Winnipeg

Water and Waste Department
Environmental Standards Division

Brady Road Resource Management Facility Annual Report - 2016

Heather Demchenko B.Sc.
Compliance Reporting Technician

Nancy Crawford B.Sc.
Compliance Reporting Branch Head

Renée Grosselle B.Sc.
Manager of Environmental Standards

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 another 98 years, assuming 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 2016.

Major construction in 2016 included the opening of the 4R Depot, work on a new waste cell, work on the lime mud berm, and construction of weirs in the dry ponds. Major incidents in 2016 included a bunker collapse in the biosolids composting facility, two fires, five spills, and two radiation alarms; all incidents were dealt with according to safety procedures, and were reported to an Environment Officer as required.

In 2016, over 36% of the 357,246 metric tonnes of material received at the BRRMF were beneficially re-used onsite or were removed from the site for recycling.

Monitoring programs for ground water, surface water, leachate, and subsurface gas migration followed the sampling and analysis plans in 2016 with the following exceptions: dissolved mercury was analyzed instead of total mercury on the surface water samples and fall ground water samples, and 4'4' Methylenebis (2-chloroaniline) was not analyzed on the leachate samples. We will evaluate statistically significant increases over background water quality starting in 2019, once we have collected 5 years of historical data. No contingency plans were activated in 2016.

In 2016, the BRRMF received 28 odour complaints; in all cases the customer was contacted for follow-up and additional odour monitoring at the complaint location was performed if necessary.

The Appendices of the report contain incident reports for 2016, statistical analyses of ground water quality and surface water quality, and the 2016 Landfill Gas Collection and Flaring Report, prepared by Integrated Gas Recovery Systems Inc.

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1.0 INTRODUCTION

The Brady Road Resource Management Facility (BRRMF) was issued Environment Act Licence No. 3081 R on April 23, 2014. Clause 127 of the licence 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 2016. The report also provides information on the BRRMF proposed activities in 2017.

2.0 CONSTRUCTION

The BRRMF performed various construction activities to satisfy conditions of the Licence in 2016; major construction activities included:

1. A rough cut out of a new waste cell (Cell 31) in the northwest quadrant of the property was partially completed. Cell 31 is directly South of Cell 30.
2. The 4R depot at BRRMF opened to the public in February 2016. The goal of the 4R depot is to increase diversion from the landfill while improving the safety, convenience and user experience for city residents.
3. The final phase of the surface water management plan, which included the construction of the weirs in the dry ponds at BRRMF, was completed.
4. The final phase of the lime mud berms was started in 2016, including portions on the southeast section and northeast sections of the site. The berms are expected to be completed by December 2017.

3.0 MAJOR INCIDENTS

In 2016, there were no disruptions or failures of waste management practices due to equipment breakdown. Bunker Four in the biosolids composting facility collapsed in September 2016; it remains out of commission, with no determined date for reopening. Two fires, five spills, and two radiation detection alarms occurred in 2016 at the BRRMF; all incidents were reported to Manitoba Sustainable Development and follow-up or corrective actions were taken. Incident reports are provided in Appendix A.

4.0 WASTE DIVERSION OPERATIONS

In 2016, BRRMF received 357,245.5 metric tonnes of waste, 128,253.5 metric tonnes of waste were re-used on-site, and 1921.3 metric tonnes of waste were removed from BRRMF for further processing or beneficial re-use off-site. The 2016 diversion rate was 36.4%, which is an increase from the 2015 diversion rate of 17.8%.

The biosolids composting facility has not been able to reach its 20% goal due to shut downs caused by the collapse of Bunker 4, mechanical issues, and cold weather.

The BRRMF Community Resource Recovery Centre (4R Depot) opened to the public in February 2016. The 4R Depot is an area where customers can drop off materials that can be recycled, reused, composted, or resold, with the goal of increasing diversion from the landfill while improving safety, convenience, and user experience. Assuming continued waste diversion practices, the estimated remaining landfill life is 98 years.

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

Table 1. 2016 BRRMF Waste Diversion Summary		2014	2015	2016
Total Waste Received	**metric tonnes**	**395,468.7**	**395,828.3**	**357,245.5**
Total Waste Re-Used or Composted On-Site	**metric tonnes**	**68,966.1**	**69,103.3**	**128,465.8**
Biosolids	metric tonnes	222.3*	3,938.6	1,898.8
Clean fill	metric tonnes	16,438.8	4,957.0	61,640.2
Concrete	metric tonnes	1,903.3	362.0	341.8
Dutch elm (wood chips)	metric tonnes	5,304.0	5,630.2	6,127.1
Glass	metric tonnes	12,826.0	9,339.4	11,489.4
Leaf and yard waste	metric tonnes	24,736.8	33,475.3	34,031.6
Street sweepings (sand)	metric tonnes	6,924.5	10,813.6	11,620.4
Wood chips	metric tonnes	462.1	172.4	1,104.1
Wood chips (for biosolids compost program)	metric tonnes	148.3	414.8	212.4
Total Waste Removed	**metric tonnes**	**1,157.8**	**1,204.8**	**1,921.3**
Compost	metric tonnes	-	342.9**	403.2
Dutch elm	metric tonnes	0.0	18.6	2.7
Ozone-depleting substances (appliances)	metric tonnes	96.5	78.3	48.0
Scrap metal (including batteries)	metric tonnes	949.1	543.5	1,388.8
Tires	metric tonnes	112.2	221.5	78.7

*pilot plant for biosolids composting came online in November 2014
**compost program began in 2015

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

5.1 GROUND WATER

Ground water is monitored to ensure that operation of the BRRMF does not negatively impact downgradient ground water quality parameters. Ground water beneath the BRRMF flows from south west to north east as determined by well elevation data. It is saline and is not used as potable water for rural residences surrounding the site.

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. The primary focus of ground water monitoring is on 13 bedrock wells, with a secondary focus on 13 till wells and 8 clay wells. Sampling frequency is twice per year (spring and fall) for bedrock wells and downgradient till wells, and once per year (spring) for clay wells and other till wells distant from the waste areas. The parameters analyzed are determined by well type and location.

In 2016, a total of 52 ground water samples were analyzed – 4 samples from wells upgradient of the site (background water quality), and 48 samples from wells crossgradient and downgradient of the site. There were no deviations from the Ground Water SAP or from normal sample collection and preservation practices except dissolved mercury was mistakenly requested instead of total mercury for fall samples. A summary of the 2016 ground water results are provided in Table 2.

The analytical results for groundwater obtained in 2016 were found to be highly variable compared to those obtained in 2014 and 2015. A comparison of the average and maximum values obtained in 2014, 2015, and 2016 are provided in Table 3. The data collected in 2016 will be used to enhance the existing ground water quality data in order to better evaluate trends. Statistical analyses of background ground water quality data are attached in Appendix B. The Contingency Action Plan required under Clause 125 was not implemented in 2016.

At this time we have no recommendations for changes in the ground water monitoring program, with the exception of removing BOD from the list of analyses because it was mistakenly included in the Ground Water SAP; 2014-2016 results were almost all below the detection limit.

Table 2. 2016 Ground Water Monitoring

			Upgradient				Downgradient & Crossgradient						
			GWQ25-6N60DR	GWQ25-6N60ER	GWQ25-W6		GWQ25-W8		GWQ25-5N62D	GWQ25-5N62E		GWQ25-W11	
			Clay	Till	Bedrock		Bedrock		Clay	Till		Bedrock	
	Units	Criteria***	Spring	Spring	Spring	Autumn	Spring	Autumn	Spring	Spring	Autumn	Spring	Autumn
Inorganic Parameters													
Alkalinity - Bicarbonate	mg/L		625	667	163	164	180	170	529	214	215	152	183
Alkalinity - Carbonate	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Hydroxide	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Total	mg/L		512	547	134	134	147	139	433	175	176	125	150
Dissolved Hardness (CaCO3)	mg/L		2260	1580	779	1350	2010	1250	3560	1460	1350	1150	1120
pH	units		6.96	6.97	7.46	7.65	7.41	7.48	6.82	7.42	7.49	7.45	7.55
Specific Conductivity	(µS/cm)		4560	4380	10200	10500	8560	8530	8650	8490	8260	8590	8830
Turbidity	(ntu)		40.4	209	16.6	14.2	1.12	10.9	17.8	564	497	4.72	21.1
Total Dissolved Solids	mg/L		3960	3470	6150	6380	5410	5190	6660	5050	4120	5190	5020
Total Suspended Solids	mg/L		310	610	340	300	330	590	460	1680	4990	480	500
Total Solids	mg/L		4270	4080	6490	6680	5740	5780	7120	6730	9110	5670	5520
Dissolved Chloride (Cl)	mg/L	2,300	450	380	3000	3000	2500	2500	2000	2500	2500	2500	2500
Dissolved Sulphate (SO4)	mg/L		2000	1450	1000	948	821	808	2470	837	772	716	718
Nutrients													
Ammonia - Dissolved	mg/L N		<0.003	0.161	1.23	1.39	1.04	1.06	0.140	0.898	1.07	0.934	1.08
Nitrate - Dissolved	mg/L N		13.0	0.445	0.023	<0.003	<0.003	<0.003	1.26	0.084	<0.003	<0.003	<0.003
Total Kjeldahl Nitrogen	mg/L N		2.0	1.0	2.0	1.9	1.0	1.4	2.0	2.0	1.6	1.0	1.2
Phosphorus - Dissolved	mg/L P		0.18	0.03	0.03	<0.01	<0.01	<0.01	0.04	<0.01	0.01	<0.01	<0.01
Other													
Cyanide - Total (CN)	mg/L	0.066		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			<0.0005	<0.0005	<0.0005
Organic Indicators													
Carbonaceous Oxygen Demand	mg/L		44	45	102	120	76	70	100	108	80	425	90
Biochemical Oxygen Demand	mg/L		<3	8.0	<3	<3	<3	<3	<3	<3	<3	<3	<3
Total Organic Carbon	mg/L		10.6	9.2	5.6	1.3	2.1	1.0	23.2	4.0	3.2	1.9	1.1
Metals													
Arsenic (As)- Dissolved	ug/L	1,900	0.394	2.48	0.385	2.63	0.413	0.470	1.40	5.71	2.95	5.37	3.85
Barium (Ba)- Dissolved	ug/L	29,000	9.08	9.15	8.98	11.4	80.6	10.8	15.0	11.9	11.5	15.8	14.9
Beryllium (Be)- Dissolved	ug/L	67	0.015	0.014	<0.010	<0.050	<0.010	<0.050	0.020	<0.010	<0.050	<0.010	<0.100
Cadmium (Cd)- Dissolved	ug/L	2.7	0.068	0.058	0.050	<0.025	<0.005	<0.025	0.365	0.024	<0.025	<0.005	<0.050
Calcium (Ca)- Dissolved	mg/L		572	376	177	313	803	280	917	318	309	263	252
Chromium (Cr)- Dissolved	ug/L	810	<0.10	0.30	0.17	<0.50	56.4	<0.50	<0.10	<0.10	<0.50	<0.10	<1.00
Copper (Cu)- Dissolved	ug/L	87	1.98	2.82	0.404	0.360	2.43	4.18	4.64	1.98	<0.250	0.076	<0.500
Iron (Fe)- Dissolved	ug/L		3.8	6.3	1.1	167	5.6	21.5	4.6	580	<5.0	438	56.0
Lead (Pb)- Dissolved	ug/L	25	0.037	0.059	0.019	<0.025	0.395	<0.025	0.077	0.073	<0.025	0.012	<0.050
Magnesium (Mg)- Dissolved	mg/L		201	155	81.7	138	272	134	310	161	141	120	119
Manganese (Mn)- Dissolved	ug/L		1,720	774	11.7	28.4	0.141	27.7	2,290	49.4	45.9	28.1	29.6
Mercury (Hg)- Total	ug/L	0.29 (2.8)	<0.010	<0.010	<0.010	<0.002**	<0.010	<0.002**	<0.010	<0.010	<0.002**	<0.010	<0.002**
Nickel (Ni)- Dissolved	ug/L	490	6.98	7.37	1.32	1.26	0.672	1.84	12.6	1.48	1.29	0.473	0.640
Potassium (K)- Dissolved	mg/L		9.67	8.15	21.3	38.8	17.1	31.1	13.2	32.7	30.4	33.9	32.2
Selenium (Se)- Dissolved	ug/L	63	0.182	0.122	<0.040	<0.200	0.673	<0.200	0.160	<0.040	<0.200	<0.040	<0.40
Silver (Ag)- Dissolved	ug/L	1.5	<0.005	<0.005	<0.005	<0.025	<0.005	<0.025	<0.005	<0.005	<0.025	<0.005	<0.050
Sodium (na)- Dissolved	mg/L	2,300	336	521	819	1460	478	1150	877	1290	1190	1270	1230
Zinc (Zn)- Dissolved	ug/L	1,100	3.59	3.88	22.9	3.28	14.1	7.33	10.2	5.94	1.31	0.770	2.80
Bacteria													
Total Coliforms (MTF)	MPN/100mL				<3	23	<3	<3				<3	<3
Fecal Coliforms (MTF)	MPN/100mL				<3	<3	<3	<3				<3	<3
E. coli (MTF)	MPN/100mL				<3	<3	<3	<3				<3	<3
Field Parameters													
pH	units		7.36	7.35	8.20	7.54	7.78	7.58	7.40	7.27	7.34	7.57	7.83
Specific Conductivity	(µS/cm)		2,330	3,190	5,017	na*	4,250	na*	4,640	890	5,305	3,723	3,203
Polycyclic Aromatic Hydrocarbons													
Naphthalene	µg/L	1400 (6400)	<0.05	<0.05	<0.05	<0.05	0.091	0.37		<0.05		<0.05	<0.05
Benzo(a)pyrene	µg/L	0.81	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01		<0.01	<0.01
Anthracene	µg/L	2.4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05
Petroleum Hydrocarbons													
F1 (C6-C10 Hydrocarbons)	µg/L	750	<25	<25	<25	<25	<25	<25		<25		<25	<25
F2 (C10-C16 Hydrocarbons)	µg/L	150	<100	<100	<100	<100	<100	<100		<100		<100	<100
F3 (C16-C34 Hydrocarbons)	µg/L	500	<200	<200	<200	<200	<200	<200		<200		<200	<200
F4 (C34-C50 Hydrocarbons)	µg/L	500	<200	<200	270	<200	430	290		<200		<200	<200
Benzene	µg/L	44 (430)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		<0.10		<0.10	<0.10
EthylBenzene	µg/L	2,300	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		<0.10		<0.10	<0.10
Toluene	µg/L	18,000	<0.20	<0.20	<0.20	<0.20	0.79	0.85		<0.20		<0.20	<0.20
Xylene (Total)	µg/L	4,200	<0.10	<0.10	<0.10	<0.10	<0.10	0.60		<0.10		<0.10	<0.10
Volatile Organic Carbons													
Vinyl chloride	µg/L	0.5 (1.7)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2		<0.2	<0.2
Pesticides													
Diazinon	µg/L		<2	<2	<2	<2	<2	<2		<2		<2	<2
Herbicides													
2,4-D	µg/L		<1	<1	<1	<1	<1	<1		<1		<1	<1

Note: Criteria from Ontario Ministry of the Environment. (2009, July 27). 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: Bracketed criteria are for till and clay.
Note: Criteria exceedences are highlighted in red.
*na - not analysed due to technician error
**dissolved mercury results, not analysed for total mercury
***criteria listed is for total chloride and total metals

Table 2. 2016 Ground Water Monitoring

			Downgradient & Crossgradient											
			GWQ25-W13A		GWQ25-W13		GWQ25-W14A		GWQ25-W14		GWQ25-W15A		GWQ25-W15	
			Till		Bedrock		Till		Bedrock		Till		Bedrock	
	Units	Criteria***	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn
Inorganic Parameters														
Alkalinity - Bicarbonate	mg/L		345	278	251	270	193	191	166	166	480	523	167	170
Alkalinity - Carbonate	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Hydroxide	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Total	mg/L		283	228	206	221	158	157	136	136	393	429	137	139
Dissolved Hardness (CaCO3)	mg/L		1060	1810	1630	1650	1040	1620	1120	1190	2570	2640	658	1590
pH	units		7.24	7.38	7.39	7.41	7.50	7.46	7.46	7.60	7.18	6.70	7.38	7.77
Specific Conductivity	(µS/cm)		8190	8190	8350	8240	7760	8190	8740	8760	7090	6880	7750	8240
Turbidity	(ntu)		3,230	5,020	1.56	5.82	9,480	706	1.49	9.08	503	1,450	5.31	6.87
Total Dissolved Solids	mg/L		5270	5160	5340	5080	4890	5270	5490	5110	5720	4610	4860	4890
Total Suspended Solids	mg/L		14030	16840	490	670	23310	2230	290	520	650	5490	240	460
Total Solids	mg/L		19300	22000	5830	5750	28200	7500	5780	5630	6370	10100	5100	5350
Dissolved Chloride (Cl)	mg/L	2,300	2100	2400	2400	2300	2200	2400	2600	2400	1300	1200	2300	2200
Dissolved Sulphate (SO4)	mg/L		1170	800	742	764	967	816	801	814	1640	1730	816	754
Nutrients														
Ammonia - Dissolved	mg/L N		0.576	0.942	0.965	1.07	1.13	1.07	1.05	1.06	0.909	0.850	0.853	0.989
Nitrate - Dissolved	mg/L N		0.295	0.027	<0.003	<0.003	0.012	<0.003	0.011	<0.003	0.074	0.010	<0.003	<0.003
Total Kjeldahl Nitrogen	mg/L N		1.0	2.4	1.0	1.4	2.0	1.7	1.0	1.5	2.0	2.5	2.0	1.3
Phosphorus - Dissolved	mg/L P		0.02	<0.01	<0.01	<0.01	0.22	<0.01	<0.01	<0.01	0.04	<0.01	0.04	<0.01
Other														
Cyanide - Total (CN)	mg/L	0.066	<0.0005		<0.0005	<0.0005	<0.0005		<0.0005	<0.0005	0.0007		<0.0005	<0.0005
Organic Indicators														
Carbonaceous Oxygen Demand	mg/L		380	490	153	80	582	250	111	90	151	290	75	80
Biochemical Oxygen Demand	mg/L		5	<5	nr*	<3	<3	<3	nr*	<3	<3	<3	<3	<3
Total Organic Carbon	mg/L		12.8	10.8	2.2	1.3	30.6	<5	2.2	2.2	37.5	22.0	3.9	1.2
Metals														
Arsenic (As)- Dissolved	ug/L	1,900	1.58	2.43	1.39	3.72	2.88	4.38	0.816	2.79	1.26	1.17	0.309	4.68
Barium (Ba)- Dissolved	ug/L	29,000	6.69	13.1	24.9	11.9	6.96	15.4	19.0	12.5	14.5	16.6	12.8	12.1
Beryllium (Be)- Dissolved	ug/L	67	0.028	<0.100	<0.010	<0.050	<0.010	<0.050	<0.010	<0.050	<0.010	<0.050	<0.010	<0.050
Cadmium (Cd)- Dissolved	ug/L	2.7	0.035	<0.050	0.024	<0.025	0.010	0.025	0.032	<0.025	0.059	0.252	<0.005	<0.025
Calcium (Ca)- Dissolved	mg/L		233	423	379	385	252	389	259	270	687	699	142	414
Chromium (Cr)- Dissolved	ug/L	810	<0.10	<1.00	0.68	<0.50	<0.10	<0.50	<0.10	<0.50	0.10	<0.50	0.12	<0.50
Copper (Cu)- Dissolved	ug/L	87	0.679	0.610	4.34	13.9	0.195	0.350	1.35	<0.250	0.433	7.08	0.443	7.08
Iron (Fe)- Dissolved	ug/L		24.4	<10.0	41.6	<5.0	340	<5.0	10.3	<5.0	188	<5.0	50.7	26.8
Lead (Pb)- Dissolved	ug/L	25	0.093	<0.050	0.019	<0.025	0.022	<0.025	0.026	<0.025	0.031	0.031	0.012	<0.025
Magnesium (Mg)- Dissolved	mg/L		115	184	165	168	99.5	156	116	125	207	216	73.8	135
Manganese (Mn)- Dissolved	ug/L		131	227	66.6	57.0	243	344	16.9	22.9	1,570	1,430	24.5	31.4
Mercury (Hg)- Total	ug/L	0.29 (2.8)	<0.010	<0.002**	<0.010	<0.002**	<0.010	<0.002**	<0.010	<0.002**	<0.010	<0.002**	<0.010	0.0034**
Nickel (Ni)- Dissolved	ug/L	490	1.70	2.15	3.76	2.10	1.51	2.83	1.77	1.20	6.67	7.64	2.50	1.29
Potassium (K)- Dissolved	mg/L		10.2	20.1	24.7	24.0	7.98	23.3	33.5	30.7	13.0	12.3	14.9	28.7
Selenium (Se)- Dissolved	ug/L	63	0.049	<0.400	0.079	<0.200	<0.040	<0.200	0.100	<0.200	0.074	<0.200	<0.040	<0.200
Silver (Ag)- Dissolved	ug/L	1.5	<0.005	<0.050	<0.005	<0.025	<0.005	<0.025	<0.005	<0.025	<0.0050	<0.025	<0.0050	<0.025
Sodium (na)- Dissolved	mg/L	2,300	553	1010	1020	1030	428	1070	1210	1140	516	538	576	1060
Zinc (Zn)- Dissolved	ug/L	1,100	1.49	1.10	49.5	1.59	7.13	0.720	44.2	1.60	3.85	6.64	0.82	2.20
Bacteria														
Total Coliforms (MTF)	MPN/100mL				23	<3			430	<3			23	<3
Fecal Coliforms (MTF)	MPN/100mL				<3	<3			<3	<3			<3	<3
E. coli (MTF)	MPN/100mL				<3	<3			<3	<3			<3	<3
Field Parameters														
pH	units		7.58	7.60	7.78	7.20	8.00	7.33	7.69	7.52	7.48	7.70	7.87	7.39
Specific Conductivity	(µS/cm)		4,470	4,570	3,727	5,120	3,570	3,110	4,187	6,630	2,945	2,770	3,913	8,227
Polycyclic Aromatic Hydrocarbons														
Naphthalene	µg/L	1400 (6400)	<0.05		<0.05	0.10	<0.05		<0.05	0.26	<0.05		<0.05	0.25
Benzo(a)pyrene	µg/L	0.81	<0.01		<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01	<0.01
Anthracene	µg/L	2.4	<0.05		<0.05	<0.05	<0.05		<0.05	<0.05	<0.05		<0.05	<0.05
Petroleum Hydrocarbons														
F1 (C6-C10 Hydrocarbons)	µg/L	750	<25		<25	130	<25		<25	<25	<25		950	180
F2 (C10-C16 Hydrocarbons)	µg/L	150	<100		<100	<100	<100		<100	<100	<100		<100	<100
F3 (C16-C34 Hydrocarbons)	µg/L	500	<200		<200	<200	<200		230	<200	<200		<200	<200
F4 (C34-C50 Hydrocarbons)	µg/L	500	<200		<200	<200	<200		560	<200	<200		<200	<200
Benzene	µg/L	44 (430)	<0.10		<0.10	<0.10	<0.10		<0.10	<0.10	<0.10		<5.0	<0.10
EthylBenzene	µg/L	2,300	<0.10		<0.10	<0.10	<0.10		<0.10	<0.10	<0.10		<5.0	<0.10
Toluene	µg/L	18,000	<0.20		<0.20	<0.20	<0.20		<0.20	<0.20	<0.20		<10	<0.20
Xylene (Total)	µg/L	4,200	<0.10		<0.10	0.37	<0.10		<0.10	0.50	<0.10		<5.0	0.15
Volatile Organic Carbons														
Vinyl chloride	µg/L	0.5 (1.7)	<0.2		<0.2	<0.2	<0.2		<0.2	<0.2	<0.2		<10	<0.2
Pesticides														
Diazinon	µg/L		<2		<2	<2	<2		<2	<2	<2		<2	<2
Herbicides														
2,4-D	µg/L		<1		<1	<1	<1		<1	<1	<1		<1	<1

Note: Criteria from Ontario Ministry of the Environment. (2009, July 27). 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: Bracketed criteria are for till and clay.
Note: Criteria exceedences are highlighted in red.
*nr - no result due to QC failure
**dissolved mercury results, not analysed for total mercury
***criteria listed is for total chloride and total metals

Table 2. 2016 Ground Water Monitoring

			Downgradient & Crossgradient									
			GWQ25-W16A		GWQ25-W16		GWQ25-6N63E	GWQ25-6N63F	GWQ25-W9		GWQ25-6N57DR	GWQ25-6N57FR
			Till		Bedrock		Clay	Till	Bedrock		Clay	Till
	Units	Criteria***	Spring	Autumn	Spring	Autumn	Spring	Spring	Spring	Autumn	Spring	Spring
Inorganic Parameters												
Alkalinity - Bicarbonate	mg/L		436	514	165	162	738	375	164	154	561	457
Alkalinity - Carbonate	mg/L		<0.50	<0.50	<0.50	<0.50	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Hydroxide	mg/L		<0.50	<0.50	<0.50	<0.50	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Total	mg/L		358	422	135	133	605	307	134	126	460	374
Dissolved Hardness (CaCO3)	mg/L		1830	1970	690	1270	2510	2440	1420	1370	2640	2120
pH	units		7.35	7.33	7.47	7.71	6.92	7.20	7.47	7.40	6.83	6.97
Specific Conductivity	(µS/cm)		5310	5460	8010	8320	6040	6540	9650	9860	6060	6070
Turbidity	(ntu)		6,600	19,400	612	69.6	13.9	813	10.6	13.5	26.3	210
Total Dissolved Solids	mg/L		3840	3730	4870	4830	5040	4520	5980	5900	5150	4450
Total Suspended Solids	mg/L		11160	57770	530	670	180	5070	410	330	270	21250
Total Solids	mg/L		15000	61500	5400	5500	5220	9590	6390	6230	5420	25700
Dissolved Chloride (Cl)	mg/L	2,300	1000	950	2300	2300	870	1400	2900	2800	830	1100
Dissolved Sulphate (SO4)	mg/L		1120	1130	813	766	1830	1180	905	899	1900	1480
Nutrients												
Ammonia - Dissolved	mg/L N		0.757	0.545	0.878	1.00	0.294	0.763	1.16	1.31	<0.003	0.867
Nitrate - Dissolved	mg/L N		0.158	1.10	0.450	<0.003	0.143	0.004	0.011	<0.003	1.76	0.012
Total Kjeldahl Nitrogen	mg/L N		4.0	20.4	2.0	1.2	1.0	2.0	2.9	1.7	2.0	2.0
Phosphorus - Dissolved	mg/L P		0.08	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Other												
Cyanide - Total (CN)	mg/L	0.066	<0.0005		<0.0005	<0.0005			<0.0005	<0.0005		
Organic Indicators												
Carbonaceous Oxygen Demand	mg/L		373	1200	78	90	58	99	104	110	61	136
Biochemical Oxygen Demand	mg/L		<3	<9	<3	<3	3	<3	<3	<3	<3	<3
Total Organic Carbon	mg/L		136.0	246.0	3.0	1.0	12.8	7.9	2.0	1.2	12.6	20.2
Metals												
Arsenic (As)- Dissolved	ug/L	1,900	0.655	2.44	0.775	3.74	0.559	4.72	7.23	4.27	0.536	0.647
Barium (Ba)- Dissolved	ug/L	29,000	11.9	20.8	10.1	11.5	10.7	10.1	11.6	11.3	9.4	10.3
Beryllium (Be)- Dissolved	ug/L	67	<0.010	<0.050	<0.010	<0.050	0.010	<0.010	<0.010	<0.100	<0.010	<0.010
Cadmium (Cd)- Dissolved	ug/L	2.7	0.065	0.126	0.0160	<0.025	0.252	0.109	0.018	<0.050	0.189	0.109
Calcium (Ca)- Dissolved	mg/L		471	497	146	276	606	527	325	309	687	533
Chromium (Cr)- Dissolved	ug/L	810	<0.10	<0.50	0.10	<0.50	<0.10	<0.10	<0.10	<1.0	<0.10	<0.10
Copper (Cu)- Dissolved	ug/L	87	0.524	8.90	0.201	8.95	3.43	0.667	0.060	<0.50	2.28	0.906
Iron (Fe)- Dissolved	ug/L		89.1	8.7	39.8	23.8	6.0	1,370	915	173	5.7	15.1
Lead (Pb)- Dissolved	ug/L	25	0.047	<0.025	0.021	<0.025	<0.005	0.025	0.028	<0.050	0.031	0.037
Magnesium (Mg)- Dissolved	mg/L		159	176	79.0	142	243	274	148	144	224	191
Manganese (Mn)- Dissolved	ug/L		747	818	27.7	34.2	1,970	207	20.6	20.7	2,220	533
Mercury (Hg)- Total	ug/L	0.29 (2.8)	<0.010	<0.002*	<0.010	0.0033*	<0.010	<0.010	<0.010	<0.002*	<0.010	<0.010
Nickel (Ni)- Dissolved	ug/L	490	4.13	5.74	1.72	1.38	11.0	3.56	1.47	1.18	9.65	5.46
Potassium (K)- Dissolved	mg/L		9.48	9.21	15.3	29.9	9.86	10.4	37.0	34.9	11.4	12.2
Selenium (Se)- Dissolved	ug/L	63	0.105	<0.200	0.048	<0.200	0.501	0.050	<0.040	<0.400	0.265	0.067
Silver (Ag)- Dissolved	ug/L	1.5	<0.005	<0.025	<0.005	<0.025	<0.005	<0.005	<0.005	<0.050	<0.005	<0.005
Sodium (na)- Dissolved	mg/L	2,300	391	463	567	1090	574	500	1430	1370	553	576
Zinc (Zn)- Dissolved	ug/L	1,100	2.46	10.7	10.7	2.83	8.02	1.52	0.51	<1.00	6.05	40.2
Bacteria												
Total Coliforms (MTF)	MPN/100mL				9	<3			<3	<3		
Fecal Coliforms (MTF)	MPN/100mL				9	<3			<3	<3		
E. coli (MTF)	MPN/100mL				9	<3			<3	<3		
Field Parameters												
pH	units		7.61	7.60	7.73	7.50	7.47	7.47	7.83	7.80	7.51	7.56
Specific Conductivity	(µS/cm)		3,755	2,250	3,725	6,280	1,703	3,650	5,960	3,557	3,010	2,960
Polycyclic Aromatic Hydrocarbons												
Naphthalene	µg/L	1400 (6400)	<0.05		<0.05	0.24			<0.05	<0.05		
Benzo(a)pyrene	µg/L	0.81	<0.01		<0.01	<0.01			<0.01	<0.01		
Anthracene	µg/L	2.4	<0.05		<0.05	<0.05			<0.05	<0.05		
Petroleum Hydrocarbons												
F1 (C6-C10 Hydrocarbons)	µg/L	750	<25		380	320			<25	<25		
F2 (C10-C16 Hydrocarbons)	µg/L	150	<100		<100	<100			<100	<100		
F3 (C16-C34 Hydrocarbons)	µg/L	500	<200		<200	<200			<200	370		
F4 (C34-C50 Hydrocarbons)	µg/L	500	<200		<200	<200			<200	<200		
Benzene	µg/L	44 (430)	<0.10		<1.0	<0.10			<0.10	<0.10		
EthylBenzene	µg/L	2,300	<0.10		<1.0	<0.10			<0.10	<0.10		
Toluene	µg/L	18,000	<0.20		<2.0	<0.20			<0.20	<0.20		
Xylene (Total)	µg/L	4,200	<0.10		<1.0	0.48			<0.10	<0.10		
Volatile Organic Carbons												
Vinyl chloride	µg/L	0.5 (1.7)	<0.2		<2	<0.2			<0.2	<0.2		
Pesticides												
Diazinon	µg/L		<2		<2	<2			<2	<2		
Herbicides												
2,4-D	µg/L		<1		<1	<1			<1	<1		

Note: Criteria from Ontario Ministry of the Environment. (2009, July 27). 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: Bracketed criteria are for till and clay.
Note: Criteria exceedences are highlighted in red.
*dissolved mercury results, not analysed for total mercury
***criteria listed is for total chloride and total metals

Table 2. 2016 Ground Water Monitoring

			Downgradient & Crossgradient									
			GWQ25-W10		GWQ25-W7		GWQ25-6N67E	GWQ25-6N67F	GWQ25-W12		GWQ25-4N34B	GWQ25-4N34DR
			Bedrock		Bedrock		Clay	Till	Bedrock		Clay	Till
	Units	Criteria***	Spring	Autumn	Spring	Autumn	Spring	Spring	Spring	Autumn	Spring	Spring
Inorganic Parameters												
Alkalinity - Bicarbonate	mg/L		156	161	146	150	548	471	167	173	828	504
Alkalinity - Carbonate	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Hydroxide	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Total	mg/L		128	132	120	123	449	386	137	142	679	413
Dissolved Hardness (CaCO3)	mg/L		1310	1220	1000	968	2230	1930	1350	1330	3090	2700
pH	units		7.61	7.41	11.30	7.60	6.92	7.03	7.20	7.50	7.21	7.34
Specific Conductivity	(µS/cm)		9140	9160	na*	6990	4720	4400	8810	8720	6060	6020
Turbidity	(ntu)		12.0	20.1	17.0	11.5	23.8	17.8	5.25	5.35	137	905
Total Dissolved Solids	mg/L		5640	5670	3240	3960	3900	3360	5470	5170	5680	5560
Total Suspended Solids	mg/L		330	270	410	510	360	400	50	500	420	2230
Total Solids	mg/L		5970	5940	3650	4470	4260	3760	5520	5670	6100	7790
Dissolved Chloride (Cl)	mg/L	2,300	2600	2600	2100	1900	620	690	2600	2500	620	480
Dissolved Sulphate (SO4)	mg/L		801	795	583	596	1460	1140	807	806	2870	3120
Nutrients												
Ammonia - Dissolved	mg/L N		1.27	1.19	1.21	1.84	<0.003	<0.003	0.989	1.10	0.049	0.248
Nitrate - Dissolved	mg/L N		<0.003	<0.003	0.087	<0.003	0.071	0.026	<0.003	<0.003	0.072	0.652
Total Kjeldahl Nitrogen	mg/L N		1.0	1.5	3.4	2.4	1.0	1.0	1.0	1.5	<1	1.0
Phosphorus - Dissolved	mg/L P		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03
Other												
Cyanide - Total (CN)	mg/L	0.066	<0.0005		<0.0005				<0.0005			<0.0005
Organic Indicators												
Carbonaceous Oxygen Demand	mg/L		na*	100	66	50	46	33	na*	80	76	70
Biochemical Oxygen Demand	mg/L		<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Total Organic Carbon	mg/L		2.1	1.1	9.7	1.4	10.4	5.5	2.1	1.6	35.3	59.1
Metals												
Arsenic (As)- Dissolved	ug/L	1,900	5.10	2.84	0.417	1.19	0.794	0.568	4.71	2.50	0.678	0.877
Barium (Ba)- Dissolved	ug/L	29,000	12.8	12.1	46.3	11.3	13.5	15.4	11.9	12.4	11.0	11.6
Beryllium (Be)- Dissolved	ug/L	67	<0.010	<0.100	<0.010	<0.050	<0.010	<0.010	<0.010	<0.050	<0.010	<0.010
Cadmium (Cd)- Dissolved	ug/L	2.7	<0.005	<0.050	<0.005	<0.025	0.236	0.102	<0.005	<0.025	0.091	0.027
Calcium (Ca)- Dissolved	mg/L		304	286	383	215	567	412	302	302	602	460
Chromium (Cr)- Dissolved	ug/L	810	<0.10	<1.00	47.5	<0.50	<0.10	<0.10	<0.10	<0.50	0.16	<0.10
Copper (Cu)- Dissolved	ug/L	87	0.073	0.510	1.31	0.780	3.35	3.33	0.177	1.33	2.17	3.44
Iron (Fe)- Dissolved	ug/L		909	160	2.9	<5.0	7.3	5.3	547	<5.0	71.5	6.8
Lead (Pb)- Dissolved	ug/L	25	0.035	<0.050	0.018	<0.025	0.134	0.081	0.007	<0.025	0.067	0.100
Magnesium (Mg)- Dissolved	mg/L		133	123	11.5	105	199	219	144	139	384	375
Manganese (Mn)- Dissolved	ug/L		14.9	12.8	<0.050	8.08	1,400	290	28.6	36.1	133	72.7
Mercury (Hg)- Total	ug/L	0.29 (2.8)	<0.010	<0.002***	<0.010	<0.002***	<0.010	<0.010	<0.010	<0.002***	<0.010	<0.010
Nickel (Ni)- Dissolved	ug/L	490	1.43	1.15	0.734	0.290	8.02	4.74	1.34	1.35	14.8	7.48
Potassium (K)- Dissolved	mg/L		37.2	33.1	19.7	27.0	9.19	8.81	35.1	32.5	10.5	16.0
Selenium (Se)- Dissolved	ug/L	63	<0.040	<0.400	0.128	<0.200	0.207	0.058	<0.040	<0.200	0.236	0.136
Silver (Ag)- Dissolved	ug/L	1.5	<0.005	<0.050	<0.005	<0.025	<0.005	<0.005	<0.005	<0.025	<0.005	0.007
Sodium (na)- Dissolved	mg/L	2,300	1370	1240	597	916	323	291	1320	1250	331	459
Zinc (Zn)- Dissolved	ug/L	1,100	0.45	<1.00	0.55	0.80	5.08	11.2	0.97	1.65	2.20	4.12
Bacteria												
Total Coliforms (MTF)	MPN/100mL		4		<3	<3			<3	<3		
Fecal Coliforms (MTF)	MPN/100mL		<3		<3	<3			<3	<3		
E. coli (MTF)	MPN/100mL		<3		<3	<3			<3	<3		
Field Parameters												
pH	units		7.47	7.58	8.22	7.66	7.45	7.45	7.73	7.09	7.33	7.43
Specific Conductivity	(µS/cm)		8,587	6,977	na**	5,625	1,143	1,345	6,030	na**	3,837	4,495
Polycyclic Aromatic Hydrocarbons												
Naphthalene	µg/L	1400 (6400)	<0.05		<0.05				<0.05			<0.05
Benzo(a)pyrene	µg/L	0.81	<0.01		<0.01				<0.01			<0.01
Anthracene	µg/L	2.4	<0.05		<0.05				<0.05			<0.05
Petroleum Hydrocarbons												
F1 (C6-C10 Hydrocarbons)	µg/L	750	<25		<25				<25			<25
F2 (C10-C16 Hydrocarbons)	µg/L	150	<100		<100				<100			<100
F3 (C16-C34 Hydrocarbons)	µg/L	500	<200		<200				<200			<200
F4 (C34-C50 Hydrocarbons)	µg/L	500	<200		<200				<200			<200
Benzene	µg/L	44 (430)	<0.10		<0.10				<0.10			<0.10
EthylBenzene	µg/L	2,300	<0.10		<0.10				<0.10			<0.10
Toluene	µg/L	18,000	<0.20		<0.20				<0.20			<0.20
Xylene (Total)	µg/L	4,200	<0.10		<0.10				<0.10			<0.10
Volatile Organic Carbons												
Vinyl chloride	µg/L	0.5 (1.7)	<0.2		<0.2				<0.2			<0.2
Pesticides												
Diazinon	µg/L		<2		<2				<2			<2
Herbicides												
2,4-D	µg/L		<1		<1				<1			<1

Note: Criteria from Ontario Ministry of the Environment. (2009, July 27). 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: Bracketed criteria are for till and clay.
Note: Criteria exceedences are highlighted in red.
*na - not analysed due to insufficient sample volume
**na - not analysed due to technician error
***dissolved mercury results, not analysed for total mercury
***criteria listed is for total chloride and total metals

Table 2. 2016 Ground Water Monitoring

			Downgradient & Crossgradient								
			GWQ25-4N34C	GWQ25-6N58DR	GWQ25-6N58FR	GWQ25-W4		GWQ25-6N59DR	GWQ25-6N59FR	GWQ25-W5	
			Clay	Till	Till	Bedrock		Clay	Till	Bedrock	
	Units	Criteria***	Spring	Spring	Spring	Spring	Autumn	Spring	Spring	Spring	Autumn
Inorganic Parameters											
Alkalinity - Bicarbonate	mg/L		709	592	330	96	96	583	667	158	162
Alkalinity - Carbonate	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Hydroxide	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Total	mg/L		581	485	270	79	79	478	547	129	133
Dissolved Hardness (CaCO3)	mg/L		1730	3270	2220	846	835	2900	1580	1380	1320
pH	units		7.21	6.80	7.23	7.77	7.83	6.85	6.95	7.45	7.50
Specific Conductivity	(µS/cm)		4440	6450	6180	7540	7460	6000	6360	8410	8480
Turbidity	(ntu)		3220	44.8	3,340	29.9	37.8	90.3	93.3	10.1	10.2
Total Dissolved Solids	mg/L		3480	5220	4440	4270	4190	4860	4740	5120	4890
Total Suspended Solids	mg/L		6500	480	22160	320	270	540	430	380	670
Total Solids	mg/L		9980	5700	26600	4590	4460	5400	5170	5500	5560
Dissolved Chloride (Cl)	mg/L	2,300	620	1000	1300	2200	2200	930	380	2300	2400
Dissolved Sulphate (SO4)	mg/L		1150	2240	1240	520	526	2030	1450	830	817
Nutrients											
Ammonia - Dissolved	mg/L N		0.602	0.177	1.19	0.713	0.781	<0.003	0.059	0.909	0.998
Nitrate - Dissolved	mg/L N		0.073	0.998	<0.003	0.007	<0.003	1.38	0.913	<0.003	<0.003
Total Kjeldahl Nitrogen	mg/L N		3.0	2.0	2.0	2.6	<1.1	2.0	1.0	3.8	1.2
Phosphorus - Dissolved	mg/L P		<0.01	0.03	0.07	<0.01	<0.01	0.02	0.03	<0.01	<0.01
Other											
Cyanide - Total (CN)	mg/L	0.066				<0.0005	<0.0005			<0.0005	
Organic Indicators											
Carbonaceous Oxygen Demand	mg/L		440	86	7	80	70	75	67	81	80
Biochemical Oxygen Demand	mg/L		<3	<3	<3	<3	<3	<3	<3	<3	<3
Total Organic Carbon	mg/L		42.9	26.3	37.2	2.3	0.7	16.9	11.0	2.2	1.3
Metals											
Arsenic (As)- Dissolved	ug/L	1,900	0.912	0.214	0.622	0.148	<0.100	0.230	0.526	5.11	3.35
Barium (Ba)- Dissolved	ug/L	29,000	22.5	5.51	6.42	10.5	10.5	5.54	6.22	13.7	14.0
Beryllium (Be)- Dissolved	ug/L	67	<0.010	<0.010	<0.010	<0.010	<0.050	<0.010	<0.010	<0.010	<0.050
Cadmium (Cd)- Dissolved	ug/L	2.7	0.049	0.145	0.011	0.050	<0.025	0.085	0.148	<0.005	<0.025
Calcium (Ca)- Dissolved	mg/L		351	857	412	192	191	791	598	303	296
Chromium (Cr)- Dissolved	ug/L	810	0.15	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.50
Copper (Cu)- Dissolved	ug/L	87	1.91	1.95	0.180	0.197	6.06	1.43	0.802	<0.050	5.19
Iron (Fe)- Dissolved	ug/L		2.70	3.50	163	2,300	<5.00	<1.00	8.90	624	82.7
Lead (Pb)- Dissolved	ug/L	25	0.038	0.037	<0.005	0.044	<0.025	0.020	0.034	0.008	<0.025
Magnesium (Mg)- Dissolved	mg/L		207	273	290	88.9	87.1	225	177	151	142
Manganese (Mn)- Dissolved	ug/L		693	2,070	46.3	32.1	34.6	1,180	514	22.2	27.8
Mercury (Hg)- Total	ug/L	0.29 (2.8)	<0.010	<0.010	<0.010	<0.010	<0.002**	<0.010	<0.010	<0.010	<0.002**
Nickel (Ni)- Dissolved	ug/L	490	6.06	7.33	1.44	0.169	0.630	4.37	3.50	1.19	1.26
Potassium (K)- Dissolved	mg/L		10.4	12.7	12.3	27.4	26.5	11.6	11.0	32.8	30.5
Selenium (Se)- Dissolved	ug/L	63	0.377	0.085	<0.040	<0.040	<0.200	0.120	0.087	<0.040	<0.200
Silver (Ag)- Dissolved	ug/L	1.5	<0.005	<0.005	<0.005	<0.005	<0.025	<0.005	<0.005	<0.005	<0.025
Sodium (na)- Dissolved	mg/L	2,300	239	554	532	1100	1060	495	702	1180	1110
Zinc (Zn)- Dissolved	ug/L	1,100	4.24	15.4	0.660	0.670	1.83	4.22	7.44	38.0	17.1
Bacteria											
Total Coliforms (MTF)	MPN/100mL					<3	<3			<3	
Fecal Coliforms (MTF)	MPN/100mL					<3	<3			<3	
E. coli (MTF)	MPN/100mL					<3	<3			<3	
Field Parameters											
pH	units		7.25	7.30	na*	8.43	8.37	7.24	7.20	7.97	7.93
Specific Conductivity	(µS/cm)		4,240	2,310	na*	5,233	2,853	4,327	1,950	5,657	3,077
Polycyclic Aromatic Hydrocarbons											
Naphthalene	µg/L	1400 (6400)				<0.05	<0.05			<0.05	
Benzo(a)pyrene	µg/L	0.81				<0.01	<0.01			<0.01	
Anthracene	µg/L	2.4				<0.05	<0.05			<0.05	
Petroleum Hydrocarbons											
F1 (C6-C10 Hydrocarbons)	µg/L	750				<25	<25			<25	
F2 (C10-C16 Hydrocarbons)	µg/L	150				<100	<100			<100	
F3 (C16-C34 Hydrocarbons)	µg/L	500				<200	<200			<200	
F4 (C34-C50 Hydrocarbons)	µg/L	500				<200	<200			<200	
Benzene	µg/L	44 (430)				<0.10	<0.10			<0.10	
EthylBenzene	µg/L	2,300				<0.10	<0.10			<0.10	
Toluene	µg/L	18,000				<0.20	<0.20			<0.20	
Xylene (Total)	µg/L	4,200				<0.10	<0.10			<0.10	
Volatile Organic Carbons											
Vinyl chloride	µg/L	0.5 (1.7)				<0.2	<0.2			<0.2	
Pesticides											
Diazinon	µg/L					<2	<2			<2	
Herbicides											
2,4-D	µg/L					<1	<1			<1	

Note: Criteria from Ontario Ministry of the Environment. (2009, July 27). 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: Bracketed criteria are for till and clay.
Note: Criteria exceedences are highlighted in red.
*na - not analysed due to technician error
**dissolved mercury results, not analysed for total mercury
***criteria listed is for total chloride and total metals

Table 3. 2016 Upgradient Ground Water Quality Comparison

	Units	Criteria*	2014		2015		2016	
			Average	Maximum	Average	Maximum	Average	Maximum
Inorganic Parameters								
Alkalinity - Bicarbonate	mg/L		359	582	399	606	405	667
Alkalinity - Carbonate	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Hydroxide	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Total	mg/L		294	477	327	496	332	547
Dissolved Hardness (CaCO3)	mg/L		1,680	2,110	1,830	2,640	1,492	2,260
pH	units		7.88	8.23	7.22	7.56	7.26	7.65
Specific Conductivity	(µS/cm)		6,910	9,700	6,482	10,400	7,410	10,500
Turbidity	(ntu)		112	370	391	1,760	70.1	209
Total Dissolved Solids	mg/L		5,305	7,020	4,956	6,860	4,990	6,380
Total Suspended Solids	mg/L		1,068	2,120	868	3,600	390	610
Total Solids	mg/L		6,373	7,240	5,824	7,220	5,380	6,680
Dissolved Chloride (Cl)	mg/L	2,300	1,270	3,200	1,438	3,000	1,708	3,000
Dissolved Sulphate (SO4)	mg/L		1,139	1,680	1,283	1,710	1,350	2,000
Nutrients								
Ammonia - Dissolved	mg/L N		0.879	1.46	0.739	1.37	0.696	1.39
Nitrate - Dissolved	mg/L N		0.407	1.57	0.318	1.35	3.40	13.0
Total Kjeldahl Nitrogen	mg/L N		2.5	3.6	1.8	3.5	1.7	2.0
Phosphorus - Dissolved	mg/L P		na	na	0.02	0.03	0.06	0.18
Other								
Cyanide - Total (CN)	mg/L	0.066	<0.00050	<0.00050	<0.00050	0.00083	<0.00050	<0.00050
Organic Indicators								
Carbonaceous Oxygen Demand	mg/L		100	155	115	290	78	120
Biochemical Oxygen Demand	mg/L		<3	<3	3	7	3	8
Total Organic Carbon	mg/L		11	24	26	106	7	11
Metals								
Arsenic (As)- Dissolved	ug/L	1,900	3.27	5.29	3.48	6.34	1.47	2.63
Barium (Ba)- Dissolved	ug/L	29,000	15.0	24.5	13.6	15.6	9.65	11.4
Beryllium (Be)- Dissolved	ug/L	67	<0.20	<0.20	<0.010	<0.010	<0.050	<0.050
Cadmium (Cd)- Dissolved	ug/L	2.7	<0.10	<0.10	0.056	0.143	0.047	0.068
Calcium (Ca)- Dissolved	mg/L		389	536	446	700	360	572
Chromium (Cr)- Dissolved	ug/L	810	<2.0	<2.0	<0.10	<0.10	<0.50	<0.50
Copper (Cu)- Dissolved	ug/L	87	1.62	2.40	1.91	3.19	1.39	2.82
Iron (Fe)- Dissolved	ug/L		674	1,570	567	1,400	44.6	167
Lead (Pb)- Dissolved	ug/L	25	0.353	0.927	0.105	0.226	0.0319	0.0590
Magnesium (Mg)- Dissolved	mg/L		172	187	174	216	144	201
Manganese (Mn)- Dissolved	ug/L		467	1,550	555	1,680	634	1,720
Mercury (Hg)- Total	ug/L	0.29 (2.8)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel (Ni)- Dissolved	ug/L	490	5.1	9.5	5.0	7.5	4.23	7.37
Potassium (K)- Dissolved	mg/L		28.4	45.5	24.0	45.9	19.5	38.8
Selenium (Se)- Dissolved	ug/L	63	<0.80	<0.80	0.13	0.38	<0.20	<0.20
Silver (Ag)- Dissolved	ug/L	1.5	<0.10	<0.10	<0.005	<0.005	<0.025	<0.025
Sodium (na)- Dissolved	mg/L	2,300	1,014	1,750	1,007	1,790	784	1,460
Zinc (Zn)- Dissolved	ug/L	1,100	5.3	10.6	12.8	34.5	8.41	22.9
Bacteria								
Total Coliforms (MTF)	MPN/100mL		<3	<3	<3	<3	12	23
Fecal Coliforms (MTF)	MPN/100mL		<3	<3	<3	<3	<3	<3
E. coli (MTF)	MPN/100mL		<3	<3	<3	<3	<3	<3
Field Parameters								
pH	units		6.69	7.51	7.33	7.94	7.61	8.20
Specific Conductivity	(µS/cm)		7,073	9,995	4,759	9,995	3,512	5,017
Polycyclic Aromatic Hydrocarbons								
Naphthalene	µg/L	1400 (6400)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(a)pyrene	µg/L	0.81	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	µg/L	2.4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Petroleum Hydrocarbons								
F1 (C6-C10 Hydrocarbons)	µg/L	750	<25	<25	<25	<25	<25	<25
F2 (C10-C16 Hydrocarbons)	µg/L	150	<100	<100	<100	<100	<100	<100
F3 (C16-C34 Hydrocarbons)	µg/L	500	<200	<200	<200	<200	<200	<200
F4 (C34-C50 Hydrocarbons)	µg/L	500	<200	<200	<200	<200	<200	270
Benzene	µg/L	44 (430)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
EthylBenzene	µg/L	2,300	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	18,000	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene (Total)	µg/L	4,200	<0.10	0.13	<0.10	<0.10	<0.10	<0.10
Volatile Organic Carbons								
Vinyl chloride	µg/L	0.5 (1.7)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Pesticides								
Diazinon	µg/L		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Herbicides								
2,4-D	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Note: Criteria from Ontario Ministry of the Environment. (2009, July 27). 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.
Note: Bracketed criteria are for till and clay.
Note: Criteria exceedences are highlighted in red.
** criteria listed is for total chloride and total

Table 3. 2016 Downgradient and Crossgradient Ground Water Quality Comparison

	Units	Criteria*	2014		2015		2016	
			Average	Maximum	Average	Maximum	Average	Maximum
Inorganic Parameters								
Alkalinity - Bicarbonate	mg/L		293	820	272	783	318	828
Alkalinity - Carbonate	mg/L		<0.5	<0.5	<0.50	<0.50	<0.50	<0.50
Alkalinity - Hydroxide	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Total	mg/L		240	672	223	642	261	679
Dissolved Hardness (CaCO3)	mg/L		2,056	5,080	1,910	3,660	1,707	3,560
pH	units		7.79	8.37	7.42	9.00	7.41	11.30
Specific Conductivity	(µS/cm)		7,098	9,170	7,159	9,910	7,510	9,860
Turbidity	(ntu)		1,226	19,500	1,871	16,100	1,194	19,400
Total Dissolved Solids	mg/L		5,729	7,450	5,266	7,370	4,906	6,660
Total Suspended Solids	mg/L		3,967	33,830	4,911	42,950	4,357	57,770
Total Solids	mg/L		9,696	38,800	10,177	48,400	9,263	61,500
Dissolved Chloride (Cl)	mg/L	2,300	1,529	2,900	1,801	2,800	1,860	2,900
Dissolved Sulphate (SO4)	mg/L		1,128	2,930	1,072	3,130	1,141	3,120
Nutrients								
Ammonia - Dissolved	mg/L N		0.98	1.81	0.83	1.29	0.804	1.84
Nitrate - Dissolved	mg/L N		0.196	2.11	0.105	1.94	0.203	1.76
Total Kjeldahl Nitrogen	mg/L N		3.5	11.2	3.1	11.4	2.1	20.4
Phosphorus - Dissolved	mg/L P		na*	na*	0.03	0.09	<0.02	0.22
Other								
Cyanide - Total (CN)	mg/L	0.066	<0.0050	<0.0050	<0.0050	<0.0050	<0.00050	0.00065
Organic Indicators								
Carbonaceous Oxygen Demand	mg/L		226	326	159	710	163	1200
Biochemical Oxygen Demand	mg/L		<3	<3	3	>33	<3	5
Total Organic Carbon	mg/L		79	543	26.4	456	18.3	246
Metals								
Arsenic (As)- Dissolved	ug/L	1,900	3.03	10.0	3.15	9.17	2.17	7.23
Barium (Ba)- Dissolved	ug/L	29,000	24.2	209	19.0	97.1	14.5	80.6
Beryllium (Be)- Dissolved	ug/L	67	0.11	1.64	<0.010	0.055	0.015	<0.10
Cadmium (Cd)- Dissolved	ug/L	2.7	0.113	1.03	0.092	2.12	0.060	0.37
Calcium (Ca)- Dissolved	mg/L		505	1,520	452	976	414	917
Chromium (Cr)- Dissolved	ug/L	810	2.40	54.3	2.41	59.1	2.33	56.4
Copper (Cu)- Dissolved	ug/L	87	1.99	21.9	1.21	4.45	2.31	13.9
Iron (Fe)- Dissolved	ug/L		1,539	15,300	441	2,800	195	2,300
Lead (Pb)- Dissolved	ug/L	25	1.07	30.1	0.047	0.404	0.039	0.395
Magnesium (Mg)- Dissolved	mg/L		193	430	190	536	172	384
Manganese (Mn)- Dissolved	ug/L		646	3,600	452	3,830	414	2,290
Mercury (Hg)- Total	ug/L	0.29 (2.8)	0.004	0.021	0.004	0.014	<0.010	<0.010
Nickel (Ni)- Dissolved	ug/L	490	5.9	31.3	3.7	14.0	3.5	14.8
Potassium (K)- Dissolved	mg/L		23.9	42.7	23.7	40.0	21.2	37.2
Selenium (Se)- Dissolved	ug/L	63	0.37	3.48	0.15	0.83	0.12	0.67
Silver (Ag)- Dissolved	ug/L	1.5	<0.10	<0.10	<0.005	0.011	0.007	0.025
Sodium (na)- Dissolved	mg/L	2,300	905	1,610	951	1,600	838	1,430
Zinc (Zn)- Dissolved	ug/L	1,100	11.2	86.6	9.6	55.8	7.6	49.5
Bacteria								
Total Coliforms (MTF)	MPN/100mL		5	43	128	930	23	430
Fecal Coliforms (MTF)	MPN/100mL		<3	<3	16	230	<3	9
E. coli (MTF)	MPN/100mL		<3	<3	16	230	<3	9
Field Parameters								
pH	units		6.64	7.97	7.26	8.48	7.60	8.43
Specific Conductivity	(µS/cm)		7,229	9,465	5,372	9,900	4,086	8,587
Polycyclic Aromatic Hydrocarbons								
Naphthalene	µg/L	1400 (6400)	0.040	0.160	0.111	1.10	0.070	0.37
Benzo(a)pyrene	µg/L	0.81	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	µg/L	2.4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Petroleum Hydrocarbons								
F1 (C6-C10 Hydrocarbons)	µg/L	750	<25	<25	176	1500	85	950
F2 (C10-C16 Hydrocarbons)	µg/L	150	<100	<100	<100	<100	<100	<100
F3 (C16-C34 Hydrocarbons)	µg/L	500	<200	<200	<200	<200	<200	370
F4 (C34-C50 Hydrocarbons)	µg/L	500	<200	<200	<200	<200	<200	560
Benzene	µg/L	44 (430)	<10	<10	<10	<10	<5	<5
EthylBenzene	µg/L	2,300	<10	<10	<10	<10	<5	<5
Toluene	µg/L	18,000	0.21	1.70	<20	<20	0.38	<10
Xylene (Total)	µg/L	4,200	<0.10	0.17	<10	<10	0.23	<5
Volatile Organic Carbons								
Vinyl chloride	µg/L	0.5 (1.7)	<0.20	<0.20	1.15	<20	<10	<10
Pesticides								
Diazinon	µg/L		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Herbicides								
2,4-D	µg/L		<2.0	<2.0	<2.0	<2.0	<1.0	<1.0

Note: Criteria from Ontario Ministry of the Environment. (2009, July 27). 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.
Note: Bracketed criteria are for till and clay.
Note: Criteria exceedences are highlighted in red.
**criteria listed is for total chloride and total

5.2 SURFACE WATER

The BRRMF surface water management 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 fall run-off.

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 and at the weir, with modifications at other locations interior to the site. Sampling for the clean water ponds is similar to sampling for perimeter ditching. Sampling for impacted water ponds (Active Area Collection Pond, Biosolids Storm Water Pond, and Leaf and Yard Waste Storm Water Pond) and dry ponds is performed only prior to discharge events. Weekly field monitoring is performed at the weir from spring thaw to freeze-up.

In 2016, a total of 34 surface water samples were analyzed – 6 upstream samples, 21 samples downstream and intermediate to the site, and 7 pond samples. Because the pond samples did not meet discharge criteria, the water was retained in the ponds or hauled to the City's North End Pollution Control Centre (NEWPCC) for further treatment. There were no deviations from the Surface Water SAP or from normal sample collection and preservation practices apart from dissolved mercury was analysed instead of total mercury. Weekly weir data is provided in Table 4 and a summary of the 2016 surface water results are provided in Table 5.

The analytical results for surface water obtained in 2016 were found to be highly variable compared to those obtained in 2014 and 2015. A comparison of the average and maximum values obtained in 2014, 2015, and 2016 are provided in Table 6. The data collected in 2016 will be used to enhance the existing surface water quality data in order to better evaluate trends. Statistical analyses of background surface water quality data are attached in Appendix C. The Contingency Action Plan required under Clause 125 was not implemented in 2016.

At this time we have no recommendations for changes in the surface water monitoring program.

Table 4. 2016 Weekly Weir Data

Date	Flow (m/s)	pH (units)	Conductivity (m/s)	DO	Temp (°C)
4-Apr-16	0.0	6.80	0.59	13.0	2.9
11-Apr-16	0.0	8.03	0.63	12.3	5.3
17-Apr-16	0.1	8.30	0.75	11.8	5.6
25-Apr-16	0.0	8.90	0.67	14.0	9.6
2-May-16	0.1	9.00	0.63	10.8	16.6
10-May-16	0.0	9.30	0.66	8.8	13.8
17-May-16	0.0	9.83	0.40	16.2	21.6
25-May-16	0.0	9.10	0.01	17.5	21.6
30-May-16	0.0	8.80	0.02	16.4	20.5
6-Jun-16	0.0	8.70	1.06	19.9	21.4
14-Jun-16	0.0	8.60	1.13	14.9	25.4
21-Jun-16	0.0	7.60	1.00	8.6	20.0
28-Jun-16	0.0	8.80	1.03	8.6	24.0
4-Jul-16	0.0	8.20	1.29	6.8	24.0
11-Jul-16	0.0	8.06	2.08	1.5	22.8
25-Jul-16	0.0	7.10	1.03	14.1	27.1
2-Aug-16	0.0	7.81	1.18	11.1	28.1
9-Aug-16	0.0	8.10	1.32	1.2	20.7
15-Aug-16	0.0	8.00	1.34	1.4	18.4
22-Aug-16	0.0	8.11	1.48	9.4	20.3
29-Aug-16	0.1	8.68	1.49	14.9	25.2
8-Sep-16	0.0	7.86	1.44	4.6	16.9
12-Sep-16	0.0	7.67	1.61	3.0	16.4
19-Sep-16	0.0	7.75	1.86	5.3	14.2
27-Sep-16	0.0	8.27	1.27	8.3	9.1
3-Oct-16	0.1	9.09	1.73	6.4	20.2
11-Oct-16	0.0	8.93	1.45	9.9	6.7
21-Oct-16	0.0	8.80	1.92	11.8	3.9
8-Nov-16	0.0	8.50	2.57	10.4	5.5
14-Nov-16	0.0	8.67	2.32	15.6	5.7
21-Nov-16	0.0	8.68	2.83	18.8	0.4
28-Nov-16	0.0	8.46	1.85	18.4	1.6

Table 5. 2016 Surface Water Monitoring

			Ponds							Upstream						Downstream				
			SW25-7		SW25-8		SW25-11a	SW25-11b	SW25-11c	SW25-1			SW25-12			SW25-2			SW25-16	
Sampling date	Units	Criteria**	19-Apr-16	27-Jul-16	19-Apr-16	27-Jul-16	27-Jul-16	27-Jul-16	27-Jul-16	19-Apr-16	27-Jul-16	1-Nov-16	19-Apr-16	27-Jul-16	1-Nov-16	19-Apr-16	27-Jul-16	1-Nov-16	19-Apr-16	27-Jul-16
Inorganic Parameters																				
Alkalinity - Bicarbonate	mg/L		258	114	502	468	358	375	190	131	343	289	133	435	328	242	314	492	179	424
Alkalinity - Carbonate	mg/L		<0.50	9.84	<0.50	21.2	22.4	22.0	35.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Hydroxide	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Total	mg/L		212	110	412	419	330	344	215	107	281	237	109	357	269	198	258	404	147	347
Dissolved Hardness (CaCO3)	mg/L		915	738	556	601	627	626	365	163	322	1060	189	341	432	297	351	920	248	409
pH	units	6.5-9.0	8.14	7.96	8.18	9.58	8.82	8.79	8.56	7.72	7.38	7.09	7.67	7.32	7.40	8.19	7.78	8.47	7.53	7.55
Specific Conductivity	(µS/cm)		2,020	1,930	1,910	2,130	2,290	2,360	1,440	415	813	1,860	483	857	1,220	745	1,110	2,910	710	1,250
Turbidity	(ntu)		20.5	47.1	71.6	45.8	33.9	77.5	252	65.2	380	7.37	35.8	1360	29.9	68.0	306	32.1	10.3	80.8
Total Dissolved Solids	mg/L		1,620	1,420	1,430	1,550	1,590	1,610	948	325	469	1,370	343	527	739	475	711	1,890	442	750
Total Suspended Solids	mg/L		140	220	130	170	80	200	322	57	1,281	110	71	1,223	113	115	1,159	320	128	244
Total Solids	mg/L		1,760	1,640	1,560	1,720	1,670	1,810	1,270	382	1,750	1,480	414	1,750	852	590	1,870	2,210	570	994
Dissolved Chloride (Cl)	mg/L	640	190	220	180	240	320	370	160	15	71	98	26	57	120	56	120	450	65	160
Dissolved Sulphate (SO4)	mg/L		645 (2)	660	200	234	350	328	189	27	46	541	26	42	196	94	129	459	48	10
Nutrients																				
Ammonia - Dissolved	mg/L N		3.86	<0.003	6.78	0.323	0.513	0.620	0.705	0.871	<0.003	0.011	0.766	<0.003	0.011	1.56	<0.003	0.637	0.034	0.019
Nitrate - Dissolved	mg/L N	13	5.32	<0.003	0.902	2.12	0.080	0.179	0.040	11.5	<0.003	0.381	13.4	0.008	0.090	4.33	0.004	4.60	12.2	<0.003
Total Kjeldahl Nitrogen	mg/L N		9.3	5.5	18.0	16.4	10.2	11.4	7.0	2.3	12.2	1.7	1.8	3.1	0.9	3.3	18.0	18.1	9.6	7.2
Phosphorus - Dissolved	ug/L P		0.06	<0.01	1.03	1.36	0.91	0.11	0.07	0.12	0.04	<0.01	0.25	0.02	0.10	0.14	0.04	<0.01	0.04	0.43
Other																				
Cyanide - Total (CN)	mg/L	5	0.00414	0.00244	0.00924	0.00938	0.00673	0.00738	0.00293	0.00221	0.00142	0.00101	0.00207	0.00267	0.00089	0.00233	0.00159	0.00415		
Organic Indicators																				
Carbonaceous Oxygen Demand	mg/L		155	150	323	320	250	260	160	53	300	40	39	710	50	87	400	260		
Biochemical Oxygen Demand	mg/L		9	10	<3	10	10	11	44	<3	15	18	<3	495	<3	6	104	42		
Metals																				
Arsenic (As)- Dissolved	ug/L	5	2.20	7.65	10.2	14.3	13.5	15.5	19.8	2.49	4.68	1.60	3.15	4.23	1.97	2.92	7.83	6.97	2.74	4.45
Barium (Ba)- Dissolved	ug/L		33.3	37.3	62.5	85.4	115	105	63.0	31.0	55.3	57.3	40.1	59.0	93.5	54.8	60.9	146	43.4	95.0
Beryllium (Be)- Dissolved	ug/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.089	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)- Dissolved	ug/L	0.09	0.023	0.005	0.057	0.037	0.023	0.014	0.007	0.011	<0.005	0.172	0.006	<0.005	0.046	0.014	0.005	0.009	0.011	<0.005
Calcium (Ca)- Dissolved	mg/L		146	98.1	81.5	90.4	56.1	57.5	28.1	32.6	61.1	285	38.3	61.3	82.1	51.2	40.0	90.0	48.9	69.4
Chromium (Cr)- Dissolved	ug/L		0.37	0.16	0.76	0.78	1.29	1.25	0.56	0.19	0.18	0.22	0.12	0.17	1.0	0.27	0.30	0.90	0.19	0.35
Copper (Cu)- Dissolved	ug/L	4	16.7	3.30	20.1	17.9	15.6	11.4	2.49	3.10	0.151	7.20	3.05	0.145	14.4	3.41	6.77	4.89	3.18	1.77
Iron (Fe)- Dissolved	ug/L	300	44.6	6.50	269	95.0	38.0	42.0	12.7	17.9	332	166	16.2	129	848	30.5	45.9	20.2	17.0	90.4
Lead (Pb)- Dissolved	ug/L	7	0.066	0.039	0.310	0.193	0.203	0.161	0.056	0.024	0.021	0.079	0.042	0.024	1.59	0.086	0.115	0.113	0.041	0.068
Magnesium (Mg)- Dissolved	mg/L		133	120	85.7	91.2	118	117	71.5	19.7	41.0	85.3	22.5	45.5	55.1	42.3	60.9	169	30.5	57.3
Manganese (Mn)- Dissolved	ug/L		67.0	27.9	259	80.3	42.9	63.7	32.4	5.08	293	186	2.54	281	211	39.9	418	59.6	1.52	421
Mercury (Hg)- Total*	ug/L	0.026	0.0024	<0.0020	0.0048	<0.0020	0.0021	0.0026	0.0041	0.0035	<0.0020	<0.010	0.0052	<0.0020	<0.010	0.0029	<0.0020	<0.010	0.0040	0.0031
Nickel (Ni)- Dissolved	ug/L	150	12.7	9.51	36.5	37.2	42.6	42.4	22.0	3.39	1.66	3.26	3.39	1.82	4.48	5.75	6.28	44.6	3.00	3.48
Potassium (K)- Dissolved	mg/L		36.3	38.3	224	315	155	151	54.9	10.1	7.13	19.7	13.1	7.04	12.3	15.5	21.9	76.4	10.7	14.2
Selenium (Se)- Dissolved	ug/L	1	1.09	0.698	1.04	1.18	1.03	1.00	0.530	0.194	0.118	0.387	0.203	0.128	0.176	0.420	0.259	0.746	0.192	0.185
Sodium (Na)- Dissolved	mg/L		102	97.8	56.9	60.6	165	163	124	9.40	37.5	46.9	12.9	35.6	65.7	32.7	54.7	214	36.1	92.4
Zinc (Zn)- Dissolved	ug/L	30	6.00	0.73	16.0	8.43	5.02	11.2	2.78	2.28	1.08	9.56	6.50	2.52	7.88	7.66	6.62	1.57	3.43	3.51
Bacteria																				
Total Coliforms (MTF)	MPN/100mL		930	4,600	930	4,600	>11,000	>11,000	4,600	>11,000	11,000	>11,000	>11,000	2,400	>11,000	>11,000	>11,000	>11,000	1,500	2,400
Fecal Coliforms (MTF)	MPN/100mL		150	430	230	4,600	4,600	4,600	750	<3	930	75	4	2,400	930	93	930	>11,000	93	930
E. coli (MTF)	MPN/100mL		150	430	230	4,600	4,600	4,600	750	<3	930	75	4	2,400	930	7	930	11,000	4	930
Field Parameters																				
pH	units	6.5-9.0	8.00	7.83	8.10	8.90	9.30	9.00	9.70	8.80	7.13	7.45	8.40	7.66	7.65	8.10	8.50	8.32	8.10	7.60
Specific Conductivity	(µS/cm)		1,812	1,700	1,802	2,060	2,170	2,190	1,350	550	710	1,580	570	910	1,050	669	1,090	2,380	675	1,370

Note: Criteria from Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Aquatic Life, Freshwater. (Retrieved April 2016)
*Dissolved mercury results, total mercury was not analysed
** Criteria listed is for total chloride and total metals

Table 5. 2016 Surface Water Monitoring

			Intermediate															
			SW25-9A		SW25-9B		SW25-13A		SW25-13B		SW25-14A		SW25-14B		SW25-15A		SW25-15B	
Sampling date	Units	Criteria**	19-Apr-16	27-Jul-16	19-Apr-16	27-Jul-16	19-Apr-16	27-Jul-16	19-Apr-16	27-Jul-16	19-Apr-16	27-Jul-16	19-Apr-16	27-Jul-16	19-Apr-16	27-Jul-16	19-Apr-16	27-Jul-16
Inorganic Parameters																		
Alkalinity - Bicarbonate	mg/L		184	215	213	179	153	336	140	340	174	328	209	127	215	211	227	211
Alkalinity - Carbonate	mg/L		<0.50	11.7	<0.50	30.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	33.3	<0.50	4.18	<0.50	2.63
Alkalinity - Hydroxide	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Total	mg/L		151	196	175	197	125	276	115	279	143	269	171	159	176	180	186	178
Dissolved Hardness (CaCO3)	mg/L		239	328	261	258	209	321	201	334	240	490	240	265	225	288	276	294
pH	units	6.5-9.0	8.04	8.82	8.07	8.43	7.71	7.54	7.69	7.67	7.96	7.73	8.04	8.43	8.22	8.62	8.18	7.37
Specific Conductivity	(µS/cm)		581	950	607	856	523	780	506	884	569	1,270	593	741	597	818	682	309
Turbidity	(ntu)		65.4	103	67.4	11,800	41.4	23.2	35.5	805	58.2	690	293	156	58.6	32.2	74.8	140
Total Dissolved Solids	mg/L		399	604	399	521	371	450	357	561	393	818	436	467	379	522	434	489
Total Suspended Solids	mg/L		137	2,206	113	28,279	77	268	69	2,269	175	2,422	854	307	99	12	134	333
Total Solids	mg/L		536	2,810	512	28,800	448	718	426	2,830	568	3,240	1,290	774	478	534	568	822
Dissolved Chloride (Cl)	mg/L	640	43	96	45	82	34	52	32	55	42	140	43	78	38	85	45	82
Dissolved Sulphate (SO4)	mg/L		48	114	59	86	31	55	32	63	50	159	56	89	59	93	72	91
Nutrients																		
Ammonia - Dissolved	mg/L N		0.078	<0.003	0.839	0.313	0.050	<0.003	0.036	<0.003	0.080	<0.003	0.965	0.147	0.892	0.038	1.34	<0.003
Nitrate - Dissolved	mg/L N	13	9.95	0.003	4.34	0.030	13.2	<0.003	13.5	<0.003	10.1	<0.003	4.23	0.10	12.3	0.020	4.22	<0.003
Total Kjeldahl Nitrogen	mg/L N		1.8	3.9	2.4	4.0	2.0	2.8	1.9	4.1	2.0	8.5	3.0	3.4	1.9	2.0	4.2	2.3
Phosphorus - Dissolved	ug/L P		0.15	0.03	0.16	0.07	0.23	0.11	0.23	0.16	0.16	0.04	0.16	0.02	0.17	0.03	0.15	0.02
Other																		
Cyanide - Total (CN)	mg/L	5	0.00236	0.00126	0.00233	0.00131	0.00226	0.00127	0.00213	0.00122	0.00223	0.00129	0.00211	0.00148	0.00232	0.00138	0.00234	0.0015
Organic Indicators																		
Carbonaceous Oxygen Demand	mg/L		67	90	69	710	53	70	49	150	62	310	98	90	61	50	64	101
Biochemical Oxygen Demand	mg/L		<3	7	<3	30	<3	32	<3	30	<3	96	<3	18	3	<3	<3	3
Metals																		
Arsenic (As)- Dissolved	ug/L	5	3.02	5.62	3.12	7.25	3.27	3.83	3.08	4.46	2.97	3.27	2.78	6.74	2.63	7.09	2.88	6.21
Barium (Ba)- Dissolved	ug/L		46.6	50.8	42.0	36.2	46.9	57.9	43.8	57.2	47.0	80.0	49.3	43.8	45.6	56.1	54.0	77.9
Beryllium (Be)- Dissolved	ug/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.035	<0.010	<0.010	<0.010	0.061
Cadmium (Cd)- Dissolved	ug/L	0.09	0.023	<0.005	<0.005	<0.005	0.013	<0.005	0.012	<0.005	0.008	<0.005	0.009	0.014	0.008	0.006	0.007	0.026
Calcium (Ca)- Dissolved	mg/L		44.6	43.0	42.6	28.1	42.7	59.3	39.8	61.2	45.9	73.6	42.9	29.6	40.5	31.9	47.6	36.9
Chromium (Cr)- Dissolved	ug/L		0.18	0.20	0.24	0.17	0.37	0.19	0.33	0.22	0.19	0.13	0.16	1.18	0.17	0.17	0.33	2.03
Copper (Cu)- Dissolved	ug/L	4	3.46	1.47	2.98	2.75	3.62	0.310	3.20	0.358	3.25	2.53	2.50	2.95	2.96	3.95	3.01	3.96
Iron (Fe)- Dissolved	ug/L	300	29.2	61.7	22.6	10.8	104	159	124	162	23.6	25.9	48.2	659	36.5	19.2	68.3	1420
Lead (Pb)- Dissolved	ug/L	7	0.075	0.076	0.033	0.075	0.197	0.030	0.091	0.087	0.060	0.070	0.112	0.474	0.074	0.093	0.117	0.846
Magnesium (Mg)- Dissolved	mg/L		31.0	53.5	37.5	45.5	24.9	42.0	24.6	43.9	30.4	74.4	32.2	46.4	30.2	50.6	38.1	48.9
Manganese (Mn)- Dissolved	ug/L		9.07	48.0	38.5	4.00	9.36	174	5.14	180	11.7	13.7	41.9	20.2	33.0	9.97	42.3	133
Mercury (Hg)- Total*	ug/L	0.026	0.0051	<0.0020	0.0062	<0.0020	0.0027	<0.0020	0.0060	<0.0020	0.0045	<0.0020	0.0062	<0.0020	0.0025	<0.0020	0.0027	<0.0020
Nickel (Ni)- Dissolved	ug/L	150	3.46	5.27	4.21	4.28	4.10	1.66	3.39	1.96	3.57	4.05	3.75	5.41	4.02	5.94	5.16	7.45
Potassium (K)- Dissolved	mg/L		14.3	14.4	17.0	16.7	14.5	7.14	13.2	7.26	14.5	12.7	14.3	16.8	13.5	16.7	15.3	15.7
Selenium (Se)- Dissolved	ug/L	1	0.299	0.222	0.266	0.211	0.225	0.136	0.254	0.138	0.311	0.172	0.241	0.204	0.289	0.256	0.345	0.192
Sodium (Na)- Dissolved	mg/L		20.1	45.5	26.5	38.7	17.2	33.9	15.4	34.7	19.4	61.6	21.2	39.1	20.1	45.0	28.0	41.8
Zinc (Zn)- Dissolved	ug/L	30	7.11	1.16	4.65	1.06	9.71	1.89	17.9	2.18	6.87	2.48	3.62	4.07	4.95	4.51	3.81	7.32
Bacteria																		
Total Coliforms (MTF)	MPN/100mL		>11,000	230	11,000	>11,000	>11,000	11000	>11,000	>11,000	>11,000	430	>11,000	4,600	>11,000	4,400	>11,000	>11,000
Fecal Coliforms (MTF)	MPN/100mL		150	93	43	>11,000	4	4,600	230	4,600	2,400	230	430	750	380	290	93	11,000
E. coli (MTF)	MPN/100mL		150	93	43	>11,000	4	4,600	230	4,600	2,400	230	150	750	380	290	93	11,000
Field Parameters																		
pH	units	6.5-9.0	8.00	7.90	8.10	8.37	8.60	7.56	8.60	8.06	8.50	6.83	8.10	8.39	8.10	9.10	8.40	8.30
Specific Conductivity	(µS/cm)		565	820	557	870	592	780	590	840	601	1,220	563	570	532	770	634	770

Note: Criteria from Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Aquatic Life, Freshwater. (Retrieved April 2016)
*Dissolved mercury results, total mercury was not analysed
** Criteria listed is for total chloride and total metals

Table 6. Upstream Surface Water Quality Comparison

	Units	Criteria**	2014		2015		2016	
			Average	Maximum	Average	Maximum	Average	Maximum
Inorganic Parameters								
Alkalinity - Bicarbonate	mg/L		470	975	270	360	277	435
Alkalinity - Carbonate	mg/L		<0.5	<0.5	<0.5	<0.5	<0.50	<0.50
Alkalinity - Hydroxide	mg/L		<0.5	<0.5	<0.5	<0.5	<0.50	<0.50
Alkalinity - Total	mg/L		385	799	221	295	227	357
Dissolved Hardness (CaCO3)	mg/L		723	1,700	302	399	418	1060
pH	units	6.5-9.0	7.72	8.14	7.62	7.80	7.43	7.72
Specific Conductivity	(µS/cm)		1,667	4,370	721	902	941	1,860
Turbidity	(ntu)		388	1,200	336	1,660	313	1,360
Total Dissolved Solids	mg/L		1,340	3,310	537	726	629	1,370
Total Suspended Solids	mg/L		1,099	2,516	373	1,573	476	1,281
Total Solids	mg/L		2,439	4,750	909	2,110	1,105	1,750
Dissolved Chloride (Cl)	mg/L	640	172	530	59	100	64.5	120
Dissolved Sulphate (SO4)	mg/L		289	784	46	68	146	541
Nutrients								
Ammonia - Dissolved	mg/L N		7.46	37.0	0.279	1.66	0.277	0.871
Nitrate - Dissolved	mg/L N	13	0.99	3.80	0.35	2.07	4.23	13.4
Total Kjeldahl Nitrogen	mg/L N		10.0	24.7	2.60	10.9	3.67	12.2
Phosphorus - Dissolved	mg/L P		190	253	132	181	0.09	0.25
Other								
Cyanide - Total (CN)	mg/L	5	0.00363	0.00847	0.00139	0.00164	0.00171	0.00267
Organic Indicators								
Carbonaceous Oxygen Demand	mg/L		283	532	104	303	199	710
Biochemical Oxygen Demand	mg/L		12	31	6	24	89	495
Metals								
Arsenic (As)- Dissolved	ug/L	5	5.14	8.94	2.89	3.85	3.02	4.68
Barium (Ba)- Dissolved	ug/L		103.8	135	59.9	77.6	56.0	93.5
Beryllium (Be)- Dissolved	ug/L		<0.050	<0.050	0.013	0.052	0.019	0.089
Cadmium (Cd)- Dissolved	ug/L	0.09	0.057	0.149	0.045	0.115	0.040	0.172
Calcium (Ca)- Dissolved	mg/L		143.5	209	57.0	70.7	93.4	285
Chromium (Cr)- Dissolved	ug/L		3.63	10.5	0.12	0.24	0.31	1.00
Copper (Cu)- Dissolved	ug/L	4	6.73	19.3	1.69	2.33	4.67	14.4
Iron (Fe)- Dissolved	ug/L	300	146	301	104	183	252	848
Lead (Pb)- Dissolved	ug/L	7	0.177	0.426	0.063	0.0935	0.297	1.59
Magnesium (Mg)- Dissolved	mg/L		188.6	287	38.8	53.9	44.9	85.3
Manganese (Mn)- Dissolved	ug/L		416	540	56.8	111	163	293
Mercury (Hg)- Total	ug/L	0.026	<0.010	<0.010	<0.010	<0.010	<0.010*	<0.010*
Nickel (Ni)- Dissolved	ug/L	150	34.5	95.0	2.78	3.16	3.00	4.48
Potassium (K)- Dissolved	mg/L		27.8	59.1	12.0	16.2	11.6	19.7
Selenium (Se)- Dissolved	ug/L	1	0.952	2.60	0.116	0.166	0.201	0.387
Sodium (Na)- Dissolved	mg/L		243	486	28.7	40.6	34.7	65.7
Zinc (Zn)- Dissolved	ug/L	30	4.9	10.1	18.8	36.1	4.97	9.56
Bacteria								
Total Coliforms (MTF)	MPN/100mL		5,886	>11,000	5,633	>11,000	9,567	>11,000
Fecal Coliforms (MTF)	MPN/100mL		3,207	>11,000	343	930	723	2,400
E. coli (MTF)	MPN/100mL		3,207	11,000	185	460	723	2,400
Field Parameters								
pH	units	6.5-9.0	7.71	8.64	7.50	8.49	7.85	8.80
Specific Conductivity	(µS/cm)		1,460	4,363	712	810	895	1,580

Note: Criteria from Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Aquatic Life, Freshwater. (Retrieved April 2016)
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.
*Dissolved mercury results, total mercury was not analysed
** Criteria for total chloride and total metals

Table 6. Intermediate/Downstream Surface Water Quality Comparison

	Units	Criteria**	2014		2015		2016	
			Average	Maximum	Average	Maximum	Average	Maximum
Inorganic Parameters								
Alkalinity - Bicarbonate	mg/L		253	569	229	333	243	492
Alkalinity - Carbonate	mg/L		15.8	79.7	11.15	51.6	4.11	33.3
Alkalinity - Hydroxide	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Total	mg/L		233	475	206	279	206	404
Dissolved Hardness (CaCO3)	mg/L		327	790	332	633	319	920
pH	units	6.5-9.0	8.35	9.41	8.67	9.42	8.00	8.82
Specific Conductivity	(µS/cm)		877	2,020	944	2,070	857	2,910
Turbidity	(ntu)		539	2,210	347	3,160	711	11,800
Total Dissolved Solids	mg/L		653	1,580	764	1,940	565	1,890
Total Suspended Solids	mg/L		1,650	5,490	1,442	18,460	1,891	28,279
Total Solids	mg/L		2,304	6,210	2,206	19,400	2,457	28,800
Dissolved Chloride (Cl)	mg/L	640	90	270	99	270	88	450
Dissolved Sulphate (SO4)	mg/L		81.7	238	93	300	90	459
Nutrients								
Ammonia - Dissolved	mg/L N		1.03	2.40	1.118	5.27	0.335	1.56
Nitrate - Dissolved	mg/L N	13	0.276	0.72	0.153	1.98	4.43	13.5
Total Kjeldahl Nitrogen	mg/L N		6.0	8.0	4.92	14.1	5.07	18.1
Phosphorus - Dissolved	mg/L P		151	214	186	916	0.121	0.430
Other								
Cyanide - Total (CN)	mg/L	5	0.00198	0.00278	0.00204	0.00325	0.00197	0.00415
Organic Indicators								
Carbonaceous Oxygen Demand	mg/L		178	493	125	301	148	710
Biochemical Oxygen Demand	mg/L		18	>52	10	45	20	104
Metals								
Arsenic (As)- Dissolved	ug/L	5	7.78	10.9	7.19	12.8	4.43	7.83
Barium (Ba)- Dissolved	ug/L		91.8	172	63.6	100	58.8	146
Beryllium (Be)- Dissolved	ug/L		<0.050	<0.050	<0.010	<0.010	0.009	0.061
Cadmium (Cd)- Dissolved	ug/L	0.09	0.018	0.041	0.015	0.068	0.009	0.026
Calcium (Ca)- Dissolved	mg/L		57.4	99.7	45.7	63.3	48.1	90.0
Chromium (Cr)- Dissolved	ug/L		0.74	2.41	0.22	0.77	0.39	2.03
Copper (Cu)- Dissolved	ug/L	4	2.18	3.18	2.75	6.00	3.01	6.77
Iron (Fe)- Dissolved	ug/L	300	61.2	160	43	130	151	1420
Lead (Pb)- Dissolved	ug/L	7	0.119	0.263	0.073	0.186	0.140	0.846
Magnesium (Mg)- Dissolved	mg/L		65.7	131	53.0	129	48.3	169.0
Manganese (Mn)- Dissolved	ug/L		184	640	114	569	81.6	421
Mercury (Hg)- Total	ug/L	0.026	<0.010	<0.010	<0.010	<0.010	<0.010*	<0.010*
Nickel (Ni)- Dissolved	ug/L	150	13.7	28.9	9.67	28.3	6.23	44.6
Potassium (K)- Dissolved	mg/L		22.7	43.0	21.7	95.7	17.3	76.4
Selenium (Se)- Dissolved	ug/L	1	0.357	0.409	0.288	0.797	0.265	0.746
Sodium (Na)- Dissolved	mg/L		69.6	142	57.0	158	44.7	214
Zinc (Zn)- Dissolved	ug/L	30	5.23	10.4	4.47	12.1	5.05	17.9
Bacteria								
Total Coliforms (MTF)	MPN/100mL		4,473	>11,000	4,600	>11,000	8,503	>11,000
Fecal Coliforms (MTF)	MPN/100mL		591	1500	2,556	>11,000	2,349	>11,000
E. coli (MTF)	MPN/100mL		591	1500	1,973	>11,000	2,328	>11,000
Field Parameters								
pH	units	6.5-9.0	8.21	9.34	8.77	9.84	8.17	9.10
Specific Conductivity	(µS/cm)		1,850	9,790	853	1,920	831	2,380

Note: Criteria from Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Aquatic Life, Freshwater. (Retrieved April 2016)

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.

*Dissolved mercury results, total mercury was not analysed

** Criteria for total chloride and total metals

5.3 LEACHATE

The leachate management system is a passive collection system which includes a network of drains, sumps, and pumping stations. Leachate is pumped from seven leachate manholes and one leachate riser around the perimeter of the landfill cells and hauled for treatment at NEWPCC; these sites also serve as sampling points.

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 Leachate SAP proposes annual sampling at the seven leachate manholes and one leachate riser, and monthly leachate elevation measurements.

The total volume of leachate removed from the BRRMF in 2016 was 34,900kL. There were no occurrences of leachate breakout from the development in 2016, and the maximum leachate head in the new waste cell was not exceeded in 2016.

In 2016, eight leachate samples were analyzed. There were no deviations from the Leachate SAP or from normal sample collection and preservation practices in 2016 except 4'4' Methylenebis (2-chloroaniline) was not analyzed. This parameter is not requested in the original lab contract, and could not be added because our contract lab does not offer this analysis; a lab that provides this analysis has been identified for the 2017 samples. Monthly leachate levels are provided in Table 7 and a summary of the 2016 leachate results are provided in Table 8.

The analytical results for leachate obtained in 2016 were found to be highly variable compared to those obtained in 2014 and 2015. A comparison of the average and maximum values obtained in 2014, 2015, and 2016 are provided in Table 9. The data collected in 2016 will be used to enhance the existing leachate quality data in order to better evaluate trends. The Contingency Action Plan required under Clause 125 was not implemented in 2016.

At this time we have no recommendations for changes in the leachate monitoring program.

Table 7. Leachate Levels 2016

	Date	25-Jan-16	24-Feb-16	23-Mar-16	22-Apr-16	11-May-16	13-Jun-16	25-Jul-16	16-Aug-16	15-Sep-16	20-Oct-16	14-Nov-16	15-Dec-16
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)	1.31	1.22	2.57	2.66	2.86	2.05	3.10	3.47	3.41	2.28	1.88	1.81
	Manhole Leachate Elevation (m)	232.35	232.44	231.09	231.00	230.80	231.61	230.56	230.19	230.25	231.38	231.78	231.85
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)	8.50	8.64	8.50	9.42	8.69	4.78	4.26	4.20	6.20	9.35	6.48	8.08
	Manhole Leachate Elevation (m)	229.22	229.08	229.22	228.30	229.03	232.94	233.46	233.52	231.52	228.37	231.24	229.64
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)	5.75	4.48	5.75	6.87	5.13	4.21	4.83	5.28	5.89	5.78	7.31	5.20
	Manhole Leachate Elevation (m)	229.14	230.41	229.14	228.02	229.76	230.68	230.06	229.61	229.00	229.11	227.58	229.69
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)	6.02	3.74	2.38	6.30	1.41	1.98	2.75	6.33	6.20	4.07	5.37	1.08
	Manhole Leachate Elevation (m)	228.98	231.26	232.62	228.70	233.59	233.02	232.25	228.67	228.80	230.93	229.63	233.92
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)	2.26	2.03	2.06	2.05	2.04	2.01	2.05	2.03	2.01	2.11	2.05	2.02
	Manhole Leachate Elevation (m)	233.45	233.68	233.65	233.66	233.67	233.70	233.66	233.68	233.70	233.60	233.66	233.69
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)	8.25	3.42	2.58	1.60	2.38	1.65	8.70	1.99	1.89	4.99	1.58	1.67
	Manhole Leachate Elevation (m)	226.49	231.32	232.16	233.14	232.36	233.09	226.04	232.75	232.85	229.75	233.16	233.07
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)	6.45	4.37	4.30	4.20	4.18	4.00	3.90	3.70	3.60	3.80	3.45	3.54
	Manhole Leachate Elevation (m)	228.97	231.05	231.12	231.22	231.24	231.42	231.52	231.72	231.82	231.62	231.97	231.88
Riser 1	Top of Riser Elevation (m)	235.18	235.18	235.18	235.18	235.18	235.18	235.18	235.18	235.18	235.18	235.18	235.18
	Depth to Leachate (m)	20.80	22.56	20.32	21.25	20.48	21.95	21.70	22.10	21.80	21.30	21.94	21.78
	Riser Leachate Elevation (m)	229.98	229.54	230.10	229.87	230.06	229.70	229.76	229.66	229.73	229.86	229.70	229.74

Table 8. 2016 Leachate Monitoring

			LQ25-MH3	LQ25-MH8	LQ25-MH13	LQ25-MH24	LQ25-MH27	LQ25-MH31	LQ25-MH34	RISER 1	Composite
Sampling Date	Units	Criteria****	8-Sep-16	7-Sep-16	9-Sep-16	7-Sep-16	7-Sep-16	7-Sep-16	8-Sep-16	9-Sep-16	9-Sep-16
Field Parameters											
pH	units		7.10	7.20	7.30	7.40	8.00	7.30	8.70	6.30	
Turbidity	ntu		30.6	83.4	32.9	15.4	19.8	55.6	27.9	nr**	
Specific Conductivity	uS/cm		6380	6420	3670	6040	660	5770	620	4660	
Inorganic Parameters											
Alkalinity - Bicarbonate	mg/L		7,130	6,400	3,520	7,250	569	6,370	480	2,490	
Alkalinity - Carbonate	mg/L		171	375	<5	224	<0.5	268	<0.5	<5	
Alkalinity - Hydroxide	mg/L		<5	<5	<5	<5	<0.5	<5	<0.5	<5	
Alkalinity - Total	mg/L		6,130	5,870	2,880	6,310	466	5,670	393	2,040	
Hardness (as CaCO3)	mg/L		2,590	2,020	2,330	2,430	549	1,170	623	1,950	
pH	units		7.33	7.27	7.04	7.20	7.36	7.26	7.94	6.48	
Specific Conductivity	uS/cm		16,000	15,100	9,190	15,600	1,410	14,600	1,430	11,500	
Turbidity	ntu		21.3	115	30.2	151	4.41	104	4.99	1,110	
Total Dissolved Solids	mg/L		8,310	7,690	5,290	7,660	901	6,940	864	10,800	
Total Suspended Solids	mg/L		820	110	310	310	85	300	206	106,200	
Chloride (dissolved)	mg/L	2300	2,000	1,400	1,200	1,500	98	1,400	190	690	
Sulphate (dissolved)	mg/L		<5	320	263	40	160	17	116	<5	
Other											
Cyanide (CN)	mg/L	0.066	0.0128	0.0180	0.0104	0.0118	0.0024	0.0158	0.0021	0.0102	
Nutrients											
Dissolved Ammonia	mg/L		1000	1000	297	1000	2.80	968	0.265	293	
Nitrate Nitrite Nitrogen	mg/L		<0.003	<0.003	<0.003	<0.003	0.848	<0.003	1.62	<0.003	
Total Kjeldhal Nitrogen	mg/L		875.0	1.1	297.0	660.0	<0.2	1.1	3.7	368.0	
Phosphorus (Total)	mg/L		2.60	4.32	1.90	3.62	0.150	3.98	<0.040	9.95	
Organic Indicators											
Biological Oxygen Demand	mg/L		113	138	64	189	4	106	<3	>4047	
Chemical Oxygen Demand	mg/L		1780	2050	610	1430	50	1980	80	nr***	
Metals											
Total Arsenic (As)	mg/L	1.9	0.0149	0.0276	0.0057	0.0165	0.0016	0.0257	0.0011	0.0179	
Total Barium (Ba)	mg/L	29	0.745	0.525	0.459	0.409	0.107	0.487	0.112	0.134	
Total Beryllium (Be)	mg/L	0.067	<0.0002	<0.0005	<0.0005	<0.0005	<0.00005	<0.0002	0.00002	<0.00025	
Total Cadmium (Cd)	mg/L	0.0027	0.00035	<0.00025	<0.00025	<0.00025	<0.000025	0.00056	0.000005	0.00108	
Total Calcium (Ca)	mg/L		157	182	231	176	109	120	88.8	113	
Total Chromium (Cr)	mg/L	0.81	0.1520	0.1500	0.0185	0.0488	0.0005	0.1150	0.0007	0.0225	
Total Chromium (Hexavalent)	mg/L		<0.010	<0.010	0.013	<0.010	<0.0010	<0.010	0.0012	<0.010	
Total Copper (Cu)	mg/L	0.087	0.01930	<0.0050	<0.0050	<0.0050	0.00273	0.01250	0.00363	0.02120	
Total Iron (Fe)	mg/L		9.36	2.94	5.81	4.74	1.22	16.1	0.226	14.0	
Total Lead (Pb)	mg/L	0.025	0.02240	0.01380	0.00430	<0.0010	0.00032	0.02380	0.00015	0.02050	
Total Magnesium (Mg)	mg/L		454	380	460	450	74	303	58.6	48.6	
Total Manganese (Mn)	mg/L		0.251	0.366	0.866	0.503	0.400	0.246	0.147	0.719	
Total Mercury (Hg)	mg/L	0.0028	<0.000002	<0.000002	<0.000020	<0.000002	<0.000002	<0.000002	<0.000002	0.0000028	
Total Nickel (Ni)	mg/L	0.49	0.3260	0.2270	0.0873	0.1960	0.0068	0.2580	0.0055	0.1300	
Total Potassium (K)	mg/L		591	453	270	540	19.5	578	33.9	23.6	
Dissolved Selenium (Se)	mg/L	0.063	<0.0040	<0.0020	<0.0008	<0.0020	<0.0002	0.00167	0.00026	0.00084	
Total Silver (Ag)	mg/L	0.0015	0.0002	<0.0005	<0.0005	<0.0005	<0.00005	<0.0002	<0.00001	<0.00025	
Total Sodium (Na)	mg/L	2,300	1460	1420	809	1270	99	1350	57.3	127	
Total Zinc (Zn)	mg/L	1.1	0.149	1.05	<0.050	<0.050	0.0065	0.142	0.0074	8.01	
Extractables											
Benzo (a) Pyrene (PAH)	mg/L	0.00081	0.00006	0.00280	<0.0001	<0.0020	0.00220	<0.0002	<0.0002	<0.0001	
Anthracene	mg/L	0.0024	0.00032	0.0047	0.00009	<0.002	<0.0008	0.00080	<0.0002	0.0010	
3'3' Dichlorobenzidine	mg/L		<0.003	<0.003	<0.003	<0.080	<0.003	<0.0008	<0.0008	<0.008	
4'4' Methylenebis 2 Chloroaniline	mg/L		na*	na*	na*	na*	na*	na*	na*	na*	
Benzo (a) anthracene (PAH)	mg/L	0.0047	<0.00025	0.0047	0.0016	<0.002	0.0019	<0.0002	<0.0002	<0.0005	
Benzo (b/j) fluoroanthene (PAH)	mg/L		<0.00025	0.0041	0.0018	<0.002	0.00370	<0.0002	<0.0002	<0.0005	
Benzo (g,h,i) Perylene (PAH)	mg/L	0.0002	<0.00025	0.0016	0.0010	<0.002	0.0016	<0.0002	<0.0002	<0.0005	
1,3-Dinitropyrene	mg/L		<0.002	<0.02	<0.004	<0.04	<0.02	<0.004	<0.0004	<0.004	
1,6-Dinitropyrene	mg/L		<0.002	<0.02	<0.004	<0.04	<0.02	<0.004	<0.0004	<0.004	
1,8-Dinitropyrene	mg/L		<0.002	<0.02	<0.004	<0.04	<0.02	<0.004	<0.0004	<0.004	
Hexachlorobenzene	ug/L	3.1	<0.005	<0.005	<0.007	<0.005	<0.005	<0.005	<0.005	<0.05	
Octachlorostyrene	ug/L		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	
Pentachlorophenol	mg/L		<0.004	<0.004	<0.004	<0.01	<0.004	<0.001	<0.001	<0.01	
Perylene	mg/L		<0.0008	<0.0008	<0.0008	<0.002	<0.0008	<0.0002	<0.0002	<0.002	
Phenanthrene	mg/L	0.58	0.0016	0.020	0.0023	0.0020	<0.0008	0.0009	<0.0002	0.0026	
Phenol	mg/L	12	0.113	0.128	0.055	0.257	0.0048	0.215	0.0045	2.35	
Toxaphene	ug/L		0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	

Note: Criteria from Ontario Ministry of the Environment. (2009, July 27). 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

*na - contract lab does not analyse this parameter

**nr - no result due to equipment malfunction

***nr - unable to analyse due to high grease content

**** criteria listed for total chloride and total metals

Table 8. 2016 Leachate Monitoring

			LQ25-MH3	LQ25-MH8	LQ25-MH13	LQ25-MH24	LQ25-MH27	LQ25-MH31	LQ25-MH34	RISER 1	Composite
Sampling Date	Units	Criteria****	8-Sep-16	7-Sep-16	9-Sep-16	7-Sep-16	7-Sep-16	7-Sep-16	8-Sep-16	9-Sep-16	9-Sep-16
Petroleum Hydrocarbons											
CCME Petroleum Hydrocarbon Fraction	ug/L	750	130	90	110	280	<25	59	<25	190	
CCME Petroleum Hydrocarbon Fraction	ug/L	150	250	250	210	190	<100	110	<100	260	
CCME Petroleum Hydrocarbon Fraction	ug/L	500	<200	<200	<200	<200	<200	<200	<200	780	
CCME Petroleum Hydrocarbon Fraction	ug/L	500	<200	<200	<200	<200	<200	<200	<200	<200	
Volatile Organic Carbons											
BTEX	ug/L		<25	<25	<25	32	<25	<25	<25	87	
Vinyl Chloride	ug/L	1.7	<10	<4.0	<4.0	<4.0	<0.20	<4.0	<0.20	<40	
1,4 Dichlorobenzene	ug/L	67	<10	<4.0	7.0	4.7	0.22	<4.0	<0.20	<40	
Chloroform	ug/L	22	<5	<2	<2	<2	<0.1	<2	<0.1	<20	
Trichloroethylene	ug/L	17	<5	<2	<2	<2	<0.1	<2	<0.1	<20	
Tetrachloroethylene	ug/L	17	<5	<2	<2	<2	<0.1	<2	<0.1	<20	
Dioxins and Furans											
2378 TeCDD	pg/L	14,000									<1.48
12378 PeCDD	pg/L	14,000									<2.22
123478 HxCDD	pg/L	14,000									3.49
123678 HxCDD	pg/L	14,000									21.2
123789 HxCDD	pg/L	14,000									13.1
1234678 HpCDD	pg/L	14,000									538
OCDD	pg/L	14,000									7,220
Total TCDDs	pg/L	14,000									25.6
Total PeCDD	pg/L	14,000									16.3
Total HxCDD	pg/L	14,000									166
Total HpCDD	pg/L	14,000									1,110
2378 TeCDF	pg/L	14,000									5.59
12378 PeCDF	pg/L	14,000									<1.34
23478 PeCDF	pg/L	14,000									<1.61
123478 HxCDF	pg/L	14,000									8.39
123678 HxCDF	pg/L	14,000									4.86
123789 HxCDF	pg/L	14,000									<1.81
234678 HxCDF	pg/L	14,000									5.61
1234678 HpCDF	pg/L	14,000									124
1234789 HpCDF	pg/L	14,000									7.09
OCDF	pg/L	14,000									407
Total TCDF	pg/L	14,000									30.4
Total PeCDF	pg/L	14,000									22.8
Total HxCDF	pg/L	14,000									129
Total HpCDF	pg/L	14,000									379
Polychlorinated Biphenyls											
Aroclor 1016	mg/L		<0.00050	<0.000005	<0.00005	<0.00005	<0.00005	<0.00005	<0.000005	<0.0005	
Aroclor 1221	mg/L		<0.00050	<0.000005	<0.00005	<0.00005	<0.00005	<0.00005	<0.000005	<0.0005	
Aroclor 1232	mg/L		<0.00050	<0.000005	<0.00005	<0.00005	<0.00005	<0.00005	<0.000005	<0.0005	
Aroclor 1242	mg/L		<0.00050	<0.000005	0.00013	<0.00005	<0.00005	0.00021	<0.000005	<0.0005	
Aroclor 1248	mg/L		<0.00050	<0.000005	<0.00005	<0.00005	<0.00005	<0.00005	<0.000005	<0.0005	
Aroclor 1254	mg/L		<0.00050	<0.000005	<0.00005	<0.00005	<0.00005	0.00016	<0.000005	<0.0005	
Aroclor 1260	mg/L		<0.00050	<0.000005	<0.00010	<0.00005	<0.00005	0.00020	<0.000005	<0.0005	
Total PCBs	mg/L	0.015	<0.00005	<0.000050	<0.00010	<0.00005	<0.00005	0.00040	<0.000050	<0.0005	
Pesticides and Herbicides											
Diazinon	ug/L		<8	<10	<2	<10	<2	<10	<2	<2	
2, 4-D	ug/L		<10	<20	<5	<20	<5	<20	<1	<2000	
Aldrin	ug/L	8.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.050	
Chlordane	ug/L	28	<0.007	<0.005	<0.007	<0.005	<0.005	<0.005	<0.005	<0.050	
Hexachlorocyclohexane (Lindane)	ug/L	1.2	<0.003	<0.003	<0.003	<0.005	<0.003	<0.003	<0.003	<0.030	
MCPA	ug/L		<20	<40	<10	<40	<10	<40	<2	<4000	
Mirex	ug/L		<0.007	<0.005	<0.007	<0.005	<0.005	<0.005	<0.005	<0.050	
Methoxyclor	ug/L	6.5	<0.03	<0.01	<0.03	<0.01	<0.01	<0.01	<0.01	<0.10	
DDT	ug/L	2.8	<0.007	<0.005	<0.007	<0.005	<0.005	<0.005	<0.005	<0.050	
Bacteria											
Total Coliforms	MPN/100mL		1,500	2,300	930	11,000	930	>11,000	210	>11,000	
Fecal Coliforms	MPN/100mL		23	15	<3	43	75	23	<3	2,400	
E. coli	MPN/100mL		23	7	<3	43	75	23	<3	2,400	

Note: Criteria from Ontario Ministry of the Environment. (2009, July 27). 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

Table 9. 2016 Leachate Quality Comparison

			2014		2015		2016	
Sampling Date	Units	Criteria*	Average	Maximum	Average	Maximum	Average	Maximum
Field Parameters								
pH	units		na	na	6.98	7.55	7.41	8.70
Turbidity - NTU	ntu		na	na	21.4	48.7	37.9	83.4
Specific Conductivity	uS/cm		na	na	6,493	12,960	4,278	6,420
Inorganic Parameters								
Alkalinity - Bicarbonate	mg/L		5,363	6,860	2,937	6,350	4,276	7,250
Alkalinity - Carbonate	mg/L		191	593	<5.0	<5.0	130	375
Alkalinity - Hydroxide	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Alkalinity - Total	mg/L		4,713	6,610	2,406	5,210	3,720	6,310
Hardness (as CaCO3)	mg/L		2,526	3,640	1,575	3,360	1,708	2,590
pH - units	units		7.29	7.66	7.57	8.10	7.24	7.94
Specific Conductivity	uS/cm		13,031	15,400	6,776	13,400	10,604	16,000
Turbidity - NTU	ntu		257	833	108	475	193	1,110
Total Dissolved Solids	mg/L		8,493	13,800	4,584	9,610	6,057	10,800
Total Suspended Solids	mg/L		1,327	7,400	245	840	13,543	106,200
Chloride (dissolved)	mg/L	2300	1,757	3,000	744	1,600	1,060	2,000
Sulphate (dissolved)	mg/L		45.8	174	128	315	115	320
Other								
Cyanide (CN)	mg/L	0.066	0.0128	0.0181	0.0103	0.0182	0.0104	0.0180
Nutrients								
Dissolved Ammonia	mg/L		342	520	250	590	570	1,000
Nitrate Nitrite Nitrogen	mg/L		0.237	1.38	0.159	0.751	0.310	1.62
Total Kjeldhal Nitrogen	mg/L		750.6	1,162	304.1	700.1	275.8	875.0
Phosphorus (Total)	mg/L		4.37	8.80	1.87	4.27	3.32	9.95
Organic Indicators								
Biological Oxygen Demand	mg/L		229	916	64.3	120	583	>4047
Chemical Oxygen Demand	mg/L		1,610	3,140	902	2,330	1,140	2,050
Metals								
Total Arsenic (As)	mg/L	1.9	0.0149	0.0295	0.0115	0.0227	0.0139	0.0276
Total Barium (Ba)	mg/L	29	0.720	1.38	0.401	0.842	0.372	0.745
Total Beryllium (Be)	mg/L	0.067	<0.00010	<0.00010	0.03126	<0.10	0.00014	<0.00050
Total Cadmium (Cd)	mg/L	0.0027	0.000320	0.000545	0.000195	0.000575	0.000307	0.001080
Total Calcium (Ca)	mg/L		237	589	129	230	147	231
Total Chromium (Cr)	mg/L	0.81	0.0671	0.1270	0.0315	0.0752	0.0635	0.1520
Total Chromium (Hexavalent)	mg/L		<0.0050	<0.0050	<0.0010	0.0029	0.0050	0.0130
Total Copper (Cu)	mg/L	0.087	0.0068	0.0210	0.0080	0.0157	0.0084	0.0212
Total Iron (Fe)	mg/L		19.8	70.6	10.7	30.1	6.80	16.1
Total Lead (Pb)	mg/L	0.025	0.01682	0.04810	0.00718	0.02190	0.01072	0.02380
Total Magnesium (Mg)	mg/L		469	603	248	679	279	460
Total Manganese (Mn)	mg/L		0.492	1.91	1.018	5.640	0.437	0.866
Total Mercury (Hg)	mg/L	0.0028	<0.000002	0.000064	0.000004	0.0000112	0.000002	<0.000020
Total Nickel (Ni)	mg/L	0.49	0.1713	0.3650	0.1222	0.2530	0.1546	0.3260
Total Potassium (K)	mg/L		494	643	254	612	314	591
Dissolved Selenium (Se)	mg/L	0.063	0.00094	0.00147	0.1733	1.38	0.0009	<0.0040
Total Silver (Ag)	mg/L	0.0015	0.000102	0.000202	0.000095	0.000161	0.00015	<0.00050
Total Sodium (Na)	mg/L	2,300	1,352	1,700	598	1,400	824	1,460
Total Zinc (Zn)	mg/L	1.1	0.5891	3.14	0.0545	0.1320	1.18	8.01
Extractables								
Benzo (a) Pyrene (PAH)	mg/L	0.00081	0.00008	0.00014	0.0138	<0.050	0.0008	0.0028
Anthracene	mg/L	0.0024	0.00038	0.00110	0.0138	<0.050	0.00105	0.00470
3'3' Dichlorobenzidine	mg/L		na	na	na	na	<0.080	<0.080
4'4' Methylenebis 2 Chloroaniline	mg/L		na	na	na	na	na	na
Benzo (a) anthracene (PAH)	mg/L	0.0047	0.00022	0.00052	0.0138	<0.050	0.0012	0.0047
Benzo (b) fluoroanthene (PAH)	mg/L		0.00016	0.00035	<0.050	<0.050	0.0014	0.0041
Benzo (g,h,i) Perylene (PAH)	mg/L	0.0002	0.00010	<0.00050	0.0138	<0.050	0.0007	0.0016
1,3-Dinitropyrene	mg/L		na	na	na	na	<0.040	<0.040
1,6-Dinitropyrene	mg/L		na	na	na	na	<0.040	<0.040
1,8-Dinitropyrene	mg/L		na	na	na	na	<0.040	<0.040
Hexachlorobenzene	ug/L	3.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Octachlorostyrene	ug/L		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Pentachlorophenol	mg/L		na	na	na	na	<0.010	<0.010
Perylene	mg/L		na	na	na	na	<0.0020	<0.0020
Phenanthrene	mg/L	0.58	0.00161	0.00560	0.00062	0.00260	0.0037	0.020
Phenol	mg/L	12	0.389	1.21	0.221	0.810	0.391	2.35
Toxaphene	ug/L		<2.0	<2.0	<2.0	<2.0	0.25	<2.0

Note: Criteria from Ontario Ministry of the Environment. (2009, July 27). 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 listed for total chloride and total metals

Table 9. 2016 Leachate Quality Comparison

			2014		2015		2016	
Sampling Date	Units	Criteria*	Average	Maximum	Average	Maximum	Average	Maximum
Petroleum Hydrocarbons								
CCME Petroleum Hydrocarbon Fraction	ug/L	750	3,881	22,000	186	540	111	280
CCME Petroleum Hydrocarbon Fraction	ug/L	150	566	1,300	<100	270	171	260
CCME Petroleum Hydrocarbon Fraction	ug/L	500	11,129	75,000	<200	<200	<200	780
CCME Petroleum Hydrocarbon Fraction	ug/L	500	1,561	10,000	<200	<200	<200	<200
Volatile Organic Carbons								
BTEX	ug/L		3,529	21,000	76	470	26	87
Vinyl Chloride	ug/L	1.7	4.64	<20	1.84	<10	<40	<40
1,4 Dichlorobenzene	ug/L	67	5.5	11	2.44	5.50	5.1	<40
Chloroform	ug/L	22	<10	<10	<5.0	<5.0	<20	<20
Trichloroethylene	ug/L	17	<10	<10	<5.0	<5.0	<20	<20
Tetrachloroethylene	ug/L	17	<10	<10	<5.0	<5.0	<20	<20
Dioxins and Furans								
2378 TeCDD	pg/L	14,000	na	na	<1.25	<1.25	<1.48	<1.48
12378 PeCDD	pg/L	14,000	na	na	<1.53	<1.53	<2.22	<2.22
123478 HxCDD	pg/L	14,000	na	na	<1.53	<1.53	3.49	3.49
123678 HxCDD	pg/L	14,000	na	na	4.5	4.5	21.2	21.2
123789 HxCDD	pg/L	14,000	na	na	2.2	2.2	13.1	13.1
1234678 HpCDD	pg/L	14,000	na	na	95	95	538	538
OCDD	pg/L	14,000	na	na	953	953	7,220	7,220
Total TCDDs	pg/L	14,000	na	na	<1.4	<1.4	25.6	25.6
Total PeCDD	pg/L	14,000	na	na	<1.53	<1.53	16.3	16.3
Total HxCDD	pg/L	14,000	na	na	42	42	166	166
Total HpCDD	pg/L	14,000	na	na	197	197	1,110	1,110
2378 TeCDF	pg/L	14,000	na	na	1.29	1.29	5.59	5.59
12378 PeCDF	pg/L	14,000	na	na	<1.31	<1.31	<1.34	<1.34
23478 PeCDF	pg/L	14,000	na	na	<1.32	<1.32	<1.61	<1.61
123478 HxCDF	pg/L	14,000	na	na	1.47	1.47	8.39	8.39
123678 HxCDF	pg/L	14,000	na	na	<1.19	<1.19	4.86	4.86
123789 HxCDF	pg/L	14,000	na	na	<1.26	<1.26	<1.81	<1.81
234678 HxCDF	pg/L	14,000	na	na	<1.37	<1.37	5.61	5.61
1234678 HpCDF	pg/L	14,000	na	na	<17.4	<17.4	124	124
1234789 HpCDF	pg/L	14,000	na	na	<1.39	<1.39	7.09	7.09
OCDF	pg/L	14,000	na	na	54	54	407	407
Total TCDF	pg/L	14,000	na	na	1.3	1.3	30.4	30.4
Total PeCDF	pg/L	14,000	na	na	<1.31	<1.31	22.8	22.8
Total HxCDF	pg/L	14,000	na	na	22	22	129	129
Total HpCDF	pg/L	14,000	na	na	33	33	379	379
Polychlorinated Biphenyls								
Aroclor 1016	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.00050
Aroclor 1221	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.00050
Aroclor 1232	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.00050
Aroclor 1242	mg/L		0.00057	0.00210	<0.0005	<0.0005	0.00011	<0.00050
Aroclor 1248	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.00050
Aroclor 1254	mg/L		0.00023	0.00030	<0.0005	<0.0005	0.00009	<0.00050
Aroclor 1260	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	0.00010	<0.00050
Total PCBs	mg/L	0.015	0.00058	0.00210	<0.0005	<0.0005	0.00010	0.00040
Pesticides and Herbicides								
Diazinon	ug/L		na	na	<40	<40	<10	<10
2, 4-D	ug/L		<8	<8	<20	<20	<2000	<2000
Aldrin	ug/L	8.5	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050
Chlordane	ug/L	28	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050
Hexachlorocyclohexane (Lindane)	ug/L	1.2	<0.03	<0.03	<0.03	<0.03	<0.030	<0.030
MCPA	ug/L		<40	<40	<40	<40	<4000	<4000
Mirex	ug/L		<0.2	<0.2	<0.2	<0.2	<0.050	<0.050
Methoxyclor	ug/L	6.5	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10
DDT	ug/L	2.8	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050
Bacteria								
Total Coliforms	MPN/100mL		3,130	11,000	141,751	>1,100,000	4,859	>11,000
Fecal Coliforms	MPN/100mL		1,718	11,000	144,943	>1,100,000	323	2,400
E. coli	MPN/100mL		186	750	139,665	>1,100,000	322	2,400

Note: Criteria from Ontario Ministry of the Environment. (2009, July 27). 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

5.4 LANDFILL GAS

5.4.1 COLLECTION AND FLARING SYSTEM

The landfill gas collection and flaring system is run by Integrated Gas Recovery Systems Inc. on behalf of the City of Winnipeg.

As per the BRRMF Operating Plan, landfill gas operations and monitoring are managed through the Landfill Gas Operating Plan, submitted October 23, 2014, as per Clause 110. The Landfill Gas Operating Plan states that if the flare is operating as per the manufacturer's recommendations, the required particulate matter limits listed in Clause 108 will be met. If the flare is not operating as designed, the system will shut down, and corrective action will be taken.

In 2016, the BRRMF Gas Collection and Flaring System operated as intended. The recommendations identified in the Annual Flare Report are being evaluated for feasibility. In 2017, the landfill gas collection system will be expanding by adding an additional 25 gas wells over an approximate 12 hectare expansion area.

The 2016 Landfill Gas Collection and Flaring Report, prepared by Integrated Gas Recovery Services Inc., is attached in Appendix D.

5.4.2 SUBSURFACE LANDFILL GAS MONITORING PROGRAM

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

As per the BRRMF Operating Plan, subsurface landfill gas 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, oxygen, carbon monoxide, and hydrogen sulphide. The monitoring program states that the Subsurface Landfill Gas Contingency Plan will be activated if >1% methane is measured at any probe. Probe P30E had elevated methane readings from January to March, this data was not representative because the well was damaged; the well was re-drilled and results returned to historical values. In 2016, the contingency plan was not activated, indicating that the collection and flaring system is operating effectively.

The 2016 subsurface gas migration probe data is provided in Table 10.

Table 10. 2016 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
1	11-Jan-16	0.1	22.1	0.0	0.0
1	8-Feb-16	0.0	20.9	0.0	0.0
1	9-Mar-16	0.2	21.4	0.0	0.0
1	12-Apr-16	0.0	20.9	0.0	0.0
1	12-May-16	0.1	20.9	0.0	0.0
1	6-Jun-16	0.0	20.6	0.0	0.0
1	15-Jul-16	0.0	20.8	0.0	0.0
1	19-Aug-16	0.0	18.9	0.0	0.0
1	13-Sep-16	0.0	18.3	1.0	0.0
1	3-Oct-16	0.0	18.9	1.0	0.0
1	8-Nov-16	0.0	20.3	0.0	0.0
1	14-Dec-16	0.0	20.9	0.0	0.0
2	11-Jan-16	0.1	23.6	0.0	0.0
2	8-Feb-16	0.0	20.9	0.0	0.0
2	9-Mar-16	0.2	22.2	0.0	0.0
2	12-Apr-16	0.0	20.9	0.0	0.0
2	12-May-16	0.1	20.9	0.0	0.0
2	6-Jun-16	0.0	21.2	0.0	0.0
2	15-Jul-16	0.0	20.4	1.0	0.0
2	19-Aug-16	0.0	20.9	0.0	0.0
2	13-Sep-16	0.0	20.1	1.0	0.0
2	3-Oct-16	0.0	19.5	1.0	0.0
2	9-Nov-16	0.0	19.0	0.0	0.0
2	14-Dec-16	0.0	20.9	0.0	0.0
3	11-Jan-16	0.0	22.9	0.0	0.0
3	8-Feb-16	0.0	20.9	0.0	0.0
3	9-Mar-16	0.2	22.7	0.0	0.0
3	12-Apr-16	0.0	20.9	0.0	0.0
3	12-May-16	0.1	20.9	1.0	0.0
3	6-Jun-16	0.0	21.0	1.0	0.0
3	15-Jul-16	0.0	20.7	1.0	0.0
3	19-Aug-16	0.0	20.9	0.0	0.0
3	13-Sep-16	0.0	21.2	1.0	0.0
3	3-Oct-16	0.0	20.4	1.0	0.0
3	9-Nov-16	0.0	20.3	0.0	0.0
3	14-Dec-16	0.0	20.9	0.0	0.0

Table 10. 2016 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
4	12-Jan-16	0.0	21.1	0.0	0.0
4	8-Feb-16	0.0	20.9	0.0	0.0
4	9-Mar-16	0.2	20.8	0.0	0.0
4	12-Apr-16	0.0	20.9	0.0	0.0
4	12-May-16	0.1	20.9	0.0	0.0
4	6-Jun-16	0.0	19.9	0.0	0.0
4	15-Jul-16	0.0	20.7	2.0	0.0
4	19-Aug-16	0.0	20.2	0.0	0.0
4	13-Sep-16	0.0	20.1	0.0	0.0
4	3-Oct-16	0.0	21.8	0.0	0.0
4	9-Nov-16	0.0	20.1	0.0	0.0
4	14-Dec-16	0.0	15.9	0.0	0.0
5	12-Jan-16	0.0	20.9	0.0	0.0
5	8-Feb-16	0.0	20.9	0.0	0.0
5	9-Mar-16	0.2	21.4	0.0	0.0
5	12-Apr-16	0.0	20.9	0.0	0.0
5	12-May-16	0.1	20.9	0.0	0.0
5	6-Jun-16	0.0	18.9	1.0	0.0
5	15-Jul-16	0.0	20.5	0.0	0.0
5	19-Aug-16	0.0	20.1	0.0	0.0
5	13-Sep-16	0.0	21.0	0.0	0.0
5	3-Oct-16	0.1	21.7	0.0	0.0
5	9-Nov-16	0.0	20.3	0.0	0.0
5	14-Dec-16	0.0	20.9	0.0	0.0
6	11-Jan-16	0.0	21.1	0.0	0.0
6	8-Feb-16	0.0	20.9	0.0	0.0
6	9-Mar-16	0.0	20.9	0.0	0.0
6	12-Apr-16	0.0	20.9	0.0	0.0
6	12-May-16	0.1	20.9	1.0	0.0
6	6-Jun-16	0.0	20.5	1.0	0.0
6	15-Jul-16	0.0	21.0	0.0	0.0
6	19-Aug-16	0.0	20.9	0.0	0.0
6	13-Sep-16	0.0	21.3	1.0	0.0
6	3-Oct-16	0.0	20.4	1.0	0.0
6	8-Nov-16	0.0	20.7	0.0	0.0
6	14-Dec-16	0.0	20.9	0.0	0.0

Table 10. 2016 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
7	11-Jan-16	0.0	23.8	2.0	0.0
7	8-Feb-16	0.1	23.2	0.0	0.0
7	9-Mar-16	0.2	21.0	0.0	0.0
7	12-Apr-16	0.0	20.9	0.0	0.0
7	12-May-16	0.1	20.2	1.0	0.0
7	6-Jun-16	0.0	17.1	0.0	0.0
7	15-Jul-16	0.0	18.9	1.0	0.0
7	19-Aug-16	0.0	19.8	0.0	0.0
7	13-Sep-16	0.0	18.7	1.0	0.0
7	3-Oct-16	0.0	20.5	0.0	0.0
7	9-Nov-16	0.0	18.2	0.0	0.0
7	14-Dec-16	0.0	18.3	0.0	0.0
8	11-Jan-16	0.0	23.3	2.0	0.0
8	8-Feb-16	0.1	20.9	0.0	0.0
8	9-Mar-16	0.1	21.0	0.0	0.0
8	12-Apr-16	0.0	20.9	0.0	0.0
8	12-May-16	0.1	20.9	0.0	0.0
8	6-Jun-16	0.0	20.7	0.0	0.0
8	15-Jul-16	0.0	21.0	0.0	0.0
8	19-Aug-16	0.0	19.9	0.0	0.0
8	13-Sep-16	0.0	20.2	1.0	0.0
8	3-Oct-16	0.0	20.5	0.0	0.0
8	9-Nov-16	0.0	19.7	0.0	0.0
8	14-Dec-16	0.0	20.9	0.0	0.0
9	11-Jan-16	0.0	20.9	0.0	0.0
9	8-Feb-16	0.1	20.1	0.0	0.0
9	9-Mar-16	0.0	20.9	0.0	0.0
9	12-Apr-16	0.0	20.9	0.0	0.0
9	12-May-16	0.1	20.9	0.1	0.0
9	6-Jun-16	0.0	20.9	0.0	0.0
9	15-Jul-16	0.0	19.9	0.0	0.0
9	19-Aug-16	0.0	19.8	0.0	0.0
9	13-Sep-16	0.0	21.1	0.0	0.0
9	4-Oct-16	0.0	20.3	0.0	0.0
9	8-Nov-16	0.0	19.7	0.0	0.0
9	14-Dec-16	0.0	20.9	0.0	0.0

Table 10. 2016 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
10	**11-Jan-16**	0.0	22.7	2.0	0.0
10	**8-Feb-16**	0.1	22.7	0.0	0.0
10	**9-Mar-16**	0.2	20.8	0.0	0.0
10	**12-Apr-16**	0.0	20.9	0.0	0.0
10	**12-May-16**	0.1	20.9	0.0	0.0
10	**6-Jun-16**	0.0	20.5	1.0	0.0
10	**15-Jul-16**	0.0	21.0	1.0	0.0
10	**19-Aug-16**	0.0	16.8	0.0	0.0
10	**13-Sep-16**	0.0	18.5	1.0	0.0
10	**4-Oct-16**	0.0	19.8	0.0	0.0
10	**9-Nov-16**	0.0	19.1	0.0	0.0
10	**14-Dec-16**	0.0	20.9	0.0	0.0
P28E	**11-Jan-16**	0.0	21.8	1.0	0.0
P28E	**8-Feb-16**	0.0	20.9	0.0	0.0
P28E	**9-Mar-16**	0.2	20.8	0.0	0.0
P28E	**12-Apr-16**	0.5	20.8	0.0	0.0
P28E	**12-May-16**	0.1	27.1	0.0	0.0
P28E	**6-Jun-16**	0.0	20.9	0.0	0.0
P28E	**15-Jul-16**	0.0	21.0	0.0	0.0
P28E	**19-Aug-16**	0.0	20.9	0.0	0.0
P28E	**13-Sep-16**	0.0	18.2	1.0	0.0
P28E	**3-Oct-16**	0.0	17.8	0.0	0.0
P28E	**9-Nov-16**	0.0	17.0	0.0	0.0
P28E	**14-Dec-16**	0.0	19.6	0.0	0.0
P30E	**11-Jan-16**	NR	NR	NR	NR
P30E	**10-Feb-16**	NR	NR	NR	NR
P30E	**11-Feb-16**	NR	NR	NR	NR
P30E	**9-Mar-16**	NR	NR	NR	NR
P30E	**31-May-16**	0.0	20.9	0.0	0.0
P30E	**6-Jun-16**	0.0	20.8	1.0	0.0
P30E	**15-Jul-16**	0.0	20.7	13.0	0.0
P30E	**19-Aug-16**	0.0	20.9	0.0	0.0
P30E	**13-Sep-16**	0.0	18.7	1.0	0.0
P30E	**3-Oct-16**	0.0	18.9	0.0	0.0
P30E	**9-Nov-16**	0.0	19.5	0.0	0.0
P30E	**14-Dec-16**	0.0	20.9	0.0	0.0

Table 10. 2016 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
P34E	**11-Jan-16**	0.2	24.0	1.0	0.0
P34E	**8-Feb-16**	0.0	20.9	0.0	0.0
P34E	**9-Mar-16**	0.2	20.1	0.0	0.0
P34E	**12-Apr-16**	0.0	20.9	0.0	0.0
P34E	**12-May-16**	0.1	20.9	0.0	0.0
P34E	**6-Jun-16**	0.0	21.0	0.0	0.0
P34E	**15-Jul-16**	0.0	20.9	0.0	0.0
P34E	**19-Aug-16**	0.0	20.9	0.0	0.0
P34E	**13-Sep-16**	0.0	20.1	0.0	0.0
P34E	**3-Oct-16**	0.0	18.7	0.0	0.0
P34E	**9-Nov-16**	0.0	20.5	0.0	0.0
P34E	**14-Dec-16**	0.0	20.9	0.0	0.0
P106E	**11-Jan-16**	0.0	22.3	0.0	0.0
P106E	**8-Feb-16**	0.2	20.5	0.0	0.0
P106E	**9-Mar-16**	0.3	20.7	0.0	0.0
P106E	**12-Apr-16**	0.0	20.9	0.0	0.0
P106E	**12-May-16**	0.1	20.7	0.0	0.0
P106E	**6-Jun-16**	0.0	20.4	0.0	0.0
P106E	**15-Jul-16**	0.0	20.8	0.0	0.0
P106E	**19-Aug-16**	0.0	20.9	0.0	0.0
P106E	**13-Sep-16**	0.0	19.3	3.0	0.0
P106E	**3-Oct-16**	0.0	19.0	0.0	0.0
P106E	**8-Nov-16**	0.0	17.3	1.0	0.0
P106E	**14-Dec-16**	1.0	20.9	4.0	0.0
P107E	**11-Jan-16**	0.0	18.5	0.0	0.0
P107E	**8-Feb-16**	0.1	14.0	4.0	1.0
P107E	**9-Mar-16**	0.3	19.7	3.0	0.0
P107E	**12-Apr-16**	0.0	20.7	0.0	0.0
P107E	**12-May-16**	0.1	21.0	0.0	0.0
P107E	**6-Jun-16**	0.0	20.6	0.0	0.0
P107E	**15-Jul-16**	0.0	20.7	0.0	0.0
P107E	**19-Aug-16**	0.0	20.9	0.0	0.0
P107E	**13-Sep-16**	0.2	18.5	0.0	0.0
P107E	**3-Oct-16**	0.2	17.5	0.0	0.0
P107E	**8-Nov-16**	0.0	18.0	0.0	0.0
P107E	**14-Dec-16**	0.0	19.3	1.0	1.0

Table 10. 2016 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
P108E	**11-Jan-16**	0.0	22.9	0.0	0.0
P108E	**8-Feb-16**	0.1	22.4	0.0	0.0
P108E	**9-Mar-16**	0.2	21.5	0.0	0.0
P108E	**12-Apr-16**	0.0	20.9	0.0	0.0
P108E	**12-May-16**	0.1	20.9	0.0	0.0
P108E	**6-Jun-16**	0.0	20.7	0.0	0.0
P108E	**15-Jul-16**	0.0	20.6	0.0	0.0
P108E	**19-Aug-16**	0.0	20.9	0.0	0.0
P108E	**13-Sep-16**	0.0	20.5	0.0	0.0
P108E	**3-Oct-16**	0.0	19.6	1.0	0.0
P108E	**8-Nov-16**	0.0	19.8	0.0	0.0
P108E	**14-Dec-16**	1.0	20.9	4.0	0.0
P109E	**11-Jan-16**	0.0	20.4	0.0	0.0
P109E	**8-Feb-16**	0.1	20.7	0.0	0.0
P109E	**9-Mar-16**	0.1	19.8	0.0	0.0
P109E	**12-Apr-16**	0.0	20.9	0.0	0.0
P109E	**12-May-16**	0.1	20.4	1.0	0.0
P109E	**6-Jun-16**	0.0	20.8	0.0	0.0
P109E	**15-Jul-16**	0.0	20.6	1.0	0.0
P109E	**19-Aug-16**	0.0	20.9	0.0	0.0
P109E	**13-Sep-16**	0.0	20.6	0.0	0.0
P109E	**3-Oct-16**	0.0	19.5	0.0	0.0
P109E	**8-Nov-16**	0.0	20.0	0.0	0.0
P109E	**14-Dec-16**	1.0	20.9	4.0	0.0
P110E	**11-Jan-16**	0.0	22.9	0.0	0.0
P110E	**8-Feb-16**	0.1	15.9	0.0	0.0
P110E	**9-Mar-16**	0.2	21.9	0.0	0.0
P110E	**12-Apr-16**	0.1	20.9	0.0	0.0
P110E	**12-May-16**	0.1	19.3	11.0	0.0
P110E	**6-Jun-16**	0.0	18.6	0.1	0.0
P110E	**15-Jul-16**	0.0	20.8	0.0	0.0
P110E	**19-Aug-16**	0.0	18.8	0.0	0.0
P110E	**13-Sep-16**	0.0	7.1	0.0	0.0
P110E	**3-Oct-16**	0.0	20.0	1.0	0.0
P110E	**8-Nov-16**	0.0	0.8	0.0	0.0
P110E	**14-Dec-16**	0.0	20.9	0.0	0.0

Table 10. 2016 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
P111E	**11-Jan-16**	0.0	23.5	0.0	0.0
P111E	**8-Feb-16**	0.0	20.9	0.0	0.0
P111E	**9-Mar-16**	0.2	21.4	0.0	0.0
P111E	**12-Apr-16**	0.0	20.9	0.0	0.0
P111E	**12-May-16**	0.1	20.4	1.0	0.0
P111E	**6-Jun-16**	0.0	21.1	0.0	0.0
P111E	**15-Jul-16**	0.0	20.7	0.0	0.0
P111E	**19-Aug-16**	0.0	20.9	0.0	0.0
P111E	**13-Sep-16**	0.0	21.1	0.0	0.0
P111E	**3-Oct-16**	0.0	20.0	1.0	0.0
P111E	**8-Nov-16**	0.0	20.2	0.0	0.0
P111E	**14-Dec-16**	0.0	11.5	0.0	0.0
P112E	**11-Jan-16**	0.0	24.2	0.0	0.0
P112E	**8-Feb-16**	0.0	20.9	0.0	0.0
P112E	**9-Mar-16**	0.2	22.2	0.0	0.0
P112E	**12-Apr-16**	0.0	20.9	0.0	0.0
P112E	**12-May-16**	0.1	20.9	0.0	0.0
P112E	**6-Jun-16**	0.0	21.1	0.0	0.0
P112E	**15-Jul-16**	0.0	21.1	0.0	0.0
P112E	**19-Aug-16**	0.0	20.9	0.0	0.0
P112E	**13-Sep-16**	0.0	21.1	1.0	0.0
P112E	**3-Oct-16**	0.0	19.9	1.0	0.0
P112E	**8-Nov-16**	0.0	19.9	0.0	0.0
P112E	**14-Dec-16**	0.0	20.9	0.0	0.0

6.0 NUISANCE MANAGEMENT

In order to reduce odour, litter, and vector nuisances at the landfill, several best practices and effective 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 to ensure that proper chemicals are used and properly handled. Noise is not a significant issue due to the separation from surrounding homes. Fugitive dust emissions are minimized through proper operating procedures which include spraying site roads with uncontaminated surface water.

In 2016, there were 28 odour complaints from 15 customers; in all cases the source of the odour was investigated. If the source of the odour could be located within the BRRMF, we immediately covered the odour causing material, moved the tipping face to a more favorable area, and used compost or wood chips to reduce the odour and prevent further occurrence.

Table 11 provides a summary of nuisance complaints received in 2016.

7.0 CONCLUSION

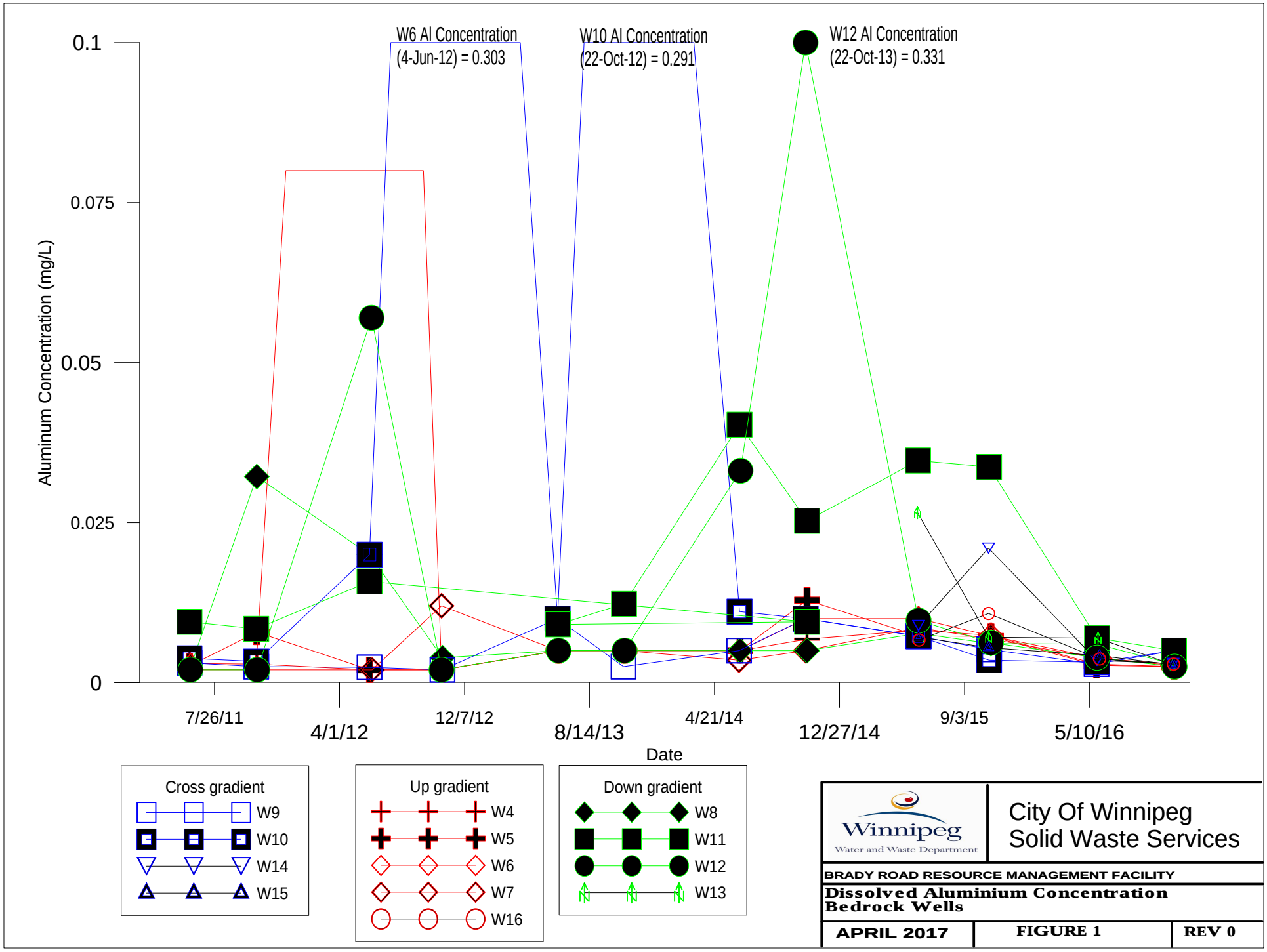
The diversion operations taking place at the BRRMF have been effective in diverting tens of thousands of metric tonnes of material from the landfill. The 4R depot, which opened in February 2016, is expected to greatly improve the diversion rate. Continuing current diversion operations and improving them as necessary will help the City of Winnipeg reach its goal of 50% diversion for residential waste.

Required detection limits are specified in our contract, but could not be reached for benzo (g,h,i) perylene (PAH), vinyl chloride, trichloroethylene, and tetrachloroethylene due to the presence of suspended solids in some leachate samples.

Due to the limited amount of historical data, we could not determine if there were any statistically significant increases (SSI) over background levels; we will evaluate SSI starting in 2019, once we have collected 5 years of historical data.

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.

APPENDIX B
STATISTICAL ANALYSIS OF GROUNDWATER QUALITY


W6 Al Concentration
(4-Jun-12) = 0.303
W10 Al Concentration
(22-Oct-12) = 0.291
W12 Al Concentration
(22-Oct-13) = 0.331
Aluminum Concentration (mg/L)
0.1
0.075
0.05
0.025
0
7/26/11
4/1/12
12/7/12
8/14/13
4/21/14
12/27/14
9/3/15
5/10/16
Date
Cross gradient
W9
W10
W14
W15
Up gradient
W4
W5
W6
W7
W16
Down gradient
W8
W11
W12
W13
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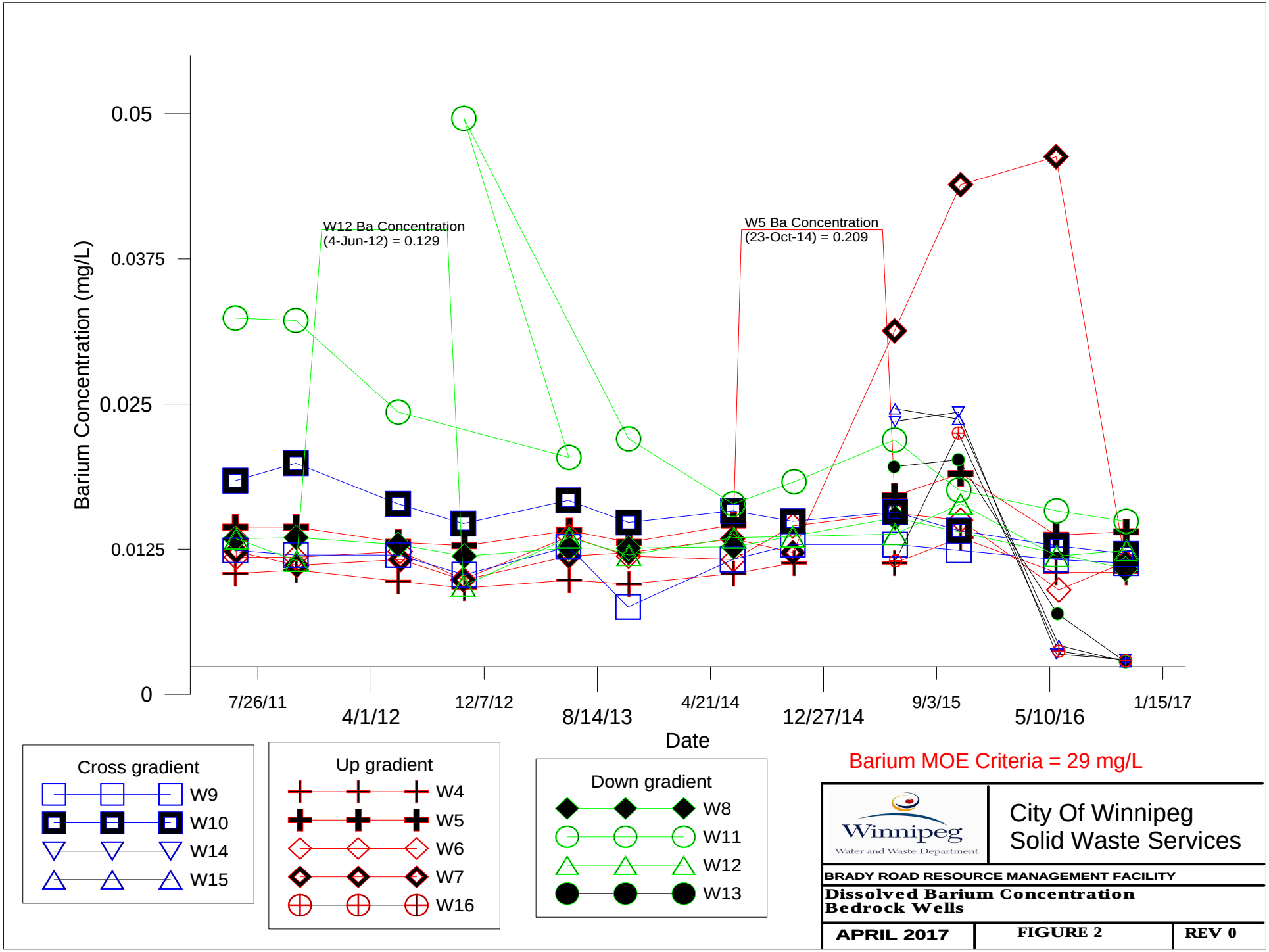
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Aluminium Concentration
Bedrock Wells
APRIL 2017
FIGURE 1
REV 0


0.05
0.0375
0.025
0.0125
0
Barium Concentration (mg/L)
W12 Ba Concentration
(4-Jun-12) = 0.129
W5 Ba Concentration
(23-Oct-14) = 0.209
7/26/11
4/1/12
12/7/12
8/14/13
4/21/14
12/27/14
9/3/15
5/10/16
1/15/17
Date
Cross gradient
W9
W10
W14
W15
Up gradient
W4
W5
W6
W7
W16
Down gradient
W8
W11
W12
W13
Barium MOE Criteria = 29 mg/L
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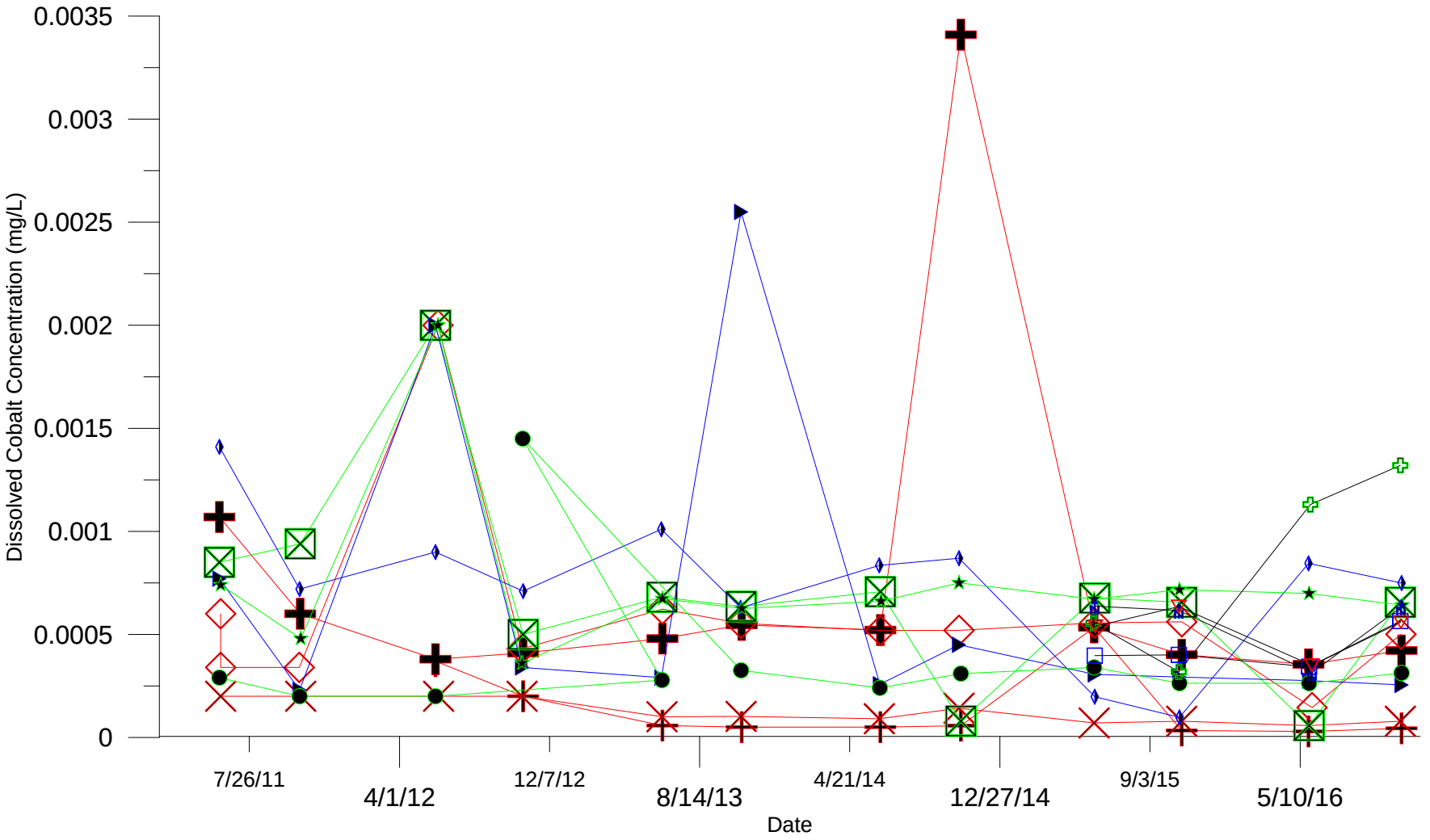
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Barium Concentration
Bedrock Wells
APRIL 2017
FIGURE 2
REV 0



Cross gradient
W9
W10
W14
W15

Up gradient
W4
W5
W6
W7
W16

Down gradient
W8
W11
W12
W13

MOE Cobalt Criteria = 0.066 mg/L

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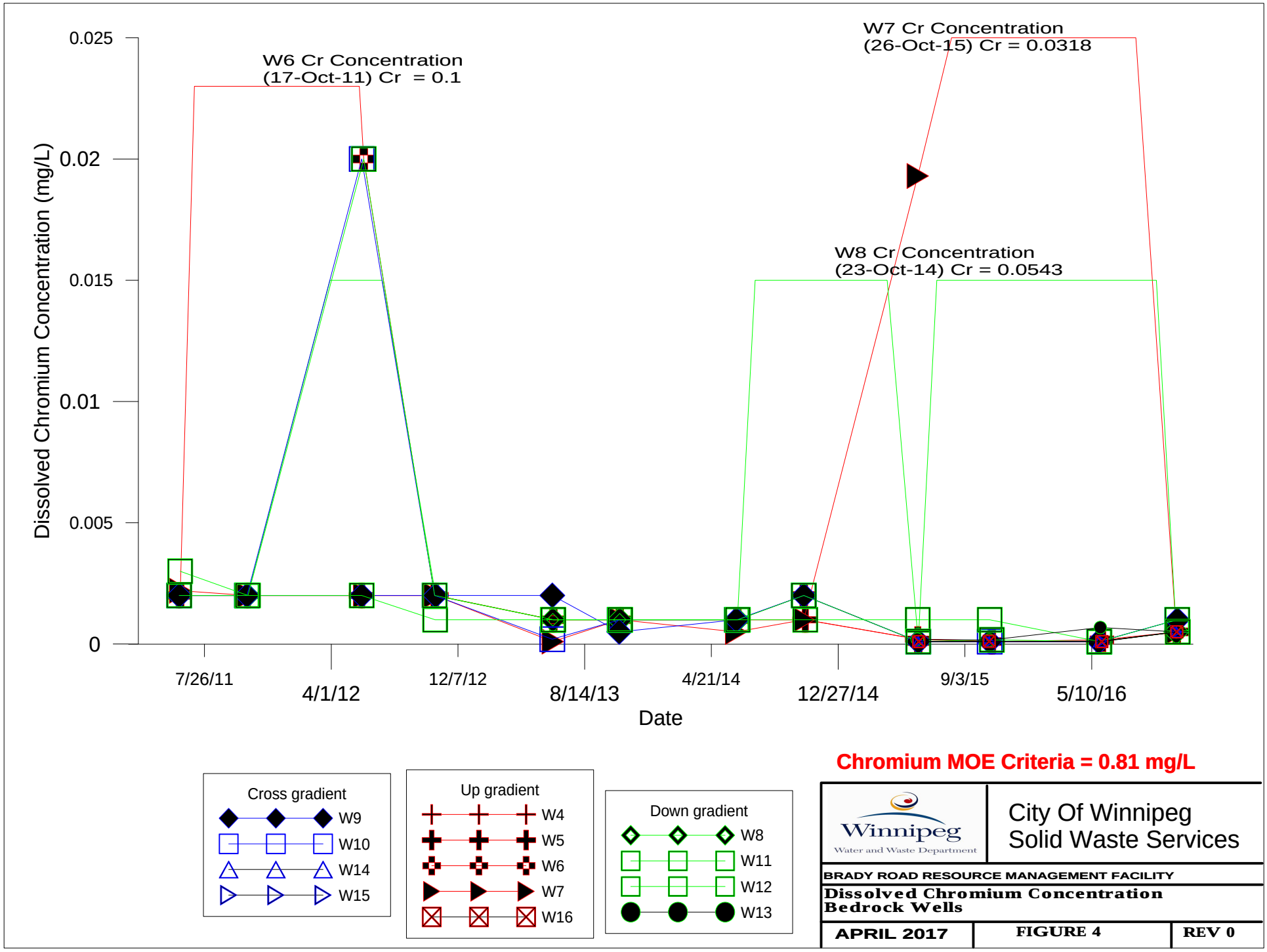
Dissolved Cobalt Concentration
Bedrock Wells

APRIL 2017	FIGURE 3	REV 0


W6 Cr Concentration
(17-Oct-11) Cr = 0.1
W7 Cr Concentration
(26-Oct-15) Cr = 0.0318
W8 Cr Concentration
(23-Oct-14) Cr = 0.0543
Dissolved Chromium Concentration (mg/L)
0.025
0.02
0.015
0.01
0.005
0
7/26/11
4/1/12
12/7/12
8/14/13
4/21/14
12/27/14
9/3/15
5/10/16
Date
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
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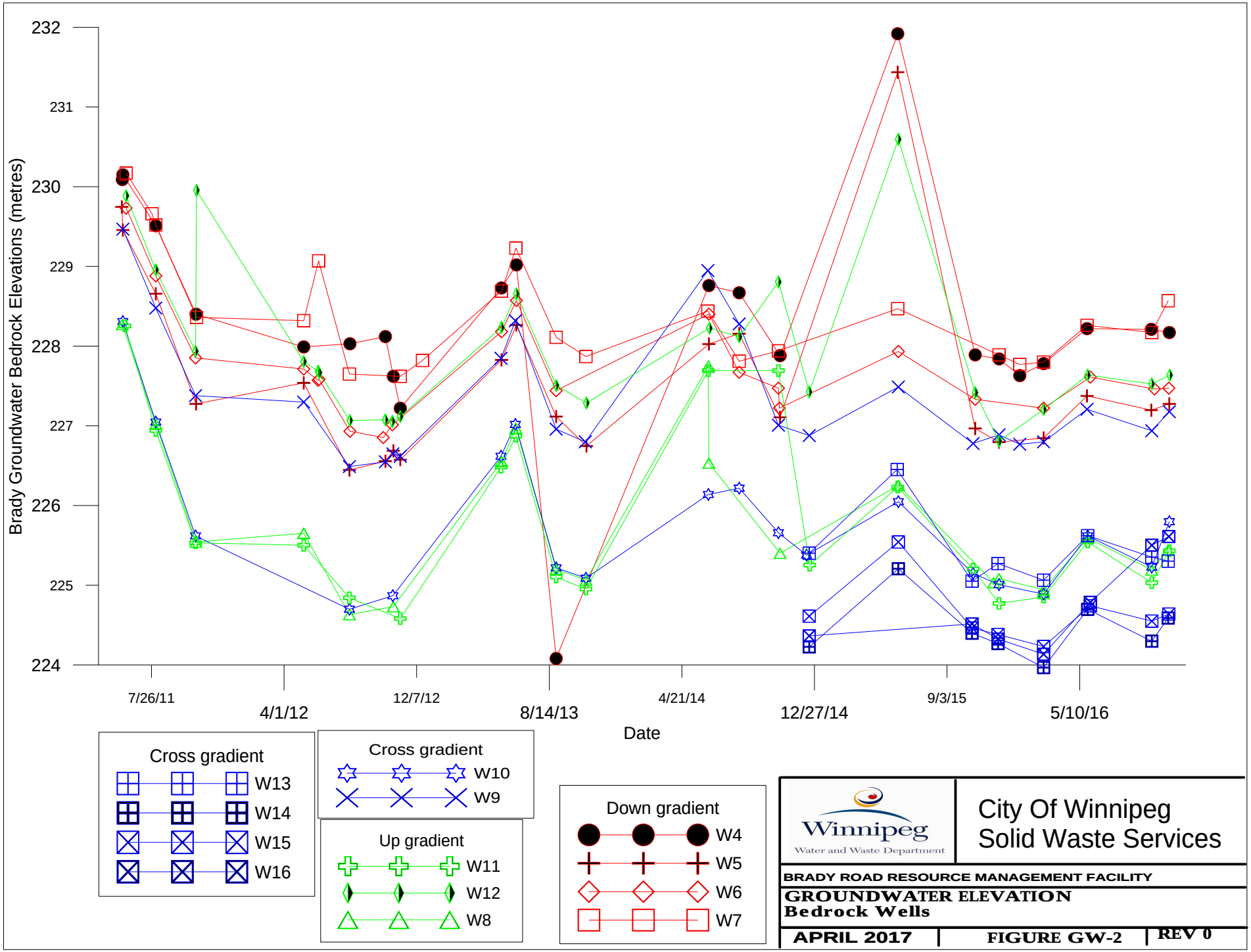
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Chromium Concentration
Bedrock Wells
APRIL 2017
FIGURE 4
REV 0



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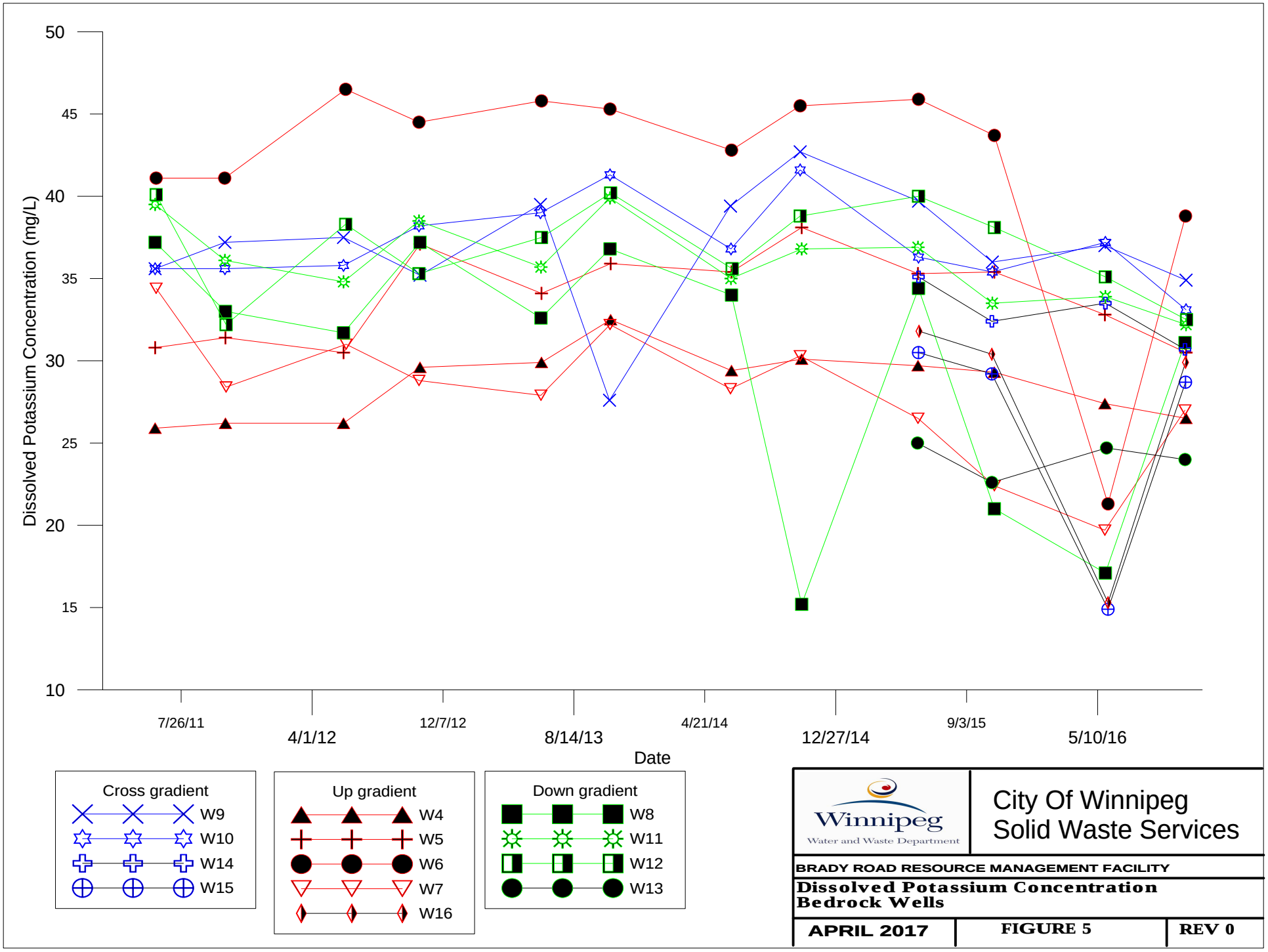
GROUNDWATER ELEVATION
Bedrock Wells

APRIL 2017 | FIGURE GW-2 | REV 0



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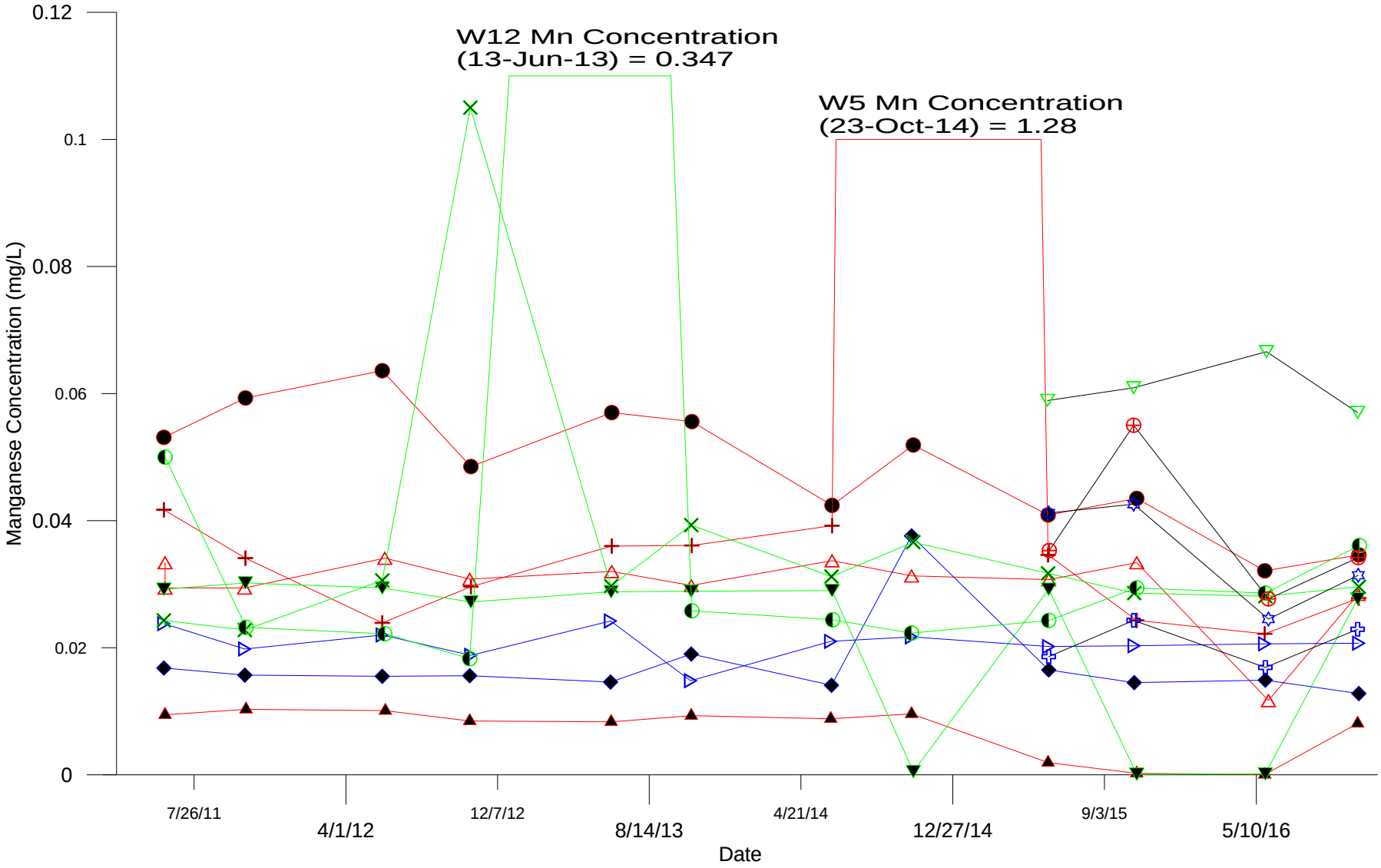
Dissolved Potassium Concentration
Bedrock Wells

APRIL 2017	FIGURE 5	REV 0



Cross gradient
W9
W10
W14
W15

Up gradient
W4
W5
W6
W7
W16

Down gradient
W8
W11
W12
W13

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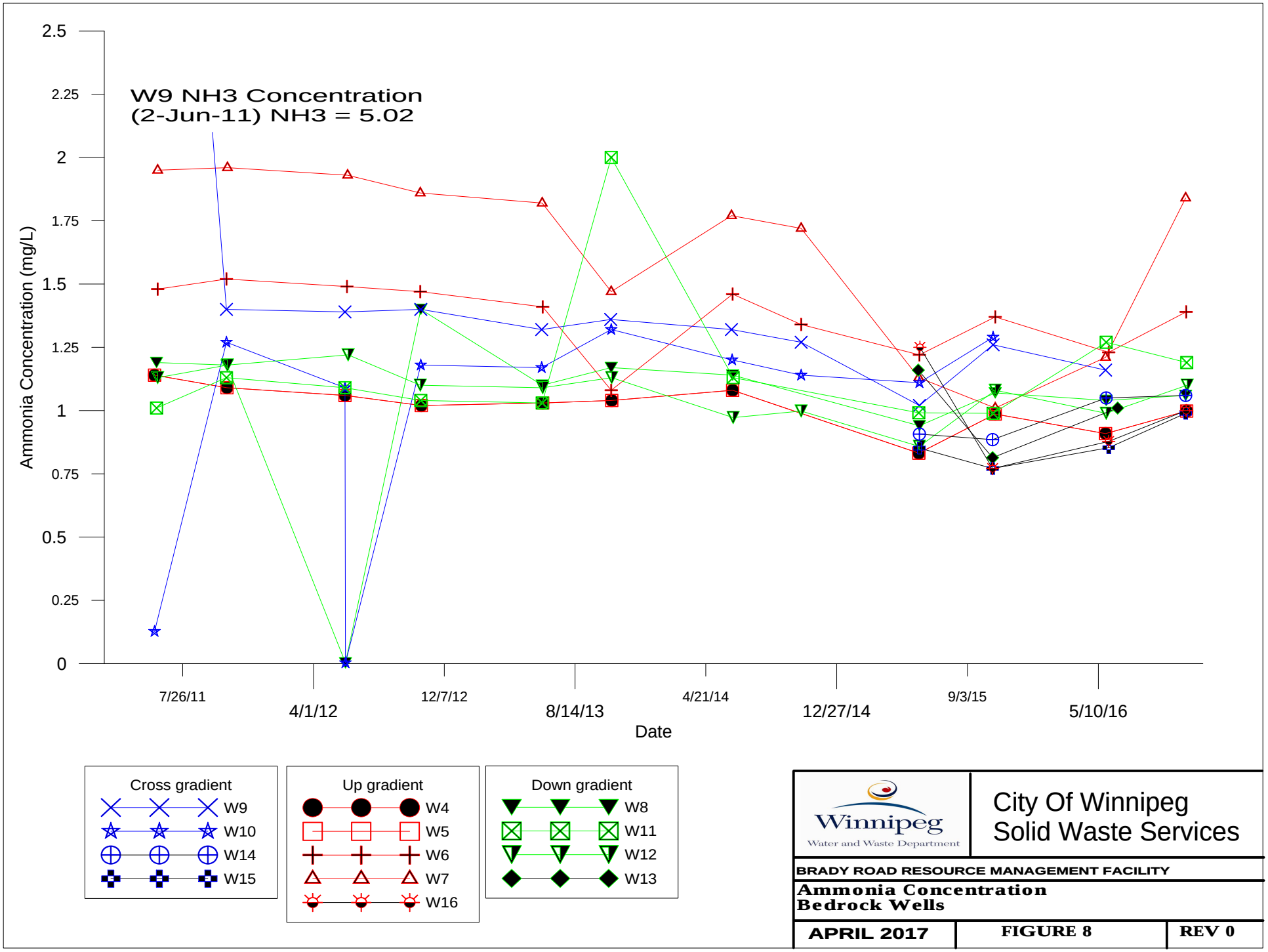
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Manganese Concentration Bedrock Wells

APRIL 2017	FIGURE 7	REV 0



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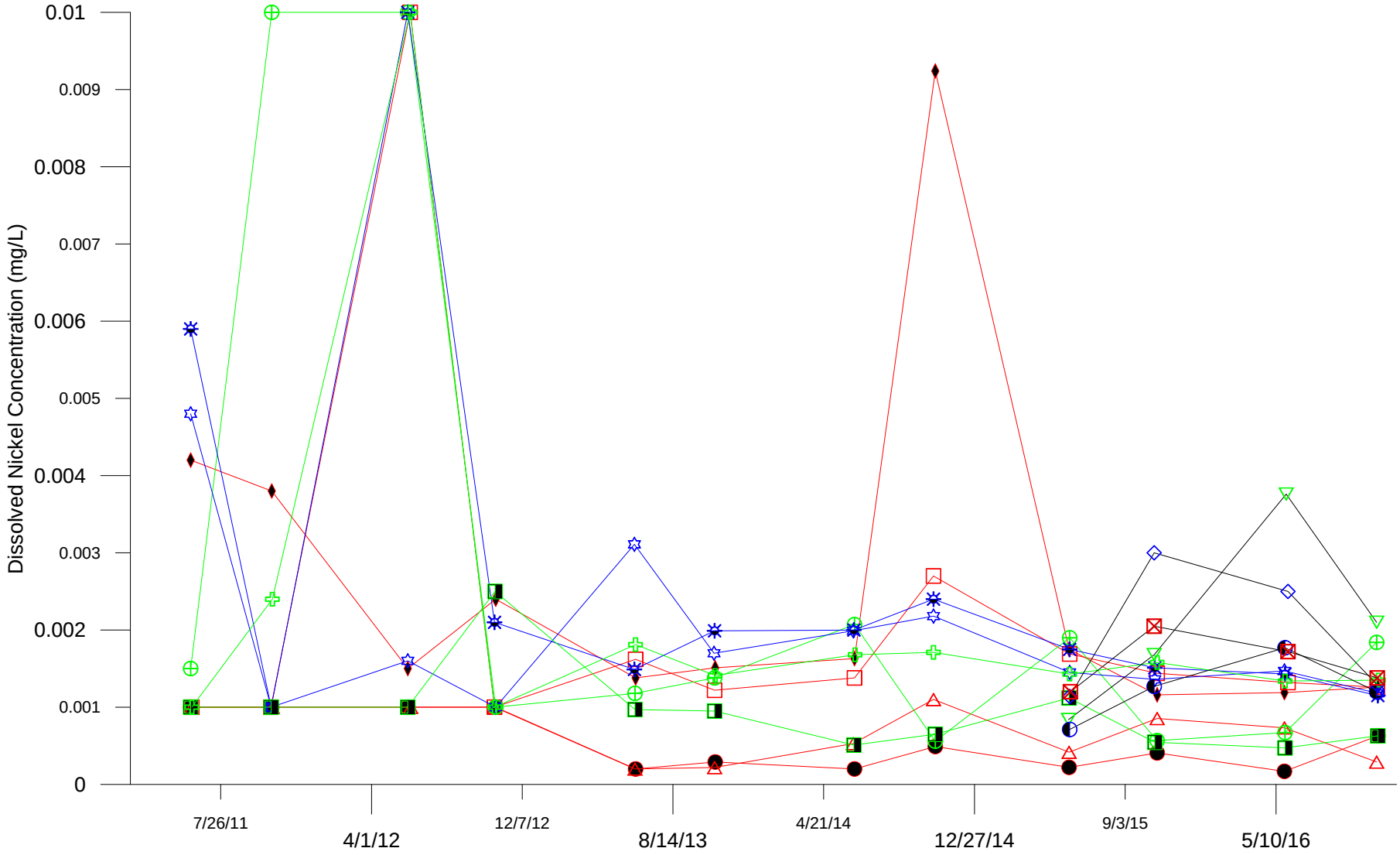
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Ammonia Concentration
Bedrock Wells

APRIL 2017	FIGURE 8	REV 0



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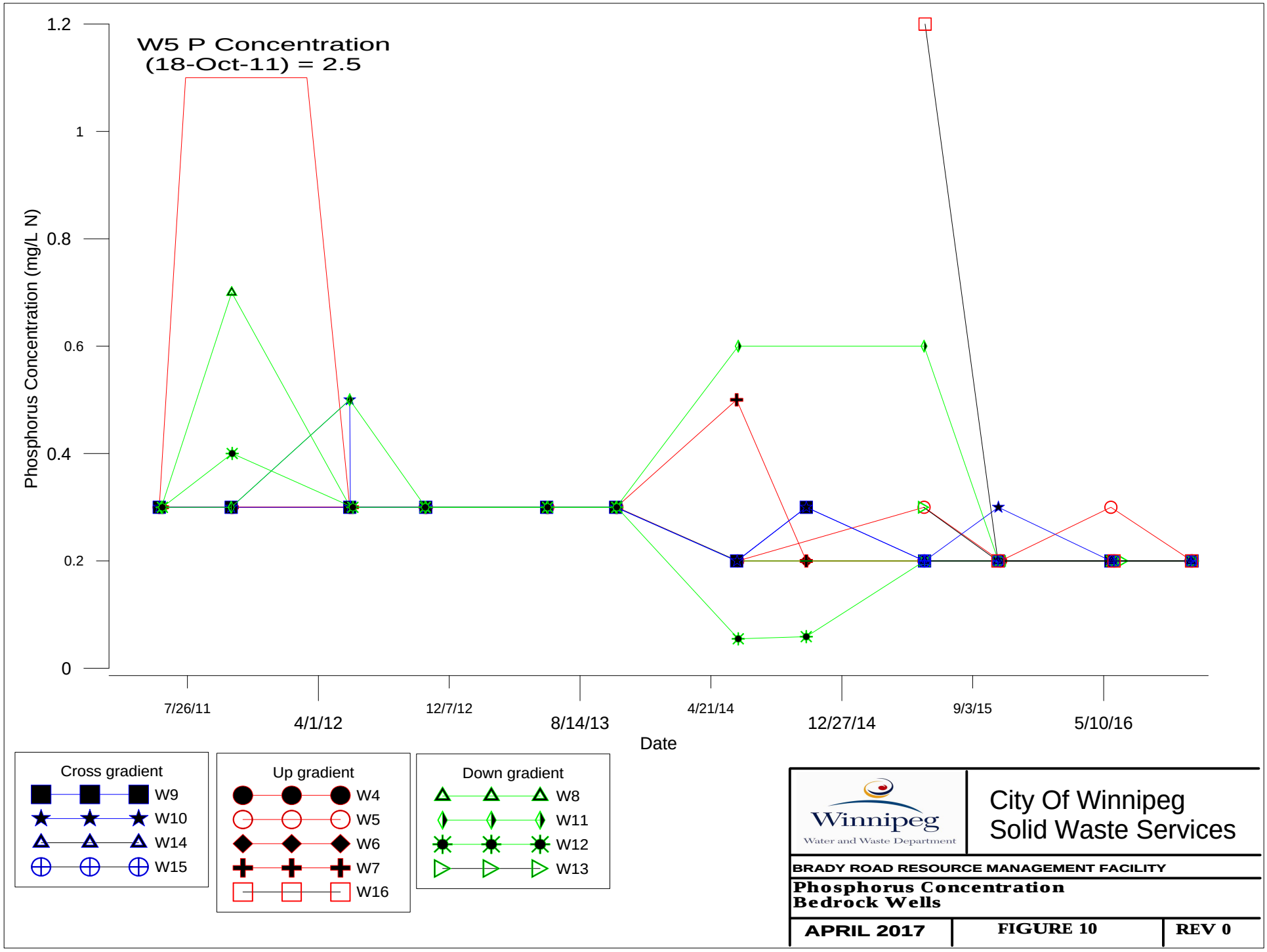
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Nickel Concentration
Bedrock Wells

APRIL 2017	FIGURE 9	REV 0



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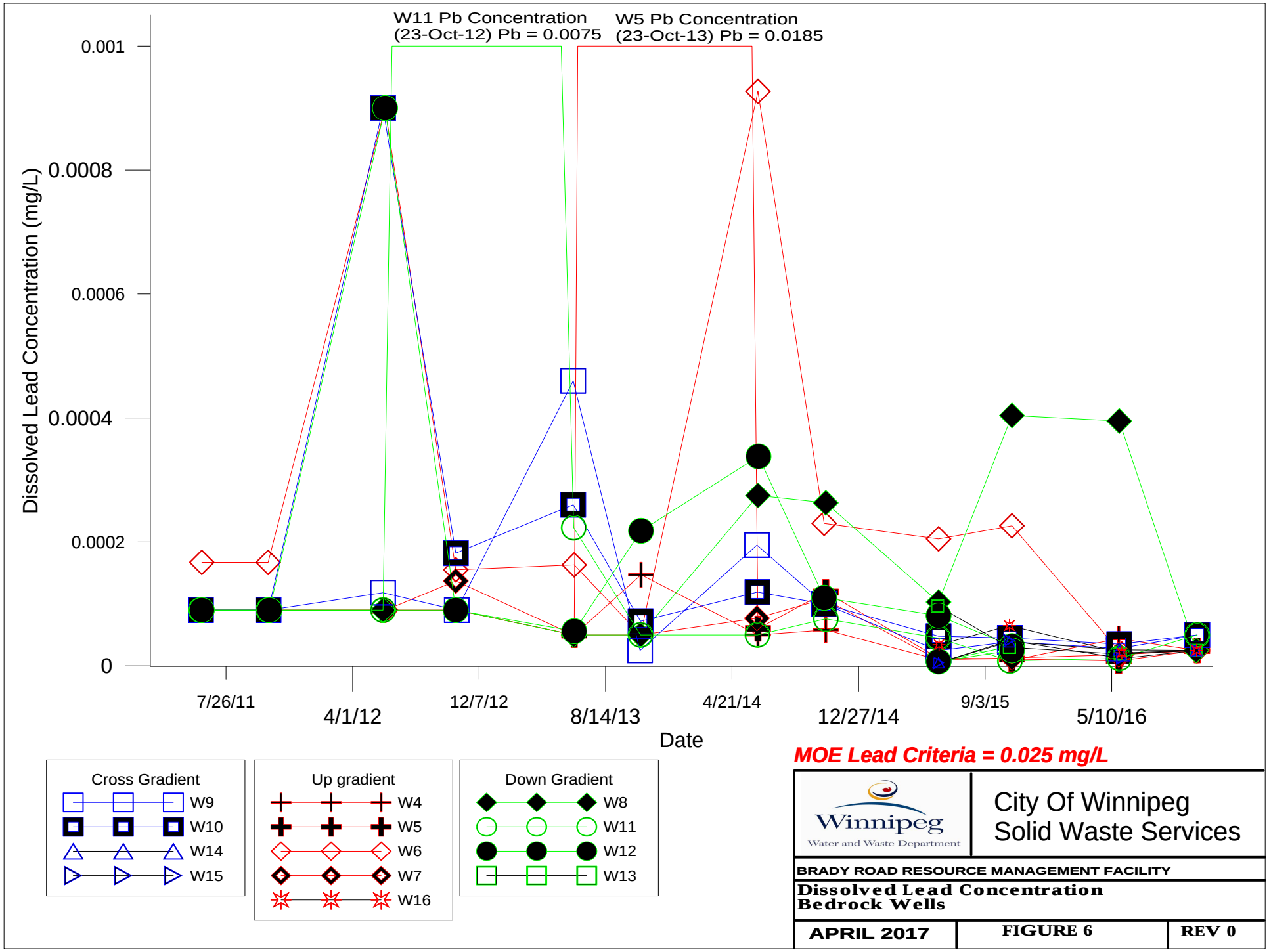
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Phosphorus Concentration
Bedrock Wells

APRIL 2017	FIGURE 10	REV 0


W11 Pb Concentration
(23-Oct-12) Pb = 0.0075
W5 Pb Concentration
(23-Oct-13) Pb = 0.0185
Dissolved Lead Concentration (mg/L)
0.001
0.0008
0.0006
0.0004
0.0002
0
7/26/11
4/1/12
12/7/12
8/14/13
4/21/14
12/27/14
9/3/15
5/10/16
Date
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
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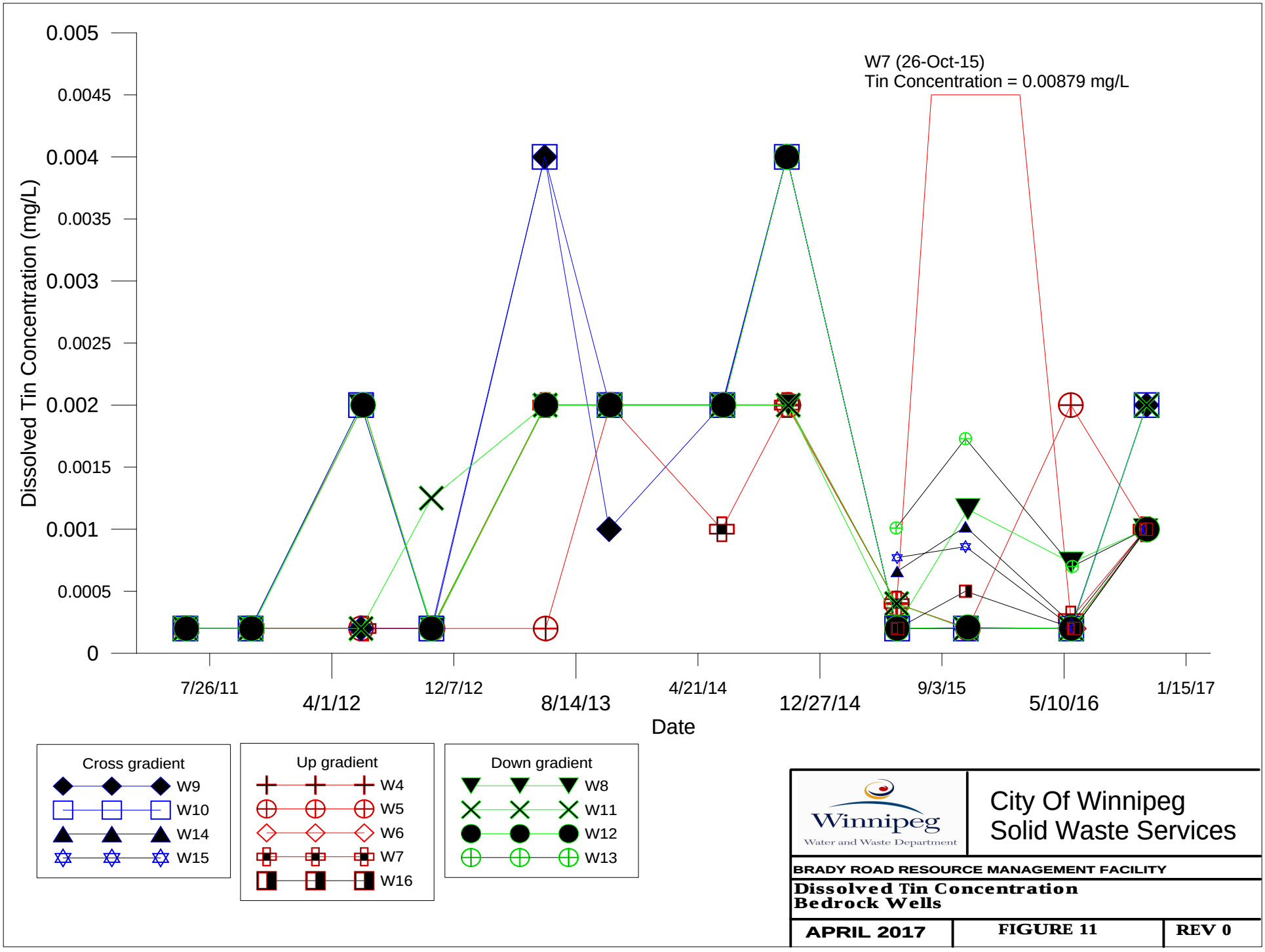
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Lead Concentration
Bedrock Wells
APRIL 2017
FIGURE 6
REV 0


W7 (26-Oct-15)
Tin Concentration = 0.00879 mg/L
Dissolved Tin Concentration (mg/L)
0.005
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
7/26/11
4/1/12
12/7/12
8/14/13
4/21/14
12/27/14
9/3/15
5/10/16
1/15/17
Date
Cross gradient
W9
W10
W14
W15
Up gradient
W4
W5
W6
W7
W16
Down gradient
W8
W11
W12
W13
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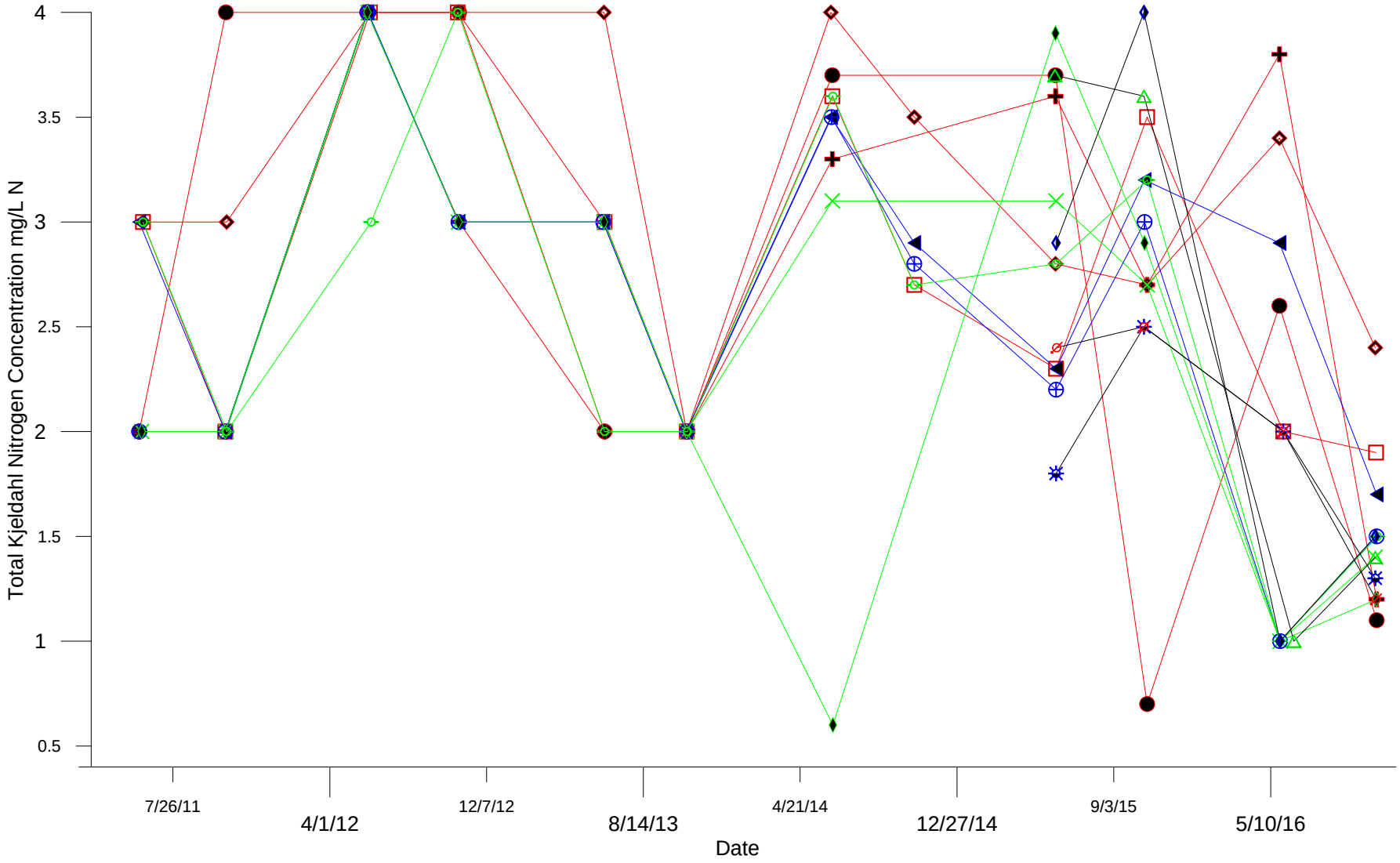
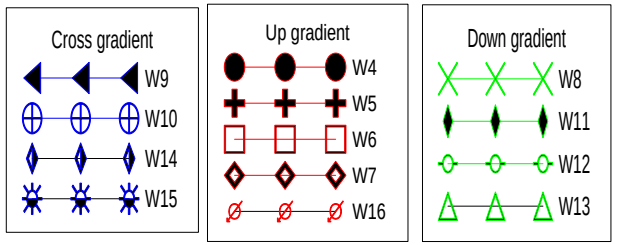
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Tin Concentration
Bedrock Wells
APRIL 2017
FIGURE 11
REV 0





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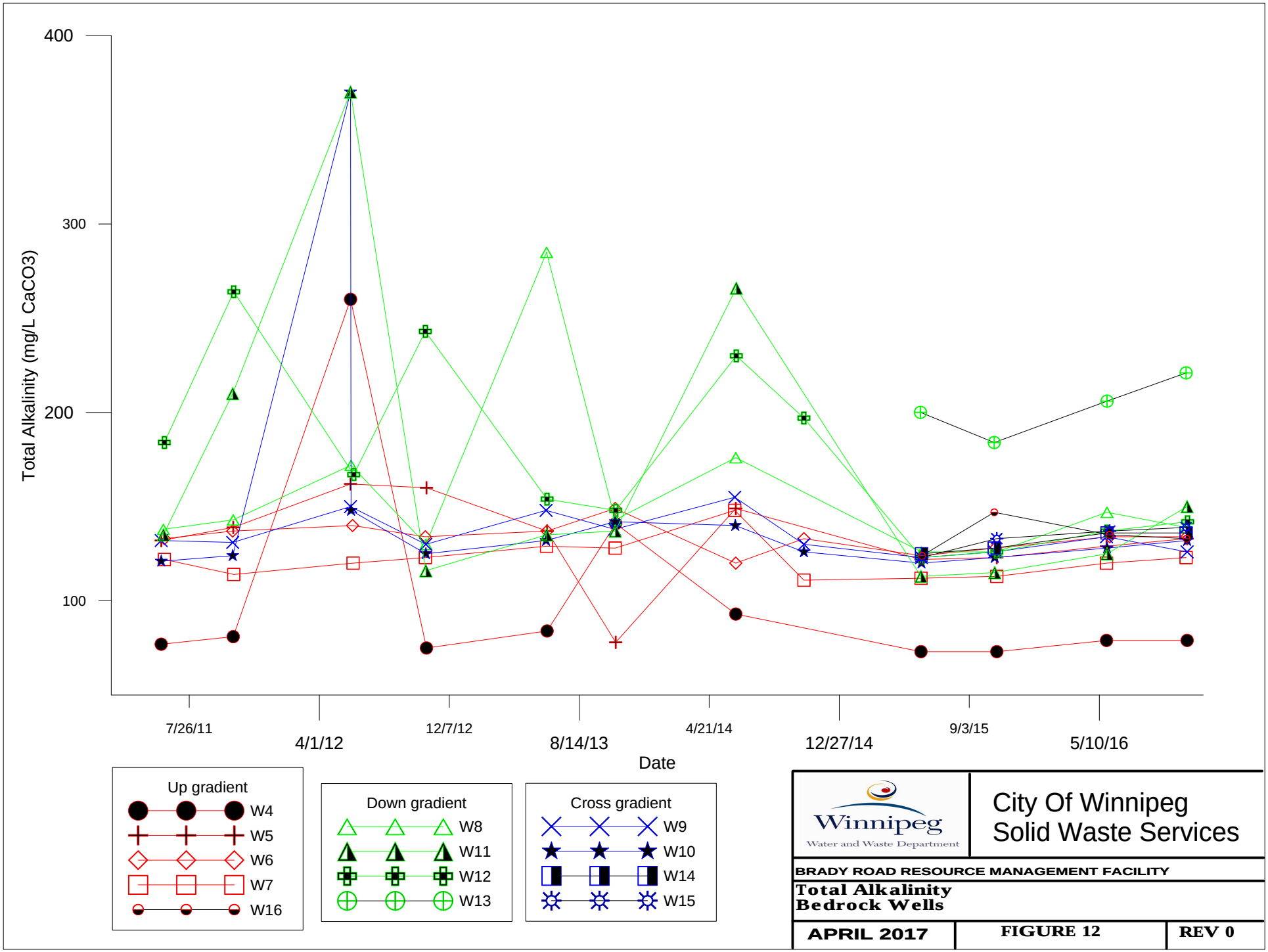
BRADY ROAD RESOURCE MANAGEMENT FACILITY

TKN Concentration
Bedrock Wells

APRIL 2017	FIGURE 12	REV 0



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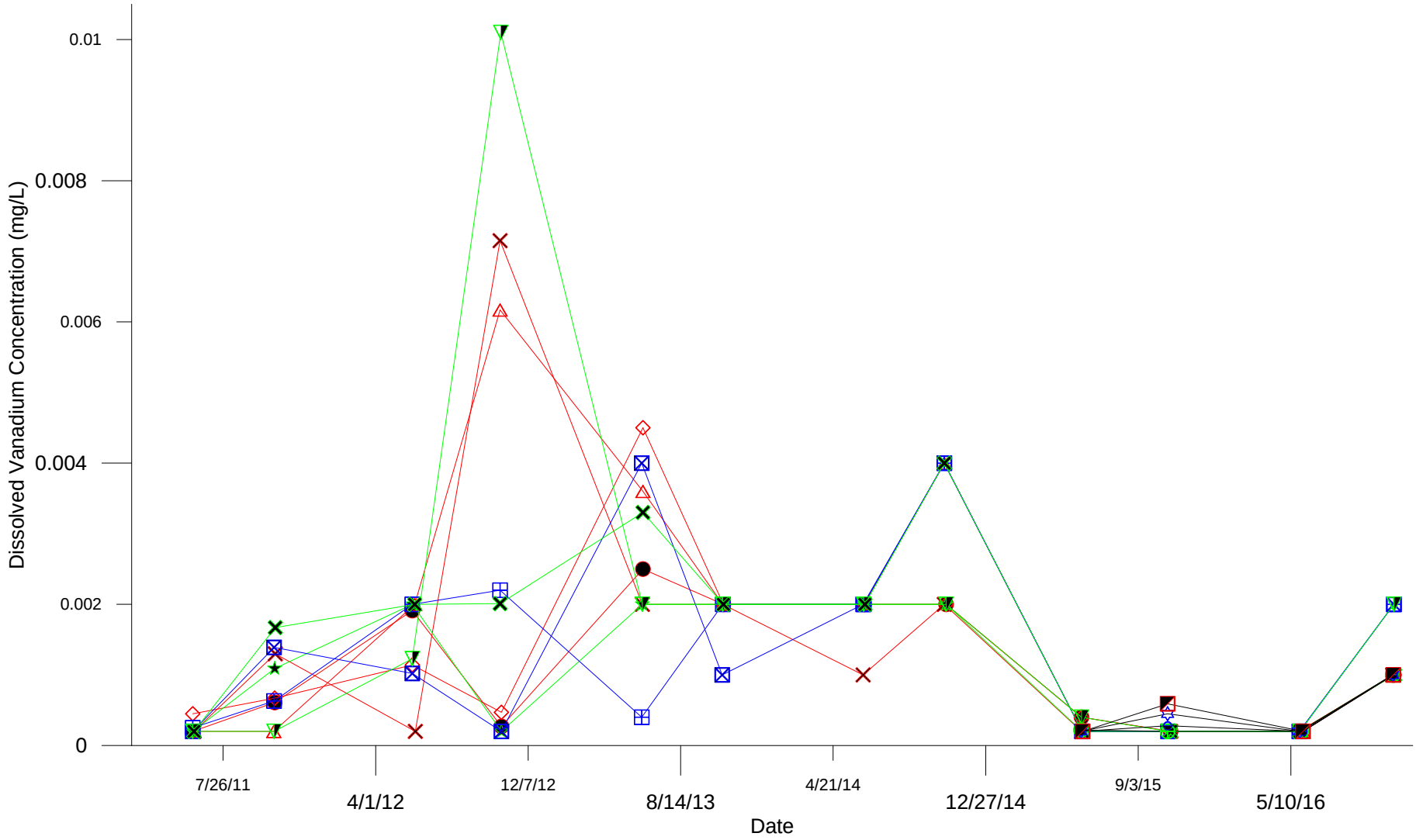
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Total Alkalinity
Bedrock Wells

APRIL 2017	FIGURE 12	REV 0



Cross gradient
W9
W10
W14
W15

Up gradient
W4
W5
W6
W7
W16

Down gradient
W8
W11
W12
W13

Vanadium MOE Criteria = 0.25 mg/L

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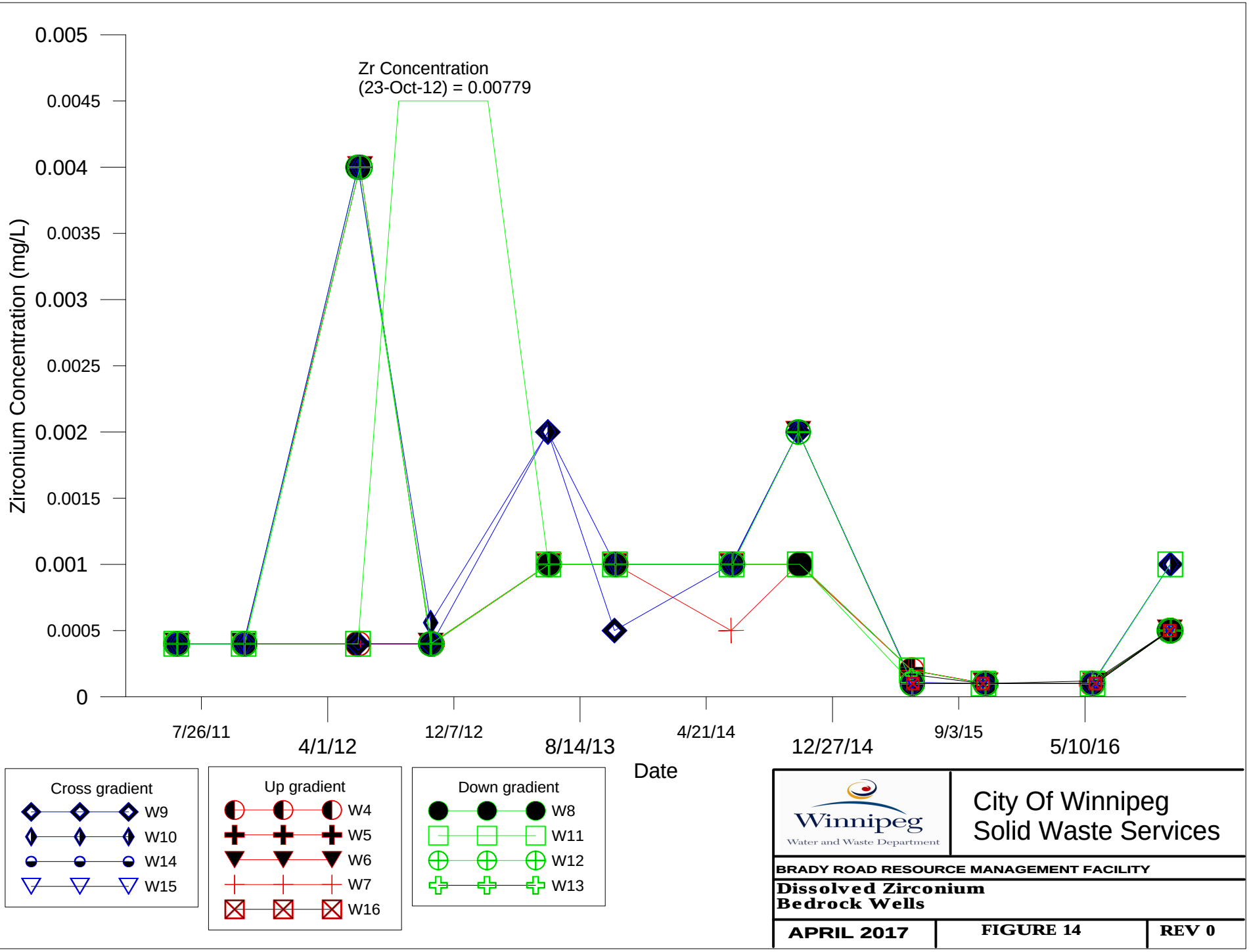
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Vanadium
Bedrock Wells

APRIL 2017	FIGURE 13	REV 0



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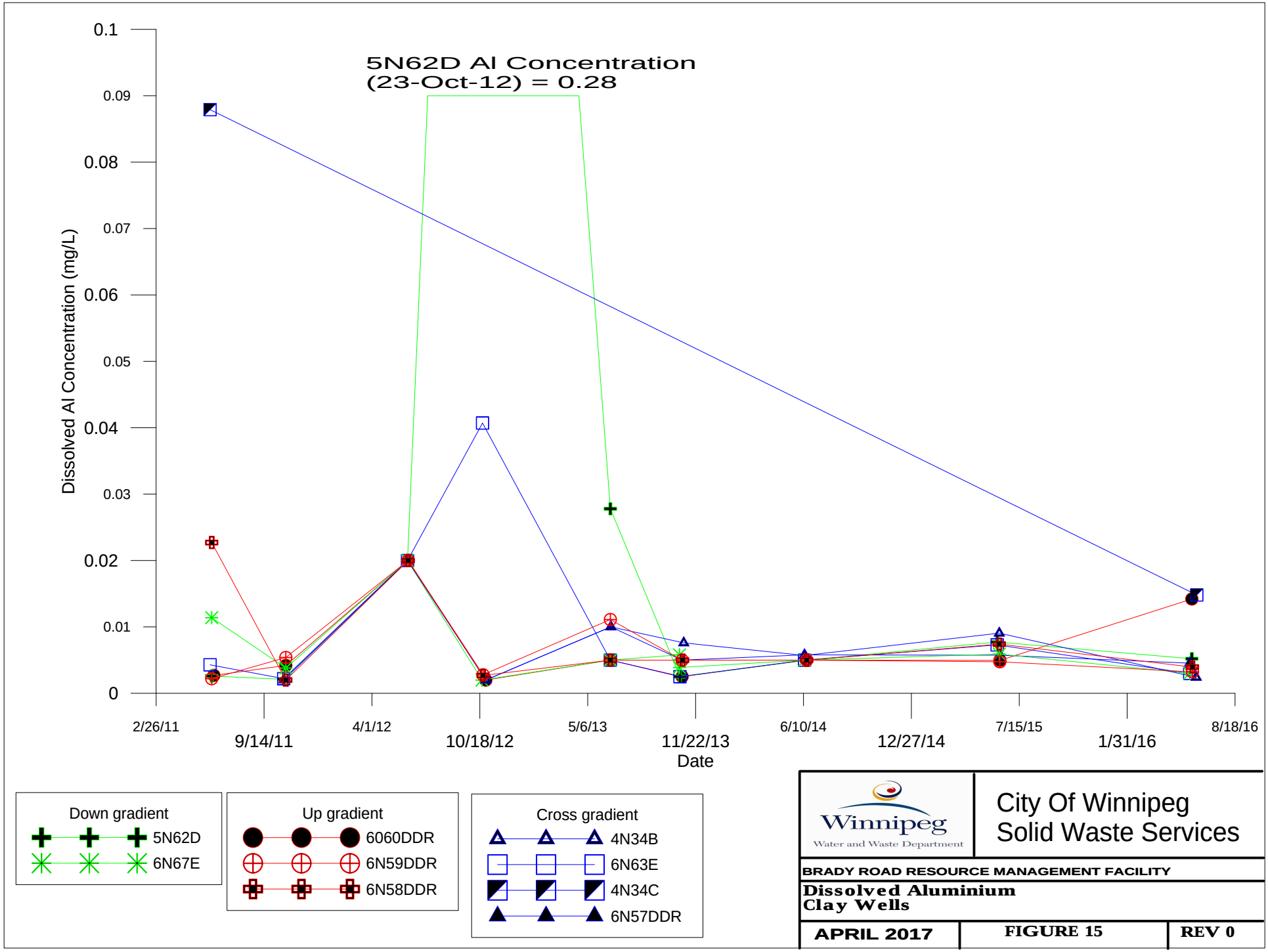
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Zirconium
Bedrock Wells

APRIL 2017	FIGURE 14	REV 0



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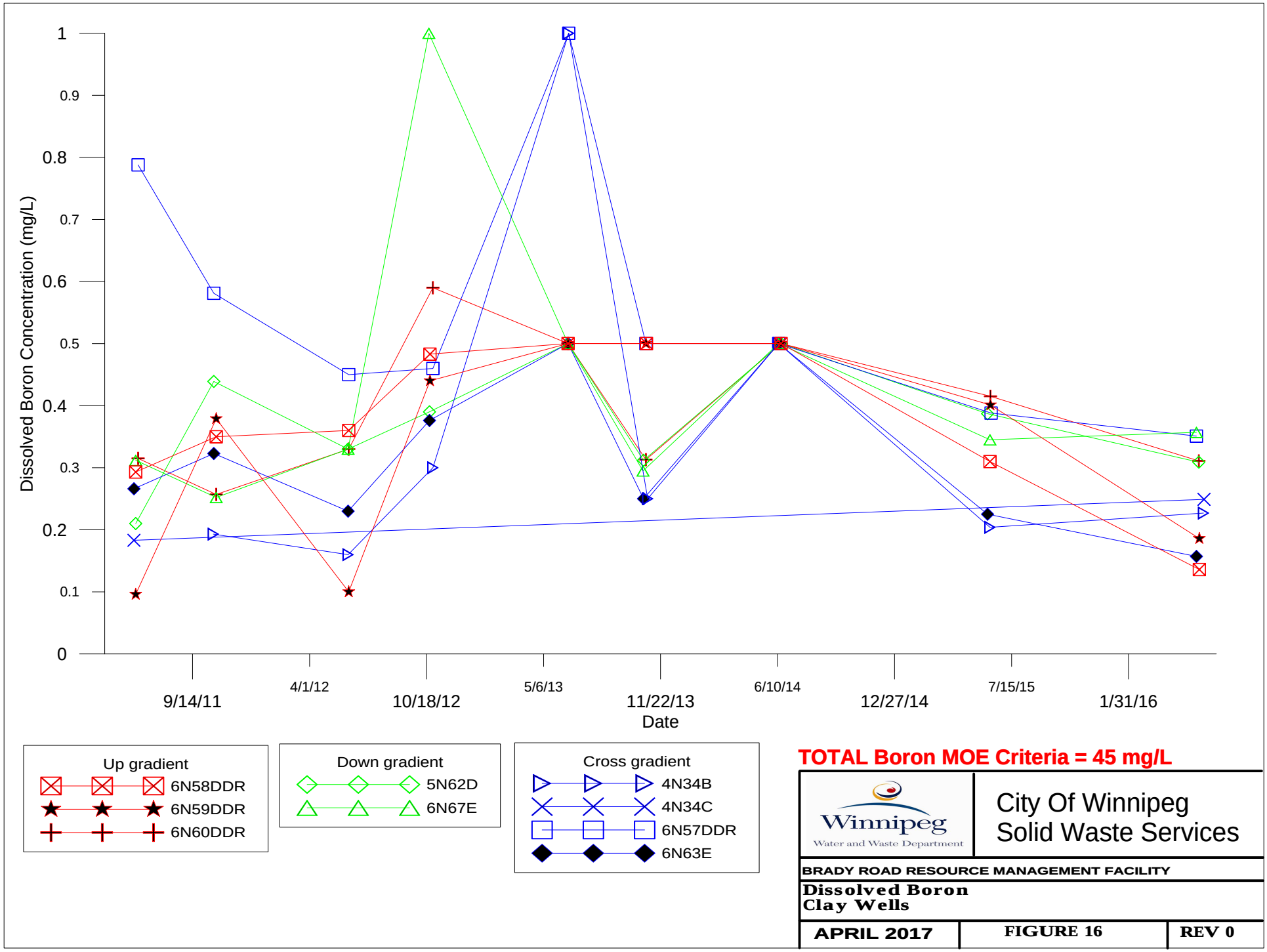
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Aluminium
Clay Wells

APRIL 2017	FIGURE 15	REV 0



TOTAL Boron MOE Criteria = 45 mg/L

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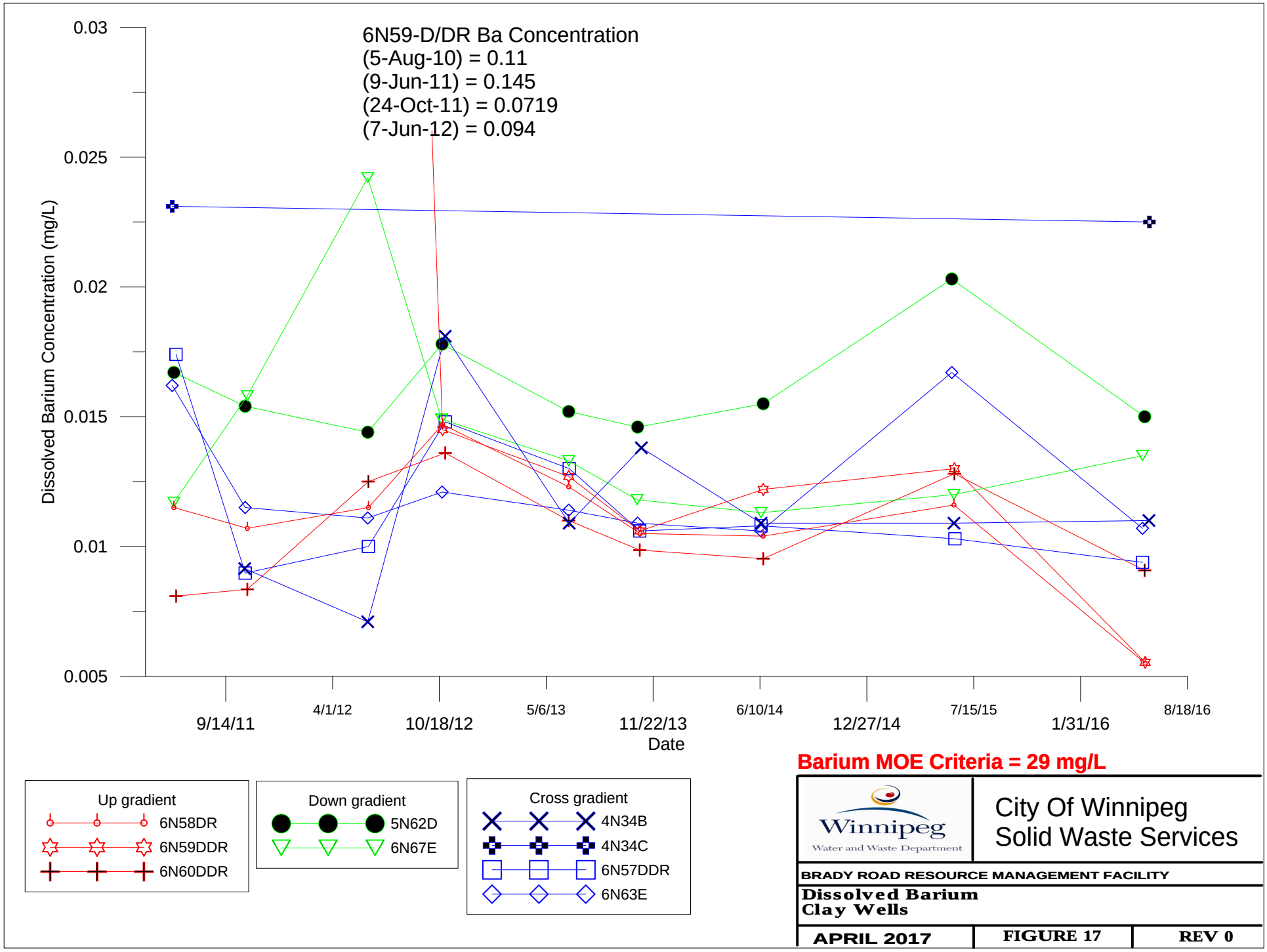
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Boron
Clay Wells

APRIL 2017	FIGURE 16	REV 0



Barium MOE Criteria = 29 mg/L

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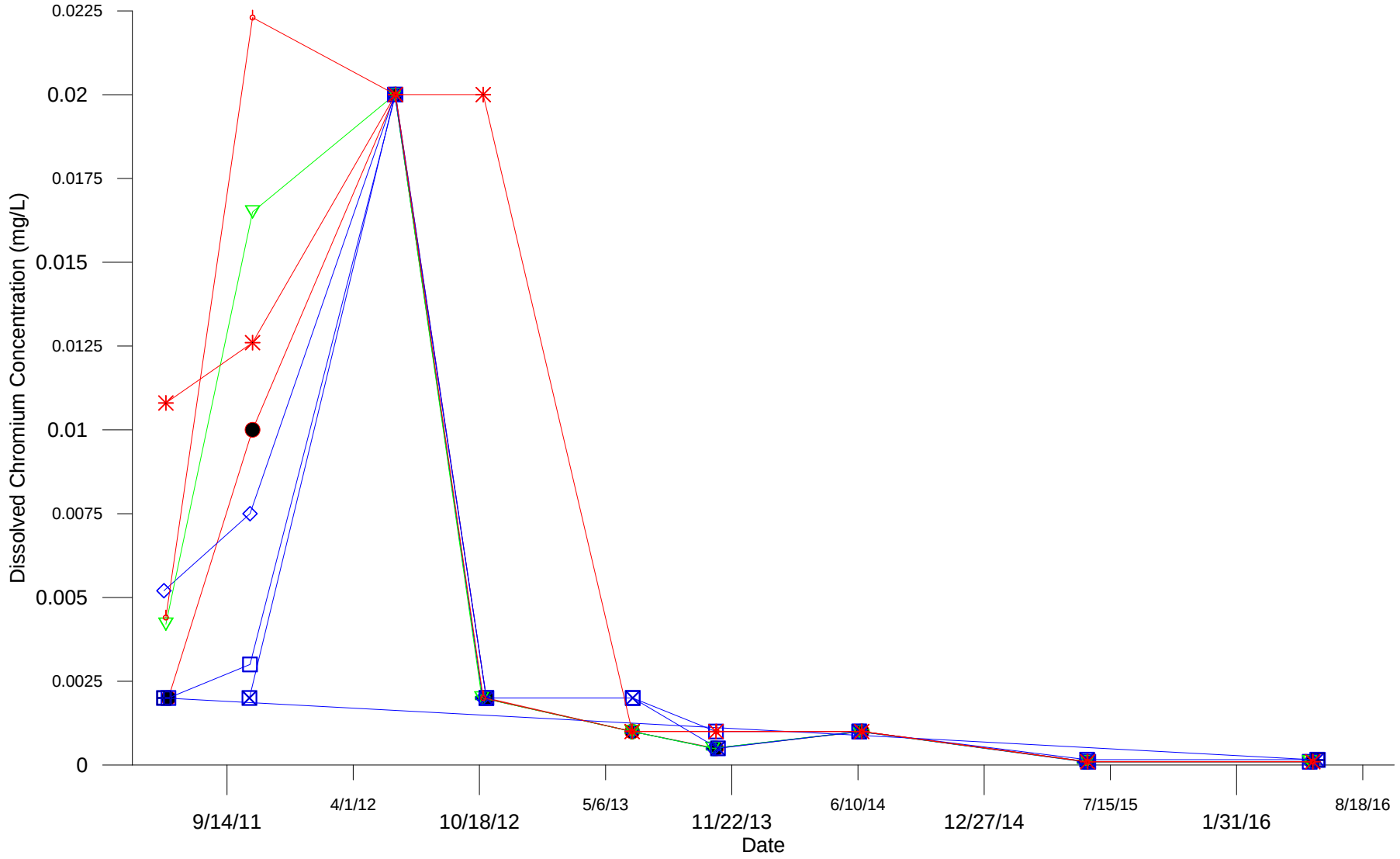
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Barium
Clay Wells

APRIL 2017	FIGURE 17	REV 0



Chromium MOE Criteria = 0.81 mg/L

Up gradient
- 6N58DDR
- 6N59DDR
- 6N60DDR

Down gradient
- 5N62D
- 6N67E

Cross gradient
- 4N34B
- 4N34C
- 6N57DDR
- 6N63E

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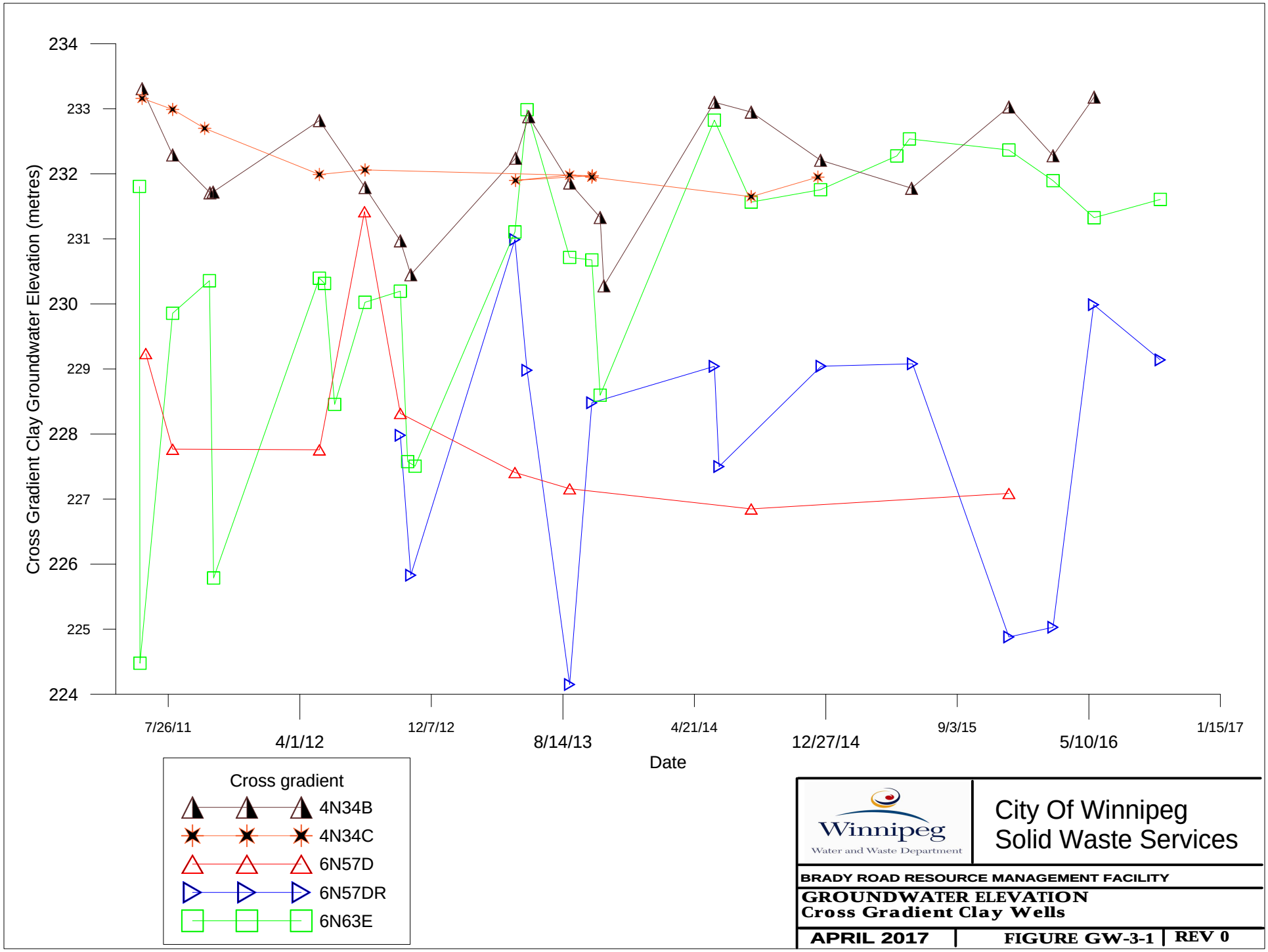
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Chromium
Clay Wells

APRIL 2017 | FIGURE 18 | REV 0



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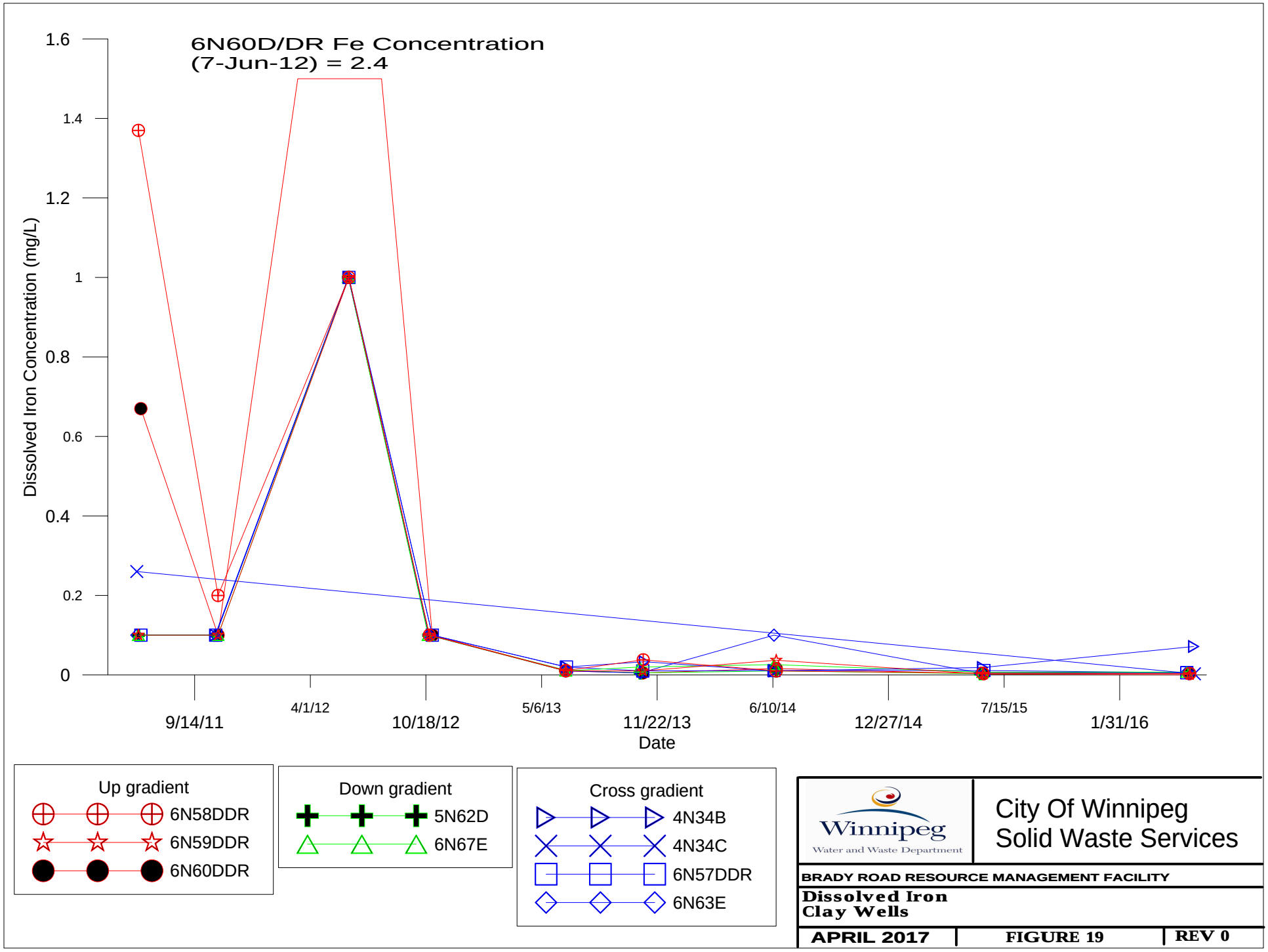
City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

GROUNDWATER ELEVATION
Cross Gradient Clay Wells

APRIL 2017 | FIGURE GW-3-1 | REV 0


6N60D/DR Fe Concentration
(7-Jun-12) = 2.4
Dissolved Iron Concentration (mg/L)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
Date
Up gradient
6N58DDR
6N59DDR
6N60DDR
Down gradient
5N62D
6N67E
Cross gradient
4N34B
4N34C
6N57DDR
6N63E
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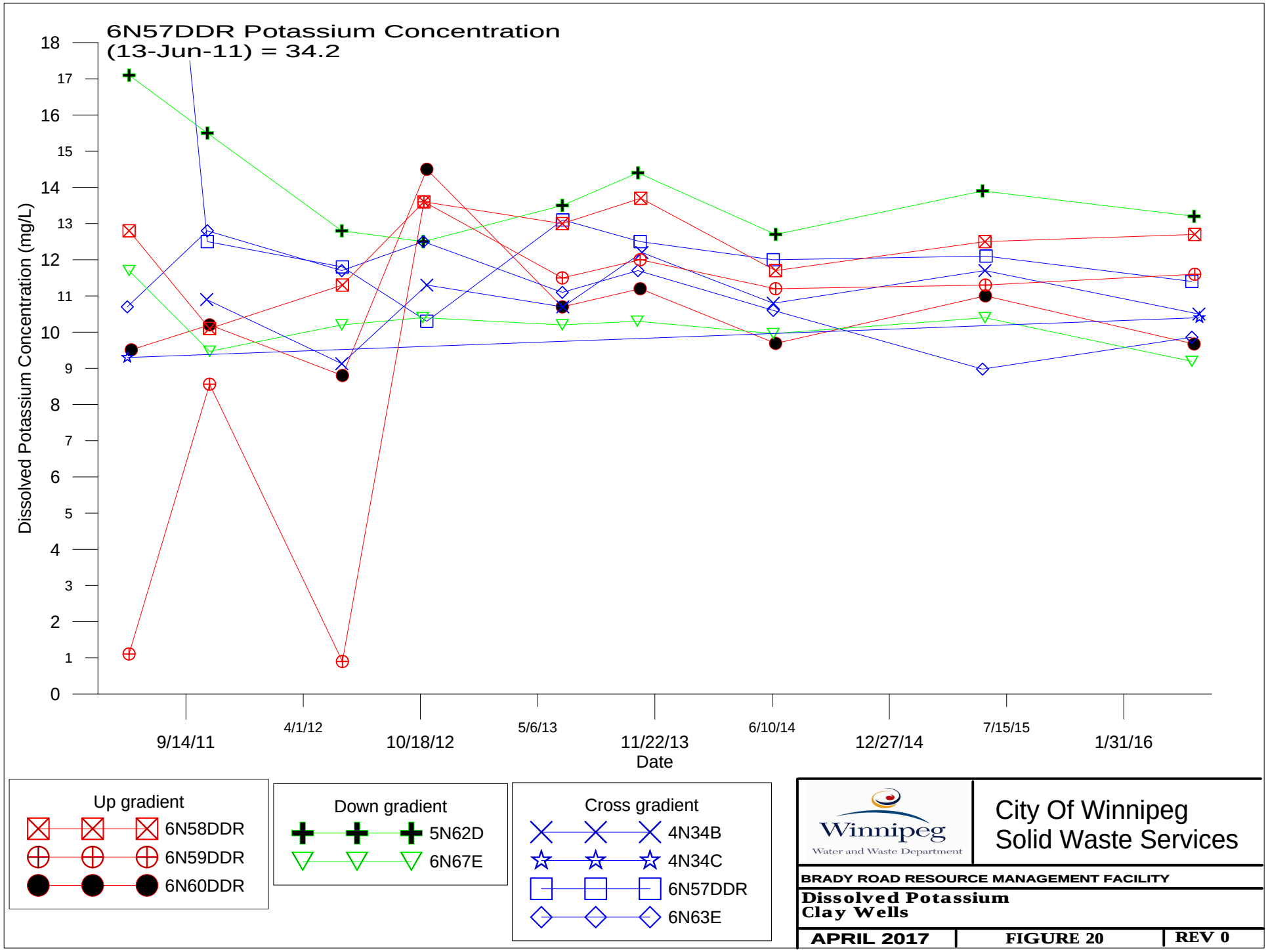
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Iron
Clay Wells
APRIL 2017
FIGURE 19
REV 0


6N57DDR Potassium Concentration
(13-Jun-11) = 34.2
Dissolved Potassium Concentration (mg/L)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
Date
Up gradient
6N58DDR
6N59DDR
6N60DDR
Down gradient
5N62D
6N67E
Cross gradient
4N34B
4N34C
6N57DDR
6N63E
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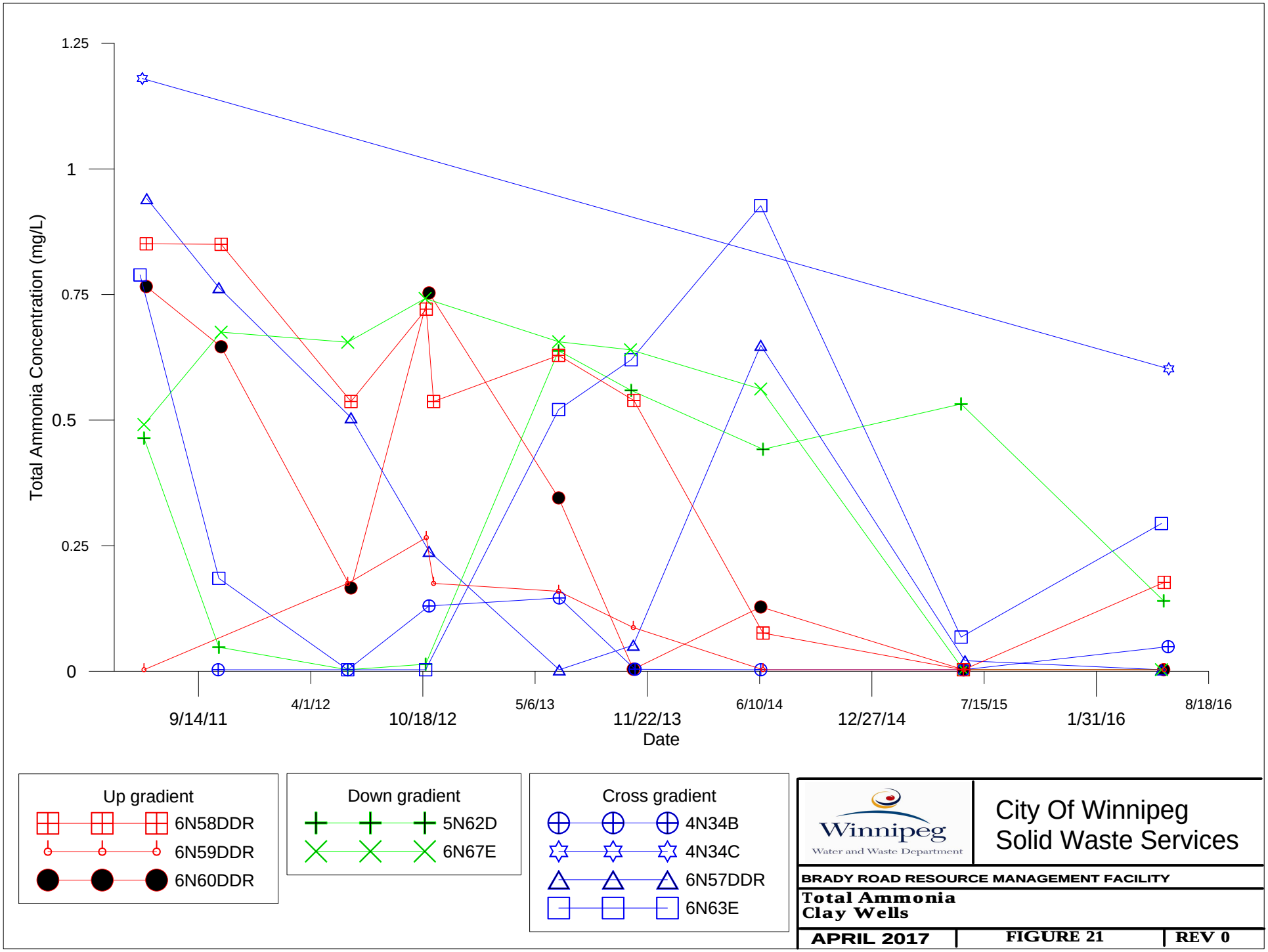
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Potassium
Clay Wells
APRIL 2017
FIGURE 20
REV 0


1.25
1
0.75
0.5
0.25
0
Total Ammonia Concentration (mg/L)
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
Date
Up gradient
6N58DDR
6N59DDR
6N60DDR
Down gradient
5N62D
6N67E
Cross gradient
4N34B
4N34C
6N57DDR
6N63E
Winnipeg
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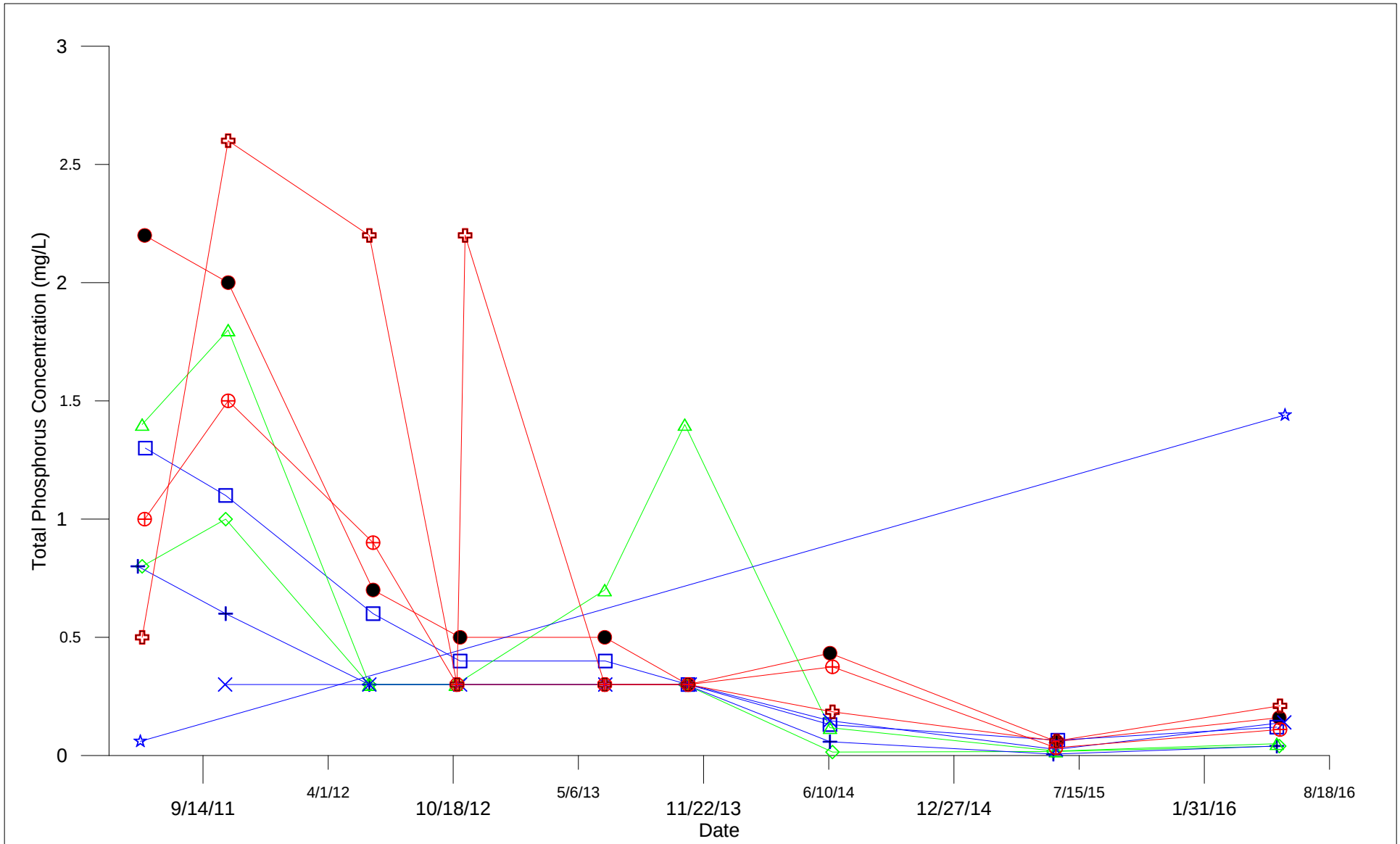
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Total Ammonia
Clay Wells
APRIL 2017
FIGURE 21
REV 0



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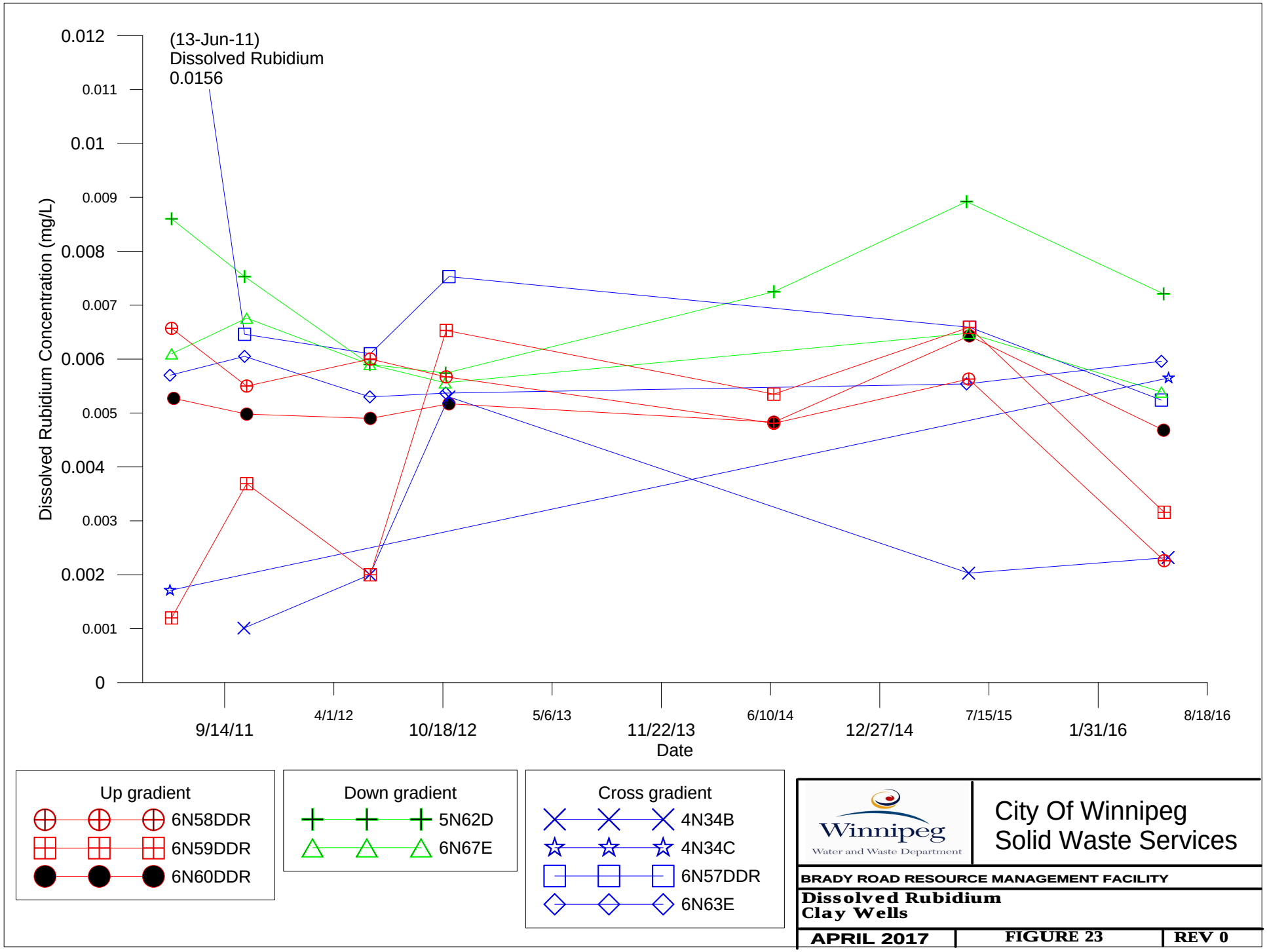
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Total Phosphorus
Clay Wells

APRIL 2017	FIGURE 22	REV 0


(13-Jun-11)
Dissolved Rubidium
0.0156
Dissolved Rubidium Concentration (mg/L)
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
Date
Up gradient
6N58DDR
6N59DDR
6N60DDR
Down gradient
5N62D
6N67E
Cross gradient
4N34B
4N34C
6N57DDR
6N63E
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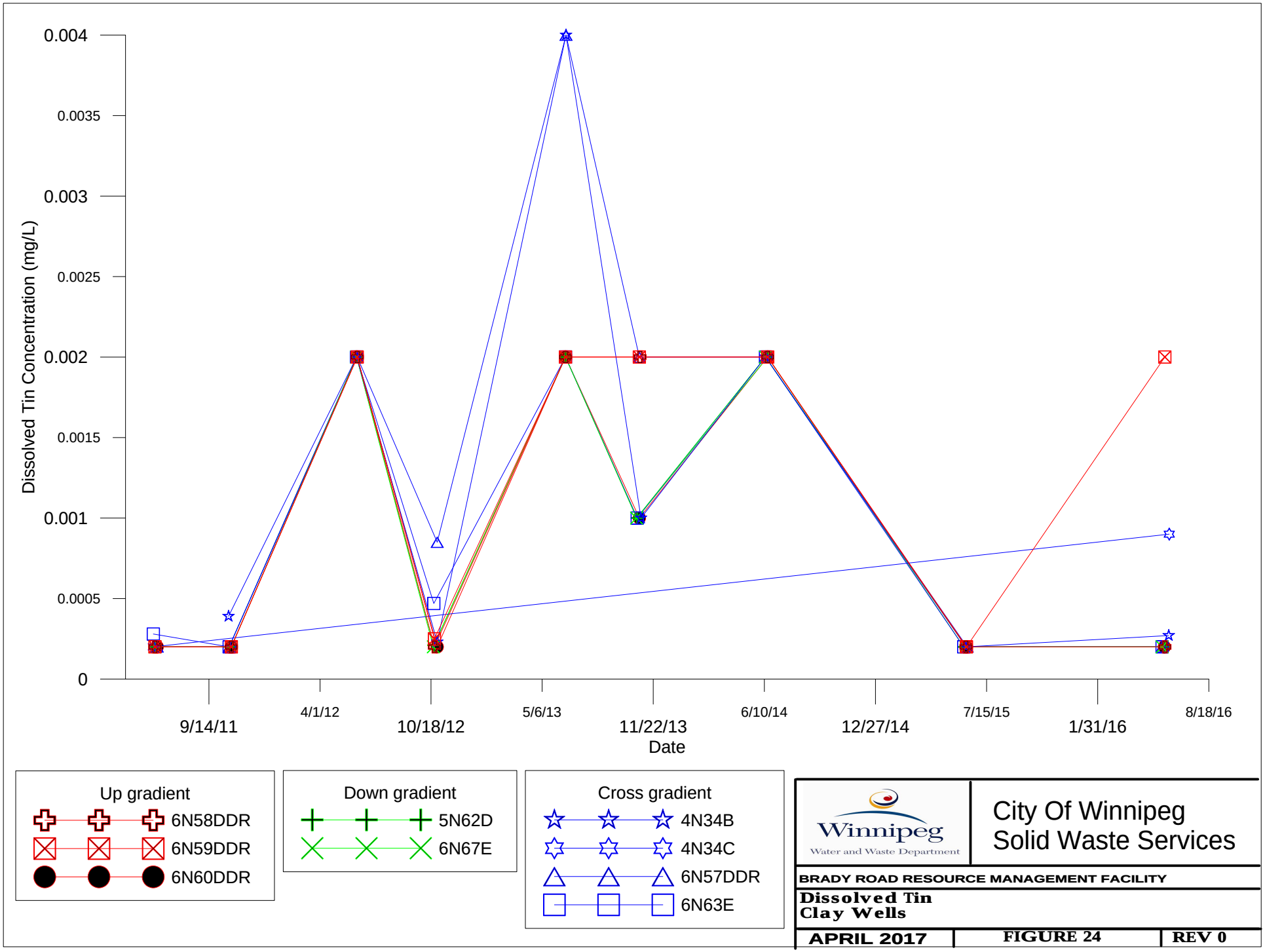
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Rubidium
Clay Wells
APRIL 2017
FIGURE 23
REV 0


0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Dissolved Tin Concentration (mg/L)
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
Date
Up gradient
6N58DDR
6N59DDR
6N60DDR
Down gradient
5N62D
6N67E
Cross gradient
4N34B
4N34C
6N57DDR
6N63E
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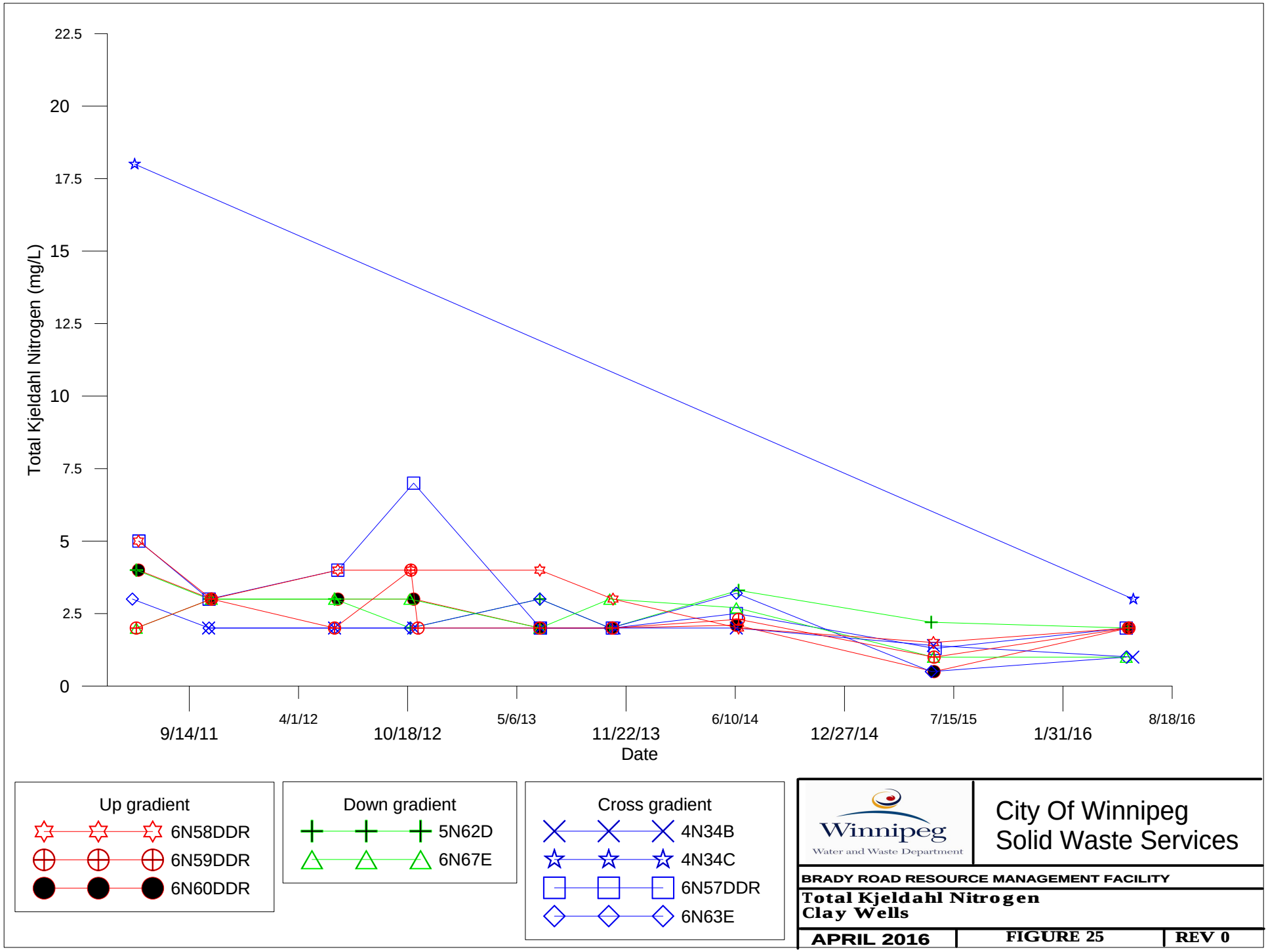
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Tin
Clay Wells
APRIL 2017
FIGURE 24
REV 0



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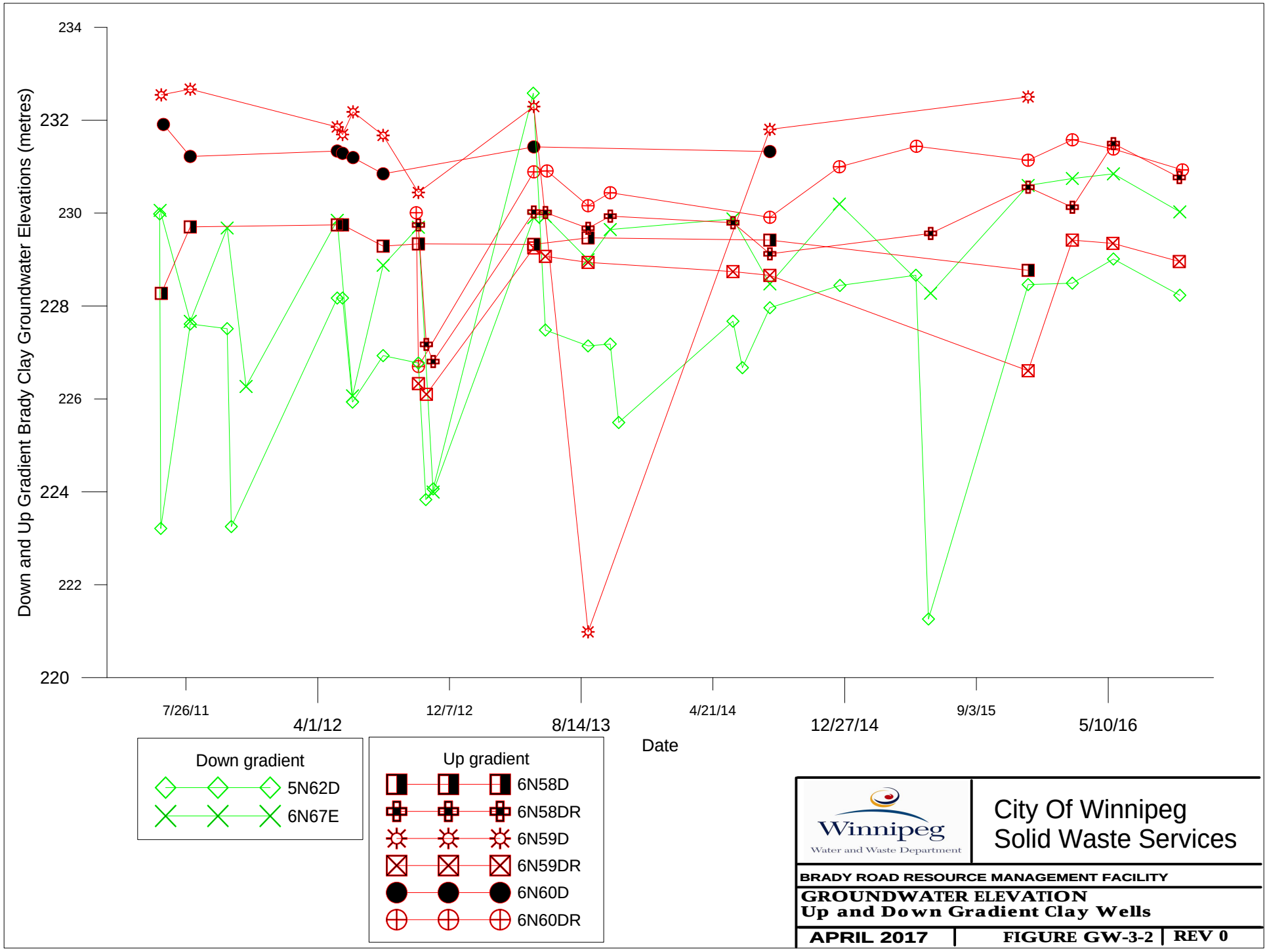
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Total Kjeldahl Nitrogen
Clay Wells

APRIL 2016	FIGURE 25	REV 0



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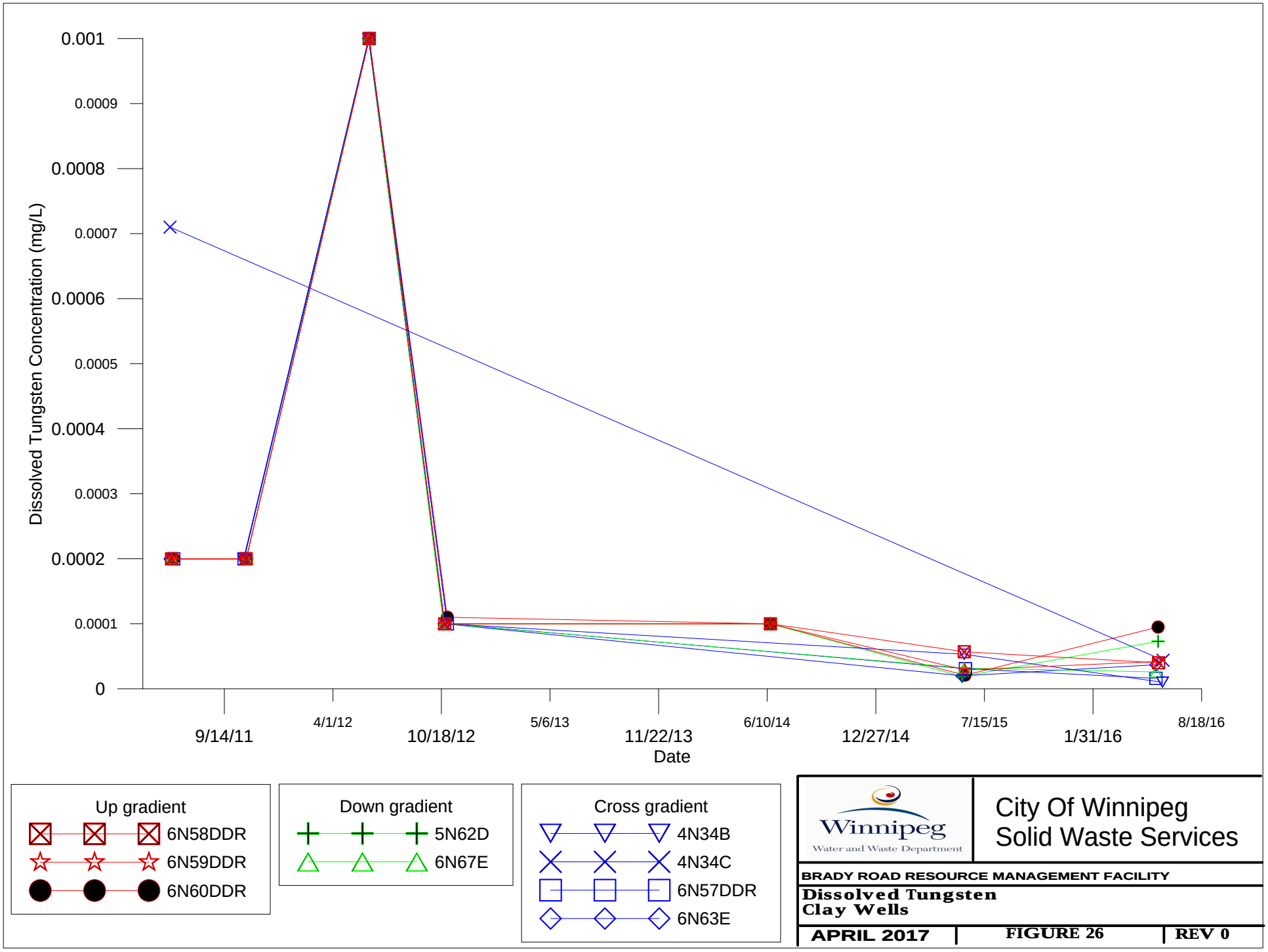
BRADY ROAD RESOURCE MANAGEMENT FACILITY

GROUNDWATER ELEVATION
Up and Down Gradient Clay Wells

APRIL 2017 | FIGURE GW-3-2 | REV 0


0.001
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
Dissolved Tungsten Concentration (mg/L)
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
Date
Up gradient
6N58DDR
6N59DDR
6N60DDR
Down gradient
5N62D
6N67E
Cross gradient
4N34B
4N34C
6N57DDR
6N63E
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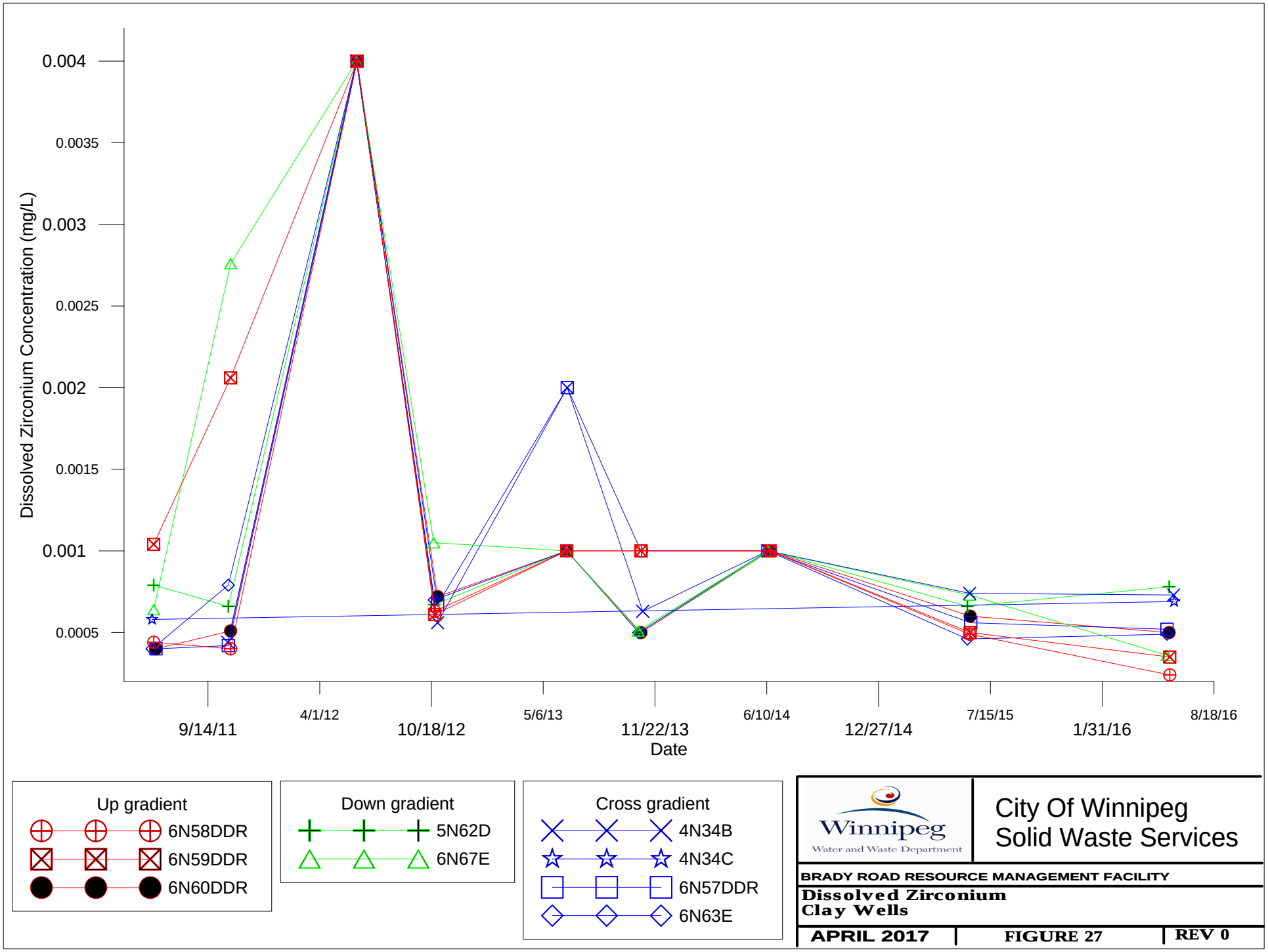
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Tungsten
Clay Wells
APRIL 2017
FIGURE 26
REV 0


Dissolved Zirconium Concentration (mg/L)
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
Date
Up gradient
6N58DDR
6N59DDR
6N60DDR
Down gradient
5N62D
6N67E
Cross gradient
4N34B
4N34C
6N57DDR
6N63E
Winnipeg
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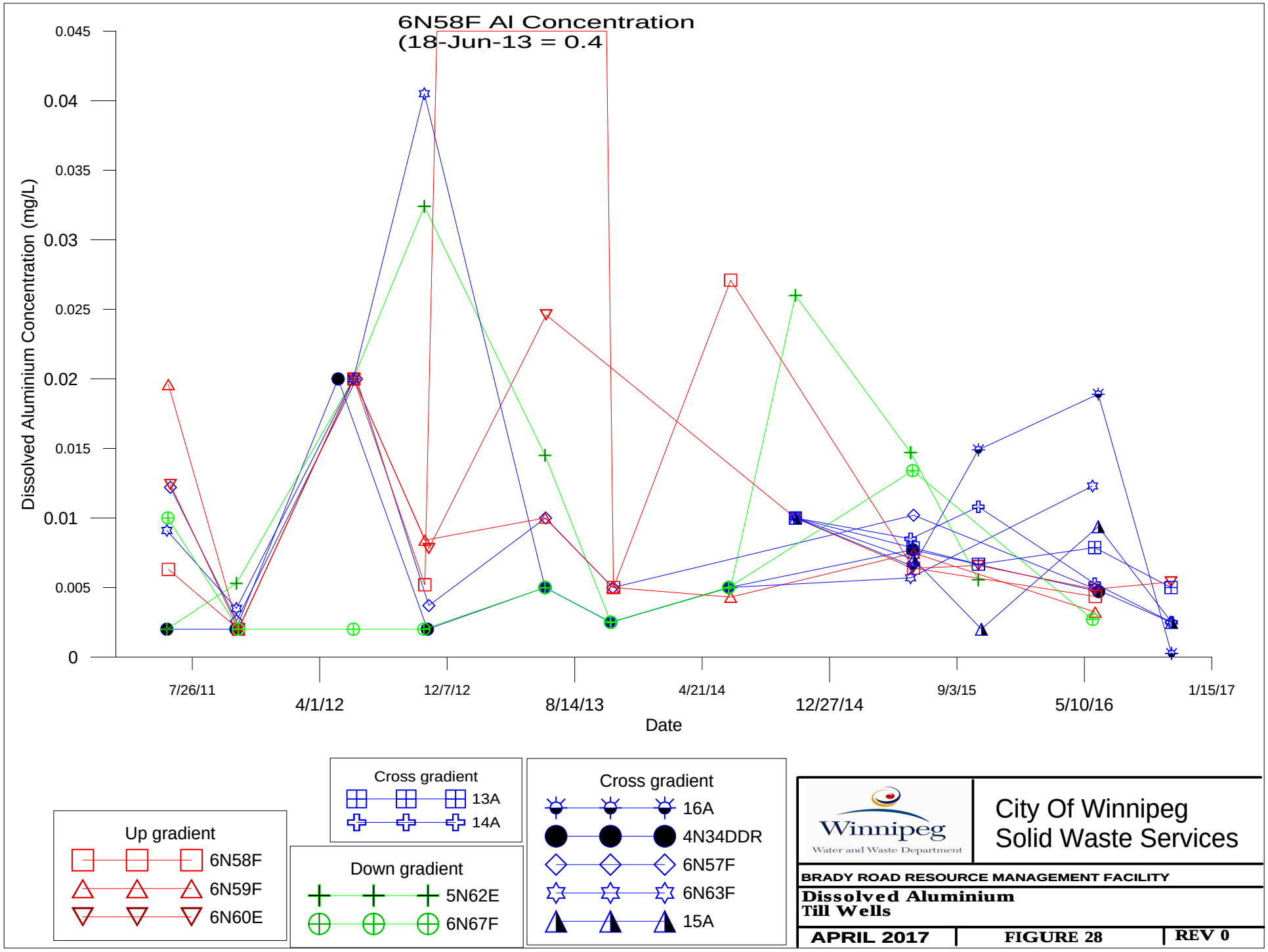
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Zirconium
Clay Wells
APRIL 2017
FIGURE 27
REV 0



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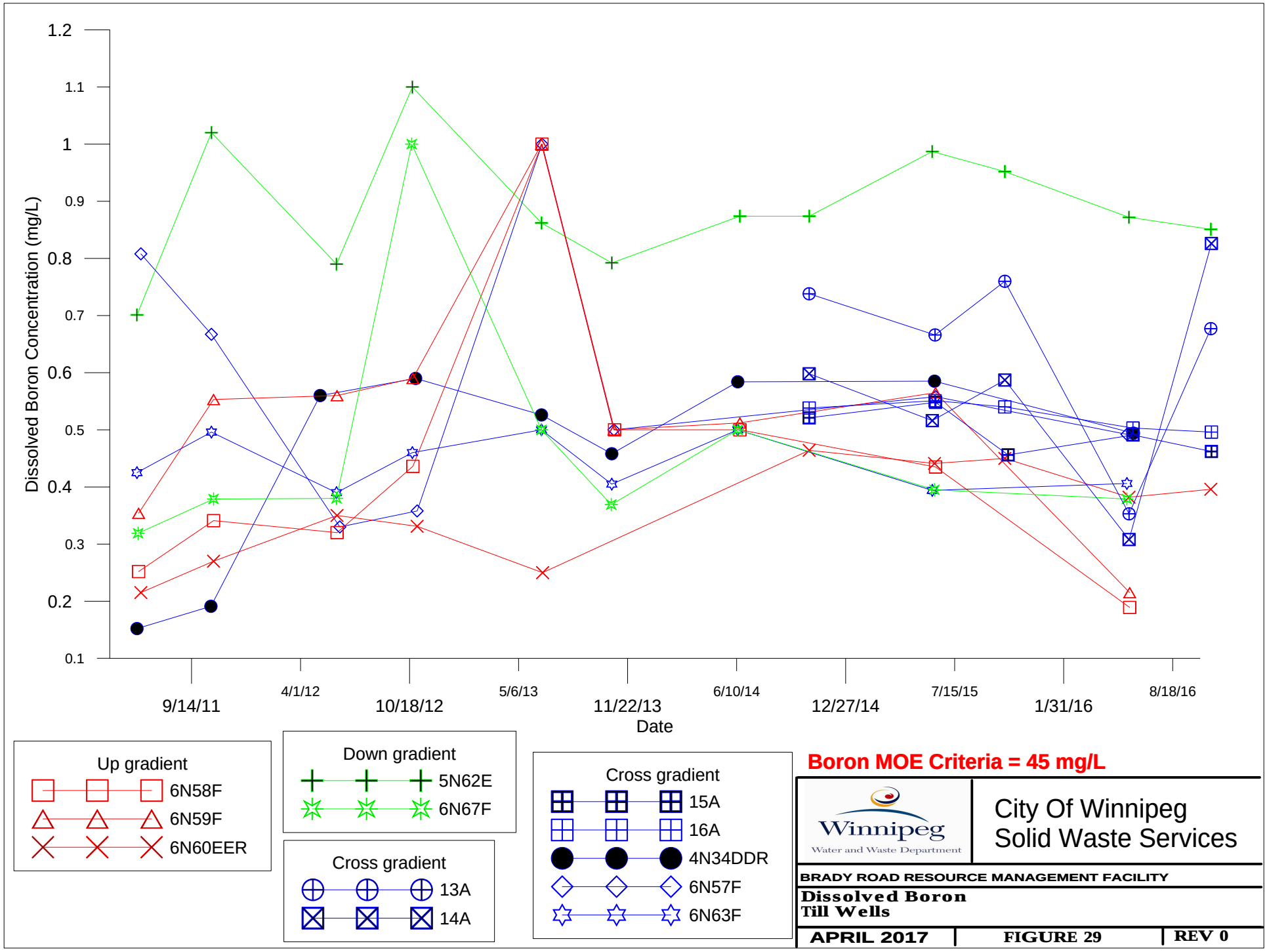
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Aluminium
Till Wells

APRIL 2017	FIGURE 28	REV 0



Boron MOE Criteria = 45 mg/L

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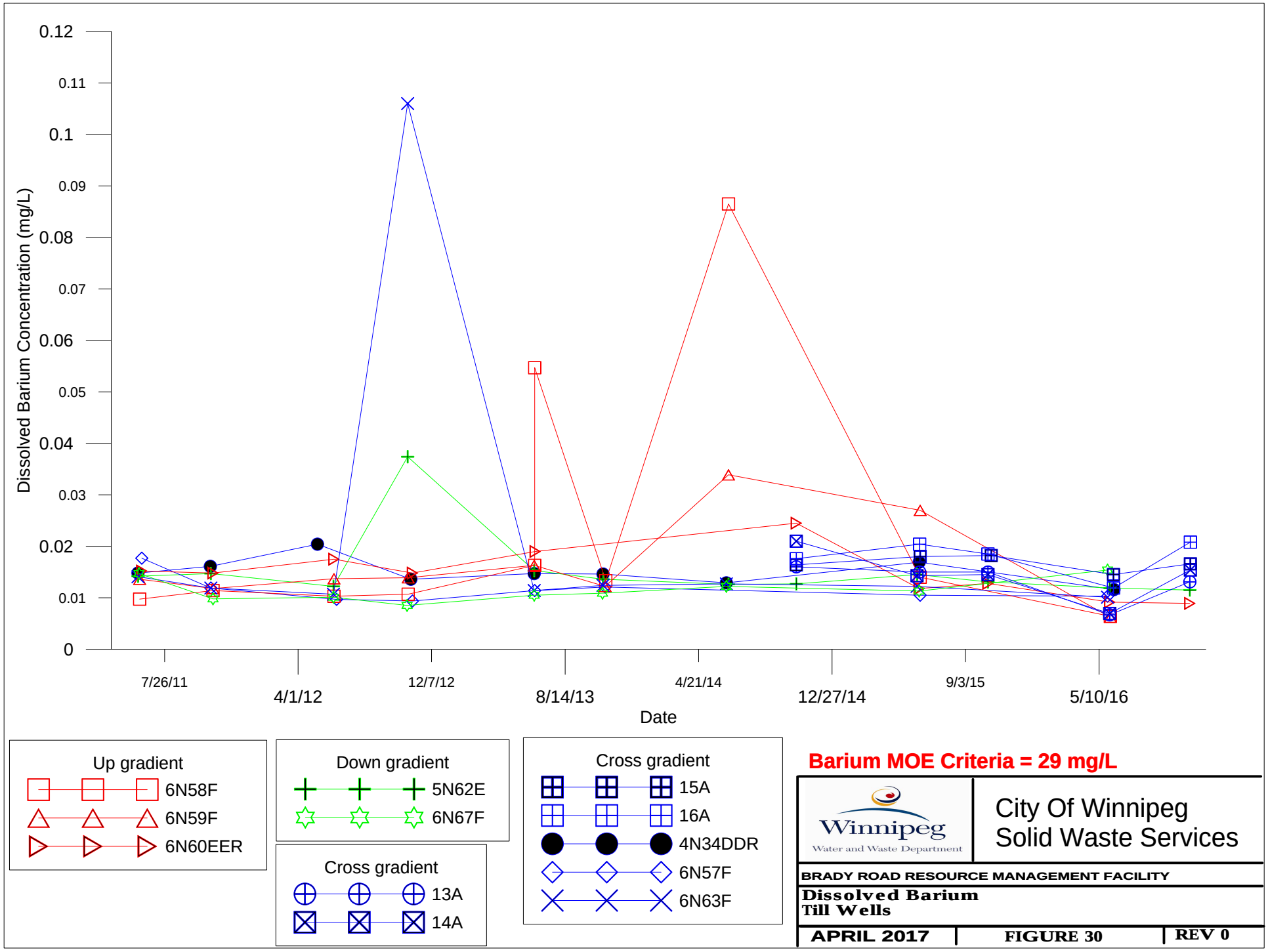
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Boron
Till Wells

APRIL 2017	FIGURE 29	REV 0


0.12
0.11
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Dissolved Barium Concentration (mg/L)
7/26/11
4/1/12
12/7/12
8/14/13
4/21/14
12/27/14
9/3/15
5/10/16
Date
Up gradient
6N58F
6N59F
6N60EER
Down gradient
5N62E
6N67F
Cross gradient
13A
14A
Cross gradient
15A
16A
4N34DDR
6N57F
6N63F
Barium MOE Criteria = 29 mg/L
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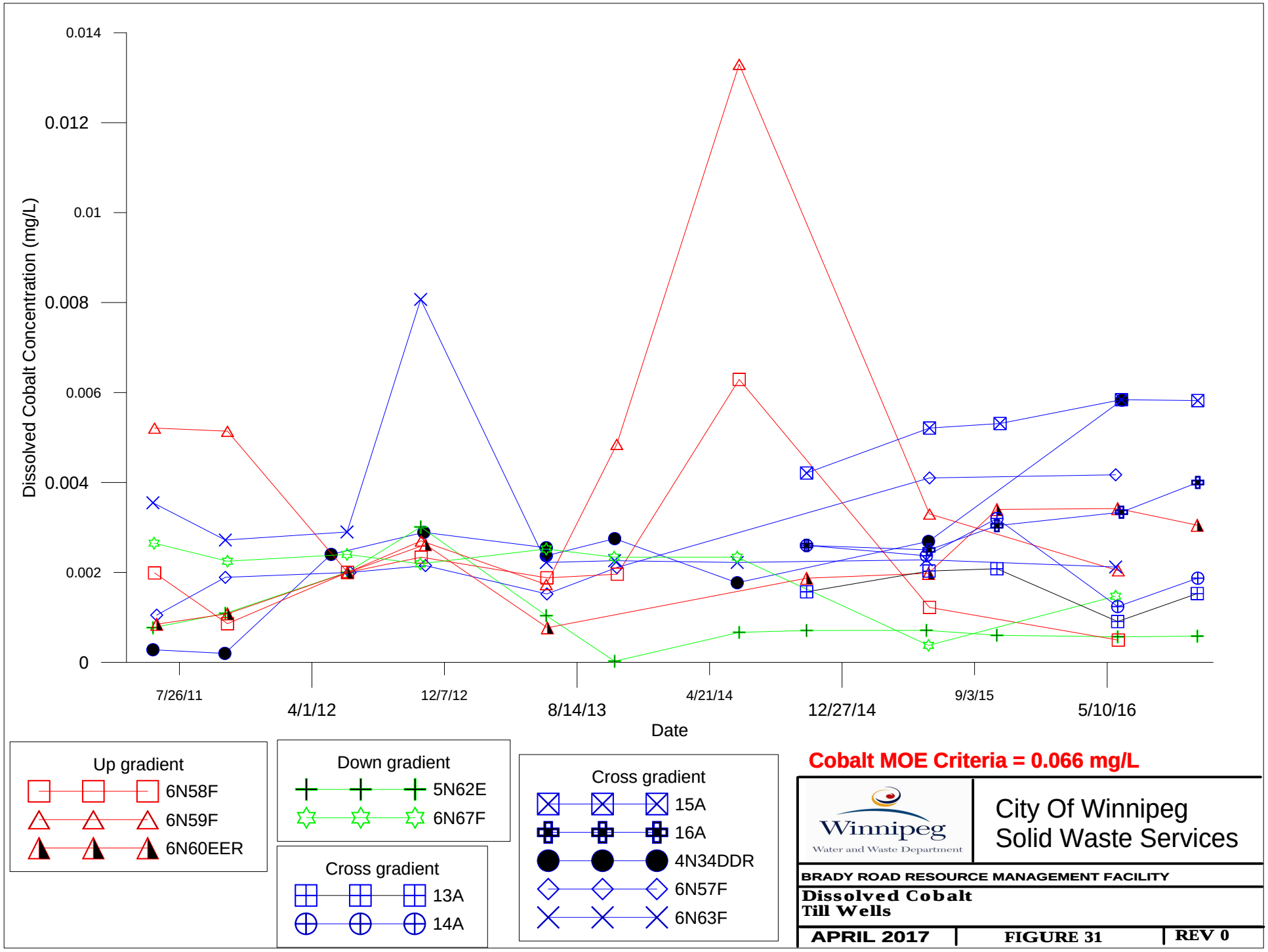
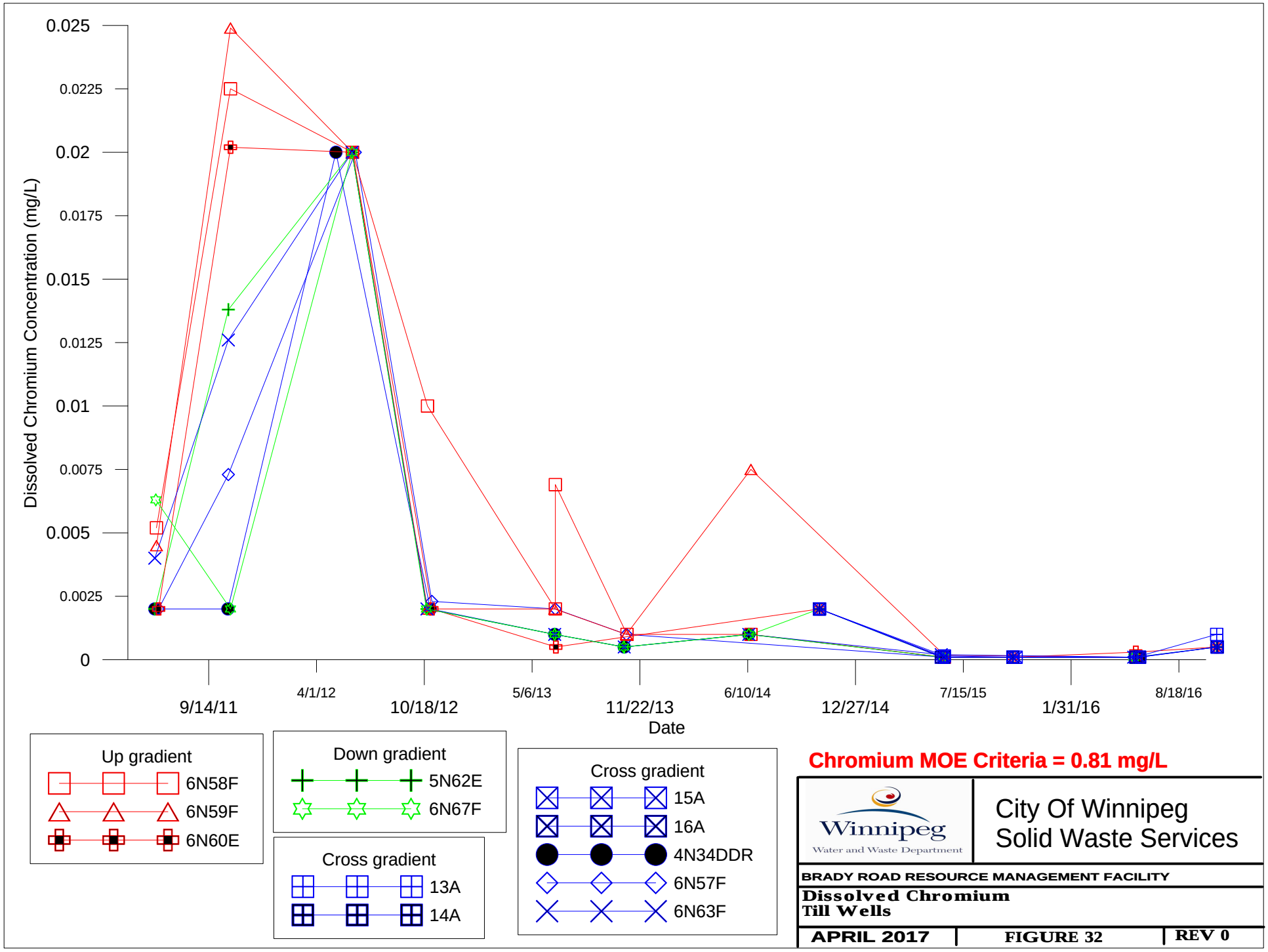
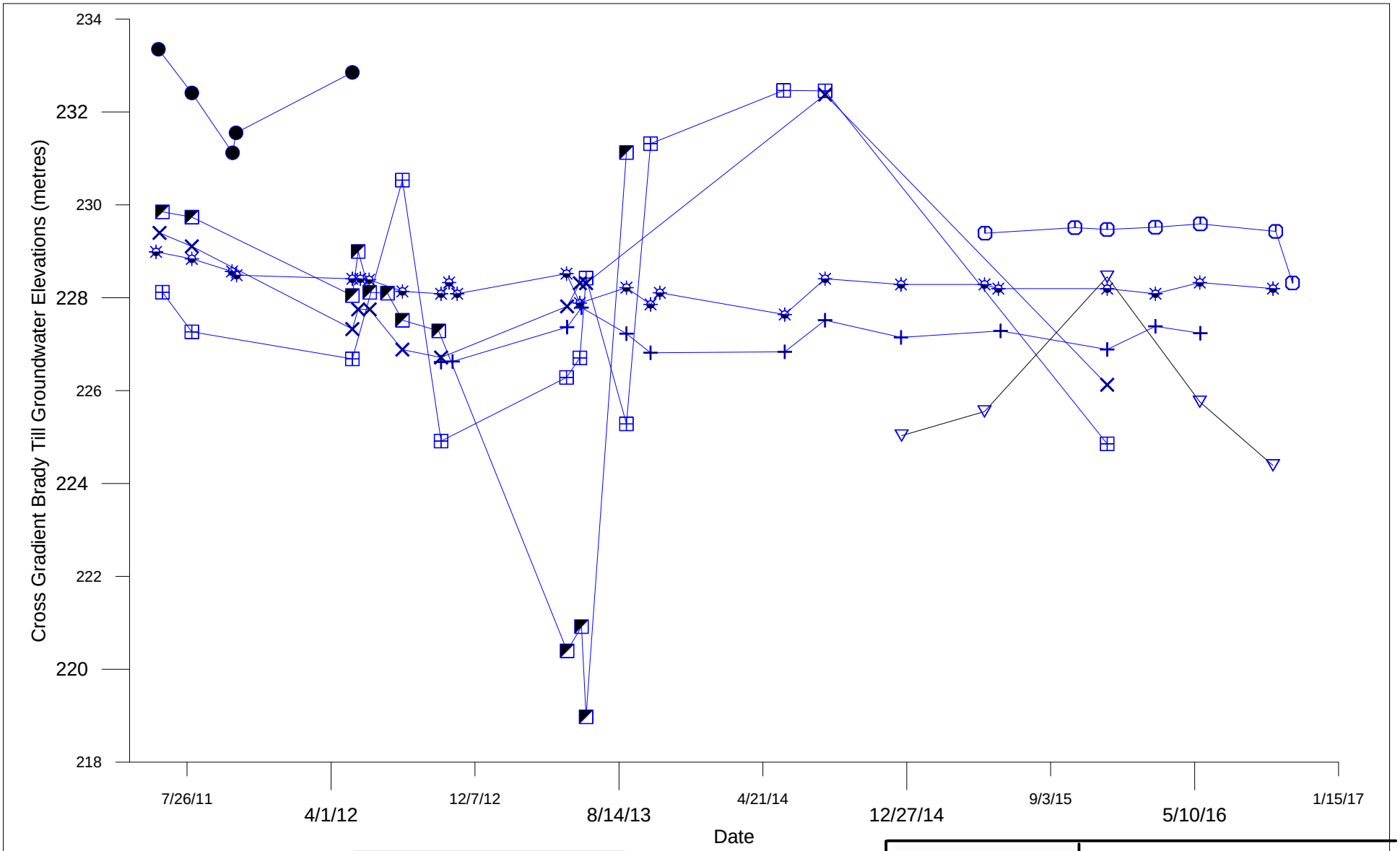
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Barium
Till Wells
APRIL 2017
FIGURE 30
REV 0


0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
Dissolved Cobalt Concentration (mg/L)
7/26/11
4/1/12
12/7/12
8/14/13
4/21/14
12/27/14
9/3/15
5/10/16
Date
Up gradient
6N58F
6N59F
6N60EER
Down gradient
5N62E
6N67F
Cross gradient
13A
14A
Cross gradient
15A
16A
4N34DDR
6N57F
6N63F
Cobalt MOE Criteria = 0.066 mg/L
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Cobalt
Till Wells
APRIL 2017
FIGURE 31
REV 0


0.025
0.0225
0.02
0.0175
0.015
0.0125
0.01
0.0075
0.005
0.0025
0
Dissolved Chromium Concentration (mg/L)
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
Date
Up gradient
6N58F
6N59F
6N60E
Down gradient
5N62E
6N67F
Cross gradient
13A
14A
Cross gradient
15A
16A
4N34DDR
6N57F
6N63F
Chromium MOE Criteria = 0.81 mg/L
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Chromium
Till Wells
APRIL 2017
FIGURE 32
REV 0



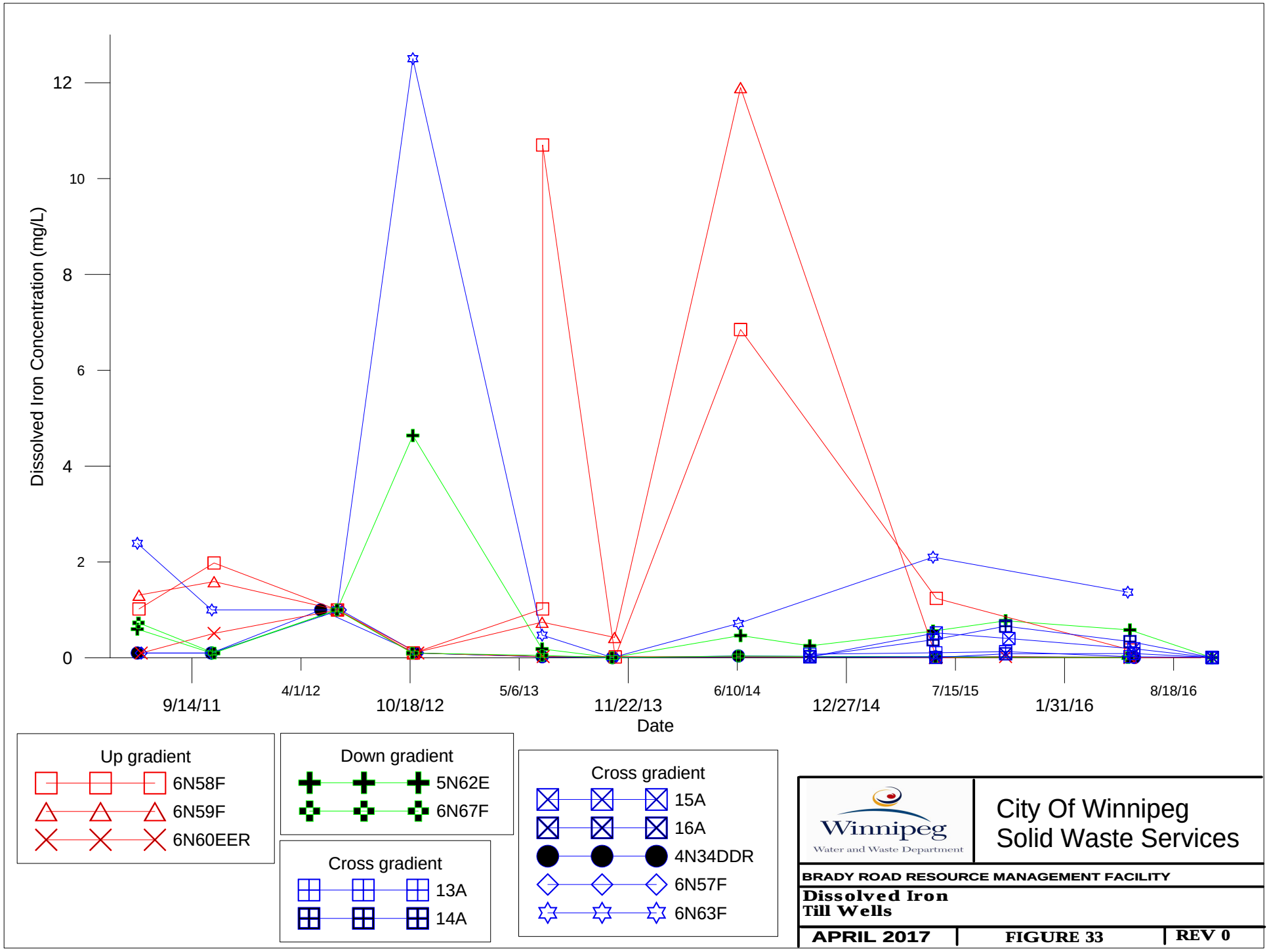
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

GROUNDWATER ELEVATION
Cross Gradient Till Wells

APRIL 2015 | FIGURE GW-1-1 | REV 0



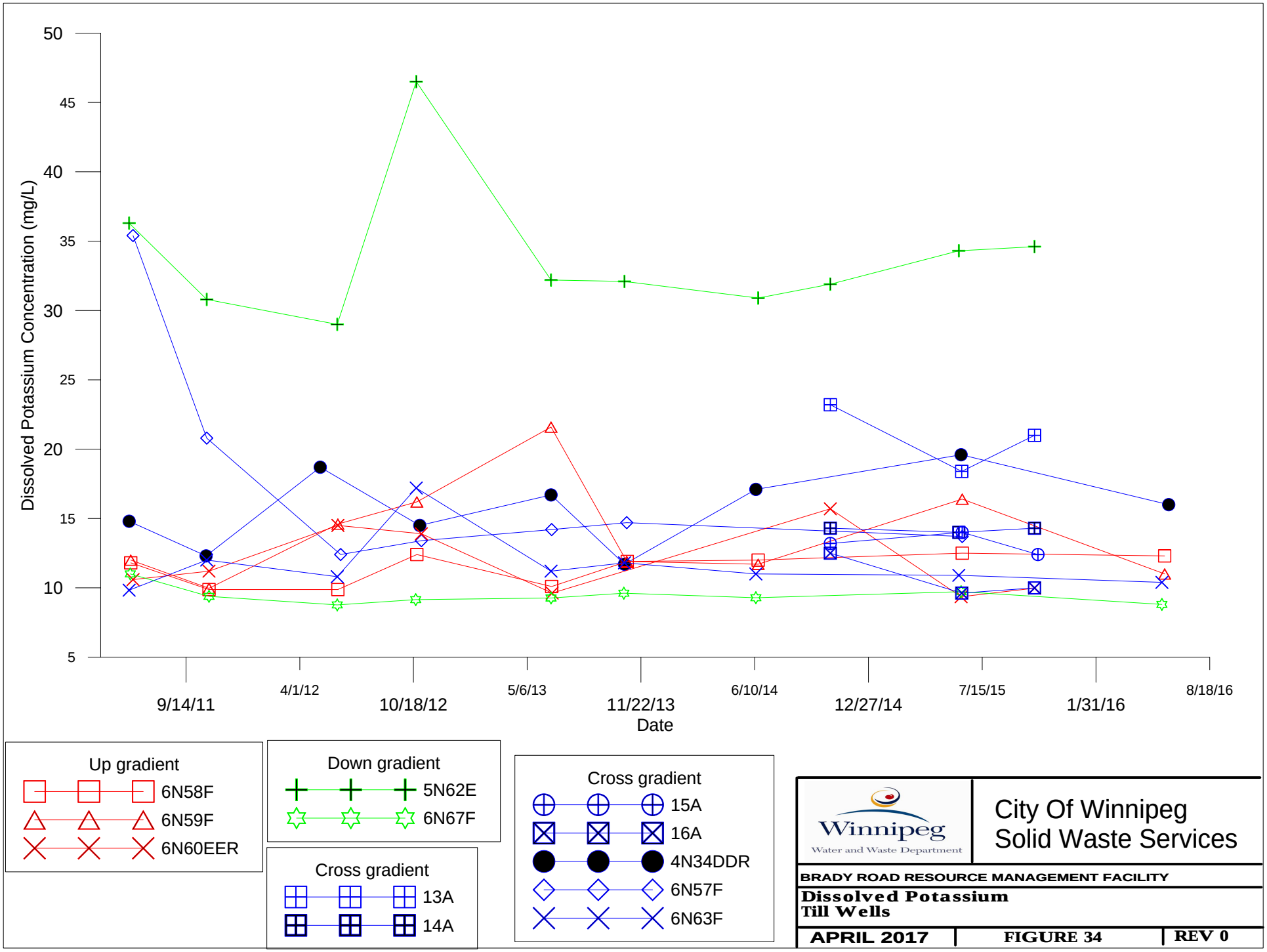
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Iron
Till Wells

APRIL 2017 | FIGURE 33 | REV 0



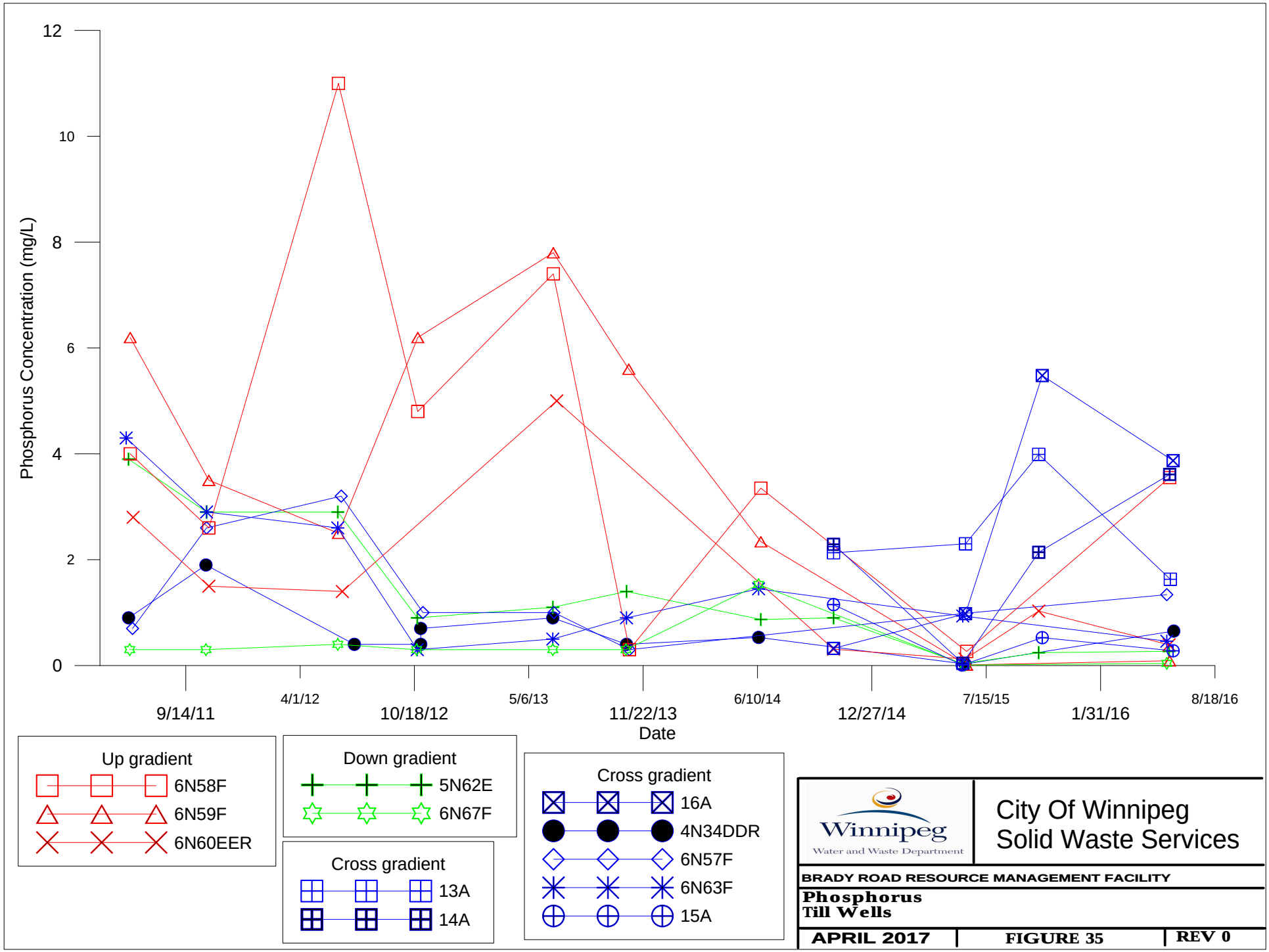
Winnipeg
Water and Waste Department

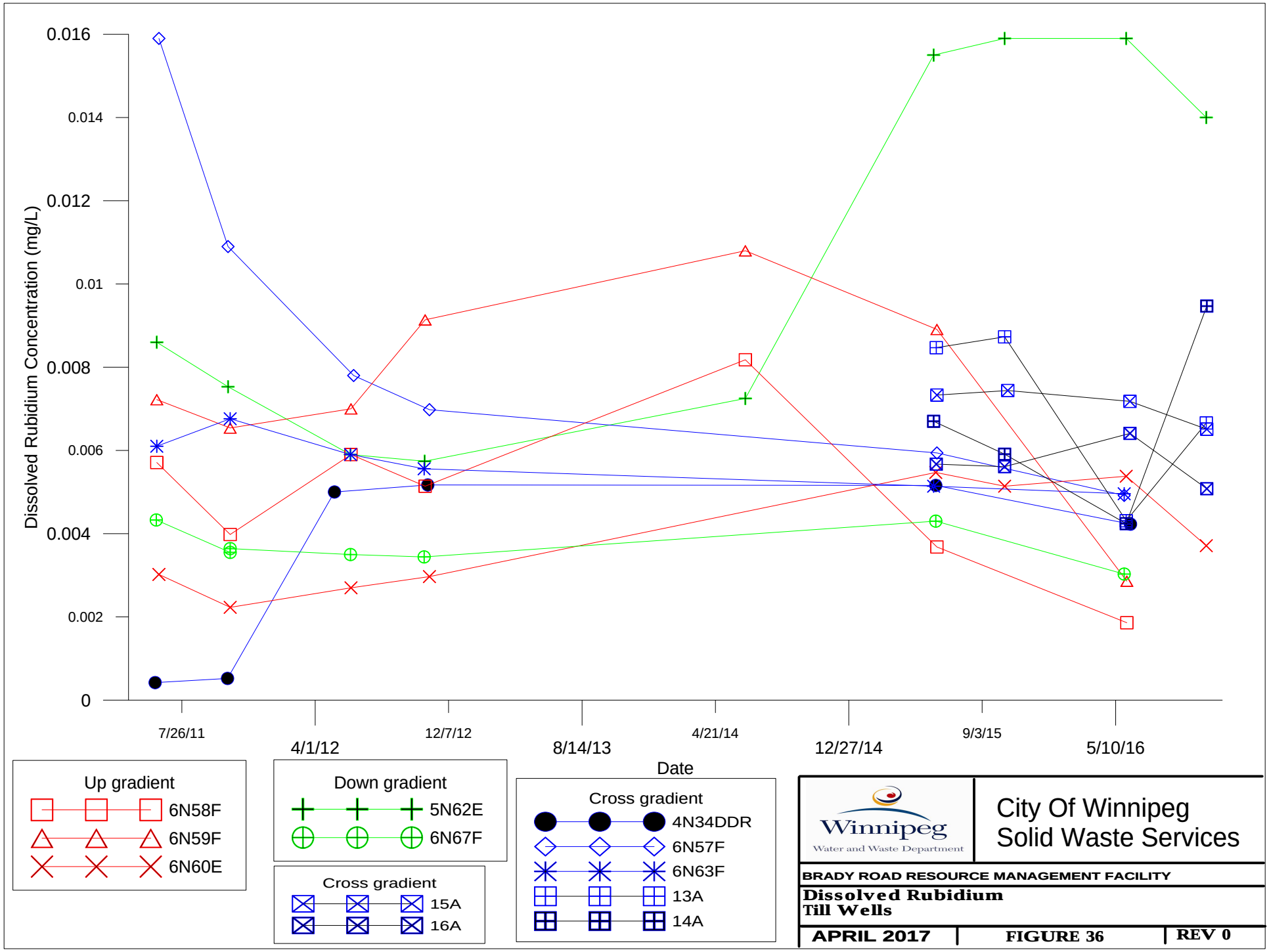
City Of Winnipeg
Solid Waste Services

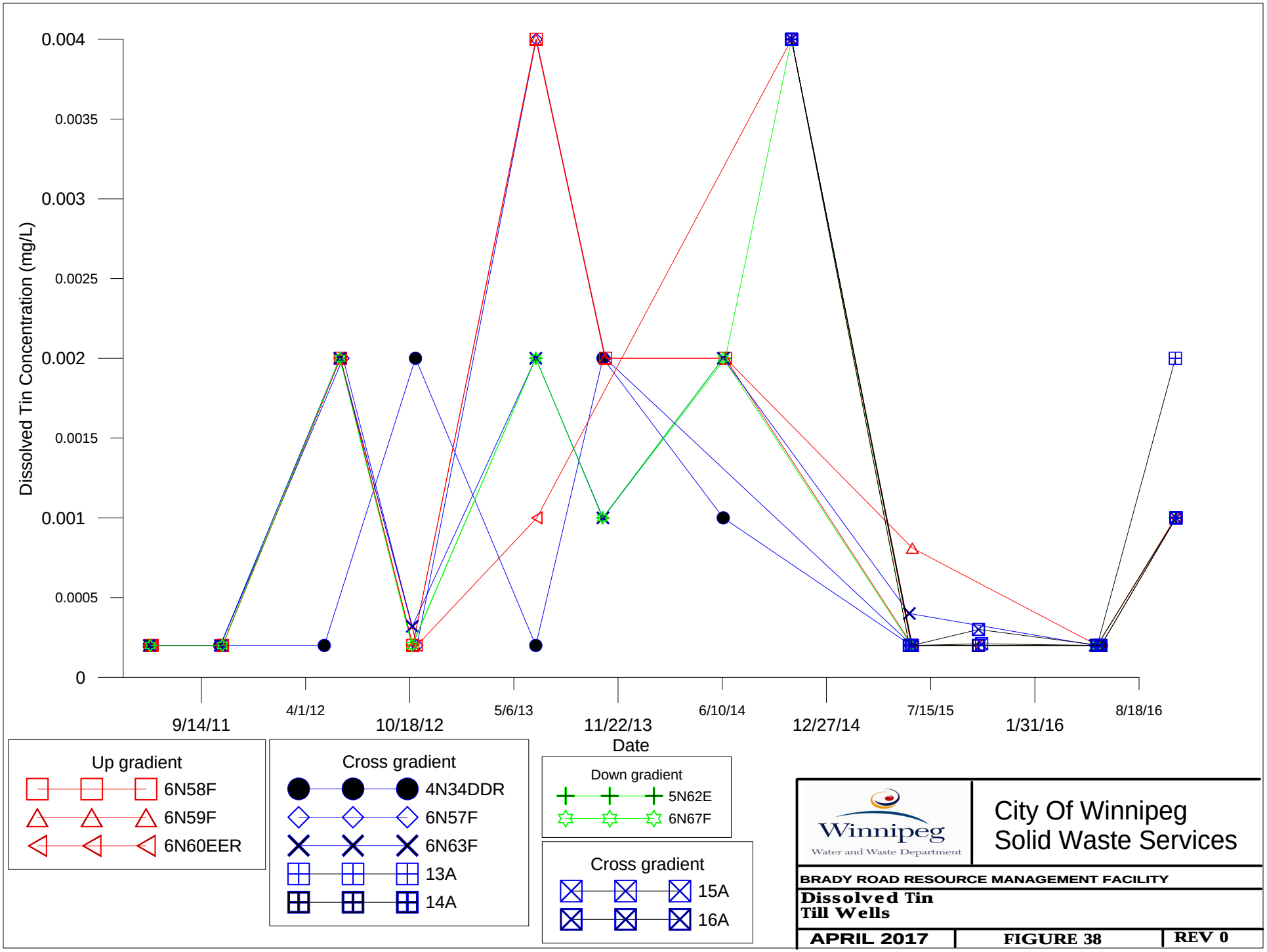
BRADY ROAD RESOURCE MANAGEMENT FACILITY

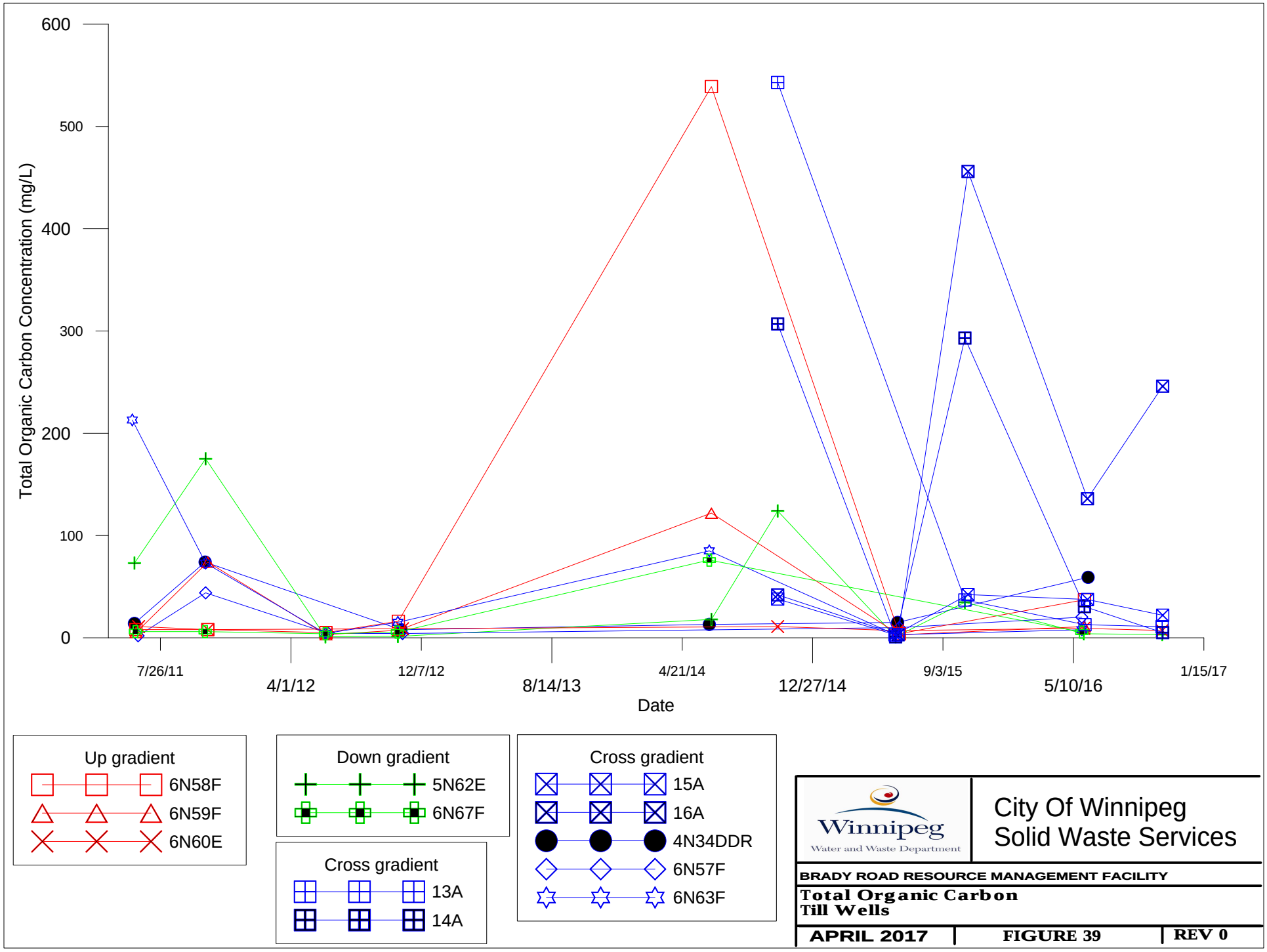
Dissolved Potassium
Till Wells

APRIL 2017	FIGURE 34	REV 0


Phosphorus Concentration (mg/L)
12
10
8
6
4
2
0
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
Date
Up gradient
6N58F
6N59F
6N60EER
Down gradient
5N62E
6N67F
Cross gradient
13A
14A
Cross gradient
16A
4N34DDR
6N57F
6N63F
15A
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Phosphorus
Till Wells
APRIL 2017
FIGURE 35
REV 0


0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
Dissolved Rubidium Concentration (mg/L)
7/26/11
4/1/12
12/7/12
8/14/13
4/21/14
12/27/14
9/3/15
5/10/16
Date
Up gradient
6N58F
6N59F
6N60E
Down gradient
5N62E
6N67F
Cross gradient
15A
16A
Cross gradient
4N34DDR
6N57F
6N63F
13A
14A
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Rubidium
Till Wells
APRIL 2017
FIGURE 36
REV 0


0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Dissolved Tin Concentration (mg/L)
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
Date
Up gradient
6N58F
6N59F
6N60EER
Cross gradient
4N34DDR
6N57F
6N63F
13A
14A
Down gradient
5N62E
6N67F
Cross gradient
15A
16A
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Tin
Till Wells
APRIL 2017
FIGURE 38
REV 0



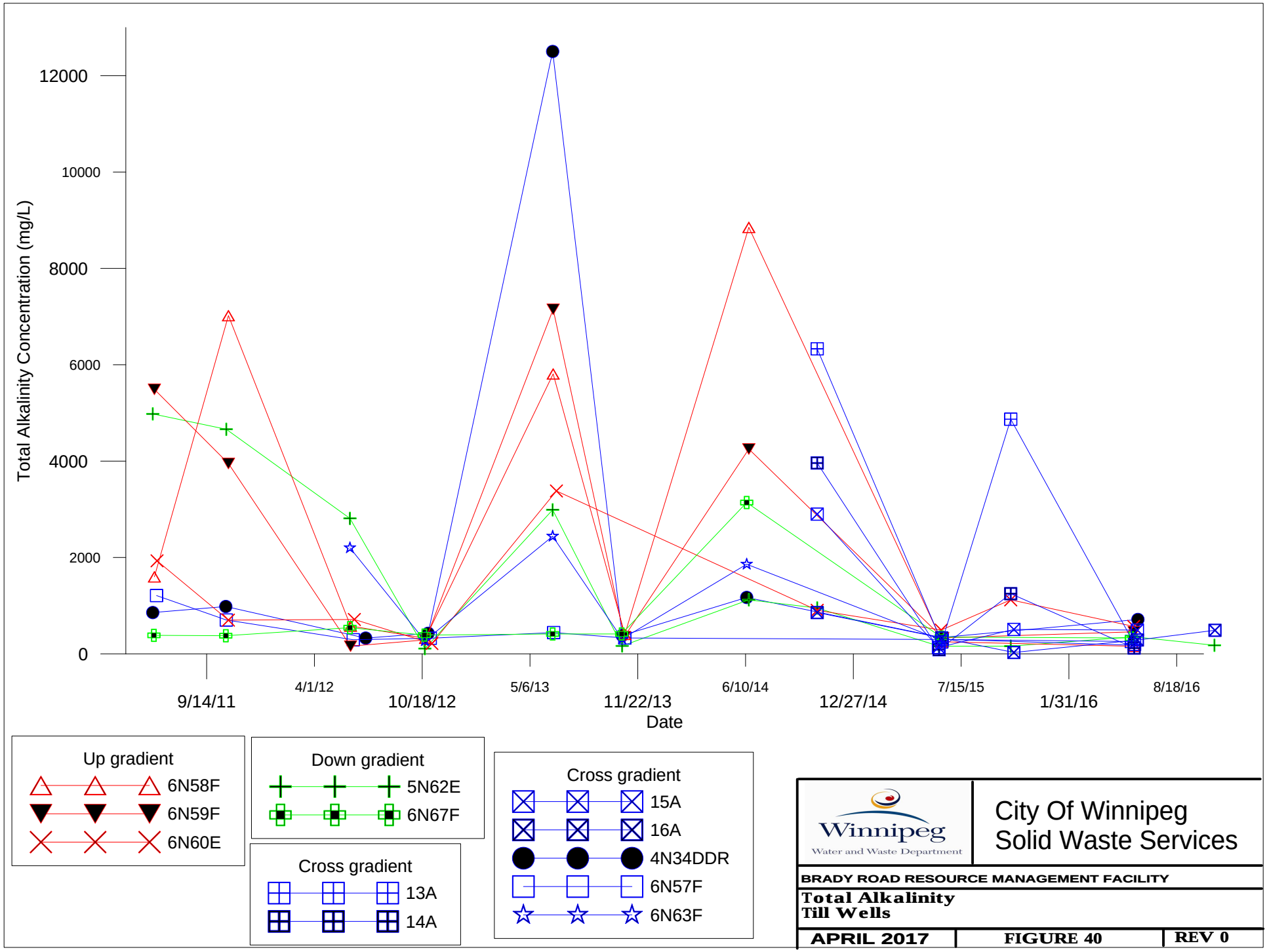
Winnipeg
Water and Waste Department

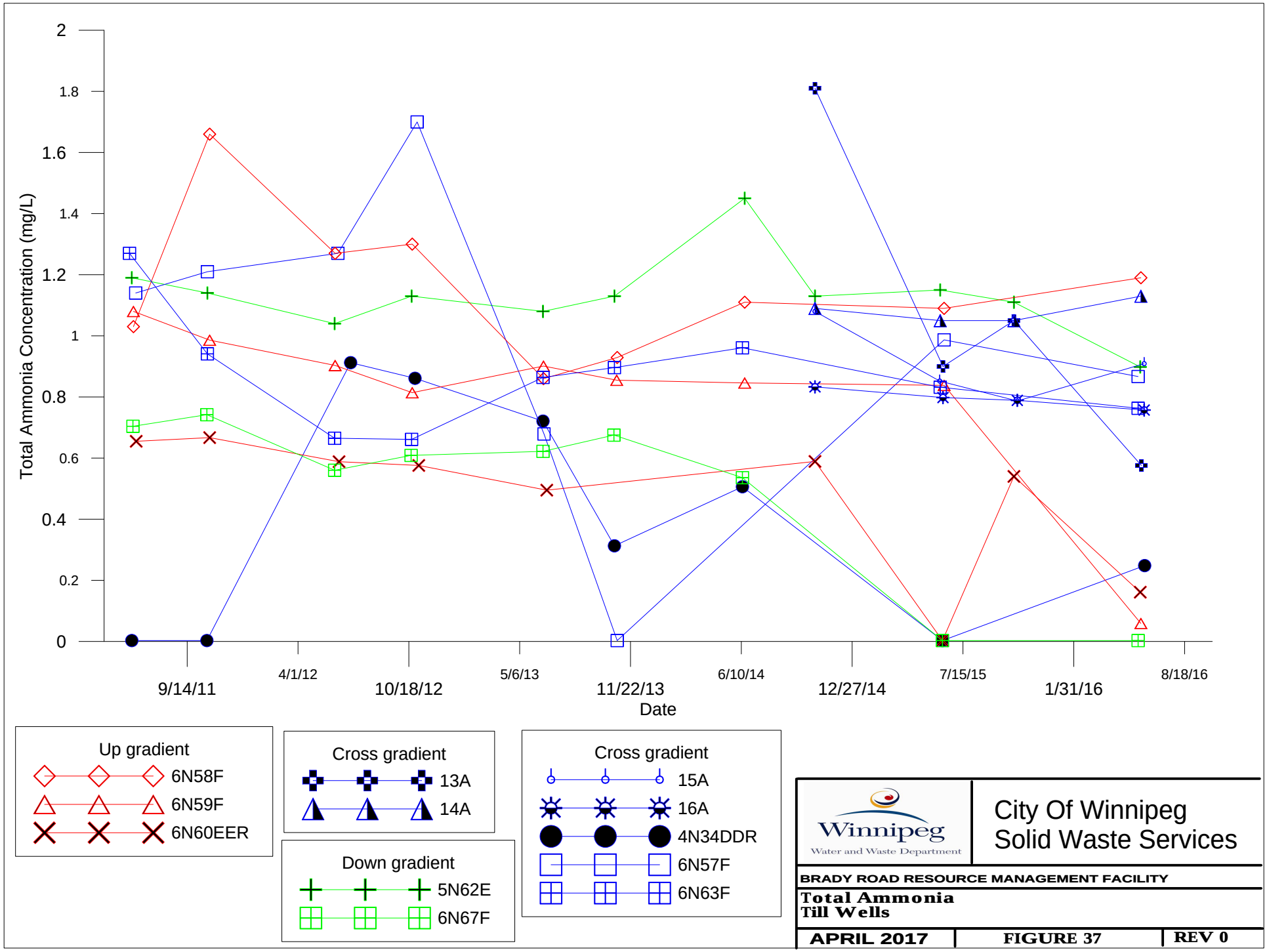
City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Total Organic Carbon
Till Wells

APRIL 2017	FIGURE 39	REV 0


Total Alkalinity Concentration (mg/L)
12000
10000
8000
6000
4000
2000
0
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
Date
Up gradient
6N58F
6N59F
6N60E
Down gradient
5N62E
6N67F
Cross gradient
13A
14A
Cross gradient
15A
16A
4N34DDR
6N57F
6N63F
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Total Alkalinity
Till Wells
APRIL 2017
FIGURE 40
REV 0



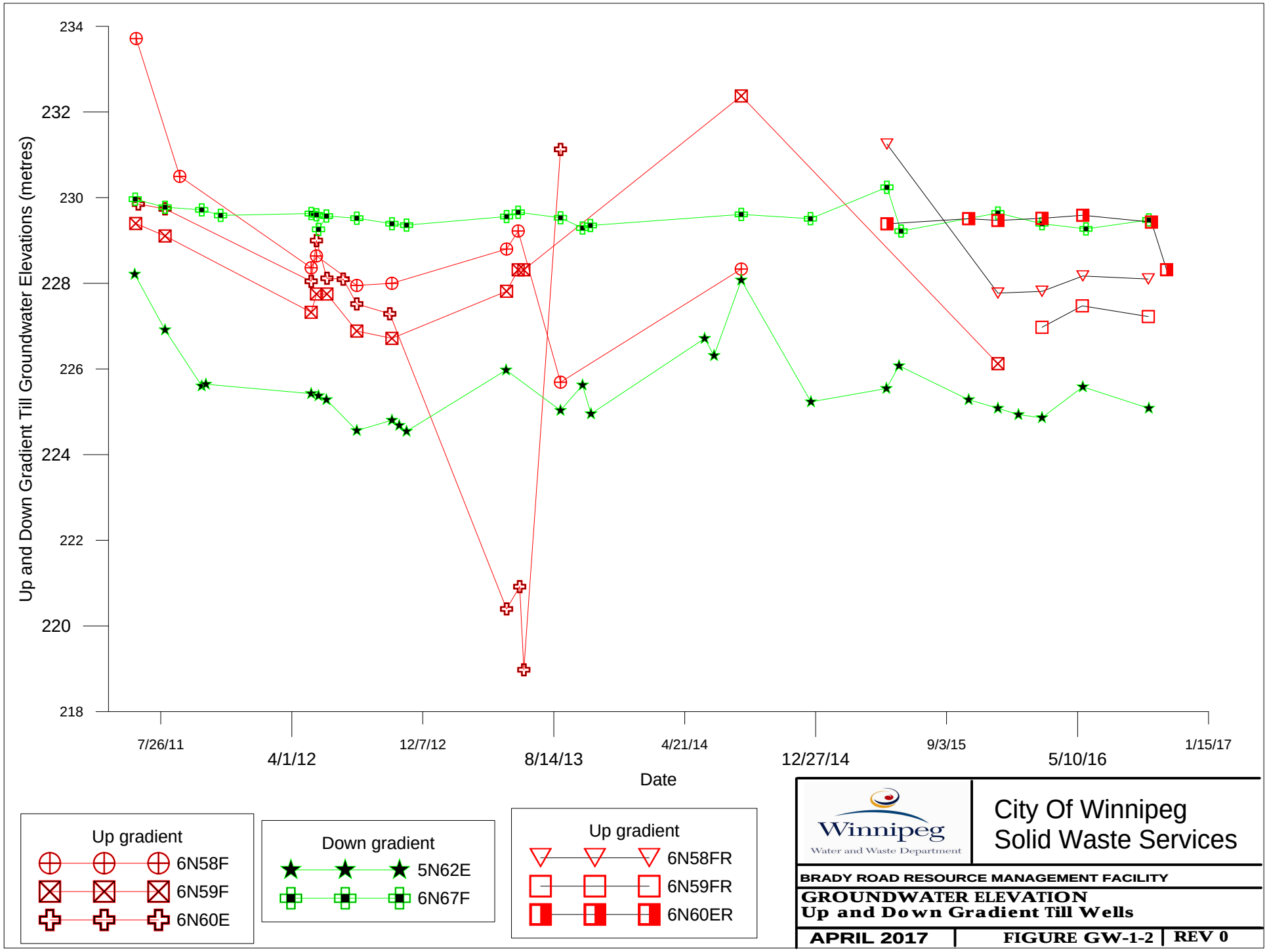
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Total Ammonia
Till Wells

APRIL 2017	FIGURE 37	REV 0



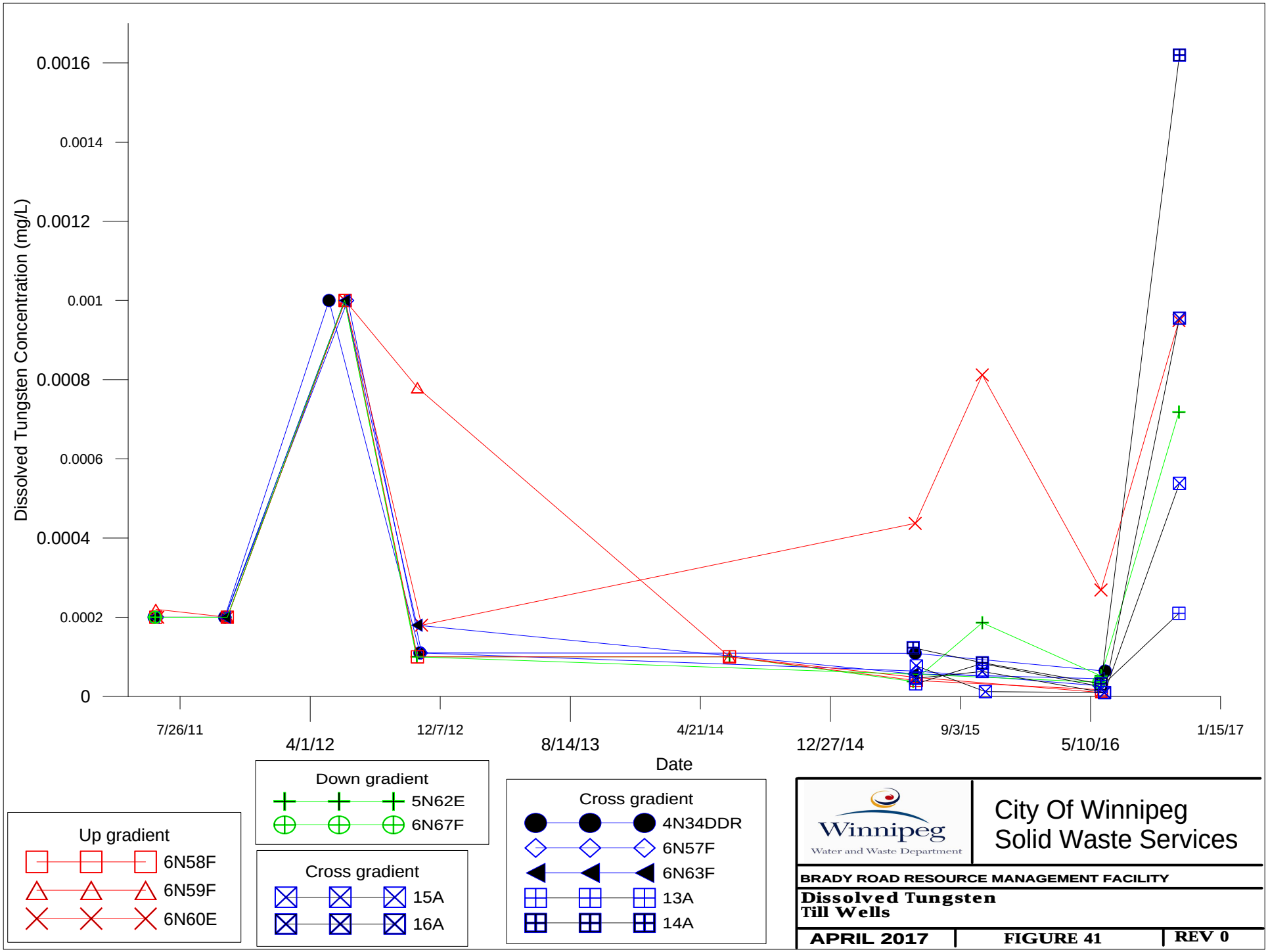
Winnipeg
Water and Waste Department

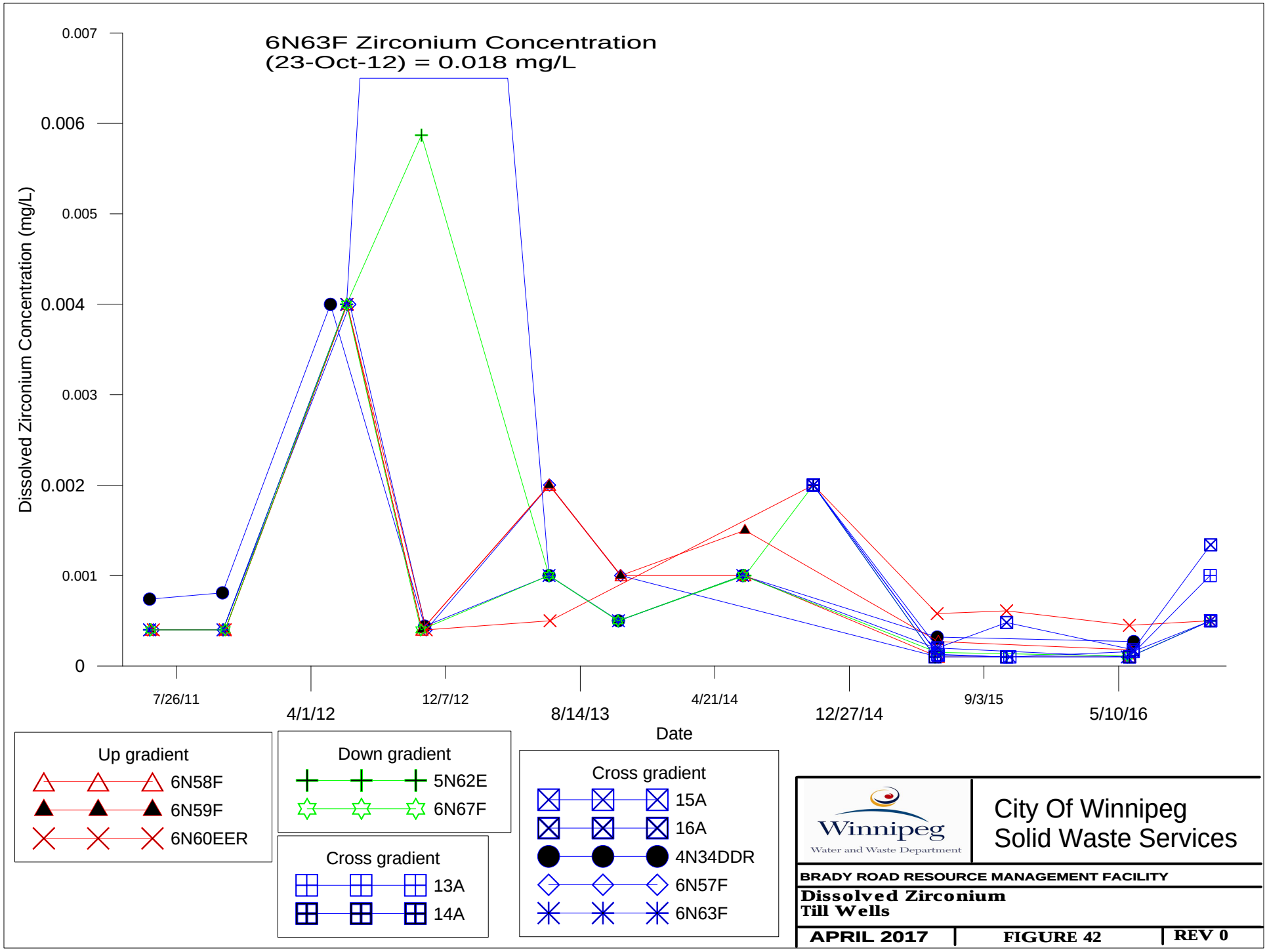
City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

GROUNDWATER ELEVATION
Up and Down Gradient Till Wells

APRIL 2017 | FIGURE GW-1-2 | REV 0


0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
Dissolved Tungsten Concentration (mg/L)
7/26/11
4/1/12
12/7/12
8/14/13
4/21/14
12/27/14
9/3/15
5/10/16
1/15/17
Date
Up gradient
6N58F
6N59F
6N60E
Down gradient
5N62E
6N67F
Cross gradient
15A
16A
Cross gradient
4N34DDR
6N57F
6N63F
13A
14A
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Tungsten
Till Wells
APRIL 2017
FIGURE 41
REV 0



Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Zirconium
Till Wells

APRIL 2017	FIGURE 42	REV 0

Site: Brady
Well #: W4

Dates:
6-Jun-11
18-Oct-11
24-Oct-12
13-Jun-13
23-Oct-13
11-Jun-14
23-Oct-14
2-Jun-15
26-Oct-15
24-May-16
26-Oct-16

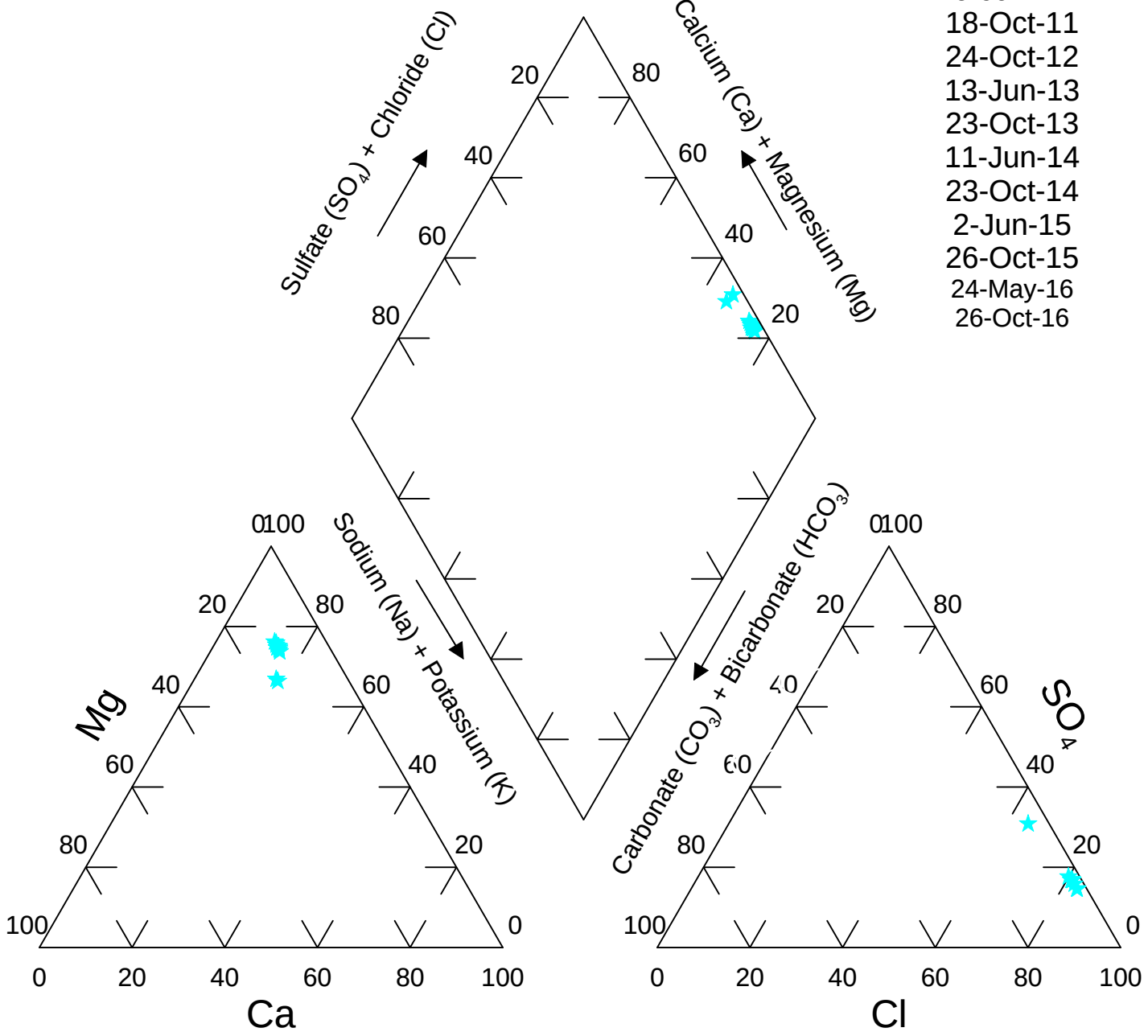


FIGURE: 1P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W5

Dates:
6-Jun-11
18-Oct-11
31-May-12
24-Oct-12
13-Jun-13
23-Oct-13
11-Jun-14
23-Oct-14
2-Jun-15
26-Oct-15
24-May-16
26-Oct-16

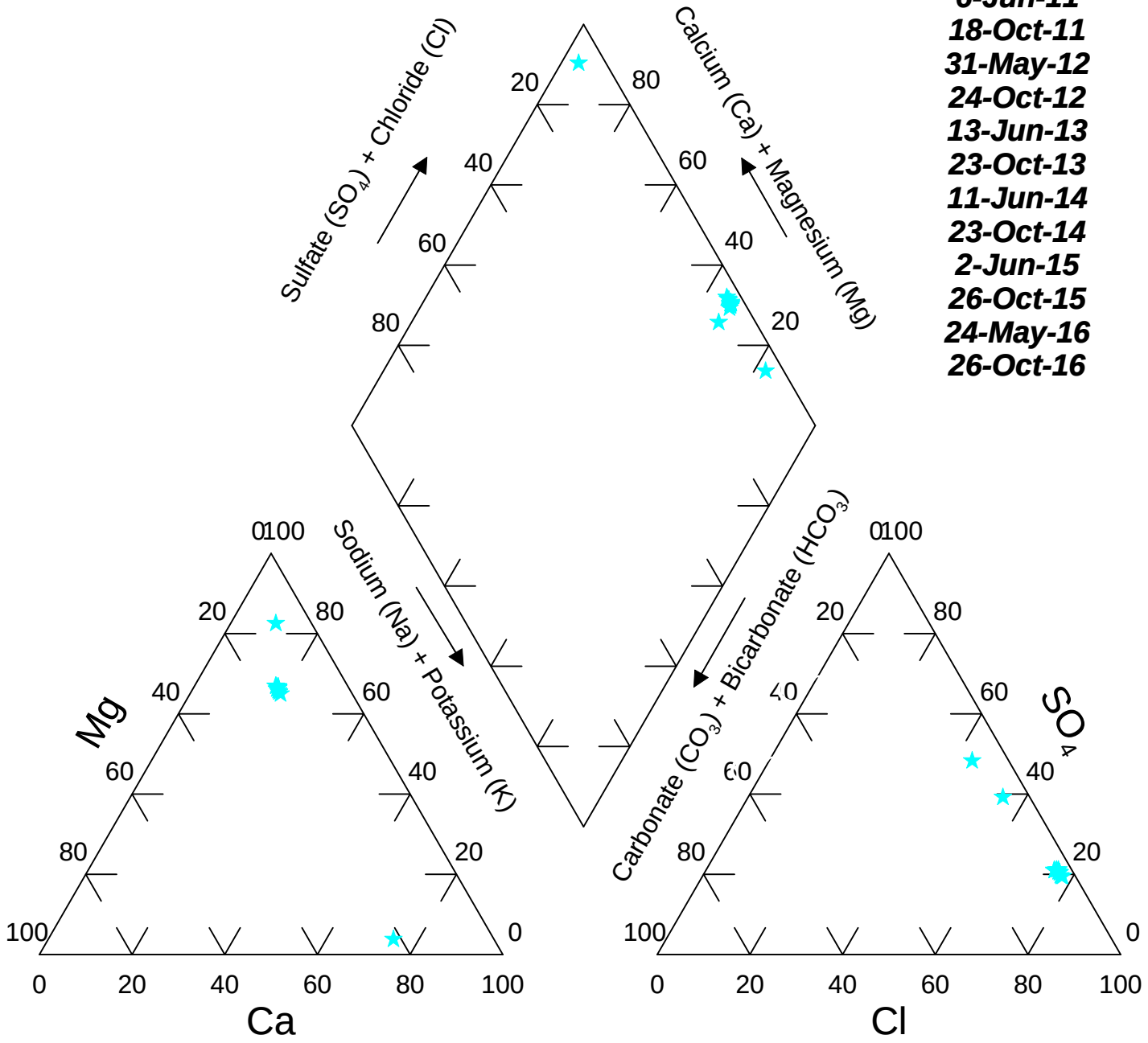


FIGURE: 2P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W6

Dates:

8-Jun-11
17-Oct-11
4-Jun-12
22-Oct-12
13-Jun-13
22-Oct-13
11-Jun-14
20-Oct-14
3-Jun-15
26-Oct-15
30-May-16
25-Oct-16

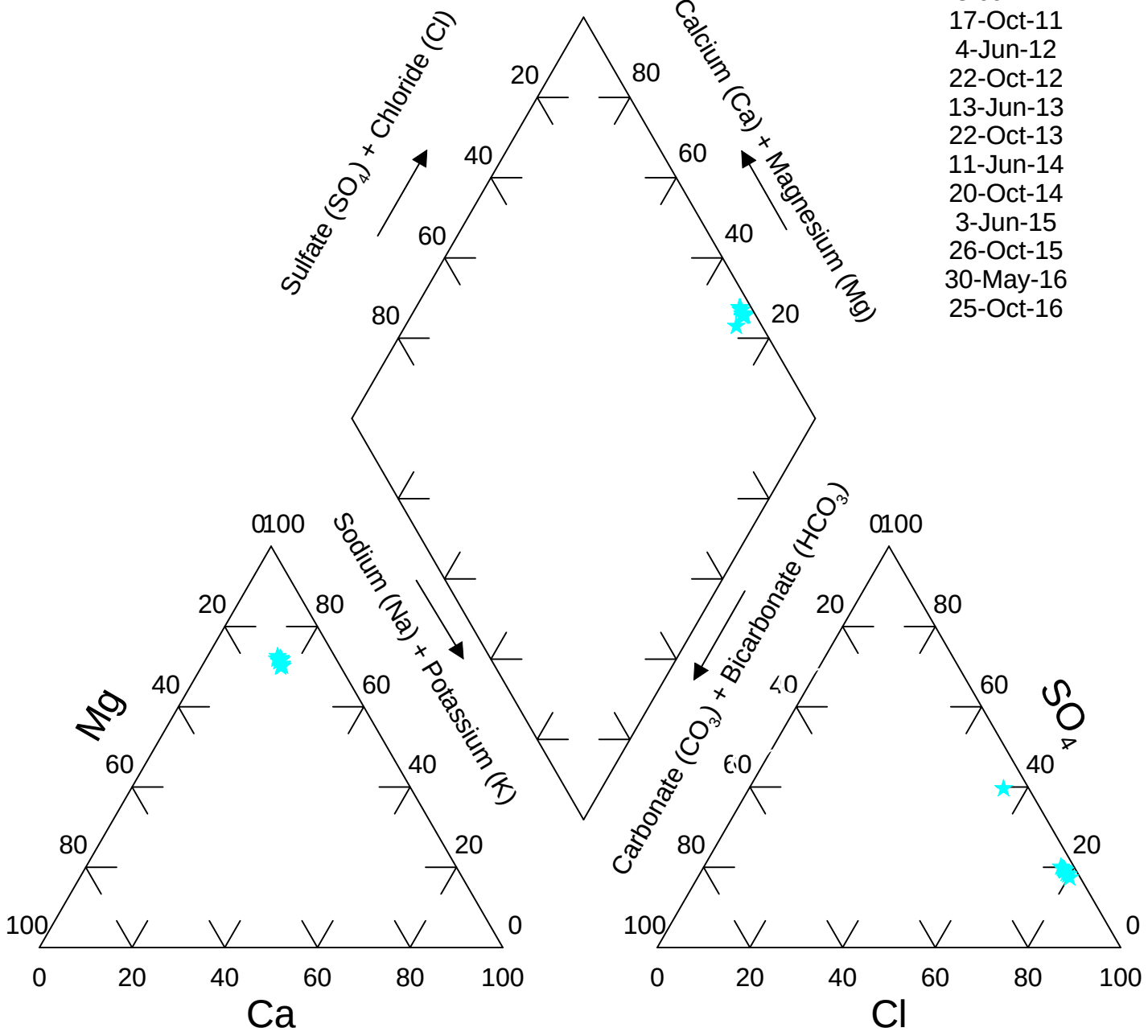


FIGURE: 3P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W7

Dates:
8-Jun-11
19-Oct-11
5-Jun-12
22-Oct-12
12-Jun-13
22-Oct-13
11-Jun-14
20-Oct-14
2-Jun-15
26-Oct-15
24-May-16
24-Oct-16

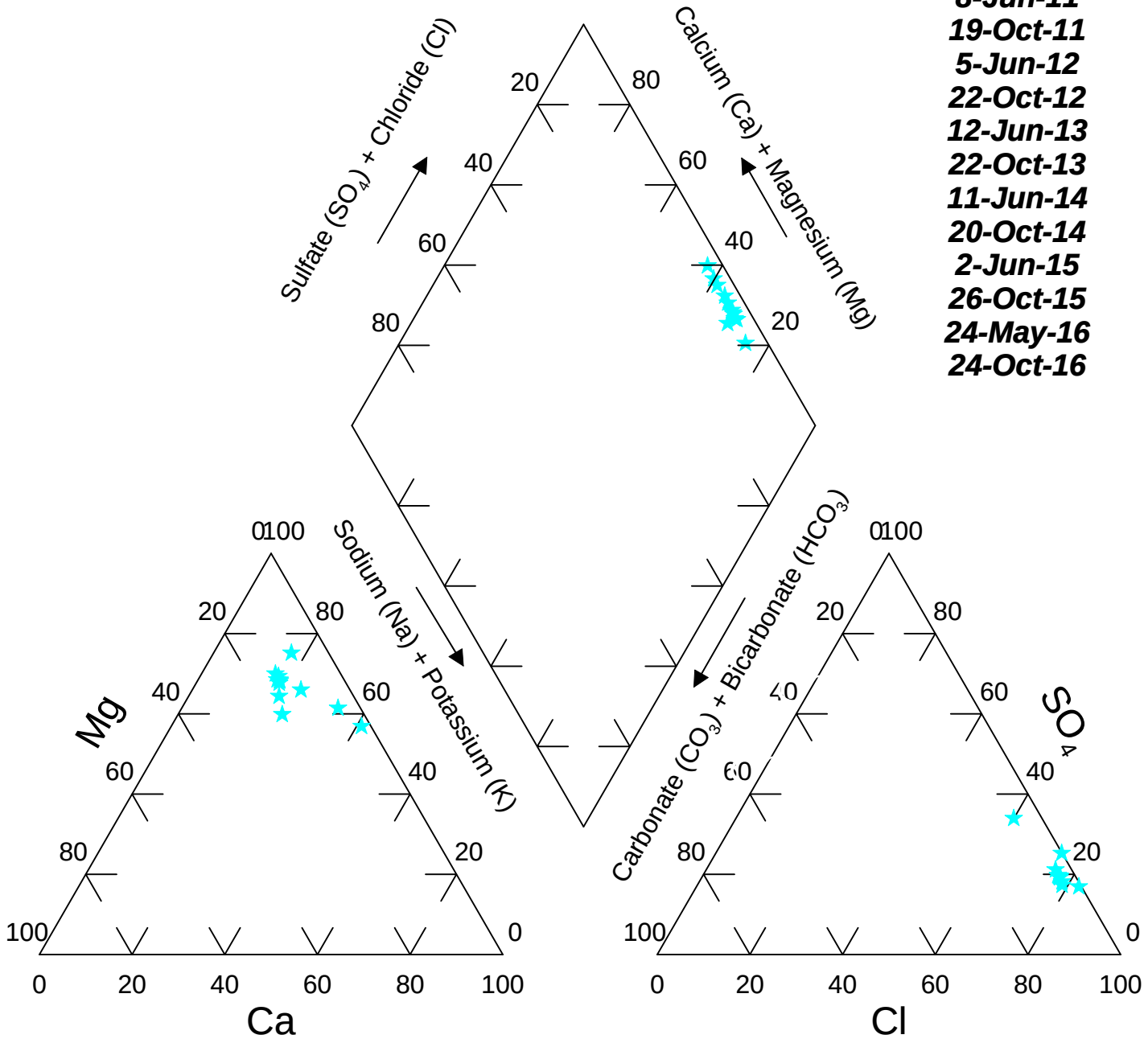


FIGURE: 4P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W8

Dates:
6-Jun-11
18-Oct-11
1-Jun-12
23-Oct-12
12-Jun-13
22-Oct-13
11-Jun-14
23-Oct-14
3-Jun-15
26-Oct-15
25-May-16
24-Oct-16

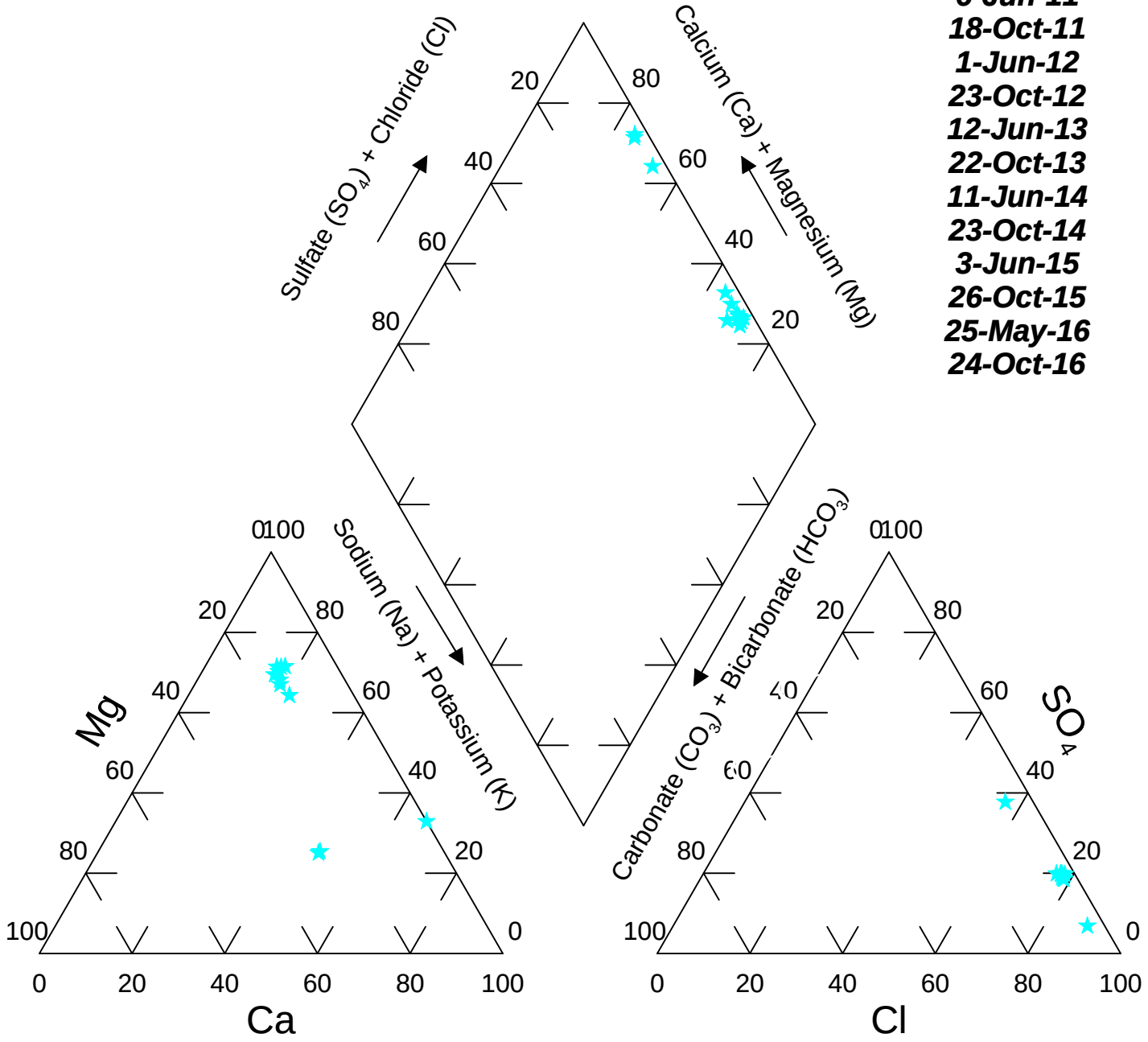


FIGURE: 5P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W9

Dates:
6-Jun-11
17-Oct-11
31-May-12
23-Oct-12
11-Jun-13
21-Oct-13
1-Jun-14
20-Oct-14
3-Jun-15
22-Oct-15
24-May-16
26-Oct-16

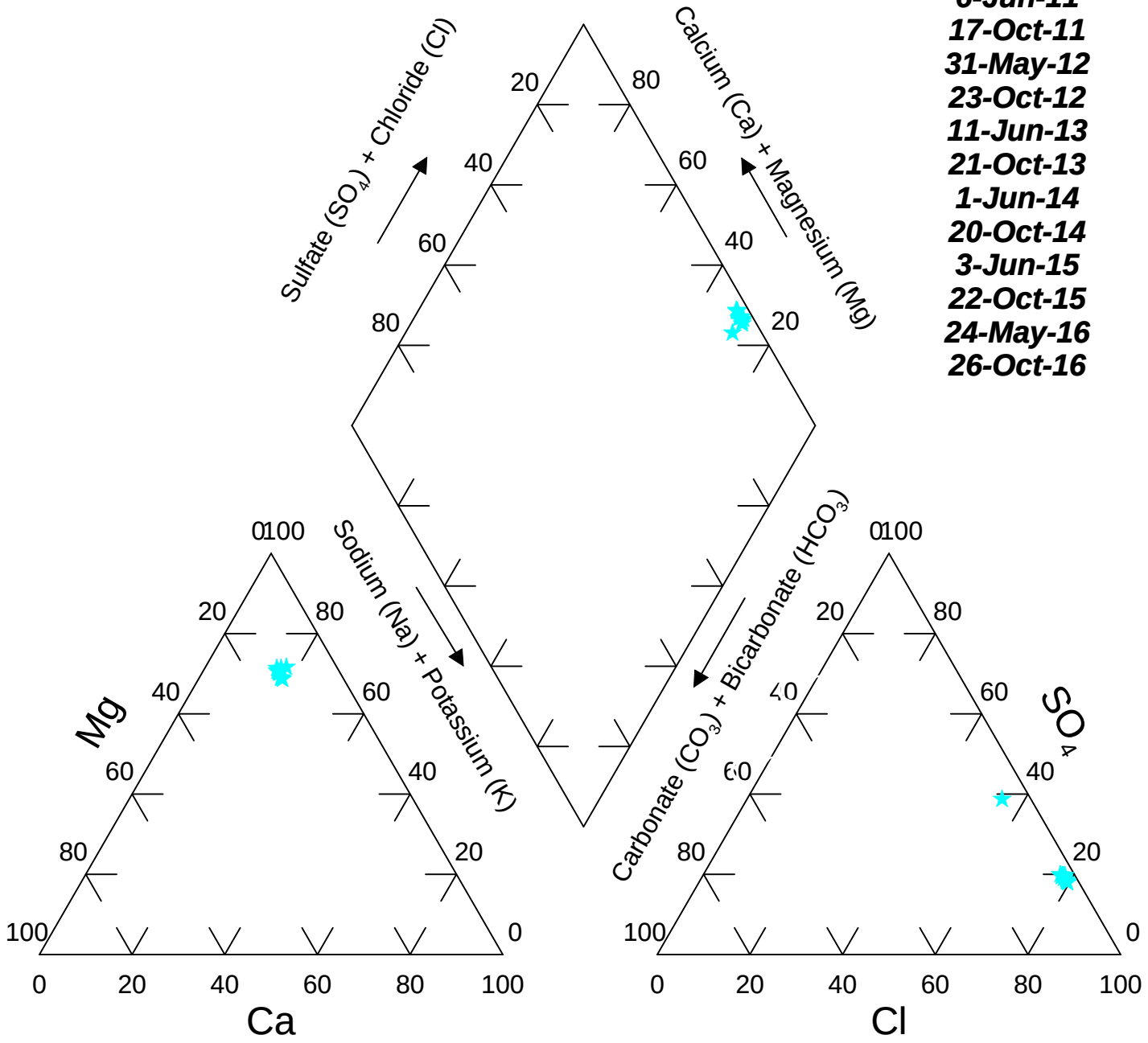


FIGURE: 6P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W10

Dates:
6-Jun-11
17-Oct-11
1-Jun-12
23-Oct-12
11-Jun-13
22-Oct-13
10-Jun-14
20-Oct-14
3-Jun-15
22-Oct-15
25-May-16
26-Oct-16

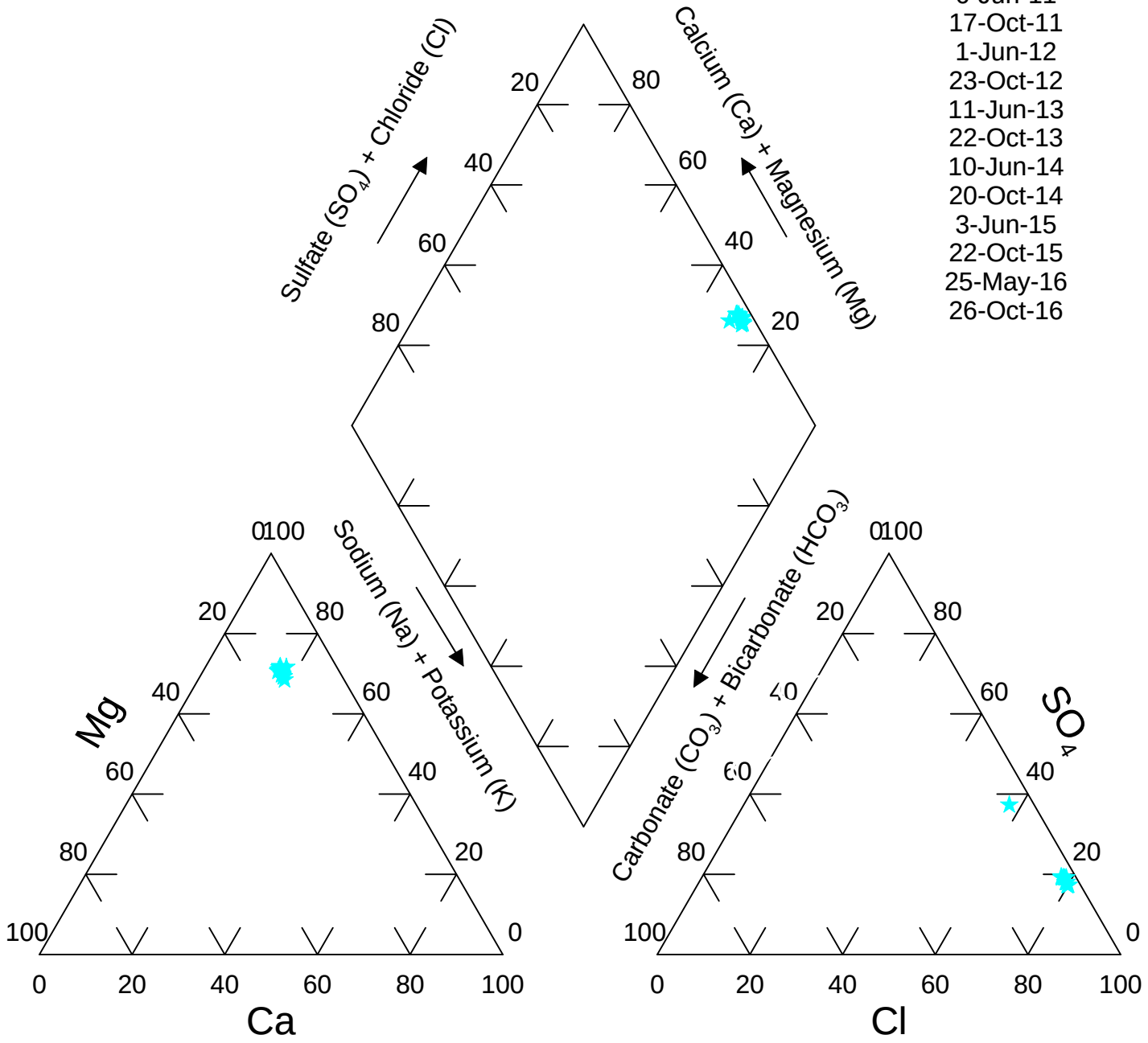


FIGURE: 7P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W11

Dates:
6-Jun-11
17-Oct-11
31-May-12
23-Oct-12
12-Jun-13
22-Oct-13
10-Jun-14
23-Oct-14
2-Jun-15
22-Oct-15
25-May-16
26-Oct-16

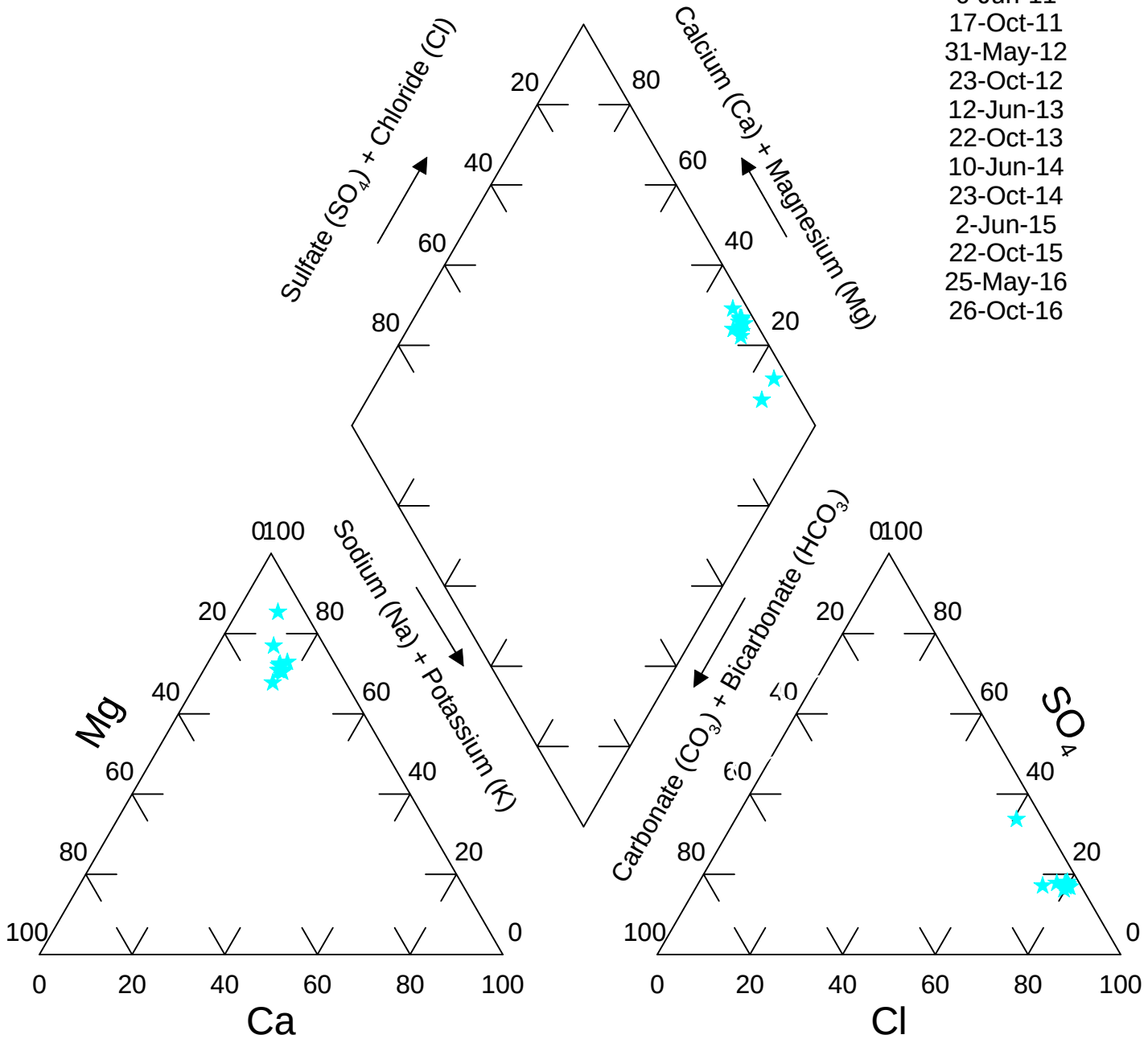
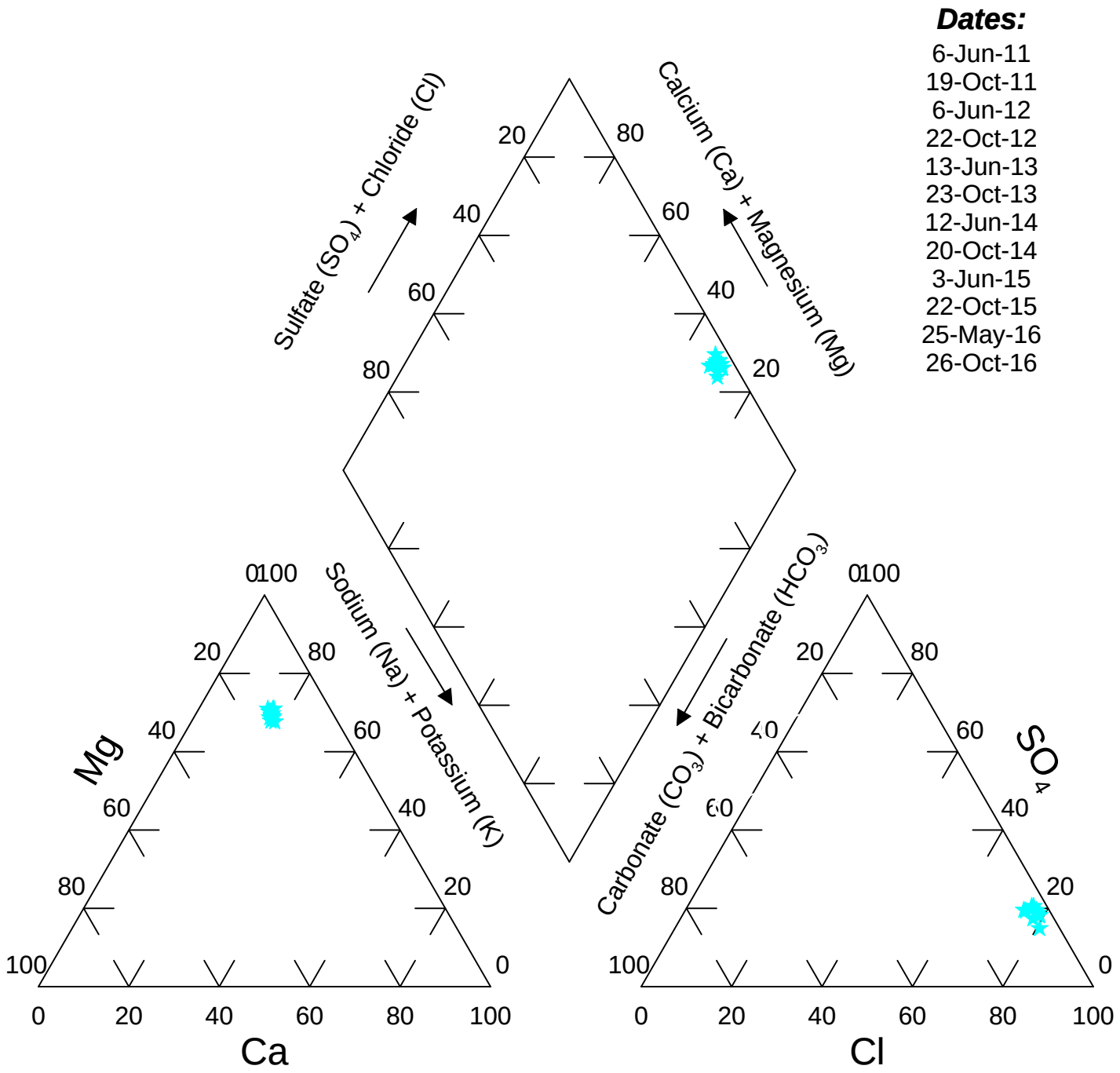


FIGURE: 8P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W12



Dates:

6-Jun-11
19-Oct-11
6-Jun-12
22-Oct-12
13-Jun-13
23-Oct-13
12-Jun-14
20-Oct-14
3-Jun-15
22-Oct-15
25-May-16
26-Oct-16

FIGURE: 9P

Winnipeg
Water and Waste Department

Site: Brady
Location : W13

Dates:
1-Jun-15
21-Oct-15
27-May-16
24-Oct-16

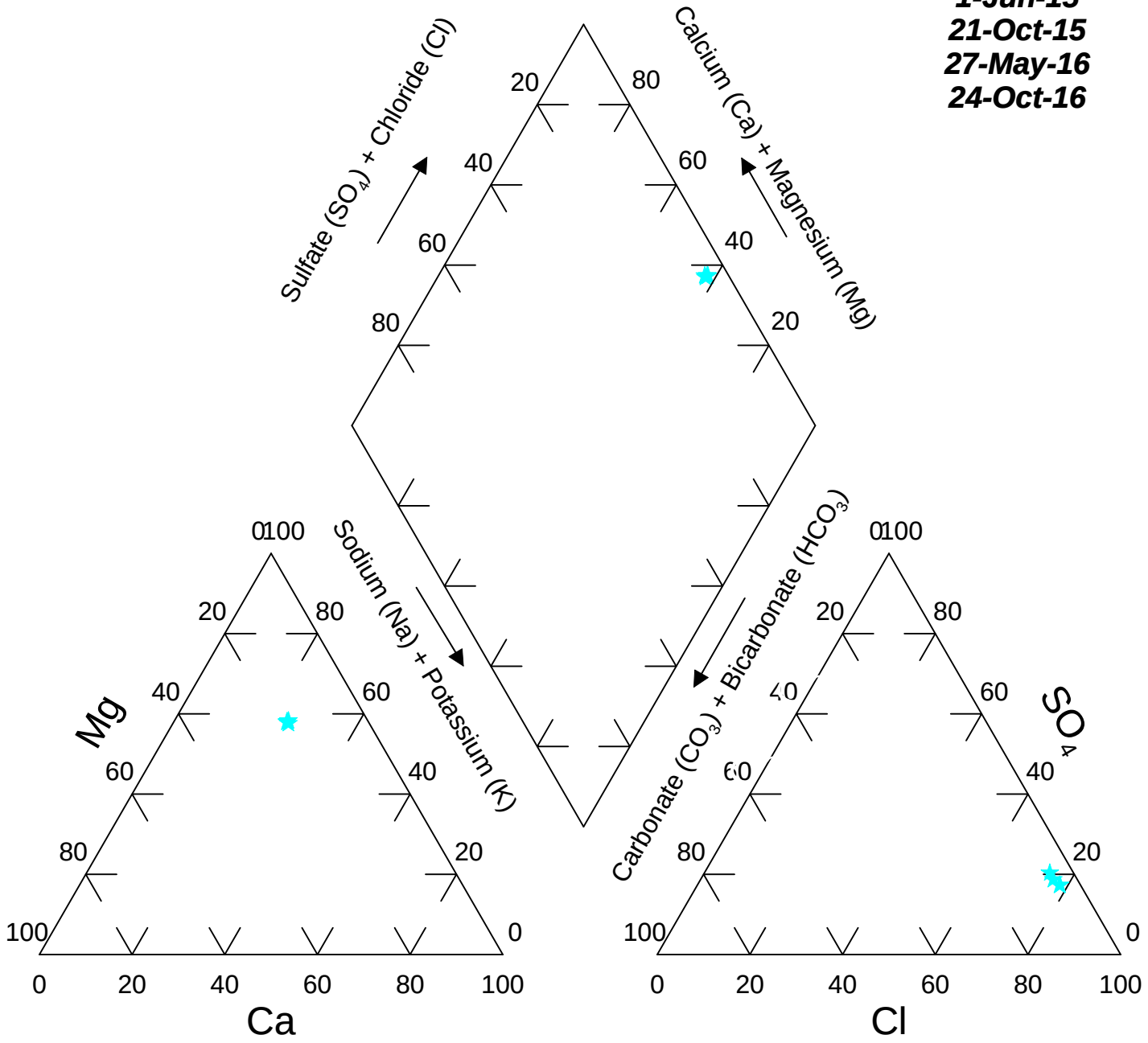


FIGURE: 1z

Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-W14

Dates:
3-Jun-15
21-Oct-15
25-May-16
26-Oct-16

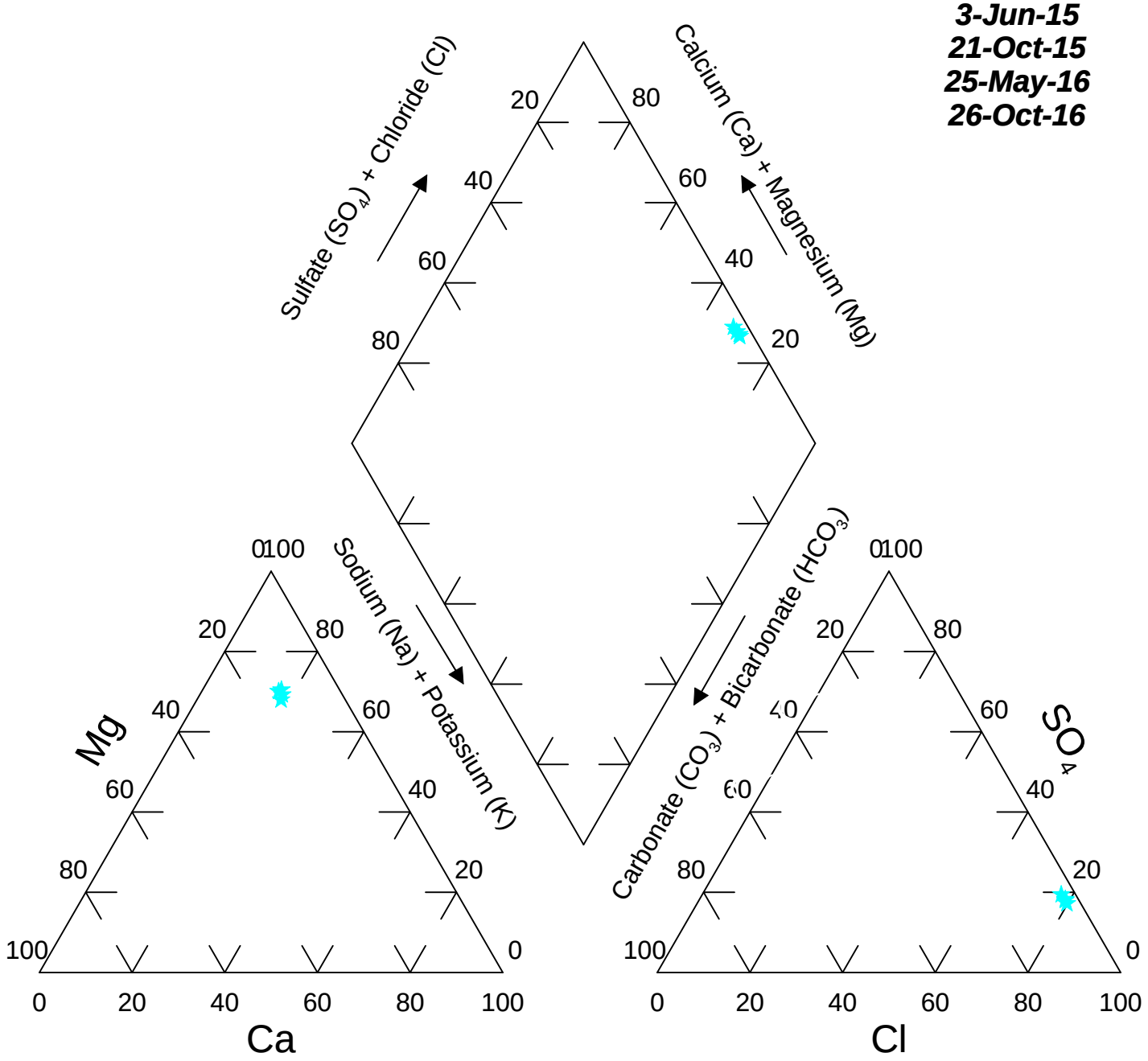


FIGURE: 2z

Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-W15

Dates:
3-Jun-15
21-Oct-15
30-May-16
25-Oct-16

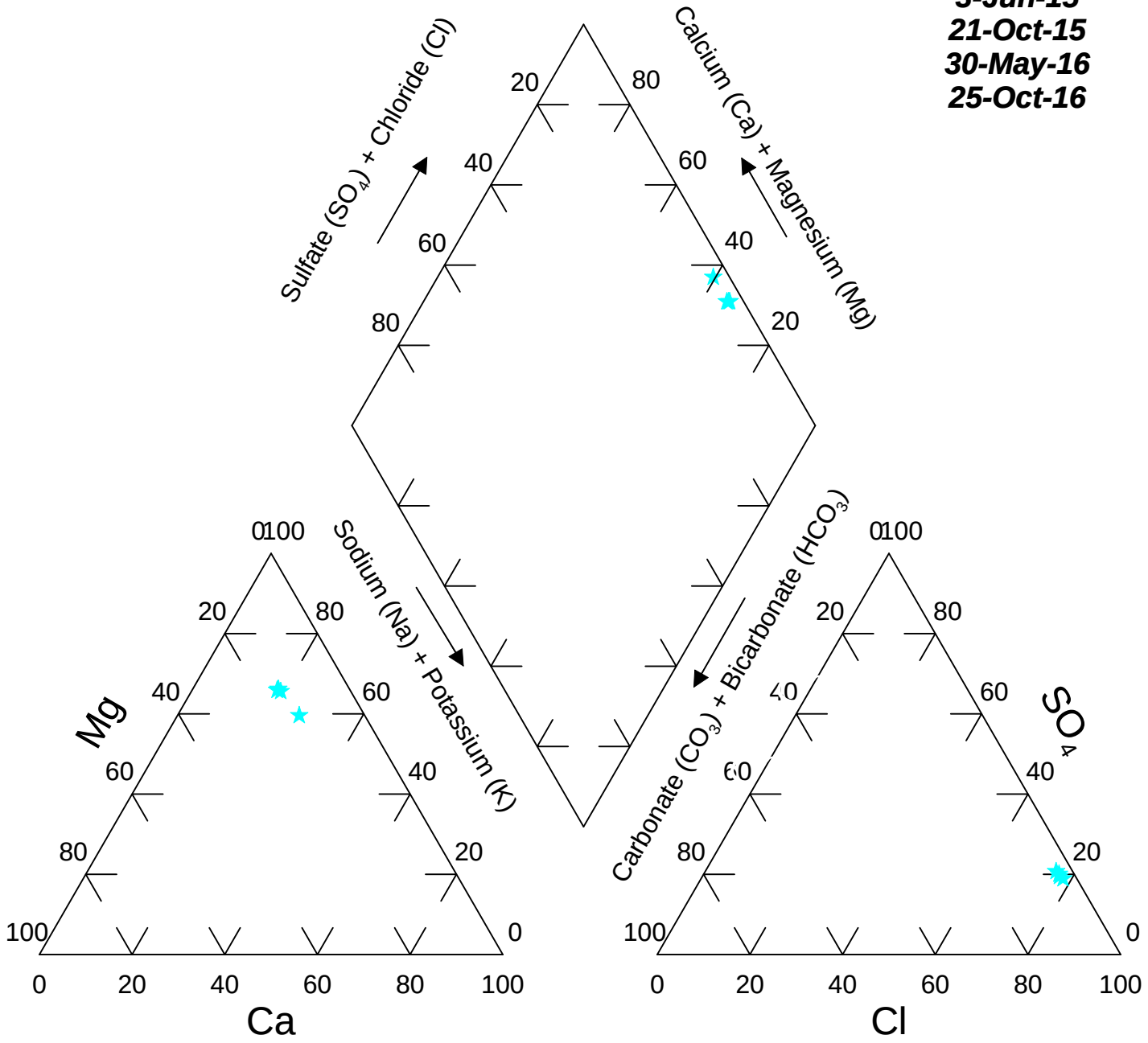


FIGURE: 3z

Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-W16

Dates:
4-Jun-15
21-Oct-15
30-May-16
25-Oct-16

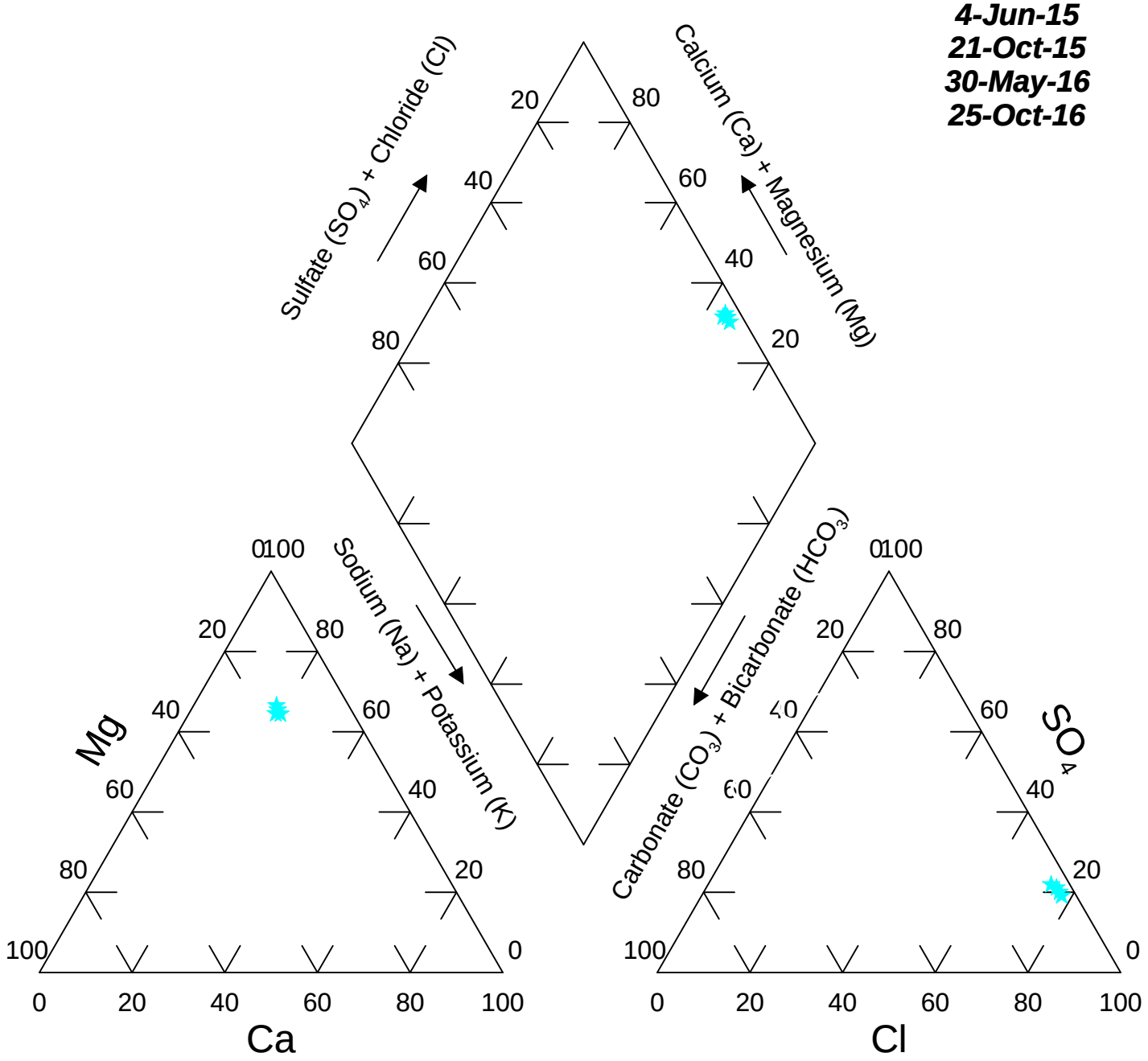
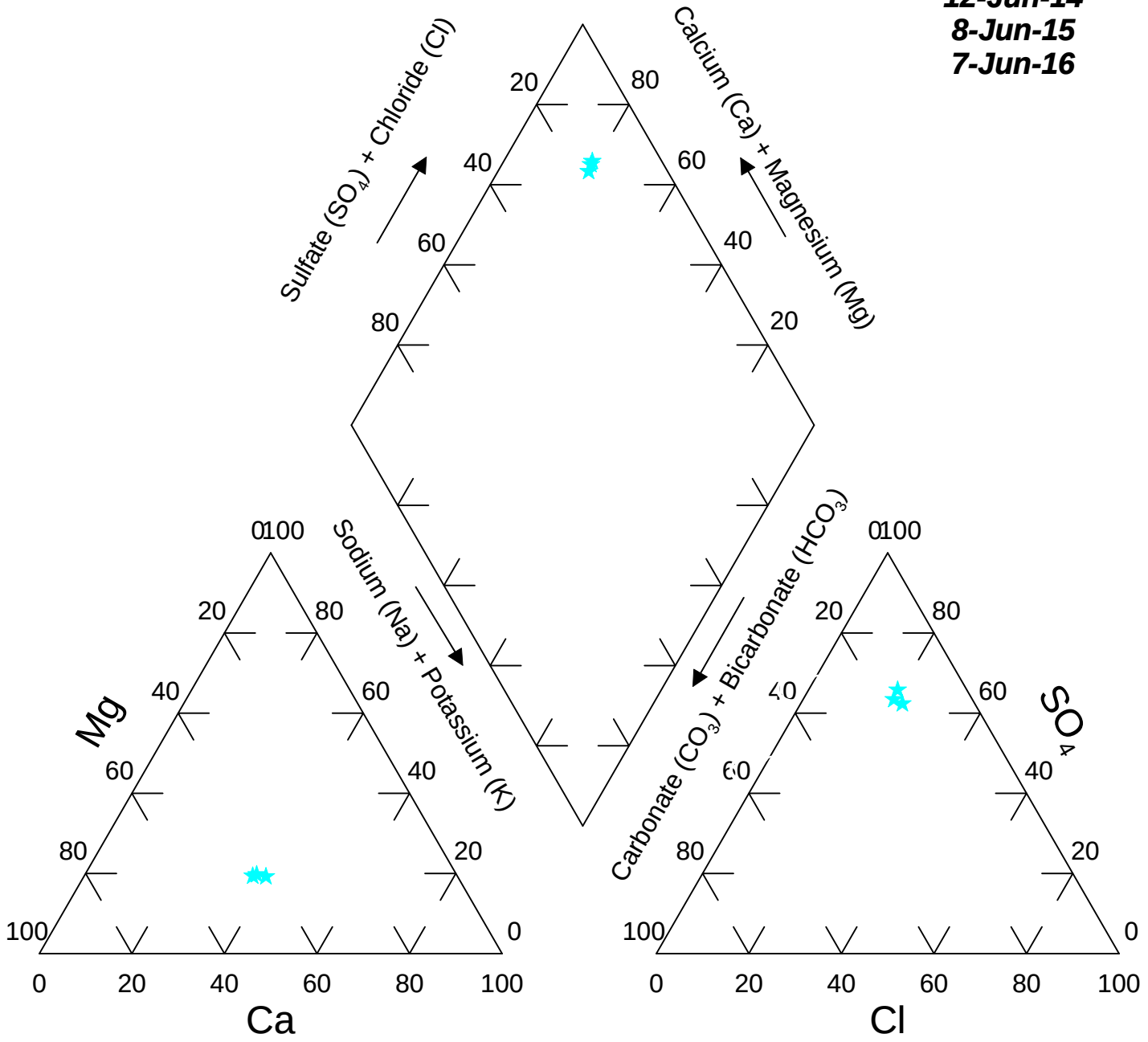


FIGURE: 4z

Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-4N34-B

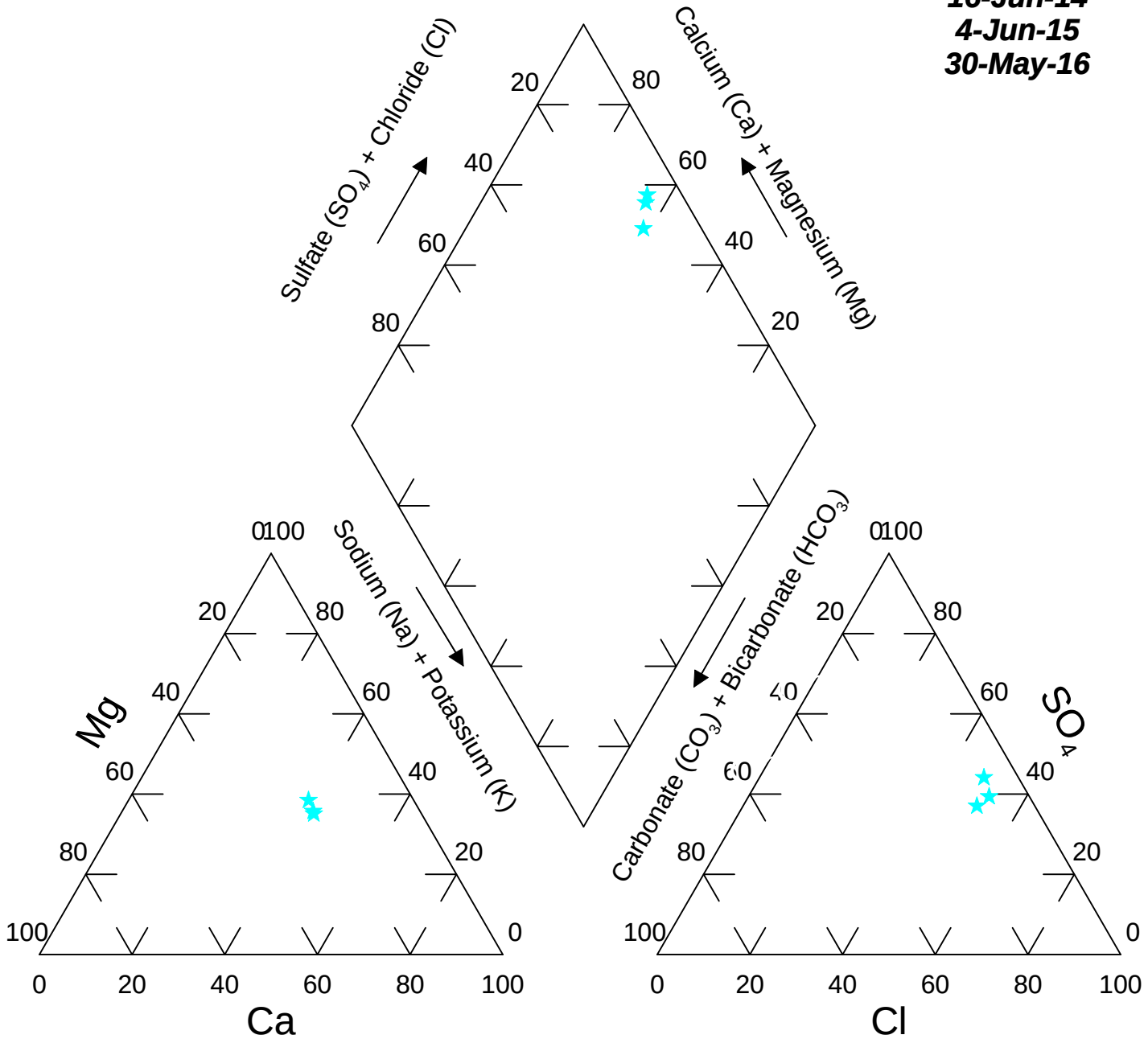
Dates:
12-Jun-14
8-Jun-15
7-Jun-16



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-5N62-D

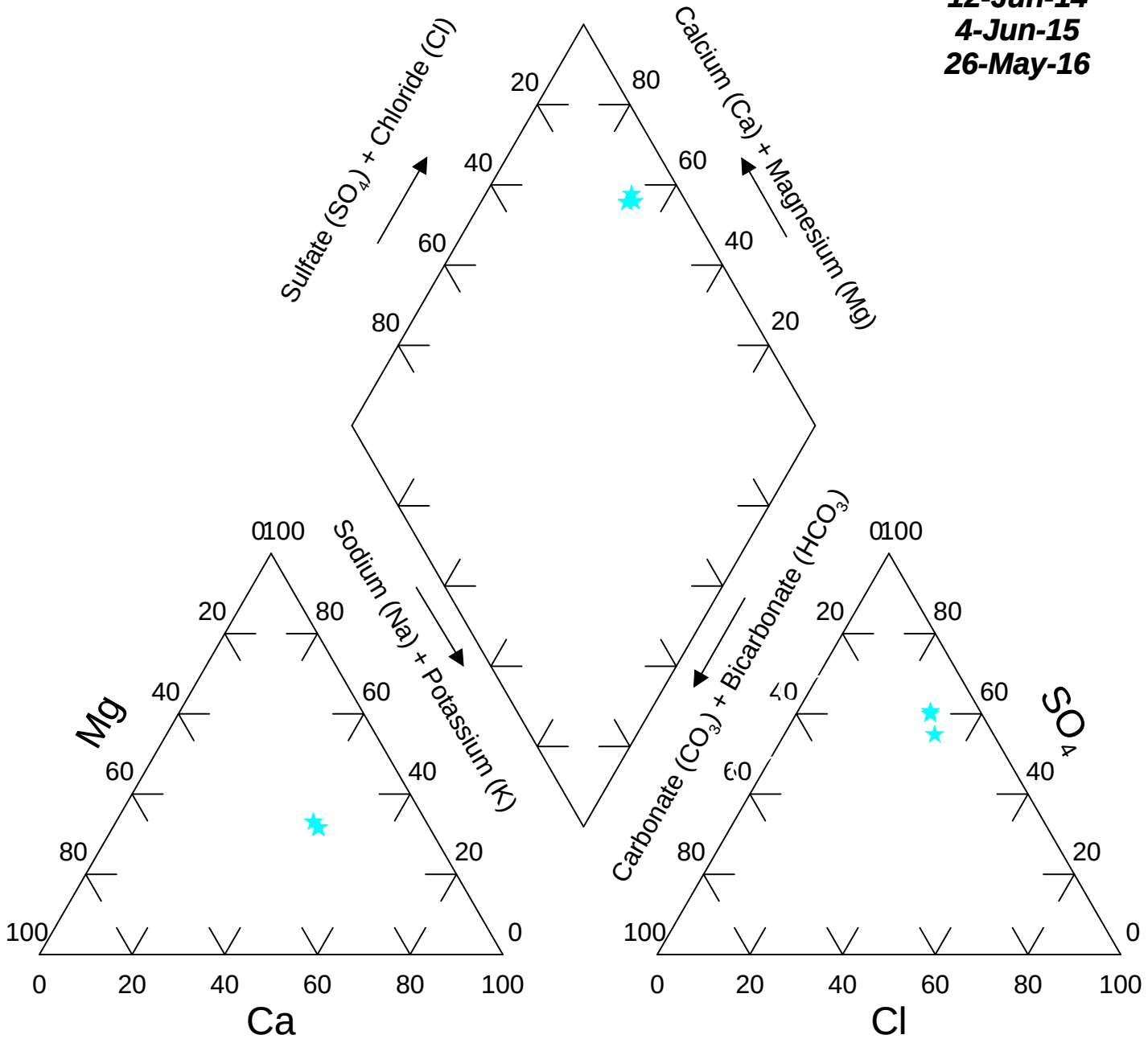
Dates:
16-Jun-14
4-Jun-15
30-May-16



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-6N57-DR

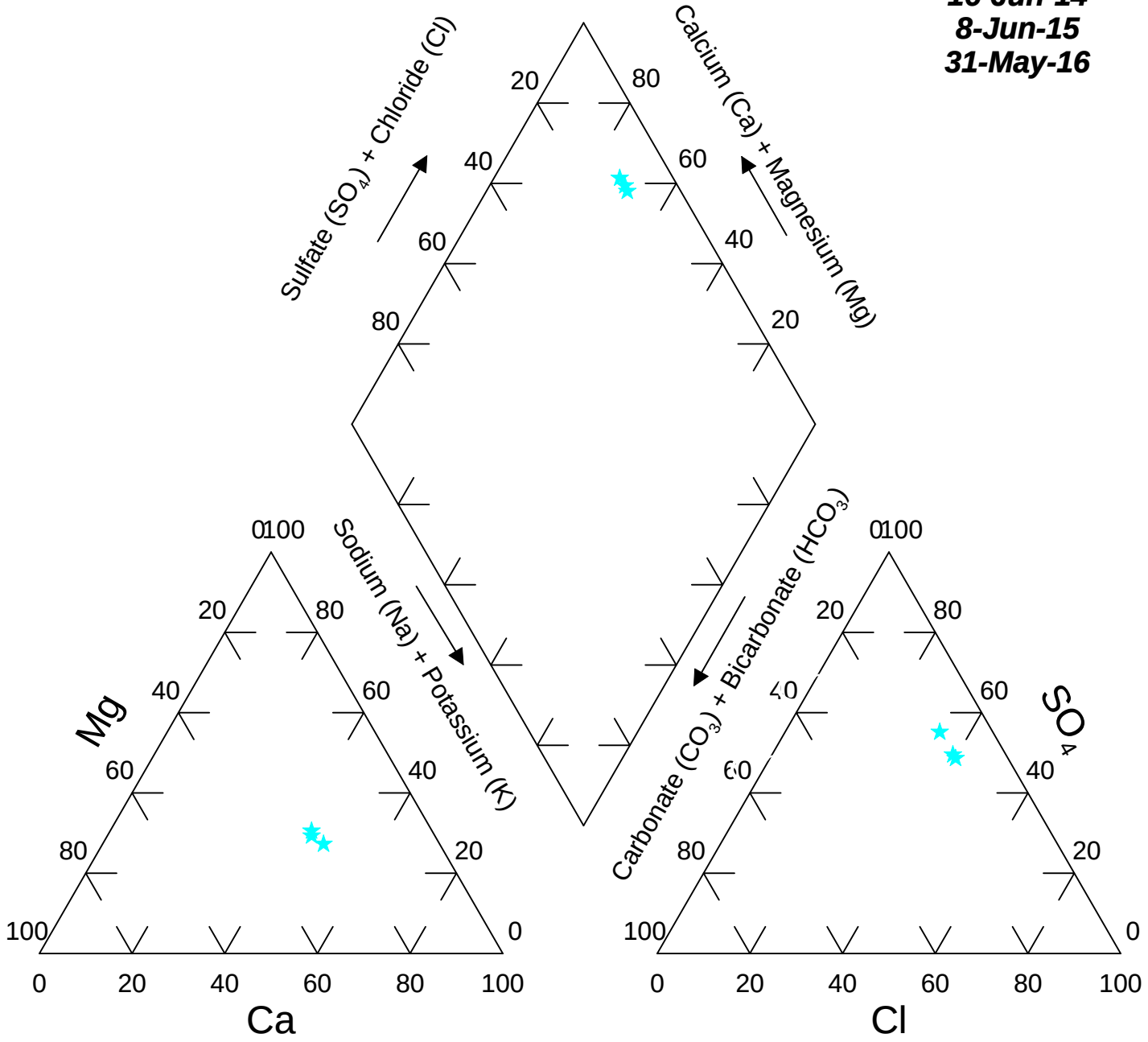
Dates:
12-Jun-14
4-Jun-15
26-May-16



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-6N58-DR

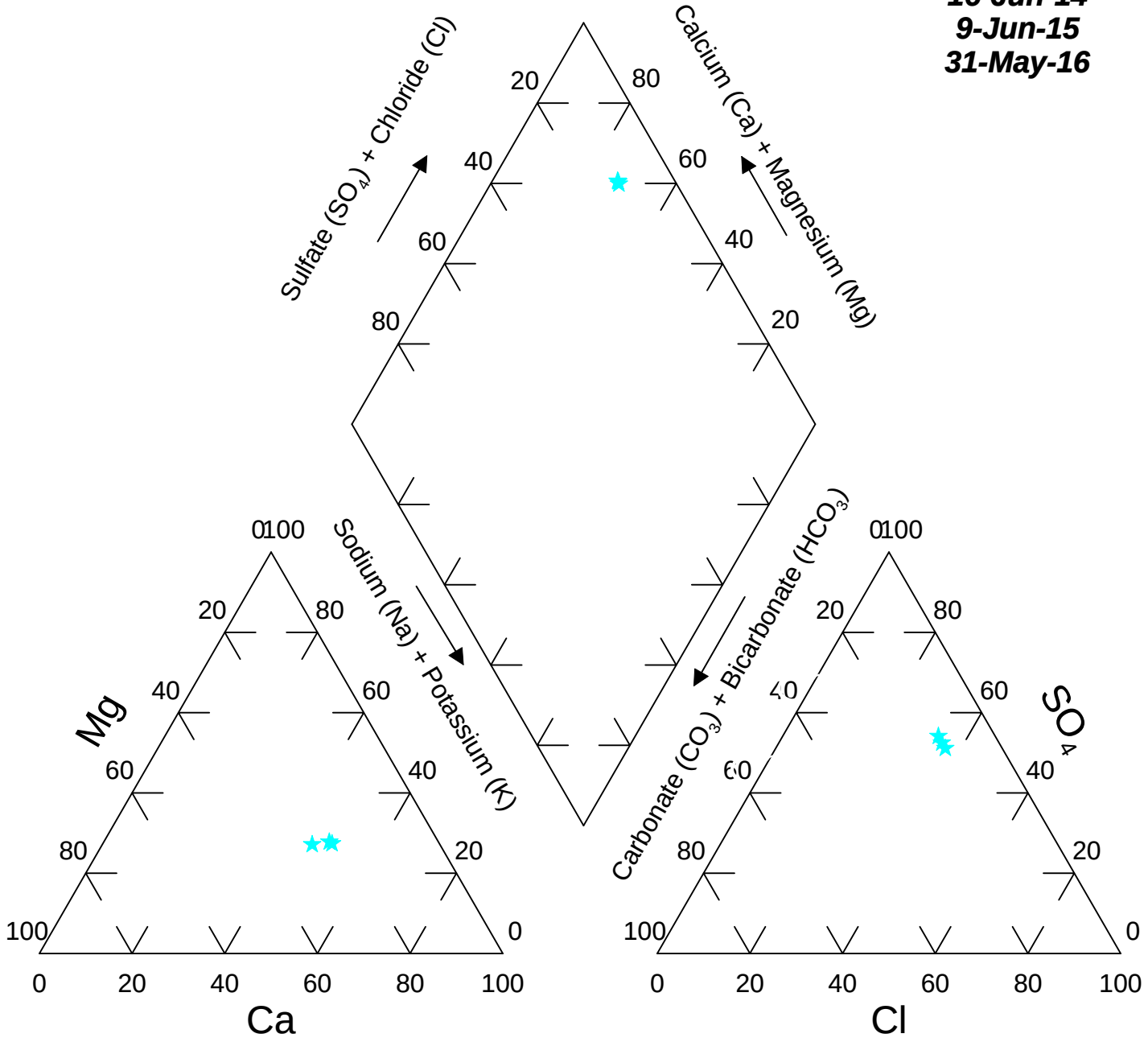
Dates:
16-Jun-14
8-Jun-15
31-May-16



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-6N59-DR

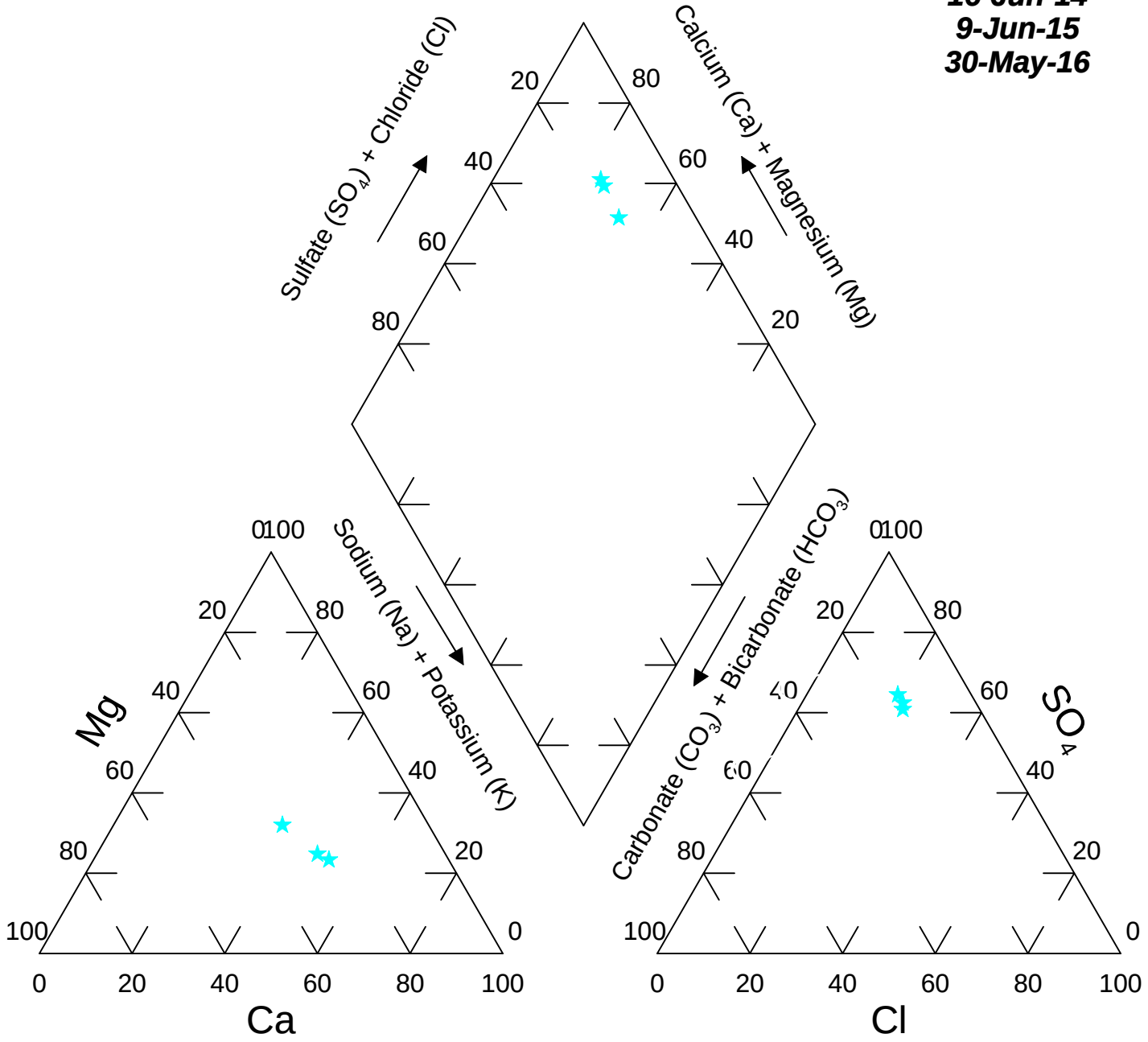
Dates:
16-Jun-14
9-Jun-15
31-May-16



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-6N60-DR

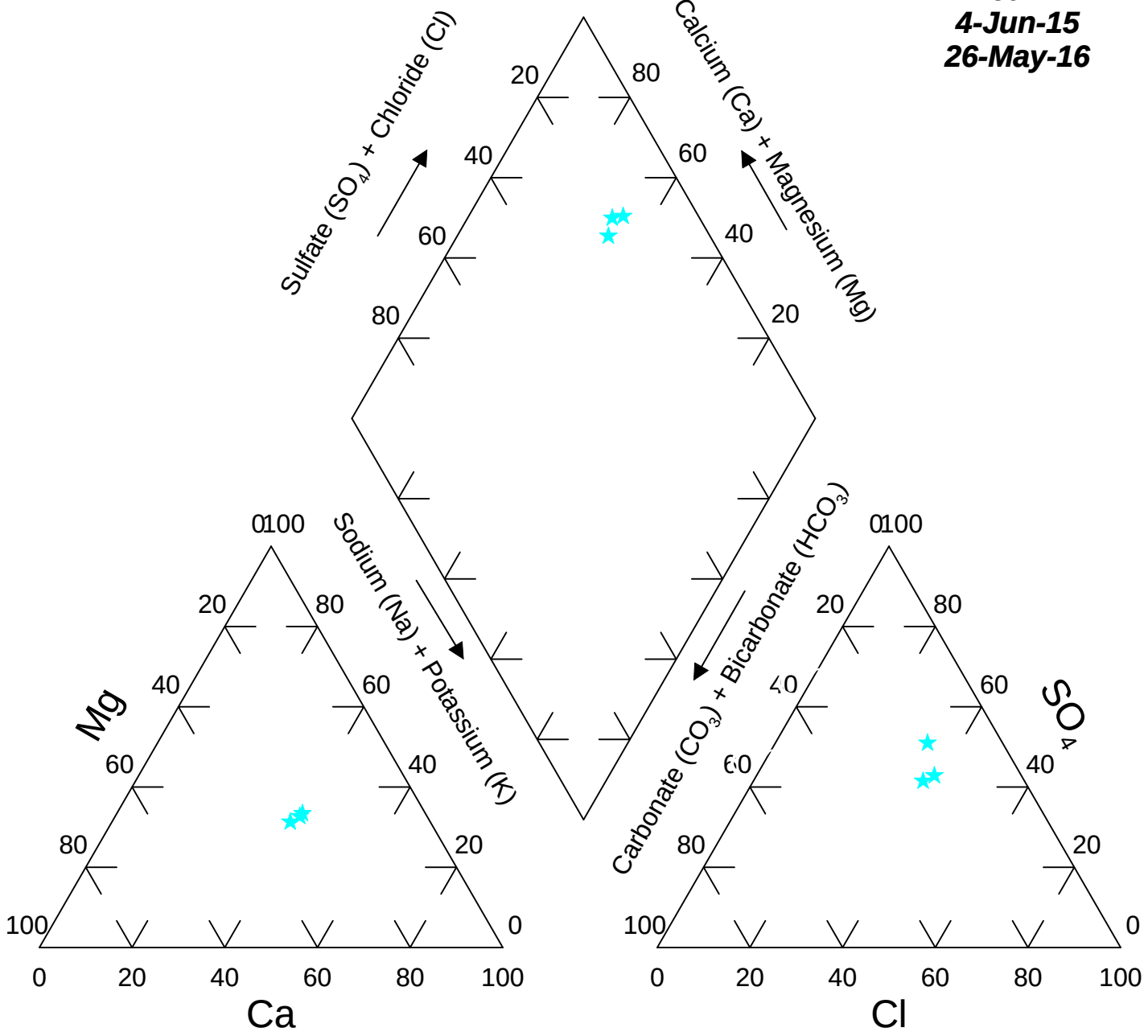
Dates:
16-Jun-14
9-Jun-15
30-May-16



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-6N63-E

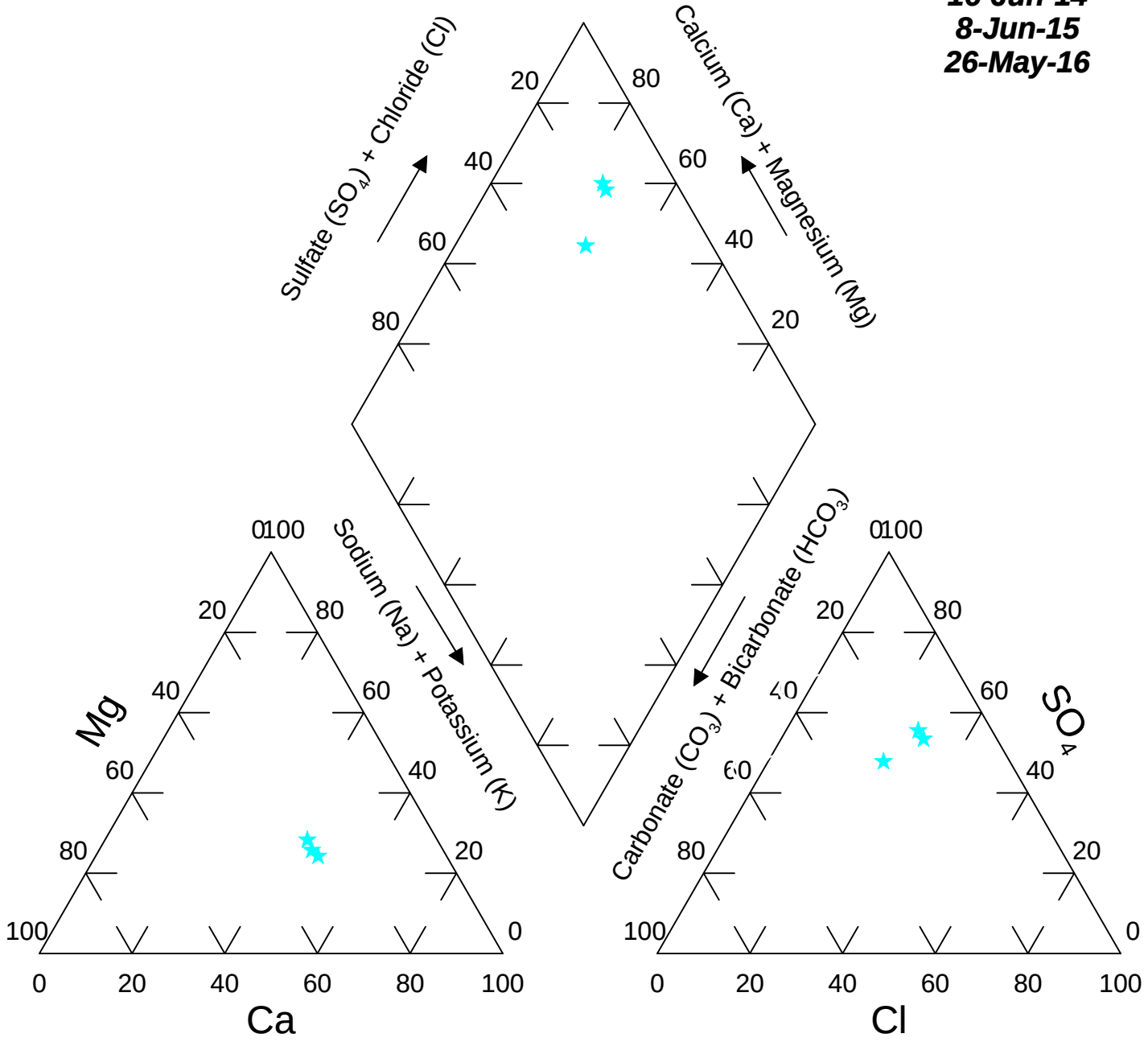
Dates:
12-Jun-14
4-Jun-15
26-May-16



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-6N67-E

Dates:
16-Jun-14
8-Jun-15
26-May-16



Winnipeg
Water and Waste Department

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

Dates:

6-Jun-11
19-Oct-11
5-Jul-12
29-Oct-12
17-Jun-13
24-Oct-13
12-Jun-14
8-Jun-15
7-Jun-16

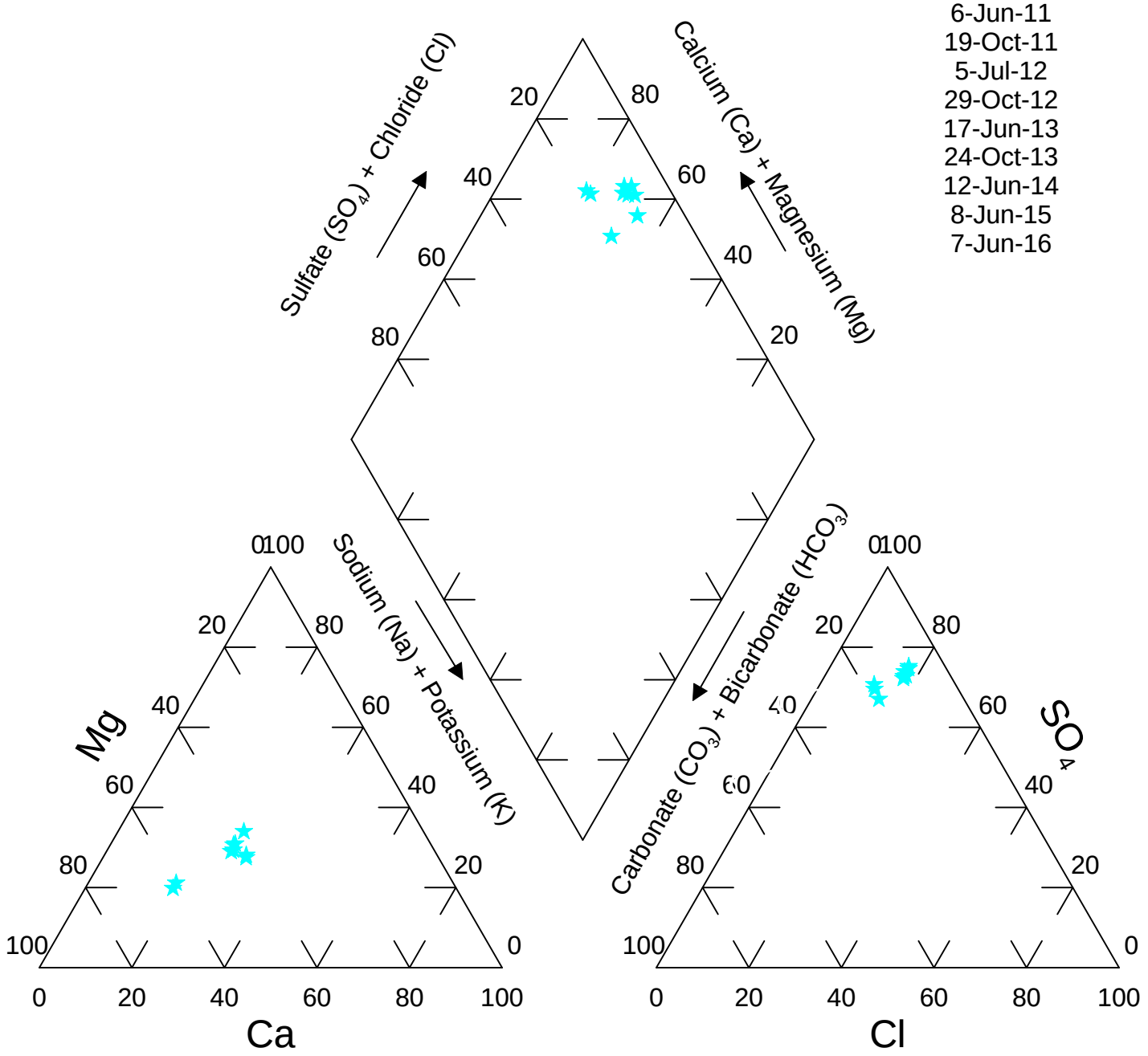


FIGURE: 10P

Winnipeg
Water and Waste Department

Site: Brady
Well #: 5N62-E

Dates:

6-Jun-11
20-Oct-11
6-Jun-12
23-Oct-12
17-Jun-13
24-Oct-13
16-Jun-14
23-Oct-14
4-Jun-15
15-Oct-15
30-May-16
27-Oct-16

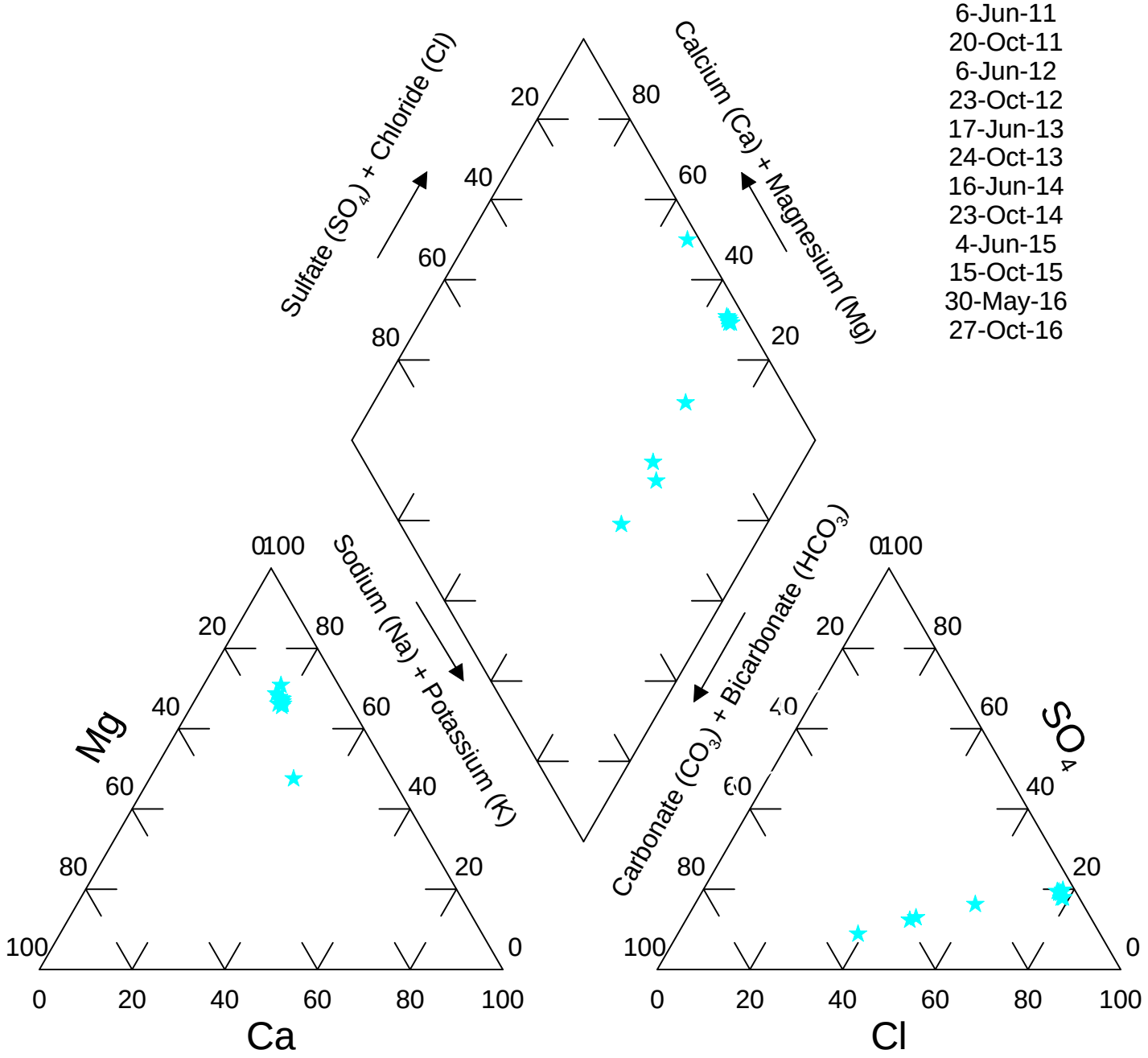


FIGURE: 11P

Winnipeg
Water and Waste Department

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

Dates:
13-Jun-11
20-Oct-11
12-Jun-12
1-Nov-12
19-Jun-13
28-Oct-13
10-Jun-15
26-May-16

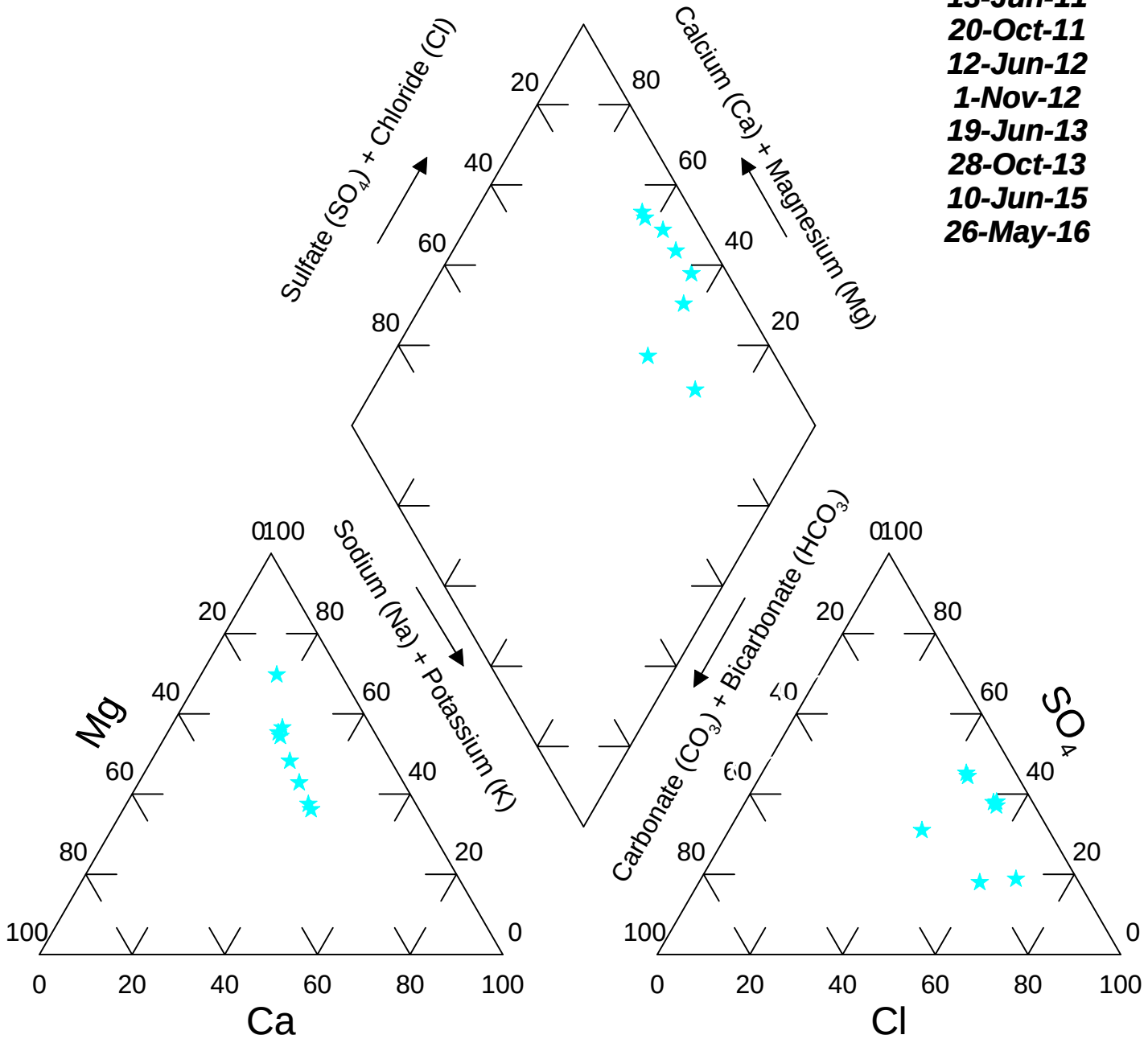


FIGURE: 12P

Winnipeg
Water and Waste Department

Site: Brady
Well #: 6N58-F/FR

Dates:
9-Jun-11
24-Oct-11
7-Jun-12
24-Oct-12
18-Jun-13
29-Oct-13
16-Jun-14
10-Jun-15
31-May-16

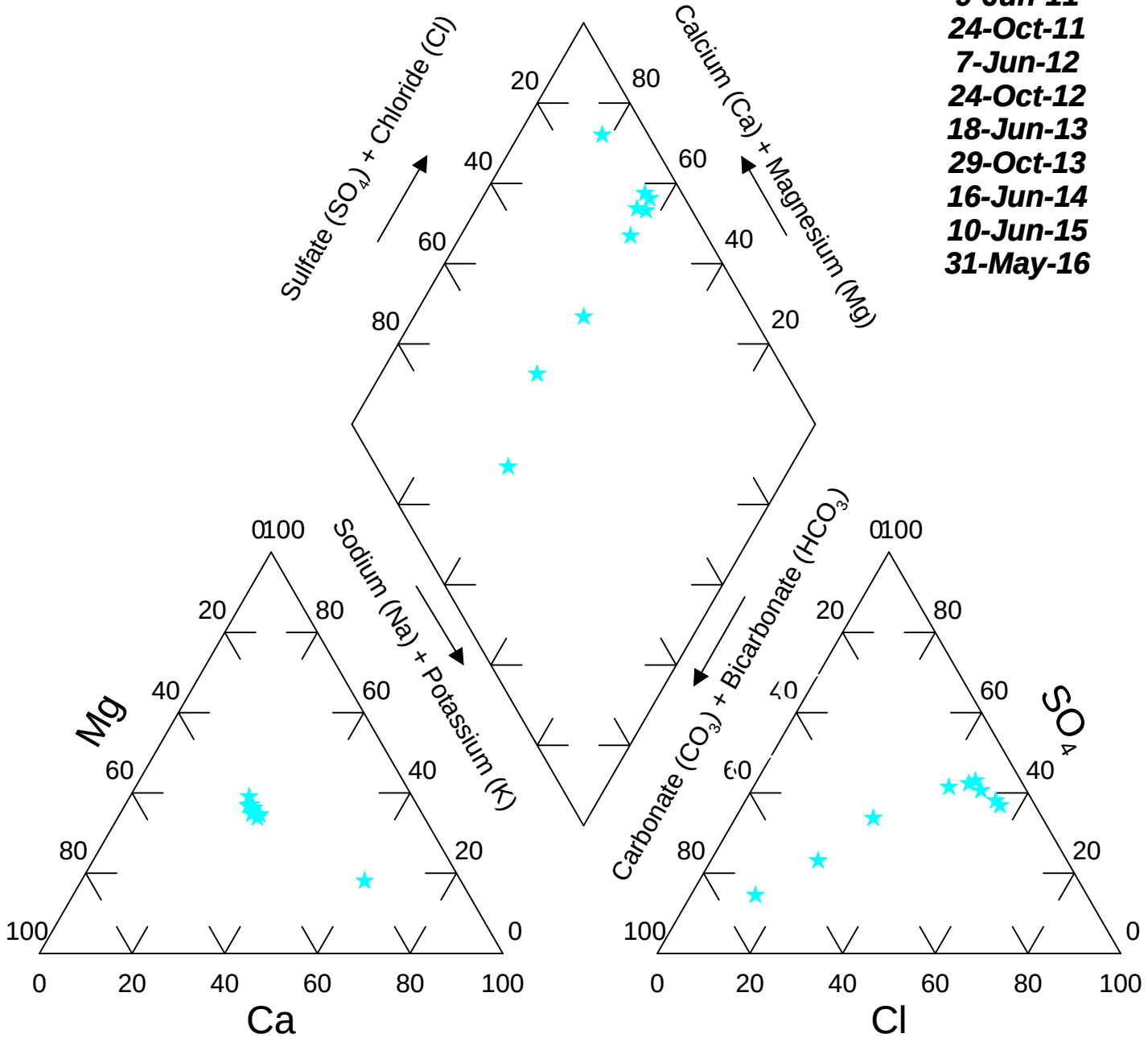


FIGURE: 13P

Winnipeg
Water and Waste Department

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

Dates:
9-Jun-11
24-Oct-11
7-Jun-12
24-Oct-12
17-Jun-13
28-Oct-13
16-Jun-14
11-Jun-15
30-May-16

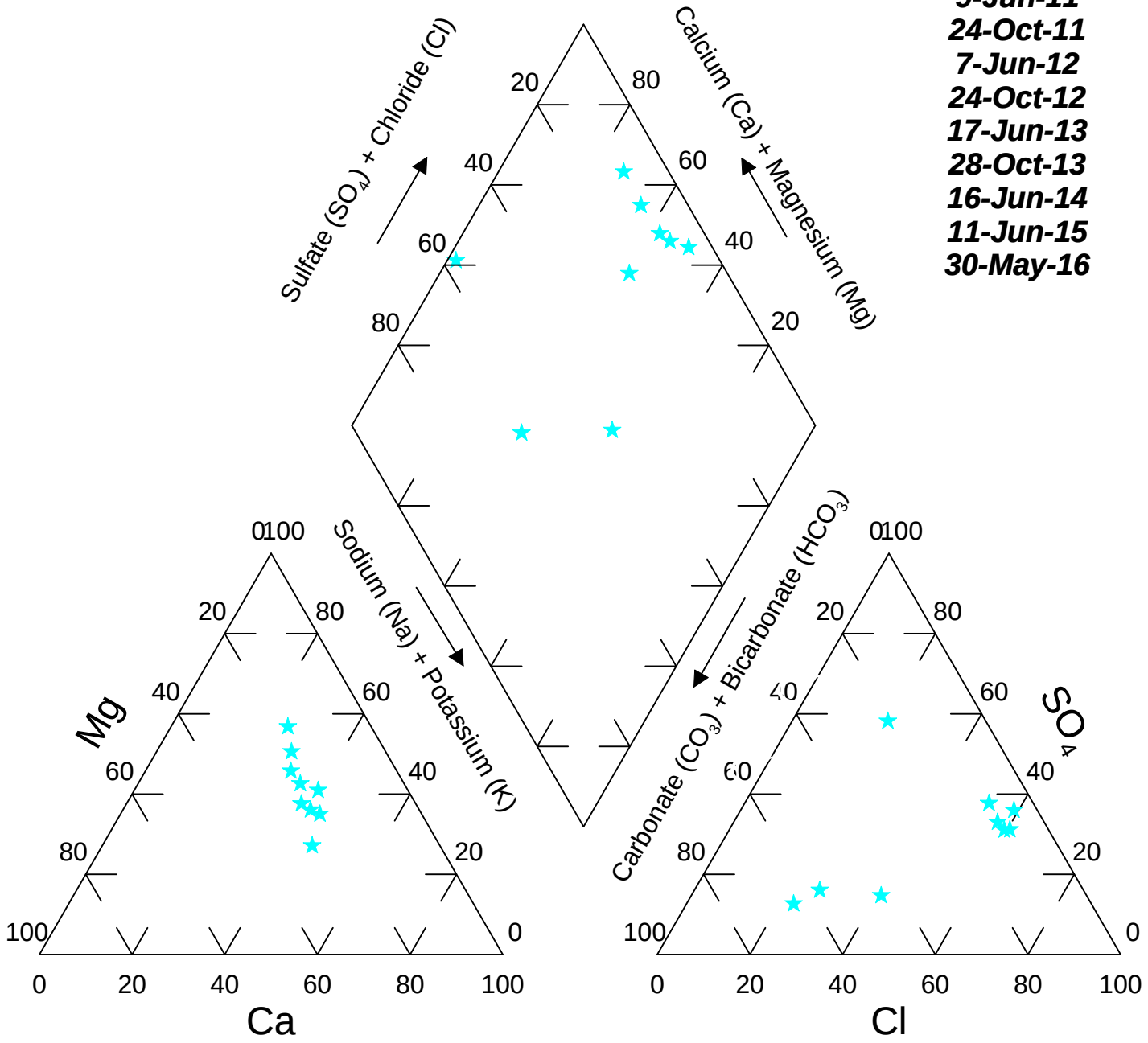


FIGURE: 14P

Winnipeg
Water and Waste Department

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

Dates:
14-Jun-11
24-Oct-11
7-Jun-12
1-Nov-12
19-Jun-13
21-Oct-14
8-Jun-15
15-Oct-15
30-May-16
27-Oct-16

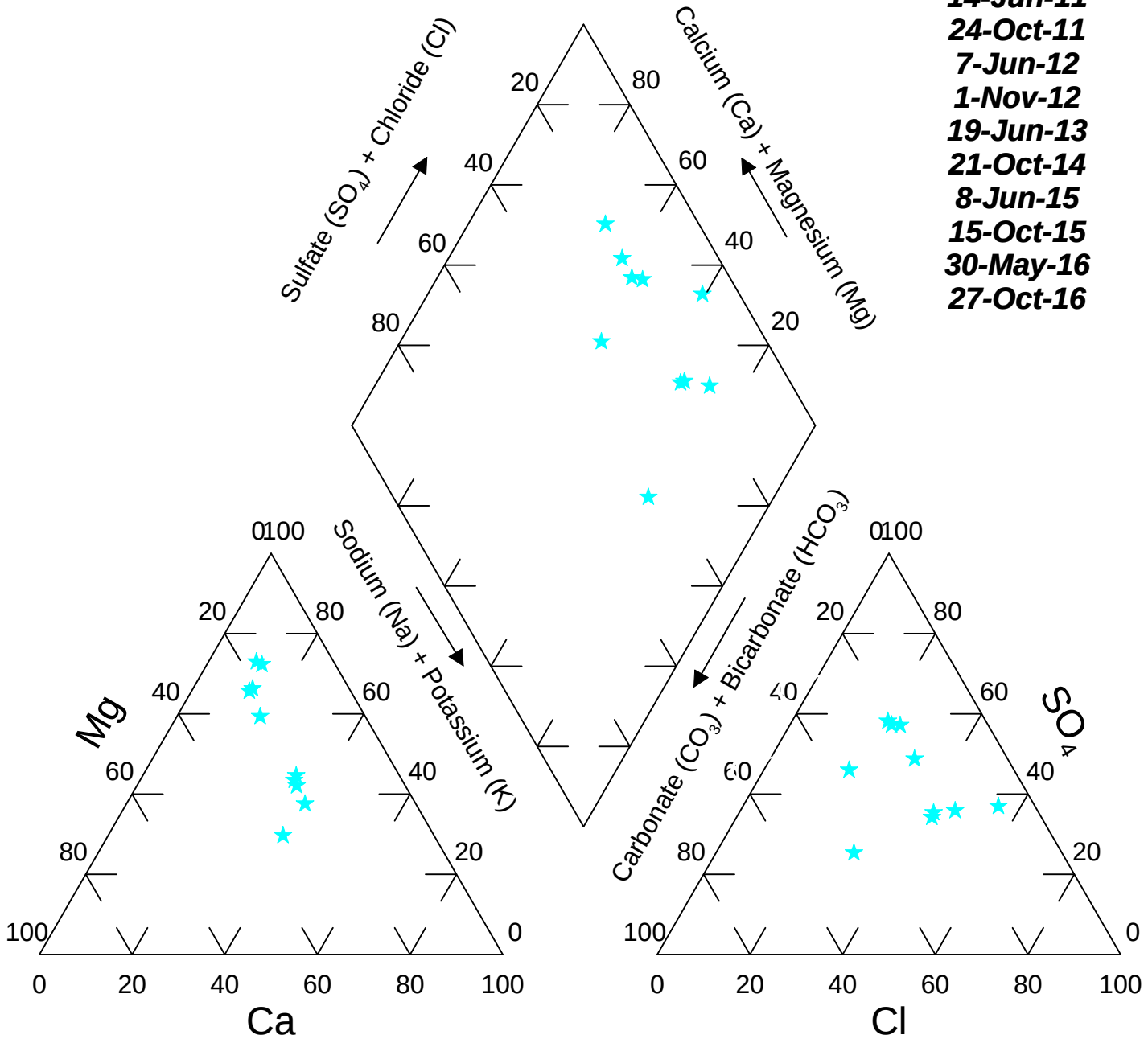


FIGURE: 15P

Winnipeg
Water and Waste Department

Site: Brady
Well #: 6N63-F

Dates:
6-Jun-11
20-Oct-11
6-Jun-12
23-Oct-12
17-Jun-13
24-Oct-13
24-Oct-13
12-Jun-14
4-Jun-15
26-May-16

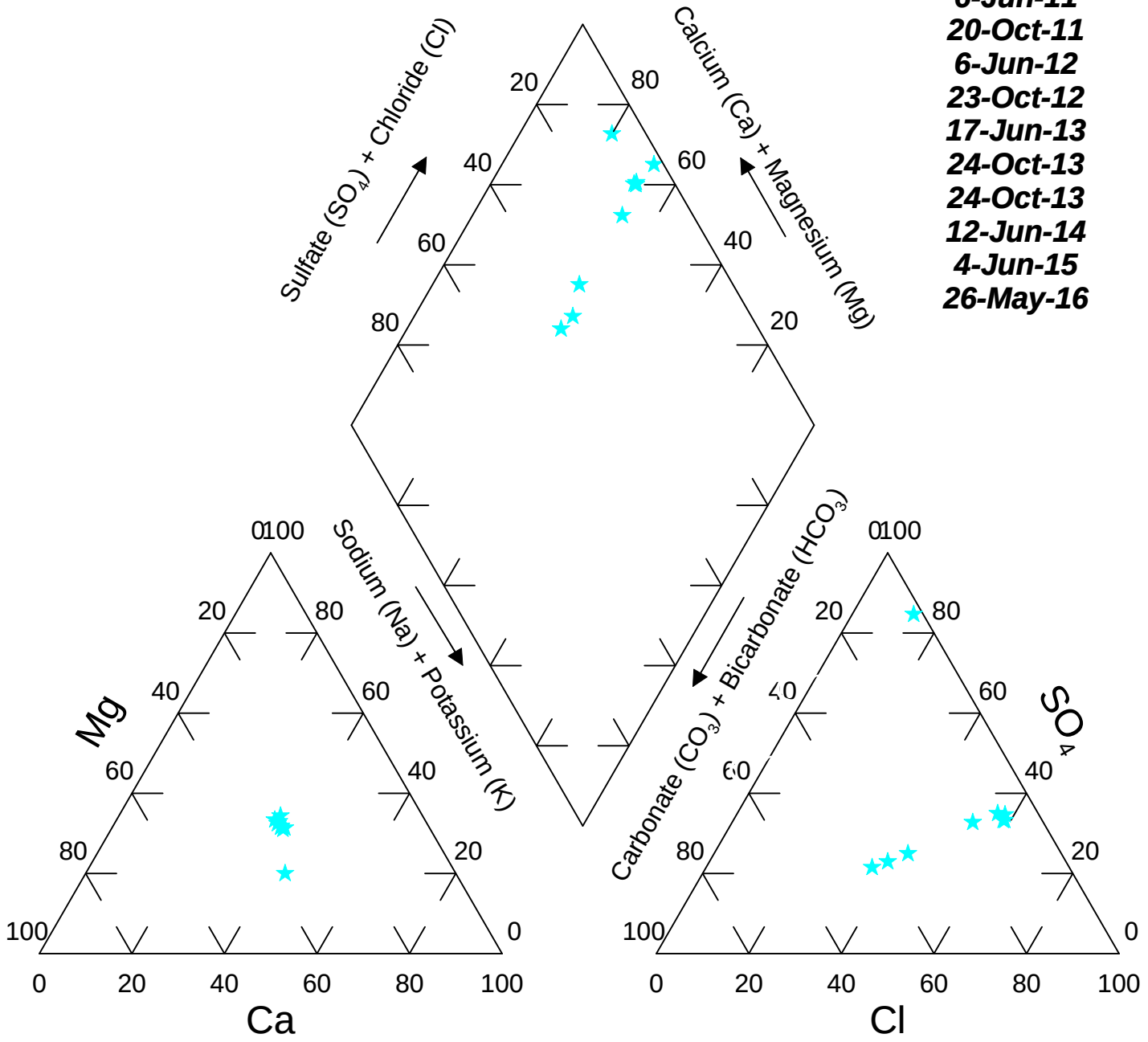


FIGURE: 16P

Winnipeg
Water and Waste Department

Site: Brady
Well #: 6N67-F

Dates:
8-Jun-11
24-oct-11
6-Jun-12
22-Oct-12
17-Jun-13
23-Oct-13
12-Jun-14
8-Jun-15
26-May-16

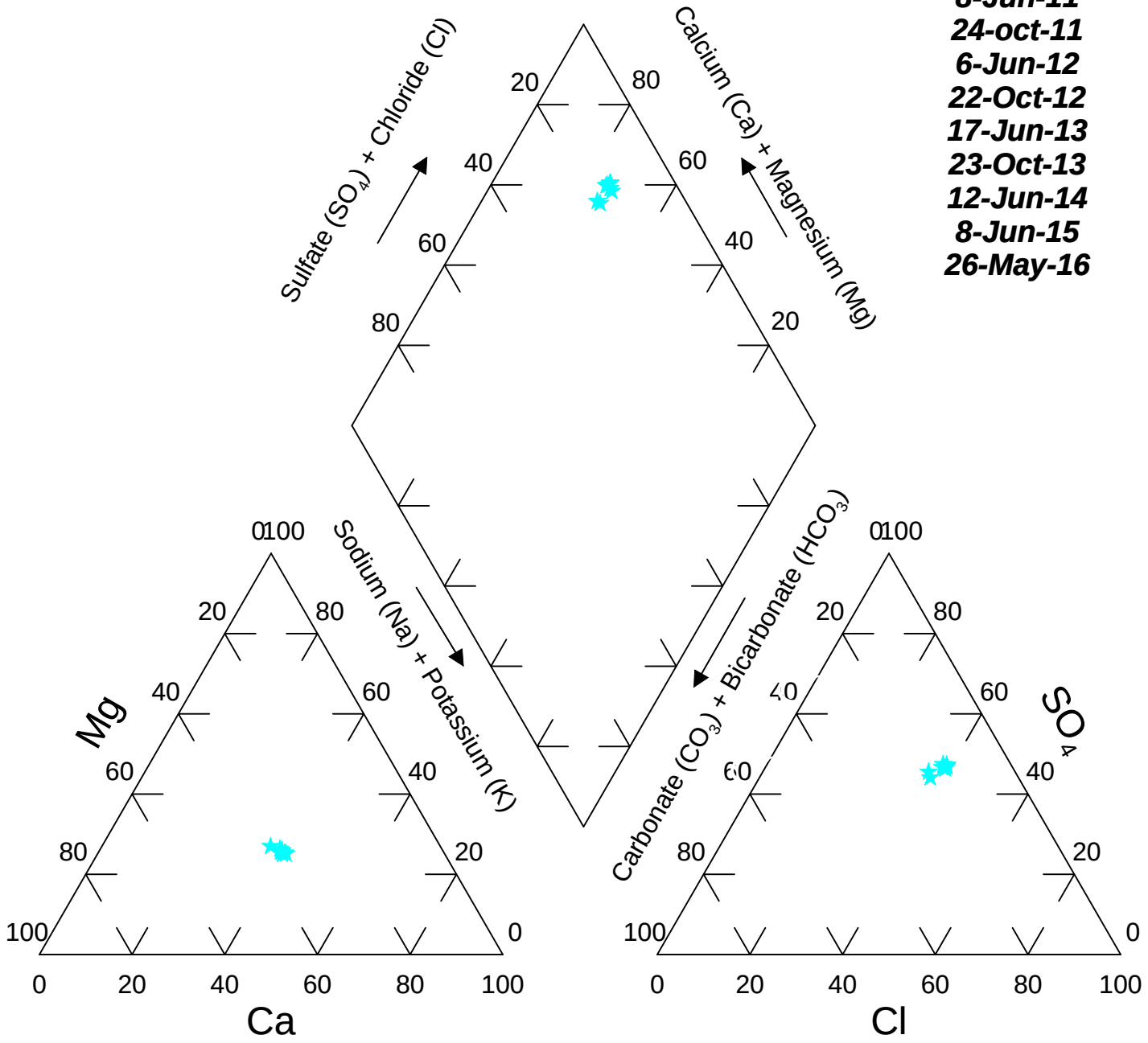
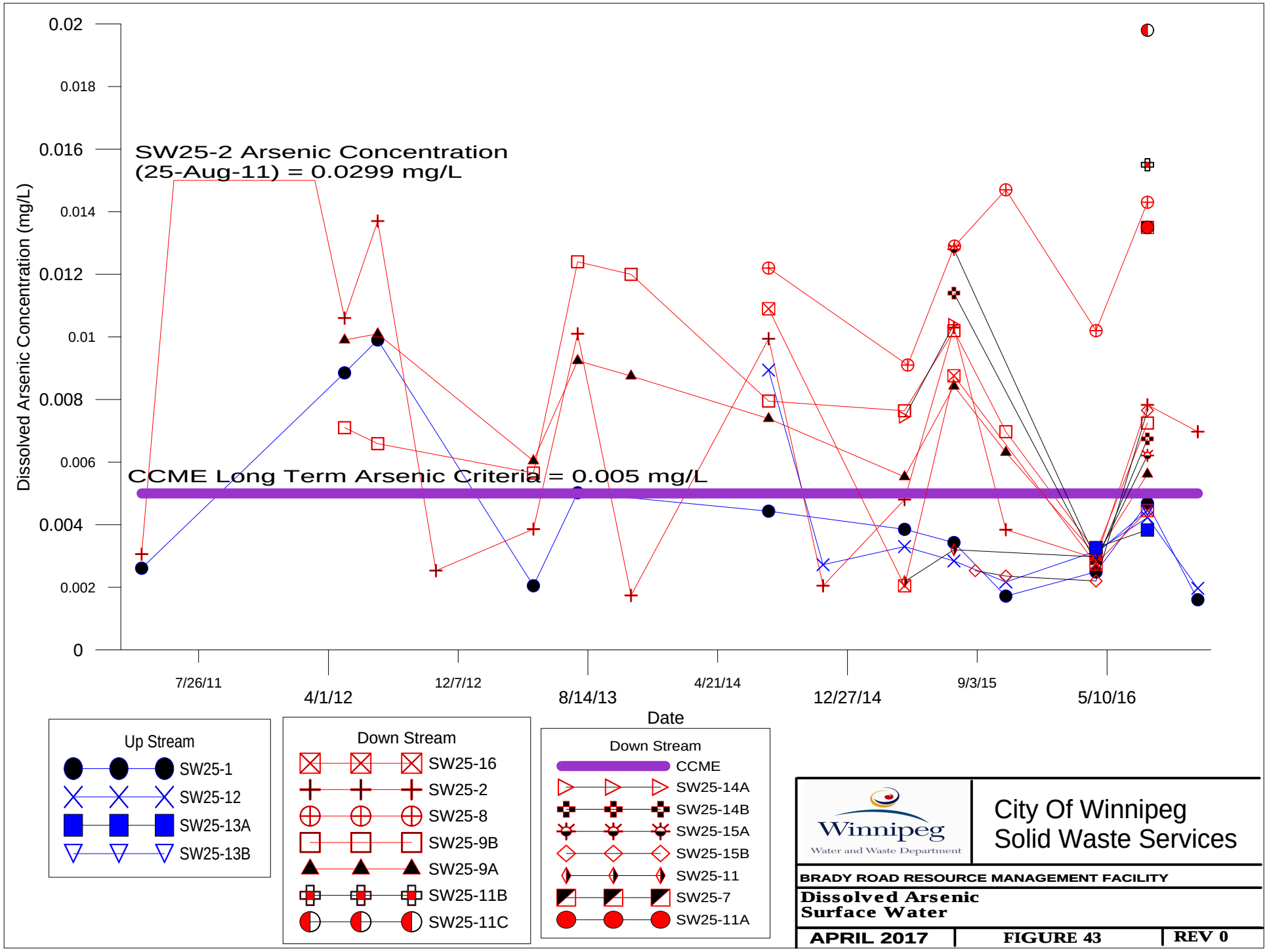


FIGURE: 17P

Winnipeg
Water and Waste Department

APPENDIX C
STATISTICAL ANALYSIS OF SURFACE WATER QUALITY



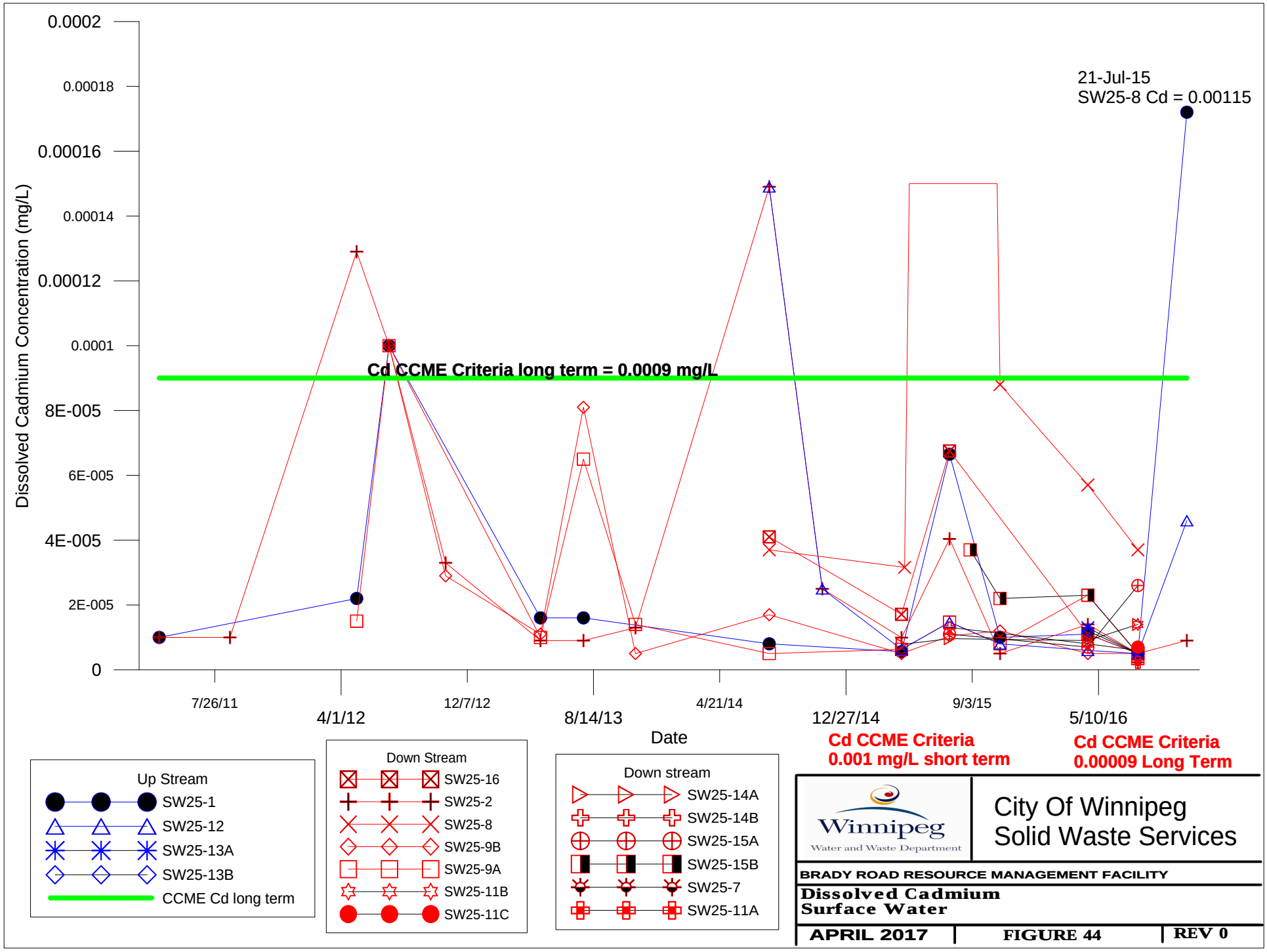
Winnipeg
Water and Waste Department

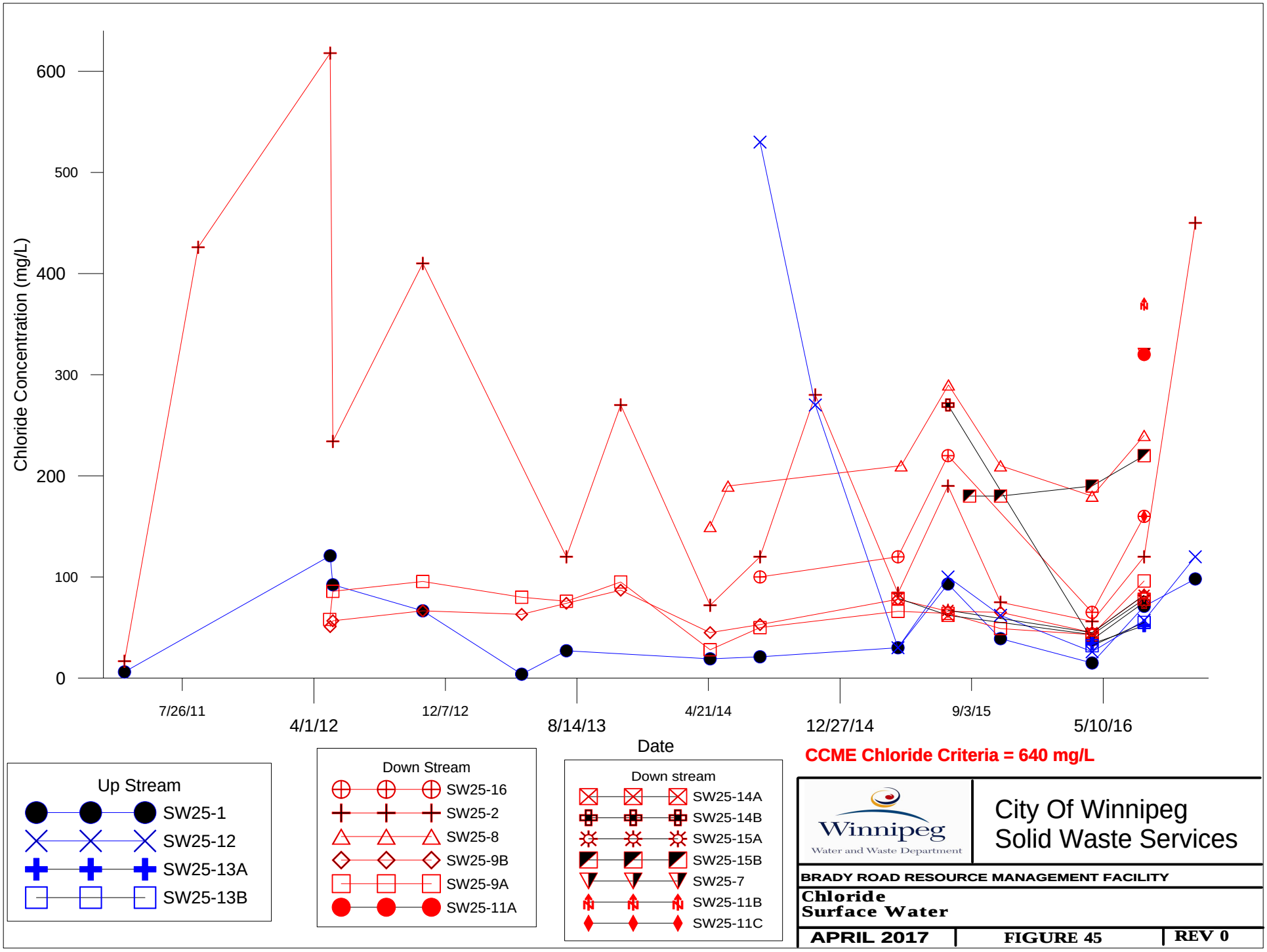
City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Arsenic
Surface Water

APRIL 2017	FIGURE 43	REV 0


0.0002
0.00018
0.00016
0.00014
0.00012
0.0001
8E-005
6E-005
4E-005
2E-005
0
Dissolved Cadmium Concentration (mg/L)
21-Jul-15
SW25-8 Cd = 0.00115
Cd CCME Criteria long term = 0.0009 mg/L
7/26/11
4/1/12
12/7/12
8/14/13
4/21/14
12/27/14
9/3/15
5/10/16
Date
Cd CCME Criteria
0.001 mg/L short term
Cd CCME Criteria
0.00009 Long Term
Up Stream
SW25-1
SW25-12
SW25-13A
SW25-13B
CCME Cd long term
Down Stream
SW25-16
SW25-2
SW25-8
SW25-9B
SW25-9A
SW25-11B
SW25-11C
Down stream
SW25-14A
SW25-14B
SW25-15A
SW25-15B
SW25-7
SW25-11A
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Cadmium
Surface Water
APRIL 2017
FIGURE 44
REV 0



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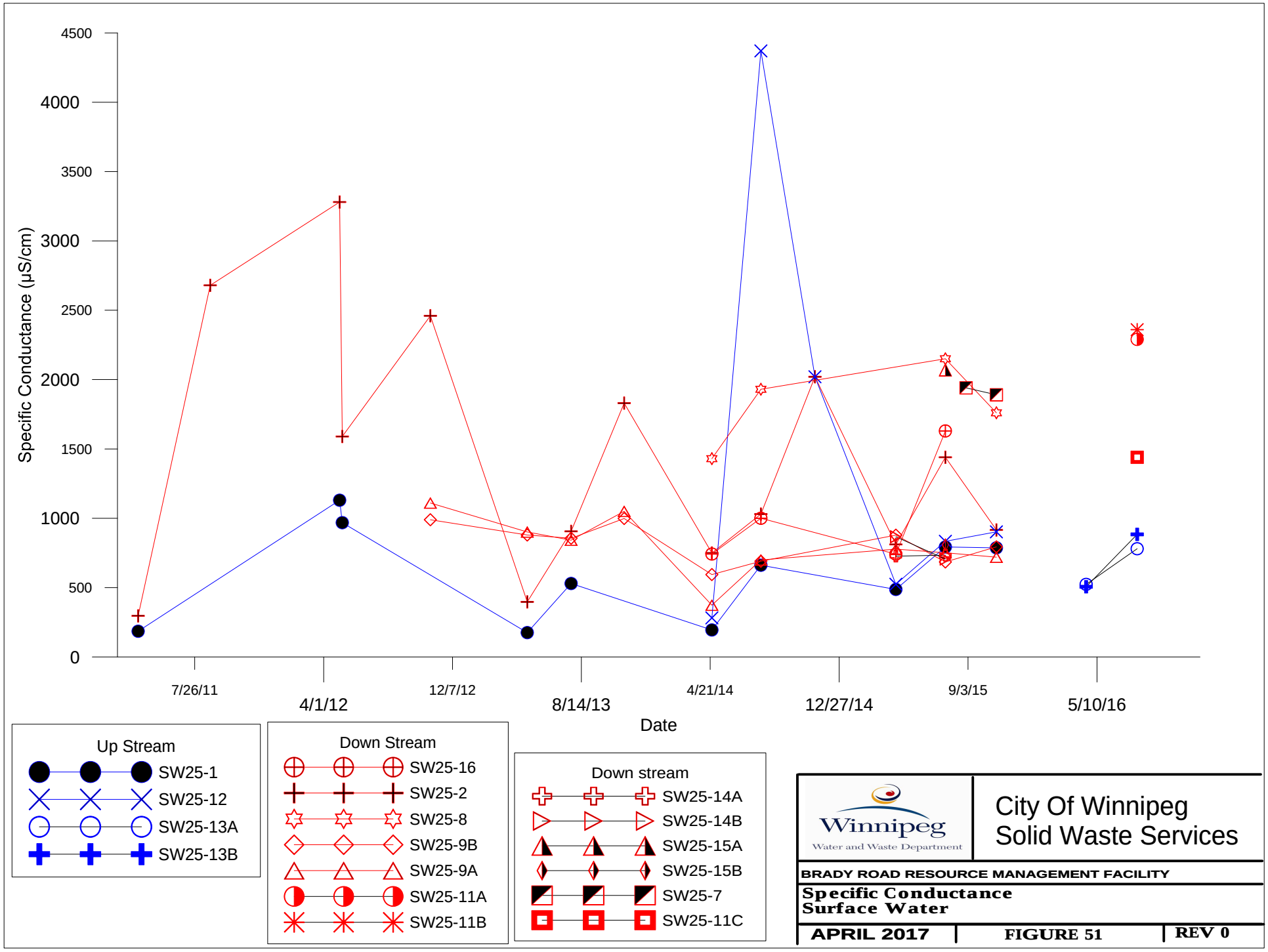
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Chloride
Surface Water

APRIL 2017	FIGURE 45	REV 0



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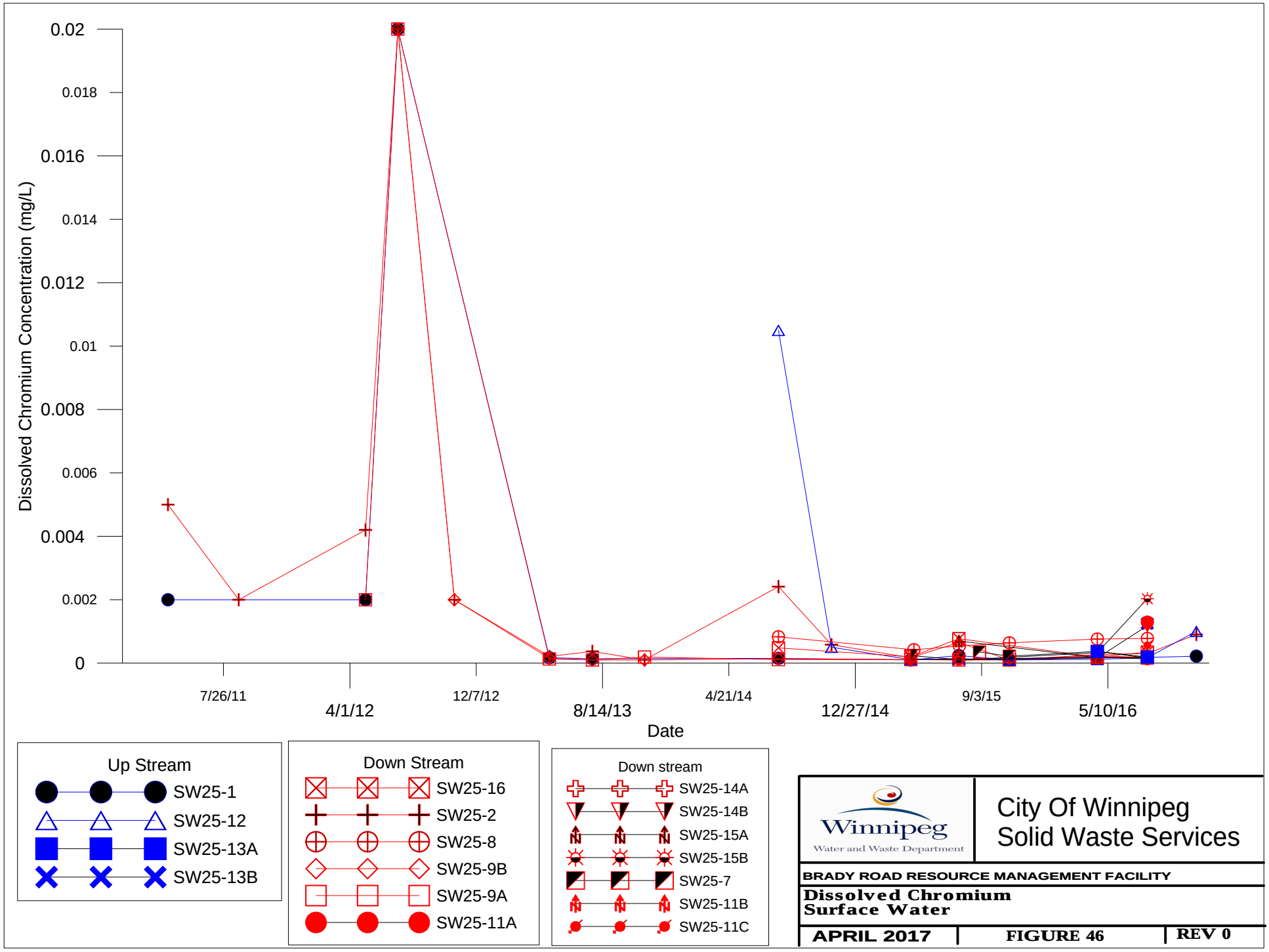
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Specific Conductance
Surface Water

APRIL 2017 | FIGURE 51 | REV 0



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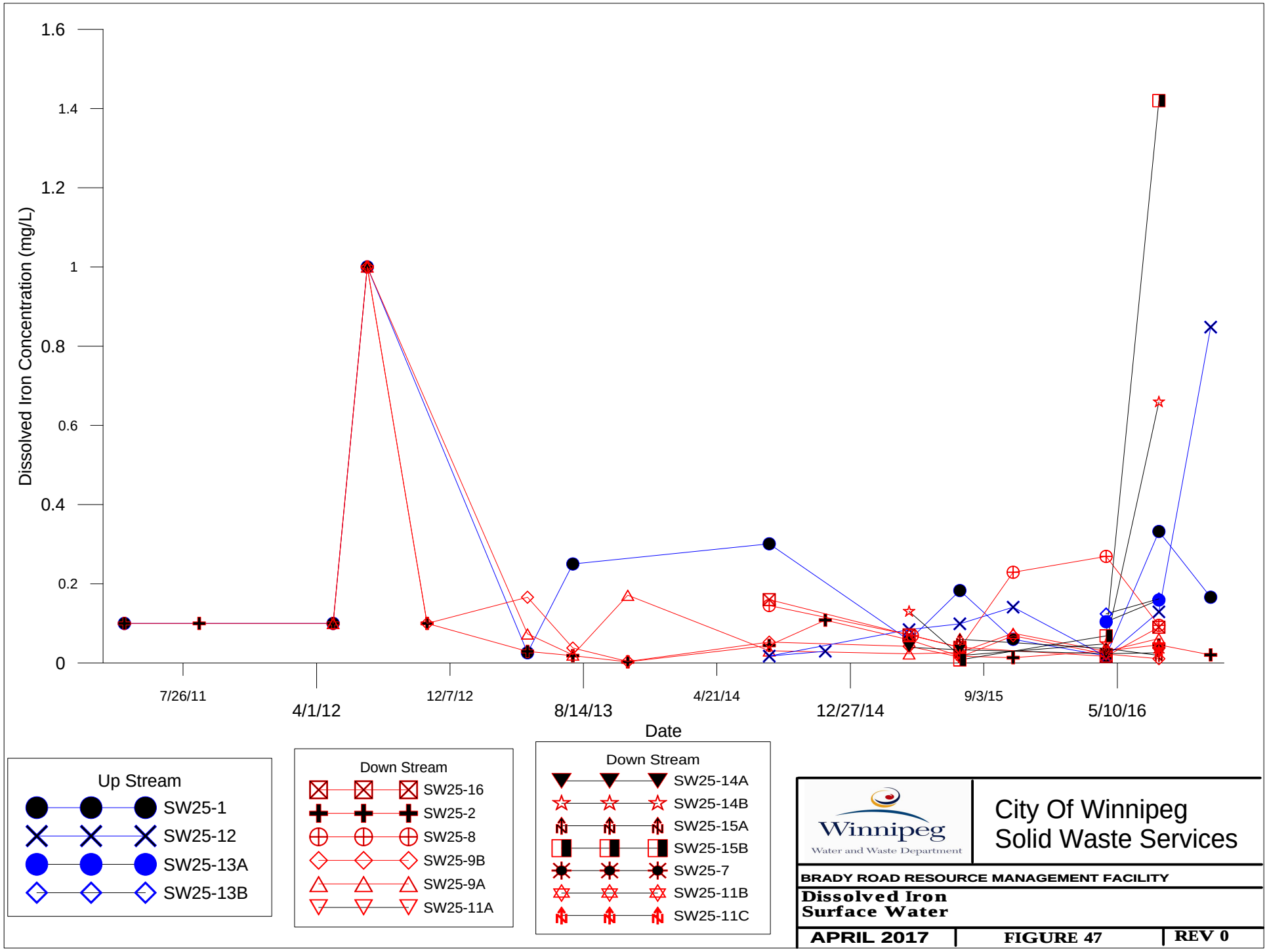
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Chromium
Surface Water

APRIL 2017 | FIGURE 46 | REV 0


1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Dissolved Iron Concentration (mg/L)
7/26/11
4/1/12
12/7/12
8/14/13
4/21/14
12/27/14
9/3/15
5/10/16
Date
Up Stream
SW25-1
SW25-12
SW25-13A
SW25-13B
Down Stream
SW25-16
SW25-2
SW25-8
SW25-9B
SW25-9A
SW25-11A
Down Stream
SW25-14A
SW25-14B
SW25-15A
SW25-15B
SW25-7
SW25-11B
SW25-11C
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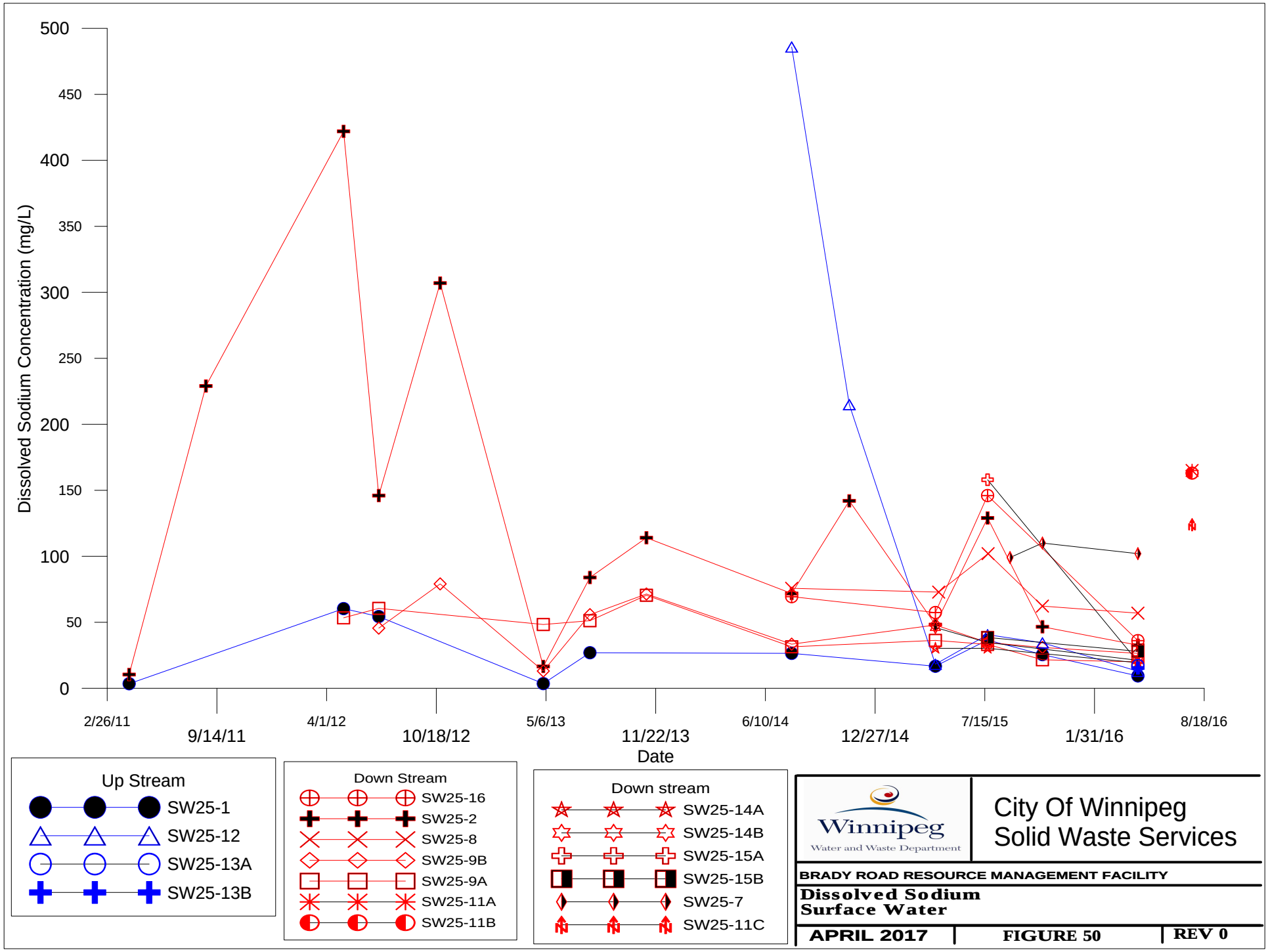
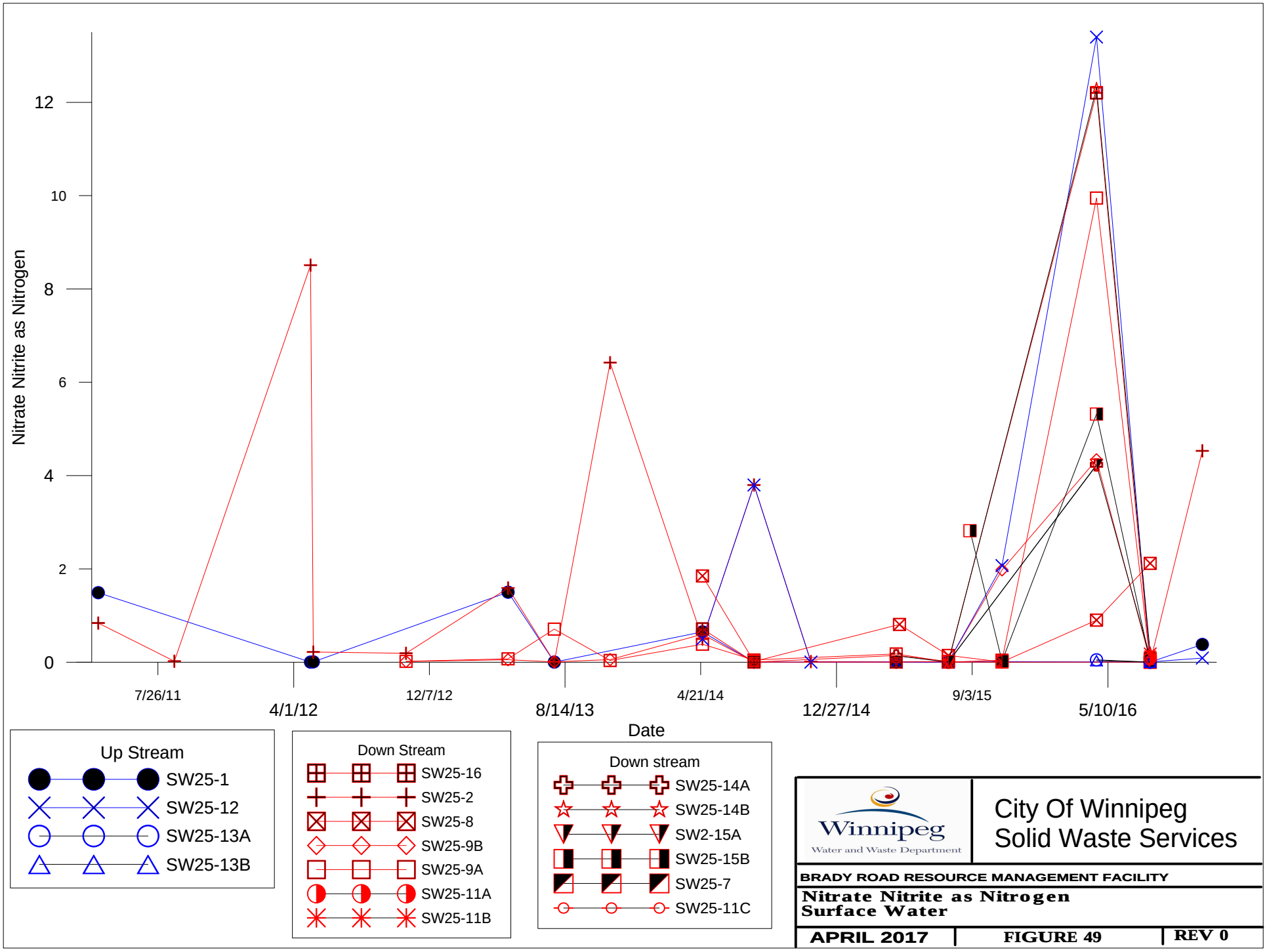
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Iron
Surface Water
APRIL 2017
FIGURE 47
REV 0


Dissolved Sodium Concentration (mg/L)
500
450
400
350
300
250
200
150
100
50
0
2/26/11
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
Date
Up Stream
SW25-1
SW25-12
SW25-13A
SW25-13B
Down Stream
SW25-16
SW25-2
SW25-8
SW25-9B
SW25-9A
SW25-11A
SW25-11B
Down stream
SW25-14A
SW25-14B
SW25-15A
SW25-15B
SW25-7
SW25-11C
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Sodium
Surface Water
APRIL 2017
FIGURE 50
REV 0



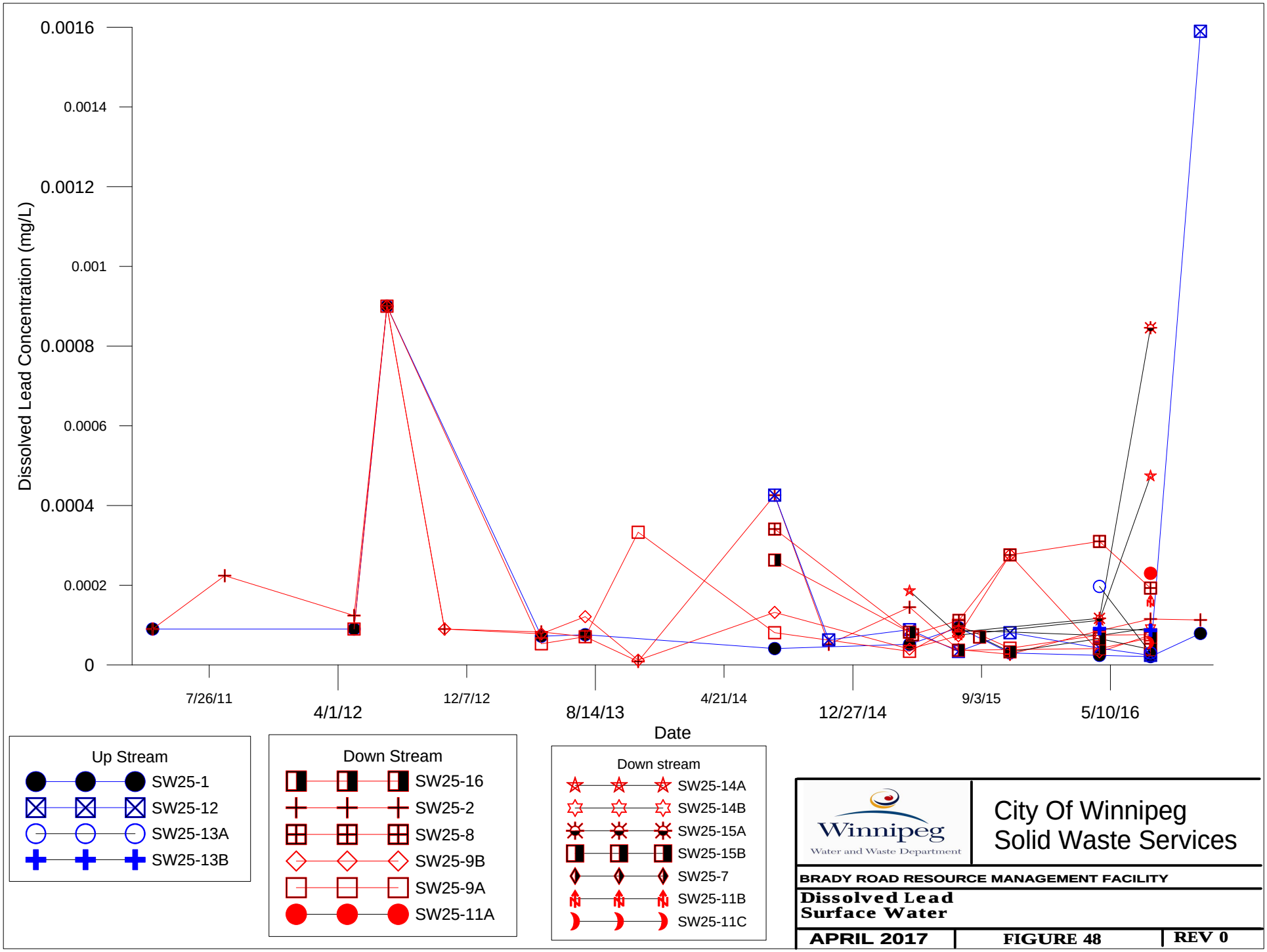
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Nitrate Nitrite as Nitrogen
Surface Water

APRIL 2017	FIGURE 49	REV 0



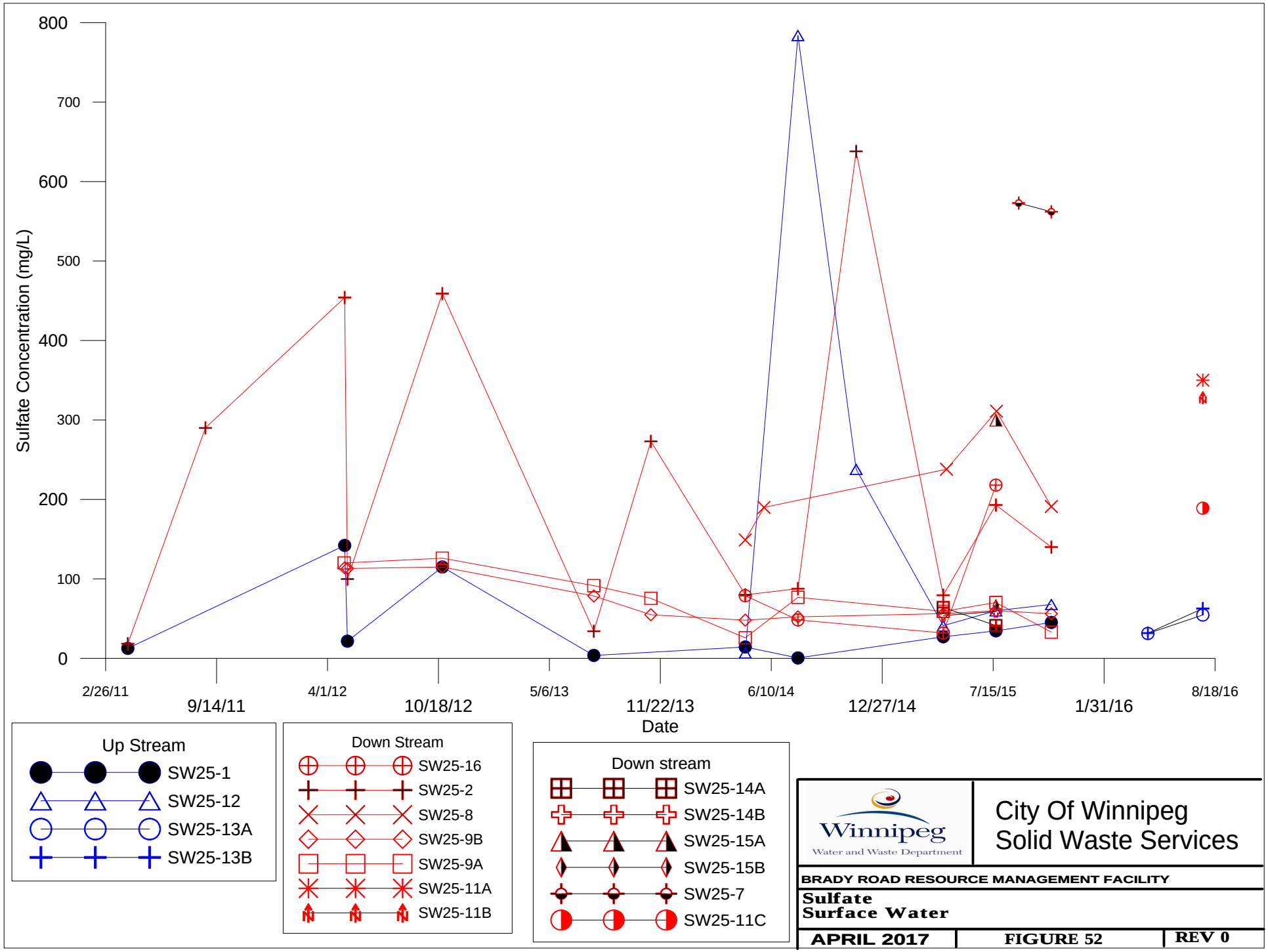
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Lead
Surface Water

APRIL 2017	FIGURE 48	REV 0



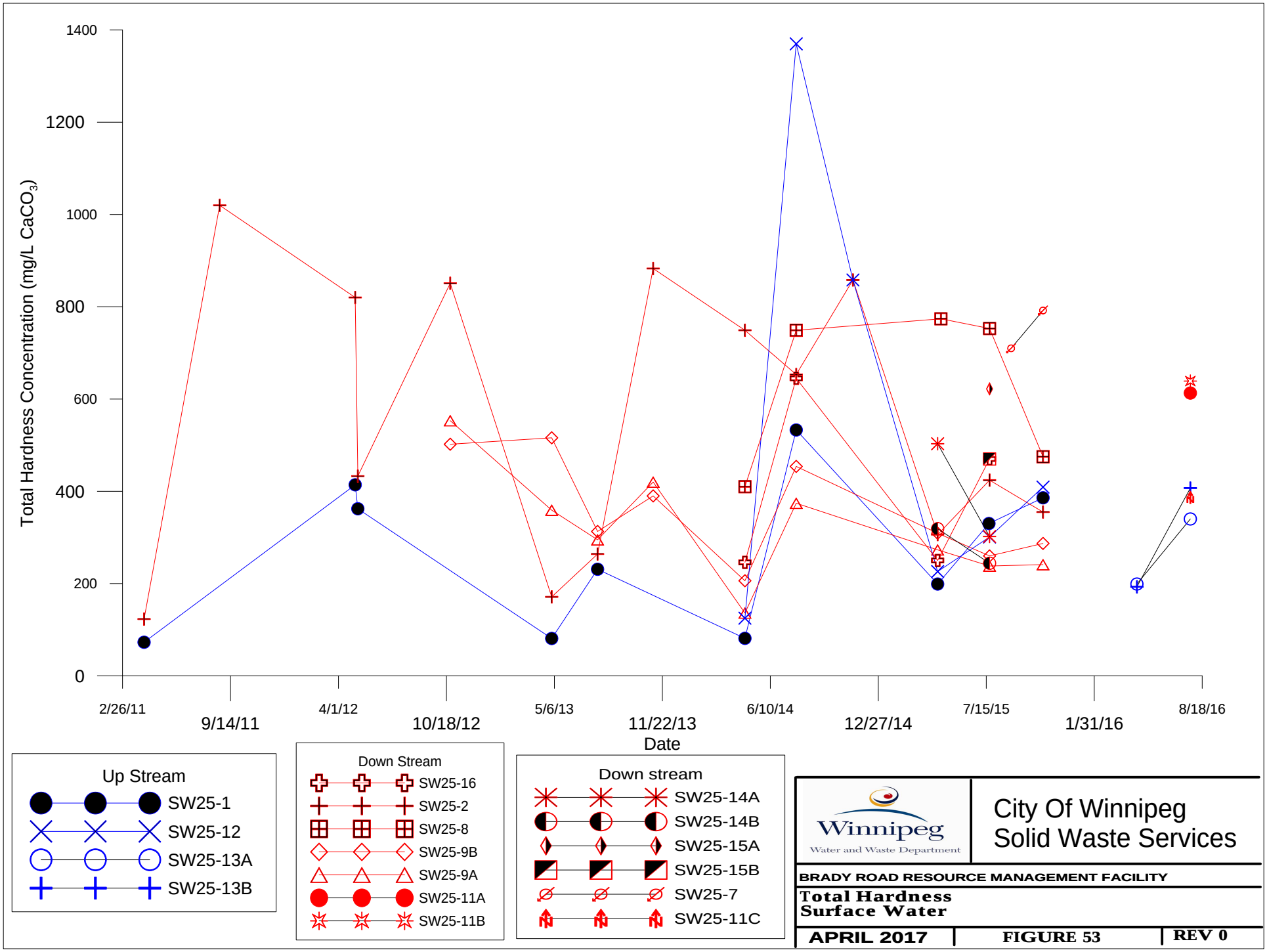
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Sulfate
Surface Water

APRIL 2017	FIGURE 52	REV 0



Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Total Hardness
Surface Water

APRIL 2017 | FIGURE 53 | REV 0

Site: Brady
Location : SW25-1

Dates:
2-May-12
25-Jul-13
28-Jul-14
16-Apr-15
20-Jul-15
28-Oct-15
19-Apr-16
27-Jul-16
1-Nov-16

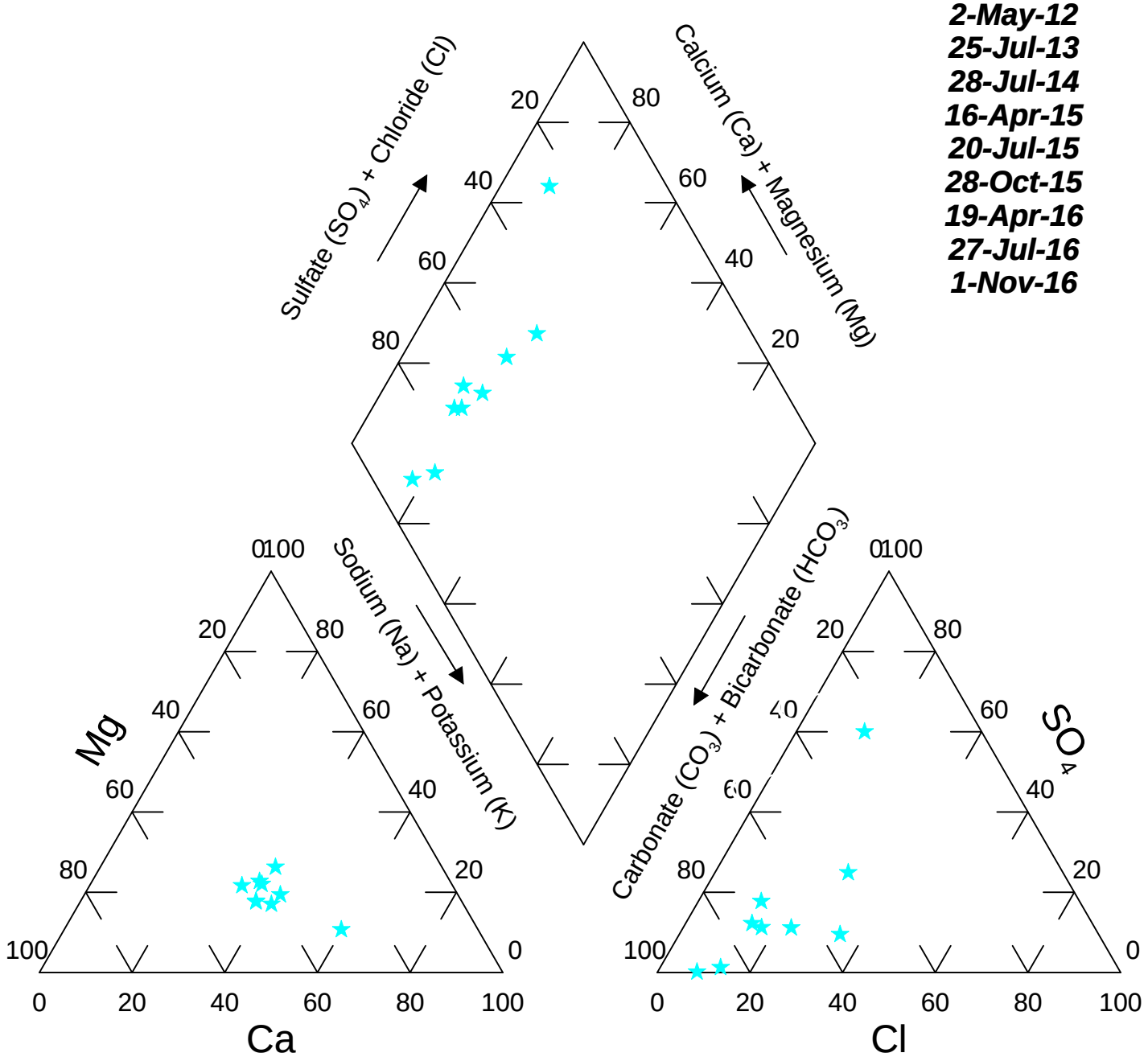


FIGURE: 25P

Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-2

Dates:
2-May-12
25-Oct-12
25-Jul-13
5-Nov-13
28-Jul-14
10-Nov-14
16-Apr-15
20-Jul-15
28-Oct-15
19-Apr-16
27-Jul-16
1-Nov-16

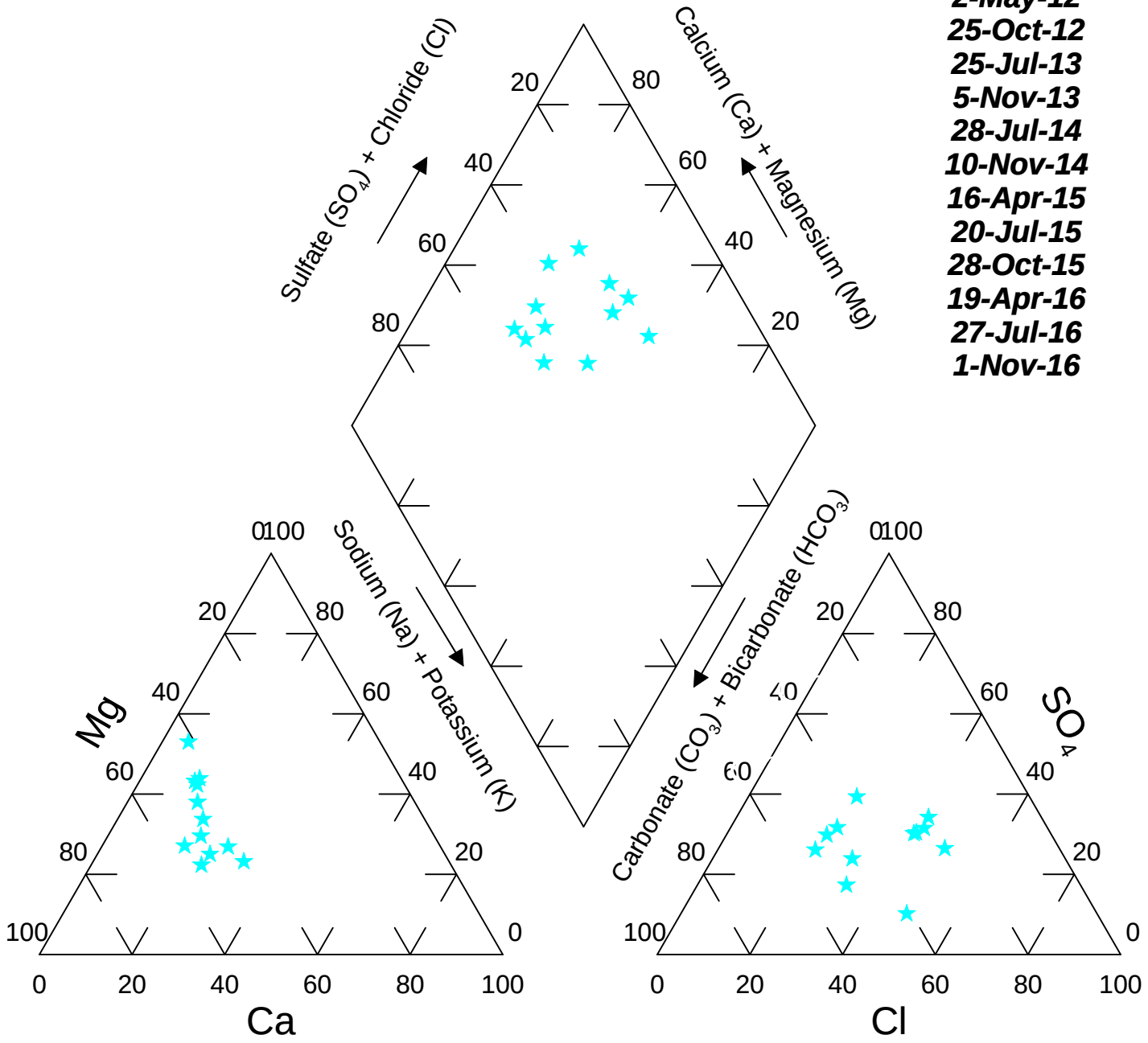
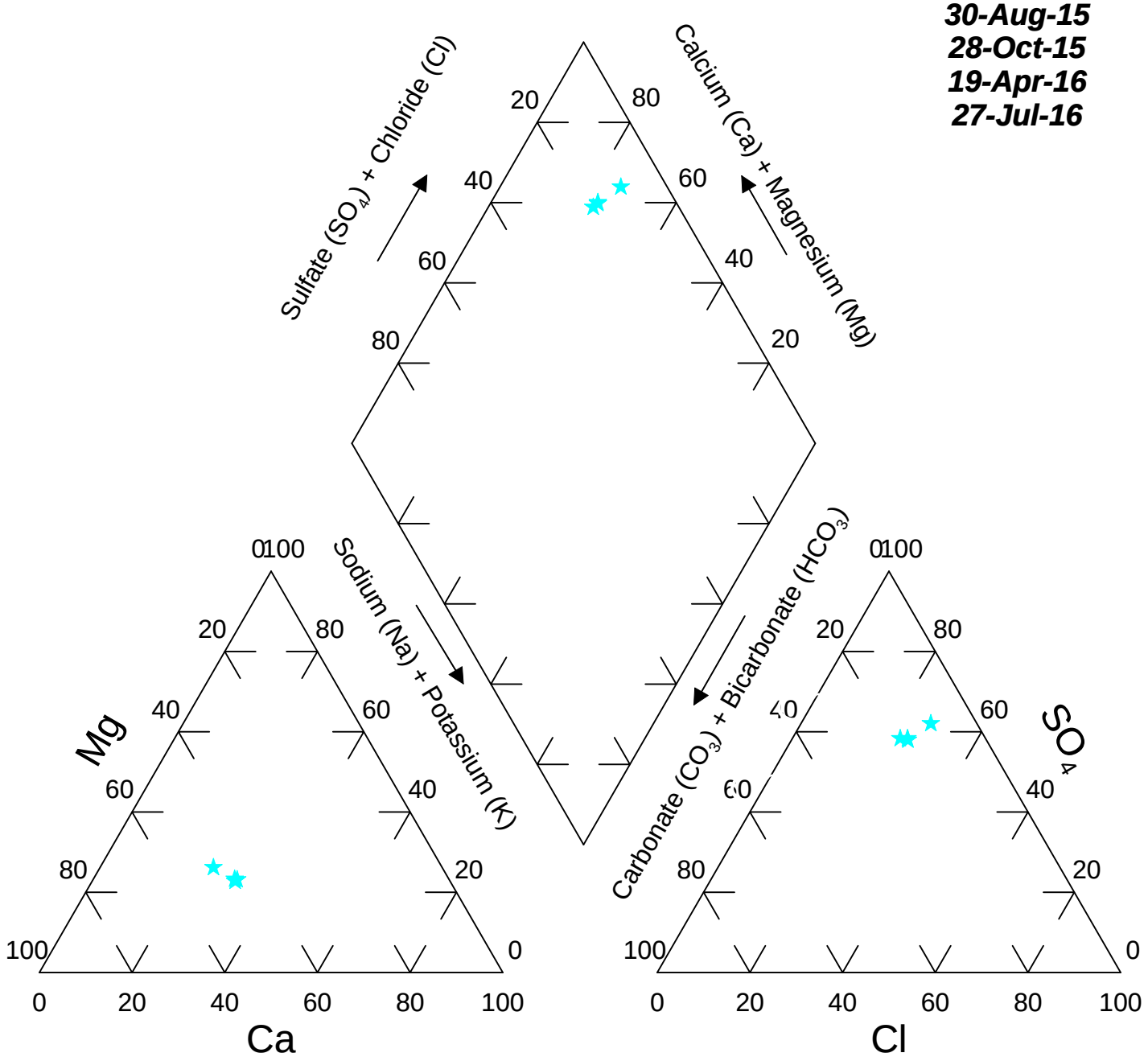


FIGURE: 26P

Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-7

Dates:
30-Aug-15
28-Oct-15
19-Apr-16
27-Jul-16



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-8

Dates:
28-Jul-14
22-Apr-15
21-Jul-15
28-Oct-15
19-Apr-16
27-Jul-16

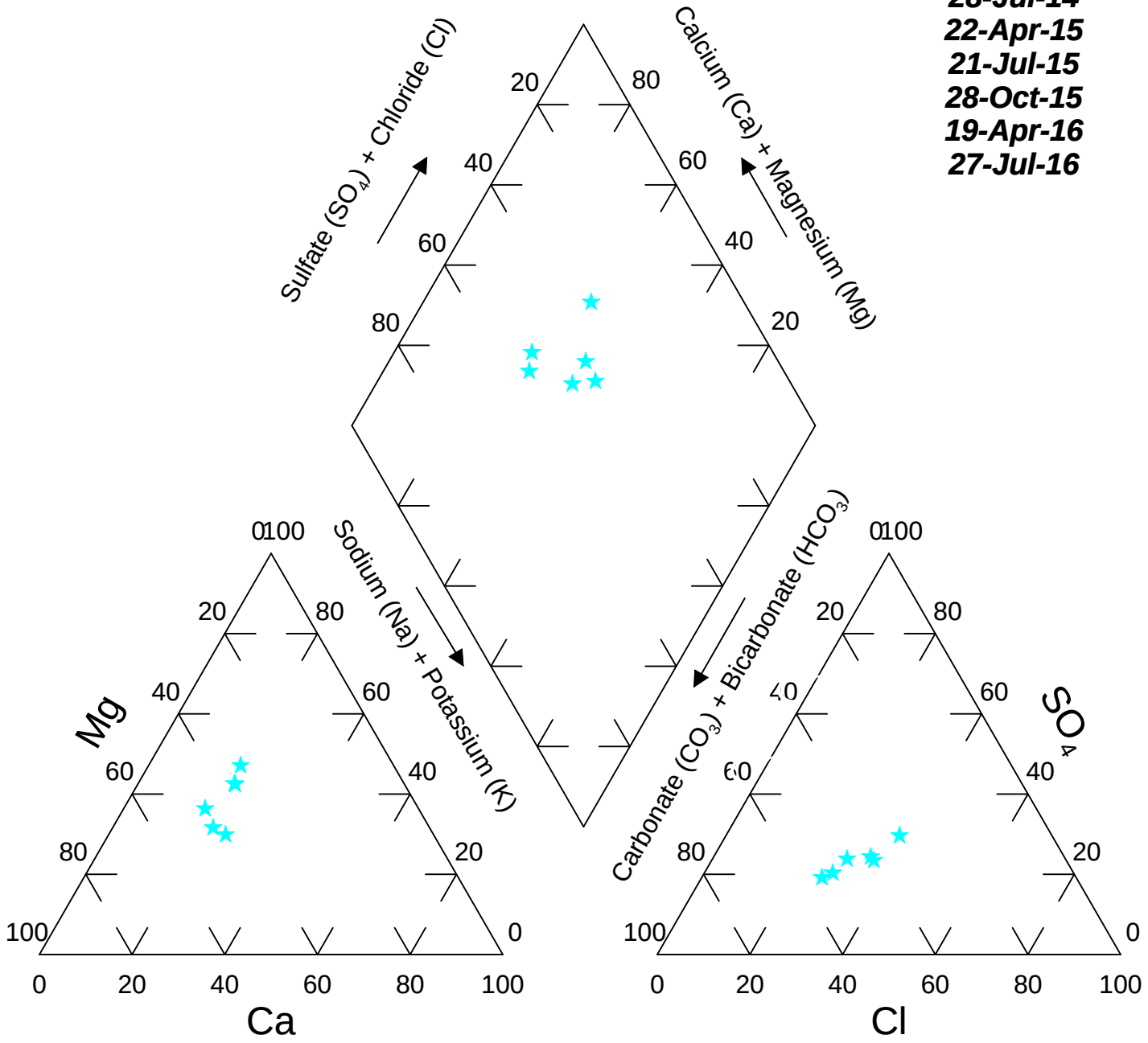


FIGURE: 27P

Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-9A

Dates:
1-May-12
25-Oct-12
25-Jul-13
28-Jul-14
16-Apr-15
20-Jul-15
28-Oct-15
19-Apr-16
27-Jul-16

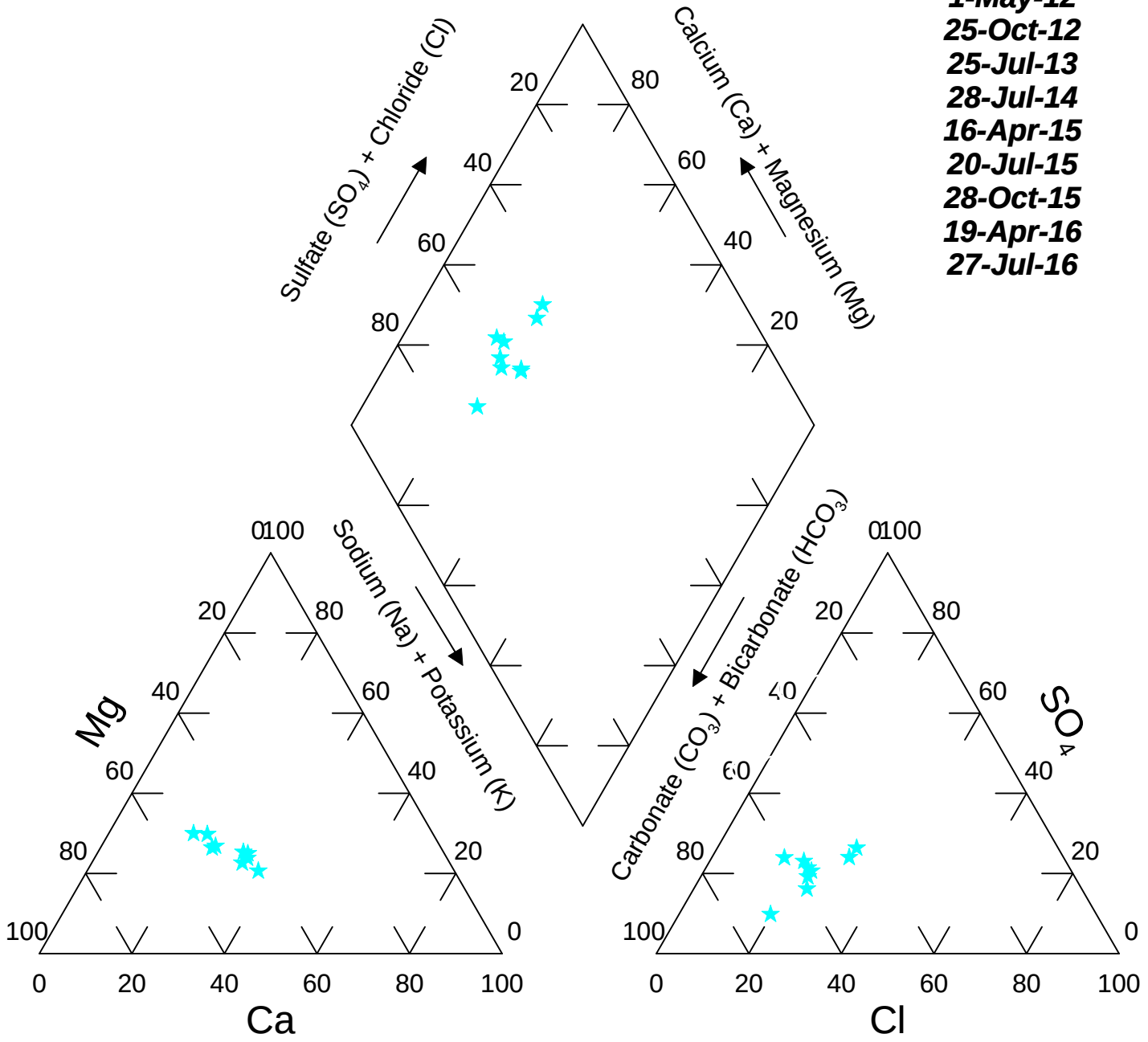


FIGURE: 31P

Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-9B

Dates:
25-Oct-12
25-Jul-13
5-Nov-13
28-Jul-14
16-Apr-15
20-Jul-15
28-Oct-15
19-Apr-16
27-Jul-16

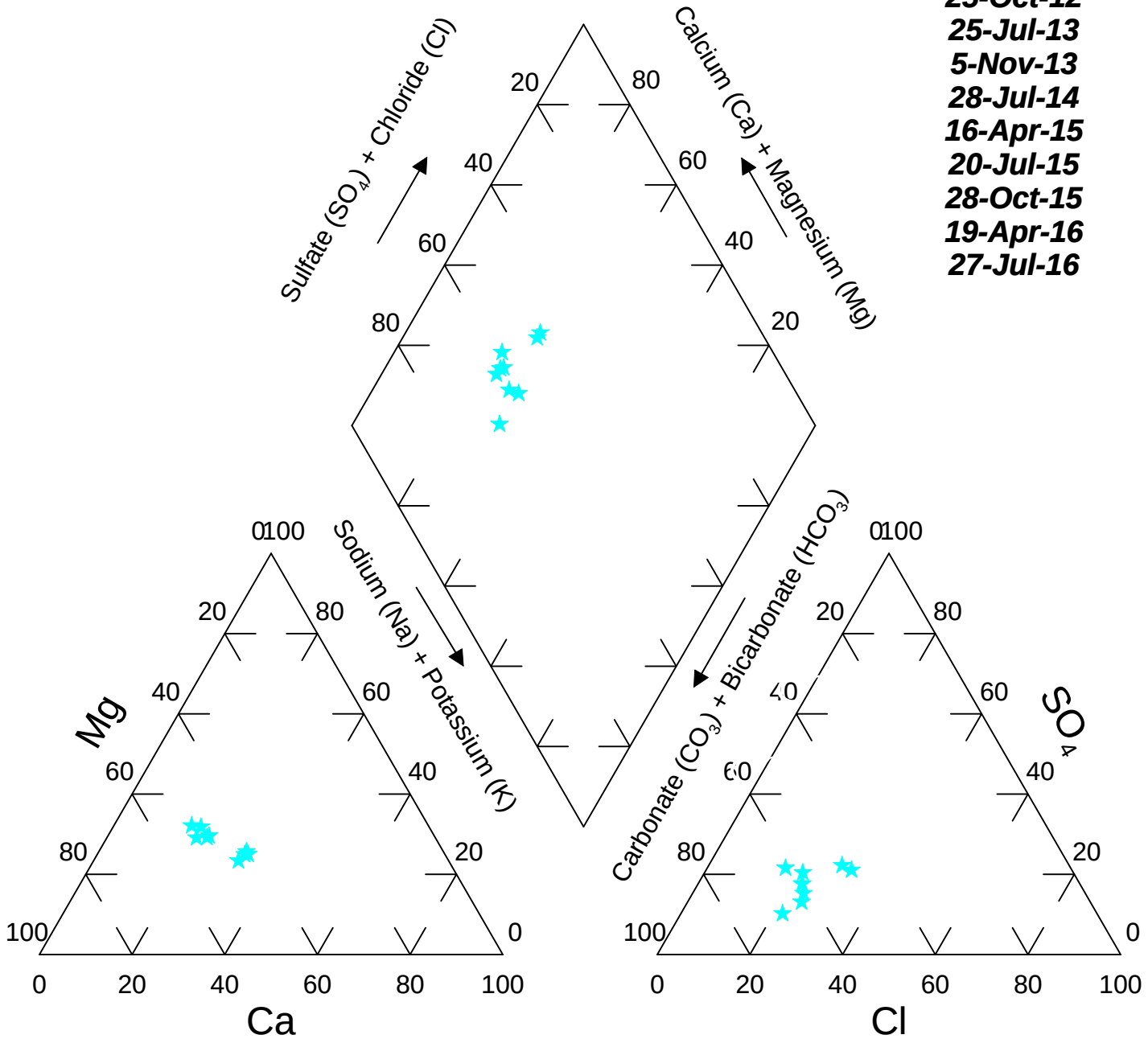
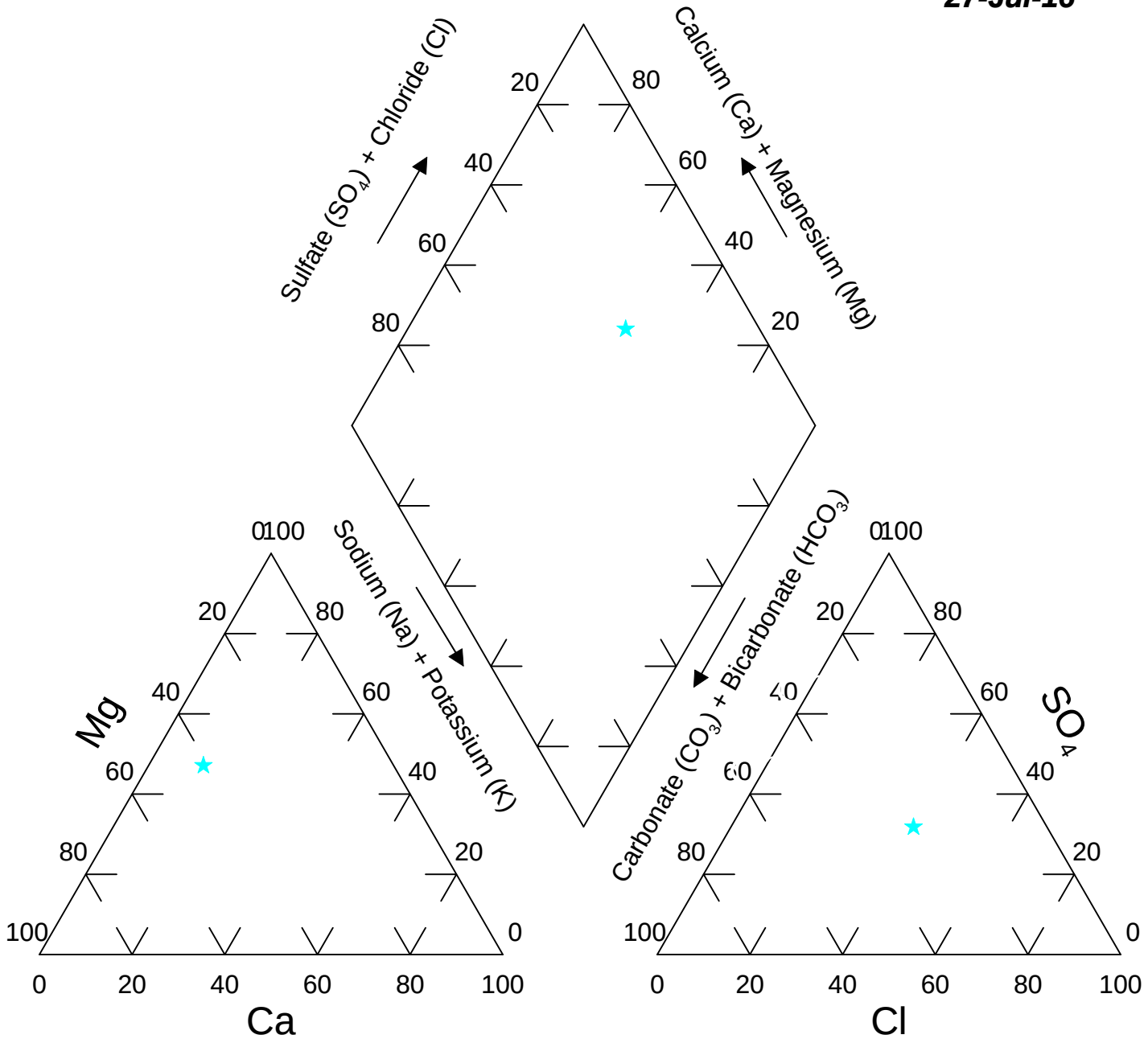


FIGURE: 30P

Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-11A

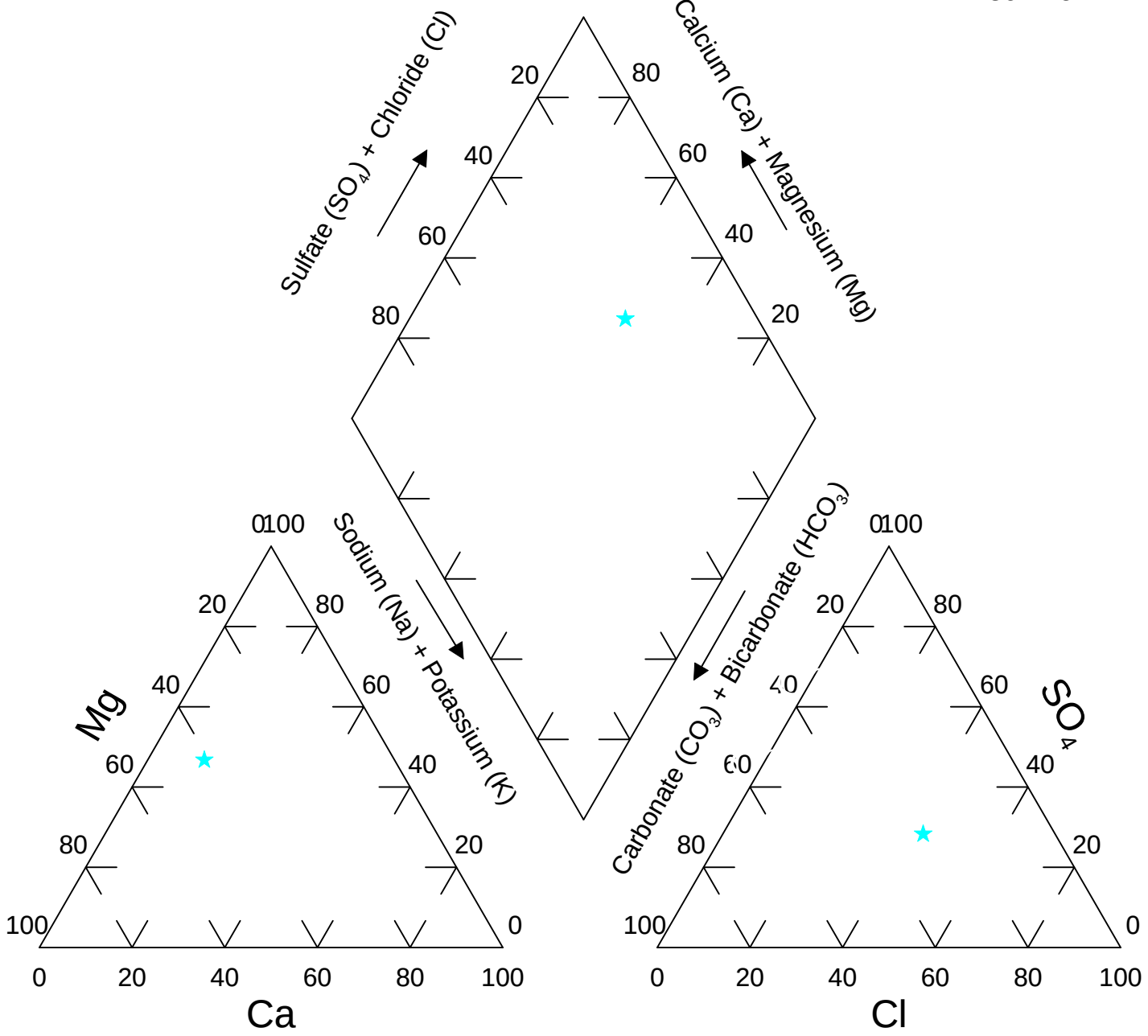
Dates:
27-Jul-16



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-11B

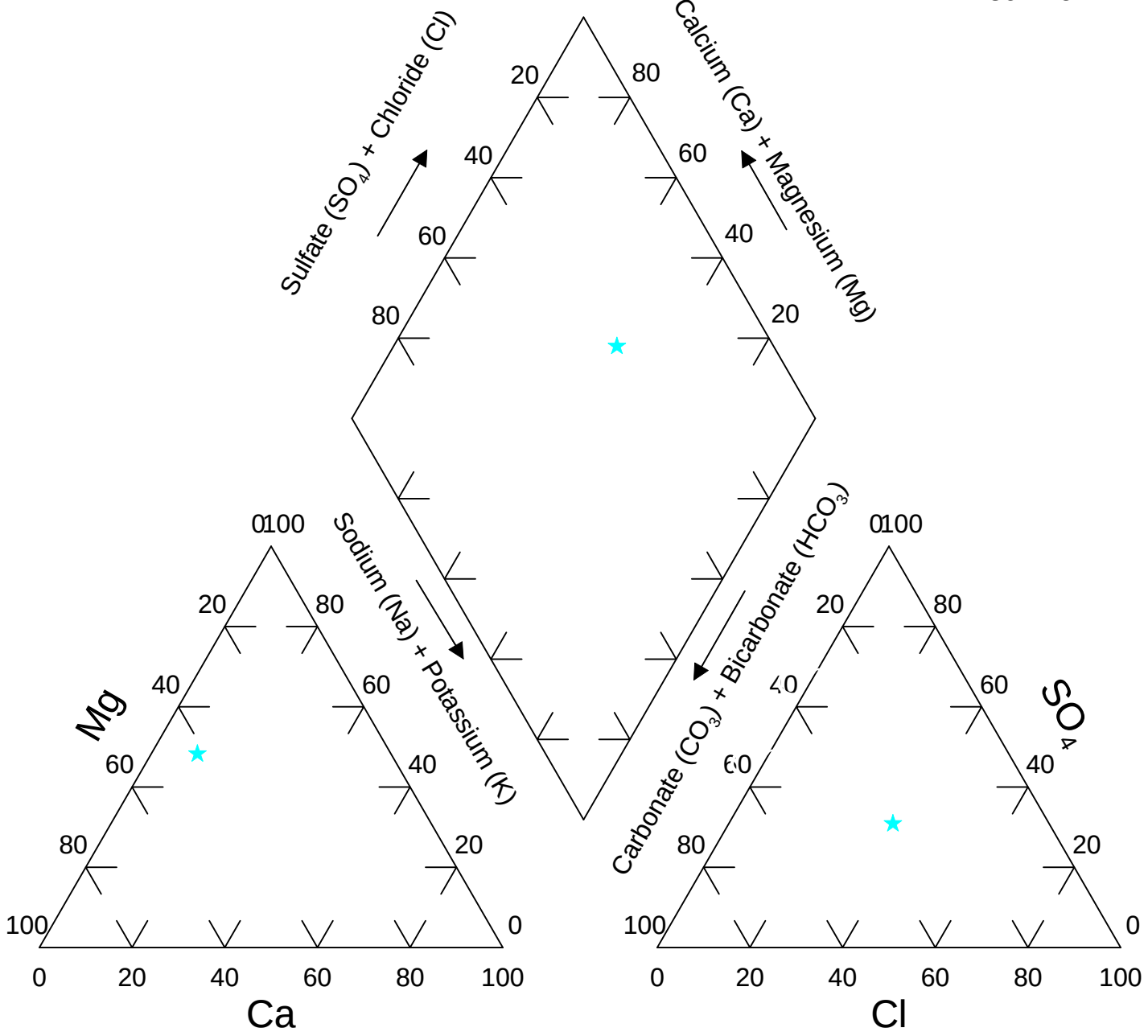
Dates:
27-Jul-16



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-11C

Dates:
27-Jul-16



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-12

Dates:
28-Jul-14
16-Apr-15
20-Jul-15
28-Oct-15
19-Apr-16
27-Jul-16
1-Nov-16

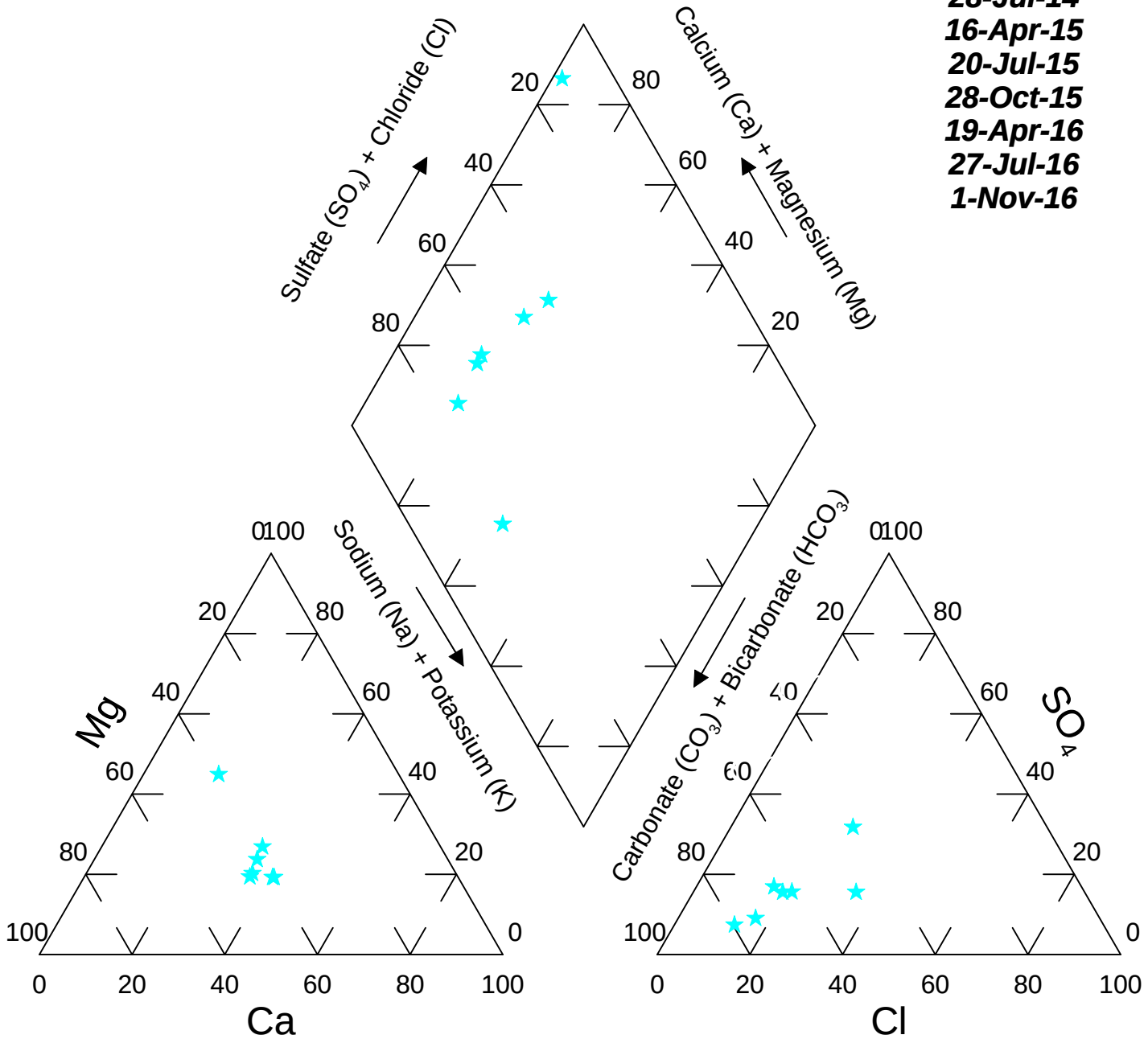
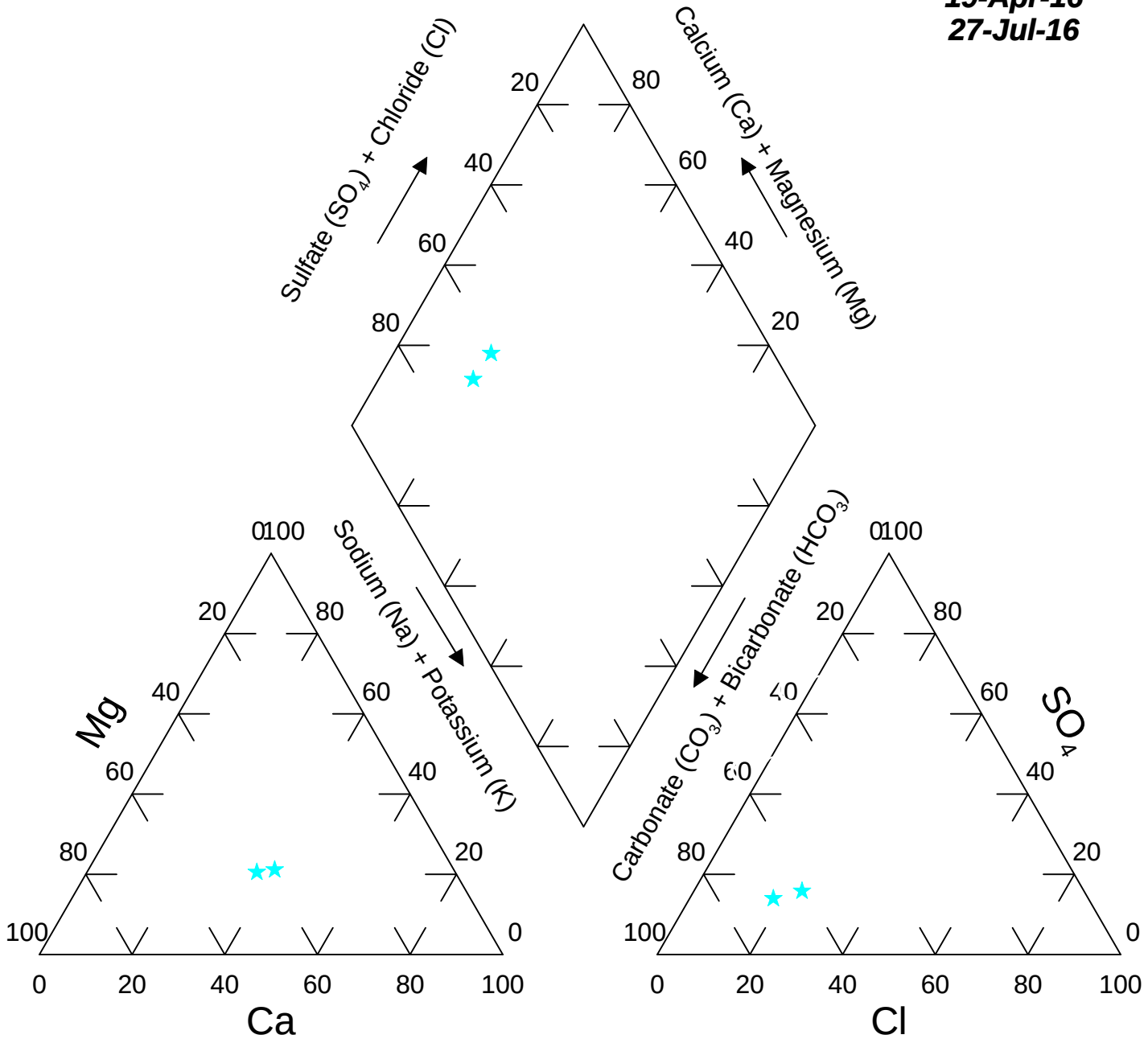


FIGURE: 28P

Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-13A

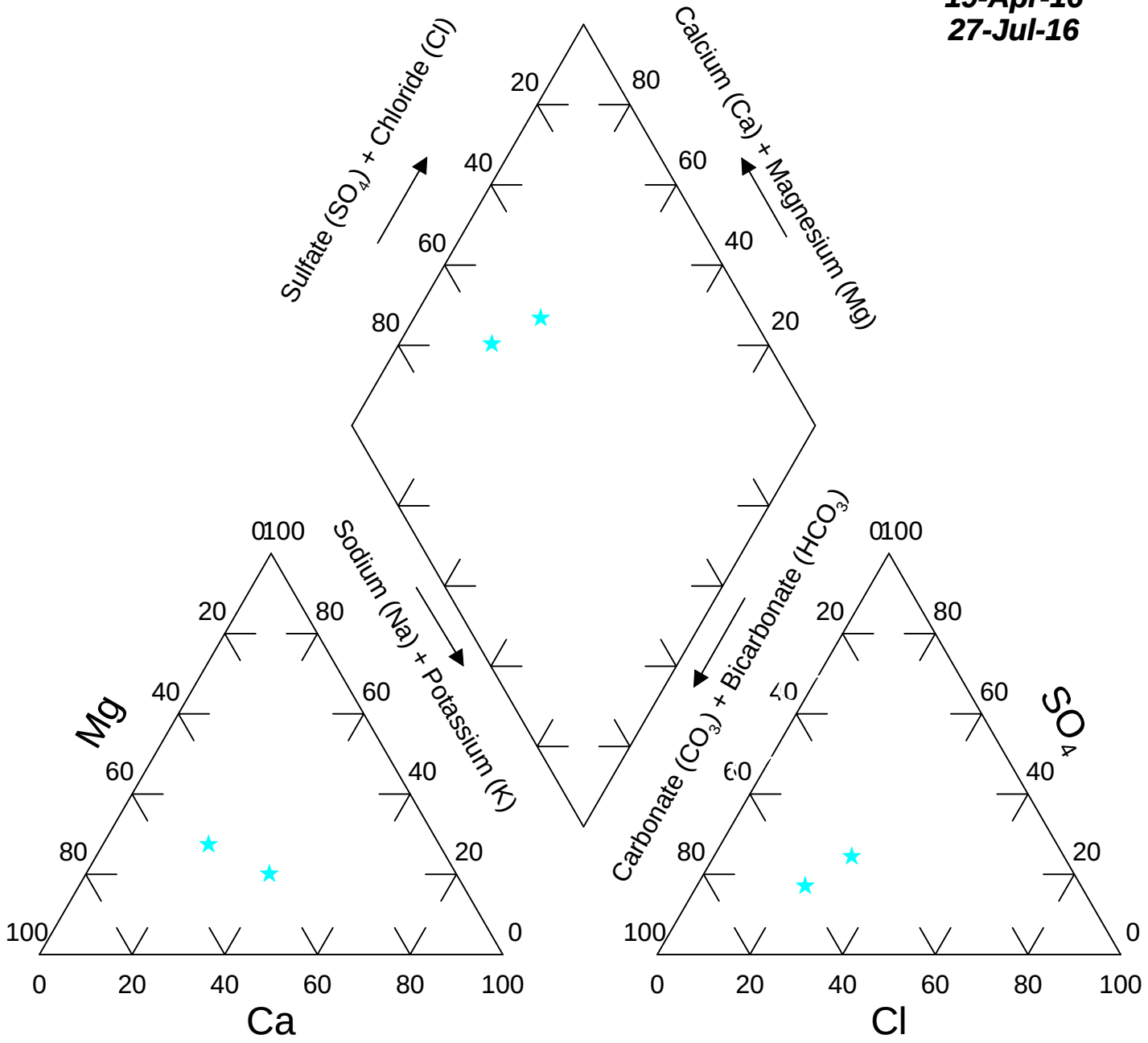
Dates:
19-Apr-16
27-Jul-16



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-13B

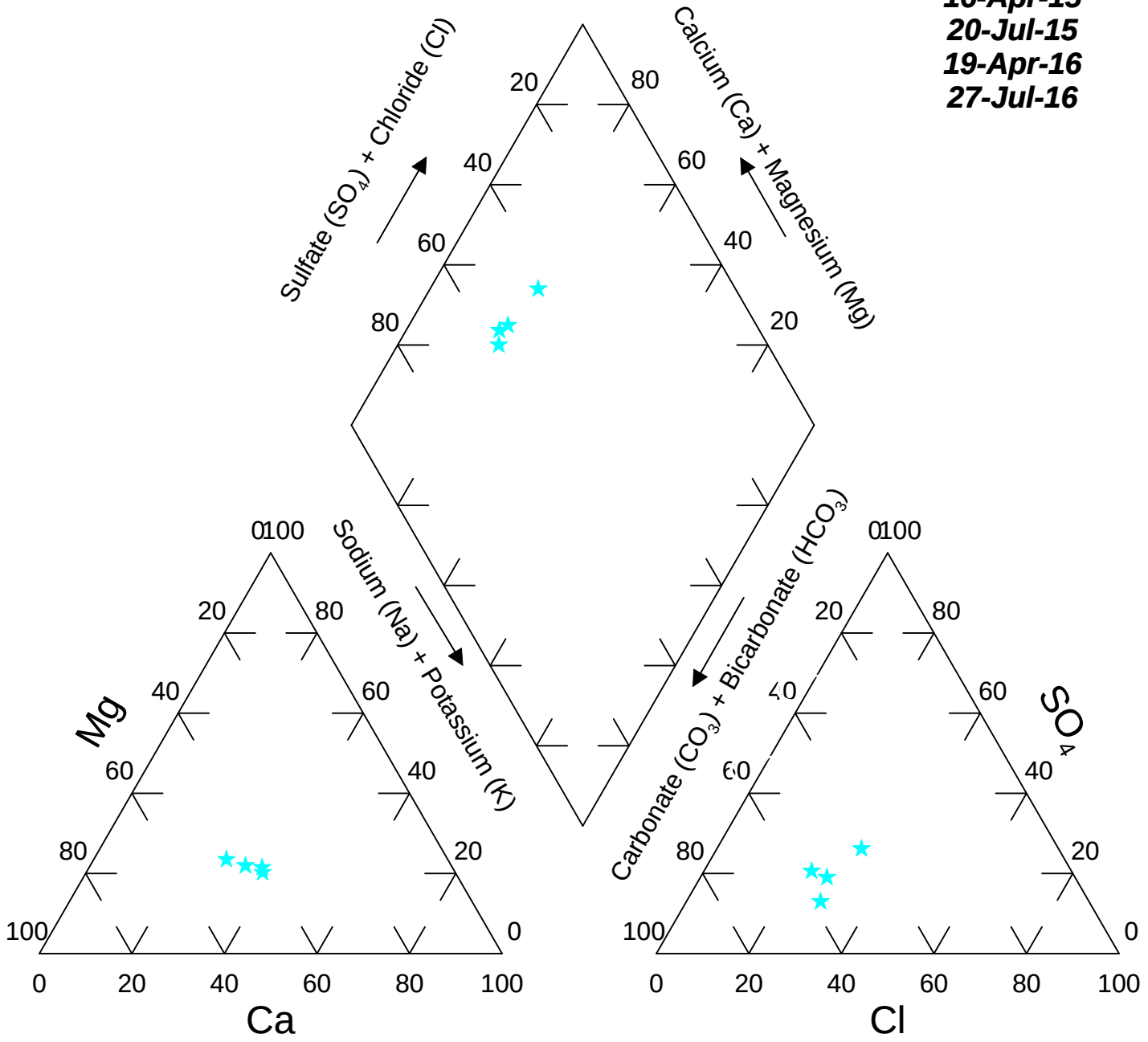
Dates:
19-Apr-16
27-Jul-16



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-14A

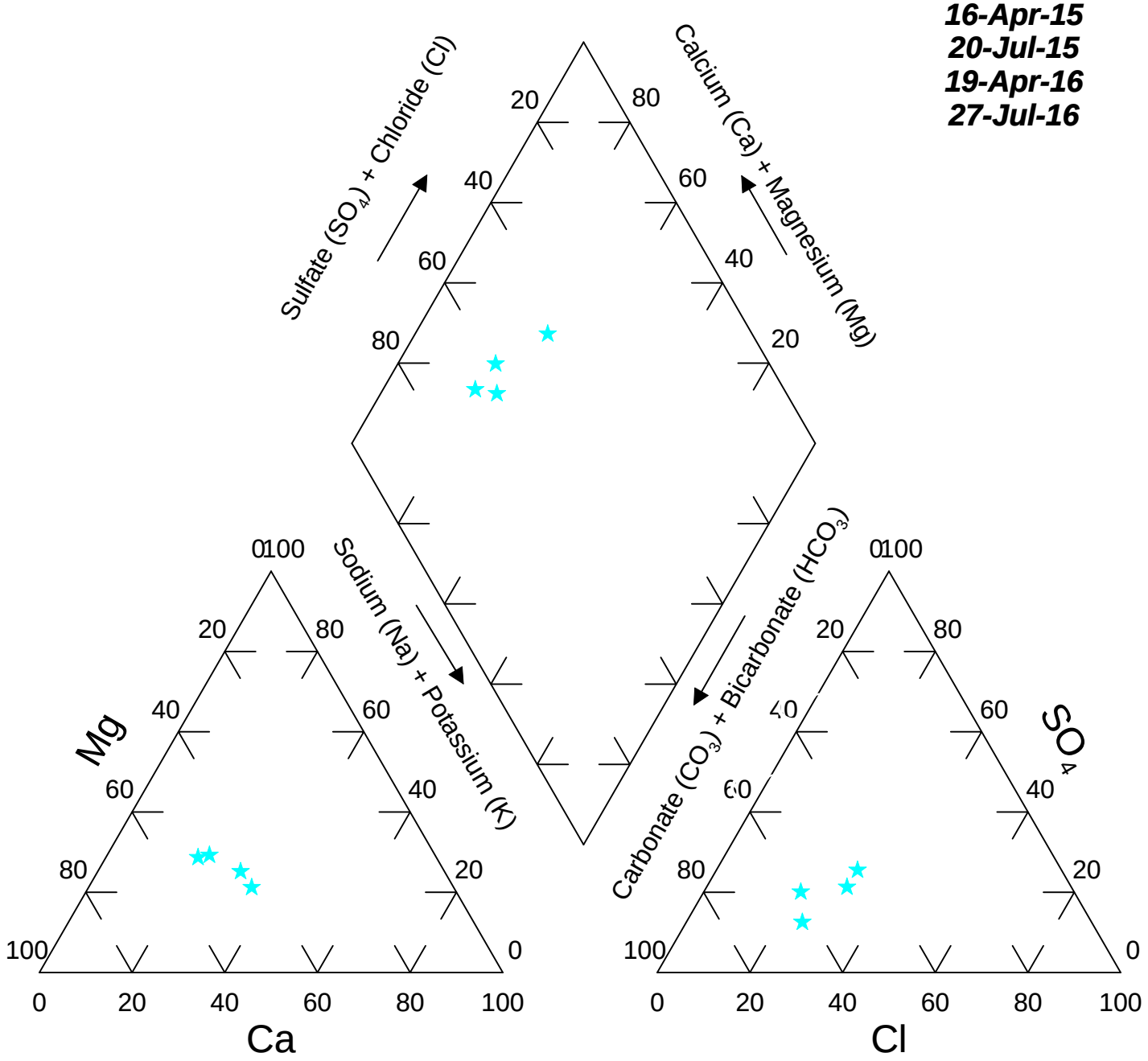
Dates:
16-Apr-15
20-Jul-15
19-Apr-16
27-Jul-16



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-14B

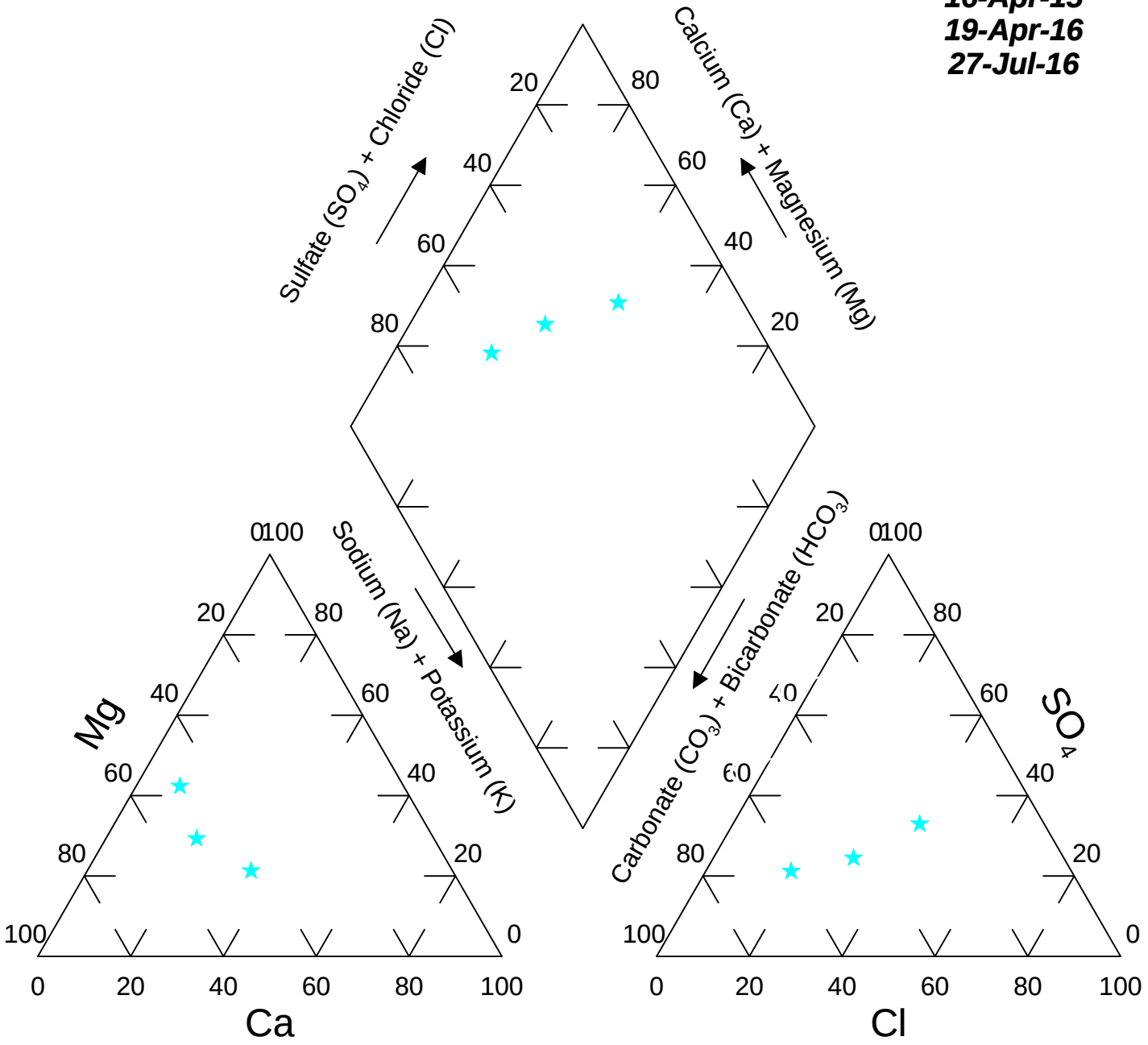
Dates:
16-Apr-15
20-Jul-15
19-Apr-16
27-Jul-16



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-15A

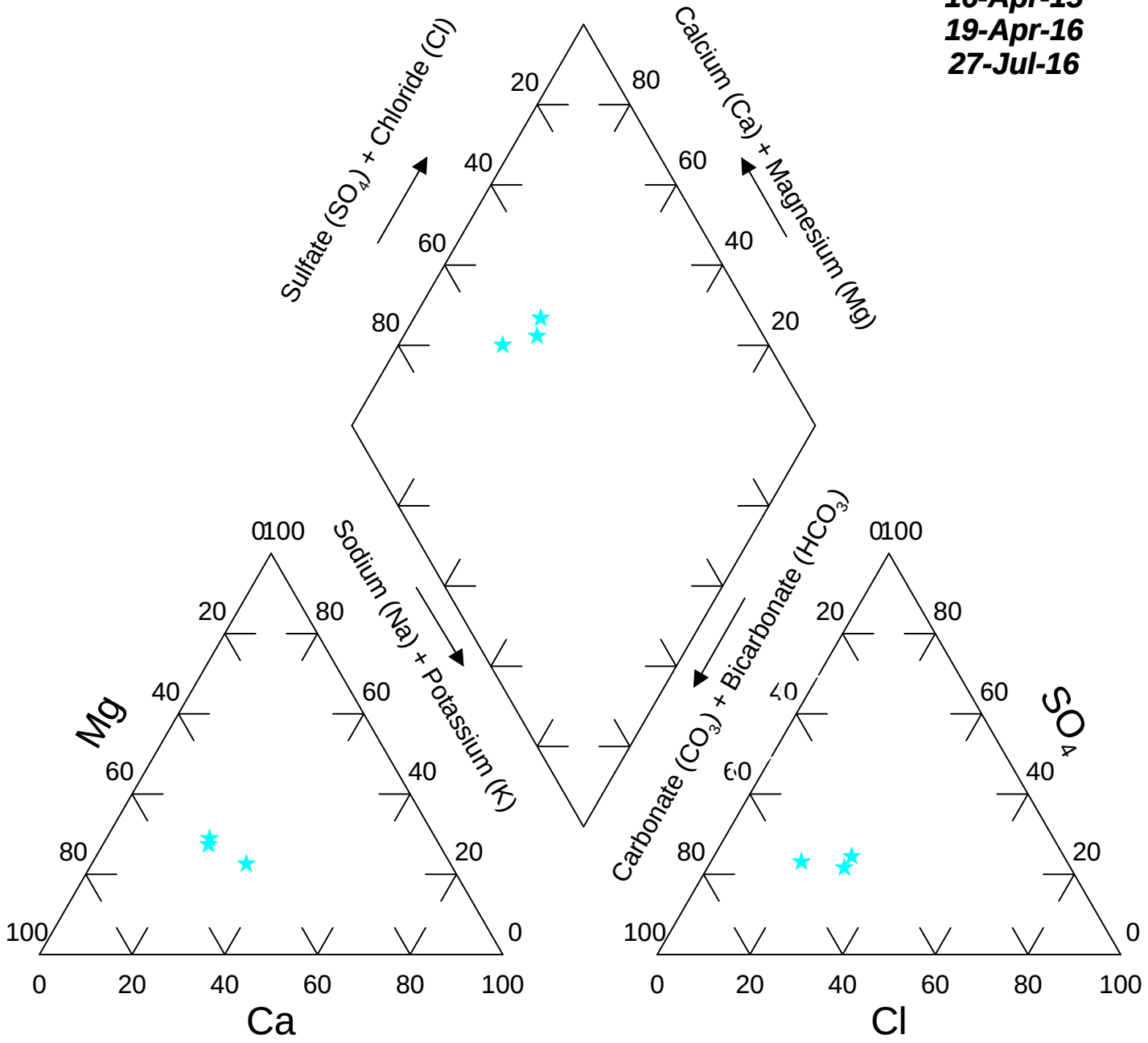
Dates:
16-Apr-15
19-Apr-16
27-Jul-16



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-15B

Dates:
16-Apr-15
19-Apr-16
27-Jul-16



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-16

Dates:
28-Jul-14
16-Apr-15
20-Jul-15
19-Apr-16
27-Jul-16

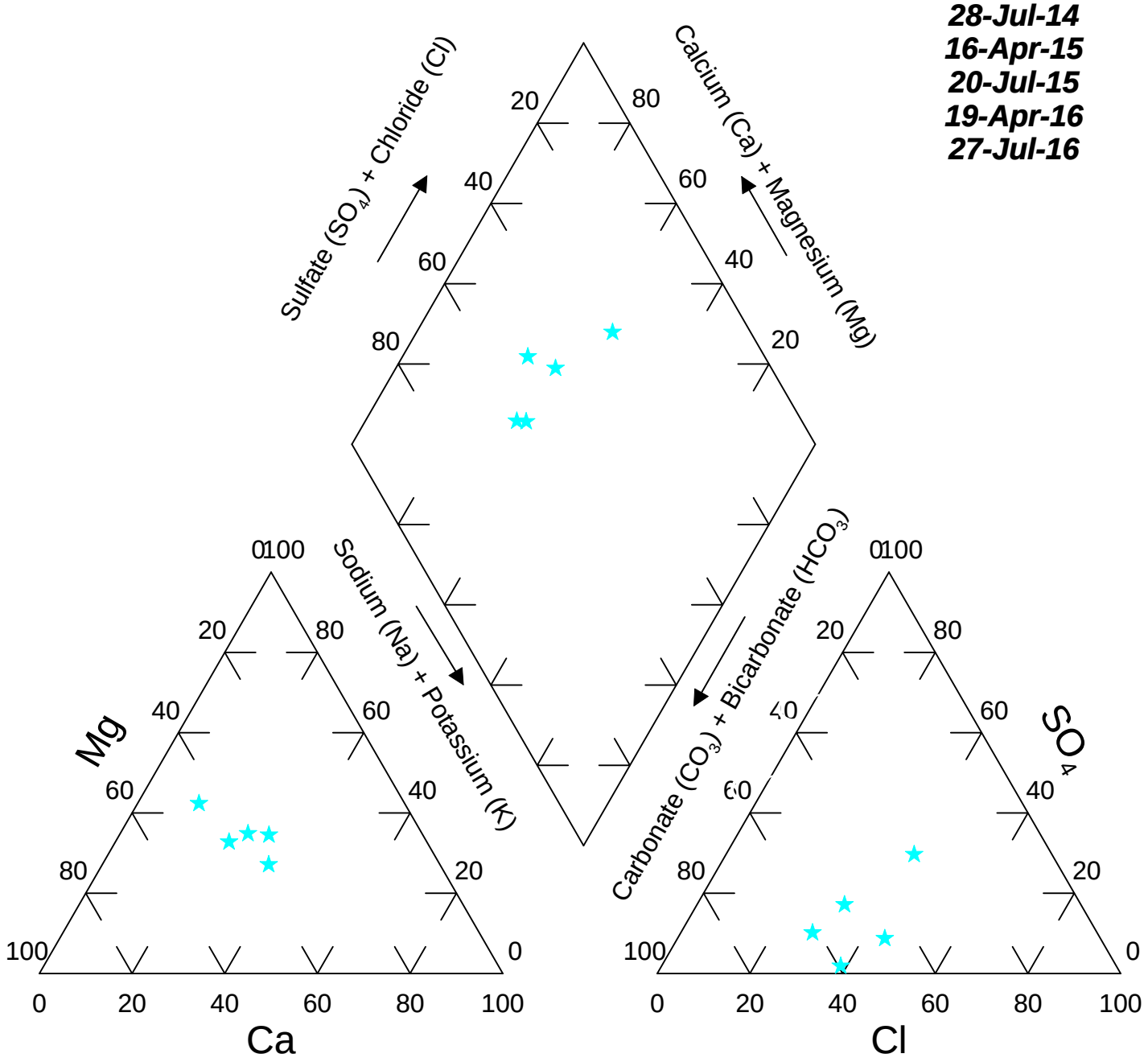


FIGURE: 29P

Winnipeg
Water and Waste Department

APPENDIX D
2016 LANDFILL GAS COLLECTION AND FLARING REPORT

2016 ANNUAL MONITORING REPORT
CITY OF WINNIPEG

BRADY ROAD RESOURCE MANAGEMENT FACILITY
LANDFILL GAS COLLECTION AND FLARING SYSTEM
2016

Prepared for

THE CITY OF WINNIPEG

Prepared by

INTEGRATED GAS RECOVERY SERVICES INC.

March 16, 2017

2016 ANNUAL MONITORING REPORT
CITY OF WINNIPEG

BRADY ROAD RESOURCE MANAGEMENT FACILITY
LANDFILL GAS COLLECTION AND FLARING SYSTEM

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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 short 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 during 2016.

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 Monitoring

The wellfield system monitoring consists of measuring vacuum/pressure in each well and lateral pipe, as well as 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 proper gas meter/analyzer such as a Landtec GEM-5000, or equivalent. Vacuum fluctuations were noted, as it can be an indication of water within in 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 2016, elevated levels of Carbon Monoxide (CO) had continuously been found at GW 2-13,which is consistent with historical monitoring. In addition, 1-7 had elevated levels of CO. As of mid 2016 the well was closed due to low methane levels and high CO levels and the CO levels are now cleared in 2017. Elevated carbon monoxide within landfill gas is an indicator of a subsurface fire within the waste.

In May 2014, wellbore seals were placed around wells: H-1, 1-5, H-12, 2-14, 3-22, 4-35, 5-39 and 5-41. The seals are designed to improve balancing at the wellhead, reduce oxygen intrusion and reduce the potential for landfill fires. Many of the wells that were fitted with wellbore seals showed some improvement in gas quality, gas flow, or both. However, the improvements in gas collection have not been significant and adding additional seals throughout the landfill gas collection system is not recommended.

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

Pump counter measurements were recorded on a monthly basis at all dual purpose gas/leachate collection wells. Table 3 presents the pump counter measurements recorded at both the pump drain traps and dual purpose wells in 2016. The following wells are fitted with pneumatic pumps for leachate removal: H-4, 1-9, 1-10, H-11, 2-18, 3-27, 3-29 and 3-30. Dual purpose well locations were chosen based on the incidence of elevated leachate levels in the surrounding area. Additional well locations were designed with compressed air and forcemain coming up to the well which allows for pumps to be relocated, as necessary.

Table 4 presents the water levels measured on a quarterly basis. 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 2016, dual purpose well pumps continue to remove leachate consistently. Most of the dual purpose wells have open screen percentages on average 55%. The pump at 3-27 shows no operation throughout 2016. However, leachate levels indicate that this well was mostly flooded most of the year. It is suspected that the pump may not be functioning as designed, due to leachate and siltation residue making the pump inoperable. Although the pump was pulled for maintenance in the summer the pump continued to not successfully draw down the water table. A new pump will be installed that is considered an aggressive fluids pump to see if the water table can be drawn down.

2.2 Surface Emission Monitoring

As required by the City, surface emission monitoring was carried out quarterly, weather conditions permitting, by Comcor. This monitoring was performed using a portable flame ionization detector (FID). A Comcor technician walked the site in a grid pattern with the FID and a GPS, marking locations where concentrations of hydrocarbons were greater than 500 ppm. Several areas were noted where there were significant volumes of gas detected, including areas where cap was weak, uncovered manholes, and around some LFG wells.

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
Weather Conditions			Mostly Cloudy	Mainly Sunny	Mainly Sunny	Mainly Sunny	Partially Cloudy	Mainly Sunny	Partially Cloudy	Sunny	Mostly Cloudy	Mostly Cloudy	Cloudy	Cloudy
Ambient Temp		^{o}C	-20	-5	9	16	16	26	25	23	13	9	0	-2
Control Panel	*Flow Rate*	*CFM*	906	901	902	909	1001	1001	1006	997	1005	899	902	904
	CH_4	%	42.6	45.7	53.1	54.3	52.1	52.8	51.7	43.3	41.2	37.8	43.6	38.3
	O_2	%	4.0	2.9	0.0	-0.2	0.3	0.1	0.6	3.87	3.8	5.3	3.6	5.1
	Wellfield Vac	$"H_2O$	-17.6	-17.5	-13.3	-9.9	-13.4	-10.4	-10.2	-11.6	-14.9	-9.8	-11.1	-13.2
	Outlet Press.	$"H_2O$	3.4	4.2	2.8	2.8	4.3	3.5	3.4	4.7	3.9	3.3	3.3	4.4
LOCATIONS														
H-1	*Well*	$"H_2O$	-0.06	-7.46	-2.87	-3.40	-4.30	-3.79	-2.97	-2.87	-5.99	-4.29	-6.88	-9.30
well bore sea	*Lateral*	$"H_2O$	frozen	-15.74	-10.02	-9.38	-11.91	-10.26	-9.92	-11.35	-16.82	-9.61	-10.97	-13.06
	CH_4	%	49.1	47.6	49.2	48.7	43.5	37.5	52.1	55.0	35.5	55.1	32.7	32.8
	CO_2	%	34.7	34.2	34.3	33.9	33.3	32.0	36.4	37.1	33.1	37.1	31.6	31.4
	O_2	%	1.2	2.2	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.6	1.0
	BAL (N_2)	%	14.6	15.9	16.1	17.1	22.8	30.0	11.2	7.6	31.0	7.4	35.0	34.8
	CO	*PPM*	0	0	23	29	0	0	15	0	10	8	10	0
	H_2S	*PPM*	32	23	39	43	29	37	33	15	27	26	15	10
	Vel Max	*m/s*	-	1.83	1.62	1.49	1.92	1.48	1.76	1.92	1.80	0.62	3.39	3.66
	Vel Min	*m/s*	-	1.74	1.53	1.39	1.85	1.41	1.49	1.64	1.76	0.47	3.15	3.47
	Flow	*CFM*	-	16.87	14.88	13.61	17.81	13.65	15.36	16.82	16.82	5.15	30.90	33.69
	Temp	^{o}C	-	6.3	16.5	20.2	23.6	24.2	23.4	17.5	16.6	7.5	12.1	13.8
	Comments		kanaflex frozen	no change	no change	no change	no change	no change	no change	opened 1/4T	no change	opened 1/2T	no change	no change
H-2	*Well*	$"H_2O$	-0.77	-0.18	-0.32	-1.17	-3.17	-4.55	-3.61	-3.74	-6.60	-5.52	-7.05	-9.19
	Lateral	$"H_2O$	-13.86	-15.73	-10.00	-9.33	-11.34	-9.58	-8.35	-11.26	-17.50	-6.35	-8.93	-10.66
	CH_4	%	31.1	57.8	58.2	58.4	57.5	49.3	43.8	42.1	44.0	24.4	49.8	48.9
	CO_2	%	24.2	41.7	41.5	41.1	42.2	41.2	38.8	38.2	38.7	18.7	39.5	39.4
	O_2	%	9.8	0.5	0.3	0.4	0.3	0.3	0.3	1.7	1.6	12.5	0.7	1.2
	BAL (N_2)	%	34.9	0.0	0.0	0.0	0.0	9.2	17.0	18.0	15.6	44.4	10.0	10.5
	CO	*PPM*	0	8	44	56	6	21	9	0	24	0	14	0
	H_2S	*PPM*	7	23	33	32	17	22	3	22	12	0	3	0
	Vel Max	*m/s*	4.30	2.21	2.44	2.77	4.04	5.03	5.33	6.73	8.82	13.06	13.49	11.21
	Vel Min	*m/s*	4.03	2.05	2.11	2.65	3.91	4.95	4.92	6.35	8.48	12.50	12.90	10.77
	Flow	*CFM*	39.36	20.13	21.50	25.61	37.56	47.15	48.43	61.80	81.74	120.76	124.69	103.85
	Temp	^{o}C	14.6	8.8	20.5	24.3	26.9	26.4	26.7	26.8	25.0	17.7	24.9	24.0
	Comments		closed 1/2T	no change	opened 1/4T	opened 1/4T	opened 1/2T	no change	no change	no change	opened 2T	closed 3T	opened 1/4T	opened 1/2T

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
H-3	*Well*	"H 2 O	-5.71	-7.47	-2.57	-2.17	-3.14	-5.15	-4.65	-4.29	-0.11	0.93	-0.20	0.35
	Lateral	"H 2 O	-13.03	-15.63	-10.14	-9.55	-11.70	-9.48	-8.71	-10.82	-18.20	-9.28	-11.80	-13.63
	CH 4	%	48.4	51.7	57.4	57.7	57.5	55.2	52.5	46.2	6.7	55.0	55.4	25.9
	CO 2	%	37.9	41.8	41.6	41.4	41.6	41.5	38.4	38.1	5.5	44.6	44.2	20.4
	O 2	%	4.1	2.8	0.9	0.8	0.9	1.0	1.3	2.3	18.2	0.4	0.3	11.5
	BAL (N 2)	%	9.4	3.7	0.0	0.0	0.0	2.3	7.8	13.5	69.7	0.0	0.0	42.5
	CO	PPM	0	110	191	270	351	221	24	0	6	139	29	0
	H 2 S	PPM	9	15	22	28	28	20	5	14	0	16	10	0
	Vel Max	m/s	3.52	2.12	2.08	1.87	2.36	2.58	3.88	5.02	5.19	0.95	1.57	-
	Vel Min	m/s	3.39	2.02	1.90	1.79	2.25	2.50	3.82	4.71	5.02	0.69	1.19	-
	Flow	CFM	32.65	19.56	18.80	17.29	21.78	24.00	36.38	45.97	48.24	7.75	13.04	-
	Temp	˘ C	8.3	3.1	12.6	15.1	18.7	17.7	15.0	14.6	14.1	2.7	4.0	-
	Comments		closed 1/4T	no change	no change	no change	opened 1/4T	no change	no change	no change	1T to closed	closed to 1/4T	no change	closed well
H-4 DP	*Well*	"H 2 O	0.22	1.21	1.06	1.12	-0.10	0.03	-0.52	-5.19	6.33	-7.14	-5.56	-4.66
	Lateral	"H 2 O	-13.81	-15.73	-10.05	-9.21	-11.66	-9.49	-8.79	-11.02	-18.19	-9.42	-11.48	-13.70
	CH 4	%	55.8	50.0	57.4	58.1	57.1	57.4	57.2	56.6	56.7	53.5	42.7	37.7
	CO 2	%	41.1	35.5	42.2	40.9	42.3	41.7	42.4	43.1	42.9	38.6	35.2	28.1
	O 2	%	2.0	4.0	0.4	1.0	0.5	0.4	0.3	0.3	0.3	2.5	5.2	8.0
	BAL (N 2)	%	1.2	10.5	0.0	0.0	0.0	0.4	0.0	0.0	0.0	5.5	17.0	26.2
	CO	PPM	0	56	112	162	119	79	121	82	86	54	10	0
	H 2 S	PPM	23	26	39	42	30	39	36	30	21	30	5	4
	Vel Max	m/s	1.36	1.18	1.22	0.72	2.03	1.66	1.21	1.56	1.55	2.25	6.29	3.90
	Vel Min	m/s	1.24	1.13	1.12	0.67	1.94	1.57	1.14	1.50	1.50	2.16	6.08	3.48
	Flow	CFM	12.28	10.91	11.06	6.57	18.76	15.26	11.10	14.46	14.41	20.84	58.44	34.87
	Temp	˘ C	7.9	4.6	14.3	17.9	20.6	20.6	16.0	15.3	12.9	9.5	9.1	8.7
	Comments		no change	no change	no change	opened 1/4T	no change	no change	no change	opened 1/4T	opened 1/4T	no change	no change	closed 1/2T
1-5	*Well*	"H 2 O	1.40	0.19	0.97	0.06	0.29	-0.95	-1.05	-1.59	-3.50	-3.33	-2.57	-5.39
well bore sea	*Lateral*	"H 2 O	-14.45	-15.67	-10.24	-9.24	-11.58	-9.40	-8.10	-11.02	-18.78	-9.54	-11.07	-13.75
	CH 4	%	55.6	49.4	56.8	57.4	57.2	54.4	53.7	50.1	47.7	48.4	52.0	50.0
	CO 2	%	44.0	42.4	42.8	42.1	42.3	41.0	40.1	39.3	38.5	38.4	38.5	37.8
	O 2	%	0.3	2.0	0.3	0.5	0.6	0.8	0.4	0.6	0.7	0.6	1.0	1.6
	BAL (N 2)	%	0.0	6.1	0.0	0.0	0.0	3.6	5.8	10.0	13.1	12.7	8.4	10.6
	CO	PPM	0	1	41	52	21	13	29	21	28	7	9	0
	H 2 S	PPM	104	25	34	36	34	22	21	7	8	11	8	10
	Vel Max	m/s	-	0.48	1.68	1.70	1.70	2.35	3.64	3.01	3.40	2.77	2.18	4.96
	Vel Min	m/s	-	0.00	1.64	1.59	1.66	2.26	3.09	2.92	3.33	2.67	1.89	4.77
	Flow	CFM	-	2.27	15.69	15.54	15.88	21.78	31.80	28.02	31.80	25.70	19.23	45.97
	Temp	˘ C	-	1.8	15.5	19.4	24.6	22.9	18.9	16.0	16.9	9.8	7.2	12.0
	Comments		kanaflex frozen	no change	no change	no change	opened 1/4T	no change	no change	no change	opened 1/4T	no change	opened 1/4T	opened 1/4T

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
1-6 DP	Well	"H2O	0.35	0.00	-0.20	-0.52	-0.19	-2.58	-0.03	-0.06	-0.07	-0.02	0.15	0.10
	Lateral	"H2O	-14.31	-15.41	-10.08	-9.44	-11.53	-10.15	-8.23	-11.16	-18.82	-9.66	-10.74	-13.82
	CH4	%	50.0	47.8	57.0	57.6	58.2	49.7	48.6	43.7	10.4	9.8	57.2	56.6
	CO2	%	35.5	36.8	37.9	38.0	38.8	35.6	34.3	36.9	7.7	7.0	41.5	42.9
	O2	%	3.4	3.3	1.0	0.9	0.8	1.8	2.9	2.8	17.2	18.7	1.1	0.6
	BAL (N2)	%	10.9	12.0	4.0	3.5	2.2	12.9	14.2	16.6	64.9	64.6	0.0	0.0
	CO	PPM	0	0	17	22	0	0	0	0	0	0	4	0
	H2S	PPM	93	133	208	233	223	141	48	22	13	1	110	277
	Vel Max	m/s	2.14	1.96	1.82	1.66	1.86	1.61	2.31	2.96	3.73	3.06	-	-
	Vel Min	m/s	2.09	1.87	1.68	1.63	1.80	1.47	2.24	2.86	3.62	2.96	-	-
	Flow	CFM	19.99	18.10	16.54	15.54	17.29	14.55	21.50	27.50	34.73	28.44	-	-
	Temp	˚C	14.1	4.3	19.3	22.7	26.7	25.5	23.7	20.8	19.9	14.0	-	-
	Comments		no change	no change	no change	no change	opened 1/4T	no change	no change	no change	closed 1/4T	closed well	well closed	well closed
1-7	Well	"H2O	0.07	0.72	0.72	0.28	-0.08	1.02	0.07	-0.33	-0.07	-0.03	0.13	0.09
	Lateral	"H2O	-15.46	-15.61	-9.83	-8.95	-11.44	-8.21	-8.61	-11.30	-17.23	-9.83	-11.01	-13.07
	CH4	%	43.1	46.7	50.1	50.2	12.4	53.3	52.6	9.0	1.5	10.3	50.9	50.4
	CO2	%	44.3	52.8	49.3	49.0	10.2	46.2	42.2	8.2	1.5	9.1	48.1	46.1
	O2	%	4.5	0.4	0.5	0.8	15.0	0.3	0.6	17.7	20.6	18.4	0.9	2.2
	BAL (N2)	%	7.9	0.0	0.0	0.0	61.5	0.1	4.7	65.1	76.2	62.4	0.0	1.1
	CO	PPM	0	1601	>>>>	>>>>	26	1391	0	136	94	100	1176	1447
	H2S	PPM	33	194	279	294	17	197	57	17	3	13	105	116
	Vel Max	m/s	0.59	0.48	0.00	0.44	0.45	0.44	-	-	-	-	-	-
	Vel Min	m/s	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-	-
	Flow	CFM	2.79	2.27	0.00	2.08	2.13	2.08	-	-	-	-	-	-
	Temp	˚C	-2.8	10.0	15.5	22.1	29.9	25.8	-	-	-	-	-	-
	Comments		no change	no change	no change	no change	closed well	well closed	well closed	well closed	well closed	well closed	well closed	well closed
1-8	Well	"H2O	-0.06	0.30	0.27	-0.05	-0.49	0.53	-0.43	-0.70	-0.65	-0.31	-0.31	-0.15
	Lateral	"H2O	-15.59	-15.62	-10.06	-8.96	-11.65	-8.46	8.77	-11.39	-17.73	-10.00	-11.10	-13.37
	CH4	%	11.1	44.9	44.7	45.1	0.1	47.6	5.8	1.9	1.3	0.2	0.2	0.2
	CO2	%	9.6	54.6	54.9	54.4	0.1	45.3	5.6	1.7	1.8	0.1	0.1	0.1
	O2	%	17.5	0.3	0.3	0.4	19.5	0.9	19.4	20.3	20.4	20.9	20.9	20.9
	BAL (N2)	%	61.9	0.0	0.0	0.0	80.3	6.2	69.2	75.9	76.5	78.8	78.8	78.8
	CO	PPM	0	43	267	244	0	<<<<	21	1	12	0	0	0
	H2S	PPM	8	76	113	112	0	234	18	0	0	0	0	0
	Vel Max	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Min	m/s	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	CFM	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	˚C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments		well closed	well closed	well closed	well closed	well closed	well closed	well closed	well closed	well closed	well closed	well closed	well closed

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
1-9 DP	*Well*	"H 2 O	-13.22	-15.14	-9.71	-9.10	-11.49	-10.01	-9.43	-12.62	-16.84	-9.79	-10.29	-12.96
	Lateral	"H 2 O	-13.59	-15.51	-10.01	-9.30	-11.63	-10.22	-9.67	-12.97	-17.14	-9.93	-10.78	-13.38
	CH 4	%	41.3	43.0	44.1	42.3	37.8	35.9	40.7	35.6	33.8	40.1	30.2	29.3
	CO 2	%	36.0	35.5	35.9	34.6	34.2	32.9	34.3	33.9	33.2	33.4	26.6	26.2
	O 2	%	0.9	1.5	0.3	0.9	0.4	0.6	0.5	0.5	0.5	0.8	3.5	3.8
	BAL (N 2)	%	21.9	20.0	19.5	22.1	27.6	30.6	24.5	30.1	32.5	25.6	39.5	40.6
	CO	PPM	0	123	214	275	122	210	185	183	181	143	174	146
	H 2 S	PPM	30	49	70	78	48	72	57	15	38	39	28	22
	Vel Max	m/s	11.24	7.34	7.46	6.22	7.43	6.68	5.68	9.03	8.43	5.98	8.04	8.90
	Vel Min	m/s	11.06	7.18	6.93	5.99	7.21	6.38	5.32	8.77	7.91	5.75	7.72	8.53
	Flow	CFM	105.36	68.60	67.99	57.69	69.17	61.70	51.97	84.10	77.20	55.42	74.46	82.35
	Temp	˚C	41.5	44.1	43.5	43.1	44.6	43.8	45.6	44.8	45.5	44.0	48.8	54.1
	Comments		full open	no change	full -> nc	full -> nc	no change	full -> nc	full -> nc	no change	full -> nc	full -> nc	Full -> nc	full -> nc
1-10 DP	*Well*	"H 2 O	0.09	-3.09	-5.79	-7.64	-10.44	-8.90	-5.07	-5.05	-14.07	-3.15	-2.09	-0.97
	Lateral	"H 2 O	-14.50	-15.56	-10.07	-9.43	-12.04	-10.41	-9.84	-12.94	-17.39	-10.12	-10.91	-13.39
	CH 4	%	63.2	52.4	59.7	59.0	54.1	49.6	56.3	37.2	35.0	16.5	15.4	11.7
	CO 2	%	36.4	38.6	38.9	39.1	39.4	37.1	39.4	34.3	32.0	9.8	8.6	6.5
	O 2	%	0.3	2.4	0.4	0.4	0.3	0.5	0.9	1.7	1.3	16.6	17.7	19.2
	BAL (N 2)	%	0.0	6.6	1.1	1.4	6.2	12.7	3.5	26.9	31.7	57.2	58.3	62.7
	CO	PPM	0	0	54	64	0	24	6	0	16	0	0	0
	H 2 S	PPM	31	33	51	48	23	36	0	0	21	0	0	0
	Vel Max	m/s	-	2.16	1.57	1.79	2.10	2.05	3.50	2.88	1.86	2.61	1.57	2.04
	Vel Min	m/s	-	1.62	1.42	1.72	1.97	1.87	3.03	2.51	1.69	2.50	1.50	1.91
	Flow	CFM	-	17.86	14.13	16.58	19.23	18.52	30.85	25.47	16.77	24.14	14.50	18.66
	Temp	˚C	-	7.3	17.2	22.0	22.6	24.3	18.7	15.8	18.1	10.5	2.6	9.5
	Comments		kanaflex frozen	no change	opened 1/4T	opened 1/4T	no change	no change	no change	closed 1/4T	no change	closed 1/4T	closed 1/4T	closed well
H-11 DP	*Well*	"H 2 O	-7.37	-9.50	-8.89	-7.94	-9.60	-8.08	-6.54	-6.58	-15.99	-6.48	-1.61	-1.04
	Lateral	"H 2 O	-15.98	-15.61	-10.05	-9.13	-11.59	-9.34	-8.82	-11.00	-18.36	-9.52	-11.52	-13.39
	CH 4	%	37.4	53.3	58.3	58.6	55.0	55.3	53.8	52.3	49.1	50.1	54.5	54.8
	CO 2	%	29.2	36.9	40.6	40.4	39.0	40.3	39.2	38.2	36.9	36.5	43.7	44.3
	O 2	%	7.2	3.5	0.8	0.7	1.4	0.8	1.4	1.9	2.5	2.8	1.1	0.9
	BAL (N 2)	%	26.6	6.4	0.2	0.4	4.6	3.4	5.7	7.7	11.3	10.5	0.0	0.0
	CO	PPM	0	0	13	17	0	0	0	0	0	0	4	0
	H 2 S	PPM	21	85	181	185	80	156	78	57	45	50	160	157
	Vel Max	m/s	2.04	1.09	0.67	0.87	1.02	0.82	1.06	1.14	0.93	1.30	2.25	2.62
	Vel Min	m/s	1.77	1.05	0.00	0.83	0.98	0.72	0.96	1.03	0.72	1.17	2.15	2.47
	Flow	CFM	18.00	10.11	3.17	8.03	9.45	7.28	9.54	10.25	7.80	11.67	20.79	24.05
	Temp	˚C	6.5	5.5	19.4	20.6	29.7	27.2	20.2	18.4	16.1	7.6	11.5	13.4
	Comments		no change	no change	no change	no change	no change	no change	no change	no change	no change	no change	no change	no change

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
H-12	*Well*	"H 2 O	-2.81	frozen	-0.19	-1.82	-2.57	-1.60	-0.35	-0.68	-2.35	-0.28	-0.39	-1.38
well bore sea	*Lateral*	"H 2 O	-15.38	-15.38	-10.03	-9.02	-11.56	-9.13	-8.58	-10.78	-17.86	-9.02	-11.48	-13.15
	CH 4	%	59.0	49.0	60.4	59.3	57.3	57.5	56.1	48.8	18.3	36.7	49.6	50.0
	CO 2	%	38.8	37.3	38.9	37.5	37.3	38.0	38.3	37.7	13.2	26.9	32.5	32.9
	O 2	%	1.8	3.3	0.6	1.2	1.5	0.8	0.9	1.7	13.8	6.9	4.8	4.4
	BAL (N 2)	%	0.5	10.5	0.0	2.0	3.9	3.7	4.7	11.8	54.7	29.4	13.1	12.7
	CO	PPM	0	0	13	20	0	0	0	0	0	0	0	0
	H 2 S	PPM	106	40	64	56	62	61	50	14	0	12	45	50
	Vel Max	m/s	0.48	1.51	1.47	1.50	1.43	1.40	1.42	3.37	3.27	1.99	1.18	0.97
	Vel Min	m/s	0.00	1.42	1.41	1.42	1.23	1.34	1.36	3.17	3.04	1.61	0.94	0.91
	Flow	CFM	2.27	13.84	13.61	13.80	12.57	12.95	13.13	30.90	29.81	17.01	10.02	8.88
	Temp	˚C	4.9	1.3	16.7	19.1	27.9	24.5	20.8	18.1	18.1	10.3	4.6	8.5
	Comments		no change	30T -> 25T	25T -> 30T	no change	30T -> nc	30T -> 35T	35T -> nc	35T -> nc	35T -> 30T	30T -> 20T	20T -> nc	20T -> nc
2-13	*Well*	"H 2 O	-0.21	-0.65	-1.03	-0.89	-1.03	-0.28	-0.71	-1.51	-2.01	-1.02	-1.97	-2.02
	Lateral	"H 2 O	-15.36	-15.38	-11.62	-8.36	-10.93	-7.97	-9.37	-11.17	-16.15	-8.75	-11.08	-13.33
	CH 4	%	24.4	54.6	55.3	55.7	55.3	56.7	55.0	54.5	54.9	54.9	55.6	54.5
	CO 2	%	21.9	45.1	44.4	44.0	44.4	42.9	44.6	45.0	44.6	44.8	42.7	44.6
	O 2	%	13.4	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.4	0.3	1.6	0.6
	BAL (N 2)	%	40.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
	CO	PPM	0	2000	1693	>>>>	1878	1691	1273	1278	1384	1178	776	732
	H 2 S	PPM	65	291	258	421	388	313	439	472	396	449	307	328
	Vel Max	m/s	3.76	2.50	2.53	2.19	2.51	2.48	2.21	2.15	2.83	1.98	2.85	2.71
	Vel Min	m/s	3.66	2.39	2.38	1.96	2.35	2.41	2.04	2.02	2.72	1.81	2.72	2.54
	Flow	CFM	35.06	23.10	23.20	19.61	22.96	23.10	20.08	19.70	26.22	17.91	26.32	24.80
	Temp	˚C	2.9	7.9	20.9	22.4	25.0	25.7	24.8	24.7	20.9	11.1	13.5	12.4
	Comments		no change	no change	no change	no change	no change	no change	no change	no change	no change	no change	no change	no change
2-14	*Well*	"H 2 O	-1.15	1.01	1.18	0.58	0.15	-0.27	-0.05	-0.74	-0.03	0.20	0.01	0.12
well bore sea	*Lateral*	"H 2 O	-16.73	-15.02	-11.73	-8.56	-11.19	-7.02	-9.21	-9.83	-11.33	-8.64	-10.58	-10.47
	CH 4	%	39.9	55.0	57.1	57.7	57.2	55.0	54.3	35.9	52.4	56.6	35.3	36.3
	CO 2	%	31.6	42.6	42.4	42.0	42.4	41.0	39.4	28.7	38.3	43.1	26.3	27.9
	O 2	%	7.6	2.0	0.3	0.3	0.3	0.5	1.0	6.5	2.3	0.3	9.7	8.7
	BAL (N 2)	%	20.8	0.5	0.0	0.0	0.0	3.5	5.1	28.8	7.1	0.0	28.6	27.2
	CO	PPM	7	43	8	85	71	85	20	21	61	23	40	3
	H 2 S	PPM	13	19	15	27	20	23	18	15	25	27	16	8
	Vel Max	m/s	2.63	2.27	2.46	2.81	4.54	6.67	5.59	7.91	2.48	2.40	5.75	4.51
	Vel Min	m/s	2.55	2.13	2.34	2.70	4.46	6.53	5.41	7.64	2.38	2.23	5.55	4.46
	Flow	CFM	24.47	20.79	22.68	26.03	42.52	62.37	51.97	73.47	22.96	21.88	53.39	42.38
	Temp	˚C	11.4	19.6	22.4	25.3	29.6	26.7	25.8	24.6	22.8	16.9	17.3	17.9
	Comments		opened 1/4T	no change	opened 1/4T	opened 1/4T	opened 1/2T	no change	no change	closed 1/2T	no change	opened 1/2T	closed 1/4T	no change

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
2-15	Well	"H2O	-0.04	0.96	0.87	0.57	0.60	1.11	0.33	-0.34	0.00	0.08	-1.95	-1.26
	Lateral	"H2O	-17.78	-15.31	-11.84	-8.43	-11.59	-7.86	-9.07	-10.76	-11.74	-8.97	-10.43	-12.57
	CH4	%	50.9	51.9	57.3	58.0	58.0	58.9	56.7	56.5	57.9	56.8	55.7	56.4
	CO2	%	34.8	42.3	42.4	41.7	41.8	40.7	43.0	43.1	41.7	42.8	42.4	42.9
	O2	%	4.1	2.5	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.4
	BAL (N2)	%	9.9	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.3
	CO	PPM	3	123	42	96	23	132	161	143	20	161	282	269
	H2S	PPM	34	51	43	62	25	22	54	37	41	44	31	26
	Vel Max	m/s	0.00	0.00	0.89	0.53	0.82	0.53	1.10	1.18	0.42	2.63	5.03	4.15
	Vel Min	m/s	0.00	0.00	0.73	0.46	0.78	0.50	1.05	1.10	0.00	2.21	4.83	3.87
	Flow	CFM	0.00	0.00	7.65	4.68	7.56	4.87	10.16	10.77	1.98	22.87	46.59	37.89
	Temp	˚C	-2.4	10.5	17.6	21.6	30.6	26.8	25.8	21.9	13.9	8.3	11.2	10.8
	Comments		no change	no change	no change	no change	no change	no change	no change	no change	opened 1/4T	opened 1/2T	opened 1/4T	opened 1/4T
2-16	Well	"H2O	-0.59	0.84	0.88	0.12	-0.31	0.26	-0.68	-1.04	-1.21	-1.85	-1.96	-2.07
	Lateral	"H2O	-14.18	-14.92	-9.66	-8.17	-10.47	-7.60	-9.20	-10.07	-16.52	-8.42	-9.74	-9.42
	CH4	%	32.8	51.7	57.4	57.6	55.7	57.7	53.9	46.6	46.7	46.8	35.8	34.7
	CO2	%	25.9	42.6	42.3	42.0	40.8	41.4	40.0	37.2	37.8	36.6	27.6	29.1
	O2	%	9.7	2.2	0.3	0.3	0.7	0.3	0.8	1.6	1.4	1.8	7.6	5.8
	BAL (N2)	%	31.5	3.5	0.0	0.0	2.8	0.5	5.3	14.5	14.0	14.9	29.1	30.3
	CO	PPM	0	160	205	275	114	134	106	104	116	136	28	54
	H2S	PPM	15	49	57	62	46	40	22	25	26	27	17	12
	Vel Max	m/s	8.88	3.94	3.49	4.61	5.48	6.29	9.79	8.85	8.45	9.10	8.94	10.71
	Vel Min	m/s	8.54	3.77	3.07	4.29	5.37	6.17	9.50	8.56	8.11	8.78	8.56	10.52
	Flow	CFM	82.30	36.43	30.99	42.05	51.26	58.87	91.14	82.26	78.24	84.48	82.68	100.31
	Temp	˚C	10.9	18.3	19.8	22.8	24.9	24.2	24.5	23.1	21.8	19.0	15.3	16.9
	Comments		closed 1/2T	no change	opened 1/4T	no change	opened 1/4T	no change	no change	no change	opened 1T	opened 1/4T	closed 1/4T	closed 1/2T
2-17	Well	"H2O	0.54	0.56	-0.30	0.02	-0.80	-0.20	-1.52	-0.86	-1.56	-0.46	0.10	0.00
	Lateral	"H2O	-17.71	-15.42	-11.81	-8.42	-11.93	-7.80	-9.46	-10.93	-11.44	-8.95	-10.59	-12.55
	CH4	%	53.8	58.3	58.8	59.3	58.9	58.8	59.0	50.6	51.8	33.0	57.6	57.6
	CO2	%	46.2	41.1	40.7	40.3	40.2	40.2	39.8	36.0	37.2	22.9	41.9	41.7
	O2	%	0.1	0.5	0.4	0.4	0.6	0.4	0.7	3.4	2.4	9.7	0.4	0.6
	BAL (N2)	%	0.0	0.0	0.0	0.0	0.0	0.6	0.5	10.0	8.7	34.3	0.0	0.0
	CO	PPM	3	0	<<<<	24	0	7	8	0	14	11	29	23
	H2S	PPM	44	15	10	14	3	7	0	1	6	3	4	2
	Vel Max	m/s	-	1.91	1.28	1.74	1.48	2.64	3.62	2.09	2.77	2.31	1.19	1.23
	Vel Min	m/s	-	1.81	1.20	1.58	1.43	2.34	3.39	2.02	2.64	2.23	1.02	1.15
	Flow	CFM	-	17.58	11.72	15.69	13.75	23.53	33.12	19.42	25.56	21.45	10.44	11.24
	Temp	˚C	-	12.4	18.5	21.3	27.9	21.8	24.0	22.9	16.0	7.6	9.0	9.5
	Comments		kanaflex frozen	no change	no change	no change	opened 1/4T	no change	no change	no change	opened 1/4T	closed 1/4T	opened 1/4T	no change

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
2-18	*Well*	"H 2 O	-0.64	-1.66	-2.49	-1.96	-5.29	-1.91	-5.58	-4.15	-2.16	-4.52	-5.22	-5.32
	Lateral	"H 2 O	-14.05	-15.11	-11.41	-8.72	-10.03	-7.58	-9.09	-11.55	-12.62	-7.84	-8.16	-8.60
	CH 4	%	55.6	47.7	52.6	51.7	40.6	52.6	53.8	30.1	32.7	33.6	31.2	31.0
	CO 2	%	40.9	37.8	38.9	38.7	35.8	39.2	39.7	31.1	31.0	31.6	29.8	29.0
	O 2	%	1.2	1.6	0.5	0.5	0.7	0.4	0.6	1.0	1.2	1.6	2.4	2.9
	BAL (N 2)	%	2.1	13.0	7.9	9.0	22.9	7.8	5.9	37.8	35.0	33.1	36.6	37.1
	CO	PPM	0	0	<<<<	53	0	28	81	68	72	92	61	63
	H 2 S	PPM	40	35	27	55	13	27	19	22	35	20	10	14
	Vel Max	m/s	4.56	6.47	7.14	5.90	11.27	6.65	10.33	7.74	3.93	10.83	12.82	13.74
	Vel Min	m/s	4.45	6.13	6.99	5.09	10.81	6.26	9.77	7.46	3.71	10.49	12.38	13.23
	Flow	CFM	42.57	59.53	66.76	51.92	104.32	61.00	94.97	71.82	36.10	100.73	119.06	127.43
	Temp	ˇ C	28.3	31.9	32.3	33.2	35.7	33.7	38.6	36.2	34.2	38.0	36.8	38.6
	Comments		opened 1/2T	no change	no change	opened 1T	closed 1T	no change	no change	closed 1/2T	opened 2T	opened 1/2T	no change	opened 1T
3-19	*Well*	"H 2 O	-0.77	-1.72	0.10	-0.90	-4.41	-2.15	-1.42	-1.21	0.85	0.18	-1.44	-0.66
	Lateral	"H 2 O	-14.77	-15.01	-9.72	-8.95	-11.06	-8.64	-9.32	-10.69	-11.34	-8.88	-10.77	-10.60
	CH 4	%	25.0	49.4	58.3	59.0	54.0	54.0	44.6	39.7	57.8	57.4	40.2	41.1
	CO 2	%	18.9	38.5	41.3	40.1	37.7	38.9	33.0	29.5	42.0	42.3	28.8	30.3
	O 2	%	13.5	3.0	0.4	0.9	2.2	1.4	4.4	6.0	0.2	0.2	7.6	7.1
	BAL (N 2)	%	42.5	9.1	0.0	0.0	6.0	5.7	18.0	24.9	0.0	0.0	23.4	21.5
	CO	PPM	0	8	12	14	0	0	0	0	0	1	3	0
	H 2 S	PPM	11	45	94	81	62	71	51	32	179	106	22	22
	Vel Max	m/s	-	4.60	4.72	4.92	6.74	6.22	6.36	5.75	2.25	3.27	5.85	4.69
	Vel Min	m/s	-	4.48	4.46	4.65	6.63	6.10	5.85	5.37	1.97	3.20	5.43	4.53
	Flow	CFM	-	42.90	43.37	45.22	63.17	58.21	57.69	52.54	19.94	30.57	53.29	43.56
	Temp	ˇ C	-	7.7	13.3	14.8	18.0	19.1	21.1	19.7	16.4	11.1	9.6	11.5
	Comments		kanaflex frozen	no change	opened 1/4T	opened 1/4T	no change	no change	closed 1/4T	closed 1/2T	opened 1/4T	opened 1/4T	closed 1/4T	no change
3-20	*Well*	"H 2 O	-13.52	-14.47	-8.62	-7.77	-10.09	-7.78	-7.68	-9.98	-16.30	-8.06	-9.60	-11.69
	Lateral	"H 2 O	-14.04	-15.25	-8.91	-7.94	-10.43	-8.22	-7.95	-10.19	-16.83	-8.52	-10.19	-12.08
	CH 4	%	56.2	56.5	56.8	57.1	56.7	56.5	56.3	56.0	56.1	56.1	55.7	55.9
	CO 2	%	42.4	43.1	42.8	42.5	42.9	42.5	43.1	43.6	43.4	43.3	43.5	43.2
	O 2	%	1.5	0.8	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.7
	BAL (N 2)	%	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	CO	PPM	0	7	162	203	211	163	119	104	69	74	24	37
	H 2 S	PPM	7	2	14	17	16	13	18	5	10	7	3	4
	Vel Max	m/s	10.57	7.03	7.59	7.80	7.56	8.13	6.57	6.52	9.54	5.85	8.14	7.22
	Vel Min	m/s	10.17	6.88	7.22	7.48	7.17	7.89	6.29	6.17	8.81	5.48	7.31	6.13
	Flow	CFM	97.99	65.72	69.97	72.19	69.60	75.69	60.76	59.96	86.70	53.53	73.00	63.07
	Temp	ˇ C	6.7	8.7	10.8	11.5	14.0	13.2	11.6	11.0	10.7	9.0	7.4	8.8
	Comments		full open	full open	full -> nc	full -> nc	full -> nc	full -> nc	full -> nc	full -> nc	full -> nc	full -> nc	Full -> nc	Full->nc

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
3-21	*Well*	"H 2 O	-0.02	0.28	1.92	-5.56	1.37	1.79	0.18	-0.10	0.24	0.19	0.21	0.22
	Lateral	"H 2 O	-15.50	-15.49	-10.09	-8.97	-11.75	-9.44	-10.24	-10.83	-11.41	-8.99	-11.43	-13.29
	CH 4	%	40.4	4.0	57.0	35.4	56.9	57.1	56.5	56.0	56.6	55.6	55.8	54.7
	CO 2	%	31.6	2.7	42.4	25.9	42.6	42.4	43.0	43.5	43.2	43.5	43.8	43.9
	O 2	%	7.1	20.5	0.3	8.5	0.4	0.4	0.3	0.4	0.2	0.3	0.3	0.7
	BAL (N 2)	%	20.8	72.8	0.0	29.8	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	CO	PPM	0	0	9	23	0	0	0	0	0	0	2	0
	H 2 S	PPM	1	0	71	7	40	42	45	22	40	32	38	30
	Vel Max	m/s	-	-	0.00	0.52	-	-	-	-	-	0.00	-	-
	Vel Min	m/s	-	-	0.00	0.49	-	-	-	-	-	0.00	-	-
	Flow	CFM	-	-	0	4.77	-	-	-	-	-	0	-	-
	Temp	˚C	-	-	19.7	23.1	-	-	-	-	-	5.0	-	-
	Comments		closed well	closed -> nc	Closed ->1/4T	closed well	closed -> nc	closed -> nc	closed -> nc	closed -> nc	closed -> nc	closed	closed -> nc	closed -> nc
3-22	*Well*	"H 2 O	-0.30	0.04	-0.02	0.06	-0.31	-0.04	0.19	-0.44	-0.31	-0.03	-0.12	0.01
well bore sea	*Lateral*	"H 2 O	-15.47	-15.21	-11.58	-9.10	-11.04	-9.23	-8.58	-10.68	-17.62	-8.86	-10.99	-13.00
	CH 4	%	37.5	57.3	50.3	58.1	45.6	56.4	56.8	38.6	18.9	46.8	39.7	56.1
	CO 2	%	27.9	42.2	35.3	41.4	33.5	41.9	42.9	28.4	13.9	33.6	28.2	39.0
	O 2	%	8.8	0.4	3.5	0.3	4.4	0.4	0.3	7.5	14.0	4.8	8.0	2.3
	BAL (N 2)	%	25.8	0.0	10.6	0.0	16.6	1.3	0.0	25.7	53.3	15.0	24.8	2.7
	CO	PPM	0	183	0	258	255	397	98	0	0	10	5	0
	H 2 S	PPM	226	413	341	414	347	346	500	362	171	452	383	500
	Vel Max	m/s	2.88	2.07	1.94	1.75	3.11	2.99	2.64	3.33	3.73	1.74	1.19	1.53
	Vel Min	m/s	2.62	1.97	1.86	1.68	3.02	2.78	2.56	3.27	3.58	1.68	1.04	1.48
	Flow	CFM	25.99	19.09	17.95	16.21	28.96	27.26	24.57	31.18	34.54	16.16	10.54	14.22
	Temp	˚C	4.5	9.6	20.4	24.6	27.6	27.5	23.2	18.0	16.7	12.5	7.8	13.4
	Comments		no change	no change	no change	opened 1/4T	no change	no change	no change	closed 1/4T	closed 1/4T	closed 1/4T	no change	no change
3-23	*Well*	"H 2 O	-10.47	-8.72	-8.44	-8.03	well	-5.70	-7.66	-9.14	-14.20	-7.73	-10.18	-9.57
	Lateral	"H 2 O	-17.78	-15.53	-9.30	-8.39	is	-6.65	-8.17	-9.63	-14.79	-8.13	-10.43	-9.73
	CH 4	%	48.5	59.2	58.2	58.5	broken	59.1	55.7	44.7	42.2	46.0	57.9	40.6
	CO 2	%	38.6	40.1	39.7	39.3	at	40.5	41.0	37.2	35.6	35.7	41.5	32.8
	O 2	%	1.2	0.3	0.5	0.5	the	0.3	0.3	0.8	1.3	1.9	0.5	3.6
	BAL (N 2)	%	11.4	0.4	1.5	1.6	moment	0.0	3.0	17.3	20.8	16.4	0.0	22.9
	CO	PPM	0	0	22	23	could	0	0	8	<<<<	3	0	0
	H 2 S	PPM	53	57	71	76	not	159	135	120	98	100	231	54
	Vel Max	m/s	7.75	6.17	5.24	5.27	record	7.80	5.43	8.06	7.25	5.58	3.98	4.69
	Vel Min	m/s	7.00	6.08	5.02	5.16	data	7.59	5.27	7.78	7.12	5.36	3.73	4.44
	Flow	CFM	69.69	57.88	48.48	49.28	-	72.71	50.55	74.84	67.89	51.69	36.43	43.14
	Temp	˚C	19.3	14.7	17.4	19.1	-	21.4	23.6	25.1	24.9	27.6	29.8	30.0
	Comments		no change	opened 1T	opened 1/2T	opened 1/2T	-	opened 3T	opened 1/4T	no change	no change	opened 1T	no change	opened 2T

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
3-24	Well	"H 2 O	0.22	0.12	0.04	0.05	-0.03	0.07	-0.03	-0.03	-0.05	0.10	0.03	0.07
	Lateral	"H 2 O	-15.79	-15.50	-11.74	-8.96	-11.37	-9.17	-10.22	-11.10	-16.32	-8.97	-11.06	-13.03
	CH 4	%	42.7	57.0	42.0	57.6	44.9	56.9	56.4	52.3	6.4	36.5	33.0	26.6
	CO 2	%	32.5	42.5	30.3	42.0	33.1	42.1	42.6	36.8	4.7	27.7	28.5	20.3
	O 2	%	6.5	0.4	6.1	0.4	4.6	0.4	0.4	1.7	19.1	8.4	9.5	12.6
	BAL (N 2)	%	17.5	0.0	23.0	0.0	17.4	0.7	0.6	9.2	69.8	27.4	29.1	40.5
	CO	PPM	0	393	155	536	379	484	362	25	<<<<	62	5	29
	H 2 S	PPM	86	158	121	175	130	126	197	126	37	186	104	155
	Vel Max	m/s	1.17	2.47	2.31	2.16	3.58	1.80	1.91	1.81	2.23	1.47	1.22	7.87
	Vel Min	m/s	1.04	2.35	2.22	2.06	3.47	1.75	1.73	1.71	2.09	1.38	0.92	7.56
	Flow	CFM	10.44	22.77	21.40	19.94	33.31	16.77	17.20	16.63	20.41	13.47	10.11	72.90
	Temp	˚C	-6.8	7.7	19.2	22.8	25.5	28.1	27.8	26.7	15.2	8.8	0.3	20.4
	Comments		no change	no change	no change	pened 1/4T mo	closed 1/4T	no change	no change	no change	no change	closed 1/4T	no change	closed well
3-25	Well	"H 2 O	-17.41	-15.03	-11.06	-8.81	-10.87	-7.17	-7.58	-11.26	-16.99	-8.81	-10.45	-12.85
	Lateral	"H 2 O	-18.72	-15.15	-11.38	-9.15	-11.18	-7.50	-7.86	-11.46	-17.84	-9.11	-10.83	-13.19
	CH 4	%	42.8	50.1	53.2	53.3	54.0	57.7	53.7	52.1	43.6	52.8	50.6	51.2
	CO 2	%	36.6	39.9	40.2	39.8	40.1	40.3	41.8	41.8	38.8	41.6	39.9	40.7
	O 2	%	2.9	2.4	0.5	0.4	0.4	0.4	0.3	0.5	0.3	0.2	0.5	0.4
	BAL (N 2)	%	17.6	4.2	6.3	6.5	5.5	1.5	4.1	5.5	17.3	5.3	9.0	7.7
	CO	PPM	0	1	0	14	0	0	0	0	0	1	0	0
	H 2 S	PPM	40	56	50	64	68	77	74	53	30	56	36	41
	Vel Max	m/s	11.88	8.21	7.26	6.25	8.25	6.55	5.81	5.87	10.10	6.07	9.33	7.87
	Vel Min	m/s	10.24	8.06	7.07	5.99	7.39	6.23	5.22	5.07	9.58	5.63	8.98	7.56
	Flow	CFM	104.51	76.87	67.71	57.83	73.89	60.38	52.11	51.69	92.98	55.28	86.51	72.90
	Temp	˚C	20.7	12.3	22.5	23.6	25.5	23.8	25.1	24.7	23.5	21.1	20.5	20.4
	Comments		opened 4T	no change	opened 1T	opened 1/4T	opened 1/4T	full -> nc	full -> nc	full -> nc	full -> nc	full -> nc	Full -> nc	Full->nc
3-26	Well	"H 2 O	-19.46	-15.15	-11.17	-8.34	-10.88	-9.08	-8.10	-11.03	-11.17	-8.68	-10.76	-12.59
	Lateral	"H 2 O	-19.40	-15.17	-11.17	-8.51	-10.84	-9.08	-8.16	-11.07	-11.09	-8.77	-10.80	-12.69
	CH 4	%	55.1	57.7	58.1	58.3	58.0	56.7	57.9	55.1	58.0	57.8	57.5	57.6
	CO 2	%	43.2	41.9	41.5	41.3	41.6	41.0	41.7	40.7	41.5	41.7	41.8	41.5
	O 2	%	1.7	0.4	0.3	0.4	0.4	0.4	0.3	0.6	0.5	0.4	0.6	0.8
	BAL (N 2)	%	0.0	0.0	0.0	0.0	0.0	1.8	0.0	3.5	0.0	0.0	0.0	0.0
	CO	PPM	4	12	16	20	0	10	3	0	0	0	11	0
	H 2 S	PPM	162	108	112	120	97	100	127	99	104	101	78	69
	Vel Max	m/s	3.20	3.53	3.44	3.14	3.67	3.29	4.01	3.60	2.31	2.40	2.51	2.55
	Vel Min	m/s	2.85	3.08	3.27	2.69	3.38	2.94	2.89	3.06	2.09	2.27	1.72	1.66
	Flow	CFM	28.58	31.23	31.70	27.55	33.31	29.43	32.60	31.47	20.79	22.06	19.99	19.89
	Temp	˚C	12.4	16.8	18.3	20.7	25.2	23.8	21.5	22.6	18.2	15.0	15.4	12.7
	Comments		full open	full open	full -> nc	full -> nc	full -> nc	full -> nc	full -> nc	full -> nc	full -> nc	full -> nc	Full -> nc	Full->nc

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
3-27 DP	*Well*	"H 2 O	-16.58	-15.07	-9.57	-8.93	-11.01	-7.45	-8.59	-11.04	-16.23	-8.95	-10.93	-12.66
	Lateral	"H 2 O	-18.66	-15.23	-9.74	-9.08	-11.08	-7.46	-8.43	-11.02	-16.05	-8.93	-10.91	-12.83
	CH 4	%	55.2	56.2	56.8	57.2	56.4	55.3	55.7	52.3	52.2	56.6	56.6	56.0
	CO 2	%	43.3	43.2	42.8	41.4	41.6	41.1	42.7	41.2	40.8	42.7	42.3	43.3
	O 2	%	1.4	0.5	0.4	0.9	0.8	0.7	0.5	0.7	1.1	0.7	1.0	0.6
	BAL (N 2)	%	0.0	0.0	0.0	0.4	1.6	3.0	1.2	5.8	5.8	0.0	0.0	0.0
	CO	PPM	0	12	20	22	0	0	0	4	0	2	0	0
	H 2 S	PPM	229	157	319	315	285	64	61	123	172	179	56	100
	Vel Max	m/s	4.19	2.85	2.32	2.45	2.51	2.08	2.43	2.93	3.41	1.69	2.71	2.67
	Vel Min	m/s	3.79	2.70	2.20	2.30	2.06	1.94	2.29	2.77	3.17	1.55	2.42	1.94
	Flow	CFM	37.70	26.22	21.36	22.44	21.59	18.99	22.30	26.93	31.09	15.31	24.24	21.78
	Temp	˚C	32.7	16.9	29.7	31.5	34.1	27.7	34.4	36.5	32.1	27.0	17.1	24.0
	Comments		opened 3T	no change	no change	no change	no change	no change	no change	no change	opened 1/2T	no change	no change	opened 1/4T
3-28	*Well*	"H 2 O	-1.10	3.18	3.04	0.30	-0.27	-1.08	0.12	-0.07	0.02	-0.01	-0.17	0.00
	Lateral	"H 2 O	-18.53	-14.93	-11.04	-8.32	-10.74	-8.84	-8.88	-9.88	-11.55	-8.48	-10.10	-10.87
	CH 4	%	51.2	51.6	58.3	58.3	58.7	55.5	57.8	39.7	57.9	48.5	40.8	51.2
	CO 2	%	35.4	41.8	41.3	40.9	40.7	39.5	41.8	28.8	41.9	34.0	28.9	36.7
	O 2	%	4.3	1.5	0.3	0.4	0.6	1.0	0.4	6.5	0.3	4.5	7.5	3.7
	BAL (N 2)	%	9.2	5.1	0.0	0.0	0.0	4.0	0.0	24.9	0.0	13.0	22.8	8.6
	CO	PPM	8	81	57	118	67	96	64	0	30	42	47	19
	H 2 S	PPM	73	104	97	105	83	97	115	49	111	81	63	57
	Vel Max	m/s	3.62	3.18	3.36	3.96	4.66	4.98	5.19	5.22	1.45	4.25	4.74	2.62
	Vel Min	m/s	3.56	3.04	3.30	3.85	4.53	4.87	5.06	5.10	1.39	4.09	4.49	2.49
	Flow	CFM	33.92	29.39	31.47	36.90	43.42	46.54	48.43	48.76	13.42	39.40	43.61	24.14
	Temp	˚C	12.9	6.0	19.6	22.6	26.6	24.5	21.4	21.4	16.5	15.0	12.9	14.6
	Comments		closed 1/4T	no change	opened 1/4T	no change	opened 1/4T	no change	opened 1/4T	closed 1/4T	nc	closed 1/4T	closed 1/4T	no change
3-29 DP	*Well*	"H 2 O	-3.36	1.53	-6.17	-5.89	-6.12	0.50	0.60	-1.79	-0.01	-0.33	-5.17	-7.40
	Lateral	"H 2 O	-19.49	-15.50	-10.94	-8.34	-10.69	-9.27	-8.38	-10.79	-11.25	-8.81	-10.69	-12.97
	CH 4	%	51.2	47.4	58.8	59.0	40.5	56.8	58.4	29.5	58.8	58.0	57.7	58.9
	CO 2	%	34.5	40.6	40.7	40.6	28.5	40.0	41.0	21.9	40.3	38.8	39.5	40.3
	O 2	%	4.2	1.6	0.4	0.4	6.0	0.3	0.4	8.9	0.8	1.6	1.1	0.7
	BAL (N 2)	%	10.2	10.5	0.0	0.0	25.0	2.9	0.0	39.6	0.0	1.5	1.6	0.1
	CO	PPM	4	9	15	19	0	11	0	0	0	0	11	0
	H 2 S	PPM	154	211	232	238	143	238	313	107	215	199	179	169
	Vel Max	m/s	4.86	4.30	5.03	4.72	7.09	4.47	4.31	6.44	2.84	2.53	4.31	4.10
	Vel Min	m/s	4.68	4.14	4.84	4.40	6.47	4.34	4.13	6.18	2.55	2.44	4.12	3.92
	Flow	CFM	45.07	39.88	46.63	43.09	64.07	41.62	39.88	59.63	25.47	23.48	39.83	37.89
	Temp	˚C	17.0	28.9	30.3	31.2	31.3	32.8	30.0	28.4	26.9	22.9	24.1	23.1
	Comments		no change	opened 1/2T	opened 1/4T	no change	closed 3/4T	opened 1/4T	opened 1/4T	closed 1/2T	nc	opened 1/4T	opened 1/4T	opened 1/4T

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
3-30 DP	*Well*	"H 2 O	-2.29	-0.74	-0.69	-0.78	-0.59	-0.26	-1.26	-0.91	-1.33	-0.61	-1.21	-1.47
	Lateral	"H 2 O	-18.78	-15.34	-10.80	-8.48	-11.14	-7.73	-8.94	-10.81	-11.23	-8.95	-10.86	-13.06
	CH 4	%	40.1	53.5	54.2	57.9	57.2	58.2	57.4	37.8	39.8	44.5	49.5	51.0
	CO 2	%	31.1	37.2	38.3	39.5	39.9	40.0	40.6	31.9	32.1	32.6	35.6	36.6
	O 2	%	3.8	3.0	1.0	0.5	0.3	0.5	0.9	1.6	2.0	4.4	2.2	1.9
	BAL (N 2)	%	25.0	6.4	6.4	2.3	2.6	1.3	1.0	28.7	26.2	18.4	12.8	10.4
	CO	PPM	0	12	18	25	8	6	0	0	0	0	13	2
	H 2 S	PPM	42	186	238	280	260	243	146	80	110	125	99	83
	Vel Max	m/s	7.47	5.32	5.32	4.38	5.32	5.57	7.43	6.51	5.80	5.21	6.13	5.60
	Vel Min	m/s	7.06	5.22	5.09	4.29	5.19	5.37	7.23	6.43	5.68	5.12	6.02	5.47
	Flow	CFM	68.65	49.80	49.18	40.96	49.66	51.69	69.26	61.14	54.24	48.81	57.41	52.30
	Temp	˚C	44.0	32.8	35.8	36.2	38.4	35.6	41.5	40.0	39.5	36.3	34.0	32.9
	Comments		no change	no change	no change	no change	opened 1/4T	no change	no change	no change	no change	no change	no change	no change
4-31	*Well*	"H 2 O	-4.21	-9.12	-7.26	-7.33	-9.61	-7.72	-8.76	-9.29	-9.10	-5.48	-8.35	-8.03
	Lateral	"H 2 O	-13.28	-15.11	-8.61	-7.99	-10.12	-7.90	-8.96	-10.23	-9.38	-6.11	-10.44	-9.32
	CH 4	%	36.4	48.8	57.8	57.8	53.8	56.5	56.9	46.4	37.1	30.0	50.9	39.5
	CO 2	%	28.3	38.3	41.9	41.8	38.8	41.5	42.3	35.6	27.6	22.5	36.6	29.9
	O 2	%	8.4	2.8	0.3	0.4	1.8	0.4	0.3	3.1	7.4	10.5	3.5	7.0
	BAL (N 2)	%	26.8	10.0	0.0	0.0	5.5	1.6	0.5	15.0	27.9	37.0	9.0	23.5
	CO	PPM	0	13	20	20	0	0	0	0	0	4	6	0
	H 2 S	PPM	12	32	83	74	52	66	66	29	29	12	42	24
	Vel Max	m/s	12.54	9.34	8.35	7.44	9.49	8.62	8.38	10.14	9.07	12.63	7.31	9.47
	Vel Min	m/s	12.10	9.08	8.11	7.14	9.34	8.47	8.04	9.89	8.14	12.05	6.83	9.04
	Flow	CFM	116.42	87.03	77.77	68.89	88.97	80.75	77.58	94.64	81.31	116.61	66.81	87.45
	Temp	˚C	5.6	14.0	17.3	18.4	21.4	21.9	22.2	22.0	19.9	16.1	17.1	16.6
	Comments		opened 1T	no change	opened 1/2T	opened 1/4T	no change	opened 1/4T	no change	opened 1.5T	closed 1/2T	closed 3T	opened 1/4T	closed 1/2T
4-32	*Well*	"H 2 O	1.53	0.32	4.46	3.90	0.29	1.22	1.07	1.18	4.26	-0.17	-1.11	-1.17
	Lateral	"H 2 O	-14.81	-15.49	-10.07	-9.39	-11.60	-9.23	-10.07	-11.22	-11.23	-8.68	-10.30	-13.50
	CH 4	%	67.6	66.7	69.6	69.5	46.7	63.4	61.6	60.5	56.9	56.5	55.9	56.2
	CO 2	%	32.1	32.7	30.0	29.8	24.9	32.5	35.8	37.9	42.7	43.1	43.2	43.0
	O 2	%	0.3	0.6	0.4	0.4	5.5	0.5	0.4	0.4	0.3	0.3	0.7	0.7
	BAL (N 2)	%	0.0	0.0	0.0	0.0	22.8	3.7	2.2	1.1	0.0	0.0	0.0	0.0
	CO	PPM	0	8	10	13	0	0	0	0	0	5	0	0
	H 2 S	PPM	33	199	>>>>	>>>>	30	220	282	329	372	368	342	359
	Vel Max	m/s	-	-	-	-	-	-	-	-	0.71	0.77	1.37	1.11
	Vel Min	m/s	-	-	-	-	-	-	-	-	0.65	0.69	1.26	0.83
	Flow	CFM	-	-	-	-	-	-	-	-	6.43	6.90	12.43	9.17
	Temp	˚C	-	-	-	-	-	-	-	-	15.4	6.1	4.8	3.0
	Comments		closed	closed -> nc	closed -> nc	closed -> nc	closed -> nc	closed -> nc	closed -> nc	closed -> nc	opened 1/4T	no change	no change	no change

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
4-33	Well	"H 2 O	0.04	0.40	0.38	-0.06	-0.08	0.33	-0.02	0.07	0.06	0.20	-0.17	-0.31
	Lateral	"H 2 O	-18.61	-14.90	-9.75	-8.59	-10.50	-9.16	-8.14	-10.84	-15.86	-8.95	-10.55	-10.48
	CH 4	%	45.2	47.8	58.2	57.2	57.2	56.4	46.6	57.7	45.0	57.3	45.1	37.4
	CO 2	%	33.7	31.9	41.4	39.1	40.1	40.7	34.7	41.5	33.5	42.3	32.0	27.6
	O 2	%	5.8	3.0	0.3	1.4	0.9	0.3	3.5	0.3	4.4	0.3	6.1	8.4
	BAL (N 2)	%	15.4	17.4	0.0	2.4	1.7	2.7	15.0	0.5	17.2	0.0	16.7	26.4
	CO	PPM	0	34	39	27	31	34	0	27	0	11	1	0
	H 2 S	PPM	106	200	219	212	232	249	194	269	242	348	228	165
	Vel Max	m/s	4.48	3.75	3.94	4.51	4.53	4.21	5.21	2.90	4.62	3.44	5.68	5.13
	Vel Min	m/s	4.25	3.59	3.77	3.90	4.38	4.07	4.77	2.74	4.45	3.19	5.47	4.97
	Flow	CFM	41.25	34.68	36.43	39.73	42.10	39.12	47.15	26.65	42.85	31.32	52.68	47.72
	Temp	˚C	17.3	13.2	24.7	25.6	26.9	28.7	26.9	28.3	24.9	21.1	18.2	19.7
	Comments		no change	no change	opened 1/4T	no change	no change	opened 1/4T	closed 1T	opened 1/2T	closed 1/4T	opened 1/2T	no change	closed 1/4T
4-34	Well	"H 2 O	-5.56	-13.53	-8.58	-8.21	-9.99	-6.00	-8.55	-5.75	0.36	-1.32	0.41	0.52
	Lateral	"H 2 O	-18.18	-14.89	-9.50	-9.08	-11.26	-7.18	-9.75	-10.87	-16.27	-6.92	-10.75	-10.41
	CH 4	%	30.0	45.3	51.0	51.5	47.3	54.7	37.7	11.9	56.4	9.6	38.1	37.8
	CO 2	%	25.5	34.4	39.7	39.8	38.4	41.2	31.3	9.4	42.3	7.3	28.2	29.0
	O 2	%	9.3	2.5	0.4	0.3	0.6	0.5	4.5	16.5	0.3	18.9	8.7	7.8
	BAL (N 2)	%	35.1	17.7	9.0	8.4	13.5	3.6	26.6	62.1	0.0	64.2	25.1	25.5
	CO	PPM	0	42	47	46	0	25	1	0	0	0	1	0
	H 2 S	PPM	65	233	380	408	353	457	272	62	>>>>	52	>>>>	>>>>
	Vel Max	m/s	15.62	12.86	10.90	8.62	9.81	8.60	10.02	23.63	0.65	16.04	2.55	2.24
	Vel Min	m/s	14.87	12.20	10.37	8.31	9.57	8.29	9.78	21.02	0.49	14.70	2.37	1.86
	Flow	CFM	144.06	118.40	100.49	79.99	91.57	79.80	93.55	210.96	5.39	145.24	23.25	19.37
	Temp	˚C	31.5	19.9	28.2	28.3	29.3	27.4	34.4	25.0	16.1	16.2	13.0	16.9
	Comments		opened 5T mor	no change	no change	no change	no change	no change	closed 1T	closed 3T	cracked -> 3T	closed 2.5T	closed 1/4T	closed 1/4T
4-35	Well	"H 2 O	1.49	0.20	0.31	-1.59	-1.31	-0.39	-1.08	-1.41	0.17	0.01	-0.52	-0.38
well bore sea	Lateral	"H 2 O	frozen	-15.90	-10.79	-8.99	-11.19	-7.66	-8.97	-10.85	-11.57	-7.48	-10.45	-10.26
	CH 4	%	55.1	44.3	57.5	49.5	51.3	55.9	49.8	41.2	56.9	57.1	44.7	41.6
	CO 2	%	44.7	30.7	42.1	36.0	38.2	40.7	38.5	33.5	42.7	41.2	32.8	31.2
	O 2	%	0.1	3.5	0.3	2.8	2.1	0.8	1.5	3.1	0.3	1.2	5.7	6.2
	BAL (N 2)	%	0.0	21.4	0.0	11.7	8.4	2.5	10.1	22.3	0.0	0.4	16.7	20.8
	CO	PPM	0	10	214	154	193	200	95	111	66	71	64	11
	H 2 S	PPM	51	109	121	94	101	95	100	103	128	126	112	103
	Vel Max	m/s	-	2.52	2.22	4.78	4.42	3.83	3.89	4.68	1.90	2.52	3.76	3.94
	Vel Min	m/s	-	2.44	2.01	4.57	4.25	3.66	3.75	4.48	1.84	2.40	3.62	3.85
	Flow	CFM	-	23.43	19.99	44.18	40.96	35.39	36.10	43.28	17.67	23.25	34.87	36.81
	Temp	˚C	-	1.4	18.2	19.2	23.3	22.3	22.5	22.8	16.8	11.0	9.2	10.7
	Comments		frozen	no change	opened 1/2T	closed 1/4T	no change	no change	no change	closed 1/2T	opened 1/4T	opened 1/4T	closed 1/4T	closed 1/4T

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
4-36	*Well*	"H_2O	0.75	0.18	0.26	0.22	0.22	0.52	0.16	-0.06	0.89	0.02	-0.22	-0.58
	Lateral	"H_2O	-18.81	-15.15	-10.25	-7.98	-9.91	-8.72	-8.14	-10.76	-11.02	-6.75	-9.90	-9.57
	CH_4	%	54.1	56.1	57.0	57.2	56.9	55.9	56.8	55.5	56.6	56.0	49.1	54.5
	CO_2	%	45.6	43.5	42.5	42.4	42.6	42.0	42.9	42.5	43.0	43.6	36.7	40.5
	O_2	%	0.2	0.3	0.4	0.3	0.3	0.2	0.2	0.4	0.3	0.3	3.7	2.0
	BAL (N_2)	%	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.5	0.0	0.0	10.6	3.0
	CO	*PPM*	0	11	95	108	138	96	47	74	0	19	45	1
	H_2S	*PPM*	185	219	247	277	290	250	271	306	309	341	285	300
	Vel Max	*m/s*	-	1.51	1.54	1.42	1.88	1.68	2.23	2.84	2.00	2.27	5.67	3.62
	Vel Min	*m/s*	-	1.44	1.47	1.33	1.79	1.57	2.13	2.77	1.77	2.12	5.08	3.28
	Flow	*CFM*	-	13.94	14.22	12.99	17.34	15.36	20.60	26.51	17.81	20.74	50.79	32.60
	Temp	˚C	-	1.5	20.9	24.6	31.0	30.3	26.3	26.2	20.3	16.0	14.9	17.8
	Comments		frozen	no change	no change	no change	no change	opened 1/4T	no change	no change	opened 1/4T	opened 1/4T	closed 1/4T	opened 1/4T
4-37	*Well*	"H_2O	0.52	0.05	0.00	0.01	-0.03	0.03	-0.08	-0.11	0.00	0.04	-0.06	-0.08
	Lateral	"H_2O	-18.83	-15.96	-10.52	-8.96	-10.88	-9.88	-10.81	-10.78	-17.90	-7.57	-10.32	-10.46
	CH_4	%	55.2	57.5	57.6	57.9	57.5	56.8	57.4	13.9	18.3	56.8	45.6	54.4
	CO_2	%	44.5	41.8	41.9	41.7	42.1	42.1	40.7	10.8	14.0	42.6	33.7	39.5
	O_2	%	0.3	0.7	0.3	0.3	0.3	0.3	0.8	14.9	13.9	0.3	4.8	2.2
	BAL (N_2)	%	0.0	0.0	0.0	0.0	0.0	0.8	1.1	60.4	53.8	0.0	15.8	4.5
	CO	*PPM*	0	8	37	35	49	44	67	0	0	0	32	0
	H_2S	*PPM*	444	222	191	236	263	168	204	51	80	498	159	173
	Vel Max	*m/s*	-	1.53	1.24	1.40	1.37	1.35	1.51	3.24	2.01	0.42	1.78	1.64
	Vel Min	*m/s*	-	1.45	1.19	1.32	1.26	1.27	1.43	3.14	1.93	0.00	1.65	1.42
	Flow	*CFM*	-	14.08	11.48	12.85	12.43	12.38	13.89	30.14	18.62	1.98	16.21	14.46
	Temp	˚C	-	1.2	21.0	22.1	30.3	29.9	20.3	22.0	17.8	7.0	9.7	9.6
	Comments		frozen	no change	no change	no change	no change	opened 1/4T	no change	closed 1/4T	no change	opened 1/4T	no change	no change
5-38	*Well*	"H_2O	0.25	0.08	0.16	0.10	0.02	-0.05	-0.06	-0.03	0.00	0.01	0.12	0.07
	Lateral	"H_2O	-14.49	-15.20	-9.56	-8.97	-11.14	-8.95	-9.98	-11.06	-11.72	-9.16	-10.55	-13.29
	CH_4	%	47.6	2.4	24.9	25.8	0.0	20.1	43.0	50.6	57.4	57.5	53.9	56.8
	CO_2	%	33.7	2.5	28.5	28.8	0.1	24.3	36.7	40.5	41.8	41.0	39.5	41.7
	O_2	%	4.7	21.2	10.1	9.1	20.4	11.0	3.5	1.5	0.7	1.1	2.7	1.3
	BAL (N_2)	%	14.0	73.8	36.3	36.4	79.5	44.5	16.7	7.4	0.0	0.5	4.0	0.0
	CO	*PPM*	0	2	17	5	0	0	0	0	0	4	4	0
	H_2S	*PPM*	4	0	0	0	0	0	8	6	3	6	0	3
	Vel Max	*m/s*	-	-	-	-	-	-	-	-	-	-	-	-
	Vel Min	*m/s*	-	-	-	-	-	-	-	-	-	-	-	-
	Flow	*CFM*	-	-	-	-	-	-	-	-	-	-	-	-
	Temp	˚C	-	-	-	-	-	-	-	-	-	-	-	-
	Comments		closed	closed -> nc	closed -> nc	closed -> nc	closed -> nc	closed -> nc	closed -> nc	closed -> nc	closed -> nc	closed -> nc	closed -> nc	closed-->nc

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
5-39	Well	"H 2 O	-13.56	-14.51	-8.94	-8.40	-10.39	-6.24	-9.17	-9.88	-10.42	-8.15	-10.73	-12.80
well bore sea	Lateral	"H 2 O	-13.80	-14.67	-9.09	-8.51	-10.44	-6.54	-9.16	-9.95	-10.54	-8.51	-10.71	-12.92
	CH 4	%	56.3	56.4	57.9	58.1	57.9	57.2	56.6	57.1	57.4	57.0	56.1	56.5
	CO 2	%	41.3	41.8	41.2	41.2	41.5	41.0	41.8	41.8	42.4	42.6	43.1	42.8
	O 2	%	1.9	0.9	0.8	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.5	0.6
	BAL (N 2)	%	0.5	1.0	0.0	0.0	0.0	1.3	1.4	0.8	0.0	0.0	0.0	0.0
	CO	PPM	0	112	199	152	238	177	125	115	35	73	33	60
	H 2 S	PPM	26	52	64	56	81	85	64	61	52	49	45	44
	Vel Max	m/s	5.12	3.63	4.49	4.36	4.36	4.63	4.46	5.70	5.25	5.07	4.19	3.88
	Vel Min	m/s	4.25	3.43	4.37	4.23	4.19	4.36	4.37	5.32	5.03	4.77	4.09	3.57
	Flow	CFM	44.27	33.36	41.86	40.59	40.40	42.48	41.72	52.07	48.57	46.49	39.12	35.20
	Temp	˚C	1.3	6.6	12.9	14.2	20.1	17.5	19.0	17.8	13.7	10.1	9.2	8.3
	Comments		opened 2T	opened 1T	no change	opened 2T	opened 1T	full -> nc	no change	full -> nc	full -> nc	full -> nc	Full -> nc	Full->nc
5-40	Well	"H 2 O	-0.64	-0.38	-0.93	-0.63	-1.18	-0.74	-1.21	-1.07	-1.58	-0.60	0.26	0.65
	Lateral	"H 2 O	-16.53	-15.08	-9.27	-8.56	-10.70	-7.01	-9.63	-10.28	-12.61	-7.01	-10.39	-9.81
	CH 4	%	42.5	53.6	51.1	50.9	48.5	55.7	49.1	46.3	46.4	44.2	38.9	36.7
	CO 2	%	34.7	39.6	38.0	38.0	37.7	41.0	39.0	37.3	37.3	35.4	28.5	27.6
	O 2	%	4.4	2.9	1.5	1.3	1.4	0.4	1.0	1.5	1.9	2.9	8.2	8.1
	BAL (N 2)	%	18.3	4.0	9.5	9.7	12.4	2.8	10.9	14.8	14.3	17.4	24.4	27.6
	CO	PPM	0	12	1	23	0	11	0	0	0	0	5	0
	H 2 S	PPM	60	137	110	126	118	170	180	148	143	64	156	143
	Vel Max	m/s	4.30	3.69	4.21	4.27	4.18	3.63	3.63	4.59	4.08	4.40	3.26	3.41
	Vel Min	m/s	3.87	3.49	4.07	4.05	4.07	3.26	3.49	4.38	3.90	4.26	3.17	3.14
	Flow	CFM	38.60	33.92	39.12	39.31	38.98	32.55	33.64	42.38	37.70	40.92	30.38	30.95
	Temp	˚C	29.7	21.1	33.4	34.7	36.6	31.0	35.0	36.0	34.2	32.3	16.9	21.5
	Comments		no change	opened 1/4T	no change	no change	no change	no change	no change	no change	opened 1/2 T	closed 1/2T	closed 1/4T	closed 1/4T
5-41	Well	"H 2 O	-9.16	-12.09	-5.77	-5.35	-7.23	-4.34	-2.19	0.15	-0.01	0.20	-0.43	-0.47
well bore sea	Lateral	"H 2 O	-11.38	-12.98	-6.87	-6.34	-8.13	-4.95	-3.91	-10.66	-11.82	-6.01	-9.30	-10.49
	CH 4	%	47.7	45.2	56.9	57.2	49.1	52.4	51.0	58.7	53.0	43.9	44.9	52.1
	CO 2	%	34.7	35.0	38.9	38.9	34.9	36.9	37.8	41.0	37.1	31.1	32.0	37.1
	O 2	%	4.7	3.0	1.5	1.3	3.0	2.0	1.5	0.3	2.2	5.8	6.4	3.3
	BAL (N 2)	%	12.8	17.0	2.7	2.5	13.0	8.7	9.6	0.0	7.7	19.2	16.7	7.5
	CO	PPM	0	35	64	57	50	29	0	19	12	0	31	1
	H 2 S	PPM	155	301	333	325	319	318	188	413	387	277	251	299
	Vel Max	m/s	16.05	9.98	11.31	10.25	10.97	10.72	13.35	6.55	7.86	6.32	6.65	5.44
	Vel Min	m/s	15.17	8.89	10.88	9.64	10.49	10.23	12.72	5.99	7.33	6.14	5.90	5.10
	Flow	CFM	147.51	89.16	104.84	93.97	101.39	98.98	123.17	59.25	71.77	58.87	59.30	49.80
	Temp	˚C	17.8	13.2	24.4	24.7	28.1	27.1	26.0	24.6	25.2	19.6	14.8	20.1
	Comments		8T to full open	no change	full -> nc	full -> nc	closed 3T	full -> nc	no change	opened 2T	no change	closed 1/2T	closed 1/4T	opened 1/4T

Brady Road Monitoring Data 2016

		Units	14-Jan-16	26-Feb-16	30-Mar-16	29-Apr-16	30-May-16	24-Jun-16	29-Jul-16	30-Aug-16	27-Sep-16	27-Oct-16	28-Nov-16	18-Dec-16
5-42	Well	"H 2 O	0.27	frozen	0.06	-0.05	-0.07	-0.01	-0.54	-0.79	-0.23	-0.26	-0.37	-0.35
	Lateral	"H 2 O	frozen	-15.74	-10.31	-9.03	-11.22	-9.34	-8.95	-10.28	-11.67	-7.25	-10.71	-10.33
	CH 4	%	53.5	56.7	57.5	51.7	56.9	56.1	55.7	56.1	56.6	56.2	56.0	55.5
	CO 2	%	46.0	42.9	41.1	36.5	42.7	42.4	41.9	43.3	43.0	43.2	42.6	44.2
	O 2	%	0.4	0.4	1.1	2.9	0.4	0.4	0.7	0.4	0.3	0.5	1.1	0.3
	BAL (N 2)	%	0.0	0.0	0.3	8.9	0.0	1.0	1.4	0.0	0.0	0.0	0.0	0.0
	CO	PPM	0	19	548	323	611	469	402	226	215	168	268	199
	H 2 S	PPM	76	165	180	119	212	187	228	236	227	256	232	233
	Vel Max	m/s	-	2.39	2.10	3.45	2.91	2.64	2.64	2.36	2.05	2.21	2.40	2.02
	Vel Min	m/s	-	2.26	2.01	3.36	2.74	2.51	2.48	2.22	1.97	2.14	2.17	1.77
	Flow	CFM	-	21.97	19.42	32.18	26.69	24.33	24.19	21.64	18.99	20.55	21.59	17.91
	Temp	˚C	-	1.5	19.1	20.0	25.0	27.3	23.1	19.5	18.0	12.1	19.3	10.4
	Comments		frozen	20T -> nc	20T -> 25T	25T -> 20T	20T -> nc	20T -> nc	20T -> nc	20T -> nc	20T -> nc	20T -> nc	20T -> nc	20T -> nc

Table 4: Water Levels

Brady Road Water Levels 2016

			30-Mar-16				23-Jun-16				27-Sep-16			
Units	meters	meters	meters	meters	°C	%	meters	meters	°C	%	meters	meters	°C	%
Locations	Screen Length	Installed Well Depth	Depth to Water	Depth to Bottom	Temp	Open Screen	Depth to Water	Depth to Bottom	Temp	Open Screen	Depth to Water	Depth to Bottom	Temp	Open Screen
H-1	12.20	14.63	7.84	14.32	25.2	44.29	7.47	14.19	27.1	41.25	7.92	14.20	26.7	44.94
H-2	13.72	16.77	9.81	18.12	28.3	49.28	9.45	17.76	29.6	46.66	9.30	18.06	27.9	45.56
H-3	12.20	15.24	7.76	16.08	9.9	38.63	7.74	15.67	12.4	38.47	7.71	15.98	10.2	38.22
H-4	10.98	14.02	7.19	8.45	12.1	37.73	8.43	9.23	15.6	49.03	8.13	9.01	12.5	46.30
1-5	10.67	13.72	8.76	14.39	18.4	53.52	8.81	14.64	19.7	53.99	8.80	14.67	18.2	53.90
1-6	12.20	15.55	10.78	16.20	20.6	60.90	9.96	16.05	22.9	54.17	10.33	16.14	21.0	57.21
1-7	18.29	21.34	16.16	20.84	24.4	71.67	15.27	20.80	25.3	66.81	16.02	20.83	24.7	70.91
1-8	21.34	24.39	16.29	24.48	30.7	62.04	16.00	24.20	31.7	60.69	16.31	24.45	31.0	62.14
1-9	12.20	14.63	13.21	15.25	30.5	88.32	13.07	15.13	32.4	87.17	13.18	15.29	31.1	88.08
1-10	9.15	12.20	10.50	11.88	24.6	81.47	10.10	11.63	27.6	77.09	10.62	12.00	25.2	82.78
H-11	9.15	12.80	3.43	12.35	19.9	0.00	3.64	12.30	21.2	0.00	3.37	12.36	21.4	0.00
H-12	13.11	16.16	7.98	16.33	19.3	37.61	7.42	15.96	21.1	33.34	7.91	16.24	20.0	37.08
2-13	21.34	25.00	8.03	19.94	41.3	20.48	8.29	19.84	41.6	21.70	8.11	18.69	42.0	20.86
2-14	19.82	22.56	11.41	22.40	23.7	43.73	11.33	22.42	25.7	43.33	11.40	22.42	24.5	43.68
2-15	18.29	21.65	13.16	22.22	15.3	53.61	13.10	21.67	17.1	53.28	13.53	21.93	15.3	55.63
2-16	25.91	28.35	22.38	29.60	15.4	76.95	22.32	29.54	17.4	76.72	22.34	29.56	16.9	76.79
2-17	15.24	18.29	12.97	17.81	20.0	65.08	12.43	17.96	22.1	61.54	13.05	17.87	19.4	65.61
2-18	15.24	18.29	14.92	19.03	26.9	77.88	14.56	18.71	29.3	75.51	14.56	18.50	30.7	75.51
3-19	12.20	14.94	8.27	15.07	12.3	45.31	8.13	14.70	15.8	44.17	8.12	14.74	14.0	44.08
3-20	10.67	13.26	9.92	10.19	6.5	68.68	10.02	10.60	13.1	69.62	9.98	10.51	12.8	69.24
3-21	4.57	7.62	5.38	7.39	6.3	50.98	5.38	7.66	10.0	50.98	5.39	7.70	8.9	51.19
3-22	24.09	26.68	7.47	25.50	27.4	20.26	8.06	25.69	28.6	22.70	7.92	25.62	28.4	22.12
3-23	22.87	25.91	6.89	22.67	31.7	16.80	6.00	22.70	27.7	12.91	6.13	22.70	28.0	13.48
3-24	21.34	23.48	11.61	22.29	26.7	44.40	11.26	22.20	27.7	42.76	11.02	22.15	27.1	41.64
3-25	18.29	21.34	7.24	21.26	29.3	22.91	7.56	21.08	31.1	24.66	7.98	21.42	30.0	26.96
3-26	9.15	12.20	3.20	12.78	21.5	1.65	3.24	12.71	22.5	2.09	4.00	11.97	21.9	10.40
3-27	21.34	24.09	6.88	23.57	45.9	19.38	7.12	23.40	45.0	20.51	7.01	23.60	46.0	19.99
3-28	12.20	15.24	7.02	15.13	22.0	32.56	7.59	14.60	24.5	37.24	7.04	14.12	22.7	32.73
3-29	12.20	14.63	9.64	12.44	29.4	59.05	9.41	14.10	36.5	57.16	9.32	13.96	37.2	56.42
3-30	7.32	9.76	7.88	8.97	36.5	74.36	8.25	8.88	39.0	79.42	8.56	9.05	40.6	83.65
4-31	16.16	18.75	8.64	18.66	19.5	37.43	8.45	18.54	21.8	36.26	8.77	18.81	21.3	38.24
4-32	9.76	12.50	2.93	10.37	14.6	1.91	3.44	10.30	16.6	7.13	2.85	10.39	15.9	1.09
4-33	24.39	26.68	4.54	19.93	31.1	9.24	4.13	19.55	32.2	7.56	4.42	19.90	32.0	8.75
4-34	19.82	22.56	6.36	21.88	33.8	18.25	6.49	21.46	36.3	18.90	6.38	21.82	36.1	18.35
4-35	15.24	17.38	11.45	17.11	17.0	61.11	11.45	17.28	19.1	61.11	11.46	17.00	19.0	61.18
4-36	15.24	18.29	7.88	17.43	32.3	31.69	8.04	17.57	35.3	32.74	8.17	17.81	35.5	33.60
4-37	12.20	14.94	5.65	13.77	40.2	23.83	5.17	13.07	41.0	19.89	5.54	13.69	41.0	22.93
5-38	7.62	10.67	2.55	11.15	9.5	0.00	3.32	11.67	12.8	3.56	2.92	11.57	10.2	0.00
5-39	7.62	10.67	3.84	11.02	9.8	10.38	3.84	10.69	12.1	10.38	3.88	11.04	10.9	10.91
5-40	18.29	21.95	7.88	21.89	39.2	23.08	8.60	21.95	39.8	27.01	6.96	21.77	40.2	18.05
5-41	16.77	18.90	7.15	16.89	26.9	29.91	10.51	16.70	30.5	49.95	9.74	16.99	30.1	45.36
5-42	12.20	16.16	11.93	15.34	19.8	65.33	11.52	15.13	22.7	61.96	12.08	15.21	23.0	66.56

Table 3: Pump Counters

	14-Jan-16			28-Jan-16			17-Feb-16			18-Feb-16			28-Mar-16			25-Apr-16			24-May-16		
Location	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	Counter	Counts / mo	Litres / mo
PDT 1	-	-	-	1552	161	418.6	1565	13	33.8	-	-	-	1686	121	314.6	1777	91	236.6	1897	120	312
PDT 2	-	-	-	22094	2694	7004.4	23436	1342	3489.2	-	-	-	26940	3504	9110.4	28096	1156	3005.6	29444	1348	3504.8
PDT 3	-	-	-	7402	1584	4118.4	7875	473	1229.8	-	-	-	8475	600	1560	8487	12	31.2	8593	106	275.6
PDT 4	-	-	-	buried	under	ice/snow	buried	under	ice/snow	-	-	-	Flooded	in a	pond	Flooded	in the	ditch	Flooded	in the	ditch
PDT 5	-	-	-	14198	255	663	14312	114	296.4	-	-	-	14927	615	1599	15113	186	483.6	15525	412	1071.2
PDT 6	-	-	-	36327	1018	2646.8	37476	1149	2987.4	-	-	-	38774	1298	3374.8	39560	786	2043.6	40608	1048	2724.8
PDT 7	-	-	-	6013	158	410.8	6114	101	262.6	-	-	-	6504	390	1014	6852	348	904.8	7073	221	574.6
PDT 8	-	-	-	1778	410	1066	1885	107	278.2	-	-	-	2468	583	1515.8	2642	174	452.4	2648	6	15.6
PDT 9	-	-	-	61358	7612	19791.2	buried	under	ice/snow	-	-	-	chamber	is	flooded	chamber	is	flooded	chamber	is	flooded
H-4	139936	7	18.2	-	-	-	-	-	-	140119	183	475.8	142930	2811	7308.6	147829	4899	12737.4	147974	145	377
1-9	448132	4983	12955.8	-	-	-	-	-	-	452279	4147	10782.2	476598	24319	63229.4	484299	7701	20022.6	495853	11554	30040.4
1-10	371517	1305	3393	-	-	-	-	-	-	376905	5388	14008.8	393539	16634	43248.4	399553	6014	15636.4	408297	8744	22734.4
H-11	525338	0	0	-	-	-	-	-	-	525338	0	0	525340	2	5.2	525340	0	0	525340	0	0
2-18	175275	0	0	-	-	-	-	-	-	207860	32585	84721	343860	136000	353600	343860	0	0	343860	0	0
3-27	238274	0	0	-	-	-	-	-	-	238274	0	0	238279	5	13	238279	0	0	238279	0	0
3-29	275463	32960	85696	-	-	-	-	-	-	305173	29710	77246	347200	42027	109270.2	377741	30541	79406.6	419858	42117	109504.2
3-30	699999	7729	20095.4	-	-	-	-	-	-	727606	27607	71778.2	760933	33327	86650.2	776066	15133	39345.8	795566	19500	50700

	21-Jun-16			26-Jul-16			29-Aug-16			22-Sep-16			24-Oct-16			22-Nov-16			14-Dec-16		
Location	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	Counter	Counts / mo	Litres / mo
PDT 1	1965	68	176.8	2019	54	140.4	2199	180	468	2416	217	564.2	2667	251	652.6	2944	277	720.2	3277	333	865.8
PDT 2	30389	945	2457	31611	1222	3177.2	33078	1467	3814.2	34737	1659	4313.4	35514	777	2020.2	36503	989	2571.4	39942	3439	8941.4
PDT 3	8705	112	291.2	8971	266	691.6	9242	271	704.6	9582	340	884	9718	136	353.6	9978	260	676	10189	211	548.6
PDT 4	Flooded	in the	ditch	Flooded	in the	ditch	4661	-	-	currently	no	counter	currently	no	counter	currently	no	counter	currently	no	counter
PDT 5	16026	501	1302.6	16711	685	1781	17911	1200	3120	18601	690	1794	19167	566	1471.6	Chamber	is	Flooded	Chamber	is	Frozen
PDT 6	41024	416	1081.6	41800	776	2017.6	42683	883	2295.8	43566	883	2295.8	44751	1185	3081	46021	1270	3302	47104	1083	2815.8
PDT 7	7191	118	306.8	7354	163	423.8	7469	115	299	7481	12	31.2	7493	12	31.2	7570	77	200.2	7652	82	213.2
PDT 8	2658	10	26	2663	5	13	2670	7	18.2	2685	15	39	2697	12	31.2	2697	0	0	2699	2	5.2
PDT 9	chamber	is	flooded	94649	-	-	98129	3480	9048	105977	7848	20404.8	109730	3753	9757.8	Chamber	is	Flooded	Chamber	is	Frozen
H-4	150405	2431	6320.6	158652	8247	21442.2	161626	2974	7732.4	163204	1578	4102.8	165323	2119	5509.4	178545	13222	34377.2	184351	5806	15095.6
1-9	504033	8180	21268	515007	10974	28532.4	534193	19186	49883.6	544130	9937	25836.2	552852	8722	22677.2	567492	14640	38064	574467	6975	18135
1-10	414396	6099	15857.4	421447	7051	18332.6	435309	13862	36041.2	440082	4773	12409.8	447871	7789	20251.4	452017	4146	10779.6	455493	3476	9037.6
H-11	525340	0	0	525340	0	0	525340	0	0	525340	0	0	525340	0	0	561321	35981	93550.6	570135	8814	22916.4
2-18	343860	0	0	343860	0	0	343860	0	0	343860	0	0	343860	0	0	343860	0	0	343860	0	0
3-27	238279	0	0	238279	0	0	238279	0	0	238279	0	0	238279	0	0	238279	0	0	238279	0	0
3-29	446205	26347	68502.2	482147	35942	93449.2	548322	66175	172055	575879	27557	71648.2	603549	27670	71942	644481	40932	106423.2	661084	16603	43167.8
3-30	811546	15980	41548	825823	14277	37120.2	862375	36552	95035.2	876287	13912	36171.2	889315	13028	33872.8	909601	20286	52743.6	917870	8269	21499.4

2.3 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
- Greenhouse Gas Emission Reduction in CO_2 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. No major repairs had to be made to the mechanical system during 2016.

Data for 2016 has been compiled, and is found in Appendix A.

2.3.1 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 2016 has been compiled, and is found in Table 2.

2.3.2 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 2016, the system operated as intended with the analyzer data recorded at an interval of 5 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 (CH_4), carbon dioxide (CO_2) and oxygen (O_2) 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 proper gas meter/analyzer such as a Landtec GEM-5000+, or equivalent.

2.3.3 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. 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 2016 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 comprises 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 21 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 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 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.

The condensate Collection System operated as intended during 2016.

6.0 CONCLUSIONS AND RECOMMENDATIONS

1. During operation in 2016, the Brady Road Resource Management Facility Gas Collection and Flaring System operated as was intended.

2. During surface emission monitoring, some areas were noted where gas was escaping. These areas included open manholes and areas of weak surface cap. In order to get maximum efficiency from the LFGCS, these issues should be looked at in the future.

3. 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

Shannan McGarr, B.Sc.
Wellfield Operations Manager

APPENDIX A

PLANT AND FLARE DATA

Date	CO2 Equivalents			Landfill Gas Flow						CH4	O2	Flare		Temp			Blower 1		Blower 2	
	Yearly	Monthly	Daily																	
	Tonnes	Tonnes	Tonnes	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Flare	Min	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	CO2	CO2	CO2	scf	scf	scf	m3	scfm	MMBTU	(%)	(%)	Hours	Starts	°C	°C	°C	Hours	Hours	Hours	Hours
Jan 1 2016	303	303	303	1440801	1440801	1440801	40815	1001	667	45.8	2.6	23:59	0	887	900	913	23.9	9005.1	0	10884
Jan 2 2016	600	600	297	2881421	2881421	1440620	40810	1000	654	44.8	3	23:59	0	887	900	914	23.9	9029	0	10884
Jan 3 2016	893	893	293	4321599	4321599	1440178	40797	1000	645	44.2	3.2	23:59	0	885	900	918	24	9053	0	10884
Jan 4 2016	1199	1199	306	5757799	5757799	1436200	40685	1000	672	46.3	2.4	23:56	1	0	899	915	23.9	9076.9	0	10884
Jan 5 2016	1498	1498	299	7198687	7198687	1440888	40817	1001	658	45.1	3	23:59	0	884	900	917	24	9100.9	0	10884
Jan 6 2016	1796	1796	298	8638656	8638656	1439969	40791	1000	655	45.3	2.9	23:59	0	883	900	913	23.8	9124.7	0	10884
Jan 7 2016	2098	2098	302	10079404	10079404	1440748	40814	1001	664	45.5	2.9	23:58	0	875	900	919	23.9	9148.6	0	10884
Jan 8 2016	2390	2390	292	11519742	11519742	1440338	40802	1000	643	44.1	3.5	23:59	0	887	900	920	24	9172.6	0	10884
Jan 9 2016	2680	2680	290	12959852	12959852	1440110	40795	1000	639	43.8	3.6	23:59	0	886	900	917	23.9	9196.5	0	10884
Jan 10 2016	2972	2972	292	14400039	14400039	1440187	40798	1000	643	44.1	3.4	23:59	0	884	900	923	24	9220.5	0	10884
Jan 11 2016	3253	3253	281	15839627	15839627	1439588	40781	1000	618	42.4	4.1	23:58	0	879	900	918	24	9244.5	0	10884
Jan 12 2016	3518	3518	265	17192290	17192290	1352663	38318	940	583	42.6	3.9	23:58	0	881	900	924	23.9	9268.4	0	10884
Jan 13 2016	3783	3783	265	18487228	18487228	1294938	36683	899	582	44.4	3.3	23:58	0	883	900	917	24	9292.4	0	10884
Jan 14 2016	4043	4043	260	19782231	19782231	1295003	36685	899	573	43.7	3.7	23:59	0	881	900	926	23.9	9316.3	0	10884
Jan 15 2016	4298	4298	255	21077285	21077285	1295054	36686	899	560	42.8	4	23:59	0	886	900	914	24	9340.3	0	10884
Jan 16 2016	4553	4553	255	22373031	22373031	1295746	36706	900	562	42.8	4	23:59	0	890	900	910	23.9	9364.2	0	10884
Jan 17 2016	4803	4803	250	23668761	23668761	1295730	36705	900	549	41.9	4.1	23:58	0	888	900	913	24	9388.3	0	10884
Jan 18 2016	5054	5054	251	24964239	24964239	1295478	36698	900	552	42.1	3.9	23:58	0	880	900	929	23.9	9412.2	0	10884
Jan 19 2016	5306	5306	252	26259390	26259390	1295151	36689	899	554	42.3	3.7	23:58	0	882	900	914	24	9436.2	0	10884
Jan 20 2016	5557	5557	251	27555230	27555230	1295840	36709	900	551	42	3.8	23:59	0	883	900	918	24	9460.2	0	10884
Jan 21 2016	5801	5801	244	28850388	28850388	1295158	36689	899	537	41	4	23:59	0	886	900	914	22.9	9483.1	0	10884
Jan 22 2016	6053	6053	252	30144969	30144969	1294581	36673	899	554	42.3	3.5	23:59	0	883	900	916	24	9507.1	0	10884
Jan 23 2016	6308	6308	255	31440743	31440743	1295774	36707	900	562	42.9	3.5	23:58	0	881	900	918	23.9	9531	0	10884
Jan 24 2016	6556	6556	248	32736939	32736939	1296196	36719	900	545	41.5	3.9	23:59	0	878	900	920	24	9555	0	10884
Jan 25 2016	6805	6805	249	34033671	34033671	1296732	36734	901	547	41.7	3.8	23:58	0	890	900	909	23.9	9578.9	0	10884
Jan 26 2016	7053	7053	248	35326009	35326009	1292338	36609	900	546	41.7	3.7	23:50	1	887	900	910	24.2	9603.1	0	10884
Jan 27 2016	7316	7316	263	36622680	36622680	1296671	36732	900	579	44.1	3.2	23:59	0	883	900	916	24	9627.1	0	10884
Jan 28 2016	7578	7578	262	37918930	37918930	1296250	36720	900	576	43.9	3.3	23:58	0	887	900	918	23.9	9651	0	10884
Jan 29 2016	7857	7857	279	39214604	39214604	1295674	36704	900	614	46.8	2.4	23:59	0	874	900	929	24	9675	0	10884
Jan 30 2016	8126	8126	269	40510785	40510785	1296181	36718	900	591	45.1	3	23:59	0	889	900	916	23.9	9698.9	0	10884
Jan 31 2016	8387	8387	261	41807911	41807911	1297126	36745	901	575	43.8	3.4	23:59	0	879	900	917	24	9722.9	0	10884
Feb 1 2016	8645	258	258	43105465	1297554	1297554	36757	901	567	43.2	3.7	23:59	0	882	900	924	23.9	9746.8	0	10884
Feb 2 2016	8907	520	262	44402042	2594131	1296577	36729	900	576	43.9	3.3	23:58	0	885	900	926	24	9770.9	0	10884
Feb 3 2016	9175	788	268	45697131	3889220	1295089	36687	899	588	44.9	3	23:59	0	882	900	924	23.9	9794.8	0	10884
Feb 4 2016	9436	1049	261	46993558	5185647	1296427	36725	900	574	43.8	3.5	23:59	0	881	900	921	24	9818.8	0	10884
Feb 5 2016	9695	1308	259	48278771	6470860	1285213	36408	900	570	43.8	3.6	23:47	1	237	895	932	16	9834.8	6.9	10891
Feb 6 2016	9948	1561	253	49542696	7734785	1263925	35804	899	555	43.4	4.1	23:23	0	882	900	917	0	9834.8	23.9	10915
Feb 7 2016	9948	1561	0	49542696	7734785	0	0	0	0	0	0	00:00	0	0	0	0	0	9834.8	0.3	10915
Feb 8 2016	10096	1709	148	50271381	8463470	728685	20642	898	325	44.1	4.3	13:34	1	-15	889	930	0	9834.8	12.7	10928
Feb 9 2016	10345	1958	249	51561501	9753590	1290120	36547	900	547	41.9	4.8	23:46	1	874	900	921	0	9834.8	24.3	10952

Date	CO2 Equivalents			Landfill Gas Flow						CH4	O2	Flare		Temp			Blower 1		Blower 2	
	Yearly	Monthly	Daily																	
	Tonnes	Tonnes	Tonnes	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Flare	Min	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	CO2	CO2	CO2	scf	scf	scf	m3	scfm	MMBTU	(%)	(%)	Hours	Starts	°C	°C	°C	Hours	Hours	Hours	Hours
Feb 10 2016	10592	2205	247	52857988	11050077	1296487	36727	900	542	41.4	4.9	23:58	0	884	900	917	0	9834.8	24	10976
Feb 11 2016	10837	2450	245	54154997	12347086	1297009	36742	901	540	41.1	5	23:59	0	887	900	913	0	9834.8	24	11000
Feb 12 2016	11070	2683	233	55450918	13643007	1295921	36711	900	512	39	5.6	23:58	0	888	900	913	0	9834.8	24	11024
Feb 13 2016	11316	2929	246	56746752	14938841	1295834	36708	900	542	41.3	4.8	23:59	0	877	900	914	0	9834.8	23.9	11048
Feb 14 2016	11565	3178	249	58042779	16234868	1296027	36714	900	548	41.8	4.7	23:59	0	881	900	917	0	9834.8	23	11071
Feb 15 2016	11811	3424	246	59339397	17531486	1296618	36731	900	541	41.2	5	23:59	0	885	900	918	0	9834.8	24	11095
Feb 16 2016	12047	3660	236	60624882	18816971	1285485	36415	901	518	39.5	5.7	23:51	0	886	900	912	0	9834.8	24.7	11120
Feb 17 2016	12293	3906	246	61920187	20112276	1295305	36693	900	542	41.3	4.8	23:58	0	884	900	927	0	9834.8	23.9	11144
Feb 18 2016	12560	4173	267	63215901	21407990	1295714	36705	900	588	44.8	3.5	23:59	0	868	900	922	0	9834.8	24	11168
Feb 19 2016	12831	4444	271	64512576	22704665	1296675	36732	900	595	45.3	3.2	23:59	0	882	900	924	0	9834.8	23	11191
Feb 20 2016	13082	4695	251	65808643	24000732	1296067	36715	900	553	42.1	4.3	23:58	0	885	900	914	0	9834.8	23.9	11214
Feb 21 2016	13340	4953	258	67104134	25296223	1295491	36699	900	568	43.3	3.7	23:59	0	879	900	918	0	9834.8	24	11238
Feb 22 2016	13609	5222	269	68400952	26593041	1296818	36736	901	591	45	3.1	23:59	0	879	900	920	0	9834.8	23.9	11262
Feb 23 2016	13868	5481	259	69697861	27889950	1296909	36739	901	571	43.5	3.7	23:59	0	869	900	930	0	9834.8	24	11286
Feb 24 2016	14126	5739	258	70993633	29185722	1295772	36707	900	567	43.2	3.8	23:58	0	887	900	916	0	9834.8	24	11310
Feb 25 2016	14385	5998	259	72289522	30481611	1295889	36710	900	570	43.4	3.7	23:58	0	890	900	910	0	9834.8	23.9	11334
Feb 26 2016	14656	6269	271	73585248	31777337	1295726	36705	900	595	45.4	3	23:59	0	887	900	916	0	9834.8	24	11358
Feb 27 2016	14918	6531	262	74877667	33069756	1292419	36612	901	576	44	3.6	23:58	0	0	899	918	0	9834.8	23.7	11382
Feb 28 2016	15174	6787	256	76173906	34365995	1296239	36720	900	564	43	4	23:59	0	882	900	918	0	9834.8	24	11406
Feb 29 2016	15418	7031	244	77469477	35661566	1295571	36701	900	537	41	4.7	23:58	0	884	900	913	0	9834.8	23.9	11430
Mar 1 2016	15673	255	255	78765906	1296429	1296429	36725	900	560	42.7	4.1	23:59	0	879	900	926	0	9834.8	24	11454
Mar 2 2016	15926	508	253	80062807	2593330	1296901	36739	901	556	42.4	4.3	23:58	0	884	900	916	0	9834.8	24	11478
Mar 3 2016	16178	760	252	81359028	3889551	1296221	36719	900	555	42.3	4.2	23:59	0	881	900	924	0	9834.8	23.9	11502
Mar 4 2016	16434	1016	256	82655742	5186265	1296714	36733	901	562	42.8	4.1	23:58	0	886	900	929	0	9834.8	24	11526
Mar 5 2016	16696	1278	262	83952021	6482544	1296279	36721	900	577	44	3.6	23:58	0	876	900	938	0	9834.8	23.9	11550
Mar 6 2016	16963	1545	267	85247392	7777915	1295371	36695	900	586	44.7	3.5	23:59	0	888	900	914	0	9834.8	24	11574
Mar 7 2016	17234	1816	271	86543657	9074180	1296265	36721	900	596	45.4	3	23:59	0	878	900	923	0	9834.8	24	11598
Mar 8 2016	17517	2099	283	87839495	10370018	1295838	36709	900	622	47.4	2.2	23:59	0	885	900	923	0	9834.8	23.9	11622
Mar 9 2016	17800	2382	283	89129051	11659574	1289556	36531	899	623	47.8	1.9	23:59	0	0	899	921	0	9834.8	23.6	11645
Mar 10 2016	18090	2672	290	90425338	12955861	1296287	36721	900	638	48.7	1.7	23:59	0	879	900	918	0	9834.8	24	11669
Mar 11 2016	18387	2969	297	91707172	14237695	1281834	36312	899	654	50.4	1.1	23:46	1	183	896	939	7.6	9842.4	16	11685
Mar 12 2016	18696	3278	309	93003945	15534468	1296773	36735	901	679	51.8	0.4	23:58	0	879	900	920	24	9866.4	0	11685
Mar 13 2016	19010	3592	314	94300831	16831354	1296886	36738	901	690	52.6	0.1	23:58	0	877	900	936	22.9	9889.3	0	11685
Mar 14 2016	19320	3902	310	95596788	18127311	1295957	36712	900	682	52	0.4	23:58	0	876	900	920	24	9913.3	0	11685
Mar 15 2016	19632	4214	312	96889463	19419986	1292675	36619	900	686	52.4	0.3	23:57	1	0	899	922	23.4	9936.7	0	11685
Mar 16 2016	19945	4527	313	98181811	20712334	1292348	36610	900	689	52.7	0.1	23:59	0	0	899	910	23.5	9960.2	0	11685
Mar 17 2016	20251	4833	306	99473361	22003884	1291550	36587	900	673	51.5	0.5	23:51	1	0	899	924	24.4	9984.6	0	11685
Mar 18 2016	20558	5140	307	100769347	23299870	1295986	36713	900	675	51.4	0.5	23:59	0	879	900	921	24	10009	0	11685
Mar 19 2016	20867	5449	309	102065524	24596047	1296177	36718	900	680	51.9	0.3	23:59	0	891	900	908	23.9	10033	0	11685
Mar 20 2016	21182	5764	315	103361733	25892256	1296209	36719	900	693	52.9	0	23:59	0	884	900	918	24	10057	0	11685

Date	CO2 Equivalents			Landfill Gas Flow						CH4	O2	Flare		Temp			Blower 1		Blower 2	
	Yearly	Monthly	Daily																	
	Tonnes	Tonnes	Tonnes	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Flare	Min	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	CO2	CO2	CO2	scf	scf	scf	m3	scfm	MMBTU	(%)	(%)	Hours	Starts	°C	°C	°C	Hours	Hours	Hours	Hours
Mar 21 2016	21448	6030	266	104447212	26977735	1085479	30749	900	585	53.3	-0.1	16:09	1	0	898	924	23.3	10080	0	11685
Mar 22 2016	21760	6342	312	105742753	28273276	1295541	36700	900	686	52.3	0.3	23:58	0	870	900	928	23.9	10104	0	11685
Mar 23 2016	22068	6650	308	107039650	29570173	1296897	36739	901	677	51.6	0.5	23:58	0	883	900	922	24	10128	0	11685
Mar 24 2016	22386	6968	318	108335432	30865955	1295782	36707	900	698	53.3	-0.1	23:59	0	884	900	914	23.9	10152	0	11685
Mar 25 2016	22691	7273	305	109630643	32161166	1295211	36691	899	671	51.2	0.7	23:59	0	888	900	914	24	10176	0	11685
Mar 26 2016	22999	7581	308	110927127	33457650	1296484	36727	900	677	51.6	0.4	23:59	0	881	900	919	24	10200	0	11685
Mar 27 2016	23311	7893	312	112222731	34753254	1295604	36702	900	686	52.3	0.3	23:58	0	884	900	916	23.9	10224	0	11685
Mar 28 2016	23619	8201	308	113519179	36049702	1296448	36726	900	677	51.6	0.5	23:59	0	866	900	932	24	10248	0	11685
Mar 29 2016	23932	8514	313	114815372	37345895	1296193	36719	900	688	52.5	0.2	23:59	0	886	900	914	23.9	10272	0	11685
Mar 30 2016	24248	8830	316	116111431	38641954	1296059	36715	900	694	52.9	0.1	23:58	0	880	900	933	24	10296	0	11685
Mar 31 2016	24556	9138	308	117407470	39937993	1296039	36714	900	678	51.7	0.5	23:59	0	880	900	917	23.9	10319	0	11685
Apr 1 2016	24860	304	304	118704201	1296731	1296731	36734	901	669	51	0.7	23:58	0	890	900	916	24	10343	0	11685
Apr 2 2016	25161	605	301	120000479	2593009	1296278	36721	900	662	50.5	0.8	23:58	0	884	900	917	23.9	10367	0	11685
Apr 3 2016	25460	904	299	121292842	3885372	1292363	36610	900	657	50.2	1	23:57	1	0	899	925	23.3	10391	0	11685
Apr 4 2016	25757	1201	297	122588957	5181487	1296115	36716	900	654	49.8	1	23:58	0	882	900	918	24	10415	0	11685
Apr 5 2016	26068	1512	311	123884506	6477036	1295549	36700	900	683	52.1	0.2	23:58	0	878	900	923	23.9	10439	0	11685
Apr 6 2016	26377	1821	309	125179651	7772181	1295145	36689	899	680	51.9	0.4	23:58	0	887	900	917	24	10463	0	11685
Apr 7 2016	26681	2125	304	126475342	9067872	1295691	36704	900	668	50.9	0.7	23:59	0	877	900	919	23.9	10486	0	11685
Apr 8 2016	26980	2424	299	127771290	10363820	1295948	36712	900	659	50.2	0.8	23:59	0	885	900	924	24	10511	0	11685
Apr 9 2016	27293	2737	313	129067443	11659973	1296153	36717	900	688	52.5	0.1	23:59	0	849	900	946	23.9	10534	0	11685
Apr 10 2016	27598	3042	305	130362955	12955485	1295512	36699	900	670	51.1	0.7	23:59	0	864	900	935	24	10558	0	11685
Apr 11 2016	27893	3337	295	131658736	14251266	1295781	36707	900	648	49.4	1.2	23:59	0	882	900	927	23.9	10582	0	11685
Apr 12 2016	28196	3640	303	132942583	15535113	1283847	36369	900	665	51.2	0.5	23:30	0	872	900	919	23.9	10606	0	11685
Apr 13 2016	28504	3948	308	134238462	16830992	1295879	36710	900	678	51.7	0.5	23:58	1	877	900	932	23.4	10630	0	11685
Apr 14 2016	28816	4260	312	135534248	18126778	1295786	36707	900	685	52.3	0.4	23:58	0	882	900	921	23.9	10654	0	11685
Apr 15 2016	29125	4569	309	136830169	19422699	1295921	36711	900	679	51.8	0.6	23:58	0	880	900	921	24	10678	0	11685
Apr 16 2016	29436	4880	311	138126642	20719172	1296473	36726	900	685	52.2	0.3	23:58	0	873	900	920	23.9	10701	0	11685
Apr 17 2016	29755	5199	319	139423848	22016378	1297206	36747	901	701	53.4	-0.1	23:58	0	874	900	925	23.9	10725	0	11685
Apr 18 2016	30077	5521	322	140720161	23312691	1296313	36722	900	708	53.9	-0.3	23:59	0	853	900	924	23.9	10749	0	11685
Apr 19 2016	30389	5833	312	141973023	24565553	1252862	35491	900	687	54.2	-0.3	23:11	1	89	897	963	23.2	10772	0	11685
Apr 20 2016	30714	6158	325	143269014	25861544	1295991	36713	900	715	54.5	-0.3	23:59	0	887	900	919	23.9	10796	0	11685
Apr 21 2016	31031	6475	317	144564972	27157502	1295958	36712	900	697	53.2	0.1	23:59	0	885	900	915	24	10820	0	11685
Apr 22 2016	31349	6793	318	145860264	28452794	1295292	36693	900	699	53.3	-0.1	23:58	0	871	900	922	23.9	10844	0	11685
Apr 23 2016	31671	7115	322	147156768	29749298	1296504	36727	900	709	54	-0.3	23:58	0	874	900	922	24	10868	0	11685
Apr 24 2016	31993	7437	322	148452765	31045295	1295997	36713	900	708	54	-0.3	23:58	0	858	900	949	23.9	10892	0	11685
Apr 25 2016	32313	7757	320	149748722	32341252	1295957	36712	900	704	53.7	-0.1	23:59	0	865	900	934	24	10916	0	11685
Apr 26 2016	32629	8073	316	151044820	33637350	1296098	36716	900	695	53	0.1	23:58	0	861	900	938	23.9	10940	0	11685
Apr 27 2016	32946	8390	317	152341051	34933581	1296231	36720	900	697	53.1	0.1	23:59	0	868	900	930	24	10964	0	11685
Apr 28 2016	33263	8707	317	153637572	36230102	1296521	36728	900	696	53.1	0.2	23:59	0	849	900	930	23.9	10988	0	11685
Apr 29 2016	33581	9025	318	154934212	37526742	1296640	36731	900	699	53.3	0.1	23:59	0	874	900	928	24	11012	0	11685

Date	CO2 Equivalents			Landfill Gas Flow						CH4	O2	Flare		Temp			Blower 1		Blower 2	
	Yearly	Monthly	Daily																	
	Tonnes	Tonnes	Tonnes	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Flare	Min	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	CO2	CO2	CO2	scf	scf	scf	m3	scfm	MMBTU	(%)	(%)	Hours	Starts	°C	°C	°C	Hours	Hours	Hours	Hours
Apr 30 2016	33899	9343	318	156230155	38822685	1295943	36711	900	700	53.4	0.1	23:59	0	859	900	931	23.9	11036	0	11685
May 1 2016	34221	322	322	157527018	1296863	1296863	36738	901	709	54	-0.2	23:59	0	878	900	922	24	11060	0	11685
May 2 2016	34546	647	325	158823740	2593585	1296722	36734	900	716	54.6	-0.3	23:59	0	857	900	931	23.9	11084	0	11685
May 3 2016	34866	967	320	160119360	3889205	1295620	36702	900	704	53.7	0	23:58	0	875	900	923	24	11108	0	11685
May 4 2016	35185	1286	319	161408546	5178391	1289186	36520	900	701	53.7	-0.1	23:44	1	0	899	924	23.6	11131	0	11685
May 5 2016	35503	1604	318	162676835	6446680	1268289	35928	940	701	54.6	-0.3	22:29	2	53	893	934	13.5	11145	9	11694
May 6 2016	35839	1940	336	164115821	7885666	1438986	40764	999	739	50.8	1	23:58	0	880	900	923	0	11145	23.9	11718
May 7 2016	36176	2277	337	165555495	9325340	1439674	40783	1000	741	50.9	0.7	23:58	0	879	900	916	0	11145	23.9	11742
May 8 2016	36516	2617	340	166995320	10765165	1439825	40787	1000	747	51.3	0.6	23:59	0	856	900	928	0	11145	24	11766
May 9 2016	36850	2951	334	168434735	12204580	1439415	40776	1000	734	50.4	0.9	23:59	0	852	900	950	0	11145	23.9	11790
May 10 2016	37176	3277	326	169874501	13644346	1439766	40786	1000	717	49.2	1.3	23:58	0	876	900	930	0	11145	24	11814
May 11 2016	37508	3609	332	171314253	15084098	1439752	40785	1000	730	50.1	0.9	23:59	0	871	900	928	0	11145	23.9	11838
May 12 2016	37830	3931	322	172751116	16520961	1436863	40703	1001	708	48.7	1.4	23:58	0	0	899	913	0	11145	23.9	11862
May 13 2016	38147	4248	317	174192492	17962337	1441376	40831	1001	698	47.9	1.7	23:58	0	880	900	918	0	11145	23.9	11886
May 14 2016	38469	4570	322	175633078	19402923	1440586	40809	1000	709	48.6	1.4	23:59	0	882	900	922	0	11145	24	11910
May 15 2016	38795	4896	326	177073382	20843227	1440304	40801	1000	716	49.2	1.3	23:59	0	881	900	917	0	11145	23.9	11934
May 16 2016	39109	5210	314	178512401	22282246	1439019	40765	999	690	47.4	2	23:59	0	876	900	930	0	11145	22.9	11957
May 17 2016	39426	5527	317	179951984	23721829	1439583	40781	1000	698	47.9	1.7	23:59	0	868	900	929	0	11145	24	11981
May 18 2016	39753	5854	327	181392207	25162052	1440223	40799	1000	718	49.3	1.2	23:58	0	866	900	921	0	11145	23.9	12004
May 19 2016	40078	6179	325	182831684	26601529	1439477	40778	1000	715	49.1	1.4	23:58	0	852	900	948	0	11145	23.9	12028
May 20 2016	40334	6435	256	183964691	27734536	1133007	32096	1000	562	49	1.6	18:52	1	54	896	939	0	11145	18.9	12047
May 21 2016	40659	6760	325	185404216	29174061	1439525	40779	1000	715	49.1	1.5	23:59	0	836	900	937	0	11145	23.9	12071
May 22 2016	40991	7092	332	186842904	30612749	1438688	40755	999	729	50.1	1.1	23:58	0	880	900	927	0	11145	23.9	12095
May 23 2016	41318	7419	327	188281602	32051447	1438698	40755	999	719	49.4	1.4	23:59	0	882	900	943	0	11145	24	12119
May 24 2016	41634	7735	316	189721105	33490950	1439503	40778	1000	695	47.7	1.9	23:58	0	865	900	931	0	11145	23.9	12143
May 25 2016	41957	8058	323	191161288	34931133	1440183	40798	1000	710	48.7	1.4	23:58	0	868	900	934	0	11145	23.9	12167
May 26 2016	42248	8349	291	192397476	36167321	1236188	35019	1000	640	51.2	0.5	20:35	0	851	900	920	0	11145	21.2	12188
May 27 2016	42452	8553	204	193267685	37037530	870209	24651	998	448	50.9	1.5	14:31	1	73	894	969	0	11145	14	12202
May 28 2016	42790	8891	338	194706365	38476210	1438680	40755	999	743	51.1	0.8	23:59	0	858	900	922	0	11145	23.9	12226
May 29 2016	43125	9226	335	196146142	39915987	1439777	40786	1000	736	50.5	0.8	23:59	0	884	900	915	0	11145	23.9	12250
May 30 2016	43461	9562	336	197586494	41356339	1440352	40802	1000	739	50.7	0.8	23:59	0	867	900	934	0	11145	24	12274
May 31 2016	43801	9902	340	199004513	42774358	1418019	40170	1000	748	52.1	0.2	23:37	1	123	897	940	0	11145	23.5	12297
Jun 1 2016	44144	343	343	200445457	1440944	1440944	40819	1001	755	51.8	0.3	23:58	0	874	900	919	0	11145	24	12321
Jun 2 2016	44488	687	344	201886072	2881559	1440615	40810	1000	757	51.9	0.2	23:58	0	884	900	923	0	11145	23.9	12345
Jun 3 2016	44834	1033	346	203325434	4320921	1439362	40774	1000	761	52.3	0.1	23:59	0	876	900	930	0	11145	23.9	12369
Jun 4 2016	45179	1378	345	204765610	5761097	1440176	40797	1000	759	52.1	0.2	23:58	0	878	900	921	0	11145	24	12393
Jun 5 2016	45527	1726	348	206205123	7200610	1439513	40779	1000	764	52.5	0	23:58	0	881	900	922	0	11145	23.9	12417
Jun 6 2016	45865	2064	338	207645775	8641262	1440652	40811	1000	742	50.9	0.5	23:59	0	875	900	922	0	11145	23.9	12441
Jun 7 2016	46166	2365	301	208925994	9921481	1280219	36266	1000	662	51.1	0.4	21:18	0	882	900	915	0	11145	21.5	12463
Jun 8 2016	46420	2619	254	209942520	10938007	1016526	28796	998	558	54.3	-0.1	17:00	1	10	894	957	0	11145	16.7	12479

Date	CO2 Equivalents			Landfill Gas Flow						CH4	O2	Flare		Temp			Blower 1		Blower 2	
	Yearly	Monthly	Daily																	
	Tonnes	Tonnes	Tonnes	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Flare	Min	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	CO2	CO2	CO2	scf	scf	scf	m3	scfm	MMBTU	(%)	(%)	Hours	Starts	°C	°C	°C	Hours	Hours	Hours	Hours
Jun 9 2016	46769	2968	349	211382113	12377600	1439593	40781	1000	768	52.8	0.1	23:59	0	858	900	942	0	11145	23.9	12503
Jun 10 2016	47115	3314	346	212820635	13816122	1438522	40750	999	761	52.3	0.3	23:59	0	876	900	924	0	11145	23.9	12527
Jun 11 2016	47446	3645	331	214260624	15256111	1439989	40792	1000	728	50	0.9	23:58	0	882	900	921	0	11145	24	12551
Jun 12 2016	47784	3983	338	215699974	16695461	1439350	40774	1000	744	51.1	0.4	23:58	0	853	900	938	0	11145	23.9	12575
Jun 13 2016	48125	4324	341	217139683	18135170	1439709	40784	1000	750	51.5	0.3	23:59	0	885	900	916	0	11145	23.9	12599
Jun 14 2016	48467	4666	342	218579159	19574646	1439476	40777	1000	752	51.6	0.2	23:58	0	867	900	941	0	11145	24	12623
Jun 15 2016	48806	5005	339	220018820	21014307	1439661	40783	1000	745	51.1	0.5	23:59	0	881	900	915	0	11145	22.9	12646
Jun 16 2016	49142	5341	336	221458806	22454293	1439986	40792	1000	740	50.8	0.5	23:58	0	856	900	938	0	11145	23.9	12670
Jun 17 2016	49483	5682	341	222898690	23894177	1439884	40789	1000	750	51.5	0.2	23:58	0	872	900	922	0	11145	24	12694
Jun 18 2016	49826	6025	343	224338276	25333763	1439586	40781	1000	755	51.8	0.1	23:59	0	880	900	920	0	11145	23.9	12718
Jun 19 2016	50178	6377	352	225778040	26773527	1439764	40786	1000	774	53.1	-0.2	23:58	0	872	900	935	0	11145	23.9	12742
Jun 20 2016	50517	6716	339	227202389	28197876	1424349	40349	999	745	51.7	0.2	23:45	1	180	897	932	7.9	11153	15.8	12757
Jun 21 2016	50863	7062	346	228642179	29637666	1439790	40786	1000	760	52.2	0	23:58	0	879	900	921	23.9	11177	0	12757
Jun 22 2016	51207	7406	344	230080660	31076147	1438481	40749	999	757	52	0.1	23:58	0	886	900	917	24	11201	0	12757
Jun 23 2016	51549	7748	342	231515014	32510501	1434354	40632	1000	751	51.8	0.2	23:56	1	0	899	912	24	11225	0	12757
Jun 24 2016	51895	8094	346	232954484	33949971	1439470	40777	1000	761	52.2	0.2	23:58	0	866	900	924	24	11249	0	12757
Jun 25 2016	51953	8152	58	233194135	34189622	239651	6789	1000	128	52.6	0.1	03:57	0	880	900	920	4.5	11253	0	12757
Jun 26 2016	51953	8152	0	233194135	34189622	0	0	0	0	0	0	00:00	0	0	0	0	0	11253	0	12757
Jun 27 2016	52192	8391	239	234116235	35111722	922100	26121	998	526	56.4	0.2	15:25	1	10	894	961	15.1	11268	0	12757
Jun 28 2016	52557	8756	365	235555687	36551174	1439452	40777	1000	802	55.1	0.1	23:58	0	887	900	914	24	11292	0	12757
Jun 29 2016	52918	9117	361	236994810	37990297	1439123	40767	999	793	54.5	0.1	23:58	0	882	900	918	24	11316	0	12757
Jun 30 2016	53270	9469	352	238434712	39430199	1439902	40790	1000	773	53.1	0.4	23:59	0	884	900	917	22.9	11339	0	12757
Jul 1 2016	53622	352	352	239874269	1439557	1439557	40780	1000	774	53.1	0.3	23:58	0	887	900	923	24	11363	0	12757
Jul 2 2016	53975	705	353	241312982	2878270	1438713	40756	999	776	53.3	0.3	23:58	0	877	900	925	24	11387	0	12757
Jul 3 2016	54329	1059	354	242751403	4316691	1438421	40748	999	778	53.5	0.2	23:58	0	884	900	918	23.9	11411	0	12757
Jul 4 2016	54684	1414	355	244190665	5755953	1439262	40771	999	780	53.6	0.2	23:59	0	882	900	921	24	11435	0	12757
Jul 5 2016	55032	1762	348	245629662	7194950	1438997	40764	999	764	52.5	0.5	23:59	0	882	900	915	24	11459	0	12757
Jul 6 2016	55375	2105	343	247065600	8630888	1435938	40677	1000	755	52	0.6	23:58	0	0	899	920	24.4	11484	0	12757
Jul 7 2016	55720	2450	345	248504830	10070118	1439230	40771	999	759	52.1	0.5	23:58	0	883	900	915	23.9	11507	0	12757
Jul 8 2016	56061	2791	341	249944049	11509337	1439219	40770	999	750	51.5	0.8	23:59	0	882	900	919	23.9	11531	0	12757
Jul 9 2016	56404	3134	343	251382645	12947933	1438596	40753	999	753	51.8	0.6	23:59	0	883	900	922	24	11555	0	12757
Jul 10 2016	56749	3479	345	252822047	14387335	1439402	40775	1000	760	52.2	0.6	23:58	0	879	900	924	22.9	11578	0	12757
Jul 11 2016	57095	3825	346	254260965	15826253	1438918	40762	999	762	52.3	0.5	23:59	0	874	900	918	24	11602	0	12757
Jul 12 2016	57445	4175	350	255701631	17266919	1440666	40811	1000	770	52.8	0.3	23:59	0	884	900	918	23.9	11626	0	12757
Jul 13 2016	57787	4517	342	257140670	18705958	1439039	40765	999	752	51.7	0.7	23:58	0	886	900	921	24	11650	0	12757
Jul 14 2016	58124	4854	337	258581880	20147168	1441210	40827	1001	742	50.9	0.9	23:59	0	883	900	917	23.9	11674	0	12757
Jul 15 2016	58465	5195	341	260021770	21587058	1439890	40789	1000	750	51.5	0.6	23:59	0	878	900	935	24	11698	0	12757
Jul 16 2016	58812	5542	347	261462654	23027942	1440884	40817	1001	763	52.3	0.4	23:58	0	882	900	921	23.9	11722	0	12757
Jul 17 2016	59155	5885	343	262901487	24466775	1438833	40759	999	755	51.8	0.6	23:58	0	881	900	916	24	11746	0	12757
Jul 18 2016	59493	6223	338	264341623	25906911	1440136	40796	1000	743	51	0.8	23:59	0	880	900	925	23.9	11770	0	12757

Date	CO2 Equivalents			Landfill Gas Flow						CH4	O2	Flare		Temp			Blower 1		Blower 2	
	Yearly	Monthly	Daily																	
	Tonnes	Tonnes	Tonnes	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Flare	Min	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	CO2	CO2	CO2	scf	scf	scf	m3	scfm	MMBTU	(%)	(%)	Hours	Starts	°C	°C	°C	Hours	Hours	Hours	Hours
Jul 19 2016	59838	6568	345	265780946	27346234	1439323	40773	1000	760	52.2	0.4	23:59	0	870	900	925	24	11794	0	12757
Jul 20 2016	60184	6914	346	267219760	28785048	1438814	40759	999	762	52.3	0.4	23:58	0	874	900	939	23.9	11818	0	12757
Jul 21 2016	60405	7135	221	268094814	29660102	875054	24789	998	486	54.8	0.1	14:35	1	23	895	930	14.6	11832	0	12757
Jul 22 2016	60754	7484	349	269534088	31099376	1439274	40772	999	768	52.7	0.5	23:59	0	884	900	916	24	11856	0	12757
Jul 23 2016	61105	7835	351	270968652	32533940	1434564	40638	999	773	53.2	0.2	23:57	1	0	899	935	24.1	11881	0	12757
Jul 24 2016	61451	8181	346	272408150	33973438	1439498	40778	1000	762	52.3	0.5	23:58	0	888	900	915	23.9	11904	0	12757
Jul 25 2016	61796	8526	345	273847550	35412838	1439400	40775	1000	760	52.2	0.5	23:58	0	887	900	914	24	11928	0	12757
Jul 26 2016	62139	8869	343	275287056	36852344	1439506	40778	1000	755	51.9	0.6	23:59	0	881	900	918	24	11952	0	12757
Jul 27 2016	62478	9208	339	276726110	38291398	1439054	40766	999	746	51.2	0.7	23:58	0	889	900	915	22.9	11975	0	12757
Jul 28 2016	62816	9546	338	278165715	39731003	1439605	40781	1000	744	51	0.8	23:59	0	886	900	916	24	11999	0	12757
Jul 29 2016	63154	9884	338	279605136	41170424	1439421	40776	1000	744	51.1	0.8	23:59	0	883	900	919	23.9	12023	0	12757
Jul 30 2016	63492	10222	338	281044334	42609622	1439198	40770	999	744	51.1	0.9	23:59	0	879	900	928	24	12047	0	12757
Jul 31 2016	63829	10559	337	282483781	44049069	1439447	40777	1000	741	50.8	1	23:59	0	872	900	918	24	12071	0	12757
Aug 1 2016	64165	336	336	283922598	1438817	1438817	40759	999	740	50.8	1	23:58	0	876	900	924	23.9	12095	0	12757
Aug 2 2016	64507	678	342	285362145	2878364	1439547	40779	1000	752	51.7	0.6	23:58	0	884	900	918	23.9	12119	0	12757
Aug 3 2016	64853	1024	346	286800949	4317168	1438804	40758	999	760	52.2	0.5	23:59	0	861	900	938	24	12143	0	12757
Aug 4 2016	65193	1364	340	288239269	5755488	1438320	40745	999	747	51.3	0.8	23:58	0	885	900	916	23.9	12167	0	12757
Aug 5 2016	65525	1696	332	289677562	7193781	1438293	40744	999	731	50.2	1.1	23:59	0	889	900	912	24	12191	0	12757
Aug 6 2016	65859	2030	334	291116909	8633128	1439347	40774	1000	734	50.4	1	23:59	0	889	900	912	23.9	12215	0	12757
Aug 7 2016	66194	2365	335	292557136	10073355	1440227	40799	1000	738	50.6	1	23:58	0	884	900	927	24	12239	0	12757
Aug 8 2016	66534	2705	340	293995829	11512048	1438693	40755	999	748	51.4	0.8	23:59	0	877	900	923	23.9	12263	0	12757
Aug 9 2016	66859	3030	325	295434896	12951115	1439067	40766	999	716	49.1	1.6	23:59	0	885	900	919	24	12287	0	12757
Aug 10 2016	67186	3357	327	296875359	14391578	1440463	40805	1000	720	49.4	1.5	23:59	0	874	900	926	23.9	12311	0	12757
Aug 11 2016	67514	3685	328	298315388	15831607	1440029	40793	1000	721	49.5	1.5	23:59	0	877	900	928	24	12335	0	12757
Aug 12 2016	67789	3960	275	299543167	17059386	1227779	34781	999	605	48.7	1.8	17:00	1	0	898	914	23.5	12358	0	12757
Aug 13 2016	68109	4280	320	300982463	18498682	1439296	40772	1000	703	48.3	1.9	23:58	0	886	900	914	23.9	12382	0	12757
Aug 14 2016	68427	4598	318	302422170	19938389	1439707	40784	1000	700	48.1	2	23:59	0	886	900	920	23.9	12406	0	12757
Aug 15 2016	68743	4914	316	303861345	21377564	1439175	40769	999	696	47.8	2.1	23:59	0	865	900	926	24	12430	0	12757
Aug 16 2016	69058	5229	315	305300965	22817184	1439620	40782	1000	693	47.6	2.2	23:58	0	881	900	917	23.9	12454	0	12757
Aug 17 2016	69373	5544	315	306740187	24256406	1439222	40770	999	694	47.6	2.2	23:59	0	876	900	926	23.9	12478	0	12757
Aug 18 2016	69692	5863	319	308179201	25695420	1439014	40764	999	701	48.1	2	23:59	0	874	900	917	23.9	12502	0	12757
Aug 19 2016	70002	6173	310	309617586	27133805	1438385	40747	999	683	46.9	2.6	23:59	0	875	900	923	24	12526	0	12757
Aug 20 2016	70308	6479	306	311057019	28573238	1439433	40776	1000	673	46.2	2.9	23:59	0	889	900	917	23.9	12550	0	12757
Aug 21 2016	70615	6786	307	312497171	30013390	1440152	40797	1000	676	46.4	2.9	23:59	0	876	900	923	23.9	12574	0	12757
Aug 22 2016	70929	7100	314	313936145	31452364	1438974	40763	999	691	47.4	2.4	23:58	0	876	900	922	24	12598	0	12757
Aug 23 2016	71234	7405	305	315331069	32847288	1394924	39515	998	671	47.5	2.2	23:15	1	66	896	968	23.2	12621	0	12757
Aug 24 2016	71485	7656	251	316487164	34003383	1156095	32750	999	552	47.2	2.4	19:18	1	23	896	919	9	12630	10.3	12768
Aug 25 2016	71784	7955	299	317926580	35442799	1439416	40776	1000	657	45.1	3.1	23:58	0	883	900	915	0	12630	23.9	12792
Aug 26 2016	72081	8252	297	319347700	36863919	1421120	40257	999	653	45.4	2.9	23:40	1	172	897	930	0	12630	23.7	12815
Aug 27 2016	72378	8549	297	320788165	38304384	1440465	40805	1000	654	44.9	3.1	23:59	0	876	900	925	0	12630	23.9	12839

Date	CO2 Equivalents			Landfill Gas Flow						CH4	O2	Flare		Temp			Blower 1		Blower 2	
	Yearly	Monthly	Daily																	
	Tonnes	Tonnes	Tonnes	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Flare	Min	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	CO2	CO2	CO2	scf	scf	scf	m3	scfm	MMBTU	(%)	(%)	Hours	Starts	°C	°C	°C	Hours	Hours	Hours	Hours
Aug 28 2016	72671	8842	293	322227864	39744083	1439699	40784	1000	645	44.2	3.4	23:59	0	880	900	920	0	12630	23.9	12863
Aug 29 2016	72954	9125	283	323667076	41183295	1439212	40770	999	622	42.7	3.9	23:59	0	883	900	915	0	12630	24	12887
Aug 30 2016	73235	9406	281	325107128	42623347	1440052	40794	1000	619	42.5	4	23:59	0	877	900	918	0	12630	23.9	12911
Aug 31 2016	73514	9685	279	326547313	44063532	1440185	40798	1000	613	42.1	4.2	23:59	0	879	900	922	0	12630	23.9	12935
Sep 1 2016	73796	282	282	327987924	1440611	1440611	40810	1000	620	42.5	4.1	23:59	0	881	900	919	0	12630	24	12959
Sep 2 2016	74082	568	286	329427358	2880045	1439434	40776	1000	629	43.2	3.9	23:58	0	874	900	924	0	12630	22.9	12982
Sep 3 2016	74368	854	286	330867103	4319790	1439745	40785	1000	629	43.2	4	23:58	0	873	900	934	0	12630	23.9	13006
Sep 4 2016	74647	1133	279	332306816	5759503	1439713	40784	1000	614	42.2	4.3	23:58	0	867	900	927	0	12630	23.9	13030
Sep 5 2016	74927	1413	280	333746681	7199368	1439865	40788	1000	616	42.3	4.3	23:59	0	885	900	926	0	12630	24	13054
Sep 6 2016	75200	1686	273	335186425	8639112	1439744	40785	1000	601	41.3	4.6	23:59	0	885	900	916	0	12630	23.9	13078
Sep 7 2016	75479	1965	279	336627239	10079926	1440814	40815	1001	613	42.1	4.3	23:58	0	874	900	923	0	12630	23.9	13101
Sep 8 2016	75756	2242	277	338067258	11519945	1440019	40793	1000	610	41.9	4.5	23:58	0	888	900	913	0	12630	24	13125
Sep 9 2016	76028	2514	272	339506909	12959596	1439651	40782	1000	599	41.1	4.6	23:59	0	885	900	920	0	12630	23.9	13149
Sep 10 2016	76321	2807	293	340947111	14399798	1440202	40798	1000	645	44.3	2.9	23:58	0	882	900	917	0	12630	23.9	13173
Sep 11 2016	76617	3103	296	342387350	15840037	1440239	40799	1000	652	44.7	2.7	23:59	0	862	900	928	0	12630	24	13197
Sep 12 2016	76895	3381	278	343827481	17280168	1440131	40796	1000	612	42	3.6	23:58	0	887	900	916	0	12630	23.9	13221
Sep 13 2016	77172	3658	277	345266693	18719380	1439212	40770	999	610	41.9	3.5	23:58	0	889	900	912	0	12630	23.9	13245
Sep 14 2016	77454	3940	282	346706735	20159422	1440042	40794	1000	621	42.6	3.2	23:59	0	883	900	918	0	12630	23.9	13269
Sep 15 2016	77742	4228	288	348147026	21599713	1440291	40801	1000	634	43.5	2.9	23:58	0	877	900	925	0	12630	24	13293
Sep 16 2016	78027	4513	285	349566956	23019643	1419930	40224	1000	627	43.6	2.7	23:38	1	128	897	971	7.9	12638	15.7	13309
Sep 17 2016	78317	4803	290	351007563	24460250	1440607	40810	1000	637	43.7	2.8	23:59	0	885	900	920	23.9	12662	0	13309
Sep 18 2016	78610	5096	293	352447603	25900290	1440040	40793	1000	644	44.2	2.6	23:59	0	874	900	934	23.9	12685	0	13309
Sep 19 2016	78888	5374	278	353888387	27341074	1440784	40815	1001	612	42	3.5	23:59	0	886	900	918	23.9	12709	0	13309
Sep 20 2016	79163	5649	275	355328284	28780971	1439897	40789	1000	605	41.5	3.5	23:58	0	884	900	920	24	12733	0	13309
Sep 21 2016	79438	5924	275	356768318	30221005	1440034	40793	1000	605	41.5	3.5	23:59	0	874	900	927	23.9	12757	0	13309
Sep 22 2016	79715	6201	277	358209115	31661802	1440797	40815	1001	609	41.8	3.4	23:59	0	874	900	919	23.9	12781	0	13309
Sep 23 2016	79996	6482	281	359649338	33102025	1440223	40799	1000	618	42.4	3.2	23:58	0	878	900	921	24	12805	0	13309
Sep 24 2016	80282	6768	286	361089857	34542544	1440519	40807	1000	630	43.2	3	23:58	0	880	900	918	23.9	12829	0	13309
Sep 25 2016	80562	7048	280	362530462	35983149	1440605	40809	1000	616	42.2	3.3	23:58	0	882	900	918	23.9	12853	0	13309
Sep 26 2016	80838	7324	276	363971868	37424555	1441406	40832	1001	606	41.5	3.5	23:59	0	885	900	916	23.9	12877	0	13309
Sep 27 2016	81114	7600	276	365412684	38865371	1440816	40815	1001	607	41.6	3.4	23:58	0	878	900	922	24	12901	0	13309
Sep 28 2016	81379	7865	265	366853274	40305961	1440590	40809	1000	582	39.9	3.8	23:59	0	875	900	916	23.9	12925	0	13309
Sep 29 2016	81649	8135	270	368292884	41745571	1439610	40781	1000	593	40.7	3.5	23:59	0	879	900	923	23.9	12949	0	13309
Sep 30 2016	81924	8410	275	369732503	43185190	1439619	40782	1000	604	41.5	3.3	23:58	0	882	900	917	24	12973	0	13309
Oct 1 2016	82198	274	274	371173310	1440807	1440807	40815	1001	602	41.3	3.5	23:59	0	873	900	925	23.9	12997	0	13309
Oct 2 2016	82471	547	273	372613296	2880793	1439986	40792	1000	601	41.2	3.6	23:58	0	876	900	924	23.9	13021	0	13309
Oct 3 2016	82747	823	276	374051717	4319214	1438421	40748	999	606	41.6	3.5	23:58	0	877	900	920	23.9	13044	0	13309
Oct 4 2016	83014	1090	267	375448329	5715826	1396612	39563	999	588	41.6	3.4	23:15	1	52	896	957	23.3	13068	0	13309
Oct 5 2016	83287	1363	273	376889302	7156799	1440973	40820	1001	601	41.2	3.3	23:59	0	875	900	922	23.9	13092	0	13309
Oct 6 2016	83545	1621	258	378330091	8597588	1440789	40815	1001	567	38.9	4.4	23:59	0	889	900	914	22.9	13115	0	13309

Date	CO2 Equivalents			Landfill Gas Flow						CH4	O2	Flare		Temp			Blower 1		Blower 2	
	Yearly	Monthly	Daily																	
	Tonnes	Tonnes	Tonnes	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Flare	Min	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	CO2	CO2	CO2	scf	scf	scf	m3	scfm	MMBTU	(%)	(%)	Hours	Starts	°C	°C	°C	Hours	Hours	Hours	Hours
Oct 7 2016	83807	1883	262	379770799	10038296	1440708	40812	1000	576	39.5	4.2	23:59	0	890	900	912	23.9	13138	0	13309
Oct 8 2016	84062	2138	255	381211125	11478622	1440326	40802	1000	560	38.4	4.6	23:58	0	875	900	930	24	13163	0	13309
Oct 9 2016	84331	2407	269	382652314	12919811	1441189	40826	1001	591	40.6	3.8	23:59	0	878	900	921	23.9	13186	0	13309
Oct 10 2016	84591	2667	260	384093041	14360538	1440727	40813	1001	571	39.2	4.5	23:58	0	883	900	916	23.9	13210	0	13309
Oct 11 2016	84783	2859	192	385130881	15398378	1037840	29400	999	421	40.1	4.1	17:15	3	26	885	957	17.3	13228	0	13309
Oct 12 2016	85034	3110	251	386501321	16768818	1370440	38822	952	552	39.8	4.2	23:59	0	876	900	918	23.9	13252	0	13309
Oct 13 2016	85276	3352	242	387797437	18064934	1296116	36716	900	533	40.7	4.2	23:59	0	884	900	917	24	13276	0	13309
Oct 14 2016	85526	3602	250	389093542	19361039	1296105	36716	900	550	41.9	3.9	23:59	0	884	900	916	23.9	13299	0	13309
Oct 15 2016	85761	3837	235	390388964	20656461	1295422	36697	900	518	39.5	4.8	23:59	0	886	900	912	23.9	13323	0	13309
Oct 16 2016	86003	4079	242	391684958	21952455	1295994	36713	900	532	40.6	4.3	23:59	0	880	900	914	24	13347	0	13309
Oct 17 2016	86242	4318	239	392965855	23233352	1280897	36285	900	526	40.6	4.5	23:43	1	195	896	975	23.6	13371	0	13309
Oct 18 2016	86475	4551	233	394262934	24530431	1297079	36744	901	513	39.1	5	23:58	0	888	900	917	24	13395	0	13309
Oct 19 2016	86701	4777	226	395559756	25827253	1296822	36736	901	497	37.9	5.4	23:59	0	887	900	912	23.9	13419	0	13309
Oct 20 2016	86933	5009	232	396855990	27123487	1296234	36720	900	510	38.9	5.1	23:59	0	874	900	920	23.9	13443	0	13309
Oct 21 2016	87171	5247	238	398151899	28419396	1295909	36711	900	524	40	4.8	23:58	0	884	900	920	23.9	13467	0	13309
Oct 22 2016	87402	5478	231	399448153	29715650	1296254	36720	900	508	38.7	5.3	23:58	0	886	900	916	24	13491	0	13309
Oct 23 2016	87632	5708	230	400744625	31012122	1296472	36726	900	505	38.5	5.3	23:58	0	885	900	921	23.9	13515	0	13309
Oct 24 2016	87865	5941	233	402040323	32307820	1295698	36705	900	513	39.1	5.1	23:59	0	885	900	918	23.9	13539	0	13309
Oct 25 2016	88102	6178	237	403332111	33599608	1291788	36594	900	521	39.9	4.9	23:50	1	0	899	912	24	13563	0	13309
Oct 26 2016	88341	6417	239	404629074	34896571	1296963	36740	901	525	40	5	23:58	0	891	900	910	24	13587	0	13309
Oct 27 2016	88566	6642	225	405839188	36106685	1210114	34280	899	496	40.5	4.8	22:23	1	17	896	937	22.3	13609	0	13309
Oct 28 2016	88800	6876	234	407103347	37370844	1264159	35811	899	515	40.3	4.7	23:24	1	66	895	952	23.4	13632	0	13309
Oct 29 2016	89028	7104	228	408399796	38667293	1296449	36726	900	502	38.2	5.4	23:59	0	874	900	938	24	13656	0	13309
Oct 30 2016	89265	7341	237	409696232	39963729	1296436	36725	900	520	39.7	5.2	23:59	0	884	900	922	23.9	13680	0	13309
Oct 31 2016	89508	7584	243	410993010	41260507	1296778	36735	901	533	40.6	4.9	23:59	0	886	900	917	24	13704	0	13309
Nov 1 2016	89744	236	236	412289283	1296273	1296273	36721	900	520	39.6	5.2	23:59	0	869	900	933	23.9	13728	0	13309
Nov 2 2016	89978	470	234	413586298	2593288	1297015	36742	901	515	39.2	5.2	23:59	0	878	900	938	23	13751	0	13309
Nov 3 2016	90215	707	237	414882967	3889957	1296669	36732	900	521	39.7	5.1	23:58	0	885	900	919	23.9	13775	0	13309
Nov 4 2016	90456	948	241	416178946	5185936	1295979	36712	900	530	40.4	4.9	23:59	0	874	900	931	24	13799	0	13309
Nov 5 2016	90700	1192	244	417475174	6482164	1296228	36720	900	536	40.9	4.8	23:58	0	885	900	916	24	13823	0	13309
Nov 6 2016	90945	1437	245	418771325	7778315	1296151	36717	900	539	41.1	4.8	23:59	0	887	900	915	24.9	13848	0	13309
Nov 7 2016	91176	1668	231	420067490	9074480	1296165	36718	900	509	38.8	5.6	23:59	0	882	900	926	24	13872	0	13309
Nov 8 2016	91410	1902	234	421363425	10370415	1295935	36711	900	515	39.2	5.3	23:58	0	868	900	930	23.9	13896	0	13309
Nov 9 2016	91669	2161	259	422728818	11735808	1365393	38679	948	569	41.1	4.6	23:59	0	884	900	935	24	13920	0	13309
Nov 10 2016	91915	2407	246	424130780	13137770	1401962	39715	974	540	38.1	5.5	23:58	0	863	900	918	23.9	13944	0	13309
Nov 11 2016	92159	2651	244	425426996	14433986	1296216	36719	900	536	40.9	4.5	23:58	0	874	900	931	24	13968	0	13309
Nov 12 2016	92412	2904	253	426722600	15729590	1295604	36702	900	557	42.5	4.1	23:59	0	872	900	923	24	13992	0	13309
Nov 13 2016	92653	3145	241	428018951	17025941	1296351	36723	900	530	40.4	5	23:58	0	879	900	934	23.9	14016	0	13309
Nov 14 2016	92887	3379	234	429241104	18248094	1222153	34621	899	515	41.6	4.4	22:40	1	14	895	941	22.6	14038	0	13309
Nov 15 2016	93131	3623	244	430571055	19578045	1329951	37675	924	536	39.9	5.3	23:59	0	868	900	932	24	14062	0	13309

Date	CO2 Equivalents			Landfill Gas Flow						CH4	O2	Flare		Temp			Blower 1		Blower 2	
	Yearly	Monthly	Daily																	
	Tonnes	Tonnes	Tonnes	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Flare	Min	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	CO2	CO2	CO2	scf	scf	scf	m3	scfm	MMBTU	(%)	(%)	Hours	Starts	°C	°C	°C	Hours	Hours	Hours	Hours
Nov 16 2016	93371	3863	240	431866890	20873880	1295835	36708	900	527	40.2	5.3	23:59	0	878	900	934	23.9	14086	0	13309
Nov 17 2016	93605	4097	234	433163346	22170336	1296456	36726	900	514	39.2	5.3	23:59	0	883	900	917	24	14110	0	13309
Nov 18 2016	93855	4347	250	434459345	23466335	1295999	36713	900	550	41.9	3.9	23:59	0	874	900	931	23.9	14134	0	13309
Nov 19 2016	94109	4601	254	435755851	24762841	1296506	36727	900	558	42.5	3.9	23:59	0	857	900	949	24	14158	0	13309
Nov 20 2016	94365	4857	256	437051881	26058871	1296030	36714	900	564	43	3.6	23:59	0	883	900	915	22.9	14181	0	13309
Nov 21 2016	94622	5114	257	438348216	27355206	1296335	36723	900	566	43.1	3.6	23:58	0	878	900	917	24	14205	0	13309
Nov 22 2016	94876	5368	254	439643954	28650944	1295738	36706	900	558	42.5	3.8	23:59	0	882	900	922	23.9	14229	0	13309
Nov 23 2016	95126	5618	250	440939539	29946529	1295585	36701	900	550	41.9	4	23:59	0	888	900	917	24	14253	0	13309
Nov 24 2016	95377	5869	251	442235462	31242452	1295923	36711	900	551	42	3.9	23:59	0	862	900	947	24	14277	0	13309
Nov 25 2016	95630	6122	253	443531286	32538276	1295824	36708	900	555	42.4	3.8	23:59	0	873	900	940	23.9	14301	0	13309
Nov 26 2016	95884	6376	254	444827275	33834265	1295989	36713	900	558	42.6	3.8	23:59	0	863	900	923	24	14325	0	13309
Nov 27 2016	96143	6635	259	446123174	35130164	1295899	36710	900	569	43.4	3.5	23:59	0	883	900	933	23.9	14349	0	13309
Nov 28 2016	96405	6897	262	447419188	36426178	1296014	36713	900	577	44	3.4	23:58	0	884	900	919	24	14373	0	13309
Nov 29 2016	96660	7152	255	448715152	37722142	1295964	36712	900	561	42.8	3.7	23:59	0	883	900	919	23.9	14397	0	13309
Nov 30 2016	96918	7410	258	450010248	39017238	1295096	36687	899	567	43.3	3.3	23:58	0	888	900	908	24	14421	0	13309
Dec 1 2016	97173	255	255	451306313	1296065	1296065	36715	900	560	42.7	3.5	23:58	0	878	900	928	23.9	14445	0	13309
Dec 2 2016	97426	508	253	452602066	2591818	1295753	36706	900	557	42.5	3.6	23:59	0	855	900	937	24	14469	0	13309
Dec 3 2016	97689	771	263	453897993	3887745	1295927	36711	900	577	44	3.1	23:58	0	884	900	920	23.9	14492	0	13309
Dec 4 2016	97955	1037	266	455193632	5183384	1295639	36703	900	586	44.7	2.9	23:58	0	883	900	928	24	14516	0	13309
Dec 5 2016	98213	1295	258	456489409	6479161	1295777	36707	900	567	43.2	3.5	23:59	0	856	900	937	23.9	14540	0	13309
Dec 6 2016	98477	1559	264	457784945	7774697	1295536	36700	900	581	44.3	3.3	23:59	0	879	900	924	24	14564	0	13309
Dec 7 2016	98718	1800	241	459081772	9071524	1296827	36737	901	530	40.4	4.4	23:58	0	874	900	926	24	14588	0	13309
Dec 8 2016	98919	2001	201	460148356	10138108	1066584	30214	897	443	41	4	19:48	3	-14	884	972	10.7	14599	8.9	13318
Dec 9 2016	99163	2245	244	461443467	11433219	1295111	36688	899	537	41	4	23:59	0	892	900	909	0	14599	24	13342
Dec 10 2016	99411	2493	248	462739722	12729474	1296255	36720	900	546	41.6	3.9	23:58	0	886	900	914	0	14599	23.9	13366
Dec 11 2016	99664	2746	253	464035185	14024937	1295463	36698	900	557	42.5	3.4	23:59	0	884	900	916	0	14599	24	13390
Dec 12 2016	99912	2994	248	465330330	15320082	1295145	36689	899	546	41.7	3.8	23:59	0	892	900	913	0	14599	23.9	13413
Dec 13 2016	100156	3238	244	466625745	16615497	1295415	36697	900	537	41	4.1	23:58	0	889	900	910	0	14599	23	13436
Dec 14 2016	100386	3468	230	467921075	17910827	1295330	36694	900	506	38.6	4.9	23:58	0	890	900	910	0	14599	24	13460
Dec 15 2016	100618	3700	232	469212711	19202463	1291636	36589	900	510	39	4.7	23:50	1	0	899	916	0	14599	24.5	13485
Dec 16 2016	100848	3930	230	470508393	20498145	1295682	36704	900	506	38.6	4.9	23:58	0	884	900	916	0	14599	24	13509
Dec 17 2016	101073	4155	225	471805054	21794806	1296661	36732	900	496	37.8	5.1	23:58	0	882	900	928	0	14599	23.9	13533
Dec 18 2016	101302	4384	229	473101333	23091085	1296279	36721	900	503	38.3	4.9	23:58	0	881	900	915	0	14599	24	13557
Dec 19 2016	101541	4623	239	474397742	24387494	1296409	36725	900	525	40	4.4	23:59	0	876	900	913	0	14599	23.9	13581
Dec 20 2016	101774	4856	233	475693505	25683257	1295763	36706	900	512	39	4.9	23:59	0	883	900	924	0	14599	23	13604
Dec 21 2016	102006	5088	232	476981412	26971164	1287907	36484	900	509	39.1	5	23:52	1	0	898	914	0	14599	23.9	13628
Dec 22 2016	102247	5329	241	478277629	28267381	1296217	36719	900	529	40.4	4.6	23:59	0	890	900	910	0	14599	23.9	13652
Dec 23 2016	102481	5563	234	479573389	29563141	1295760	36706	900	514	39.2	5.2	23:59	0	887	900	912	0	14599	24	13676
Dec 24 2016	102701	5783	220	480868261	30858013	1294872	36681	899	484	36.9	5.9	23:58	0	889	900	916	0	14599	23.9	13699
Dec 25 2016	102945	6027	244	482163964	32153716	1295703	36705	900	537	40.9	4.1	23:58	0	880	900	918	0	14599	24	13724

Date	CO2 Equivalents			Landfill Gas Flow						CH4	O2	Flare		Temp			Blower 1		Blower 2	
	Yearly	Monthly	Daily																	
	Tonnes	Tonnes	Tonnes	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Flare	Min	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	CO2	CO2	CO2	scf	scf	scf	m3	scfm	MMBTU	(%)	(%)	Hours	Starts	°C	°C	°C	Hours	Hours	Hours	Hours
Dec 26 2016	103181	6263	236	483459875	33449627	1295911	36711	900	518	39.5	4.9	23:58	0	877	900	922	0	14599	23.9	13747
Dec 27 2016	103412	6494	231	484755531	34745283	1295656	36703	900	508	38.7	5.1	23:58	0	887	900	931	0	14599	24	13771
Dec 28 2016	103650	6732	238	486052127	36041879	1296596	36730	900	523	39.9	5.1	23:58	0	882	900	914	0	14599	23.9	13795
Dec 29 2016	103874	6956	224	487348646	37338398	1296519	36728	900	494	37.6	6.1	23:58	0	887	900	915	0	14599	24	13819
Dec 30 2016	104113	7195	239	488643990	38633742	1295344	36695	900	525	40.1	5.3	23:59	0	885	900	915	0	14599	23.9	13843
Dec 31 2016	104349	7431	236	489939471	39929223	1295481	36698	900	519	39.6	5.5	23:59	0	884	900	923	0	14599	24	13867
Annual Average								941.9		46	2.5			783	895	918				