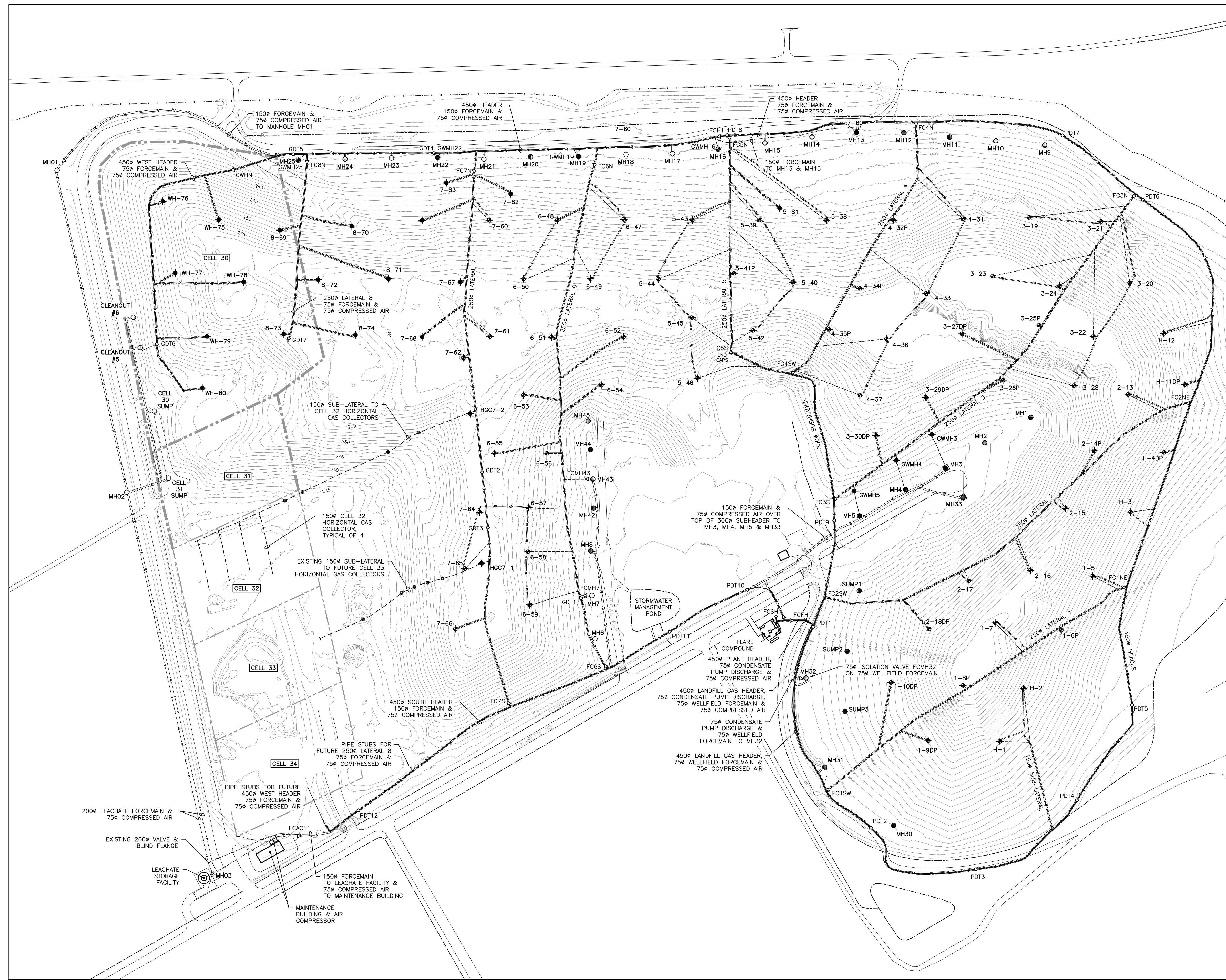
All of which is Respectfully Submitted,

INTEGRATED GAS RECOVERY SERVICES

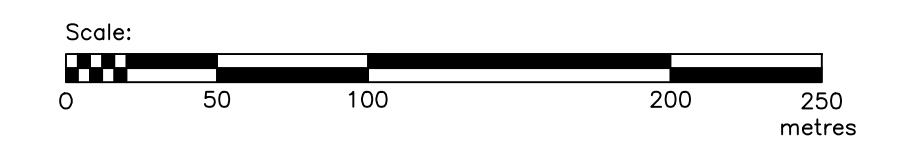
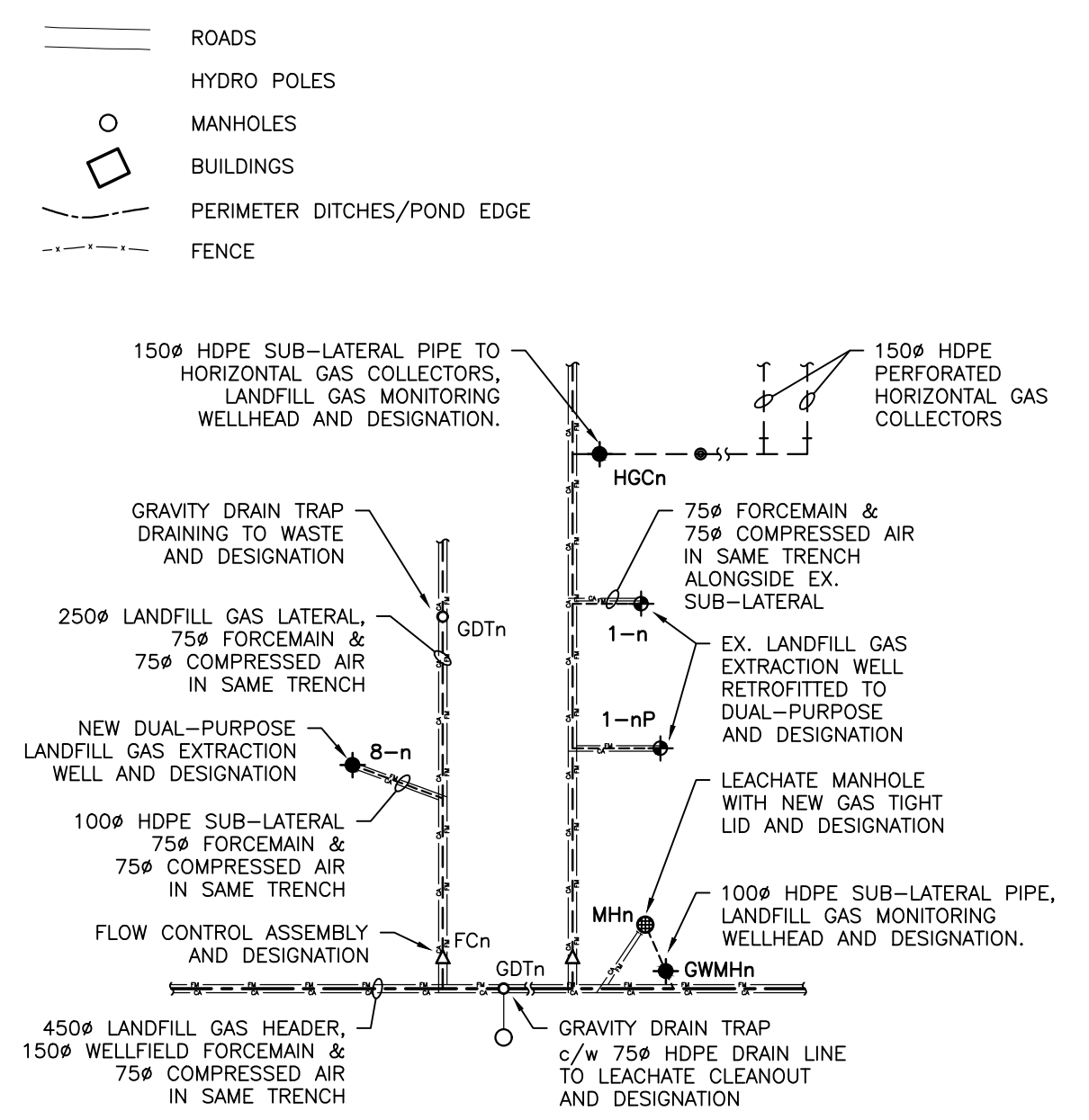
Jordan Demerchant
Environmental Technician

Shannan McGarr, B.Sc.
Director of Operations

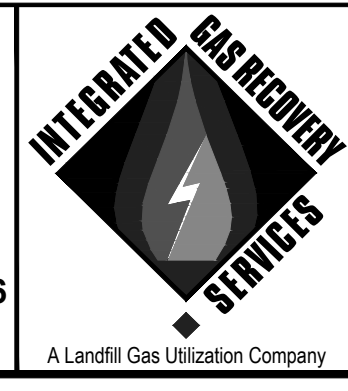
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LEGEND



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City of Winnipeg
 Brady Road
 Resource Management
 Facility

FIGURE 1
 EXISTING SITE CONDITIONS
 MARCH 2022

Table 2: Wellfield Monitoring Data

			15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22
Weather Conditions			Cloudy	Cloudy	Cloudy	Sunny	Sunny	Sunny	Sunny	Sunny	Sunny	Sunny	Sunny	Sunny
Ambient Temperature		° C	-25	-23	-10	5	15	23	25	28	20	10	-10	-20
Control Panel														
Flow Rate		CFM	800	730	730	730	730	800	800	800	900	1000	1000	900
CH ₄		%	40.4	34.5	38.6	39.4	44.6	45.7	46.8	51.3	52.3	49.9	50.3	49.8
O ₂		%	5.5	5.9	5.3	5.5	4.0	3.9	3.7	1.0	1.0	1.3	1.3	4.4
Wellfield Vac		"H ₂ O	-14.5	-36.0	-12.2	-20.7	-13.4	-12.7	-12.4	-9.0	-9.1	-12.1	-13.5	-19.6
Outlet Press.		"H ₂ O	3.0	3.5	2.5	2.8	2.4	2.5	2.8	2.5	2.9	3.6	4.0	4.0
LOCATIONS														
H-1														
Well		"H ₂ O	-1.53	-1.14	-3.44	-1.27	-0.05	-0.04	-0.03	-0.04	0.05	0.03	0.01	0.05
well bore seal		"H ₂ O	-18.57	-20.47	-10.28	-8.68	-7.44	-7.69	-6.33	-5.76	-4.02	-5.64	-6.38	-6.02
CH ₄		%	1.5	1.8	47.5	40.7	38.4	35.6	33.8	31.7	35.2	34.2	32.6	35.6
CO ₂		%	1.1	1.4	26.9	27.9	28.1	26.2	27.0	27.5	26.3	27.5	27.1	28.1
O ₂		%	22.3	21.6	4.1	3.5	3.9	4.0	3.1	2.6	2.4	2.5	2.6	2.4
BAL (N ₂)		%	75.1	75.2	21.5	27.9	29.6	34.2	36.1	38.2	36.1	35.8	37.7	33.9
CO		PPM	0	0	5	5	6	7	5	6	10	11	10	10
H ₂ S		PPM	1	2	7	9	15	12	20	25	21	15	14	12
Vel Min		m/s	frozen	frozen	frozen	-	-	-	-	-	-	-	-	-
Vel Max		m/s	frozen	frozen	frozen	-	-	-	-	-	-	-	-	-
Flow		CFM	frozen	frozen	frozen	-	-	-	-	-	-	-	-	-
Temp		° C	frozen	frozen	frozen	-	-	-	-	-	-	-	-	-
Comments			frozen open	frozen open	frozen open	closed	closed	closed	closed	closed	closed	closed	closed	closed
H-2														
Well		"H ₂ O	-6.84	-7.98	-2.57	-2.48	-2.69	-1.87	-1.55	-1.24	-1.47	-2.01	-1.01	-1.68
Lateral		"H ₂ O	-18.09	-21.47	-11.69	-8.64	-7.82	-7.41	-6.55	-6.13	-5.28	-6.32	-6.32	-7.68
CH ₄		%	45.8	42.1	42.7	40.5	41.5	42.8	43.8	41.8	42.6	41.9	40.1	40.3
CO ₂		%	33.2	34.9	31.6	28.4	28.6	27.0	28.3	29.5	28.2	27.1	27.3	29.1
O ₂		%	1.7	2.0	1.8	3.1	2.8	3.6	4.0	4.9	4.1	3.8	4.2	3.8
BAL (N ₂)		%	19.3	21.0	23.9	28.0	27.1	26.6	23.9	23.8	25.1	27.2	28.4	26.8
CO		PPM	7	7	5	6	6	6	4	5	8	10	12	10
H ₂ S		PPM	7	4	7	10	18	40	15	36	44	24	58	34
Vel Min		m/s	1.84	1.24	1.57	1.25	1.54	1.44	1.02	1.30	1.14	1.04	1.00	1.24
Vel Max		m/s	1.94	1.60	1.84	1.80	1.96	1.63	1.33	1.87	1.58	1.67	1.24	1.82
Flow		CFM	17.86	13.42	16.11	14.41	16.54	14.50	11.10	14.98	12.85	12.80	1.69	14.46
Temp		° C	12.5	10.4	15.7	18.3	20.7	22.8	28.6	29.5	30.3	28.4	15.2	10.1
Comments			1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T
H-3														
Well		"H ₂ O	-0.05	-0.05	-0.09	-0.05	-0.01	-2.47	-3.68	-3.68	-2.89	-3.24	-2.47	-3.01
Lateral		"H ₂ O	-14.57	-21.47	-12.88	-8.17	-7.26	-7.18	-6.39	-6.34	-4.15	-5.98	-5.95	-7.25
CH ₄		%	20.1	17.4	22.7	30.8	33.8	45.6	52.7	56.0	55.2	54.2	54.9	52.0
CO ₂		%	16.8	18.3	19.4	23.8	25.7	26.7	34.2	39.4	38.6	37.2	35.2	33.6
O ₂		%	10.7	9.9	8.9	7.5	6.8	2.5	1.8	0.8	1.0	1.1	0.8	1.1
BAL (N ₂)		%	52.4	54.4	7.0	37.9	33.7	25.2	11.3	3.8	5.2	7.5	9.1	13.3
CO		PPM	10	7	6	8	7	10	11	14	10	14	12	15
H ₂ S		PPM	5	4	7	4	15	8	7	10	11	15	10	10
Vel Min		m/s	-	-	-	-	-	1.78	2.11	2.35	1.99	1.27	1.58	1.47
Vel Max		m/s	-	-	-	-	-	2.14	2.39	3.01	2.67	2.45	2.14	1.98
Flow		CFM	-	-	-	-	-	18.52	21.26	25.32	22.02	17.58	17.58	16.30
Temp		° C	-	-	-	-	-	24.8	25.8	30.4	28.1	29.3	20.4	17.2
Comments			closed	closed	closed	closed	closed	2T	2T	2T	2T	2T	2T	2T

Table 2: Wellfield Monitoring Data

			15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22
H-4 DP	Well	"H ₂ O	-0.04	-0.09	-0.05	-0.04	-0.05	-0.01	-0.03	-0.03	-0.01	0.01	-0.01	-0.02
	Lateral	"H ₂ O	-14.22	-19.47	-13.47	-8.65	-7.15	-7.51	-6.84	-6.40	-3.98	-4.99	-6.30	-7.95
	CH ₄	%	24.1	23.9	22.7	18.4	19.6	22.3	17.1	15.1	20.4	22.5	24.1	25.2
	CO ₂	%	27.3	29.5	26.8	24.8	21.7	15.9	19.3	10.3	14.6	16.3	20.4	20.3
	O ₂	%	8.8	7.2	8.0	10.2	7.6	8.3	10.4	14.9	12.8	11.0	9.5	7.4
	BAL (N ₂)	%	39.8	39.4	42.5	46.6	51.1	53.5	53.2	59.7	52.2	50.2	46.0	47.1
	CO	PPM	9	8	7	4	4	8	5	0	1	2	7	7
	H ₂ S	PPM	9	6	4	10	7	5	4	15	10	11	7	12
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments		closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed
1-5 well bore seal	Well	"H ₂ O	-0.04	-0.05	-0.05	-0.03	-0.05	-0.04	-0.05	-0.02	-0.01	0.01	-0.01	0.04
	Lateral	"H ₂ O	-13.54	-22.47	-11.57	-8.32	-7.18	-7.45	-6.85	-5.60	-3.55	-4.85	-6.28	-5.22
	CH ₄	%	20.8	25.4	26.9	26.3	24.8	25.9	26.0	22.2	20.0	22.3	25.1	24.0
	CO ₂	%	21.3	23.6	22.4	20.3	19.6	21.4	18.3	17.4	21.6	22.0	25.9	23.1
	O ₂	%	8.1	6.8	7.3	8.4	7.2	8.3	9.1	10.4	9.6	10.1	9.1	9.4
	BAL (N ₂)	%	49.8	44.2	43.4	45.0	48.4	44.4	46.6	50.0	48.8	45.6	39.9	43.5
	CO	PPM	7	8	10	6	6	4	5	3	5	8	7	10
	H ₂ S	PPM	12	10	11	12	7	6	8	4	5	4	5	7
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments		closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed
1-6 DP	Well	"H ₂ O	-0.03	-0.05	-0.05	-0.04	-0.03	-0.05	-0.04	-0.04	0.01	-0.02	0.02	0.01
	Lateral	"H ₂ O	-13.68	-21.47	-11.38	-8.57	-7.29	-7.58	-6.84	-5.38	-4.15	-5.67	-6.14	-5.98
	CH ₄	%	29.5	28.6	27.6	25.9	28.6	30.1	29.5	27.8	30.6	31.6	32.8	32.3
	CO ₂	%	28.6	25.1	27.3	24.5	26.9	25.0	23.1	23.9	24.6	25.8	27.1	26.8
	O ₂	%	7.6	8.1	7.0	5.6	6.7	4.1	5.5	4.4	5.1	5.3	4.2	4.9
	BAL (N ₂)	%	34.3	38.2	38.1	44.0	37.8	40.8	41.9	43.9	39.7	37.3	35.9	36.0
	CO	PPM	8	10	12	10	8	7	2	0	2	5	10	8
	H ₂ S	PPM	24	26	19	22	20	17	26	29	19	14	14	19
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments		closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed
1-7	Well	"H ₂ O	-0.04	-0.05	-0.06	-0.05	-0.04	-0.34	-0.40	-0.47	-0.98	-1.55	-1.24	-1.57
	Lateral	"H ₂ O	-12.17	-22.58	-13.47	-8.61	-7.18	-7.66	-6.57	-5.71	-5.69	-5.68	-6.21	-7.95
	CH ₄	%	21.4	23.7	25.9	30.6	33.5	36.7	39.5	45.1	46.2	47.1	45.8	44.2
	CO ₂	%	23.9	25.1	24.1	25.6	24.8	26.3	28.1	27.2	28.2	27.2	27.3	27.3
	O ₂	%	10.5	9.5	9.9	8.9	7.2	7.5	7.0	6.5	5.1	4.4	4.2	4.0
	BAL (N ₂)	%	44.2	41.7	40.1	34.9	34.5	29.5	25.4	21.2	20.5	21.3	22.7	24.5
	CO	PPM	45	33	47	42	48	55	56	52	41	50	32	32
	H ₂ S	PPM	33	54	26	36	30	28	40	45	32	25	22	28
	Vel Min	m/s	-	-	-	-	-	0.00	0.00	0.78	1.22	1.58	1.57	1.00
	Vel Max	m/s	-	-	-	-	-	1.22	0.88	1.06	1.96	2.33	1.96	1.64
	Flow	CFM	-	-	-	-	-	5.76	4.16	8.69	15.02	18.47	16.68	12.47
	Temp	°C	-	-	-	-	-	20.4	21.3	29.3	30.6	28.5	20.5	14.0
	Comments		closed	closed	closed	closed	closed	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T

Table 2: Wellfield Monitoring Data

			15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22
1-8	Well	"H ₂ O	-0.05	-0.06	-0.07	-0.05	-0.06	-0.94	-0.71	-0.69	-1.24	-1.54	-1.36	-1.69
	Lateral	"H ₂ O	-12.44	-22.47	-11.69	-8.47	-8.66	-7.28	-6.47	-5.90	-4.96	-5.62	-5.54	-5.96
	CH ₄	%	26.3	25.1	28.3	31.5	33.9	40.1	41.8	40.6	42.8	41.8	41.0	40.2
	CO ₂	%	26.8	27.9	27.1	28.1	28.6	27.1	29.3	29.7	30.6	29.5	29.6	27.2
	O ₂	%	9.1	8.4	8.4	7.5	6.6	3.8	4.1	4.9	4.7	4.8	4.2	4.2
	BAL (N ₂)	%	37.8	38.6	36.2	32.9	30.9	29.0	24.8	24.8	21.9	23.9	25.2	28.4
	CO	PPM	6	10	12	10	10	8	7	6	8	10	12	10
	H ₂ S	PPM	87	57	68	71	86	72	90	106	95	68	65	76
	Vel Min	m/s	-	-	-	-	-	0.98	1.24	0.69	1.11	1.00	1.17	1.28
	Vel Max	m/s	-	-	-	-	-	1.24	1.53	1.24	1.96	1.64	1.58	1.88
	Flow	CFM	-	-	-	-	-	10.49	13.09	9.12	14.50	12.47	12.99	14.93
	Temp	°C	-	-	-	-	-	24.3	25.9	24.8	25.3	24.0	18.2	15.1
	Comments		closed	closed	closed	closed	closed	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T
	1-9 DP	Well	"H ₂ O	-0.03	-0.05	-0.05	-0.04	-0.06	-0.57	-0.85	-0.87	-1.96	-1.57	-1.68
Lateral		"H ₂ O	-10.58	-23.47	-11.74	-8.65	-8.14	-7.52	-6.30	-6.23	-5.31	-5.62	-6.00	-8.32
CH ₄		%	26.9	25.1	29.8	33.6	34.7	41.8	42.1	43.7	44.8	43.9	42.5	41.2
CO ₂		%	26.8	28.3	27.1	28.6	27.1	26.9	28.1	33.7	31.0	30.6	30.7	28.6
O ₂		%	7.0	6.7	8.1	4.2	5.6	2.2	2.8	1.4	1.1	1.2	1.3	1.5
BAL (N ₂)		%	39.3	39.9	35.0	33.6	32.6	29.1	27.0	21.2	23.1	24.3	25.5	28.7
CO		PPM	8	7	10	8	7	9	7	8	11	14	14	12
H ₂ S		PPM	9	7	11	14	18	16	11	20	16	22	19	19
Vel Min		m/s	-	-	-	-	-	1.02	1.39	0.88	1.11	1.14	1.34	1.01
Vel Max		m/s	-	-	-	-	-	1.54	1.74	1.36	1.63	1.80	1.88	1.67
Flow		CFM	-	-	-	-	-	12.10	14.79	10.58	12.95	13.89	15.21	12.66
Temp		°C	-	-	-	-	-	30.8	31.6	33.9	32.6	30.4	22.1	15.1
Comments			closed	closed	closed	closed	closed	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T
1-10 DP		Well	"H ₂ O	-0.06	-0.07	-0.05	-0.04	-0.04	-0.06	-0.05	-0.05	0.00	-0.03	0.00
	Lateral	"H ₂ O	-12.54	-21.87	-12.05	-13.57	-10.48	-6.84	-6.02	-5.40	4.38	-5.67	-6.11	-8.24
	CH ₄	%	23.6	26.7	28.6	29.5	29.4	33.5	37.5	38.5	35.9	36.8	34.2	31.0
	CO ₂	%	25.4	24.1	23.6	28.2	27.5	28.3	27.0	29.4	28.4	27.1	28.6	27.3
	O ₂	%	9.9	8.7	8.1	7.4	6.5	6.4	4.5	3.5	5.6	5.3	5.0	5.2
	BAL (N ₂)	%	41.1	40.5	39.7	34.9	36.6	31.8	31.0	28.6	30.1	30.8	32.2	36.5
	CO	PPM	8	10	10	8	10	9	7	8	7	8	7	10
	H ₂ S	PPM	11	12	14	12	8	7	7	4	5	8	3	5
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments		closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed
	H-11 DP	Well	"H ₂ O	-2.47	-6.57	-3.17	-2.57	-2.89	-2.17	-2.27	-2.58	-1.58	-1.29	-1.44
Lateral		"H ₂ O	-17.45	-21.36	-11.38	-8.69	-7.30	-7.20	-7.22	-6.94	-4.96	-5.34	-5.26	-7.25
CH ₄		%	40.2	39.7	41.8	43.6	44.8	44.0	50.9	53.9	55.7	54.0	50.7	51.1
CO ₂		%	26.3	27.6	27.4	30.1	28.6	29.4	31.5	35.3	34.9	31.9	33.6	32.1
O ₂		%	8.3	8.4	8.1	7.6	5.3	5.0	4.2	2.1	1.5	1.9	1.2	1.8
BAL (N ₂)		%	25.2	24.3	22.7	18.7	21.3	21.6	13.4	8.7	7.9	12.2	14.5	15.0
CO		PPM	1	3	6	4	5	5	7	2	5	10	14	12
H ₂ S		PPM	29	19	22	45	30	29	58	99	74	52	69	56
Vel Min		m/s	1.58	1.27	1.57	1.02	0.94	0.63	1.24	1.98	1.11	1.47	1.85	1.25
Vel Max		m/s	1.68	1.57	1.89	1.23	1.45	1.98	1.60	2.36	1.62	1.99	2.14	1.87
Flow		CFM	15.40	13.42	16.35	10.63	11.29	12.33	13.42	20.51	12.90	16.35	18.85	14.74
Temp		°C	14.8	10.4	12.3	16.9	18.6	19.2	20.1	20.4	25.6	24.0	20.1	15.2
Comments			1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T

Table 2: Wellfield Monitoring Data

			15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22	
H-12 well bore seal	Well	"H ₂ O	-1.22	-2.38	-1.99	-1.57	-1.96	-1.87	-2.59	-3.47	-2.55	-3.67	-2.17	-3.01	
	Lateral	"H ₂ O	-17.44	-22.68	-13.47	-8.19	-8.69	-7.84	-7.11	-6.98	-5.30	-5.68	-6.24	-8.24	
		CH ₄	%	60.0	58.5	56.2	55.9	54.8	53.2	55.6	53.2	52.9	51.8	50.1	49.9
		CO ₂	%	38.3	37.1	34.1	30.5	31.5	27.5	25.8	27.4	28.5	30.6	27.2	27.5
		O ₂	%	1.6	1.8	1.9	2.3	2.8	4.2	4.8	5.1	4.2	4.0	5.1	5.0
		BAL (N ₂)	%	0.1	2.6	7.8	11.3	10.9	15.1	13.8	14.3	14.4	13.6	17.6	17.6
		CO	PPM	2	5	9	12	10	7	9	15	11	15	15	10
		H ₂ S	PPM	29	22	18	14	19	24	20	19	11	12	16	8
		Vel Min	m/s	1.55	1.35	1.87	0.67	0.82	0.72	1.67	2.57	2.00	1.57	1.84	1.45
		Vel Max	m/s	2.12	1.98	2.14	1.03	1.25	1.46	3.22	3.06	2.39	2.14	2.15	1.96
		Flow	CFM	17.34	15.73	18.95	8.03	9.78	10.30	23.10	26.60	20.74	17.53	18.85	16.11
		Temp	°C	13.3	11.8	14.8	15.3	17.4	18.8	25.0	30.4	29.6	25.8	20.3	18.2
	Comments		1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	2T	2T	2T	2T	2T	2T	
2-13	Well	"H ₂ O	-8.64	-9.57	-6.57	-3.25	-3.58	-2.84	-3.01	-2.98	-2.15	-2.58	-2.54	-2.45	
	Lateral	"H ₂ O	-18.69	-22.54	-12.56	-8.69	-7.12	-7.35	-7.38	-4.53	-4.66	-5.63	-5.98	-7.20	
		CH ₄	%	59.2	58.6	57.3	55.2	54.9	47.2	50.3	48.9	49.0	48.5	48.3	48.8
		CO ₂	%	38.5	37.1	38.6	35.1	34.9	32.8	30.8	33.0	32.6	31.2	30.9	31.8
		O ₂	%	0.9	1.0	1.3	2.0	1.8	2.6	2.4	3.8	2.8	3.5	2.9	3.1
		BAL (N ₂)	%	1.4	3.3	2.8	7.7	8.4	17.4	16.5	14.3	15.6	16.8	17.9	16.3
		CO	PPM	51	44	50	45	62	63	51	62	54	40	68	58
		H ₂ S	PPM	191	173	196	156	184	122	109	210	112	98	127	130
		Vel Min	m/s	3.54	2.47	2.14	1.58	2.03	1.57	2.06	2.54	1.99	1.55	1.67	1.54
		Vel Max	m/s	3.64	2.83	2.98	1.99	2.84	1.98	2.55	2.69	2.18	2.01	2.03	2.00
		Flow	CFM	33.92	25.04	24.19	16.87	23.01	16.77	21.78	24.71	19.70	16.82	17.48	16.73
		Temp	°C	13.5	12.5	15.8	22.5	26.9	24.8	28.3	30.5	32.0	28.6	21.6	18.3
	Comments		2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	
2-14 well bore seal	Well	"H ₂ O	-0.02	-0.03	-0.02	-0.03	-0.03	-0.02	-0.98	-1.24	-2.04	-2.54	-1.57	-2.12	
	Lateral	"H ₂ O	-13.39	-21.57	-12.30	-8.96	-8.36	-7.58	-7.14	-3.82	-3.21	-4.85	-4.98	-7.00	
		CH ₄	%	36.8	37.5	38.6	39.5	38.6	39.9	43.8	41.1	43.6	40.2	45.2	44.3
		CO ₂	%	28.1	27.4	27.1	30.2	28.5	30.5	31.9	33.3	31.0	30.2	30.8	29.3
		O ₂	%	7.2	7.1	6.4	5.0	4.5	4.2	3.0	2.3	2.2	3.5	1.6	2.0
		BAL (N ₂)	%	27.9	28.0	27.9	25.3	28.4	25.4	21.3	23.3	23.2	26.1	22.4	24.4
		CO	PPM	9	10	12	5	9	4	10	0	5	8	10	7
		H ₂ S	PPM	41	37	31	16	20	31	17	29	16	15	12	15
		Vel Min	m/s	-	-	-	-	-	-	1.33	1.01	1.17	1.02	1.77	1.11
		Vel Max	m/s	-	-	-	-	-	-	1.69	1.53	1.66	1.68	2.01	1.65
		Flow	CFM	-	-	-	-	-	-	14.27	12.00	13.37	12.76	17.86	13.04
		Temp	°C	-	-	-	-	-	-	25.3	24.6	25.0	23.6	17.6	14.2
	Comments		closed	closed	closed	closed	closed	closed	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	
2-15	Well	"H ₂ O	-0.04	-0.05	-0.03	-0.03	-0.02	-0.05	-2.00	-2.10	-1.77	-1.47	-1.27	-1.52	
	Lateral	"H ₂ O	-11.3	-20.7	-12.7	-8.7	-8.0	-7.7	-7.7	-4.3	-3.3	-4.3	-5.6	-7.0	
		CH ₄	%	35.4	36.3	34.6	35.6	33.7	39.2	44.2	45.2	46.9	45.8	44.8	43.2
		CO ₂	%	29.6	28.0	28.0	29.6	27.1	28.3	30.9	32.5	31.7	30.6	30.2	30.0
		O ₂	%	4.1	4.2	4.5	4.0	3.5	3.0	2.9	3.3	3.1	3.4	4.0	4.2
		BAL (N ₂)	%	30.9	31.5	32.9	30.8	35.7	29.5	22.0	19.0	18.3	20.2	21.0	22.6
		CO	PPM	22.0	30.0	23.0	15.0	19.0	14.0	10.0	16.0	15.0	10.0	19.0	14.0
		H ₂ S	PPM	32.0	31.0	27.0	20.0	19.0	24.0	15.0	20.0	22.0	24.0	23.4	19.0
		Vel Min	m/s	-	-	-	-	-	-	1.3	1.3	1.1	1.1	1.5	1.1
		Vel Max	m/s	-	-	-	-	-	-	1.9	1.7	2.0	2.0	2.0	1.6
		Flow	CFM	-	-	-	-	-	-	14.88	14.08	14.79	14.46	16.16	12.85
		Temp	°C	-	-	-	-	-	-	27.6	28.6	29.6	25.0	19.3	16.2
	Comments		closed	closed	closed	closed	closed	closed	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	

Table 2: Wellfield Monitoring Data

	Units	15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22	
2-16	Well	"H ₂ O	-3.55	-3.98	-2.47	-1.58	-2.14	-1.85	-1.00	-1.28	-1.69	-2.04	-2.37	-2.04
	Lateral	"H ₂ O	-18.70	-22.35	-11.48	-8.96	-8.02	-7.22	-7.20	-4.03	-4.99	-5.98	-5.68	-7.68
	CH ₄	%	37.9	36.1	37.0	38.6	39.2	40.1	43.2	44.3	45.8	43.8	44.2	43.2
	CO ₂	%	27.1	28.9	27.6	28.6	24.5	29.6	28.4	32.0	31.0	30.1	30.6	29.1
	O ₂	%	7.7	7.4	6.7	4.3	4.8	5.0	4.0	5.1	4.2	4.0	4.6	4.8
	BAL (N ₂)	%	27.3	27.6	28.7	28.5	31.5	25.3	24.4	18.6	19.0	22.1	20.6	22.9
	CO	PPM	0	2	1	5	4	8	5	12	19	22	22	14
	H ₂ S	PPM	22	15	19	30	18	19	22	28	35	56	41	36
	Vel Min	m/s	0.00	frozen	-	1.02	1.33	0.00	0.00	1.35	1.24	1.02	1.54	1.55
	Vel Max	m/s	0.00	frozen	-	1.55	1.67	0.68	0.00	1.68	1.78	1.47	1.87	1.80
	Flow	CFM	0	-	-	12.14	14.17	3.21	0.00	14.32	14.27	11.76	16.11	15.83
	Temp	° C	7.0	-	-	15.6	18.6	25.6	26.3	25.0	26.4	24.0	20.1	19.4
	Comments		cracked	cracked	cracked	cracked	cracked	cracked	cracked	1T	1T	1T	1T	1T
	2-17	Well	"H ₂ O	-1.11	-2.57	-1.33	-2.11	-2.07	-3.68	-2.87	-3.54	-2.55	-3.02	-2.68
Lateral		"H ₂ O	-17.90	-23.67	-13.66	-8.96	-9.14	-7.55	-6.22	-4.77	-4.03	-5.24	-5.28	-7.85
CH ₄		%	44.8	43.0	42.2	46.9	50.2	55.6	52.4	58.1	54.2	53.6	50.1	49.9
CO ₂		%	28.8	27.2	29.6	30.1	28.6	28.5	32.4	39.5	35.3	34.2	31.6	30.1
O ₂		%	8.0	7.9	6.9	5.0	4.1	4.3	2.8	0.6	0.7	1.0	1.2	1.5
BAL (N ₂)		%	18.4	21.9	21.3	18.0	17.1	11.6	12.4	1.8	9.8	11.2	17.1	18.5
CO		PPM	2	5	4	5	4	8	5	0	1	2	5	7
H ₂ S		PPM	19	14	18	12	10	7	16	10	4	2	5	3
Vel Min		m/s	1.24	1.04	1.33	1.00	0.69	2.33	2.85	2.33	2.00	1.58	1.57	1.47
Vel Max		m/s	1.39	1.69	1.80	1.25	1.05	2.69	3.09	2.57	2.68	2.34	1.96	2.01
Flow		CFM	12.43	12.90	14.79	10.63	8.22	23.72	28.06	23.15	22.11	18.52	16.68	16.44
Temp		° C	10.1	14.8	15.9	20.3	25.3	26.4	29.7	28.6	29.5	28.2	20.6	18.3
Comments			1/2T	1/2T	1/2T	1/2T	1/2T	2T	2T	2T	2T	2T	2T	2T
2-18		Well	"H ₂ O	-0.05	-0.06	-0.04	-0.02	-0.04	0.00	-0.01	-1.47	-1.26	-1.54	-1.04
	Lateral	"H ₂ O	-12.57	-19.66	-14.55	-8.69	-7.14	-8.96	-5.14	-4.62	-4.21	-4.68	-4.21	-6.24
	CH ₄	%	26.3	27.3	28.6	30.5	39.4	35.7	33.5	42.1	44.8	45.1	42.6	41.2
	CO ₂	%	28.4	28.1	28.0	29.5	30.1	32.6	28.6	35.2	36.0	35.2	33.0	31.1
	O ₂	%	6.6	7.0	6.8	5.2	4.8	3.0	4.5	0.9	1.0	1.1	1.9	2.3
	BAL (N ₂)	%	38.7	37.6	36.6	34.8	25.7	28.7	33.4	21.8	18.2	18.6	22.5	25.4
	CO	PPM	20	22	25	10	18	16	10	7	10	15	12	14
	H ₂ S	PPM	33	36	31	28	15	30	33	27	18	22	24	20
	Vel Min	m/s	-	-	-	-	-	-	-	1.35	1.11	1.34	1.59	1.27
	Vel Max	m/s	-	-	-	-	-	-	-	1.66	1.62	1.68	1.99	1.68
	Flow	CFM	-	-	-	-	-	-	-	14.22	12.90	14.27	16.91	13.94
	Temp	° C	-	-	-	-	-	-	-	21.0	25.1	21.0	17.5	15.7
	Comments		closed	closed	closed	closed	closed	closed	closed	1/2T	1/2T	1/2T	1/2T	1/2T
	3-19	Well	"H ₂ O	-0.06	-0.05	-0.04	-0.04	-0.04	-0.02	-0.03	-0.05	-0.01	0.02	-0.01
Lateral		"H ₂ O	-10.57	-19.31	-11.20	-8.65	-7.02	-8.69	-5.22	-3.99	-3.57	-4.28	-6.24	-5.11
CH ₄		%	25.3	24.3	26.2	20.9	18.5	24.7	15.9	11.1	19.4	20.1	19.5	18.6
CO ₂		%	26.3	27.6	26.3	20.8	17.4	17.4	10.2	9.1	10.6	10.1	15.3	14.2
O ₂		%	11.0	12.0	11.5	10.2	12.8	10.7	11.0	13.7	11.8	10.1	10.7	11.8
BAL (N ₂)		%	37.4	36.1	36.0	48.1	51.3	47.2	62.9	66.1	58.2	59.7	54.5	55.4
CO		PPM	5	9	8	5	4	10	8	0	1	2	5	4
H ₂ S		PPM	10	12	15	10	8	7	10	5	1	2	7	7
Vel Min		m/s	-	-	-	-	-	-	-	-	-	-	-	-
Vel Max		m/s	-	-	-	-	-	-	-	-	-	-	-	-
Flow		CFM	-	-	-	-	-	-	-	-	-	-	-	-
Temp		° C	-	-	-	-	-	-	-	-	-	-	-	-
Comments			closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed

Table 2: Wellfield Monitoring Data

	<i>Units</i>	15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22	
3-20	Well	"H ₂ O	-0.01	-0.02	-0.05	-0.04	-0.05	-2.47	-2.66	-1.58	-1.89	-1.99	-2.17	-2.00
	Lateral	"H ₂ O	-15.33	-22.69	-12.50	-8.96	-9.47	-7.21	-5.55	-4.24	-4.02	-4.57	-5.64	-8.24
	CH ₄	%	0.3	1.8	12.5	20.9	33.6	42.5	45.9	45.8	46.3	45.2	44.8	45.1
	CO ₂	%	0.1	0.9	1.3	2.5	10.8	29.6	28.4	34.6	33.2	30.6	31.6	32.0
	O ₂	%	20.4	18.6	20.5	18.6	19.1	5.7	4.3	3.6	3.0	3.3	3.3	3.2
	BAL (N ₂)	%	79.2	78.7	65.7	58.0	36.5	22.2	21.4	16.0	17.5	20.9	20.3	19.7
	CO	PPM	1	2	2	3	3	18	10	18	20	25	14	17
	H ₂ S	PPM	0	2	1	2	2	14	18	13	10	12	12	14
	Vel Min	m/s	FROZEN	FROZEN	-	-	-	1.58	1.66	1.00	1.24	1.27	1.27	1.57
	Vel Max	m/s	FROZEN	FROZEN	-	-	-	1.96	2.14	1.65	1.99	1.66	1.55	1.99
	Flow	CFM	FROZEN	FROZEN	-	-	-	16.73	17.95	12.52	15.26	13.84	13.32	16.82
	Temp	° C	FROZEN	FROZEN	-	-	-	17.6	18.0	25.7	24.0	25.9	20.1	17.3
	Comments		closed	closed	closed	closed	closed	1T	1T	1T	1T	1T	1T	1T
3-21	Well	"H ₂ O	-0.04	-0.04	-0.05	-0.04	-0.03	-1.22	-1.57	-1.68	-2.04	-1.99	-1.68	-2.24
	Lateral	"H ₂ O	-11.56	-19.57	-12.49	-8.99	-7.20	-8.22	-5.96	-4.51	-5.92	-5.47	-6.11	-7.95
	CH ₄	%	20.3	21.5	23.9	35.6	39.1	45.2	44.8	46.1	47.2	45.9	45.9	45.0
	CO ₂	%	19.5	18.0	20.1	22.5	29.3	30.1	32.9	32.1	28.6	27.6	29.3	28.3
	O ₂	%	13.0	12.3	10.8	9.8	8.5	4.1	3.2	3.6	2.6	2.5	3.4	3.5
	BAL (N ₂)	%	47.2	48.2	45.2	32.1	23.1	20.6	19.1	18.2	21.6	24.0	21.4	23.2
	CO	PPM	6	5	5	4	3	4	10	0	4	10	10	7
	H ₂ S	PPM	2	3	3	4	5	22	19	42	25	30	36	15
	Vel Min	m/s	-	-	-	-	-	1.58	1.67	2.36	1.57	1.62	1.44	1.17
	Vel Max	m/s	-	-	-	-	-	1.99	2.33	2.87	2.03	1.98	1.95	1.87
	Flow	CFM	-	-	-	-	-	16.87	18.90	24.71	17.01	17.01	16.02	14.36
	Temp	° C	-	-	-	-	-	28.5	24.1	27.1	28.4	25.1	25.1	20.3
	Comments		closed	closed	closed	closed	closed	1T	1T	1T	1T	1T	1T	1T
3-22 well bore seal	Well	"H ₂ O	-5.17	-3.57	-2.17	-2.58	-3.21	-2.44	-1.57	-2.47	-2.69	-2.58	-2.98	-3.24
	Lateral	"H ₂ O	-13.79	-19.65	-11.06	-8.96	-8.22	-7.54	-5.69	-3.52	-4.85	-5.02	-5.84	-8.20
	CH ₄	%	56.1	55.2	56.9	55.3	56.9	58.2	59.4	58.6	57.1	57.2	55.5	
	CO ₂	%	43.3	41.2	40.8	38.6	37.2	38.6	35.2	39.0	37.4	36.3	34.3	35.1
	O ₂	%	0.5	0.8	0.4	0.6	1.0	1.2	0.8	1.0	1.0	1.0	1.2	1.4
	BAL (N ₂)	%	0.1	2.8	1.9	5.5	4.9	2.0	4.7	0.6	3.0	5.6	7.3	8.0
	CO	PPM	29	31	30	24	19	27	33	27	16	15	20	15
	H ₂ S	PPM	55	69	48	55	25	32	33	46	47	40	54	36
	Vel Min	m/s	1.01	1.25	1.58	1.66	2.01	1.69	1.66	2.38	1.97	1.66	1.74	1.24
	Vel Max	m/s	1.54	1.86	2.13	1.89	2.58	2.00	2.36	3.01	2.48	2.03	1.96	2.00
	Flow	CFM	12.05	14.69	17.53	16.77	21.69	17.43	18.99	25.47	21.02	17.43	17.48	15.30
	Temp	° C	10.1	10.8	15.7	20.3	22.3	23.3	26.3	30.6	24.9	25.3	20.3	16.2
	Comments		1T	1T	1T	1T	1T	1T	1T	2T	2T	2T	2T	2T
3-23	Well	"H ₂ O	-0.09	-0.07	-0.05	-0.03	-0.04	-0.03	-0.02	-0.05	-0.01	0.02	0.03	0.02
	Lateral	"H ₂ O	-6.42	-17.45	-9.65	-9.66	-7.14	-5.55	-4.21	-3.91	-3.68	-4.02	-5.62	-5.31
	CH ₄	%	24.6	25.0	27.8	28.3	24.1	29.6	25.1	24.8	26.9	28.6	24.8	25.4
	CO ₂	%	24.5	23.9	25.0	22.1	23.8	24.6	19.6	17.0	18.4	19.4	19.3	17.6
	O ₂	%	10.1	9.9	9.4	8.8	7.6	9.3	9.5	10.9	9.8	9.5	10.2	10.1
	BAL (N ₂)	%	40.8	41.2	37.8	40.8	44.5	36.5	45.8	47.3	44.9	42.5	45.7	46.9
	CO	PPM	10	12	15	10	9	4	4	0	1	4	5	5
	H ₂ S	PPM	162	147	139	89	93	101	74	60	54	36	69	69
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	° C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments		closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed

Table 2: Wellfield Monitoring Data

			15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22	
3-24	Well	"H ₂ O	-0.03	-0.04	-0.03	-0.02	0.03	0.05	0.02	-0.05	0.34	0.12	0.08	0.04	
	Lateral	"H ₂ O	-10.57	-19.54	-11.30	-8.54	-9.36	-4.85	-4.11	-4.44	-3.95	-4.25	-4.68	-6.30	
	CH ₄	%	23.6	26.3	25.1	30.6	27.1	25.6	24.0	25.4	29.6	30.1	31.3	30.8	
	CO ₂	%	25.4	26.1	24.6	22.3	20.3	20.4	21.5	18.3	20.4	25.3	21.5	22.3	
	O ₂	%	10.5	9.8	9.9	8.5	9.6	10.4	8.6	10.5	8.5	8.2	8.0	8.9	
	BAL (N ₂)	%	40.5	37.8	40.4	38.6	43.0	43.7	45.9	45.8	41.5	36.4	39.2	38.0	
	CO	PPM	22	25	26	20	17	10	7	8	14	15	10	12	
	H ₂ S	PPM	197	173	200	165	177	104	111	122	160	124	157	134	
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-	
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-	
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-	
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-	
	Comments			closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed
	3-25	Well	"H ₂ O	-3.57	-5.69	-2.69	-2.57	-1.47	-0.05	0.04	-0.12	0.02	0.01	-0.01	0.02
Lateral		"H ₂ O	-14.52	-22.68	-11.85	-9.66	-8.33	-7.14	-5.66	-3.65	-3.87	-4.11	-5.00	-8.02	
CH ₄		%	35.6	34.1	37.6	35.4	36.9	30.4	22.9	12.6	15.2	19.6	22.5	25.3	
CO ₂		%	34.0	33.2	32.5	30.5	28.6	24.1	25.8	25.9	24.9	25.1	23.6	25.1	
O ₂		%	2.3	3.6	2.2	5.6	6.0	7.1	7.5	8.6	9.1	8.0	8.5	8.4	
BAL (N ₂)		%	28.1	29.1	27.7	28.5	28.5	38.4	43.8	52.9	50.8	47.3	45.4	41.2	
CO		PPM	1	5	3	4	5	10	4	5	5	10	10	12	
H ₂ S		PPM	92	100	102	98	104	115	101	111	108	124	67	57	
Vel Min		m/s	-	-	-	-	0.57	-	-	-	-	-	-	-	
Vel Max		m/s	-	-	-	-	1.00	-	-	-	-	-	-	-	
Flow		CFM	-	-	-	-	7.42	-	-	-	-	-	-	-	
Temp		°C	-	-	-	-	10.2	-	-	-	-	-	-	-	
Comments				frozen open	frozen open	frozen open	frozen open	1/2T	closed	closed	closed	closed	closed	closed	closed
3-26		Well	"H ₂ O	-0.02	-0.03	-0.03	-0.03	-0.66	1.22	-1.98	-1.47	-2.05	-2.14	-2.21	-2.35
	Lateral	"H ₂ O	-12.57	-20.39	-11.54	-9.30	-7.11	-6.32	-5.98	-3.88	-4.21	-5.01	-5.98	-8.21	
	CH ₄	%	29.4	28.4	29.3	34.9	41.2	43.8	45.2	46.1	45.8	45.6	44.6	45.1	
	CO ₂	%	26.8	27.0	28.6	27.4	28.0	28.6	29.1	30.9	29.6	30.9	30.1	29.9	
	O ₂	%	12.0	11.6	12.7	10.5	4.6	4.0	3.5	4.4	3.5	3.1	3.6	4.0	
	BAL (N ₂)	%	31.8	33.0	29.4	27.2	26.2	23.6	22.2	18.6	21.1	20.4	21.7	21.0	
	CO	PPM	5	6	9	8	4	2	5	4	8	10	10	12	
	H ₂ S	PPM	68	77	84	70	75	86	74	82	104	95	98	82	
	Vel Min	m/s	-	-	-	-	0.00	1.00	1.47	1.57	1.11	1.24	1.24	1.27	
	Vel Max	m/s	-	-	-	-	0.00	1.24	1.67	1.97	1.88	1.95	1.66	2.03	
	Flow	CFM	-	-	-	-	0	10.58	14.84	16.73	14.13	15.07	13.70	15.59	
	Temp	°C	-	-	-	-	15.3	18.6	24.8	25.3	24.0	23.0	25.3	17.2	
	Comments			closed	closed	closed	closed	cracked	1/2T	1T	1T	1T	1T	1T	1T
	3-27 DP	Well	"H ₂ O	-0.02	-0.03	-0.09	-0.05	-0.68	-0.42	-0.24	-1.02	-1.65	-1.96	-1.66	-1.57
Lateral		"H ₂ O	-17.11	-20.14	-11.57	-7.12	-8.54	-6.33	-5.02	-3.97	-5.96	-5.47	-6.11	-7.25	
CH ₄		%	0.5	1.1	15.6	10.6	38.2	39.2	40.1	42.8	43.1	44.9	41.0	40.5	
CO ₂		%	0.2	0.5	5.9	8.6	25.1	24.8	26.3	29.4	30.2	31.6	29.6	29.5	
O ₂		%	22.9	23.9	20.7	19.5	10.2	4.2	5.5	5.1	4.5	4.4	4.1	4.0	
BAL (N ₂)		%	76.4	74.5	57.8	61.3	26.5	31.8	28.1	22.7	22.2	19.1	25.3	26.0	
CO		PPM	0	0	1	2	2	1	0	0	2	5	5	8	
H ₂ S		PPM	0	0	1	1	10	24	29	71	51	62	56	66	
Vel Min		m/s	FROZEN	FROZEN	-	-	0.00	0.00	0.44	0.95	1.66	1.54	1.11	1.57	
Vel Max		m/s	FROZEN	FROZEN	-	-	0.00	0.00	0.98	1.47	2.01	2.33	1.68	2.17	
Flow		CFM	FROZEN	FROZEN	-	-	0	0	6.71	11.43	17.34	18.28	13.18	17.67	
Temp		°C	FROZEN	FROZEN	-	-	15.1	19.3	22.5	27.1	26.9	27.1	20.3	15.2	
Comments				FROZEN OPEN	FROZEN OPEN	FROZEN OPEN	Frozen open	cracked	cracked	cracked	1/2T	1/2T	1/2T	1/2T	1/2T

Table 2: Wellfield Monitoring Data

		Units	15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22	
3-28	Well	"H ₂ O	-0.03	-0.05	-0.03	-0.05	-0.03	-0.04	-0.05	-0.05	-0.06	-0.91	-0.84	-0.55	
	Lateral	"H ₂ O	-12.47	-19.64	-11.33	-8.22	-7.10	-5.32	-4.98	-4.07	-4.55	-5.22	-5.98	-7.11	
	CH ₄	%	20.5	22.1	26.9	30.2	35.9	40.0	38.1	40.0	42.4	45.6	43.6	40.3	
	CO ₂	%	19.6	20.4	23.7	25.3	26.9	27.1	25.3	28.1	28.3	30.1	29.4	28.6	
	O ₂	%	12.5	13.9	12.2	10.4	8.5	4.1	5.2	5.7	5.4	4.2	6.3	6.2	
	BAL (N ₂)	%	47.4	43.6	37.2	34.1	28.7	28.8	31.4	26.2	23.9	20.1	20.7	24.9	
	CO	PPM	4	5	9	6	4	10	7	6	10	15	15	7	
	H ₂ S	PPM	41	62	55	69	71	50	87	90	74	75	84	65	
	Vel Min	m/s	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	0.00	
	Vel Max	m/s	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	0.00	
	Flow	CFM	-	-	-	-	-	-	-	0	0	0	0	0	
	Temp	°C	-	-	-	-	-	-	-	24.1	25.3	24.0	18.3	15.2	
	Comments		closed	closed	closed	closed	closed	closed	closed	closed	cracked	cracked	cracked	cracked	cracked
	3-29 DP	Well	"H ₂ O	-0.02	-0.03	-0.02	-0.02	-0.01	-2.40	-1.68	-3.11	-2.57	-3.21	-2.65	-3.14
Lateral		"H ₂ O	-11.32	-22.93	-12.58	-7.12	-8.63	-5.22	-5.98	-4.77	-4.31	-5.66	-5.96	-8.34	
CH ₄		%	27.8	2.8	29.6	35.6	40.1	46.9	52.4	55.3	54.2	53.7	51.4	51.3	
CO ₂		%	26.1	28.3	28.4	29.3	32.4	30.6	33.7	35.4	34.2	33.6	33.2	31.6	
O ₂		%	8.6	9.6	9.2	7.7	6.5	2.0	1.7	1.4	1.1	1.7	1.8	1.9	
BAL (N ₂)		%	37.5	59.3	32.8	27.4	21.0	20.5	12.2	7.9	10.5	11.0	13.6	15.2	
CO		PPM	7	9	8	5	4	7	9	4	5	10	17	14	
H ₂ S		PPM	11	18	18	25	68	74	55	96	74	85	63	52	
Vel Min		m/s	-	-	-	-	-	1.02	0.68	2.04	2.22	1.98	1.88	1.75	
Vel Max		m/s	-	-	-	-	-	1.58	1.33	3.17	2.75	2.47	2.47	2.95	
Flow		CFM	-	-	-	-	-	12.28	9.50	24.62	23.48	21.02	20.55	22.21	
Temp		°C	-	-	-	-	-	20.1	304.0	33.9	31.0	30.8	21.3	18.3	
Comments			closed	closed	closed	closed	closed	1T	1T	2T	2T	2T	2T	2T	
3-30 DP		Well	"H ₂ O	-0.02	-0.03	-0.03	-0.02	0.03	-0.04	-0.01	-0.05	-0.01	0.02	0.00	0.02
	Lateral	"H ₂ O	-11.58	-19.64	-11.57	-8.47	-7.56	-7.14	-6.32	-3.67	-4.25	-5.32	-6.33	-7.65	
	CH ₄	%	24.1	25.6	28.3	30.2	31.8	28.4	25.0	26.9	30.9	27.2	27.1	25.1	
	CO ₂	%	19.6	20.1	22.5	20.3	22.4	19.5	18.0	17.7	18.5	20.3	20.3	22.3	
	O ₂	%	10.1	12.9	9.6	10.2	11.5	12.4	11.7	12.2	10.2	9.9	9.4	9.3	
	BAL (N ₂)	%	46.2	41.4	39.6	39.3	34.3	39.7	45.3	43.2	40.4	42.6	43.2	43.3	
	CO	PPM	15	10	15	10	8	5	5	3	5	7	8	10	
	H ₂ S	PPM	196	167	173	100	84	56	27	23	36	26	40	35	
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-	
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-	
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-	
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-	
	Comments		closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	
	4-31	Well	"H ₂ O	-0.06	-0.05	-0.04	-0.03	-0.02	-1.47	-0.99	-2.14	-2.02	-1.84	-2.14	-2.35
Lateral		"H ₂ O	-16.57	-20.17	-12.47	-9.63	-7.10	-8.55	-4.22	-4.27	-5.36	-5.01	-5.68	-7.24	
CH ₄		%	24.1	25.3	25.9	35.6	37.1	42.5	44.0	47.8	48.3	49.0	47.2	47.0	
CO ₂		%	17.0	18.3	18.9	20.3	24.8	30.8	28.1	34.7	32.6	30.5	30.2	31.1	
O ₂		%	11.6	12.4	12.5	10.3	10.8	4.4	3.8	2.9	2.5	2.4	2.8	3.5	
BAL (N ₂)		%	47.3	44.0	42.7	33.8	27.3	22.3	24.1	14.6	16.6	18.1	19.8	18.4	
CO		PPM	2	5	9	5	7	10	6	6	10	15	15	12	
H ₂ S		PPM	27	28	37	69	101	254	240	229	258	201	214	217	
Vel Min		m/s	-	-	-	-	-	0.57	1.11	1.57	1.48	1.65	1.24	1.11	
Vel Max		m/s	-	-	-	-	-	0.93	1.69	2.04	2.00	2.14	1.90	1.65	
Flow		CFM	-	-	-	-	-	7.09	13.23	17.06	16.44	17.91	14.84	13.04	
Temp		°C	-	-	-	-	-	17.6	18.5	25.6	24.2	23.5	18.3	14.2	
Comments			closed	closed	closed	closed	closed	1/2T	1/2T	1T	1T	1T	1T	1T	

Table 2: Wellfield Monitoring Data

			15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22
4-32	Well	"H ₂ O	-3.54	-3.87	-8.47	-3.58	-3.11	-2.47	-1.99	-3.01	-2.95	-3.02	-2.58	-3.26
	Lateral	"H ₂ O	-18.81	-22.57	-12.55	-8.62	-7.00	-6.58	-3.99	-3.75	-4.30	-5.68	-5.68	-8.14
	CH ₄	%	6.2	9.6	36.7	45.2	48.3	51.4	50.8	50.1	51.4	50.4	52.8	51.9
	CO ₂	%	3.9	5.8	23.9	30.4	32.7	34.8	31.6	37.3	35.6	26.3	34.1	33.5
	O ₂	%	21.2	21.0	5.4	4.9	4.1	2.5	3.2	3.1	2.4	2.8	2.8	3.0
	BAL (N ₂)	%	68.7	63.6	34.0	19.5	14.9	11.3	14.4	9.5	10.6	20.5	10.3	11.6
	CO	PPM	0	1	5	4	7	10	6	5	9	12	12	10
	H ₂ S	PPM	7	1	101	133	107	118	189	162	150	164	164	174
	Vel Min	m/s	FROZEN	FROZEN	1.24	1.88	2.22	1.69	2.11	1.57	1.47	1.45	1.55	1.66
	Vel Max	m/s	FROZEN	FROZEN	1.55	2.54	2.71	3.05	2.69	2.66	1.95	1.62	1.96	2.02
	Flow	CFM	#VALUE!	#VALUE!	13.18	20.88	23.29	22.40	22.68	19.99	16.16	14.50	16.58	17.39
	Temp	° C	FROZEN	FROZEN	10.4	15.8	22.7	25.8	26.9	29.6	27.2	24.5	22.4	18.6
	Comments			2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T
4-33	Well	"H ₂ O	-0.04	-0.05	-0.54	-0.68	-0.05	-0.04	-0.05	-0.02	0.03	0.05	0.02	0.01
	Lateral	"H ₂ O	-14.52	-19.63	-13.27	-9.66	-8.91	-6.33	-5.55	-2.89	-3.21	-5.11	-6.00	-7.95
	CH ₄	%	0.3	0.4	38.5	32.7	30.5	10.8	5.8	3.0	12.8	15.3	17.2	18.2
	CO ₂	%	0.1	0.2	24.1	20.8	10.4	5.5	4.9	1.9	15.9	19.7	18.6	19.6
	O ₂	%	21.8	21.0	6.3	8.6	13.5	14.8	18.2	18.1	14.0	12.5	11.3	10.4
	BAL (N ₂)	%	77.8	78.4	31.1	37.9	45.6	68.9	71.1	77.0	57.3	52.5	52.9	51.8
	CO	PPM	0	0	4	5	1	7	2	1	5	8	10	14
	H ₂ S	PPM	3	2	<<<<	222	210	100	85	63	88	54	69	75
	Vel Min	m/s	-	-	-	0.00	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	0.00	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	0	-	-	-	-	-	-	-	-
	Temp	° C	-	-	-	10.6	-	-	-	-	-	-	-	-
	Comments			frozen	frozen	cracked	cracked	closed	closed	closed	closed	closed	closed	closed
4-34	Well	"H ₂ O	-0.04	-0.05	-0.05	-0.04	-1.55	-2.55	-2.69	-2.57	-2.65	-2.98	-2.47	-3.27
	Lateral	"H ₂ O	-11.25	-20.48	-10.55	-9.68	-7.14	-5.20	-5.39	-3.57	-4.85	-5.47	-5.69	-7.62
	CH ₄	%	39.6	36.7	37.6	38.9	43.7	46.9	50.2	54.6	52.0	51.6	50.2	51.1
	CO ₂	%	28.4	27.1	29.6	30.8	33.9	38.4	36.5	37.5	35.9	34.2	32.9	30.2
	O ₂	%	5.9	6.9	5.2	4.3	2.0	1.8	2.6	1.2	1.5	1.8	1.8	2.7
	BAL (N ₂)	%	26.1	29.3	27.6	26.0	20.4	12.9	10.7	6.7	10.6	12.4	15.1	16.0
	CO	PPM	6	7	7	10	7	7	4	5	10	15	15	19
	H ₂ S	PPM	<<<<	<<<<	<<<<	<<<<	<<<<	<<<<	<<<<	451	<<<<	<<<<	<<<<	<<<<
	Vel Min	m/s	-	-	-	-	0.44	1.36	2.07	2.00	1.88	1.47	1.47	1.58
	Vel Max	m/s	-	-	-	-	1.08	1.85	2.66	2.58	2.32	2.30	1.98	2.14
	Flow	CFM	-	-	-	-	7.18	15.17	22.35	24.1	21.64	19.84	17.81	16.30
	Temp	° C	-	-	-	-	14.8	20.5	24.1	26.3	27.0	25.7	20.1	15.2
	Comments			closed	closed	closed	closed	1/2T	1T	1T	2T	2T	2T	2T
4-35	Well	"H ₂ O	-0.05	-0.06	-0.04	-0.03	-1.22	3.68	-3.55	-2.15	-2.57	-3.24	-2.69	-3.25
	well bore seal	Lateral	"H ₂ O	-10.68	-21.84	-11.52	-10.50	-8.56	-7.03	-5.66	-3.42	-5.00	-5.68	-6.17
	CH ₄	%	31.2	30.2	33.9	39.6	45.8	50.1	53.9	54.9	53.0	52.6	50.8	50.1
	CO ₂	%	24.9	25.9	26.8	32.8	37.6	35.6	32.9	38.7	37.6	38.1	34.9	30.1
	O ₂	%	9.1	10.3	9.8	5.6	4.2	3.0	1.0	0.9	1.0	1.5	1.9	1.8
	BAL (N ₂)	%	34.8	33.6	29.5	22.0	12.4	11.3	12.2	5.5	8.4	7.8	12.4	18.0
	CO	PPM	12	15	10	8	8	12	4	7	11	15	15	19
	H ₂ S	PPM	103	127	137	233	207	455	389	467	326	235	287	283
	Vel Min	m/s	-	-	-	-	1.66	2.03	1.45	2.36	2.03	1.68	1.88	1.84
	Vel Max	m/s	-	-	-	-	2.47	2.77	1.99	2.88	2.95	2.54	2.34	2.35
	Flow	CFM	-	-	-	-	19.51	22.68	16.25	24.76	23.53	19.94	19.94	19.80
	Temp	° C	-	-	-	-	20.3	22.8	24.8	25.6	24.8	23.0	19.4	16.3
	Comments			closed	closed	closed	closed	1T	2T	2T	2T	2T	2T	2T

Table 2: Wellfield Monitoring Data

	Units	15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22	
4-36	Well	"H ₂ O	-	-	-	-	-	-	-	-	-	-	-	
	Lateral	"H ₂ O	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	
	CH ₄	%	-	-	-	-	-	-	-	-	-	-	-	
	CO ₂	%	-	-	-	-	-	-	-	-	-	-	-	
	O ₂	%	-	-	-	-	-	-	-	-	-	-	-	
	BAL (N ₂)	%	-	-	-	-	-	-	-	-	-	-	-	
	CO	PPM	-	-	-	-	-	-	-	-	-	-	-	
	H ₂ S	PPM	-	-	-	-	-	-	-	-	-	-	-	
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	
Comments		NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV		
4-37	Well	"H ₂ O	-0.02	-0.04	-0.05	0.02	0.05	-0.02	-0.04	-0.01	0.03	0.02	0.01	
	Lateral	"H ₂ O	-12.55	-19.67	-13.28	-10.88	-8.63	-5.74	-5.02	-3.16	-4.38	-5.30	-6.17	-7.68
	CH ₄	%	7.6	10.5	15.7	10.4	12.6	7.7	8.0	8.5	18.3	20.1	19.3	22.1
	CO ₂	%	5.0	6.9	12.9	8.6	9.7	10.4	8.3	7.6	14.0	16.2	13.8	18.6
	O ₂	%	17.1	19.4	18.6	12.5	17.6	18.0	16.3	15.2	12.9	11.5	12.3	10.1
	BAL (N ₂)	%	70.3	63.2	52.8	68.5	60.1	63.9	67.4	68.7	54.8	52.2	54.6	49.2
	CO	PPM	5	8	8	7	1	2	2	3	5	8	8	10
	H ₂ S	PPM	11	14	15	10	18	19	20	17	10	7	11	14
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-
Comments		closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	
5-38	Well	"H ₂ O	-0.04	-0.05	-0.03	-0.01	-0.02	0.02	-0.03	-0.05	0.06	0.04	0.02	0.05
	Lateral	"H ₂ O	-13.50	-19.16	-12.47	-10.69	-8.20	-7.14	-6.33	-2.55	-3.97	-4.68	-5.37	-7.58
	CH ₄	%	25.9	28.6	29.3	22.8	20.4	10.6	8.5	5.5	10.1	15.8	12.7	15.7
	CO ₂	%	18.4	20.1	22.9	22.8	15.0	10.2	10.7	3.8	5.8	6.9	12.8	15.1
	O ₂	%	9.9	10.6	9.4	12.6	17.5	18.0	16.9	18.2	17.6	14.0	14.0	13.6
	BAL (N ₂)	%	45.8	40.7	38.4	41.8	47.1	61.2	63.9	72.5	66.5	63.3	60.5	55.6
	CO	PPM	1	2	5	2	2	10	7	3	5	8	10	12
	H ₂ S	PPM	10	15	12	19	20	33	26	21	39	50	42	55
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-
Comments		closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	
5-39 well bore seal	Well	"H ₂ O	-1.21	-3.57	-3.57	-2.88	-3.66	-2.10	-2.66	-1.95	-1.57	-2.14	-1.24	-1.68
	Lateral	"H ₂ O	-2.69	-5.34	-4.75	-6.33	-5.20	-4.11	-2.88	-2.62	-3.95	-4.25	-4.69	-5.96
	CH ₄	%	55.8	56.7	57.3	52.7	48.4	45.8	44.3	40.6	41.2	42.8	43.1	43.6
	CO ₂	%	40.7	37.2	37.1	35.6	30.4	27.4	29.6	28.6	27.1	28.6	28.6	26.4
	O ₂	%	3.1	2.5	2.5	3.6	5.7	5.0	5.2	6.0	5.5	4.1	5.0	5.2
	BAL (N ₂)	%	0.4	3.6	3.1	8.1	15.5	21.8	20.9	24.8	26.2	24.5	23.3	24.8
	CO	PPM	11	15	14	15	10	17	18	11	15	20	17	14
	H ₂ S	PPM	33	68	53	60	41	42	55	44	32	52	58	42
	Vel Min	m/s	frozen	frozen	frozen	1.00	1.68	1.88	1.47	1.00	1.11	1.27	1.47	1.27
	Vel Max	m/s	surging	surging	-	1.69	2.66	2.11	2.33	1.57	1.80	1.65	1.85	1.90
	Flow	CFM	frozen	frozen	frozen	12.71	20.51	18.85	17.95	12.14	13.75	13.80	15.69	14.98
	Temp	°C	-	-	-	17.6	22.9	24.0	28.4	32.9	31.0	30.1	18.3	15.2
Comments		2T	2T	2T	1T	1T	1T	1T	1/2T	1/2T	1/2T	1/2T	1/2T	

Table 2: Wellfield Monitoring Data

	Units	15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22	
5-40	Well	"H ₂ O	-0.04	-0.05	-0.06	-0.03	-0.51	-1.55	-1.00	-1.54	-2.00	-2.31	-2.34	-3.25
	Lateral	"H ₂ O	-14.30	-19.67	-10.67	-9.63	-7.63	-5.22	-3.80	-2.09	-3.21	-4.85	-5.40	-7.62
	CH ₄	%	21.2	20.7	29.3	33.6	43.7	50.2	53.9	55.8	56.9	55.2	54.9	53.8
	CO ₂	%	14.3	15.6	20.7	22.8	30.4	35.6	34.2	37.9	35.4	34.1	31.6	30.7
	O ₂	%	13.8	15.8	10.2	8.8	4.2	2.5	1.0	1.1	1.0	1.2	1.9	2.1
	BAL (N ₂)	%	50.7	47.9	39.8	34.8	21.7	11.7	10.9	5.2	6.7	9.5	11.6	13.4
	CO	PPM	0	1	5	9	5	1	3	3	5	8	8	10
	H ₂ S	PPM	276	218	103	177	214	328	266	369	248	237	266	214
	Vel Min	m/s	-	-	-	-	0.45	1.22	2.69	2.57	2.30	2.00	1.98	1.64
	Vel Max	m/s	-	-	-	-	1.63	1.68	3.14	3.11	2.71	2.48	2.57	2.14
	Flow	CFM	-	-	-	-	9.83	13.70	27.55	26.84	23.67	21.17	21.50	17.86
	Temp	° C	-	-	-	-	20.1	22.8	28.6	31.8	30.8	28.6	22.3	16.3
Comments		closed	closed	closed	closed	1/2T	1T	1T	2T	2T	2T	2T	2T	
5-41 well bore seal	Well	"H ₂ O	-1.24	-0.05	-0.06	-0.04	-0.03	0.02	0.03	-0.66	-0.94	-0.87	-1.32	-1.22
	Lateral	"H ₂ O	-12.02	-22.68	-10.75	-8.55	-9.47	-6.21	-4.02	-2.16	-2.68	-3.33	-4.95	-6.98
	CH ₄	%	29.8	32.6	34.6	36.8	37.1	36.2	41.9	43.3	44.8	45.9	48.2	49.3
	CO ₂	%	19.5	20.1	23.9	26.8	24.1	25.7	26.9	28.8	29.6	30.1	30.1	28.6
	O ₂	%	9.7	10.6	8.4	5.5	4.7	4.2	4.8	4.7	4.0	3.3	3.2	3.6
	BAL (N ₂)	%	41.0	36.7	33.1	30.9	34.1	33.9	26.4	23.2	21.6	20.7	18.5	18.5
	CO	PPM	0	2	5	4	4	3	8	3	5	10	17	10
	H ₂ S	PPM	121	101	109	188	266	207	317	346	245	215	198	207
	Vel Min	m/s	-	-	-	-	-	-	0.00	0.44	1.24	1.27	1.55	1.10
	Vel Max	m/s	-	-	-	-	-	-	0.00	1.48	1.66	1.66	1.99	1.65
	Flow	CFM	-	-	-	-	-	-	0	9.07	13.70	13.84	16.73	12.99
	Temp	° C	-	-	-	-	-	-	25.7	30.9	27.0	25.8	20.6	16.9
Comments		closed	closed	closed	closed	closed	closed	cracked	1/2T	1/2T	1/2T	1/2T	1/2T	
5-42	Well	"H ₂ O	-0.03	-0.05	-0.05	-0.02	0.02	0.05	0.01	-0.33	-0.48	-0.66	-0.39	-0.56
	Lateral	"H ₂ O	-14.08	-22.68	-12.60	-7.56	-8.22	-4.62	-3.33	-2.65	-3.03	-3.68	-4.58	-7.28
	CH ₄	%	12.6	19.4	22.5	28.6	27.4	33.8	35.1	36.2	38.3	39.2	39.1	38.5
	CO ₂	%	9.6	10.3	12.7	15.7	20.5	22.6	27.4	26.7	28.0	25.4	28.1	27.1
	O ₂	%	15.6	11.6	10.2	8.4	7.2	6.0	7.0	6.2	5.5	6.3	5.4	5.6
	BAL (N ₂)	%	62.2	58.7	54.6	47.3	44.9	37.6	30.5	30.9	28.2	29.1	27.4	28.8
	CO	PPM	0	0	0	1	1	4	2	4	7	10	9	10
	H ₂ S	PPM	17	15	19	100	127	199	239	483	366	297	398	270
	Vel Min	m/s	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	0.00
	Vel Max	m/s	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	0.44
	Flow	CFM	-	-	-	-	-	-	-	0	0	0	0	2.08
	Temp	° C	-	-	-	-	-	-	-	28.4	25.0	20.7	17.6	12.5
Comments		closed	closed	closed	closed	closed	closed	closed	cracked	cracked	cracked	cracked	cracked	
5-43	Well	"H ₂ O	-2.47	-5.47	-1.58	-2.44	-1.69	-1.47	-1.33	-1.69	-2.68	-2.57	-2.97	-3.26
	Lateral	"H ₂ O	-14.82	-21.06	-10.29	-9.63	-7.50	-6.02	-4.15	-2.92	-4.88	-5.27	-5.55	-8.27
	CH ₄	%	43.4	44.8	45.9	46.8	49.3	50.1	50.2	53.4	52.0	51.4	50.2	51.7
	CO ₂	%	28.7	29.3	28.2	30.4	29.8	33.6	32.4	35.3	34.1	35.2	31.7	30.8
	O ₂	%	6.0	4.8	4.9	3.0	3.3	4.2	2.7	2.3	2.6	2.0	3.3	3.5
	BAL (N ₂)	%	21.9	21.1	21.0	19.8	17.6	12.1	14.7	9.0	11.3	11.4	14.8	14.0
	CO	PPM	5	8	9	4	5	8	10	7	10	15	12	8
	H ₂ S	PPM	60	74	84	100	98	74	58	103	88	103	74	101
	Vel Min	m/s	frozen	frozen	frozen	0.89	0.44	1.22	1.58	1.24	1.45	1.57	1.22	1.27
	Vel Max	m/s	-	-	-	1.01	0.98	1.87	2.33	1.66	1.98	1.86	1.58	1.88
	Flow	CFM	-	-	-	8.98	6.71	14.61	18.47	13.70	16.21	16.21	13.23	14.88
	Temp	° C	-	-	-	10.5	12.3	15.3	28.6	31.8	30.5	31.4	17.5	15.8
Comments		1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	2T	2T	2T	2T	2T	

Table 2: Wellfield Monitoring Data

	<i>Units</i>	15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22	
5-44	Well	"H ₂ O	-0.05	-0.06	-0.05	-0.02	-0.02	-0.03	-1.27	-1.66	-2.63	-2.87	-2.89	-2.99
	Lateral	"H ₂ O	-11.66	-19.64	-10.68	-8.62	-7.02	-5.27	-3.66	-2.55	-4.85	-5.01	-5.68	-7.88
	CH ₄	%	25.0	26.1	29.3	32.8	36.1	40.2	52.7	58.1	57.6	55.9	54.1	53.8
	CO ₂	%	20.2	22.0	21.5	30.4	28.4	29.3	32.5	39.5	38.2	35.2	35.6	34.2
	O ₂	%	7.8	8.3	8.0	7.6	7.1	5.3	2.3	1.0	1.1	1.0	1.5	1.8
	BAL (N ₂)	%	47.0	43.6	41.2	29.2	28.4	25.2	12.5	1.4	3.1	7.9	8.8	10.2
	CO	PPM	1	2	4	7	5	4	4	3	5	10	7	10
	H ₂ S	PPM	244	198	251	302	325	369	<<<<	<<<<	<<<<	<<<<	<<<<	<<<<
	Vel Min	m/s	-	-	-	-	-	-	2.69	2.40	1.87	1.24	1.22	1.95
	Vel Max	m/s	-	-	-	-	-	-	3.47	2.98	2.36	1.88	1.64	2.54
	Flow	CFM	-	-	-	-	-	-	29.10	25.42	19.99	14.74	13.51	21.21
	Temp	°C	-	-	-	-	-	-	30.1	33.9	30.5	25.3	18.2	14.0
	Comments		closed	closed	closed	closed	closed	closed	1T	2T	2T	2T	2T	2T
5-45	Well	"H ₂ O	-0.02	-0.05	-0.02	-0.03	-0.01	0.01	-0.81	-0.88	-1.55	-1.87	-1.97	-1.85
	Lateral	"H ₂ O	-13.99	-22.30	-12.86	-8.62	-7.15	-5.22	-3.62	-1.97	-3.02	-3.95	-4.21	-6.24
	CH ₄	%	0.9	0.8	22.6	30.6	32.8	38.7	44.0	48.2	47.6	45.9	48.2	49.2
	CO ₂	%	0.4	0.5	15.4	20.7	22.6	30.8	35.2	37.1	34.0	33.0	32.6	30.5
	O ₂	%	16.8	18.6	18.3	10.3	8.5	7.3	3.0	2.2	2.6	2.2	2.1	2.5
	BAL (N ₂)	%	81.9	80.1	43.7	38.4	36.1	23.2	17.8	12.5	15.8	18.9	17.1	17.8
	CO	PPM	0	0	2	5	5	2	1	4	8	10	12	10
	H ₂ S	PPM	26	12	55	75	66	51	72	84	47	26	52	36
	Vel Min	m/s	-	-	-	-	-	-	1.22	1.33	1.11	1.24	1.44	1.44
	Vel Max	m/s	-	-	-	-	-	-	1.99	1.69	1.68	1.58	1.86	1.95
	Flow	CFM	-	-	-	-	-	-	15.17	14.27	13.18	13.32	15.59	16.02
	Temp	°C	-	-	-	-	-	-	25.1	28.2	24.0	25.0	20.5	17.4
	Comments		frozen	frozen	frozen	closed	closed	closed	1/2T	1T	1T	1T	1T	1T
5-46	Well	"H ₂ O	-0.07	-0.05	-0.04	-0.02	-0.03	-0.04	-0.02	-0.05	0.01	0.01	-0.02	0.00
	Lateral	"H ₂ O	-14.28	-24.95	-13.62	-7.26	-7.50	-5.22	-3.69	-1.88	-3.00	-4.21	-4.55	-6.93
	CH ₄	%	10.6	12.5	19.7	20.5	21.8	20.4	22.8	23.5	29.3	30.8	29.0	29.2
	CO ₂	%	15.3	18.6	20.2	25.9	24.7	28.6	26.3	28.4	27.1	26.4	28.6	29.3
	O ₂	%	15.0	16.8	16.2	14.5	13.0	15.8	14.7	13.4	12.8	11.9	11.5	10.4
	BAL (N ₂)	%	59.1	52.1	43.9	39.1	40.5	35.2	36.2	34.7	30.8	30.9	30.9	31.1
	CO	PPM	9	4	4	4	7	7	7	5	8	10	12	10
	H ₂ S	PPM	8	4	13	10	5	6	7	7	10	12	12	19
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments		closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed
6-47	Well	"H ₂ O	-0.87	-2.57	-2.01	-2.57	-3.22	-2.58	-2.14	-1.68	-2.35	-2.68	-2.54	-3.01
	Lateral	"H ₂ O	-14.22	-20.17	-11.24	-12.90	-9.25	-7.02	-6.38	-2.59	-3.97	-4.55	-5.01	-7.58
	CH ₄	%	40.1	39.5	42.3	58.6	56.4	55.2	52.7	54.1	55.0	54.2	52.6	52.1
	CO ₂	%	25.4	26.3	26.8	34.8	32.6	30.7	31.8	33.6	32.9	31.6	31.4	30.6
	O ₂	%	7.9	8.1	8.2	1.9	2.0	3.3	2.7	2.8	2.4	2.7	2.6	2.9
	BAL (N ₂)	%	26.6	26.1	22.7	4.7	9.0	10.8	12.8	9.5	9.7	11.5	13.4	14.4
	CO	PPM	2	5	4	2	5	4	9	2	5	10	10	7
	H ₂ S	PPM	93	87	101	69	72	78	94	68	54	42	36	26
	Vel Min	m/s	1.64	1.58	0.68	1.44	1.00	1.27	1.29	2.34	2.01	1.47	1.71	1.65
	Vel Max	m/s	1.88	1.99	1.24	2.14	1.69	1.99	2.35	2.97	2.68	1.99	2.03	2.13
	Flow	CFM	16.63	16.87	9.07	16.91	12.71	15.40	17.20	25.09	22.16	16.35	17.67	17.86
	Temp	°C	13.9	10.1	15.3	16.8	19.6	20.7	22.6	28.6	30.8	24.8	18.6	15.2
	Comments		1T	1T	1T	1T	1T	1T	1T	2T	2T	2T	2T	2T

Table 2: Wellfield Monitoring Data

			15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22
6-48	Well	"H ₂ O	0.03	-0.01	-0.02	-0.02	-0.02	-0.02	-0.03	-0.56	-0.85	-1.12	-1.11	-1.58
	Lateral	"H ₂ O	-13.39	-18.65	-12.47	-10.57	-9.68	-7.22	-6.98	-2.74	-3.21	-4.21	-4.62	-7.32
	CH ₄	%	22.4	20.4	25.3	29.4	28.1	50.1	47.1	43.3	45.3	46.8	44.8	44.8
	CO ₂	%	16.0	17.9	19.3	18.4	15.3	18.4	19.0	29.9	30.8	28.4	31.6	30.3
	O ₂	%	11.0	11.4	10.4	12.5	10.4	11.8	10.6	1.6	1.9	2.4	1.7	1.8
	BAL (N ₂)	%	50.6	50.3	45.0	39.7	46.2	19.7	23.3	25.2	22.0	22.4	21.9	23.1
	CO	PPM	4	5	5	5	6	10	7	6	10	15	12	8
	H ₂ S	PPM	2	5	5	5	5	6	5	7	7	9	7	8
	Vel Min	m/s	-	-	-	-	-	1.11	0.85	0.44	0.85	1.11	1.10	1.00
	Vel Max	m/s	-	-	-	-	-	1.57	1.24	1.00	1.24	1.54	1.68	1.38
	Flow	CFM	-	-	-	-	-	12.66	9.87	6.80	9.87	12.52	13.13	11.24
	Temp	°C	-	-	-	-	-	25.1	24.8	22.6	25.9	20.6	14.2	14.3
	Comments			closed	closed	closed	closed	closed	1T	1T	1/2T	1/2T	1/2T	1/2T
6-49	Well	"H ₂ O	-2.88	-3.98	-1.98	-2.68	-2.04	-1.95	-1.32	-0.02	0.11	0.05	0.04	0.01
	Lateral	"H ₂ O	-8.49	-20.14	-12.68	-11.50	-9.84	-8.62	-6.00	-2.26	-4.25	-4.68	-5.22	-6.88
	CH ₄	%	53.5	55.9	54.2	50.8	52.3	50.7	45.8	36.4	35.8	36.8	33.2	30.6
	CO ₂	%	35.8	33.0	33.9	33.7	31.6	30.5	32.9	26.0	24.1	23.0	25.6	28.3
	O ₂	%	3.7	3.5	3.1	5.9	6.0	4.8	3.2	10.1	9.9	10.0	10.5	11.5
	BAL (N ₂)	%	7.0	7.6	8.8	9.6	10.1	14.0	18.1	27.5	30.2	30.2	30.7	29.6
	CO	PPM	2	5	4	2	5	6	10	2	5	10	12	10
	H ₂ S	PPM	343	247	268	344	203	268	333	268	211	215	248	199
	Vel Min	m/s	2.08	1.57	1.27	1.59	1.00	1.24	1.09	-	-	-	-	-
	Vel Max	m/s	2.66	2.34	1.98	2.58	1.34	1.66	1.69	-	-	-	-	-
	Flow	CFM	22.40	18.47	15.36	19.70	11.06	13.70	13.13	-	-	-	-	-
	Temp	°C	10.3	11.5	13.6	15.9	19.6	22.5	25.8	-	-	-	-	-
	Comments			1T	1T	1T	1T	1T	1T	1T	closed	closed	closed	closed
6-50	Well	"H ₂ O	-0.02	-0.03	-0.02	-0.02	-0.02	-0.02	-0.02	-0.01	-0.02	0.00	0.00	-0.02
	Lateral	"H ₂ O	-6.49	-17.48	-12.47	-10.31	-8.66	-7.24	-5.20	-2.36	-3.69	-4.02	-4.35	-3.65
	CH ₄	%	8.4	5.6	10.6	15.6	20.5	22.9	25.8	18.6	23.6	25.8	25.1	30.1
	CO ₂	%	6.3	12.4	10.0	24.8	26.3	27.1	22.0	18.4	20.8	21.9	22.3	26.3
	O ₂	%	18.3	19.6	18.6	17.5	16.4	12.7	14.8	3.6	5.1	6.6	8.3	7.4
	BAL (N ₂)	%	67.0	62.4	60.8	42.1	36.8	37.3	37.4	59.4	50.5	45.7	44.3	36.2
	CO	PPM	0	2	1	2	5	7	10	10	15	17	10	14
	H ₂ S	PPM	4	1	4	4	5	7	1	10	12	10	13	19
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments			closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed
6-51	Well	"H ₂ O	-1.47	-2.57	-1.87	-0.98	-1.58	-1.20	-0.94	-0.99	-1.90	-1.58	-1.02	-1.66
	Lateral	"H ₂ O	-9.51	-17.12	-11.27	-9.64	-8.62	-7.00	-4.31	-2.68	-3.64	-4.23	-5.31	-5.89
	CH ₄	%	35.0	34.2	36.9	39.6	43.6	44.8	48.1	48.4	49.2	48.3	45.9	42.4
	CO ₂	%	23.5	25.9	26.9	24.8	25.1	29.6	30.7	38.4	36.2	35.1	35.1	33.1
	O ₂	%	10.3	11.0	9.4	8.5	7.6	8.0	9.6	0.5	7.0	5.2	6.3	2.1
	BAL (N ₂)	%	31.2	28.9	26.8	27.1	23.7	17.6	11.6	12.7	7.6	11.4	12.7	22.4
	CO	PPM	3	5	6	4	9	5	7	6	10	15	15	4
	H ₂ S	PPM	93	95	101	124	109	174	150	130	198	154	147	74
	Vel Min	m/s	0.00	0.00	-	-	-	-	-	1.11	1.66	1.55	1.24	1.00
	Vel Max	m/s	0.00	0.00	-	-	-	-	-	1.57	2.00	2.03	1.66	1.39
	Flow	CFM	0	0	-	-	-	-	-	12.66	17.29	16.91	13.70	11.29
	Temp	°C	10.8	11.0	-	-	-	-	-	30.6	27.5	26.3	20.1	15.2
	Comments			frozen open	frozen open	frozen open	1/2T	1/2T	1/2T	1/2T	1T	1T	1T	1T

Table 2: Wellfield Monitoring Data

Units			15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22
6-52	Well	"H ₂ O	0.02	0.00	-0.01	-0.05	-0.04	-0.03	0.00	-0.02	-0.03	0.01	-0.01	0.02
	Lateral	"H ₂ O	-16.60	-22.54	-12.47	-11.57	-7.51	-6.03	-4.20	-2.04	-3.21	-4.02	-4.68	-4.85
	CH ₄	%	9.4	10.6	15.6	22.4	30.5	35.9	39.1	21.0	26.8	27.6	26.0	25.3
	CO ₂	%	11.8	15.4	12.4	15.7	20.1	25.6	24.8	0.3	24.1	25.0	25.8	26.3
	O ₂	%	19.8	20.8	16.4	15.2	10.4	9.9	9.8	2.0	3.0	3.9	3.3	4.0
	BAL (N ₂)	%	59.0	53.2	55.6	46.7	39.0	28.6	26.3	76.8	46.1	43.5	44.9	44.4
	CO	PPM	0	0	0	1	2	4	2	0	2	5	5	8
	H ₂ S	PPM	0	0	0	1	3	3	7	5	4	5	7	4
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments		closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed
	6-53	Well	"H ₂ O	-5.69	-6.57	-4.57	-4.10	-3.66	-2.14	-1.57	-1.57	-2.13	-2.55	-2.10
Lateral		"H ₂ O	-17.20	-22.35	-12.69	-11.67	-8.62	-7.10	-4.29	-2.14	-4.90	-5.62	-4.00	-3.44
CH ₄		%	57.5	58.1	56.3	59.6	58.1	57.6	55.3	59.8	58.3	56.2	55.3	57.9
CO ₂		%	39.6	38.0	38.2	38.2	37.6	35.2	34.9	37.5	35.2	34.2	35.2	36.9
O ₂		%	2.9	3.5	2.8	1.4	2.2	2.4	1.8	2.4	1.4	1.9	1.1	1.7
BAL (N ₂)		%	0.0	0.4	2.7	0.8	2.1	4.8	8.0	0.3	5.1	7.7	8.4	3.5
CO		PPM	1	2	5	4	5	9	7	3	11	15	3	3
H ₂ S		PPM	<<<<	<<<<	<<<<	<<<<	<<<<	<<<<	<<<<	464	278	225	434	424
Vel Min		m/s	2.68	1.58	2.47	2.14	1.98	2.34	2.55	1.66	1.30	1.30	1.14	1.22
Vel Max		m/s	3.30	2.22	2.56	2.58	2.47	2.55	3.02	1.96	1.95	1.86	1.85	1.65
Flow		CFM	28.25	17.95	23.77	22.30	21.02	23.10	26.32	17.10	15.36	14.93	14.13	13.56
Temp		°C	15.1	14.8	19.1	20.6	21.8	25.3	28.3	28.3	25.7	23.5	18.2	14.9
Comments			2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T
6-54		Well	"H ₂ O	-	-	-	-0.57	-0.03	-0.02	-0.03	0.00	0.02	-0.01	-0.01
	Lateral	"H ₂ O	-16.95	-22.57	-12.47	-13.54	-9.68	-8.10	-6.03	-1.93	-3.07	-3.95	-4.22	-4.28
	CH ₄	%	0.7	0.5	0.8	42.5	39.6	37.1	38.3	38.3	35.2	34.1	33.8	32.5
	CO ₂	%	0.3	0.9	0.8	28.6	24.2	23.6	25.9	26.1	28.3	29.3	27.1	28.3
	O ₂	%	23.2	21.1	22.4	3.6	4.9	3.2	2.7	5.9	4.9	5.1	5.8	6.0
	BAL (N ₂)	%	75.8	77.5	76.0	25.3	31.3	36.1	33.1	29.7	31.6	31.5	33.3	33.2
	CO	PPM	0	0	1	5	4	3	6	3	5	10	8	10
	H ₂ S	PPM	1	0	1	4	10	12	18	82	53	69	44	36
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments		FROZEN	FROZEN	FROZEN	1/2T	closed	closed	closed	closed	closed	closed	closed	closed
	6-55	Well	"H ₂ O	-6.87	-5.70	-4.61	-3.67	-3.25	-2.67	-2.00	-	-	-	-2.57
Lateral		"H ₂ O	-15.25	-23.64	-13.60	-12.47	-8.62	-6.02	-3.66	NLV	NLV	NLV	-5.68	-5.99
CH ₄		%	47.7	46.2	46.7	52.3	53.6	55.7	54.2	-	-	-	Not	Not
CO ₂		%	33.3	34.1	32.6	31.2	30.9	32.6	31.5	-	-	-	connected	connected
O ₂		%	3.6	5.5	3.3	3.8	3.0	2.8	2.1	-	-	-	-	-
BAL (N ₂)		%	15.4	14.2	17.4	12.7	12.5	8.9	12.2	-	-	-	-	-
CO		PPM	3	5	9	9	15	19	10	-	-	-	-	-
H ₂ S		PPM	<<<<	<<<<	<<<<	<<<<	<<<<	<<<<	<<<<	-	-	-	-	-
Vel Min		m/s	2.69	2.14	0.14	1.57	1.00	1.35	1.44	-	-	-	-	-
Vel Max		m/s	3.64	2.68	2.66	1.74	1.59	1.96	2.06	-	-	-	-	-
Flow		CFM	29.91	22.77	13.23	15.64	12.24	15.64	16.54	-	-	-	-	-
Temp		°C	12.0	13.2	14.0	19.6	22.6	26.8	19.6	-	-	-	-	-
Comments			2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T

Table 2: Wellfield Monitoring Data

			15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22	
6-56	Well	"H ₂ O	0.03	0.03	0.02	-	-	0.31	0.22	-0.17	-0.01	0.02	0.02	0.01	
	Lateral	"H ₂ O	NLV	NLV	NLV	NLV	NLV	-2.47	-2.11	-1.28	-1.95	-2.55	-3.57	-4.01	
	CH ₄	%	19.3	22.1	24.6	-	-	30.6	33.9	18.3	25.4	26.3	24.7	25.3	
	CO ₂	%	19.3	20.5	21.9	-	-	29.4	30.2	18.9	26.1	25.7	24.3	26.7	
	O ₂	%	9.5	8.2	10.5	-	-	3.9	4.2	4.6	3.5	3.2	3.0	3.3	
	BAL (N ₂)	%	51.9	49.2	43.0	-	-	36.1	31.7	58.2	45.0	44.8	48.0	44.7	
	CO	PPM	13	10	12	-	-	10	8	18	10	11	10	8	
	H ₂ S	PPM	9	10	12	-	-	10	15	8	7	5	5	4	
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-	
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-	
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-	
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-	
	Comments			closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed
	6-57	Well	"H ₂ O	-0.03	-0.04	-0.03	-0.03	-0.02	-0.02	-0.04	-2.68	-1.95	-2.30	-2.03	-1.84
Lateral		"H ₂ O	-15.84	-19.66	-11.47	-11.74	-8.62	-7.00	-5.30	-7.80	-5.28	-5.65	-5.98	-4.86	
CH ₄		%	18.2	22.9	23.6	25.6	30.5	33.6	43.8	50.8	51.0	50.9	52.3	50.6	
CO ₂		%	21.7	20.1	22.6	23.9	25.6	28.4	27.0	37.2	36.9	35.8	34.0	32.1	
O ₂		%	10.1	9.6	9.6	8.4	7.0	7.2	5.5	1.2	1.0	1.2	1.5	1.2	
BAL (N ₂)		%	50.0	47.4	44.2	42.1	36.9	30.8	23.7	10.8	11.1	12.1	12.2	16.1	
CO		PPM	17	15	17	14	22	30	18	10	15	20	23	20	
H ₂ S		PPM	18	17	14	26	25	19	14	31	27	31	33	23	
Vel Min		m/s	-	-	-	-	-	-	-	2.57	1.85	1.52	1.57	1.77	
Vel Max		m/s	-	-	-	-	-	-	-	3.00	2.03	1.83	1.88	1.36	
Flow		CFM	-	-	-	-	-	-	-	26.32	18.33	15.83	16.30	14.79	
Temp		°C	-	-	-	-	-	-	-	28.7	29.0	24.1	15.3	15.2	
Comments				closed	closed	closed	closed	closed	closed	closed	2T	2T	2T	2T	2T
6-58		Well	"H ₂ O	-0.04	-0.03	-0.04	-0.04	-0.02	-0.02	-0.01	-1.68	-1.58	-1.96	-1.69	-2.02
	Lateral	"H ₂ O	-14.33	-18.60	-13.65	-10.55	-8.22	-6.30	-4.20	-7.16	-5.96	-5.48	-6.21	-6.21	
	CH ₄	%	21.0	25.4	20.1	28.6	33.6	32.7	38.6	49.0	48.5	45.6	45.1	46.3	
	CO ₂	%	25.0	24.3	23.7	26.3	28.9	30.2	31.4	34.5	35.6	33.4	32.3	34.6	
	O ₂	%	10.3	8.4	9.6	7.1	6.8	5.5	5.3	1.4	1.5	1.9	1.8	1.9	
	BAL (N ₂)	%	43.7	41.9	46.6	38.0	30.7	31.6	24.7	15.1	14.4	19.1	20.8	17.2	
	CO	PPM	22	39	36	54	32	68	72	5	10	15	12	9	
	H ₂ S	PPM	137	102	124	130	102	144	196	176	154	134	122	166	
	Vel Min	m/s	-	-	-	-	-	-	-	1.00	1.24	1.22	1.27	1.58	
	Vel Max	m/s	-	-	-	-	-	-	-	1.83	1.58	1.60	1.68	2.04	
	Flow	CFM	-	-	-	-	-	-	-	13.37	13.32	13.32	13.94	17.10	
	Temp	°C	-	-	-	-	-	-	-	26.6	28.0	25.3	25.3	18.6	
	Comments			closed	closed	closed	closed	closed	closed	closed	1T	1T	1T	1T	1T
	6-59	Well	"H ₂ O	0.04	0.08	-0.05	0.04	-0.01	-0.02	0.02	-0.05	-0.01	0.01	0.02	-0.01
Lateral		"H ₂ O	-11.02	-17.24	-13.05	-10.69	-7.20	-5.32	-4.00	-8.47	-4.96	-5.68	-5.69	-5.24	
CH ₄		%	17.1	19.5	18.4	25.1	33.6	38.5	37.4	43.7	40.8	39.2	38.2	39.6	
CO ₂		%	22.2	21.6	23.4	24.2	25.1	29.6	25.4	30.3	28.6	27.2	26.1	25.8	
O ₂		%	10.0	9.9	9.5	8.5	7.5	6.2	5.7	10.7	7.4	8.0	8.5	9.4	
BAL (N ₂)		%	50.7	49.0	48.7	42.2	33.8	25.7	31.5	15.3	23.2	25.6	27.2	25.2	
CO		PPM	11	15	19	14	15	22	10	3	5	10	6	9	
H ₂ S		PPM	48	40	38	38	56	58	71	37	17	7	12	10	
Vel Min		m/s	-	-	-	-	-	-	-	-	-	-	-	-	
Vel Max		m/s	-	-	-	-	-	-	-	-	-	-	-	-	
Flow		CFM	-	-	-	-	-	-	-	-	-	-	-	-	
Temp		°C	-	-	-	-	-	-	-	-	-	-	-	-	
Comments				closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed

Table 2: Wellfield Monitoring Data

	Units	15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22	
7-60	Well	"H ₂ O	-1.94	-2.47	-1.24	-2.99	-2.04	-1.57	-1.30	-1.00	-2.45	-2.68	-1.95	-2.54
	Lateral	"H ₂ O	-7.69	-16.38	-11.27	-11.50	-9.01	-4.28	-3.66	-1.82	-3.01	-3.94	-4.22	-5.02
	CH ₄	%	15.8	20.4	22.1	65.5	56.2	54.2	52.0	66.6	62.3	60.2	60.3	59.6
	CO ₂	%	7.9	19.6	12.7	33.3	30.1	31.6	29.6	32.9	30.5	29.6	32.6	29.5
	O ₂	%	19.7	14.1	13.6	1.2	1.0	1.4	1.6	0.5	0.4	0.8	0.5	0.8
	BAL (N ₂)	%	56.6	45.9	51.6	0.0	12.7	12.8	16.8	0.0	6.8	9.4	6.6	10.1
	CO	PPM	0	5	4	1	2	4	2	2	4	5	5	6
	H ₂ S	PPM	5	5	10	27	36	27	15	43	33	27	23	51
	Vel Min	m/s	1.33	1.05	1.05	1.33	1.01	1.30	1.57	2.11	2.00	1.68	1.88	1.85
	Vel Max	m/s	1.34	1.67	1.67	2.05	1.63	1.85	1.84	2.69	2.65	2.14	2.34	2.35
	Flow	CFM	12.61	12.85	12.85	15.97	12.47	14.88	16.11	22.68	21.97	18.05	19.94	19.84
	Temp	°C	3.9	5.5	10.3	16.9	20.3	25.3	24.0	29.4	30.2	30.0	25.8	20.7
	Comments		FROZEN OPEN	FROZEN OPEN	FROZEN OPEN	1T	1T	1T	1T	2T	2T	2T	2T	2T
	7-61	Well	"H ₂ O	-2.14	-5.64	-2.69	-2.34	-2.31	-	-	-	-	-	-
Lateral		"H ₂ O	-7.03	-14.22	-11.06	-12.50	-7.00	NLV	NLV	NLV	NLV	NLV	NLV	NLV
CH ₄		%	55.8	56.9	56.8	57.2	-	-	-	-	-	-	-	-
CO ₂		%	41.9	29.1	40.9	40.2	35.6	-	-	-	-	-	-	-
O ₂		%	1.1	2.0	2.0	1.0	1.1	-	-	-	-	-	-	-
BAL (N ₂)		%	1.2	12.0	0.3	1.9	6.1	-	-	-	-	-	-	-
CO		PPM	11	19	15	16	19	-	-	-	-	-	-	-
H ₂ S		PPM	<<<<	<<<<	<<<<	<<<<	<<<<	-	-	-	-	-	-	-
Vel Min		m/s	1.02	1.57	1.34	1.67	1.11	-	-	-	-	-	-	-
Vel Max		m/s	1.54	2.04	1.87	2.14	1.89	-	-	-	-	-	-	-
Flow		CFM	12.10	17.06	15.17	18.00	14.17	-	-	-	-	-	-	-
Temp		°C	15.2	14.0	16.2	18.4	20.3	-	-	-	-	-	-	-
Comments			frozen open	frozen open	frozen open	2T	2T	2T	2T	2T	2T	2T	2T	closed
7-62		Well	"H ₂ O	-0.98	-2.47	-1.24	-1.99	-2.01	-	-	-	-	-	-
	Lateral	"H ₂ O	-1.82	-8.54	-9.54	-8.54	-6.52	NLV	NLV	NLV	NLV	NLV	NLV	NLV
	CH ₄	%	51.9	54.2	53.1	52.8	53.6	-	-	-	-	-	-	-
	CO ₂	%	34.9	35.2	33.9	35.6	34.2	-	-	-	-	-	-	-
	O ₂	%	3.4	4.8	3.9	3.0	2.5	-	-	-	-	-	-	-
	BAL (N ₂)	%	9.8	5.8	9.1	8.6	9.7	-	-	-	-	-	-	-
	CO	PPM	3	5	6	6	10	-	-	-	-	-	-	-
	H ₂ S	PPM	<<<<	<<<<	<<<<	<<<<	<<<<	-	-	-	-	-	-	-
	Vel Min	m/s	-	-	1.78	1.69	1.01	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	2.06	2.15	1.54	-	-	-	-	-	-	-
	Flow	CFM	#VALUE!	#VALUE!	18.14	18.14	12.05	-	-	-	-	-	-	-
	Temp	°C	-	-	16.7	19.4	20.3	-	-	-	-	-	-	-
	Comments		2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	closed
	7-63	Well	"H ₂ O	-2.48	-3.58	-2.33	-5.11	-3.47	-2.88	-2.00	-2.01	-1.88	-1.96	-2.01
Lateral		"H ₂ O	-8.37	-15.20	-11.02	-11.44	-8.20	-5.03	-4.22	-2.24	-2.95	-3.21	-3.62	-4.35
CH ₄		%	19.8	25.3	25.9	56.9	55.9	54.1	55.8	62.5	60.3	58.2	58.2	59.3
CO ₂		%	10.9	11.4	20.4	32.4	30.6	28.4	30.8	36.1	35.1	33.1	31.6	32.5
O ₂		%	18.1	15.3	17.2	2.8	1.8	1.5	1.7	1.4	1.2	1.8	1.1	1.5
BAL (N ₂)		%	51.2	48.0	36.5	7.9	11.7	16.0	11.7	0.0	3.4	6.9	9.1	6.7
CO		PPM	0	5	4	1	5	1	2	2	4	12	8	5
H ₂ S		PPM	54	98	38	139	203	255	210	189	213	148	200	241
Vel Min		m/s	1.94	1.58	1.57	1.69	1.00	1.54	1.22	1.55	1.62	1.54	1.55	1.96
Vel Max		m/s	2.05	2.34	2.00	2.31	1.56	2.11	2.38	1.97	2.01	1.96	1.96	2.52
Flow		CFM	18.85	18.52	16.87	18.90	12.10	17.25	17.01	16.63	17.15	16.54	16.58	21.17
Temp		°C	6.9	9.3	12.9	15.0	22.5	25.3	26.0	29.0	24.8	25.8	22.5	17.4
Comments			FROZEN OPEN	FROZEN OPEN	FROZEN OPEN	1T	1T	1T	1T	2T	2T	2T	2T	2T

Table 2: Wellfield Monitoring Data

		<i>Units</i>	15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22	
7-64	Well	"H ₂ O	-4.47	-5.68	-3.47	-3.57	-2.58	-1.54	-1.30	-	-	-	-2.57	-2.14	
	Lateral	"H ₂ O	-14.74	-20.47	-12.47	-11.54	-8.62	-4.20	-3.96	NLV	NLV	NLV	-3.00	-3.41	
	CH ₄	%	55.2	52.1	54.9	55.2	53.2	50.7	51.4	-	-	-	55.4	59.1	
	CO ₂	%	43.8	40.6	41.5	41.6	38.6	34.2	36.2	-	-	-	37.6	39.3	
	O ₂	%	1.0	2.0	2.3	2.0	1.5	1.8	1.7	-	-	-	1.5	1.6	
	BAL (N ₂)	%	0.0	5.3	1.3	1.2	6.7	13.3	10.7	-	-	-	5.5	0.0	
	CO	PPM	4	5	9	8	10	5	6	-	-	-	5	3	
	H ₂ S	PPM	117	79	84	147	200	147	166	-	-	-	213	294	
	Vel Min	m/s	1.24	1.61	1.68	1.03	1.02	1.58	1.57	-	-	-	1.11	1.57	
	Vel Max	m/s	1.55	1.88	2.14	1.43	1.66	1.47	1.99	-	-	-	1.57	1.87	
	Flow	CFM	13.18	16.49	18.05	11.62	12.66	14.41	16.82	-	-	-	12.66	16.25	
	Temp	°C	10.3	12.4	15.9	16.2	20.1	23.6	26.2	-	-	-	19.3	14.3	
	Comments		1T	1T	1T	1T	1T	1T	1T	1T	1T	1T	1T	2T	2T
	7-65	Well	"H ₂ O	-0.03	-0.03	-0.03	0.05	-0.02	-0.01	-0.02	-	-	-	-0.09	-0.58
Lateral		"H ₂ O	-6.98	-15.99	-12.57	-11.65	-7.30	-5.30	-4.91	NLV	NLV	NLV	Surging	-2.01	
CH ₄		%	26.9	28.6	29.3	32.6	35.6	36.7	39.0	-	-	-	31.9	34.0	
CO ₂		%	22.8	25.1	26.7	25.1	26.8	27.4	29.0	-	-	-	31.6	28.1	
O ₂		%	5.6	6.9	4.2	5.0	4.2	5.3	4.9	-	-	-	5.9	3.5	
BAL (N ₂)		%	44.7	39.4	39.8	37.3	33.4	30.6	27.1	-	-	-	30.6	34.4	
CO		PPM	15	19	22	12	10	8	8	-	-	-	4	3	
H ₂ S		PPM	103	124	100	87	101	105	136	-	-	-	90	85	
Vel Min		m/s	-	-	-	-	-	-	-	-	-	-	-	-	
Vel Max		m/s	-	-	-	-	-	-	-	-	-	-	-	-	
Flow		CFM	-	-	-	-	-	-	-	-	-	-	-	-	
Temp		°C	-	-	-	-	-	-	-	-	-	-	-	-	
Comments			closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	
7-66		Well	"H ₂ O	0.01	-0.02	-0.01	-0.05	-0.04	-0.03	-0.01	-1.54	-2.30	-2.54	-	-
	Lateral	"H ₂ O	-9.45	-15.11	-10.95	-11.39	-6.30	-4.87	-3.14	-4.29	-5.95	-6.01	NLV	NLV	
	CH ₄	%	17.5	15.4	18.6	20.6	25.6	34.9	44.9	54.0	53.2	55.8	-	-	
	CO ₂	%	21.0	23.6	22.6	20.0	25.1	28.6	24.0	32.0	30.9	28.6	-	-	
	O ₂	%	4.0	10.1	6.1	5.9	5.0	4.8	3.6	2.3	2.0	1.4	-	-	
	BAL (N ₂)	%	57.5	50.9	52.7	53.5	44.3	31.7	27.5	11.7	13.9	14.2	-	-	
	CO	PPM	35	15	22	10	11	14	15	3	5	10	-	-	
	H ₂ S	PPM	7	4	7	15	22	14	20	52	69	55	-	-	
	Vel Min	m/s	-	-	-	-	-	-	-	1.01	1.22	1.39	-	-	
	Vel Max	m/s	-	-	-	-	-	-	-	1.94	1.85	1.88	-	-	
	Flow	CFM	-	-	-	-	-	-	-	13.94	14.50	15.45	-	-	
	Temp	°C	-	-	-	-	-	-	-	27.3	26.2	25.3	-	-	
	Comments		CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	2T	2T	2T	2T	2T	
	7-67	Well	"H ₂ O	-1.57	-2.14	-1.66	-2.57	-1.47	-1.02	-0.85	-0.01	-0.09	-0.48	-1.22	-1.58
Lateral		"H ₂ O	-5.75	-16.95	-13.65	-10.16	-7.30	-5.03	-4.95	-0.14	-1.11	-1.99	-3.22	-3.76	
CH ₄		%	41.3	40.5	42.6	54.1	52.0	51.2	50.9	58.7	55.6	54.8	54.9	53.5	
CO ₂		%	28.7	29.6	29.3	34.7	32.6	31.5	30.9	38.0	37.6	36.4	36.2	35.8	
O ₂		%	6.3	7.1	5.4	9.6	8.2	8.0	4.9	3.3	2.9	2.2	2.1	2.1	
BAL (N ₂)		%	23.7	22.8	22.7	1.6	7.2	9.3	13.3	0.0	3.9	6.6	6.8	8.6	
CO		PPM	3	5	9	1	2	4	5	3	10	15	7	3	
H ₂ S		PPM	188	144	154	207	236	299	145	298	187	148	164	293	
Vel Min		m/s	0.47	0.68	0.98	1.22	0.44	1.00	0.44	Surging	Surging	Surging	1.00	1.27	
Vel Max		m/s	0.86	1.55	1.54	1.54	1.03	1.33	1.32	Surging	Surging	Surging	1.62	1.66	
Flow		CFM	6.28	10.54	11.91	13.04	6.95	11.01	8.32	Surging	Surging	Surging	12.38	13.84	
Temp		°C	9.9	10.3	16.4	17.6	22.3	26.9	28.6	-	-	-	18.0	14.0	
Comments			1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	2T	2T	2T	2T	2T	

Table 2: Wellfield Monitoring Data

	<i>Units</i>	15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22
7-68	Well	"H ₂ O	-1.24	-3.68	-2.14	-1.68	-1.02	-	-	-	-	-	-
	Lateral	"H ₂ O	-5.17	-16.03	-10.40	-10.01	-5.62	NLV	NLV	NLV	NLV	NLV	NLV
	CH ₄	%	24.6	26.9	26.8	29.6	45.1	-	-	-	-	-	-
	CO ₂	%	17.1	18.5	19.4	18.2	23.6	-	-	-	-	-	-
	O ₂	%	12.8	10.1	11.6	10.0	8.5	-	-	-	-	-	-
	BAL (N ₂)	%	45.5	44.5	42.2	42.2	22.8	-	-	-	-	-	-
	CO	PPM	1	5	6	5	6	-	-	-	-	-	-
	H ₂ S	PPM	373	354	254	268	202	-	-	-	-	-	-
	Vel Min	m/s	frozen	frozen	frozen	1.69	1.03	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	2.01	1.34	-	-	-	-	-	-
	Flow	CFM	-	-	-	17.48	11.20	-	-	-	-	-	-
	Temp	°C	-	-	-	17.6	22.1	-	-	-	-	-	-
	Comments		frozen open	frozen open	frozen open	1T	1T	1T	1T	1T	1T	1T	1T
	8-69	Well	"H ₂ O	-	-	-	-0.03	-0.02	-0.03	-0.04	-0.02	0.03	0.02
Lateral		"H ₂ O	NLV	NLV	NLV	-6.98	-5.47	-4.21	-3.99	-2.13	-2.85	-3.66	-3.68
CH ₄		%	-	-	-	38.5	35.2	30.1	25.8	22.6	26.7	25.9	32.1
CO ₂		%	-	-	-	26.1	20.8	15.6	17.3	16.2	18.1	20.7	22.0
O ₂		%	-	-	-	6.8	8.6	9.4	11.4	10.2	8.6	9.9	5.3
BAL (N ₂)		%	-	-	-	28.6	35.4	44.9	45.5	51.0	46.6	43.5	40.6
CO		PPM	-	-	-	10	5	7	12	2	15	20	10
H ₂ S		PPM	-	-	-	222	154	236	258	108	98	69	107
Vel Min		m/s	-	-	-	-	-	-	-	-	-	-	-
Vel Max		m/s	-	-	-	-	-	-	-	-	-	-	-
Flow		CFM	-	-	-	-	-	-	-	-	-	-	-
Temp		°C	-	-	-	-	-	-	-	-	-	-	-
Comments			1/2T	1/2T	1/2T	closed	closed	closed	closed	closed	closed	closed	closed
8-70		Well	"H ₂ O	-	-	-	-0.02	-0.03	-0.01	-0.01	-0.02	0.03	0.01
	Lateral	"H ₂ O	NLV	NLV	NLV	-4.58	-3.66	-2.57	-2.01	-0.96	-1.85	-1.99	-1.96
	CH ₄	%	-	-	-	36.8	37.1	40.5	38.1	39.5	38.0	39.6	35.2
	CO ₂	%	-	-	-	26.5	27.1	29.0	29.3	27.4	28.1	25.7	25.1
	O ₂	%	-	-	-	7.4	8.2	6.3	7.2	8.6	7.3	6.3	8.9
	BAL (N ₂)	%	-	-	-	29.3	27.6	24.2	25.4	24.5	26.6	28.4	30.8
	CO	PPM	-	-	-	3	10	5	7	6	8	10	10
	H ₂ S	PPM	-	-	-	5	2	7	4	2	8	12	4
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-
	Comments		closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed
	8-71	Well	"H ₂ O	-	-	-	-2.34	-3.15	-2.55	-1.04	-0.47	-0.58	-1.24
Lateral		"H ₂ O	NLV	NLV	NLV	-10.38	-8.62	-5.26	-3.67	-0.84	1.12	-2.55	-1.52
CH ₄		%	-	-	-	52.1	53.6	55.7	55.9	57.3	56.8	55.8	55.9
CO ₂		%	-	-	-	40.2	39.4	28.4	35.9	38.4	39.1	36.7	36.2
O ₂		%	-	-	-	3.0	2.4	2.8	2.3	1.9	1.4	1.2	2.0
BAL (N ₂)		%	-	-	-	4.7	4.6	13.1	5.9	2.4	2.7	5.3	5.9
CO		PPM	-	-	-	5	6	2	7	3	9	12	4
H ₂ S		PPM	-	-	-	200	315	394	287	308	362	362	250
Vel Min		m/s	-	-	-	1.24	1.60	1.47	1.85	2.51	2.14	1.88	1.47
Vel Max		m/s	-	-	-	1.95	2.15	2.15	2.65	3.60	2.68	2.51	1.72
Flow		CFM	-	-	-	15.07	17.72	17.10	21.26	28.87	22.77	20.74	15.07
Temp		°C	-	-	-	20.1	22.6	23.6	26.9	33.6	30.0	31.5	20.1
Comments			NLV	NLV	NLV	1T	1T	1T	2T	2T	2T	2T	2T

Table 2: Wellfield Monitoring Data

	<i>Units</i>	15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22	
8-72	Well	"H ₂ O	-	-	-	-3.68	-2.47	-2.65	-1.84	-0.99	-1.10	-2.14	-1.68	-2.35
	Lateral	"H ₂ O	NLV	NLV	NLV	-5.32	-4.62	-3.44	-2.58	-1.71	-2.03	-3.95	-3.55	-4.00
	CH ₄	%	-	-	-	55.1	56.3	55.2	55.8	59.4	55.8	55.1	56.3	59.1
	CO ₂	%	-	-	-	28.5	32.6	30.8	35.7	39.9	32.8	30.2	33.6	40.3
	O ₂	%	-	-	-	1.4	1.0	1.1	0.7	0.6	1.0	1.9	0.8	0.6
	BAL (N ₂)	%	-	-	-	15.0	10.1	12.9	7.8	0.1	10.4	12.8	9.3	0.0
	CO	PPM	-	-	-	8	4	5	9	6	10	15	7	4
	H ₂ S	PPM	-	-	-	154	200	234	355	263	200	158	201	240
	Vel Min	m/s	-	-	-	1.25	1.68	1.95	2.00	1.28	1.62	1.24	1.22	1.68
	Vel Max	m/s	-	-	-	1.95	2.42	2.47	2.21	2.31	2.03	1.63	1.97	2.34
	Flow	CFM	-	-	-	15.12	19.37	20.88	19.89	16.96	17.25	13.56	15.07	18.99
	Temp	°C	-	-	-	15.4	18.6	20.5	30.1	32.9	30.5	25.7	18.2	17.0
	Comments		NLV	NLV	NLV	2T	2T	2T	2T	2T	2T	2T	2T	2T
	8-73	Well	"H ₂ O	-	-	-	-2.57	-2.57	-2.57	-2.57	too tall	too tall	too tall	too tall
Lateral		"H ₂ O	NLV	NLV	NLV	-5.62	-4.65	-3.07	-0.65	-0.12	-0.32	-0.66	-1.55	-3.96
CH ₄		%	-	-	-	53.4	55.6	55.4	56.7	59.6	58.2	59.3	58.6	59.5
CO ₂		%	-	-	-	33.5	31.6	30.8	37.4	38.6	37.3	36.1	38.3	40.0
O ₂		%	-	-	-	1.8	2.2	2.3	1.5	1.8	1.6	1.9	1.0	0.5
BAL (N ₂)		%	-	-	-	11.3	10.6	11.5	4.4	0.0	2.9	2.7	2.1	0.0
CO		PPM	-	-	-	15	10	11	10	4	5	10	8	3
H ₂ S		PPM	-	-	-	<<<<	<<<<	<<<<	<<<<	<<<<	<<<<	<<<<	<<<<	<<<<
Vel Min		m/s	-	-	-	1.85	1.62	1.24	Surging	Surging	Surging	Surging	Surging	Surging
Vel Max		m/s	-	-	-	2.64	2.17	1.68	-	-	-	-	-	-
Flow		CFM	-	-	-	21.21	17.91	13.80	Surging	Surging	Surging	Surging	Surging	Surging
Temp		°C	-	-	-	20.4	25.9	29.6	-	-	-	-	-	-
Comments			2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T
8-74		Well	"H ₂ O	-	-	-	-3.01	-3.01	-3.01	-	-	-	-	-
	Lateral	"H ₂ O	NLV	-	-	-4.08	-2.66	-1.24	NLV	NLV	NLV	NLV	NLV	NLV
	CH ₄	%	-	-	-	56.0	57.1	56.9	-	-	-	-	-	-
	CO ₂	%	-	-	-	37.0	36.2	37.4	-	-	-	-	-	-
	O ₂	%	-	-	-	1.9	1.6	1.5	-	-	-	-	-	-
	BAL (N ₂)	%	-	-	-	5.1	5.1	4.2	-	-	-	-	-	-
	CO	PPM	-	-	-	12	15	8	-	-	-	-	-	-
	H ₂ S	PPM	-	-	-	<<<<	<<<<	<<<<	-	-	-	-	-	-
	Vel Min	m/s	-	-	-	1.58	2.01	2.30	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	2.36	2.50	2.47	-	-	-	-	-	-
	Flow	CFM	-	-	-	18.62	21.31	22.54	-	-	-	-	-	-
	Temp	°C	-	-	-	21.5	30.6	32.5	-	-	-	-	-	-
	Comments		2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T
	WH-75	Well	"H ₂ O	-	-	-	-1.27	-1.65	-1.24	-1.00	-0.78	-1.01	-1.85	-1.24
Lateral		"H ₂ O	NLV	NLV	NLV	-9.41	-5.67	-4.95	-3.02	-1.75	-1.95	-2.68	-4.68	-3.24
CH ₄		%	-	-	-	51.1	50.2	51.6	52.7	57.0	56.3	57.1	54.2	53.6
CO ₂		%	-	-	-	36.0	35.6	30.4	29.6	37.5	28.1	27.1	32.9	35.9
O ₂		%	-	-	-	4.7	4.0	3.3	3.6	1.4	1.5	2.5	1.2	1.6
BAL (N ₂)		%	-	-	-	8.2	10.2	14.7	14.1	4.1	14.1	13.3	11.7	8.9
CO		PPM	-	-	-	6	5	5	7	3	9	10	4	4
H ₂ S		PPM	-	-	-	112	165	157	122	197	150	174	164	138
Vel Min		m/s	-	-	-	-	1.02	1.47	1.02	1.47	1.14	1.33	1.22	1.55
Vel Max		m/s	-	-	-	-	1.66	1.86	1.55	1.86	1.62	1.85	1.98	2.03
Flow		CFM	-	-	-	-	12.66	15.73	12.14	15.73	13.04	15.02	15.12	16.91
Temp		°C	-	-	-	-	23.6	26.3	28.3	27.4	28.0	29.3	20.1	14.0
Comments			1T	1T	1T	1T	1T	1T	1T	2T	2T	2T	2T	2T

Table 2: Wellfield Monitoring Data

			15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22
WH-76	Well	"H ₂ O	-	-	-	-1.57	-1.47	-1.02	0.96	-1.04	-1.00	-1.87	-1.22	-1.66
	Lateral	"H ₂ O	NLV	NLV	NLV	-8.15	-6.32	-4.28	-3.00	-1.95	-2.34	-2.69	-4.62	-3.72
	CH ₄	%	-	-	-	52.3	50.3	49.1	48.3	60.4	59.3	58.5	55.9	52.9
	CO ₂	%	-	-	-	30.5	30.2	27.6	28.0	38.2	36.2	35.2	34.0	33.5
	O ₂	%	-	-	-	1.5	1.0	1.3	1.7	1.4	1.2	1.9	2.0	2.9
	BAL (N ₂)	%	-	-	-	15.7	18.5	22.0	22.0	0.0	3.3	4.4	8.1	10.7
	CO	PPM	-	-	-	1	5	5	7	3	5	7	8	4
	H ₂ S	PPM	-	-	-	<<<<	<<<<	<<<<	<<<<	500	368	355	355	414
	Vel Min	m/s	-	-	-	-	0.94	1.30	1.80	1.20	1.20	1.11	1.11	1.54
	Vel Max	m/s	-	-	-	-	1.44	1.66	1.96	1.63	1.48	1.37	1.98	1.80
	Flow	CFM	-	-	-	-	11.24	13.99	17.76	13.37	12.66	11.72	14.60	15.78
	Temp	°C	-	-	-	-	20.4	22.7	28.6	27.3	24.0	23.8	17.3	15.3
	Comments		1T	1T	1T	1T	1T	1T	1T	1T	2T	2T	2T	2T
WH-77	Well	"H ₂ O	-	-	-	-0.95	-0.68	-	-	-	-	-	-	-
	Lateral	"H ₂ O	NLV	NLV	NLV	-7.66	-4.20	NLV	NLV	NLV	NLV	NLV	NLV	NLV
	CH ₄	%	-	-	-	50.3	51.6	-	-	-	-	-	-	-
	CO ₂	%	-	-	-	33.9	32.6	-	-	-	-	-	-	-
	O ₂	%	-	-	-	3.4	3.0	-	-	-	-	-	-	-
	BAL (N ₂)	%	-	-	-	12.4	12.8	-	-	-	-	-	-	-
	CO	PPM	-	-	-	4	5	-	-	-	-	-	-	-
	H ₂ S	PPM	-	-	-	105	136	-	-	-	-	-	-	-
	Vel Min	m/s	-	-	-	-	0.69	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	1.03	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	8.13	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	20.1	-	-	-	-	-	-	-
	Comments		1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T	1/2T
WH-78	Well	"H ₂ O	-	-	-	-1.58	-0.68	-	-	-	-	-	-	-
	Lateral	"H ₂ O	NLV	NLV	NLV	-6.66	-3.20	NLV	NLV	NLV	NLV	NLV	NLV	NLV
	CH ₄	%	-	-	-	51.2	50.8	-	-	-	-	-	-	-
	CO ₂	%	-	-	-	35.6	33.6	-	-	-	-	-	-	-
	O ₂	%	-	-	-	3.3	3.0	-	-	-	-	-	-	-
	BAL (N ₂)	%	-	-	-	9.9	12.6	-	-	-	-	-	-	-
	CO	PPM	-	-	-	10	15	-	-	-	-	-	-	-
	H ₂ S	PPM	-	-	-	<<<<	<<<<	-	-	-	-	-	-	-
	Vel Min	m/s	-	-	-	-	0.74	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	1.01	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	8.27	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	23.8	-	-	-	-	-	-	-
	Comments		2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T	2T
WH-79	Well	"H ₂ O	-	-	-	-	-	-	-	-	-	-	-	-
	Lateral	"H ₂ O	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV
	CH ₄	%	-	-	-	-	-	-	-	-	-	-	-	-
	CO ₂	%	-	-	-	-	-	-	-	-	-	-	-	-
	O ₂	%	-	-	-	-	-	-	-	-	-	-	-	-
	BAL (N ₂)	%	-	-	-	-	-	-	-	-	-	-	-	-
	CO	PPM	-	-	-	-	-	-	-	-	-	-	-	-
	H ₂ S	PPM	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments		1T	1T	1T	1T	1T	1T	1T	1T	1T	1T	1T	1T

Table 2: Wellfield Monitoring Data

			15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22
WH-80	Well	"H ₂ O	-	-	-	-	-	-	-	-	-	-	-	-
	Lateral	"H ₂ O	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV
	CH ₄	%	-	-	-	-	-	-	-	-	-	-	-	-
	CO ₂	%	-	-	-	-	-	-	-	-	-	-	-	-
	O ₂	%	-	-	-	-	-	-	-	-	-	-	-	-
	BAL (N ₂)	%	-	-	-	-	-	-	-	-	-	-	-	-
	CO	PPM	-	-	-	-	-	-	-	-	-	-	-	-
	H ₂ S	PPM	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	°C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments		1T	1T	1T	1T	1T	1T	1T	1T	1T	1T	1T	1T
	5-81	Well	"H ₂ O	-	-	-	-	-	0.95	-1.84	-2.01	-2.14	-2.99	-2.34
Lateral		"H ₂ O	NLV	NLV	NLV	NLV	NLV	-3.44	-3.95	-2.99	-3.96	-4.62	-4.88	-4.58
CH ₄		%	-	-	-	-	-	54.8	55.0	56.5	55.2	55.3	52.6	50.2
CO ₂		%	-	-	-	-	-	38.6	36.2	39.9	38.3	35.2	36.1	33.2
O ₂		%	-	-	-	-	-	1.0	1.3	1.2	1.5	1.7	1.9	1.8
BAL (N ₂)		%	-	-	-	-	-	5.6	7.5	2.4	5.0	7.8	9.4	14.8
CO		PPM	-	-	-	-	-	10	8	11	19	24	22	14
H ₂ S		PPM	-	-	-	-	-	33	27	29	38	40	41	26
Vel Min		m/s	-	-	-	-	-	2.33	3.17	1.57	1.03	1.03	1.44	1.25
Vel Max		m/s	-	-	-	-	-	2.86	3.66	2.33	1.97	1.97	1.96	1.69
Flow		CFM	-	-	-	-	-	24.52	32.27	18.43	14.17	14.17	16.06	13.89
Temp		°C	-	-	-	-	-	24.1	26.0	30.4	25.7	26.9	19.3	14.2
Comments			NLV	NLV	NLV	NLV	NLV	2T	2T	2T	2T	2T	2T	2T
7-82		Well	"H ₂ O	-0.01	-0.02	-0.01	0.05	0.05	0.04	-0.01	-0.66	-1.20	-1.62	-1.62
	Lateral	"H ₂ O	-6.87	-16.54	-11.57	-9.64	-7.20	-5.32	-4.25	-2.29	-3.68	-4.95	-4.65	-5.21
	CH ₄	%	20.1	22.1	23.4	29.6	25.3	33.4	38.4	48.7	49.0	48.2	48.2	48.3
	CO ₂	%	21.5	23.0	22.6	23.1	25.4	26.3	24.0	33.6	32.7	31.6	31.2	30.6
	O ₂	%	9.6	8.8	8.1	9.5	8.8	7.1	8.2	3.9	3.0	2.2	3.1	2.9
	BAL (N ₂)	%	48.8	46.1	45.9	37.8	40.5	33.2	29.4	13.8	15.3	18.0	17.5	18.2
	CO	PPM	15	16	19	19	22	29	19	36	56	60	59	47
	H ₂ S	PPM	137	187	103	127	200	146	165	206	147	133	132	102
	Vel Min	m/s	-	-	-	-	-	-	-	0.87	0.88	1.00	1.11	1.23
	Vel Max	m/s	-	-	-	-	-	-	-	1.54	1.47	1.84	1.35	1.53
	Flow	CFM	-	-	-	-	-	-	-	11.39	11.10	13.42	11.62	13.04
	Temp	°C	-	-	-	-	-	-	-	25.4	23.0	25.3	16.2	14.8
	Comments		closed	closed	closed	closed	closed	closed	closed	1T	1T	1T	1T	1T
	7-83	Well	"H ₂ O	0.02	-0.01	-0.02	0.02	0.02	0.02	0.02	-0.01	-0.01	-0.01	-0.01
Lateral		"H ₂ O	-6.33	-16.95	-10.99	-11.66	-6.98	-5.14	-3.22	-1.68	-2.00	-2.54	-3.02	-4.02
CH ₄		%	0.4	0.5	0.9	0.4	1.5	15.6	12.7	0.2	1.2	1.5	1.9	1.8
CO ₂		%	1.0	0.5	1.6	0.3	1.3	1.9	5.8	0.3	2.6	2.9	2.4	2.6
O ₂		%	19.4	20.1	19.5	11.4	10.3	11.9	7.6	19.6	19.5	18.5	20.1	20.0
BAL (N ₂)		%	79.2	78.9	78.0	87.9	86.9	70.6	73.9	79.9	76.7	77.1	75.6	75.6
CO		PPM	2	1	5	0	0	0	0	0	1	2	3	5
H ₂ S		PPM	1	1	4	18	25	14	10	5	1	2	4	4
Vel Min		m/s	-	-	-	-	-	-	-	-	-	-	-	-
Vel Max		m/s	-	-	-	-	-	-	-	-	-	-	-	-
Flow		CFM	-	-	-	-	-	-	-	-	-	-	-	-
Temp		°C	-	-	-	-	-	-	-	-	-	-	-	-
Comments			closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed

Table 2: Wellfield Monitoring Data

<i>Units</i>	15-Jan-22	15-Feb-22	15-Mar-22	27-Apr-22	27-May-22	27-Jun-22	10-Jul-22	10-Aug-22	10-Sep-22	10-Oct-22	10-Nov-22	15-Dec-22
Notes:	<p>NLV No Lateral Vacuum - Indicates no reading was taken. 0 Indicates a reading was taken, with no values registered Anemometer does not record flows below 0.4 m/s. A flow reading is typically taken even when the well is cracked. <<<< Number too large to be displayed (over 500 ppm). closed Well is closed. 1/2T Valve opened 1/2 turn 1T Valve opened 1 turn 2T Valve opened 2 turns</p>											

Table 3: Pump Counters

Location	January 25, 2022				February 26, 2022			March 26, 2022			April 26, 2022			May 20, 2022			June 25, 2022		
	Prev. Counter	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo
PDT 1	1402	1002	50	130	1002	0	0	1002	0	0	1019	17	44.2	1103	84	218.4	1110	7	18.2
PDT 2	107974	BURIED	-	-	BURIED	-	-	BURIED	-	-	N/C	-	-	53100	-	-	56944	3844	9994.4
PDT 3	18098	18099	0	0	18099	0	0	18099	0	0	18101	2	5.2	18101	0	0	18101	0	0
PDT 4	-	-	-	-	-	-	-	-	-	-	flooded	-	-	flooded	-	-	flooded	-	-
PDT 5	60910	-	-	-	-	-	-	-	-	-	flooded	-	-	flooded	-	-	flooded	-	-
PDT 6	154003	441	0	0	480	39	101.4	1024	544	1414.4	3164	2140	5564	3164	0	0	3164	0	0
PDT 7	-	N/C	-	-	N/C	-	-	N/C	-	-	N/C	-	-	N/C	-	-	N/C	-	-
PDT 8	52924	-	-	-	N/C	-	-	N/C	-	-	N/C	-	-	6682	-	-	6745	63	163.8
PDT 9	21965	BURIED	-	-	BURIED	-	-	BURIED	-	-	Lake	-	-	flooded	-	-	flooded	-	-
PDT 10	1124	BURIED	-	-	BURIED	-	-	BURIED	-	-	Lake	-	-	Lake	-	-	5945	-	-
PDT 11	4132	BURIED	-	-	BURIED	-	-	BURIED	-	-	Lake	-	-	Lake	-	-	25147	-	-
PDT 12	31	BURIED	-	-	BURIED	-	-	BURIED	-	-	Buried	-	-	31	-	-	31	0	0
H-1		22	0	0	22	0	0	22	0	0	22	0	0	22	0	0	22	0	0
H-2		17	0	0	17	0	0	17	0	0	17	0	0	17	0	0	17	0	0
H-3		97806	2	5.2	97806	0	0	97806	0	0	97807	1	2.6	97807	0	0	97807	0	0
H-4	426948	471472	62	161.2	471472	0	0	471472	0	0	471483	11	28.6	471483	0	0	471852	369	959.4
1-5		88095	6841	17786.6	90841	2746	7139.6	94845	4004	10410.4	133444	38599	100357.4	142578	9134	23748.4	154289	11711	30448.6
1-6		260635	14761	38378.6	275154	14519	37749.4	310215	35061	91158.6	421898	111683	290375.8	458415	36517	94944.2	473250	14835	38571
1-7		3502	2	5.2	3502	0	0	3502	0	0	3504	2	5.2	3504	0	0	3504	0	0
1-8		62170	3685	9581	69547	7377	19180.2	76845	7298	18974.8	98797	21952	57075.2	110248	11451	29772.6	136220	25972	67527.2
1-9	812087	837989	31	80.6	837989	0	0	837989	0	0	844437	6448	16764.8	846215	1778	4622.8	847651	1436	3733.6
1-10	623077	652413	1572	4087.2	652413	0	0	652413	0	0	661427	9014	23436.4	662348	921	2394.6	663522	1174	3052.4
H-11	927145	986741	0	0	986741	0	0	986741	0	0	N/C	-	-	N/C	-	-	N/C	-	-
H-12		169877	68303	177587.8	182154	12277	31920.2	187458	5304	13790.4	214988	27530	71578	238451	23463	61003.8	261227	22776	59217.6
2-13		2747	45	117	2747	0	0	2747	0	0	2748	1	2.6	2748	0	0	2748	0	0
2-14		102499	0	0	102499	0	0	102499	0	0	102499	0	0	102499	0	0	102499	0	0
2-15		47003	3515	9139	47003	0	0	47003	0	0	47003	0	0	47003	0	0	47003	0	0
2-16		38	1	2.6	38	0	0	38	0	0	40	2	5.2	40	0	0	40	0	0
2-17		468687	10836	28173.6	468687	0	0	468687	0	0	468687	0	0	468687	0	0	468687	0	0
2-18	830087	532245	14396	37429.6	532245	0	0	532245	0	0	532345	100	260	532345	0	0	532345	0	0
3-19		16844	11987	31166.2	35459	18615	48399	42154	6695	17407	62205	20051	52132.6	70124	7919	20589.4	72589	2465	6409
3-20		80214	2436	6333.6	82454	2240	5824	84754	2300	5980	94246	9492	24679.2	98657	4411	11468.6	102478	3821	9934.6
3-21		49964	15110	39286	74845	24881	64690.6	86484	11639	30261.4	102177	15693	40801.8	108541	6364	16546.4	111885	3344	8694.4
3-22		14947	1303	3387.8	22548	7601	19762.6	30254	7706	20035.6	36007	5753	14957.8	37544	1537	3996.2	38695	1151	2992.6
3-23		93892	9380	24388	149548	55656	144705.6	154845	5297	13772.2	170980	16135	41951	180247	9267	24094.2	188639	8392	21819.2
3-24		197573	12941	33646.6	201478	3905	10153	215888	14410	37466	296915	81027	210670.2	296915	0	0	296915	0	0
3-25		259847	5660	14716	260514	667	1734.2	261254	740	1924	263475	2221	5774.6	286244	22769	59199.4	324966	38722	100677.2
3-26		6435	0	0	6994	559	1453.4	8475	1481	3850.6	11656	3181	8270.6	11656	0	0	11656	0	0
3-27	69456	245848	2697	7012.2	258988	13140	34164	264847	5859	15233.4	283279	18432	47923.2	283279	0	0	283279	0	0
3-28		86909	4894	12724.4	92548	5639	14661.4	100251	7703	20027.8	108390	8139	21161.4	110247	1857	4828.2	113698	3451	8972.6
3-29	830087	11	0	0	11	0	0	11	0	0	13	2	5.2	13	0	0	13	0	0
3-30	69488	69462	0	0	69462	0	0	69462	0	0	69469	7	18.2	69469	0	0	69469	0	0
4-31		17	0	0	17	0	0	17	0	0	17	0	0	17	0	0	17	0	0
4-32		2473	0	0	2473	0	0	2473	0	0	5688	3215	8359	6324	636	1653.6	8639	2315	6019
4-33		468729	0	0	468729	0	0	468729	0	0	471471	2742	7129.2	562178	90707	235838.2	699582	137404	357250.4
4-34		774693	24582	63913.2	789514	14821	38534.6	794218	4704	12230.4	820820	26602	69165.2	872477	51657	134308.2	985175	112698	293014.8
4-35		114080	11627	30230.2	114080	0	0	114080	0	0	116580	2500	6500	124859	8279	21525.4	139658	14799	38477.4
4-36		16	0	0	16	0	0	16	0	0	16	0	0	16	0	0	16	0	0
4-37		27975	9434	24528.4	27975	0	0	27975	0	0	29488	1513	3933.8	68495	39007	101418.2	102478	33983	88355.8
5-38		687326	0	0	687326	0	0	687326	0	0	772547	85221	221574.6	885147	112600	292760	214578	-670569	-1743479.4
5-39		27074	0	0	27074	0	0	27074	0	0	28450	1376	3577.6	63002	34552	89835.2	103455	40453	105177.8
5-40		6	0	0	6	0	0	6	0	0	12	6	15.6	12	0	0	12	0	0
5-41		21	0	0	21	0	0	21	0	0	23	2	5.2	23	0	0	23	0	0
5-42		102447	0	0	102447	0	0	102985	538	1398.8	105543	2558	6650.8	105543	0	0	105543	0	0
5-43		28657	0	0	28657	0	0	28657	0	0	28874	217	564.2	28874	0	0	28874	0	0
5-44		13	0	0	13	0	0	13	0	0	14	1	2.6	14	0	0	14	0	0
5-45		54	0	0	54	0	0	54	0	0	54	0	0	54	0	0	54	0	0
5-46		670	0	0	670	0	0	670	0	0	673	3	7.8	673	0	0	673	0	0
6-47		445859	97108	252480.8	487510	41651	108292.6	526901	39391	102416.6	579686	52785	137241	633856	54170	140842	671554	37698	98014.8
6-48		7391	4	10.4	7391	0	0	7391	0	0	7460	69	179.4	7460	0	0	7460	0	0
6-49		83516	15061	39158.6	157489	73973	192329.8	248511	91022	236657.2	310284	61773	160609.8	376699	66415	172679	441578	64879	168685.4

Table 3: Pump Counters

Location	Prev. Counter	January 25, 2022			February 26, 2022			March 26, 2022			April 26, 2022			May 20, 2022			June 25, 2022		
		Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo
6-50		8978	326	847.6	9647	669	1739.4	11245	1598	4154.8	12375	1130	2938	14254	1879	4885.4	17548	3294	8564.4
6-51		12	0	0	12	0	0	12	0	0	13	1	2.6	13	0	0	13	0	0
6-52		13603	2062	5361.2	13603	0	0	13603	0	0	18627	5024	13062.4	22657	4030	10478	25178	2521	6554.6
6-53		70	0	0	70	0	0	70	0	0	72	2	5.2	72	0	0	72	0	0
6-54		877961	76707	199438.2	887123	9162	23821.2	901438	14315	37219	85471	-815967	-2121514.2	274124	188653	490497.8	368412	94288	245148.8
6-55		83723	0	0	83723	0	0	83723	0	0	83723	0	0	83723	0	0	83723	0	0
6-56		362103	90	234	362174	71	184.6	369574	7400	19240	394758	25184	65478.4	401248	6490	16874	404852	3604	9370.4
6-57		360	10	26	360	0	0	360	0	0	361	1	2.6	30215	29854	77620.4	46522	16307	42398.2
6-58		7	0	0	7	0	0	7	0	0	7	0	0	7	0	0	7	0	0
6-59		17	0	0	17	0	0	17	0	0	17	0	0	17	0	0	17	0	0
7-60		575825	136910	355966	575825	0	0	575825	0	0	575922	97	252.2	575999	77	200.2	575999	0	0
7-61		283	0	0	283	0	0	283	0	0	283	0	0	283	0	0	283	0	0
7-62		125607	3118	8106.8	127910	2303	5987.8	129305	1395	3627	192447	63142	164169.2	230658	38211	99348.6	261000	30342	78889.2
7-63		288415	78568	204276.8	312499	24084	62618.4	356221	43722	113677.2	425499	69278	180122.8	474154	48655	126503	510699	36545	95017
7-64		46987	21517	55944.2	47815	828	2152.8	49152	1337	3476.2	60248	11096	28849.6	72084	11836	30773.6	81256	9172	23847.2
7-65		159615	24774	64412.4	170548	10933	28425.8	182450	11902	30945.2	271548	89098	231654.8	302548	31000	80600	330658	28110	73086
7-66		15080	1829	4755.4	16247	1167	3034.2	17555	1308	3400.8	39658	22103	57467.8	61248	21590	56134	74210	12962	33701.2
7-67		29	0	0	29	0	0	29	0	0	30	1	2.6	30	0	0	30	0	0
7-68		3	0	0	3	0	0	3	0	0	3	0	0	3	0	0	3	0	0
8-69		209544	6146	15979.6	209544	0	0	210447	903	2347.8	213578	3131	8140.6	223589	10011	26028.6	234155	10566	27471.6
8-70		395403	46632	121243.2	395403	0	0	395403	0	0	395403	0	0	395403	0	0	395403	0	0
8-71		30264	1779	4625.4	30694	430	1118	31488	794	2064.4	32363	875	2275	32363	0	0	32363	0	0
8-72		605409	102252	265855.2	609415	4006	10415.6	611222	1807	4698.2	622746	11524	29962.4	622746	0	0	622746	0	0
8-73		163207	64553	167837.8	190555	27348	71104.8	197443	6888	17908.8	253666	56223	146179.8	270002	16336	42473.6	345662	75660	196716
8-74		49	3	7.8	49	0	0	49	0	0	49	0	0	49	0	0	49	0	0
WH-75		7	1	2.6	7	0	0	7	0	0	7	0	0	7	0	0	7	0	0
WH-76		572	11	28.6	572	0	0	572	0	0	572	0	0	572	0	0	572	0	0
WH-77		14123	0	0	14123	0	0	14123	0	0	16847	2724	7082.4	16847	0	0	16847	0	0
WH-78		51	0	0	51	0	0	51	0	0	51	0	0	51	0	0	51	0	0
WH-79		16	0	0	16	0	0	16	0	0	16	0	0	16	0	0	16	0	0
WH-80		18	0	0	18	0	0	18	0	0	18	0	0	18	0	0	18	0	0
5-81		27074	0	0	27074	0	0	27074	0	0	28064	990	2574	28064	0	0	28064	0	0
7-82		-	-	-	-	-	-	548777	-	-	635769	86992	226179.2	712548	76779	199625.4	796255	83707	217638.2
7-83		20	1	2.6	20	0	0	20	0	0	21	1	2.6	21	0	0	21	0	0

Notes:
 N/C No Counter
 - Incorrect Reading at Counter
 - No reading

Table 3: Pump Counters

Location	July 10, 2022			August 10, 2022			September 10, 2022			October 20, 2022			November 20, 2022			December 20, 2022		
	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo
PDT 1	1247	137	356.2	1264	17	44.2	1284	20	52	1302	18	46.8	1384	82	213.2	1402	18	46.8
PDT 2	59621	2677	6960.2	61512	1891	4916.6	62547	1035	2691	66217	3670	9542	68471	2254	5860.4	69017	546	1419.6
PDT 3	18101	0	0	18101	0	0	18101	0	0	18101	0	0	18101	0	0	18101	0	0
PDT 4	flooded	-	-	flooded	-	-	flooded	-	-	flooded	-	-	-	-	-	-	-	-
PDT 5	flooded	-	-	flooded	-	-	flooded	-	-	flooded	-	-	-	-	-	-	-	-
PDT 6	3164	0	0	4597	1433	3725.8	6951	2354	6120.4	11024	4073	10589.8	13540	2516	6541.6	13965	425	1105
PDT 7	N/C	-	-	N/C	-	-	N/C	-	-	N/C	-	-	N/C	-	-	-	-	-
PDT 8	6807	62	161.2	6813	6	15.6	6821	8	20.8	6901	80	208	6999	98	254.8	7028	29	75.4
PDT 9	flooded	-	-	flooded	-	-	flooded	-	-	flooded	-	-	-	-	-	-	-	-
PDT 10	6044	99	257.4	6356	312	811.2	6521	165	429	6718	197	512.2	6935	217	564.2	7010	75	195
PDT 11	27101	1954	5080.4	29965	2864	7446.4	32015	2050	5330	33485	1470	3822	34588	1103	2867.8	34895	307	798.2
PDT 12	31	0	0	160495	160464	417206.4	160495	0	0	160495	0	0	160495	0	0	160495	0	0
H-1	22	0	0	22	0	0	22	0	0	22	0	0	22	0	0	22	0	0
H-2	17	0	0	17	0	0	17	0	0	17	0	0	17	0	0	17	0	0
H-3	97807	0	0	97811	4	10.4	97811	0	0	97811	0	0	97811	0	0	97811	0	0
H-4	472018	166	431.6	473143	1125	2925	473149	6	15.6	473221	72	187.2	473541	320	832	473600	59	153.4
1-5	159684	5395	14027	176872	17188	44688.8	204335	27463	71403.8	215471	11136	28953.6	217452	1981	5150.6	218366	914	2376.4
1-6	495811	22561	58658.6	575349	79538	206798.8	619620	44271	115104.6	628457	8837	22976.2	631574	3117	8104.2	632610	1036	2693.6
1-7	3504	0	0	3504	0	0	3504	0	0	3504	0	0	3504	0	0	3504	0	0
1-8	142685	6465	16809	152674	9989	25971.4	164482	11808	30700.8	167485	3003	7807.8	170002	2517	6544.2	171203	1201	3122.6
1-9	848014	363	943.8	850714	2700	7020	852040	1326	3447.6	853307	1267	3294.2	854102	795	2067	854258	156	405.6
1-10	666980	3458	8990.8	673485	6505	16913	678448	4963	12903.8	682145	3697	9612.2	684221	2076	5397.6	684517	296	769.6
H-11	N/C	-	-	N/C	-	-	N/C	-	-	N/C	-	-	N/C	-	-	N/C	-	-
H-12	312548	51321	133434.6	339181	26633	69245.8	385075	45894	119324.4	398442	13367	34754.2	402199	3757	9768.2	403268	1069	2779.4
2-13	2748	0	0	2748	0	0	2748	0	0	2748	0	0	2748	0	0	2748	0	0
2-14	102499	0	0	102499	0	0	102499	0	0	102499	0	0	102499	0	0	102499	0	0
2-15	47003	0	0	47003	0	0	47003	0	0	47003	0	0	47003	0	0	47003	0	0
2-16	40	0	0	40	0	0	40	0	0	40	0	0	40	0	0	40	0	0
2-17	468687	0	0	468687	0	0	468687	0	0	468687	0	0	468687	0	0	468687	0	0
2-18	532345	0	0	532345	0	0	532345	0	0	532345	0	0	532345	0	0	532345	0	0
3-19	81230	8641	22466.6	102177	20947	54462.2	113507	11330	29458	119430	5923	15399.8	121457	2027	5270.2	122574	1117	2904.2
3-20	108477	5999	15597.4	125660	17183	44675.8	128457	2797	7272.2	129847	1390	3614	131224	1377	3580.2	131958	734	1908.4
3-21	118650	6765	17589	124972	6322	16437.2	126841	1869	4859.4	127568	727	1890.2	128001	433	1125.8	128024	23	59.8
3-22	40278	1583	4115.8	43056	2778	7222.8	44596	1540	4004	45218	622	1617.2	45618	400	1040	45835	217	564.2
3-23	194255	5616	14601.6	213877	19622	51017.2	224885	11008	28620.8	229037	4152	10795.2	232144	3107	8078.2	233541	1397	3632.2
3-24	296915	0	0	296915	0	0	296915	0	0	296915	0	0	296915	0	0	296915	0	0
3-25	369980	45014	117036.4	432234	62254	161860.4	441520	9286	24143.6	445815	4295	11167	449211	3396	8829.6	450221	1010	2626
3-26	11700	44	114.4	11745	45	117	11894	149	387.4	12017	123	319.8	12284	267	694.2	12385	101	262.6
3-27	283279	0	0	283279	0	0	283279	0	0	283279	0	0	283279	0	0	283279	0	0
3-28	118442	4744	12334.4	126896	8454	21980.4	129004	2108	5480.8	130288	1284	3338.4	131005	717	1864.2	131399	394	1024.4
3-29	13	0	0	13	0	0	13	0	0	13	0	0	13	0	0	13	0	0
3-30	69469	0	0	69469	0	0	69469	0	0	69469	0	0	69469	0	0	69469	0	0
4-31	17	0	0	20	3	7.8	20	0	0	20	0	0	20	0	0	20	0	0
4-32	12577	3938	10238.8	15677	3100	8060	16852	1175	3055	17588	736	1913.6	17958	370	962	18024	66	171.6
4-33	852178	152596	396749.6	217250	-634928	-1650812.8	328455	111205	289133	347102	18647	48482.2	352645	5543	14411.8	353204	559	1453.4
4-34	102478	-882697	-2295012.2	189624	87146	226579.6	258447	68823	178939.8	274033	15586	40523.6	280365	6332	16463.2	281547	1182	3073.2
4-35	152007	12349	32107.4	182200	30193	78501.8	203174	20974	54532.4	213550	10376	26977.6	216541	2991	7776.6	217366	825	2145
4-36	16	0	0	16	0	0	16	0	0	16	0	0	16	0	0	16	0	0
4-37	125669	23191	60296.6	154408	28739	74721.4	175440	21032	54683.2	182166	6726	17487.6	184217	2051	5332.6	184588	371	964.6
5-38	477120	262542	682609.2	698952	221832	576763.2	865207	166255	432263	921744	56537	146996.2	923658	1914	4976.4	923880	222	577.2
5-39	147855	44400	115440	162864	15009	39023.4	183422	20558	53450.8	189557	6135	15951	192478	2921	7594.6	193651	1173	3049.8
5-40	12	0	0	12	0	0	12	0	0	12	0	0	12	0	0	12	0	0
5-41	23	0	0	23	0	0	23	0	0	23	0	0	23	0	0	23	0	0
5-42	105543	0	0	105543	0	0	125744	20201	52522.6	131274	5530	14378	133258	1984	5158.4	133503	245	637
5-43	28874	0	0	28874	0	0	36201	7327	19050.2	39021	2820	7332	41296	2275	5915	41394	98	254.8
5-44	14	0	0	14	0	0	14	0	0	14	0	0	14	0	0	14	0	0
5-45	54	0	0	54	0	0	54	0	0	54	0	0	54	0	0	54	0	0
5-46	673	0	0	673	0	0	1004	331	860.6	1255	251	652.6	111	288.6	1401	35	91	
6-47	705631	34077	88600.2	797110	91479	237845.4	854772	57662	149921.2	865714	10942	28449.2	867512	1798	4674.8	867922	410	1066
6-48	7460	0	0	7460	0	0	7460	0	0	7460	0	0	7460	0	0	7460	0	0
6-49	509812	68234	177408.4	588123	78311	203608.6	602411	14288	37148.8	609543	7132	18543.2	612451	2908	7560.8	612844	393	1021.8

Table 3: Pump Counters

Location	July 10, 2022			August 10, 2022			September 10, 2022			October 20, 2022			November 20, 2022			December 20, 2022		
	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo	Counter	Counts / mo	Litres / mo
6-50	21455	3907	10158.2	23368	1913	4973.8	23998	630	1638	24578	580	1508	27695	3117	8104.2	30675	2980	7748
6-51	13	0	0	13	0	0	13	0	0	13	0	0	13	0	0	13	0	0
6-52	28453	3275	8515	32442	3989	10371.4	33647	1205	3133	34852	1205	3133	35298	446	1159.6	35862	564	1466.4
6-53	72	0	0	100	28	72.8	101	1	2.6	101	0	0	101	0	0	101	0	0
6-54	521744	153332	398663.2	717833	196089	509831.4	901114	183281	476530.6	935786	34672	90147.2	941245	5459	14193.4	942114	869	2259.4
6-55	83723	0	0	83723	0	0	83723	0	0	83723	0	0	nc	-	-	-	-	-
6-56	405284	432	1123.2	406007	723	1879.8	406715	708	1840.8	412470	5755	14963	415690	3220	8372	416847	1157	3008.2
6-57	59841	13319	34629.4	78616	18775	48815	83124	4508	11720.8	84569	1445	3757	85947	1378	3582.8	86225	278	722.8
6-58	7	0	0	7	0	0	7	0	0	7	0	0	7	0	0	7	0	0
6-59	17	0	0	43	26	67.6	43	0	0	43	0	0	43	0	0	43	0	0
7-60	575999	0	0	575999	0	0	575999	0	0	575999	0	0	575999	0	0	575999	0	0
7-61	283	0	0	606	323	839.8	854	248	644.8	1032	178	462.8	5220	4188	10888.8	6397	1177	3060.2
7-62	286285	25285	65741	323394	37109	96483.4	333625	10231	26600.6	338647	5022	13057.2	347215	8568	22276.8	365048	17833	46365.8
7-63	562174	51475	133835	606081	43907	114158.2	658115	52034	135288.4	669214	11099	28857.4	672154	2940	7644	673014	860	2236
7-64	92653	11397	29632.2	100490	7837	20376.2	108332	7842	20389.2	114576	6244	16234.4	116847	2271	5904.6	119504	2657	6908.2
7-65	365482	34824	90542.4	388845	23363	60743.8	405888	17043	44311.8	410588	4700	12220	413208	2620	6812	415190	1982	5153.2
7-66	86295	12085	31421	96031	9736	25313.6	99852	3821	9934.6	100258	406	1055.6	101260	1002	2605.2	101737	477	1240.2
7-67	30	0	0	31	1	2.6	31	0	0	31	0	0	31	0	0	35	4	10.4
7-68	3	0	0	3	0	0	3	0	0	3	0	0	3	0	0	3	0	0
8-69	248621	14466	37611.6	258004	9383	24395.8	258018	14	36.4	258211	193	501.8	258368	157	408.2	258409	41	106.6
8-70	395403	0	0	395403	0	0	395403	0	0	395403	0	0	395403	0	0	395658	255	663
8-71	32363	0	0	32370	7	18.2	32370	0	0	32370	0	0	41228	8858	23030.8	53235	12007	31218.2
8-72	622746	0	0	622748	2	5.2	622748	0	0	622748	0	0	622748	0	0	622748	0	0
8-73	402488	56826	147747.6	416405	13917	36184.2	428107	11702	30425.2	436855	8748	22744.8	-	-	-	-	-	-
8-74	49	0	0	96	47	122.2	102	6	15.6	102	0	0	102	0	0	103	1	2.6
WH-75	7	0	0	7	0	0	7	0	0	7	0	0	7	0	0	7	0	0
WH-76	572	0	0	572	0	0	572	0	0	572	0	0	572	0	0	572	0	0
WH-77	16847	0	0	16847	0	0	16847	0	0	16847	0	0	42366	25519	66349.4	50847	8481	22050.6
WH-78	51	0	0	51	0	0	51	0	0	51	0	0	75487	75436	196133.6	88044	12557	32648.2
WH-79	16	0	0	16	0	0	16	0	0	16	0	0	16	0	0	16	0	0
WH-80	18	0	0	18	0	0	18	0	0	18	0	0	18	0	0	18	0	0
5-81	28064	0	0	28064	0	0	28064	0	0	28064	0	0	28064	0	0	28064	0	0
7-82	862558	66303	172387.8	933555	70997	184592.2	978455	44900	116740	74512	-903943	-2350251.8	102154	27642	71869.2	120455	18301	47582.6
7-83	21	0	0	24	3	7.8	24	0	0	24	0	0	24	0	0	24	0	0

Notes: N/C No Counter
 - Incorrect Reading at Counter
 - No reading

Table 4: Water Levels

Units			01-Apr-22				01-Aug-22				01-Dec-22			
	meters	Installed Well	meters	meters	°C	%	meters	meters	°C	%	meters	meters	°C	%
Locations	Screen Length	Depth	Depth to Water	Depth to Bottom	Temperature	Open Screen	Depth to Water	Depth to Bottom	Temperature	Open Screen	Depth to Water	Depth to Bottom	Temperature	Open Screen
H-1	12	14.63	6.40	14.30	40.3	27.07	7.00	14.40	34.1	31.17	7.20	14.30	33.0	32.53
H-2	14	16.77	8.40	15.80	32.9	31.91	10.50	13.70	29.6	44.44	10.80	13.80	28.6	46.23
H-3	12	15.24	6.40	14.70	24.7	21.98	6.60	14.60	22.4	23.30	8.60	14.50	22.3	36.42
H-4	11	14.02	8.50	8.80	30.8	38.87	7.60	8.40	19.3	32.45	8.00	8.40	19.2	35.30
1-5	11	13.72	7.80	14.00	22.9	34.63	8.00	14.00	25.7	36.09	10.30	14.00	24.6	52.85
1-6	12	15.55	10.30	15.00	24.0	44.67	10.00	14.80	26.3	42.75	11.70	14.70	27.4	53.68
1-7	18	21.34	12.70	15.20	28.2	45.22	10.40	14.50	30.7	34.45	11.30	14.50	29.3	38.66
1-8	21	24.39	8.80	23.90	34.6	23.58	13.00	13.50	24.9	40.80	12.40	13.60	26.7	38.34
1-9	12	14.63	9.60	14.30	32.8	48.93	10.00	14.40	39.6	51.67	9.80	14.20	38.2	50.30
1-10	9	12.20	9.40	11.50	29.6	52.08	10.00	11.30	40.1	57.00	10.30	11.40	38.0	59.46
H-11	9	12.80	Foam	12.20	29.7	-	Foam	12.30	35.7	-	Foam	12.40	33.6	-
H-12	13	16.16	12.70	16.00	30.8	59.73	12.90	16.00	26.1	60.97	13.20	15.80	27.4	62.82
2-13	21	25.00	-	-	-	-	-	-	-	-	-	-	-	-
2-14	20	22.56	12.30	21.10	40.5	42.36	15.70	21.00	40.7	57.43	16.10	21.10	39.2	59.20
2-15	18	21.65	10.50	17.80	35.6	33.01	13.80	17.50	32.9	48.26	14.30	17.60	33.1	50.57
2-16	26	28.35	16.80	20.30	29.5	50.65	17.65	19.60	34.1	53.65	17.00	19.80	35.1	51.35
2-17	15	18.29	12.50	16.40	20.1	51.67	12.80	16.20	19.6	53.31	12.50	16.10	24.6	51.67
2-18	15	18.29	14.00	15.80	42.8	59.87	14.80	15.50	38.4	64.24	14.50	15.40	33.6	62.60
3-19	12	14.94	9.60	14.30	33.5	45.89	10.80	14.50	30.5	53.93	10.20	14.60	28.4	49.91
3-20	11	13.26	11.60	13.80	21.4	67.93	12.70	13.90	26.3	76.22	12.30	14.10	25.9	73.20
3-21	5	7.62	5.20	7.50	24.1	28.22	6.00	7.50	28.7	38.72	6.10	7.40	29.3	40.03
3-22	24	26.68	11.90	20.00	30.6	34.89	12.80	19.50	35.7	38.27	13.00	19.60	33.7	39.02
3-23	23	25.91	12.70	18.40	30.7	37.24	14.30	18.20	38.1	43.42	14.40	18.20	39.2	43.80
3-24	21	23.48	13.60	20.40	34.8	48.84	15.40	20.20	39.2	56.51	15.30	20.30	38.6	56.08
3-25	18	21.34	9.90	18.60	33.0	32.10	10.20	18.50	34.0	33.51	10.20	18.40	35.2	33.51
3-26	9	12.20	8.50	12.50	36.1	44.70	9.60	13.50	33.7	53.72	10.10	13.60	30.4	57.82
3-27	21	24.09	10.80	19.80	40.8	33.45	12.00	19.40	40.2	38.43	13.60	19.40	39.6	45.07
3-28	12	15.24	8.80	15.10	34.8	37.73	8.60	15.30	33.9	36.42	9.40	15.20	35.1	41.66
3-29	12	14.63	11.70	14.80	30.9	63.28	11.40	15.30	34.8	61.23	11.50	15.30	36.8	61.92
3-30	7	9.76	6.50	8.20	35.8	41.63	6.80	8.00	38.6	44.70	6.60	8.10	34.2	42.65
4-31	16	18.75	14.70	18.20	36.1	63.77	14.30	18.00	34.0	61.63	14.10	18.20	30.1	60.57
4-32	10	12.50	9.30	11.80	34.9	52.45	8.20	11.60	35.8	43.65	8.50	11.70	33.6	46.05
4-33	24	26.68	13.50	21.00	33.0	42.03	14.30	20.60	39.1	45.03	15.00	20.40	38.4	47.66
4-34	20	22.56	13.20	19.60	30.0	46.35	12.80	18.50	32.5	44.57	13.40	18.30	25.7	47.23
4-35	15	17.38	14.00	18.20	25.7	68.28	13.70	18.40	31.0	66.55	13.80	18.50	32.6	67.13
4-36	15	18.29	10.30	17.80	33.9	39.64	10.90	18.00	35.8	42.92	10.50	17.90	33.7	40.73
4-37	12	14.94	12.00	15.10	32.7	61.96	12.00	15.30	30.7	61.96	13.60	15.00	28.6	72.67
5-38	8	10.67	7.60	11.90	22.0	42.65	8.60	12.40	25.7	52.02	9.50	14.80	26.9	60.46
5-39	8	10.67	11.30	11.80	21.1	77.33	10.50	12.20	19.3	69.83	10.70	12.30	22.4	71.70
5-40	18	21.95	8.40	13.80	33.0	21.60	8.80	13.30	35.8	23.42	9.00	13.50	34.6	24.33
5-41	17	18.90	11.40	16.20	33.5	49.02	11.60	15.90	30.8	50.08	11.40	15.70	28.7	49.02
5-42	12	16.16	9.60	14.60	30.9	34.88	10.20	14.90	30.9	38.60	12.50	15.00	31.6	52.83
5-43	14	16.16	7.5	12.5	37.6	31.32	8	12.2	26.8	34.42	8.5	12.1	25.8	37.51
5-44	19	21.95	11.5	13.8	37.4	38.50	11.4	14	35	38.04	11.3	14.1	35.1	37.59
5-45	15	16.77	9	15.5	30.2	44.58	9.6	15.5	28.5	48.16	9.9	15.6	28.6	49.95
5-46	16	18.90	10.2	16.8	31.4	37.83	12.4	16.8	25.3	49.47	12.5	17	24.2	50.00
6-47	14	15.85	8.7	13.5	25.7	41.42	8.8	14	26.8	42.05	8.7	16.9	25.9	41.42
6-48	15	17.68	9.3	15.5	29.5	35.35	10.6	14.8	27.5	42.70	10.9	14.9	26.7	44.40
6-49	20	23.48	18.2	22.8	32.6	64.54	18.7	23.2	30.6	66.67	18.5	23	31.4	65.82
6-50	14	17.38	12.7	16.5	36.4	55.54	12.4	16.9	40.8	53.81	12.6	17.2	36.7	54.96
6-51	12	14.94	7.5	8.6	31.5	31.84	7.4	10.9	25.7	31.17	7.9	10.7	24.9	34.51
6-52	6	9.15	5.6	7.5	30.8	27.89	5	7.6	29.1	21.33	5.2	7.7	28.4	23.52
6-53	22	23.63	17	19.9	34.8	65.50	16.8	21.1	34.7	64.65	17.4	21.1	33.6	67.19
6-54	13	15.85	7	15.2	34.8	26.85	6.7	15.1	21.7	24.95	9.6	15.1	22.5	43.25
6-55	18	21.34	11.3	2.19	30.6	38.66	11.5	21.6	30.3	39.60	15.4	21.7	29.6	57.87
6-56	10	12.80	9.1	12.5	33.2	49.64	9.6	12.4	33.8	53.54	10.8	12.6	32.7	62.91
6-57	-	-	10.3	14.3	30.7	-	11.4	14.6	30.2	-	11.2	14.5	30	-
6-58	-	-	11.3	20.8	22.9	-	11.8	21.5	25.7	-	12.6	21.2	24.6	-
6-59	17	20.12	16.1	21.3	31.3	64.86	16.9	21.3	27.3	68.84	17.1	21.4	28.5	69.83
7-60	13	15.55	12.7	13.8	32.3	62.07	12.5	14	26	60.78	12.3	21.6	27.6	59.50
7-61	13	15.24	8.6	12.2	31.1	40.42	8.9	12.1	32.5	42.38	9.2	12.4	31.8	44.35
7-62	17	18.29	15	16.9	30.5	73.67	15.4	16.5	38.1	75.85	15	16.5	33.8	73.67
7-63	11	14.00	8	12.5	33.6	41.45	8.6	12	40.8	45.93	9.1	12.1	36.9	49.65
7-64	22	24.09	18.3	25.7	32.7	67.12	19.4	25.3	24.1	71.69	20.1	25.3	28	74.59
7-65	24	26.22	22.6	26.3	35.5	76.89	22.8	27.2	32.6	77.66	21.6	27.1	33.6	73.08
7-66	19	22.00	18.2	21.9	31	69.02	19.3	22.3	31	74.03	19.1	22.1	32.4	73.12
7-67	26	28.50	6.3	8.6	30.2	34.40	5.8	8.5	25.9	29.11	6.1	8.8	26.9	32.28
7-68	28	31.30	14	17.3	35.8	42.06	14.2	17.2	31.7	43.09	14.4	17.1	30.8	44.11
8-69	16	19.10	9.6	14.9	25.6	40.50	9.9	14.9	22.5	42.19	10.6	15.1	25.5	46.15

Table 4: Water Levels

			01-Apr-22				01-Aug-22				01-Dec-22			
Units	meters	meters	meters	meters	°C	%	meters	meters	°C	%	meters	meters	°C	%
Locations	Screen Length	Installed Well Depth	Depth to Water	Depth to Bottom	Temperature	Open Screen	Depth to Water	Depth to Bottom	Temperature	Open Screen	Depth to Water	Depth to Bottom	Temperature	Open Screen
8-70	13	15.50	10.1	14	30.1	66.08	10	14	30.8	65.14	10.8	13.8	31.6	72.64
8-71	27	30.00	9.5	14.1	32.6	40.69	9.8	14	32.6	42.58	9.7	14.2	30.8	41.95
8-72	27	29.50	21.3	26.5	32.7	70.43	20.3	26.9	34	66.57	21.3	26.8	27.6	70.43
8-73	24	26.50	14.9	18.5	30.5	48.59	16.4	18.5	30.8	54.74	15.8	18.5	31.1	52.28
8-74	27	29.80	15.7	18	36.5	46.11	16.8	19.3	28.6	50.12	16.4	19.2	25.9	48.66
WH-75	20	22.70	10.2	14	36.2	38.45	10.7	13.8	41.7	41.14	10.4	13.8	36.7	39.53
WH-76	15	17.80	9.1	11.2	31.4	39.70	8.9	11	32.6	38.38	8.4	11.2	30.6	35.10
WH-77	15	17.90	10.2	13.1	30.6	49.91	10.4	13	35.9	51.30	10.5	13.4	33.6	52.00
WH-78	24	27.20	15.9	19.6	33.7	50.18	15.8	19.8	35	49.79	15.4	20	33.4	48.23
WH-79	19	21.80	12	16.8	26.3	71.61	11.6	17	31.7	68.41	12.1	16.9	30.8	72.41
WH-80	15	18.00	12.6	16.5	16.8	54.79	12.5	16.6	22.4	54.24	12.8	16.8	25.6	55.91
5-81	6	9.00	3	5.5	21.2	2.90	2.9	5.3	26.3	1.77	3.5	5.5	23.8	8.55
7-82	8	11.00	4.3	6.1	28.6	56.97	4.1	6	33.6	54.12	4	6.1	30.9	52.70
7-83	8	10.90	3.2	5.5	27.6	42.28	2.8	5.4	30.8	32.18	3.1	5.4	27.6	39.75

Notes:
- Could Not Measure



APPENDIX A

Flare Data

Date	Data Reliability	CO2 Equivalents			Landfill Gas Flow						Methane	Oxygen	Flare	Flare	Temperature			Blower 1		Blower 2	
		Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run Hours	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
		Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)			°C	°C	°C	Hours	Hours	Hours	Hours
2022 Totals		70977			401148684																
1-Jan-2022	99.03	208	208	208	1152287	1152287	1152287	32642	800	458	39.3	6	24	0	890	900	913	23.2	28042.7	0	39509.8
2-Jan-2022	99.03	421	421	213	2305279	2305279	1152992	32662	801	468	40.1	5.7	24	0	891	900	913	24.2	28066.9	0	39509.8
3-Jan-2022	99.03	625	625	204	3457562	3457562	1152283	32642	800	449	38.5	6.1	24	0	882	900	921	24.3	28091.2	0	39509.8
4-Jan-2022	99.03	832	832	207	4609456	4609456	1151894	32631	800	455	39.1	5.8	24	0	890	900	912	23.2	28114.4	0	39509.8
5-Jan-2022	99.03	1027	1027	195	5743514	5743514	1134058	32126	800	429	37.4	6.4	23.6	1	-8	897	916	23.8	28138.2	0	39509.8
6-Jan-2022	99.03	1229	1229	202	6895971	6895971	1152457	32647	800	444	38.1	6.2	24	0	890	900	910	24.2	28162.4	0	39509.8
7-Jan-2022	99.03	1441	1441	212	8048729	8048729	1152758	32655	801	466	40	5.8	24	0	866	900	931	23.2	28185.6	0	39509.8
8-Jan-2022	99.03	1640	1640	199	9200687	9200687	1151958	32633	800	439	37.6	6.5	24	0	886	900	920	24.2	28209.8	0	39509.8
9-Jan-2022	99.03	1831	1831	191	10352919	10352919	1152232	32640	800	420	36	6.7	24	0	886	900	912	24.2	28234	0	39509.8
10-Jan-2022	99.03	2031	2031	200	11505390	11505390	1152471	32647	800	440	37.8	6.2	24	0	879	900	912	23.2	28257.3	0	39509.8
11-Jan-2022	99.03	2237	2237	206	12657371	12657371	1151981	32633	800	452	38.8	5.9	24	0	889	900	912	24.3	28281.6	0	39509.8
12-Jan-2022	99.03	2437	2437	200	13809053	13809053	1151682	32625	800	441	37.8	6.1	24	0	887	900	912	24.2	28305.8	0	39509.8
13-Jan-2022	99.17	2626	2626	189	14960027	14960027	1150974	32605	799	416	35.7	7	24	0	843	900	951	23.1	28328.9	0	39509.8
14-Jan-2022	99.03	2781	2781	155	15718313	15718313	758286	21481	799	341	44.4	5.5	15.8	1	-17	896	927	16	28344.9	0	39509.8
15-Jan-2022	99.03	3012	3012	231	16870155	16870155	1151842	32629	800	508	43.6	4.9	24	0	883	900	914	24.2	28369.1	0	39509.8
16-Jan-2022	99.17	3220	3220	208	18022119	18022119	1151964	32633	800	458	39.3	5.5	24	0	882	900	920	24.2	28393.3	0	39509.8
17-Jan-2022	99.31	3428	3428	208	19173874	19173874	1151755	32627	800	458	39.3	5.6	24	0	885	900	914	23.2	28416.5	0	39509.8
18-Jan-2022	99.03	3642	3642	214	20325424	20325424	1151550	32621	800	471	40.4	5.9	24	0	877	900	935	24.2	28440.7	0	39509.8
19-Jan-2022	98.75	3836	3836	194	21478127	21478127	1152703	32654	800	427	36.6	6.4	24	0	882	900	919	24.3	28465	0	39509.8
20-Jan-2022	98.89	3993	3993	157	22379680	22379680	901553	25539	799	345	37.8	5.8	18.8	2	-18	895	917	18	28483.1	0	39509.8
21-Jan-2022	99.17	4146	4146	153	23264444	23264444	884764	25064	800	337	37.6	5.9	18.4	1	-14	896	932	18.7	28501.8	0	39509.8
22-Jan-2022	99.03	4331	4331	185	24416338	24416338	1151894	32631	800	406	34.9	5.4	24	0	885	900	916	24.2	28526	0	39509.8
23-Jan-2022	99.03	4513	4513	182	25567685	25567685	1151347	32615	800	401	34.4	5.3	24	0	874	900	922	23.2	28549.2	0	39509.8
24-Jan-2022	99.03	4676	4676	163	26700767	26700767	1133082	32098	799	358	31.2	6.1	23.6	1	-3	897	929	23.9	28573.1	0	39509.8
25-Jan-2022	99.03	4803	4803	127	27494333	27494333	793566	22480	798	280	34.8	6.3	16.6	4	-22	886	927	16.8	28590	0	39509.8
26-Jan-2022	99.03	4980	4980	177	28646035	28646035	1151702	32625	800	390	33.5	5.1	24	0	868	900	918	24.2	28614.2	0	39509.8
27-Jan-2022	99.03	5140	5140	160	29798231	29798231	1152196	32639	800	352	30.2	5.7	24	0	884	900	916	23.2	28637.4	0	39509.8
28-Jan-2022	98.75	5302	5302	162	30949141	30949141	1150910	32603	799	356	30.6	5.2	24	0	883	900	922	24.3	28661.7	0	39509.8
29-Jan-2022	98.89	5473	5473	171	32100127	32100127	1150986	32605	799	377	32.4	5.6	24	0	877	900	930	23.2	28684.9	0	39509.8
30-Jan-2022	98.89	5658	5658	185	33251510	33251510	1151383	32616	800	408	35	5.9	24	0	886	900	914	24.2	28709.1	0	39509.8
31-Jan-2022	99.03	5845	5845	187	34361932	34361932	1110422	31456	771	412	36.7	5.6	24	0	861	900	925	24.2	28733.3	0	39509.8
1-Feb-2022	99.03	6018	173	173	35442047	1080115	1080115	30598	750	380	34.8	5.5	24	0	875	900	927	24.2	28757.5	0	39509.8
2-Feb-2022	98.89	6175	330	157	36522584	2160652	1080537	30609	750	346	31.6	5.7	24	0	881	900	918	23.2	28780.7	0	39509.8
3-Feb-2022	99.03	6332	487	157	37602299	3240367	1079715	30586	750	345	31.6	5.5	24	0	869	900	934	24.2	28804.9	0	39509.8
4-Feb-2022	99.03	6484	639	152	38682864	4320932	1080565	30610	750	334	30.5	5.6	24	0	871	900	926	24.3	28829.2	0	39509.8
5-Feb-2022	98.89	6528	683	44	39763319	5401387	1080455	30607	750	98	8.9	18.1	24	0	872	900	941	23.2	28852.4	0	39509.8
6-Feb-2022	98.75	6554	709	26	40843444	6481512	1080125	30598	750	58	5.3	20	24	0	878	900	924	24.3	28876.7	0	39509.8
7-Feb-2022	98.89	6644	799	90	41879010	7517078	1035566	29336	723	198	19.4	12.1	23.9	1	1	896	946	24.1	28900.8	0	39509.8
8-Feb-2022	99.03	6794	949	150	42886628	8524696	1007618	28544	700	330	32.3	5.4	24	0	883	900	917	23.2	28924	0	39509.8
9-Feb-2022	99.03	6945	1100	151	43894135	9532203	1007507	28541	700	333	32.6	5.4	24	0	884	900	915	24.2	28948.2	0	39509.8
10-Feb-2022	98.89	7073	1228	128	44649344	10287412	755209	21394	700	281	36.8	4.3	18	0	884	900	914	18.4	28966.7	0	39509.8
11-Feb-2022	98.75	7086	1241	13	45206190	10844258	556846	15774	718	28	5	18.3	12.9	6	-17	817	928	12.2	28978.8	0	39509.8
12-Feb-2022	98.89	7110	1265	24	46249976	11888044	1043786	29568	725	53	5	18.3	24	0	887	900	916	24.2	29003	0	39509.8
13-Feb-2022	98.89	7134	1289	24	47293598	12931666	1043622	29564	725	53	5	18.3	24	0	870	900	925	24.2	29027.2	0	39509.8
14-Feb-2022	99.03	7158	1313	24	48336736	13974804	1043138	29550	724	53	5	18.3	24	0	877	900	933	23.2	29050.4	0	39509.8
15-Feb-2022	99.03	7182	1337	24	49380342	15018410	1043606	29563	725	53	5	18.3	24	0	880	900	924	24.3	29074.8	0	39509.8
16-Feb-2022	99.03	7206	1361	24	50423506	16061574	1043164	29551	724	53	5	18.3	24	0	883	900	917	24.2	29099	0	39509.8
17-Feb-2022	98.89	7230	1385	24	51467882	17105950	1044376	29585	725	53	5	18.3	24	0	873	900	928	23.2	29122.2	0	39509.8
18-Feb-2022	98.89	7254	1409	24	52511459	18149527	1043577	29562	725	53	5	18.3	24	0	875	900	913	24.3	29146.5	0	39509.8
19-Feb-2022	98.89	7278	1433	24	53551749	19189817	1040290	29469	722	53	5	18.3	24	0	856	900	928	24.2	29170.7	0	39509.8
20-Feb-2022	98.89	7302	1457	24	54594712	20232780	1042963	29545	724	53	5	18.3									

Date	Data Reliability	CO2 Equivalent			Landfill Gas Flow						Methane	Oxygen	Flare	Flare	Temperature			Blower 1		Blower 2	
		Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run Hours	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
		Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)			°C	°C	°C	Hours	Hours	Hours	Hours
7-Mar-2022	98.61	7594	168	24	67330343	7358897	1050453	29757	730	53	5	18.3	24	0	887	900	912	24.3	29485.2	0	39509.8
8-Mar-2022	98.47	7618	192	24	68380409	8408963	1050066	29746	729	53	5	18.3	24	0	874	900	925	23.3	29508.6	0	39509.8
9-Mar-2022	98.47	7642	216	24	69431863	9460417	1051454	29786	730	54	5	18.3	24	0	884	900	916	24.4	29533	0	39509.8
10-Mar-2022	98.47	7666	240	24	70482737	10511291	1050874	29769	730	53	5	18.3	24	0	883	900	921	23.3	29556.3	0	39509.8
11-Mar-2022	98.47	7690	264	24	71533178	11561732	1050441	29757	729	53	5	18.3	24	0	886	900	917	24.3	29580.6	0	39509.8
12-Mar-2022	98.47	7714	288	24	72584190	12612744	1051012	29773	730	54	5	18.3	24	0	871	900	921	23.3	29603.9	0	39509.8
13-Mar-2022	94.44	7738	312	24	73635499	13664053	1051309	29781	730	54	5	18.3	24	0	887	900	918	23.4	29627.3	0	39509.8
14-Mar-2022	98.61	7762	336	24	74686663	14715217	1051164	29777	730	54	5	18.3	24	0	882	900	914	24.3	29651.6	0	39509.8
15-Mar-2022	98.61	7786	360	24	75738995	15767549	1052332	29810	731	54	5	18.3	24	0	873	900	918	23.3	29674.9	0	39509.8
16-Mar-2022	98.47	7810	384	24	76791344	16819898	1052349	29811	731	54	5	18.3	24	0	883	900	918	24.3	29699.2	0	39509.8
17-Mar-2022	98.47	7834	408	24	77843646	17872200	1052302	29810	731	54	5	18.3	24	0	885	900	918	23.4	29722.6	0	39509.8
18-Mar-2022	98.47	7858	432	24	78895094	18923648	1051448	29785	730	54	5	18.3	24	0	883	900	912	24.3	29746.9	0	39509.8
19-Mar-2022	98.47	7882	456	24	79946862	19975416	1051768	29794	730	54	5	18.3	24	0	885	900	914	23.3	29770.2	0	39509.8
20-Mar-2022	98.47	7906	480	24	80998226	21026780	1051364	29783	730	54	5	18.3	24	0	885	900	913	24.4	29794.6	0	39509.8
21-Mar-2022	98.61	7930	504	24	82050448	22079002	1052222	29807	731	54	5	18.3	24	0	880	900	923	24.3	29818.9	0	39509.8
22-Mar-2022	98.75	7954	528	24	83102458	23131012	1052010	29801	731	54	5	18.3	24	0	886	900	917	23.3	29842.2	0	39509.8
23-Mar-2022	98.61	7978	552	24	84154314	24182868	1051856	29797	730	54	5	18.3	24	0	878	900	921	24.3	29866.5	0	39509.8
24-Mar-2022	98.75	7993	567	15	84798670	24827224	644356	18253	727	33	5	18.3	14.8	1	666	899	1002	15.5	29882.1	0	39509.8
25-Mar-2022	98.89	7993	567	0	84798670	24827224	0	0	0	0	0	0	0	0	0	0	0	1.6	29883.7	0	39509.8
26-Mar-2022	98.89	7993	567	0	84799879	24828433	1209	34	594	0	5	18.3	0.1	1	-19	-19	-19	0	29883.7	0	39509.8
27-Mar-2022	98.89	7993	567	0	84799879	24828433	0	0	0	0	0	0	0	0	0	0	0	0	29883.7	0	39509.8
28-Mar-2022	98.75	8007	581	14	85423121	25451675	623242	17655	727	32	5	18.3	14.3	1	-13	857	1184	13.6	29897.3	0	39509.8
29-Mar-2022	98.61	8031	605	24	86472674	26501228	1049553	29732	733	53	5	18.3	23.8	4	839	900	964	24.3	29921.6	0	39509.8
30-Mar-2022	98.33	8055	629	24	87512989	27541543	1040315	29470	723	53	5	18.3	24	1	846	900	979	23.3	29944.9	0	39509.8
31-Mar-2022	97.92	8079	653	24	88564173	28592727	1051184	29778	730	54	5	18.3	24	0	870	900	938	24.5	29969.4	0	39509.8
1-Apr-2022	98.47	8103	24	24	89608918	1044745	1044745	29596	727	53	5	18.3	24	1	878	900	920	23.3	29992.8	0	39509.8
2-Apr-2022	98.61	8127	48	24	90655477	2091304	1046559	29647	728	53	5	18.3	24	1	874	900	922	24.3	30017.1	0	39509.8
3-Apr-2022	98.47	8151	72	24	91700697	3136524	1045220	29609	728	53	5	18.3	23.9	1	869	900	926	24.1	30041.2	0	39509.8
4-Apr-2022	99.31	8175	96	24	92747573	4183400	1046876	29656	727	53	5	18.3	24	0	872	900	924	23.1	30064.3	0	39509.8
5-Apr-2022	99.31	8199	120	24	93796434	5232261	1048861	29712	729	53	5	18.3	24	0	872	900	959	24.2	30088.5	0	39509.8
6-Apr-2022	99.17	8223	144	24	94844839	6280666	1048405	29699	728	53	5	18.3	24	0	851	900	941	24.2	30112.7	0	39509.8
7-Apr-2022	99.03	8247	168	24	95889699	7325526	1044860	29599	726	53	5	18.3	24	0	858	900	964	24.2	30136.9	0	39509.8
8-Apr-2022	99.03	8271	192	24	96938818	8374645	1049119	29719	729	53	5	18.3	24	0	879	900	916	23.2	30160.1	0	39509.8
9-Apr-2022	99.03	8295	216	24	97994567	9430394	1055749	29907	733	54	5	18.3	24	0	822	900	1003	24.2	30184.3	0	39509.8
10-Apr-2022	98.47	8319	240	24	99046988	10482815	1052421	29813	733	54	5	18.3	23.9	1	887	900	916	24.4	30208.7	0	39509.8
11-Apr-2022	98.89	8334	255	15	99691772	11127599	644784	18265	730	33	5	18.3	14.7	0	877	900	925	14.7	30223.4	0	39509.8
12-Apr-2022	99.17	8334	255	0	99691772	11127599	0	0	0	0	0	0	0	0	0	0	0	0	30223.4	0	39509.8
13-Apr-2022	99.03	8334	255	0	99691772	11127599	0	0	0	0	0	0	0	0	0	0	0	0	30223.4	0	39509.8
14-Apr-2022	99.03	8334	255	0	99691772	11127599	0	0	0	0	0	0	0	0	0	0	0	0	30223.4	0	39509.8
15-Apr-2022	99.03	8334	255	0	99691772	11127599	0	0	0	0	0	0	0	0	0	0	0	0	30223.4	0	39509.8
16-Apr-2022	99.03	8334	255	0	99691772	11127599	0	0	0	0	0	0	0	0	0	0	0	0	30223.4	0	39509.8
17-Apr-2022	99.03	8334	255	0	99691772	11127599	0	0	0	0	0	0	0	0	0	0	0	0	30223.4	0	39509.8
18-Apr-2022	98.89	8349	270	15	100358871	11794698	667099	18898	727	34	5	18.3	15.3	1	-15	885	980	14.7	30238.1	0	39509.8
19-Apr-2022	98.75	8373	294	24	101408724	12844551	1049853	29740	729	53	5	18.3	24	0	876	900	932	24.3	30262.4	0	39509.8
20-Apr-2022	98.47	8397	318	24	102456336	13892163	1047612	29677	729	53	5	18.3	24	0	875	899	983	23.1	30285.5	0	39509.8
21-Apr-2022	98.75	8421	342	24	103503873	14939700	1047537	29675	729	53	5	18.3	23.9	2	862	900	957	24.3	30309.8	0	39509.8
22-Apr-2022	98.75	8505	426	84	104551878	15987705	1048005	29688	728	185	17.4	13.6	24	0	872	900	934	24.3	30334.1	0	39509.8
23-Apr-2022	98.75	8705	626	200	105603767	17039594	1051889	29798	730	441	41.4	4.6	24	0	882	900	927	23.2	30357.3	0	39509.8
24-Apr-2022	99.03	8795	716	90	106076667	17512494	472900	13396	731	199	41.5	4.6	10.8	0	878	900	917	11.7	30369	0	39509.8
25-Apr-2022	99.03	8911	832	116	106691458	18127285	614791	17416	730	256	41.2	5.3	14.1	1	-13	896	923	13.8	30382.7	0	39509.8
26-Apr-2022	98.89	9023	944	112	107742486	19178313	1051028	29774	730	245	23.1	12.8	24	0	883	900	921	23.2	30405.9	0	39509.8
27-Apr-2022	98.89	9215	1136	192	108794707	20230534	1052221	29807	731	423	39.7	5.3	24	0	873	900	933	24.3	30430.2	0	39509.8
28-Apr-2022	98.75	9407	1328	192	109845671	21281498	1050964	29772	730	423	39.8	5.3	24	0	877	900	919	24.2	30454.4	0	39509.8
29-Apr-2022	98.75	9598	1519	191	110898100	22333927	1052429	29813	731	420	39.4	5.4	24	0	887	900	914	23.3	30477.8	0	39509.8
30-Apr-2022	98.89	9799	1720	201	111949822	23385649	1051722	29793	730	443	41.6	4.6	24	0	884	900	915	24.3	30502.1	0	39509.8
1-May-2022	98.89	9996	197	197	113001142	1051320	1051320	29782	730	433	40.7	5	24	0	874	900	926	24.2	30526.3	0	39509.8
2-May-2022	98.75	10184	385	188	114052767	2102945	1051625	29790	730	413	38.8	5.4	24	0	884	900	915	23.3	30549.6	0	39509.8
3-May-2022	98.89	10371	572	187	115103763	3153941	1050996	29773	730	411	38.6	5.5	24	0	888	900	913	24.2	30573.8	0	39509.8
4-May-2022	98.89	10559	760	188	116155709	4205887	1051946	29800	731	413	38.8	5.4	24	0							

Date	Data Reliability	CO2 Equivalents			Landfill Gas Flow						Methane	Oxygen	Flare	Flare	Temperature			Blower 1		Blower 2	
		Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run Hours	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
		Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)			°C	°C	°C	Hours	Hours	Hours	Hours
12-May-2022	98.89	12116	2317	187	124568813	12618991	1052658	29820	731	412	38.7	4.6	24	0	884	900	922	24.3	30789.1	0	39509.8
13-May-2022	98.89	12317	2518	201	125616732	13666910	1047919	29685	728	442	41.7	3.6	24	0	828	900	949	23.2	30812.3	0	39509.8
14-May-2022	98.89	12519	2720	202	126666003	14716181	1049271	29724	729	445	41.9	2.8	24	0	876	900	920	24.3	30836.6	0	39509.8
15-May-2022	98.89	12715	2916	196	127717214	15767392	1051211	29779	730	431	40.6	3.2	24	0	882	900	917	24.2	30860.8	0	39509.8
16-May-2022	98.75	12909	3110	194	128769952	16820130	1052738	29822	731	426	40	3.4	24	0	885	900	913	23.3	30884.2	0	39509.8
17-May-2022	98.89	13117	3318	208	129820680	17870858	1050728	29765	730	458	43.1	2.8	24	0	846	900	951	24.2	30908.4	0	39509.8
18-May-2022	99.03	13339	3540	222	130854516	18904694	1033836	29287	729	489	46.8	2.5	23.6	1	27	898	929	23.9	30932.3	0	39509.8
19-May-2022	98.89	13487	3688	148	131542370	19592548	687854	19486	729	326	46.9	2.7	15.7	0	883	900	930	15.8	30948.1	0	39509.8
20-May-2022	98.89	13600	3801	113	132056550	20106728	514180	14566	731	248	47.6	3.2	11.7	1	-2	897	929	11.2	30959.3	0	39509.8
21-May-2022	98.89	13826	4027	226	133107544	21157722	1050994	29773	730	497	46.7	3.3	24	0	878	900	918	24.2	30983.5	0	39509.8
22-May-2022	98.89	13985	4186	159	133842591	21892769	735047	20822	731	351	47.1	3.2	16.7	0	870	900	923	16.9	31000.4	0	39509.8
23-May-2022	99.17	13985	4186	0	133842591	21892769	0	0	0	0	0	0	0	0	0	0	0	0	31000.4	0	39509.8
24-May-2022	99.03	14111	4312	126	134406909	22457087	564318	15986	730	278	48.7	3.1	12.9	1	15	894	921	12.6	31013	0	39509.8
25-May-2022	98.89	14342	4543	231	135458375	23508553	1051466	29786	730	508	47.8	3.2	24	0	847	900	941	23.2	31036.2	0	39509.8
26-May-2022	98.75	14573	4774	231	136509131	24559309	1050756	29766	730	509	47.8	3.1	24	0	851	900	951	24.3	31060.5	0	39509.8
27-May-2022	98.75	14807	5008	234	137559990	25610168	1050859	29769	730	514	48.3	2.9	24	0	880	900	916	24.3	31084.8	0	39509.8
28-May-2022	98.75	15042	5243	235	138610891	26661069	1050901	29770	730	516	48.6	2.8	24	0	852	900	937	23.2	31108	0	39509.8
29-May-2022	98.75	15278	5479	236	139660491	27710669	1049600	29733	729	519	48.9	2.7	24	0	876	900	923	24.3	31132.3	0	39509.8
30-May-2022	98.89	15518	5719	240	140711922	28762100	1051431	29785	730	528	49.7	2.5	24	0	866	900	924	24.2	31156.5	0	39509.8
31-May-2022	98.89	15759	5960	241	141760654	29810832	1048732	29708	728	531	50	2.2	24	0	829	900	955	23.3	31179.8	0	39509.8
1-Jun-2022	98.89	16000	241	241	142811585	1050931	1050931	29771	730	530	49.8	2	24	0	867	900	926	24.2	31204	0	39509.8
2-Jun-2022	98.89	16241	482	241	143863025	2102371	1051440	29785	730	531	49.9	2	24	0	862	900	940	24.2	31228.2	0	39509.8
3-Jun-2022	98.75	16470	711	229	144914611	3153957	1051586	29789	730	503	47.3	3.1	24	0	868	900	932	23.3	31251.5	0	39509.8
4-Jun-2022	98.89	16680	921	210	145966208	4205554	1051597	29790	730	461	43.3	4.8	24	0	875	900	920	24.2	31275.7	0	39509.8
5-Jun-2022	98.75	16890	1131	210	147018698	5258044	1052490	29815	731	461	43.3	4.8	24	0	884	900	918	24.3	31300	0	39509.8
6-Jun-2022	99.03	17113	1354	223	148069172	6308518	1050474	29758	730	491	46.2	3.7	24	0	873	900	926	23.2	31323.2	0	39509.8
7-Jun-2022	98.75	17363	1604	250	149164951	7404297	1095779	31041	761	549	49.5	2.3	24	0	844	900	937	24.2	31347.4	0	39509.8
8-Jun-2022	98.75	17622	1863	259	150316177	8555523	1151226	32612	799	569	48.8	2.4	24	0	858	900	947	24.3	31371.7	0	39509.8
9-Jun-2022	98.75	17823	2064	201	151223371	9462717	907194	25699	799	442	48.1	2.8	18.9	1	22	897	966	18.2	31390	0	39509.8
10-Jun-2022	98.75	18076	2317	253	152376746	10616092	1153375	32673	800	556	47.7	3	24	0	887	900	917	24.3	31414.3	0	39509.8
11-Jun-2022	98.61	18328	2569	252	153528999	11768345	1152253	32641	800	555	47.6	3	24	0	877	900	924	23.2	31437.5	0	39509.8
12-Jun-2022	98.75	18579	2820	251	154680701	12920047	1151702	32625	800	553	47.4	3	24	0	857	900	933	24.3	31461.8	0	39509.8
13-Jun-2022	98.75	18831	3072	252	155832628	14071974	1151927	32632	800	555	47.6	3	24	0	844	900	923	24.3	31486.1	0	39509.8
14-Jun-2022	98.75	19082	3323	251	156984728	15224074	1152100	32637	800	553	47.4	3	24	0	841	900	952	23.3	31509.4	0	39509.8
15-Jun-2022	98.75	19333	3574	251	158135206	16374552	1150478	32591	799	553	47.5	3	24	0	878	900	927	24.2	31533.6	0	39509.8
16-Jun-2022	98.89	19579	3820	246	159286794	17526140	1151588	32622	800	541	46.4	3.3	24	0	876	900	931	24.3	31557.9	0	39509.8
17-Jun-2022	98.89	19822	4063	243	160437804	18677150	1151010	32606	799	535	45.9	3.3	24	0	883	900	924	23.2	31581.1	0	39509.8
18-Jun-2022	98.75	20071	4312	249	161588175	19827521	1150371	32588	799	547	47	3.1	24	0	830	900	964	24.3	31605.4	0	39509.8
19-Jun-2022	98.61	20324	4565	253	162740380	20979726	1152205	32640	800	557	47.8	2.9	24	0	856	900	926	23.3	31628.7	0	39509.8
20-Jun-2022	98.61	20572	4813	248	163892458	22131804	1152078	32636	800	546	46.8	3.1	24	0	872	900	923	24.3	31653	0	39509.8
21-Jun-2022	98.75	20816	5057	244	165044075	23283421	1151617	32623	800	537	46.1	3.2	24	0	858	900	924	24.3	31677.3	0	39509.8
22-Jun-2022	98.75	21061	5302	245	166196220	24435566	1152145	32638	800	538	46.2	3.2	24	0	882	900	918	23.2	31700.6	0	39509.8
23-Jun-2022	98.75	21309	5550	248	167348765	25588111	1152545	32649	800	545	46.8	3.1	24	0	874	900	924	24.3	31724.9	0	39509.8
24-Jun-2022	98.61	21349	5590	40	168500601	26739947	1151836	32629	800	88	7.6	19.4	24	0	859	900	940	24.3	31749.2	0	39509.8
25-Jun-2022	98.33	21377	5618	28	169653323	27892669	1152722	32654	801	61	5.3	20.2	24	0	876	900	924	23.3	31772.5	0	39509.8
26-Jun-2022	98.47	21405	5646	28	170805375	29044721	1152052	32635	800	61	5.3	20.2	24	0	872	900	922	24.4	31796.9	0	39509.8
27-Jun-2022	98.75	21500	5741	95	171958200	30197546	1152825	32657	801	208	17.9	15.2	24	0	860	900	927	23.2	31820.1	0	39509.8
28-Jun-2022	98.89	21527	5768	27	173109718	31349064	1151518	32620	800	60	5.2	20	24	0	871	900	926	24.3	31844.4	0	39509.8
29-Jun-2022	98.75	21659	5900	132	174261412	32500758	1151694	32625	800	290	24.9	12	24	0	830	900	943	24.3	31868.7	0	39509.8
30-Jun-2022	98.89	21895	6136	236	175413635	33652981	1152223	32640	800	520	44.6	3.9	24	0	882	900	923	23.2	31891.9	0	39509.8
1-Jul-2022	98.89	22129	234	234	176566352	1152717	1152717	32654	800	515	44.1	3.9	24	0	882	900	920	24.3	31916.2	0	39509.8
2-Jul-2022	98.89	22362	467	233	177717447	2303812	1151095	32608	799	512	44	3.9	24	0	879	900	929	24.2	31940.4	0	39509.8
3-Jul-2022	98.89	22597	702	235	178868812	3455177	1151365	32616	800	518	44.4	3.8	24	0	864	900	925	23.3	31963.7	0	39509.8
4-Jul-2022	98.89	22833	938	236	180020873	4607238	1152061	32636	800	519	44.5	3.8	24	0	885	900	918	24.2	31987.9	0	39509.8
5-Jul-2022	98.89	23072	1177	239	181173375	5759740	1152502	32648	800	525	45	3.6	24	0	886	900	916	23.3	32011.2	0	39509.8
6-Jul-2022	98.89	23317	1422	245	182325920	6912285	1152545	32649	800	539	46.2	3.1	24	0	842	900	938	24.3	32035.5	0	39509.8
7-Jul-2022	98.61	23557	1662	240	183477432	8063797	1151512	3													

Date	Data Reliability	CO2 Equivalent			Landfill Gas Flow						Methane	Oxygen	Flare	Flare	Temperature			Blower 1		Blower 2	
		Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run Hours	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
		Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)			°C	°C	°C	Hours	Hours	Hours	Hours
17-Jul-2022	98.75	25980	4085	248	194865725	19452090	1152072	32636	800	545	46.7	2.9	24	0	885	900	922	24.3	32295.9	0	39509.8
18-Jul-2022	98.75	26167	4272	187	195724187	20310552	858462	24319	800	412	47.5	2.7	17.8	1	21	898	963	18.1	32314	0	39509.8
19-Jul-2022	98.89	26354	4459	187	196580233	21166598	856046	24250	800	412	47.6	2.7	17.8	0	842	900	959	17.9	32332	0	39509.8
20-Jul-2022	98.89	26499	4604	145	197225555	21811920	645322	18281	799	319	48.9	2.7	13.5	1	21	897	948	13	32344.9	0	39509.8
21-Jul-2022	98.75	26748	4853	249	198377227	22963592	1151672	32625	800	547	47	3.1	24	0	881	900	922	24.3	32369.2	0	39509.8
22-Jul-2022	98.75	26994	5099	246	199529423	24115788	1152196	32639	800	542	46.5	3.2	24	0	874	900	919	23.2	32392.4	0	39509.8
23-Jul-2022	98.75	27238	5343	244	200681527	25267892	1152104	32637	800	538	46.1	3.2	24	0	880	900	919	24.3	32416.7	0	39509.8
24-Jul-2022	98.75	27479	5584	241	201833592	26419957	1152065	32636	800	530	45.5	3.4	24	0	875	900	925	23.2	32440	0	39509.8
25-Jul-2022	98.75	27724	5829	245	202985240	27571605	1151648	32624	800	540	46.3	3.1	24	0	886	900	917	24.3	32464.3	0	39509.8
26-Jul-2022	99.31	27972	6077	248	204137051	28723416	1151811	32628	800	545	46.7	3	24	0	867	900	918	24.2	32488.5	0	39509.8
27-Jul-2022	98.89	28120	6225	148	204815074	29401439	678023	19207	798	325	47.4	2.9	14.1	1	15	898	980	14.4	32502.9	0	39509.8
28-Jul-2022	98.75	28364	6469	244	205967602	30553967	1152528	32649	800	537	46	3.3	24	0	881	900	919	23.2	32526.1	0	39509.8
29-Jul-2022	98.75	28609	6714	245	207120314	31706679	1152712	32654	800	538	46.1	3.2	24	0	884	900	915	24.3	32550.4	0	39509.8
30-Jul-2022	98.75	28857	6962	248	208272791	32859156	1152477	32647	800	546	46.8	3	24	0	880	900	917	23.2	32573.6	0	39509.8
31-Jul-2022	98.75	29102	7207	245	209425385	34011750	1152594	32651	800	538	46.1	3.1	24	0	860	900	925	24.3	32597.9	0	39509.8
1-Aug-2022	98.89	29345	243	243	210578563	1153178	1153178	32667	801	535	45.8	3.2	24	0	876	900	920	24.3	32622.2	0	39509.8
2-Aug-2022	98.89	29594	492	249	211730649	2305264	1152086	32636	800	547	46.9	2.9	24	0	865	900	928	23.2	32645.5	0	39509.8
3-Aug-2022	98.89	29831	729	237	212882238	3456853	1151589	32622	800	521	44.7	3.5	24	0	872	900	923	24.3	32669.8	0	39509.8
4-Aug-2022	98.75	30067	965	236	214033765	4608380	1151527	32620	800	519	44.5	3.6	24	0	861	900	928	24.3	32694.1	0	39509.8
5-Aug-2022	98.75	30302	1200	235	215185588	5760203	1151823	32629	800	517	44.4	3.7	24	0	883	900	917	23.2	32717.3	0	39509.8
6-Aug-2022	98.75	30526	1424	224	216337190	6911805	1151602	32623	800	493	42.3	4.3	24	0	882	900	917	24.3	32741.6	0	39509.8
7-Aug-2022	98.75	30753	1651	227	217490685	8065300	1153495	32676	801	499	42.8	4.2	24	0	879	900	919	24.3	32765.9	0	39509.8
8-Aug-2022	98.75	30985	1883	232	218641619	9216234	1150934	32604	799	511	43.9	3.9	24	0	886	900	914	23.6	32789.5	0	39509.8
9-Aug-2022	98.75	31213	2111	228	219793399	10368014	1151780	32628	800	501	43	4.2	24	0	882	900	918	24.8	32814.3	0	39509.8
10-Aug-2022	98.75	31437	2335	224	220947015	11521630	1153616	32680	801	492	42.2	4.4	24	0	881	900	922	23.7	32837.9	0	39509.8
11-Aug-2022	98.75	31663	2561	226	222097932	12672547	1150917	32603	799	498	42.7	4.2	24	0	885	900	915	24.8	32862.7	0	39509.8
12-Aug-2022	98.75	31893	2791	230	223249591	13824206	1151659	32624	800	505	43.3	4	24	0	888	900	915	24.8	32887.5	0	39509.8
13-Aug-2022	98.75	32120	3018	227	224401744	14976359	1152153	32638	800	499	42.8	4.2	24	0	887	900	914	23.7	32911.2	0	39509.8
14-Aug-2022	98.75	32347	3245	227	225554002	16128617	1152258	32641	800	500	42.9	4.2	24	0	888	900	914	24.8	32936	0	39509.8
15-Aug-2022	98.75	32573	3471	226	226707428	17282043	1153426	32674	801	496	42.5	4.3	24	0	881	900	917	24.8	32960.7	0	39509.8
16-Aug-2022	98.75	32802	3700	229	227859495	18434110	1152067	32636	800	503	43.1	4.3	24	0	884	900	924	23.7	32984.4	0	39509.8
17-Aug-2022	98.75	33042	3940	240	229010772	19585387	1151277	32613	800	528	45.3	3.6	24	0	878	900	928	24.8	33009.2	0	39509.8
18-Aug-2022	98.75	33292	4190	250	230161106	20735721	1150334	32587	799	550	47.3	2.9	24	0	863	900	927	24.8	33034	0	39509.8
19-Aug-2022	98.75	33542	4440	250	231312392	21887007	1151286	32614	800	549	47.1	3	24	0	880	900	918	23.7	33057.6	0	39509.8
20-Aug-2022	98.75	33790	4688	248	232465051	23039666	1152659	32653	800	546	46.8	3	24	0	884	900	915	24.8	33082.4	0	39509.8
21-Aug-2022	98.75	34038	4936	248	233616449	24191064	1151398	32617	800	546	46.9	3	24	0	887	900	916	23.8	33106.2	0	39509.8
22-Aug-2022	98.75	34285	5183	247	234769190	25343805	1152741	32655	801	544	46.6	3	24	0	874	900	918	24.8	33131	0	39509.8
23-Aug-2022	98.75	34530	5428	245	235921384	26495999	1152194	32639	800	539	46.3	3.1	24	0	874	900	915	24.7	33155.6	0	39509.8
24-Aug-2022	98.75	34768	5666	238	237059518	27634133	1138134	32241	799	524	45.5	3.3	23.7	1	38	898	932	23.5	33179.1	0	39509.8
25-Aug-2022	98.61	35008	5906	240	238210744	28785359	1151226	32612	799	528	45.3	3.4	24	0	838	900	994	24.8	33203.9	0	39509.8
26-Aug-2022	98.75	35253	6151	245	239362287	29936902	1151543	32621	800	539	46.3	3.1	24	0	871	900	912	24.8	33228.7	0	39509.8
27-Aug-2022	98.75	35502	6400	249	240515088	31089703	1152801	32657	801	547	46.9	2.9	24	0	884	900	918	23.8	33252.4	0	39509.8
28-Aug-2022	98.75	35752	6650	250	241666456	32241071	1151368	32616	800	551	47.3	2.8	24	0	885	900	918	24.8	33277.2	0	39509.8
29-Aug-2022	98.61	36006	6904	254	242818256	33392871	1151800	32628	800	558	47.9	2.6	24	0	870	900	929	23.8	33301	0	39509.8
30-Aug-2022	98.61	36267	7165	261	243971662	34546277	1153406	32674	801	574	49.2	2.2	24	0	866	900	927	24.8	33325.8	0	39509.8
31-Aug-2022	98.75	36541	7439	274	245124007	35698622	1152345	32644	800	602	51.6	1.3	24	0	878	900	916	24.7	33350.4	0	39509.8
1-Sep-2022	98.75	36819	778	278	246276397	1152390	1152390	32645	800	612	52.5	1.1	24	0	878	900	919	23.8	33374.2	0	39509.8
2-Sep-2022	98.75	37089	548	270	247427888	2303881	1151491	32619	800	593	50.9	1.2	24	0	855	900	941	24.8	33399	0	39509.8
3-Sep-2022	98.75	37361	820	272	248580180	3456173	1152292	32642	800	599	51.4	0.9	24	0	874	900	918	23.7	33422.6	0	39509.8
4-Sep-2022	98.75	37638	1097	277	249731667	4607660	1151487	32619	800	610	52.3	0.9	24	0	852	900	943	24.8	33447.4	0	39509.8
5-Sep-2022	98.75	37912	1371	274	250883345	5759338	1151678	32625	800	603	51.8	1.3	24	0	845	900	961	24.8	33472.2	0	39509.8
6-Sep-2022	98.89	38130	1589	218	251810346	6686339	927001	26260	800	480	51.2	1.4	19.3	0	853	900	934	19.8	33492	0	39509.8
7-Sep-2022	98.75	38309	1768	179	252518007	7394000	707661	20047	800	394	55	0.7	14.8	1	9	898	941	14.4	33506.4	0	39509.8
8-Sep-2022	98.47	38515	1974	206	253349429	8225422	831422	23553	800	453	53.9	0.8	17.3	0	854	900	940	18.2	33524.6	0	39509.8
9-Sep-2022	98.75	38515	1974	0	253349429	8225422	0	0	0	0	0	0	0	0	0	0	0	0	33524.6	0	39509.8
10-Sep-2022	98.61	38667	2126	152	253957249	8833242	607820	17218	799	334	54.4	0.8	12.7	1	14	895	944	12.5	33537.1	0	39509.8
11-Sep-2022	97.78	38951	2410	284	255105962	9981955	1148713														

Date	Data Reliability	CO2 Equivalents			Landfill Gas Flow						Methane	Oxygen	Flare	Flare	Temperature			Blower 1		Blower 2	
		Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run Hours	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
		Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)			°C	°C	°C	Hours	Hours	Hours	Hours
21-Sep-2022	85.83	41869	5328	286	267036785	21912778	1203161	34083	899	628	51.6	1.2	20.7	3	0	899	946	24.6	33803.2	0	39509.8
22-Sep-2022	98.75	42178	5637	309	268332508	23208501	1295723	36705	900	681	51.9	1.1	24	0	870	900	924	24.8	33828	0	39509.8
23-Sep-2022	98.75	42492	5951	314	269628223	24504216	1295715	36705	900	691	52.7	1	24	0	871	900	931	23.7	33851.6	0	39509.8
24-Sep-2022	98.89	42803	6262	311	270923599	25799592	1295376	36695	900	683	52.1	1.2	24	0	858	900	946	24.8	33876.4	0	39509.8
25-Sep-2022	98.89	43109	6568	306	272219417	27095410	1295818	36708	900	674	51.4	1.3	24	0	846	900	959	24.7	33901.1	0	39509.8
26-Sep-2022	99.03	43405	6864	296	273478823	28354816	1259406	35676	900	652	51.1	1.4	23.3	1	36	898	942	23.1	33924.2	0	39509.8
27-Sep-2022	98.75	43704	7163	299	274774791	29650784	1295968	36712	900	657	50.1	1.6	24	0	876	900	916	24.7	33948.8	0	39509.8
28-Sep-2022	98.75	44012	7471	308	276070539	30946532	1295748	36706	900	677	51.6	1.3	24	0	870	900	937	24.8	33973.6	0	39509.8
29-Sep-2022	98.89	44324	7783	312	277367051	32243044	1296512	36728	900	685	52.2	1.1	24	0	874	900	926	23.7	33997.3	0	39509.8
30-Sep-2022	98.89	44632	8091	308	278657435	33533428	1290384	36554	900	679	52	1.2	23.9	1	44	898	944	24.7	34022	0	39509.8
1-Oct-2022	98.75	44940	8308	308	279953987	1296552	1296552	36729	900	677	51.6	1.1	24	0	884	900	912	24.7	34046.6	0	39509.8
2-Oct-2022	98.89	45253	8621	313	281250418	2592983	1296431	36725	900	688	52.5	1	24	0	858	900	934	23.8	34070.4	0	39509.8
3-Oct-2022	98.89	45572	8940	319	282576698	3919263	1326280	37571	921	703	52.3	1.1	24	0	876	900	922	24.7	34095.1	0	39509.8
4-Oct-2022	98.89	45903	9271	331	283944538	5287103	1367840	38748	950	728	52.6	0.9	24	0	859	900	942	24.8	34119.9	0	39509.8
5-Oct-2022	98.89	46230	9598	327	285311999	6654564	1367461	38737	950	719	52	0.9	24	0	858	900	952	23.7	34143.5	0	39509.8
6-Oct-2022	98.89	46544	9912	314	286679430	8021995	1367431	38737	950	690	49.9	1.3	24	0	858	900	941	24.7	34168.2	0	39509.8
7-Oct-2022	98.89	46873	10241	329	288048021	9390586	1368591	38769	950	724	52.3	0.7	24	0	877	900	914	24.8	34193	0	39509.8
8-Oct-2022	98.75	47206	10574	333	289416136	10758701	1368115	38756	950	732	52.9	0.6	24	0	862	900	938	23.7	34216.7	0	39509.8
9-Oct-2022	98.75	47531	10909	325	290784267	12126832	1368131	38756	950	714	51.6	0.9	24	0	862	900	924	24.8	34241.4	0	39509.8
10-Oct-2022	98.89	47866	11234	335	292152418	13494983	1368151	38757	950	736	53.2	0.6	24	0	875	900	914	24.8	34266.2	0	39509.8
11-Oct-2022	98.89	48201	11569	335	293520404	14862969	1367986	38752	950	736	53.2	0.6	24	0	884	900	922	23.7	34289.9	0	39509.8
12-Oct-2022	98.75	48527	11905	326	294888449	16231014	1368045	38754	950	717	51.8	0.8	24	0	848	900	944	24.8	34314.7	0	39509.8
13-Oct-2022	98.75	48856	12241	329	296256074	17598639	1367625	38742	950	723	52.3	0.7	24	0	862	900	939	23.8	34338.4	0	39509.8
14-Oct-2022	98.75	49194	12577	338	297675175	19017740	1419101	40200	985	743	51.7	0.8	24	0	852	900	953	24.7	34363.1	0	39509.8
15-Oct-2022	98.75	49528	12913	334	299114944	20457509	1439769	40786	1000	734	50.4	1.2	24	0	843	900	959	24.8	34387.9	0	39509.8
16-Oct-2022	98.75	49850	13249	322	300554466	21897031	1439522	40779	1000	708	48.6	1.4	24	0	846	900	955	23.7	34411.6	0	39509.8
17-Oct-2022	98.75	50174	13585	324	301994766	23337331	1440300	40801	1000	712	48.9	1.3	24	0	846	900	949	24.8	34436.3	0	39509.8
18-Oct-2022	98.75	50505	13921	331	303435064	24777629	1440298	40801	1000	727	49.9	1	24	0	872	900	929	24.8	34461.1	0	39509.8
19-Oct-2022	98.75	50848	14257	343	304874782	26217347	1439718	40784	1000	754	51.7	0.7	24	0	862	900	926	23.7	34484.8	0	39509.8
20-Oct-2022	98.89	51196	14605	348	306314854	27657419	1440072	40794	1000	765	52.5	0.6	24	0	868	900	938	24.8	34509.6	0	39509.8
21-Oct-2022	98.89	51533	14953	337	307756270	29098835	1441416	40832	1001	741	50.8	1	24	0	874	900	937	24.7	34534.2	0	39509.8
22-Oct-2022	98.89	51865	15301	332	309196676	30539241	1440406	40804	1000	729	50	1.2	24	0	880	900	919	23.7	34557.9	0	39509.8
23-Oct-2022	98.89	52202	15649	337	310637134	31979699	1440458	40805	1000	741	50.8	0.9	24	0	868	900	924	24.8	34582.7	0	39509.8
24-Oct-2022	99.03	52546	16007	344	312077355	33419920	1440221	40799	1000	756	51.9	0.8	24	0	877	900	923	24.7	34607.4	0	39509.8
25-Oct-2022	99.03	52847	16365	301	313376656	34719221	1299301	36807	999	663	50.4	1.1	21.7	1	-3	898	977	21.3	34628.7	0	39509.8
26-Oct-2022	99.03	53177	16723	330	314816730	36159295	1440074	40794	1000	727	49.9	1.2	24	0	874	900	916	24.7	34653.4	0	39509.8
27-Oct-2022	99.03	53514	17081	337	316256699	37599264	1439969	40791	1000	741	50.9	0.9	24	0	881	900	915	24.8	34678.2	0	39509.8
28-Oct-2022	98.89	53846	17439	332	317697427	39039992	1440728	40813	1001	731	50.1	1.2	24	0	885	900	912	23.7	34701.8	0	39509.8
29-Oct-2022	98.89	54176	17807	330	319138118	40480683	1440691	40812	1000	725	49.7	1.3	24	0	882	900	918	24.7	34726.5	0	39509.8
30-Oct-2022	98.89	54509	18175	333	320578279	41920844	1440161	40797	1000	733	50.3	1.1	24	0	881	900	916	24.8	34751.3	0	39509.8
31-Oct-2022	98.75	54854	18543	345	322071829	43414394	1493550	42309	1037	759	50.2	1.3	24	0	881	900	924	23.7	34774.9	0	39509.8
1-Nov-2022	98.89	55097	18911	243	323178842	1107013	1107013	41359	1049	534	47.7	2.4	17.6	1	11	898	1018	18.2	34793.1	0	39509.8
2-Nov-2022	98.89	55417	19279	320	324689640	2617811	1510798	42798	1049	703	46	3.3	24	0	870	900	931	24.7	34817.8	0	39509.8
3-Nov-2022	99.03	55719	19647	302	326201252	4129423	1511612	42821	1050	664	43.4	3.7	24	0	858	900	936	23.8	34841.6	0	39509.8
4-Nov-2022	99.17	56026	20015	307	327678605	5606776	1477353	41850	1026	676	45.3	2.8	24	0	867	900	931	24.7	34866.3	0	39509.8
5-Nov-2022	98.89	56349	20383	323	329118022	7046193	1439417	40776	1000	711	48.8	1.5	24	0	848	900	958	24.7	34890.9	0	39509.8
6-Nov-2022	98.89	56651	20751	302	330558265	8486436	1440243	40799	1000	664	45.6	2.4	24	0	868	900	935	24.7	34915.6	0	39509.8
7-Nov-2022	99.03	56920	21119	269	331998487	9926658	1440222	40799	1000	591	40.6	3.2	24	0	879	900	925	24.8	34940.4	0	39509.8
8-Nov-2022	99.03	57220	21487	300	333438610	11366781	1440123	40796	1000	660	45.3	1.9	24	0	855	900	940	24.7	34965.1	0	39509.8
9-Nov-2022	98.89	57511	21855	291	334878338	12806509	1439728	40785	1000	640	43.9	2.5	24	0	862	900	931	23.7	34988.7	0	39509.8
10-Nov-2022	98.89	57802	22223	291	336310190	14238361	1431852	40562	1000	640	44.2	2.4	23.8	1	4	898	943	24.7	35013.4	0	39509.8
11-Nov-2022	98.89	58085	22591	283	337750446	15678617	1440256	40800	1000	622	42.7	2.9	24	0	876	900	927	24.7	35038.1	0	39509.8
12-Nov-2022	98.89	58367	22959	282	339190989	17119160	1440543	40808	1000	621	42.6	2.8	24	0	884	900	912	23.7	35061.8	0	39509.8
13-Nov-2022	99.17	58650	23327	283	340632106	18560277	1441117	40824	1001	621	42.6	2.8	24	0	887	900	909	24.7	35086.4	0	39509.8
14-Nov-2022	99.31	58930	23695	280	342071208	19999379	1439102	40767	999	615	42.2	3	24	0	889	900	912	24.7	35111.1	0	39509.8
15-Nov-2022	99.31	59205	24063	275	343510885	21439056	1439677	40783	1000	604	41.5	3.2	24	0	883	900	926				

Date	Data Reliability	CO2 Equivalents			Landfill Gas Flow						Methane	Oxygen	Flare	Flare	Temperature			Blower 1		Blower 2	
		Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run Hours	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
		Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)			°C	°C	°C	Hours	Hours	Hours	Hours
26-Nov-2022	99.03	62257	7403	275	359351678	37279849	1440146	40796	1000	606	41.6	3.6	24	0	882	900	913	24.7	35403.8	0	39509.8
27-Nov-2022	99.17	62536	7682	279	360792109	38720280	1440431	40805	1000	614	42.1	3.3	24	0	864	900	932	23.7	35427.5	0	39509.8
28-Nov-2022	99.03	62821	7967	285	362232979	40161150	1440870	40817	1001	627	43	3.2	24	0	871	900	930	24.7	35452.2	0	39509.8
29-Nov-2022	99.03	63094	8240	273	363673054	41601225	1440075	40794	1000	601	41.3	3.7	24	0	872	900	917	24.7	35476.8	0	39509.8
30-Nov-2022	99.17	63330	8476	236	364976789	42904960	1303735	36932	999	518	39.3	4.1	21.7	1	-15	898	926	21.4	35498.3	0	39509.8
1-Dec-2022	99.03	63605	275	275	366417335	1440546	1440546	40808	1000	605	41.5	3.6	24	0	872	900	932	24.7	35523	0	39509.8
2-Dec-2022	99.03	63875	545	270	367857668	2880879	1440333	40802	1000	594	40.7	3.9	24	0	854	900	941	24.7	35547.6	0	39509.8
3-Dec-2022	98.89	64142	812	267	369297252	4320463	1439584	40781	1000	588	40.3	3.6	24	0	890	900	908	23.7	35571.3	0	39509.8
4-Dec-2022	98.89	64421	1091	279	370738279	5761490	1441027	40821	1001	614	42.1	3.2	24	0	880	900	920	24.7	35596	0	39509.8
5-Dec-2022	99.03	64669	1339	248	372115305	7138516	1377026	39008	956	546	39.2	4.1	24	0	869	900	928	24.7	35620.7	0	39509.8
6-Dec-2022	99.03	64941	1611	272	373411218	8434429	1295913	36711	900	599	45.7	2.2	24	0	882	900	920	23.7	35644.3	0	39509.8
7-Dec-2022	99.03	65213	1883	272	374708218	9731429	1297000	36741	901	599	45.6	2.1	24	0	884	900	923	24.7	35669	0	39509.8
8-Dec-2022	99.03	65489	2159	276	376004284	11027495	1296066	36715	900	608	46.3	2.1	24	0	883	900	914	24.7	35693.7	0	39509.8
9-Dec-2022	99.03	65775	2445	286	377299883	12323094	1295599	36702	900	630	48	1.8	24	0	865	900	925	24.7	35718.4	0	39509.8
10-Dec-2022	99.03	66065	2735	290	378595772	13618983	1295889	36710	900	637	48.6	1.7	24	0	870	900	921	23.7	35742	0	39509.8
11-Dec-2022	99.17	66356	3026	291	379892111	14915322	1296339	36723	900	639	48.7	1.6	24	0	870	900	930	24.7	35766.7	0	39509.8
12-Dec-2022	99.03	66651	3321	295	381187979	16211190	1295868	36709	900	648	49.4	1.5	24	0	856	900	936	24.7	35791.4	0	39509.8
13-Dec-2022	99.03	66947	3617	296	382483997	17507208	1296018	36714	900	652	49.7	1.6	24	0	884	900	915	23.7	35815	0	39509.8
14-Dec-2022	99.03	67248	3918	301	383780716	18803927	1296719	36733	901	662	50.5	1.5	24	0	881	900	915	24.7	35839.7	0	39509.8
15-Dec-2022	99.03	67550	4220	302	385077343	20100554	1296627	36731	900	665	50.7	1.4	24	0	858	900	928	24.8	35864.5	0	39509.8
16-Dec-2022	99.03	67845	4515	295	386372918	21396129	1295575	36701	900	648	49.4	1.7	24	0	853	900	937	23.7	35888.2	0	39509.8
17-Dec-2022	98.89	68128	4798	283	387669004	22692215	1296086	36716	900	622	47.4	2.2	24	0	869	900	945	24.7	35912.9	0	39509.8
18-Dec-2022	99.03	68403	5073	275	388964459	23987670	1295455	36698	900	604	46.1	2.6	24	0	878	900	918	24.7	35937.5	0	39509.8
19-Dec-2022	99.03	68679	5349	276	390260300	25283511	1295841	36709	900	607	46.3	2.5	24	0	888	900	918	23.7	35961.2	0	39509.8
20-Dec-2022	99.03	68950	5620	271	391557038	26580249	1296738	36734	901	597	45.5	2.7	24	0	881	900	916	24.7	35985.9	0	39509.8
21-Dec-2022	99.03	69223	5893	273	392854246	27877457	1297208	36747	901	601	45.8	2.6	24	0	870	900	916	24.7	36010.6	0	39509.8
22-Dec-2022	99.03	69498	6168	275	394151884	29175095	1297638	36759	901	605	46.1	2.5	24	0	871	900	916	24.7	36035.2	0	39509.8
23-Dec-2022	99.03	69766	6436	268	395448874	30472085	1296990	36741	901	590	45	2.8	24	0	881	900	920	23.7	36058.9	0	39509.8
24-Dec-2022	81.67	69987	6657	221	396518881	31542092	1070007	30311	900	486	44.9	2.8	19.8	0	880	900	917	20.6	36079.5	0	39509.8
25-Dec-2022	0.14	69987	6657	0	396518881	31542092	0	0	0	0	0	0	0	0	0	0	0	0	36079.5	0	39509.8
26-Dec-2022	0.14	69987	6657	0	396518881	31542092	0	0	0	0	0	0	0	0	0	0	0	0	36079.5	0	39509.8
27-Dec-2022	60.14	69987	6657	0	396518881	31542092	0	0	0	0	0	0	0	0	0	0	0	62.9	36142.4	0	39509.8
28-Dec-2022	98.89	70156	6826	169	397261045	32284256	742164	21024	900	372	49.5	2.2	13.8	1	-13	897	925	13.9	36156.3	0	39509.8
29-Dec-2022	98.89	70431	7101	275	398556591	33579802	1295546	36700	900	606	46.2	2.9	24	0	872	900	931	23.7	36180	0	39509.8
30-Dec-2022	98.89	70702	7372	271	399852738	34875949	1296147	36717	900	595	45.4	2.9	24	0	881	900	916	24.8	36204.7	0	39509.8
31-Dec-2022	98.75	70977	7647	275	401148684	36171895	1295946	36712	900	605	46.1	2.8	24	0	865	900	923	23.7	36228.4	0	39509.8



APPENDIX B

Surface Emission Reports



June 5, 2022

Mr. Duy Doan
Project Coordinator
The City of Winnipeg
1120 Waverly Street
Winnipeg MB
R3T 0P4

Project No. 9-457

Dear Mr. Doan:

**RE: Landfill Gas Emissions Survey
Area 1 - Landfill Gas Collection and Flaring System
Brady Road Resource Management Facility, Winnipeg, MB**

1.0 BACKGROUND

As part of the Operations contract with the City of Winnipeg (City), Integrated Gas Recovery Services (IGRS) is required to perform Surface Emission Surveys (survey or sweep) during each calendar year to assess the effectiveness of the gas collection well field at the Brady Road Resource Management Facility (Site). In May 2022, IGRS performed the first survey of 2022. The survey will provide information on the performance of the landfill gas (LFG) collection system, and indicate any areas on the landfill surface that may require attention to limit amounts of LFG being released to the atmosphere. The results of the May 2022 survey can be compared to previous surveys completed as well as future surveys in order to determine areas that may consistently have high surface levels of LFG.

The flaring system was commissioned the week of July 8th, 2013. After completing the initial survey, the system has since been running on a constant basis with flow rates consistently between 800-1000 CFM.

This report discusses the results of the Surface Emission Survey, evaluates the emission and odour sources, and provides recommended remedial measures. The Surface Emissions Survey Protocol (Protocol) is included in Attachment A.

2.0 METHODOLOGY

The survey is based on the United States Environmental Protection Agency's (USEPA) New Source Performance Standards (NSPS) for surface emissions monitoring at municipal solid waste landfills. The Protocol prepared by Comcor describes the procedures used for the survey and is included as Attachment A.



A Landtec SEM or similar with integral GPS, landfill gas surface emission monitor was used to perform the survey. A serpentine pattern was used to cover the entirety of the landfill site survey area. This path was tracked by GPS and is displayed in Figure 1.

3.0 OPERATIONAL AND SITE CONDITIONS

The results of this sweep are a good initial indicator of the effectiveness of the gas collection system. After examining the results, areas indicating high levels of emissions may need to be reviewed to determine if remedial action is required.

The survey was performed over the entirety of the previously capped area, as well as the newly capped Cell 30 and Cell 31. The survey included areas where LFG collection wells are installed, and the active area where there is no LFG collection system. The survey was completed on May 4th and 5th, 2022 by Comcor staff. The LFG collection and flaring system had been running consistently, and all wells had been previously balanced prior to the sweep being performed to allow for optimal readings to be taken.

There was a large area currently active with cover and dumping operations, which is indicated by the black boxes on Figure 3, this area was not able to be effectively monitored due to the ongoing work.

Weather during this time period was also considered. During the dates on which the survey was conducted, the weather fell within the acceptable guidelines as outlined in Attachment A.

4.0 RESULTS

Background Emissions

Background methane concentration readings are taken before a surface sweep is conducted in order to identify which surface emissions are results of the landfill, and which are from alternative sources offsite. Each day, prior to commencing the survey, Comcor took background concentration readings both upwind and downwind at a distance of 30 meters or more from the limit of waste. In all cases, readings were between 0-2 ppm, and no further action was required to correct readings taken during the survey.

Measured Emissions and Remedial Measures

In accordance with the Protocol, a minimum concentration of 400 ppm was used as the emission exceedance threshold. Figure 2 presents the locations of the emission exceedances.



The majority of the exceedances were directly related to gas escaping through the landfill surface. In most instances, the emissions were clearly indicated by the lack of vegetation on the affected area. Figure 2 presents the locations of the exceedances, of which, a number are clustered together. When compared with a map of the location of the header and laterals it is clear that the majority of exceedances arise from these locations. This is potentially caused by ineffective recapping of the area following the installation of the header, laterals, and more recently, the compressed air and forcemain lines to all wells. These areas are easily identifiable by the distinct lack of vegetation regrowth.

The remaining locations with exceedances were generally located on the top of the hill. This location remains unfinished, and is currently being recovered and capped. Due to the ongoing work in this area, it is difficult to determine the cause of the methane exceedances.

Special attention was paid to the areas that were previously excavated during the installation of the compressed air and forcemain lines during the 2020 construction project. These areas largely provided no indications of excessive methane escape. Four locations of significance were noted in the areas excavated around wells 4-35, 4-31, 6-49 and 6-50. All showed significant methane escape through the cap. This survey was completed following the excavation and re-covering with fresh capping material around these wells, indicating further action may be required to reduce the elevated methane emissions.

Manholes were also directly monitored to test the effectiveness of the new air tight lids that were installed as part of the most recent construction project. Very low methane emissions were detected in the areas of the manholes with properly installed lids.

Vegetation and Clay Cap Condition

Special attention and observation were given to the condition of the clay cap and vegetation. Large cracks and ruts in the clay cap can allow gas to escape the landfill mound. Stressed or missing vegetation indicates that gas is escaping through the clay cap and is affecting plant/vegetation health.

While conducting the survey, Comcor observed many areas of stressed vegetation in addition to the areas that were previously noted. Many of these areas did not exceed the methane threshold, however they will need to be monitored in the future for issues that may arise from potential gas emissions.

5.0 CONCLUSIONS

The number of exceedances recorded since the most recent survey in November 2021 have decreased. The exceedances can vary between surveys due to the generally low vegetation



growth on Site. The generally limited vegetation makes it more difficult to identify specific areas with low vegetation growth directly due to methane exceedances.

Overall, the majority of the landfill has sufficient cap, or cap in good condition. Continued monitoring and Surface Emission Surveys in the future will determine if there are any areas where the clay cap is allowing methane emissions to escape. If this continues, these areas may require maintenance.

If you have any questions or concerns, please contact the undersigned.

Yours truly,

COMCOR ENVIRONMENTAL LIMITED

Jordan DeMerchant



Figure 1: Emissions Sampling Path

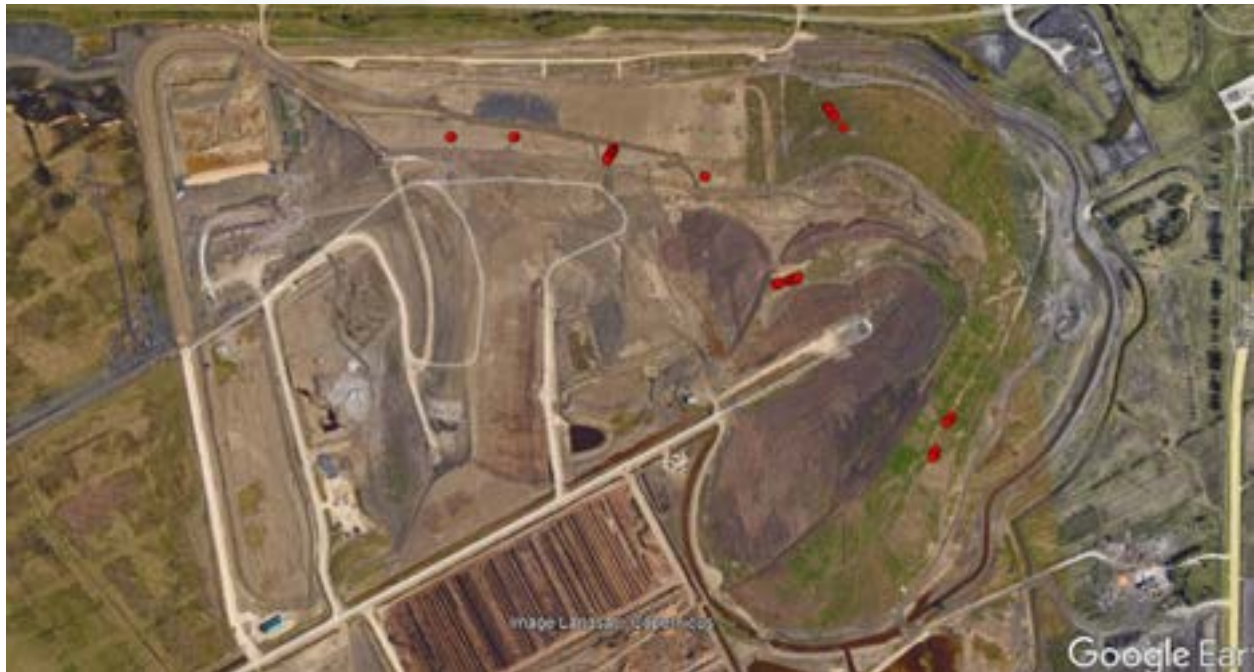


Figure 2: Methane Emissions Exceedances



Figure 3: Areas Not Monitored Due to Ongoing Work



January 1, 2023

Mr. Duy Doan
Project Coordinator
The City of Winnipeg
1120 Waverly Street
Winnipeg MB
R3T 0P4

Project No. 9-457

Dear Mr. Doan:

**RE: Landfill Gas Emissions Survey
Area 1 - Landfill Gas Collection and Flaring System
Brady Road Resource Management Facility, Winnipeg, MB**

1.0 BACKGROUND

As part of the Operations contract with the City of Winnipeg (City), Integrated Gas Recovery Services (IGRS) is required to perform Surface Emission Surveys (survey or sweep) during each calendar year to assess the effectiveness of the gas collection well field at the Brady Road Resource Management Facility (Site). In December 2022, IGRS performed the final survey of 2022. The survey will provide information on the performance of the landfill gas (LFG) collection system and indicate any areas on the landfill surface that may require attention to limit amounts of LFG being released to the atmosphere. The results of the December 2022 survey can be compared to previous surveys completed as well as future surveys in order to determine areas that may consistently have high surface levels of LFG.

The flaring system was commissioned the week of July 8th, 2013. After completing the initial survey, the system has since been running on a constant basis with flow rates consistently between 800-1000 CFM.

This report discusses the results of the Surface Emission Survey, evaluates the emission and odour sources, and provides recommended remedial measures. The Surface Emissions Survey Protocol (Protocol) is included in Attachment A.

Due to the surface emission sweep being conducted in the winter, and much of the Site being inaccessible during this time, the scope of the sweep was limited to areas of the landfill where large amounts of emissions were believed to be escaping. The effectiveness of the sweep in the areas that were measured was also impacted by the large amount of snow on the surface of the landfill. Excess snow can mute or hide potential emissions, resulting in the emissions registered during this sweep being significantly lower than previous sweeps conducted.



2.0 METHODOLOGY

The survey is based on the United States Environmental Protection Agency's (USEPA) New Source Performance Standards (NSPS) for surface emissions monitoring at municipal solid waste landfills. The Protocol prepared by Comcor describes the procedures used for the survey and is included as Attachment A.

A Landtec SEM or similar with integral GPS landfill gas surface emission monitor was used to perform the survey. A serpentine pattern was used to cover a portion of the landfill Site survey area. This path was tracked by GPS and is displayed in Figure 1.

3.0 OPERATIONAL AND SITE CONDITIONS

The results of this sweep are a good initial indicator of the effectiveness of the gas collection system. After examining the results, areas indicating high levels of emissions may need to be reviewed to determine if remedial action is required.

The survey was performed on capped Cell 30 and Cell 31. The survey included areas where LFG collection wells are installed, and the active area where there is no LFG collection system. The survey was completed on December 7th, 2022 by Comcor staff. The LFG collection and flaring system had been running consistently, and all wells had been previously balanced prior to the sweep being performed to allow for optimal readings to be taken.

Weather during this time period was also considered. On the day the survey was conducted, the weather fell within the acceptable guidelines as outlined in Attachment A.

4.0 RESULTS

Background Emissions

Background methane concentration readings are taken before a surface sweep is conducted in order to identify which surface emissions are results of the landfill, and which are from alternative sources offsite. Prior to commencing the survey, Comcor took background concentration readings both upwind and downwind at a distance of 30 meters or more from the limit of waste. In all cases, readings were between 0-2 ppm, and no further action was required to correct readings taken during the survey.

Measured Emissions and Remedial Measures

In accordance with the Protocol, a minimum concentration of 400 ppm was used as the emission exceedance threshold.



Due to the limited scope of the survey only one exceedance was detected. This exceedance was directly at the base of an LFG well, however no odour was noticeable by Comcor staff. Figure 1 presents the locations of the emission exceedance, represented with a star.

5.0 CONCLUSIONS

As stated previously, due to the survey being completed during the winter and the limitation previously noted, it is difficult to draw conclusions from the results. While not exceeding the 400ppm threshold a number of readings were noted directly surrounding the tipping face. In addition, the area around the tipping face was the largest contributor to odours in the area. Continued monitoring and Surface Emission Surveys in the future will determine if there are any areas where the clay cap is allowing methane emissions to escape. If this continues, these areas may require maintenance.

With the large amount of capping operations currently occurring on the Site. A full sweep of the entire Site in spring will provide a fuller picture of the state of the cap.

If you have any questions or concerns, please contact the undersigned.

Yours truly,

COMCOR ENVIRONMENTAL LIMITED

Jordan DeMerchant



Figure 1: Emissions Sampling Path and Methane Emissions Exceedance



Attachment A

**SURFACE EMISSIONS SURVEY
PROTOCOL**

Prepared by
COMCOR ENVIRONMENTAL LIMITED
320 Pinebush Road, Suite 12
Cambridge, Ontario
N1T 1Z6

SURFACE EMISSIONS SURVEY PROTOCOL

1. OBJECTIVE AND BACKGROUND INFORMATION

The objective of a Surface Emission Monitoring Plan is to complete a gas assessment within a landfill footprint.

The landfill gas emissions survey is based on the United States Environmental Protection Agency's (USEPA) New Source Performance Standards (NSPS) for surface emissions monitoring at municipal solid waste landfills. Background methane concentration should be taken before each emissions survey and will be determined by monitoring upwind and downwind outside the boundary of the landfill at a distance of at least 30 metres from the limit of waste. The on-site emission survey is to be conducted as described within this document.

2. MONITORING MAP

- A grid will be imposed on the available site maps. This grid will cover all areas of the landfill. The grid shows the path to be followed by the individual(s) who perform surface monitoring. The grid will be set up at 30 meter intervals.
- The maps will show the location of all gas monitors, each of which is shown with a unique identifier.
- The monitoring grid map may also indicate each area that is excluded from surface monitoring. Each excluded area is labeled and an attachment to the map has been prepared to explain the basis for each area's exclusion from monitoring. The following areas are excluded from required monitoring:
 - 1) Slopes that are determined by the individual(s) performing the monitoring to be too steep to be safely traversed while carrying the monitor.
 - 2) Areas containing only waste other than Municipal Solid Waste (for example, "construction and demolition" debris, kiln ash, etc.).
 - 3) Areas of known asbestos disposal.

3. INSTRUMENT AND CALIBRATION GAS SPECIFICATIONS

- All instruments will be field calibrated and have certification from the manufacturer or rental supplier.

4. MONITORING SCHEDULE

- Under the NSPS, quarterly monitoring is required for all landfills that require a gas collection system (GCS). A landfill that can demonstrate that surface concentrations are below 500 parts per million by volume (ppmv) measured as methane in four consecutive quarters do not require a GCS.
- Any closed landfills that has surface concentrations not to exceed 500 parts per million by volume (ppmv) measured as methane in four consecutive quarterly monitoring periods may conduct annual monitoring.
- Monitoring will only occur if conditions are appropriate. Below is an outline of reasons that monitoring may not be able to be completed.
 - 1) Weather that is determined by the individual(s) who perform the surface monitoring to be unsafe in which to conduct outdoor activities or which may be damaging to health (i.e. , extremes of temperature, high winds, rain-snow-ice or thunder storms, snow and ice accumulation, darkness, ozone alerts, other air pollution alerts).
 - 2) Occurrence of meteorological conditions considered to be other than “typical”.
 - 3) For Tier 4 Landfills, average wind speed (on a 5-minute interval) must not exceed 40 km/h (25 mph).
 - 4) Ambient temperatures which do not rise above the minimum required ambient operational temperature of the monitoring instrument.
 - 5) Ambient temperatures which do not fall below the maximum allowable ambient operational temperature of the monitoring instrument.
 - 6) Accumulation of snow/ice to a depth in excess of the maximum allowable monitoring height-above-surface (i.e., 10 cm. = 4 inches).
 - 7) Wet surface conditions such that traversing the landfill would either present a hazard to the individual(s) performing the monitoring, or would damage the cover and potentially result in the creation of methane leaks.
- Where a delay in the monitoring schedule has been caused by one or more of the above conditions, monitoring will resume as soon as the condition(s) which precluded meeting the monitoring schedule subside. Documentation will be entered into the report detailing the regular monitoring schedule and conditions in which they were completed.

5. MONITORING PROCEDURE

- Conduct monitoring *only if* ambient temperatures are within acceptable operating limits for the monitoring instrument; there is no snow/ice cover greater than four inches deep, weather conditions are “typical” for the area, and weather and site conditions are such that it is not dangerous to conduct monitoring.
- For Tier 4 Landfills, conduct monitoring *only if* average wind speeds are below 40 km/h (25 mph). Utilize a wind barrier if average wind speeds exceed 6.4 km/h (4 mph) or gusts exceed 16.1 km/h (10 mph). Average wind speed to be determined every 5-minutes in an open area using an on-site anemometer with a continuous recorder and data logger for the entire monitoring event.
- Warm up the instrument per the manufacturer’s recommendations.
- Perform an instrument calibration prior to each monitoring day.
- At a distance of 30 meters (98 feet) from the perimeter wells on the upwind side of the landfill, face into the wind and move the probe in the air for at least 30 seconds.
- Note the meter reading and record it as “upwind reading”.
- Perform the same procedure at a distance of 30 meters (98 feet) from the perimeter wells on the downwind side of the landfill and record the meter reading as “downwind reading”.
- Average the upwind and downwind readings and record the average in “background concentration”.
- Using the surface monitoring grid map, begin walking the sampling path at the starting point on the map holding the monitor probe no more than four inches above the landfill surface. Walk at a steady pace of approximately 1.5 mph (approximately 1 step per second).
- When the instrument gives a meter reading of ≥ 500 ppm, stop walking and note the maximum meter reading. Record the time of detection and a unique location identifier from the GPS unit. It may be necessary to create a location identifier on the sampling grid map.
- Continue walking the sampling grid path until the entire route has been traversed.

- While traversing the grid, if any areas are seen off of the grid path that appear to have a high potential for methane leaks (i.e., stressed vegetation, noticeable surface cracks, sunken areas, etc.), deviate from the grid path and monitor these areas as if they were on the grid path. Cover penetrations such as wellheads, vents and posts that pass through the cover of the landfill must also be monitored. Document these areas only if a leak is recorded.
- If the portable PID/FID gas monitor gives a reading above its detectable limits use the GEM to determine methane levels.
- All areas of stressed vegetation, noticeable surface cracks, sunken areas, etc. should also be noted and the location recorded. If possible take digital pictures to record any extreme conditions.

6. MEASURED EXCEEDANCES

- If methane is detected at a concentration greater than 1000 ppm above background, the following steps may be taken until the exceedance is remedied:
 1. The location and concentration of the exceedance will be recorded.
 2. Adjustments to adjacent extraction wells will be made to increase gas collection in the vicinity of the exceedance. The location will be re-monitored within ten (10) calendar days of detecting the exceedance.
 3. If re-monitoring the location shows a second exceedance, cover maintenance will be performed. The location will be re-monitored within ten (10) calendar days of maintenance.
 4. If re-monitoring shows a third exceedance, consideration will be given to installing additional landfill gas extraction wells.

APPENDIX D
2022 NUISANCE COMPLAINT
MONITORING

Brady Road Resource Management Facility Annual Report – 2022



**Water and Waste
Eaux et déchets**

Table 11. 2022 Nuisance Complaint Monitoring

Date	Complaint	Response
5/4/2022	Citizen states that Brady smells. They don't cover it as per usual. Flare might not be running as usual.	Informed the citizen that the atmospheric conditions and wind on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
6/6/2022	Citizen states that there was a potent smell coming from Brady on June 1. This was smelled at 2:00 a.m.	Informed the citizen that the atmospheric conditions (south wind and higher humidity), and police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
6/7/2022	Report received via email dated May 24. Citizen is complaining about the Brady Landfill odour. Citizen states they don't cover it as per usual and flare might not be running as usual.	Informed the citizen that the atmospheric conditions and wind on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
6/15/2022	Citizen says that the smell from the Brady Landfill has been really strong all day. Caller would like something done about it as no matter what side of the landfill he is on, it smells.	Informed the citizen that the atmospheric conditions and wind on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
6/15/2022	Citizen lives in Prairie Point and is complaining about the intense smell that is coming from the Brady Rd Landfill. Citizen states that on the morning of 06/15/22, the odor was very strong; citizen found it hard to breath.	Informed the citizen that the atmospheric conditions and wind on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
6/19/2022	Citizen states that they are once again experiencing the smell coming from Brady Landfill and would like them to investigate again, please and thank you.	Informed the citizen that the atmospheric conditions, temperature, south wind and higher humidity on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
6/22/2022	Citizen reports, "city did not do the odour control this year at the Brady Landfill and the smell is pretty bad". Please look into this request for the odour control as soon as possible.	Informed the citizen that the atmospheric conditions (south wind and higher humidity), and police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
6/22/2022	Citizen states that it started smelling like the landfill around 6:30 this evening in South Pointe. Very strong offensive odour.	Informed the citizen that the atmospheric conditions (south wind and higher humidity), and police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
6/22/2022	Citizen says that at 6:00 p.m. there is a foul odor from Brady Landfill (sour smell). Odor still persisting after 9:00 p.m. causing shortness of breath, and nausea.	Informed the citizen that the atmospheric conditions (south wind and higher humidity), and police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
6/22/2022	Citizen lives in Prairie Point and can smell garbage smell coming from the landfills area. Today it was unbearably bad. Please inspect it and inform when it will be taken care of.	Informed the citizen that the atmospheric conditions (south wind and higher humidity), and police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
6/23/2022	Citizen states, "The garbage smell from Brady Landfill has been exceptionally bad this week. The smell is very bad and keeps us from enjoying our outdoor space in our home during the summer months. Something really needs to be done to mitigate this."	Informed the citizen that the atmospheric conditions (south wind and higher humidity), and police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
6/23/2022	Citizen reports they noticed yesterday afternoon that the smell coming from Brady Landfill got a lot stronger. Citizen states they cannot go outside at all today, the smell is very strong and needs to be addressed.	Informed the citizen that the atmospheric conditions (south wind and higher humidity), and police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
6/25/2022	Citizen says via email received June 7, "Potent smell coming from Brady."	Informed the citizen that the atmospheric conditions (south wind and higher humidity), and police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/6/2022	Email received on July 6, citizen is reporting unusually bad smell that is blowing in the Prairie Pointe area today. It wasn't this bad unlike other days, however today is exceptionally worse.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/6/2022	Citizen states, "Just reporting that there was a strong foul odour in the entire Prairie Pointe neighborhood around 11 PM today. Likely from Brady Landfill.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/9/2022	Emailing regarding odour complaint on June 18th at 5pm. Email received July 9th, contained necessary info such as phone number and name to complete request.	Informed the citizen that the atmospheric conditions, police investigation, and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/10/2022	Email received on July 10, citizen is reporting landfill smelled on Friday, 8th, starting around 7:50pm and on Saturday, 9th, the smell was intermittent in the evening.	Informed the citizen that the atmospheric conditions, police investigation, and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/14/2022	Citizen states, "It currently smells like the landfill in South Pointe. There was a foul landfill odour in the morning earlier this week as well. "	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/15/2022	Citizen says a foul smell periodically wafting into Brio Townhouses on Eaglewood Drive, west of the Brady Road Landfill. Most recently at 10 p.m. tonight.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.

Client File No. 5556.00

Manitoba Environment Act Licence No. 3081 R

Brady Road Resource Management Facility Annual Report – 2022

Date	Complaint	Response
7/15/2022	Citizen states, "Just reporting that there was a strong foul odour in the entire Prairie Pointe neighborhood around 11 PM today. Likely from Brady Landfill.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/18/2022	Citizen states they have lived in Prairie Pointe since 2020. They have found that sometimes the smell from Brady Road Landfill is very bad. This summer, it happens quite often.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/26/2022	Citizen reports they live in Prairie Point and there is an odour from the dump which is closest to them.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/27/2022	Citizen says they live in Prairie Point and there is an odour from the dump which is closest to them. The smell is quite often. It is such a strong bad smell that it is very hard to sit or walk/stay outside of the house. The smell prevents outside activities.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/29/2022	Citizen lives in Prairie Pointe, the Brady Landfill is just around the area. Today when they came home this afternoon, they noticed a pungent smell they believe is coming from the landfill as it smells kinda like garbage.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/29/2022	Email received on July 29 - citizen reports odour concerns from the landfill around 10 PM.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/29/2022	Citizen states that there is foul odour coming from the landfill which is making the air stink a lot.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/29/2022	Email received on July 29 - Citizen states the dump was particularly pungent at approximately 9:15 p.m. this evening. Citizen lives in Bridgewater Lakes however also smelled it at Cineplex on McGillivray at approximately 9:00 p.m.	Informed the citizen that the atmospheric conditions, landfill operations, and additional animal waste suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/29/2022	Citizen says that there is a very foul order coming from Brady Landfill.	Informed the citizen that the atmospheric conditions, landfill operations, and additional animal waste suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/30/2022	Email received on July 29 - citizen says the air quality was terrible in her area due to the odour from the landfill.	Informed the citizen that the atmospheric conditions, landfill operations, and additional animal waste suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/30/2022	Citizen emailed on July 14th to report a very "foul odor" from the Brady Road Landfill apparently filled up the Prairie Pointe neighborhood on the day the email was submitted.	Informed the citizen that the atmospheric conditions, additional animal waste and ongoing police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/30/2022	Email on July 14: Citizen states that there was a strong foul odour in the entire neighborhood around 6:50 AM and then again at 9:30 PM today. Likely from Brady Landfill.	No response needed, as this citizen just wants to report in and doesn't require a response unless they ask for one.
7/30/2022	Citizen is reporting that there is a very bad odor coming from the dump this summer and it has been frequent and unbearable.	Informed the citizen that the atmospheric conditions, additional animal waste and ongoing police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/30/2022	Citizen would like to advise that there is a strong foul odor coming from the Brady Landfill	Informed the citizen that the atmospheric conditions, additional animal waste and ongoing police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/30/2022	Email on July 15th - Citizen lives in Prairie Pointe and notices a smell in the area more consistently than last year. At 10:16 on Friday July 15th, with no wind and the smell is quite foul. Email on July 30th - At 7:57 the area is smelling like the dump again.	Informed the citizen that the atmospheric conditions, additional animal waste and ongoing police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/30/2022	Citizen wants to speak to someone about the really bad odour from Brady Landfill. He states it has been really bad for the past 3 days. He states he wants to plan activities for people in the neighborhood, and they can't enjoy due to the smell.	Informed the citizen that the atmospheric conditions, additional animal waste and ongoing police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
7/30/2022	Citizen is reporting that there is a strong odour coming from Brady Road Landfill. Citizen claims her windows are closed, and she still smells it. It is giving her migraines.	Informed the citizen that the atmospheric conditions on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community, and that the odours are not harmful to human health.
8/21/2022	Email on August 20 - Citizen is writing to complain about odour from Brady Landfill. The odour became very strong since around 9pm today. It is a health hazard. "	Informed the citizen that the atmospheric conditions on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community, and that the odours are not harmful to human health.
8/21/2022	Email on August 20 - Citizen states "the smell has been super strong lately, especially tonight."	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
8/21/2022	Email on August 21 - Citizen says "The smell in the South End is atrocious. We have lived in the same location for four years and have only smelt this smell twice. Since Spring 2022, every day it smells like garbage. It is disgusting and does not improve.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
8/22/2022	Email on August 21 - Citizen reports a horrible smell in Prairie Pointe the past 2 months but was the worst this week. It's hard to enjoy time outside because of this smell. It smells like the landfill.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.

Client File No. 5556.00

Manitoba Environment Act Licence No. 3081 R

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Date	Complaint	Response
8/31/2022	In Prairie Pointe in Winnipeg's South End, the smell is very bad today.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
9/6/2022	Citizen states there is a lot of strong, pungent odour of methane gas smells coming from the nearby Brady dump. They believe this may be contributing to nausea, headaches and dizziness.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
9/6/2022	Citizen states there seems to be a really bad odour coming from the Brady landfill. The smell is strong at their property, the air is not breathable.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
9/9/2022	Citizen says, over the last 5-10 years the smell has gotten more frequent. Clearly not enough is being done since this problem NEVER occurred during the first 15 years or so that he was here.	Informed the citizen that the City takes concerns very seriously and continues to work to mitigate potential odour sources generated from operations at Brady Road Resource Management Facility by collecting information about the odours encountered by residents in the area.
9/10/2022	Email on September 2 - "This email is to communicate to the City the terrible odour coming from the landfill (Brady Resource Management Facility). The smell is so strong that my kids are not willing to leave the house, we have to keep everything closed and AC on all the time.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
9/11/2022	Citizen reports that the Brady Landfill could be smelled from citizen's house by the Bridgewater area.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
9/11/2022	Email received on September 11, citizen is reporting a very bad smell/odor from Brady Landfill.	Informed the citizen that the City takes concerns very seriously and continues to work to mitigate potential odour sources generated from operations at Brady Road Resource Management Facility by collecting information about the odours encountered by residents in the area.
9/11/2022	Email received on September 11, citizen is reporting that the smell from Brady Landfill is terrible. Citizen states today, evening and afternoon had so much smell in their area.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
9/12/2022	Citizen says the smell from the landfill is bad	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
9/12/2022	Email received on September 12 - citizen is reporting a really bad smell from the Brady Landfill. It has been ongoing for 48 hours and coming in through their home.	Informed the citizen that the City takes concerns very seriously and continues to work to mitigate potential odour sources generated from operations at Brady Road Resource Management Facility by collecting information about the odours encountered by residents in the area.
9/12/2022	Email on September 7 - Citizen states "I am staying at the Four Points Sheridan on Pembina South. I was woken by a bad odour around midnight. It's really bad. I checked all floors and then went outside. The smell outside is very strong. It smells exactly like the landfill when driving by on a day with a south wind.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
9/30/2022	Email on July 14 - Citizen states the odour from the landfill is excessive today.	Informed the citizen that the atmospheric conditions, additional animal waste and ongoing police investigation suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
10/7/2022	Citizen says that they were just outside and the landfill smell is horrid - worst they've ever smelled it.	No response needed, as this citizen just wants to report in and doesn't require a response unless they ask for one.
10/7/2022	Citizen says they are currently experiencing a strong odour that smells like garbage. (Brady)	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
10/7/2022	Email on October 7 - Citizen is reporting the foul smell stinking today at Prairie Pointe. Tonight is really bad. They sneezed a lot and got a runny nose and immediately went inside the house.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
10/11/2022	Emailer states that for three days now the odours coming from Brady Road landfill are awful.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
10/27/2022	Citizen reports a strong odor coming from Brady Landfill in the neighborhood of Prairie Pointe	Informed the citizen that the City takes concerns very seriously and continues to work to mitigate potential odour sources generated from operations at Brady Road Resource Management Facility by collecting information about the odours encountered by residents in the area.
10/29/2022	Citizen states that they are experiencing foul stench of smell Friday night and Saturday Oct 29. Citizen states residents of Prairie Pointe were unable to enjoy their weekend outdoors due to the sickening smell of City dump.	Informed the citizen that the landfill gas collection system on the Northwest area of Brady is undergoing repairs. This can produce some unpleasant gassy odours, during the past couple of weeks. The City is working hard to complete the repairs as quickly as possible.
10/30/2022	Citizen reports they live in the Prairie Pointe neighbourhood of the City and have lived there for 2 years. Since they moved in the smell from the Brady Landfill has gotten increasingly worse. Today was especially bad.	Informed the citizen that the landfill gas collection system on the Northwest area of Brady is undergoing repairs. This can produce some unpleasant gassy odours, during the past couple of weeks. The City is working hard to complete the repairs as quickly as possible.
10/30/2022	Citizen says "I will like to complain about the smell from the dump - please file a complaint on my behalf."	Informed the citizen that the landfill gas collection system on the Northwest area of Brady is undergoing repairs. This can produce some unpleasant gassy odours, during the past couple of weeks. The City is working hard to complete the repairs as quickly as possible.
11/8/2022	Citizen is requesting "Please help us lessen the capacity and intensity of the smell from Brady Landfill, currently the smell is so strong in our community.	Informed the citizen that the landfill gas collection system on the Northwest area of Brady is undergoing repairs. This can produce some unpleasant gassy odours, during the past couple of weeks. The City is working hard to complete the repairs as quickly as possible.

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Date	Complaint	Response
11/16/2022	Citizen is reporting a foul smell in the air likely coming from Brady.	Informed the citizen that the landfill gas collection system on the Northwest area of Brady is undergoing repairs. This can produce some unpleasant gassy odours, during the past couple of weeks. The City is working hard to complete the repairs as quickly as possible.
11/16/2022	Citizen reports that there was a strong foul odour in the Prairie Pointe and Bridgewater neighborhood through most of the day today. Likely from Brady Landfill.	No response needed, as this citizen just wants to report in and doesn't require a response unless they ask for one.
11/17/2022	Caller states that for the last 2 - 3 months they have been smelling an odour outside. The odour occurs more frequently about 2 - 3 times a week. They smell the odour in the early evenings. It's a gas smell and could be coming from the landfill.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
11/22/2022	Citizen states, "Brady Landfill is giving out really bad smell. It's so bad that we can smell it inside our home this time. It smells like really bad methane gas. Please look into this ASAP"	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
11/22/2022	Citizen reports a strong odour at the Brady landfill on Monday, November 21 at 4:25pm.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
11/23/2022	Citizen states, the Brady Landfill is just around their area. They notice the smell possibly coming from the Brady landfill since the previous night.	Informed the citizen that the landfill gas collection system on the Northwest area of Brady is undergoing repairs. This can produce some unpleasant gassy odours, during the past couple of weeks. The City is working hard to complete the repairs as quickly as possible.
11/23/2022	Citizen says the smell from the dump is very very bad right now, usually there are no smells in the winter but this year there have been many.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
11/24/2022	Citizen says that Brady Landfill is creating smell and it is unbearable. He says that the smell has started to come to the neighborhood and it is so hard in the houses, even when all the vents are running.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
11/25/2022	Citizen states that they have noticed a significant amount of times the landfill has a odour.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.
12/3/2022	Citizen is reporting strong garbage odor tonight. Citizen has several reports in the past.	Informed the citizen that the landfill gas collection system on the Northwest area of Brady is undergoing repairs. This can produce some unpleasant gassy odours, during the past couple of weeks. The City is working hard to complete the repairs as quickly as possible.
12/6/2022	Citizen is reporting that landfill seemed particularly smelly on December 5, at 9:40pm.	Informed the citizen that the landfill gas collection system on the Northwest area of Brady is undergoing repairs. This can produce some unpleasant gassy odours, during the past couple of weeks. The City is working hard to complete the repairs as quickly as possible.
12/10/2022	Citizen states there is an odour from the Brady Landfill today. They've smelt it quite often the past few weeks and will start reporting it.	Informed the citizen that the atmospheric conditions and landfill operations on that day suggest that it would be likely the odour originated from Brady Landfill. Also described the steps taken to reduce the impact of the landfill on our community.