Water and Waste Department
Environmental Standards Division

Brady Road Resource Management Facility Annual Report - 2015

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

Environment Act Licence No. 3081 R, issued on April 23, 2014, requires that the City of Winnipeg monitor all activities conducted pursuant to the licence at the Brady Road Resource Management Facility (BRRMF) during the previous calendar year and submit an annual report on or before April 15th of each year. This Annual Report covers the requirements described in Clause 127 regarding activities at the BRRMF for 2015 and information as identified in the Operating Plan as per Clause 41 of the licence.

The BRRMF is located in the South end of the City of Winnipeg and is the City's only active landfill. The current site activities are 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 site opened in 1973, with disposal taking place in the southwest portion of the property until 1978. Disposals took place in the northeast section of the property until December 2014 when a new disposal cell in the northwest portion of the property was put into use.

This report provides a summary of the following activities of the BRRMF in 2015: major expenditures and construction activities, equipment breakdown and fire reports, waste diversion operations, ground water management, surface water management, leachate management, landfill gas management, and nuisance management.

There were no disruptions to waste disposal functions in 2015 as a result of equipment failures. Two fires, one spill, and one radiation alarm occurred at the BRRMF in 2015; all incidents were dealt with according to safety procedures, and were reported to an Environment Officer as required. Thirteen odour complaints were received in 2015. In all cases, the customer was contacted for follow-up and additional odour monitoring at the complaint location was performed if necessary.

Of the 395,828.3 metric tonnes of material received at the BRRMF in 2015, 70,308.1 metric tonnes were beneficially re-used onsite or were removed from the site for recycling or further processing.

Monitoring programs for ground water, surface water, leachate, and subsurface gas migration followed the sampling and analysis plans in 2015. 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. No contingency plans were activated in 2015.

The Appendices of the report contain incident reports for 2015, statistical analyses of ground water quality and surface water quality, and the 2015 Landfill Gas Collection and Flaring Report, prepared by Integrated Gas Recovery Systems Inc.

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APPENDICES

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 2015. The report also provides information on the BRRMF proposed activities in 2016.

2.0 CONSTRUCTION AND MAJOR INCIDENTS

The BRRMF performed various construction activities to satisfy conditions of the Licence in 2015; major construction activities included:

1. Design and construction of a new waste cell (Cell 30) in the northwest quadrant of the property was completed. The new section of the cell was put into use on October 29th, 2015.
2. Road construction for access to Cell 30 and possible future disposal access was completed by October 2015.
3. Construction of the Community Resource Recovery Centre (4R Depot) was completed in December 2015.
4. The second phase of the surface water management plan was completed which included the construction of the dry ponds as well upgrades to ditches onsite at BRRMF.
5. The first phase of the landscaping plan was completed which included the planting of trees along a berm on a northeast section of the site and the installation of a test plot on a closed section of the landfill.
6. The second phase of the lime mud berm construction was started in March 2015; this includes the berm on the southeast section and the berm on the northeast section of the site. Construction of both berms is expected to be completed by December 2017

In 2015, there were no disruptions or failures of waste management practices due to equipment breakdown. Two fires, one hydraulic oil spill, and one radiation detection alarm occurred in 2015 at the BRRMF; all incidents were reported to Manitoba Conservation and Water Stewardship and follow-up or corrective actions were taken. Incident reports are provided in Appendix A.

3.0 WASTE DIVERSION OPERATIONS

In 2015, BRRMF received 395,828.3 metric tonnes of waste, 69,103.3 metric tonnes of waste were re-used on-site, and 1,204.8 metric tonnes of waste were removed from BRRMF for further processing or beneficial re-use off-site. This represents a total diversion rate of 17.8%, which is an increase from the 17.7% diversion rate in 2014.

The Community Resource Recovery Centre (4R Depot) opened to the public in January 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 the safety, convenience and user experience. Assuming continued waste diversion practices, the estimated remaining landfill life is 99 years.

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

Table 1. 2015 BRRMF Waste Diversion Summary		2014	2015
Total Waste Received	**metric tonnes**	**395,468.7**	**395,828.3**
Total Waste Re-Used or Composted On-Site	**metric tonnes**	**68,966.1**	**69,103.3**
Biosolids	metric tonnes	222.3*	3,938.6
Clean fill	metric tonnes	16,438.8	4,957.0
Concrete	metric tonnes	1,903.3	362.0
Dutch elm (wood chips)	metric tonnes	5,304.0	5,630.2
Glass	metric tonnes	12,826.0	9,339.4
Leaf and yard waste	metric tonnes	24,736.8	33,475.3
Street sweepings (sand)	metric tonnes	6,924.5	10,813.6
Wood chips	metric tonnes	462.1	172.4
Wood chips (for biosolids compost program)	metric tonnes	148.3	414.8
Total Waste Removed	**metric tonnes**	**1,157.8**	**1,204.8**
Compost	metric tonnes	-	342.9**
Dutch elm	metric tonnes	0.0	18.6
Ozone-depleting substances (appliances)	metric tonnes	96.5	78.3
Scrap metal (including batteries)	metric tonnes	949.1	543.5
Tires	metric tonnes	112.2	221.5
*pilot plant for biosolids composting came online in November 2014 **program began in 2015			

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

4.1 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 vary depending on well type and location.

In 2015, a total of 52 ground water samples were analyzed – 5 samples from wells upgradient of the site (background water quality), and 47 samples from wells crossgradient and downgradient of the site. With the exception of well GWQ25-4N34C, which collapsed during the spring sampling event, there were no deviations from the Ground Water SAP or from normal sample collection and preservation practices. The collapsed well will be re-drilled prior to the 2016 spring sampling event. A summary of the 2015 ground water results are provided in Table 2.

The analytical results for groundwater obtained in 2015 were found to be highly variable compared to those obtained in 2014. A comparison of the average, minimum, and maximum values obtained in 2014 and 2015 are provided in Table 3. The data collected in 2015 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 2015.

At this time we have no recommendations for changes in the ground water monitoring program, with the exception of removing leachable lead from the list of analyses as it is not applicable to liquid samples.

Table 2. 2015 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	9-Jun-15	8-Jun-15	15-Oct-15*	3-Jun-15	23-Oct-15	3-Jun-15	26-Oct-15	4-Jun-15	4-Jun-15	15-Oct-15	2-Jun-15	22-Oct-15
Inorganic Parameters														
Alkalinity - Bicarbonate	mg/L		548	606	533	150	156	154	153	501	195	195	138	140
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		449	496	437	124	128	126	126	410	159	160	113	115
Dissolved Hardness (CaCO3)	mg/L		2,640	1,590	1,660	1,680	1,580	1,630	2,440	3,570	1,600	1,500	1,230	1,100
pH	units		6.96	7.10	7.14	7.56	7.35	7.79	7.46	6.85	7.41	7.32	7.76	7.68
Specific Conductivity	(µS/cm)		4,390	4,120	3,940	9,560	10,400	8,160	8,640	8,530	8,230	8,620	8,390	8,900
Turbidity	(ntu)		23.8	143	1,760	15.3	11.6	10.5	9.35	12.2	206	740	210	172
Total Dissolved Solids	mg/L		4,060	3,620	3,620	6,860	6,620	5,800	5,500	7,370	5,660	5,320	5,500	5,450
Total Suspended Solids	mg/L		160	500	3,600	50	30	40	110	250	5,140	1,150	740	370
Total Solids	mg/L		4,220	4,120	7,220	6,910	6,650	5,840	5,610	7,620	10,800	6,470	6,240	5,820
Dissolved Chloride (Cl)	mg/L	2,300	440	440	410	3,000	2,900	2,500	2,500	1,800	2,400	2,200	2,500	2,400
Dissolved Sulphate (SO4)	mg/L		1,710	1,430	1,390	924	960	799	873	1,850	818	758	707	708
Nutrients														
Ammonia - Dissolved	mg/L N		<0.003	0.563	0.540	1.22	1.37	0.940	1.07	0.532	1.15	1.11	0.991	0.989
Nitrate - Dissolved	mg/L N		1.35	0.099	0.124	<0.003	0.013	<0.003	<0.003	0.299	0.014	0.023	0.007	<0.003
Total Kjeldahl Nitrogen	mg/L N		0.5	1.3	1.5	2.3	3.5	3.1	2.7	2.2	2.4	2.7	3.9	2.9
Phosphorus - Dissolved	mg/L P		0.02	0.03	0.02	0.02	0.03	0.02	0.03	0.04	0.03	<0.01	0.02	0.03
Other														
Cyanide - Total (CN)	mg/L	0.066	0.00052	0.00083		<0.00050	<0.00050	0.00054	<0.00050			0.00058	<0.00050	<0.00050
Organic Indicators														
Carbonaceous Oxygen Demand	mg/L		32	48	60	290	145	74	83	95	121	580	101	125
Biochemical Oxygen Demand	mg/L		4	<3	7	<3	<3	<3	<3	<3	<3	<3	<3	<3
Total Organic Carbon	mg/L		12.0	7.0	106	3.0	2.0	3.0	1.6	26.0	<1.0	34.7	26.0	3.6
Metals														
Arsenic (As)- Dissolved	ug/L	1,900	0.422	1.80	2.69	6.34	6.15	6.51	0.417	1.50	5.52	7.27	5.35	5.25
Barium (Ba)- Dissolved	ug/L	29,000	12.8	11.8	12.8	15.6	15.0	15.2	97.1	20.3	14.5	13.1	21.9	17.6
Beryllium (Be)- Dissolved	ug/L	67	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.055	<0.010
Cadmium (Cd)- Dissolved	ug/L	2.7	0.143	0.0313	0.0720	0.0222	0.0110	0.0480	0.0150	0.128	0.0203	0.0050	0.0650	0.0090
Calcium (Ca)- Dissolved	mg/L		700	380	391	393	364	399	976	917	363	337	275	257
Chromium (Cr)- Dissolved	ug/L	810	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	59.1	<0.10	<0.10	<0.10	<0.20	<0.10
Copper (Cu)- Dissolved	ug/L	87	3.19	2.01	1.98	1.90	0.464	1.61	1.14	3.52	1.16	0.582	2.57	0.239
Iron (Fe)- Dissolved	ug/L		2.80	2.70	27.3	1,400	1,400	941	6.20	3.20	558	772	287	348
Lead (Pb)- Dissolved	ug/L	25	0.0372	0.0178	0.0370	0.2050	0.2260	0.1030	0.4040	0.0796	0.0332	0.0280	0.0450	0.0080
Magnesium (Mg)- Dissolved	mg/L		216	155	166	171	163	154	0.338	311	168	160	131	112
Manganese (Mn)- Dissolved	ug/L		1,680	506	525	30.7	33.4	29.2	0.093	2,120	65.0	51.0	31.7	28.6
Mercury (Hg)- Total	ug/L	0.29 (2.8)	<0.010	<0.002	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel (Ni)- Dissolved	ug/L	490	6.99	7.14	7.52	1.69	1.44	1.90	0.567	11.8	1.59	1.23	1.12	0.546
Potassium (K)- Dissolved	mg/L		11.0	9.36	9.98	45.9	43.7	34.4	21.0	13.9	34.3	34.6	36.9	33.5
Selenium (Se)- Dissolved	ug/L	63	0.155	0.381	0.094	<0.040	<0.040	<0.040	0.598	0.142	<0.040	0.040	<0.080	0.139
Silver (Ag)- Dissolved	ug/L	1.5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0107	<0.0050	<0.0050	<0.0100	<0.0050
Sodium (na)- Dissolved	mg/L	490	362	582	580	1,790	1,720	1,330	576	904	1,380	1,370	1,430	1,190
Zinc (Zn)- Dissolved	ug/L	1,100	7.88	2.33	8.62	34.5	10.6	8.83	1.21	11.9	5.24	9.88	6.83	1.18
Bacteria														
Total Coliforms (MTF)	MPN/100mL					<3	<3	<3	<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		7.42	7.92	7.14	6.24	7.94	7.96	7.64	6.93	7.68	7.49	7.60	8.08
Specific Conductivity	(µS/cm)		4,230	4,230	1,825	9,995	3,513	8,260	8,860	8,440	7,470	2,000	8,160	4,000
Polycyclic Aromatic Hydrocarbons														
Naphthalene	µg/L	1400 (6400)	na**	<0.050		<0.050	<0.050	<0.050	<0.050		<0.050		<0.050	<0.050
Benzo(a)pyrene	µg/L	0.81	na**	<0.010		<0.010	<0.010	<0.010	<0.010		<0.010		<0.010	<0.010
Anthracene	µg/L	2.4	na**	<0.050		<0.050	<0.050	<0.050	<0.050		<0.050		<0.050	<0.050
Petroleum Hydrocarbons														
F1 (C6-C10 Hydrocarbons)	µg/L	750	na**	<25		<25	<25	<25	<25		<25		<25	<25
F2 (C10-C16 Hydrocarbons)	µg/L	150	na**	<100		<100	<100	<100	<100		<100		<100	<100
F3 (C16-C34 Hydrocarbons)	µg/L	500	na**	<200		<200	<200	<200	<200		<200		<200	<200
F4 (C34-C50 Hydrocarbons)	µg/L	500	na**	<200		<200	<200	<200	<200		<200		<200	<200
Benzene	µg/L	44 (430)	na**	<0.10		<0.10	<0.10	<0.10	<0.10		<0.10		<0.10	<0.10
EthylBenzene	µg/L	2,300	na**	<0.10		<0.10	<0.10	<0.10	<0.10		<0.10		<0.10	<0.10
Toluene	µg/L	18,000	na**	<0.20		<0.20	<0.20	<0.20	0.90		<0.20		<0.20	<0.20
Xylene (Total)	µg/L	4,200	na**	<0.10		<0.10	<0.10	0.12	0.18		<0.10		<0.10	<0.10
Volatile Organic Carbons														
Vinyl chloride	µg/L	0.5 (1.7)	na**	<0.20		<0.20	<0.20	<0.20	<0.20		<0.20		<0.20	<0.20
Pesticides														
Diazinon	µg/L		na**	<2		<2	<2	<2	<2		<2		<2	<2
Herbicides														
2,4-D	µg/L		na**	<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.
* extra sampling not specified in sampling and analysis plan
**na - not analysed due to lab error

Table 2. 2015 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	9-Jun-15	15-Oct-15	1-Jun-15	21-Oct-15	4-Jun-15	15-Oct-15	3-Jun-15	21-Oct-15	10-Jun-15	21-Oct-15	3-Jun-15	26-Oct-15
Inorganic Parameters														
Alkalinity - Bicarbonate	mg/L		284	284	244	224	160	172	153	157	396	447	150	162
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		233	233	200	184	131	141	125	128	325	366	123	133
Dissolved Hardness (CaCO3)	mg/L		1,840	2,140	1,710	1,490	2,210	2,420	1,270	1,160	2,660	2,430	1,330	1,270
pH	units		7.21	7.15	7.29	7.43	7.49	7.48	7.65	7.63	7.63	7.04	7.63	7.69
Specific Conductivity	(µS/cm)		7,660	8,260	na*	4,470	7,120	7,550	8,140	8,650	7,660	5,990	7,660	8,320
Turbidity	(ntu)		10,400	13,100	3.29	21.8	13,500	7,700	8.57	76.2	5.94	1,260	5.94	34.0
Total Dissolved Solids	mg/L		5,500	5,470	5,720	5,350	5,450	5,240	5,730	5,370	5,380	5,420	5,380	5,220
Total Suspended Solids	mg/L		36,400	32,430	300	80	42,950	10,560	90	110	30	1,880	30	70
Total Solids	mg/L		41,900	37,900	6,020	5,430	48,400	15,800	5,820	5,480	5,410	7,300	5,410	5,290
Dissolved Chloride (Cl)	mg/L	2,300	1,900	1,900	2,500	1,900	1,800	1,700	2,500	2,400	1,500	1,300	2,300	2,000
Dissolved Sulphate (SO4)	mg/L		927	982	748	702	921	958	784	699	1,270	1,330	754	742
Nutrients														
Ammonia - Dissolved	mg/L N		0.900	1.05	1.16	0.814	1.05	1.05	0.907	0.885	0.852	0.787	0.852	0.771
Nitrate - Dissolved	mg/L N		0.134	0.054	<0.003	0.032	0.012	<0.003	<0.003	0.023	<0.003	0.047	<0.003	0.023
Total Kjeldahl Nitrogen	mg/L N		5.1	5.9	3.7	3.6	4.9	4.2	2.9	4.0	1.8	4.3	1.8	2.5
Phosphorus - Dissolved	mg/L P		0.07	<0.01	0.02	0.03	0.04	<0.01	0.02	0.01	0.02	0.04	0.02	0.03
Other														
Cyanide - Total (CN)	mg/L	0.066	na**		<0.00500	0.00059	0.00074		<0.00050	<0.00050	0.00069		<0.00050	<0.00050
Organic Indicators														
Carbonaceous Oxygen Demand	mg/L		424	347	81	120	303	202	86	136	169	179	169	210
Biochemical Oxygen Demand	mg/L		12	10	<3	6	<3	<3	<3	<3	<3	4	<3	16
Total Organic Carbon	mg/L		na**	36.9	8.0	11.1	<1.0	293	3.0	15.0	3.0	42.2	3.0	26.8
Metals														
Arsenic (As)- Dissolved	ug/L	1,900	2.12	4.69	2.99	2.82	3.54	4.66	2.00	2.54	2.74	2.40	2.94	2.73
Barium (Ba)- Dissolved	ug/L	29,000	15.0	15.0	19.6	20.2	14.3	14.5	23.5	24.3	18.0	18.2	24.6	23.7
Beryllium (Be)- Dissolved	ug/L	67	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)- Dissolved	ug/L	2.7	0.0184	0.0140	0.0250	0.0370	0.0385	0.0170	0.0055	0.0340	0.0635	0.0630	0.0052	0.138
Calcium (Ca)- Dissolved	mg/L		396	495	403	350	547	601	283	269	692	638	292	284
Chromium (Cr)- Dissolved	ug/L	810	<0.10	<0.10	0.19	0.16	<0.10	<0.10	<0.10	<0.10	0.15	<0.10	<0.10	<0.10
Copper (Cu)- Dissolved	ug/L	87	0.679	0.877	0.488	0.843	0.198	0.391	0.474	0.415	0.386	0.572	0.373	2.79
Iron (Fe)- Dissolved	ug/L		104	128	41.3	41.6	377	661	32.0	193	521	401	4.80	3.40
Lead (Pb)- Dissolved	ug/L	25	0.0443	0.0630	0.0970	0.0300	0.0216	0.0820	0.0052	0.0390	0.0137	0.0310	<0.0050	0.0410
Magnesium (Mg)- Dissolved	mg/L		207	220	170	149	205	223	138	119	227	203	147	135
Manganese (Mn)- Dissolved	ug/L		361	291	58.9	60.9	434	621	18.6	24.3	1,350	1,210	41.2	42.6
Mercury (Hg)- Total	ug/L	0.29 (2.8)	<0.010	<0.010	<0.002	<0.002	<0.010	<0.010	<0.010	<0.002	<0.010	<0.002	<0.010	<0.002
Nickel (Ni)- Dissolved	ug/L	490	3.06	3.18	0.838	1.68	2.95	3.60	0.711	1.27	5.97	5.51	1.14	3.00
Potassium (K)- Dissolved	mg/L		18.4	21.0	25.0	22.6	14.0	14.3	35.1	32.4	14.0	12.4	30.5	29.2
Selenium (Se)- Dissolved	ug/L	63	0.091	0.074	0.067	0.134	<0.040	0.044	0.080	0.084	0.051	0.112	0.066	0.111
Silver (Ag)- Dissolved	ug/L	1.5	<0.0050	<0.0050	0.0080	<0.0050	0.0059	0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sodium (na)- Dissolved	mg/L	490	1,030	1,160	1,080	914	730	745	1,350	1,180	628	539	1,180	1,090
Zinc (Zn)- Dissolved	ug/L	1,100	2.77	7.08	29.8	34.9	1.31	1.28	14.6	37.6	4.67	6.11	15.9	34.9
Bacteria														
Total Coliforms (MTF)	MPN/100mL				<3	930			<3	930			<3	930
Fecal Coliforms (MTF)	MPN/100mL				<3	4			<3	93			<3	230
E. coli (MTF)	MPN/100mL				<3	4			<3	93			<3	230
Field Parameters														
pH	units		7.39	7.20	7.06	7.97	6.13	7.71	7.42	7.85	6.13	6.92	7.26	7.92
Specific Conductivity	(µS/cm)		7,110	2,000	7,743	2,000	6,160	2,000	8,284	2,000	6,160	2,000	7,718	3,096
Polycyclic Aromatic Hydrocarbons														
Naphthalene	µg/L	1400 (6400)	<0.050		<0.050	0.660	<0.050		<0.050	1.10	<0.050		<0.050	0.410
Benzo(a)pyrene	µg/L	0.81	<0.010		<0.010	<0.010	<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	<0.050		<0.050	<0.050
Petroleum Hydrocarbons														
F1 (C6-C10 Hydrocarbons)	µg/L	750	<25		220	140	<25		320	65	<25		1,500	1,300
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	<200	<200		<200	<200	<200		<200	<200
Benzene	µg/L	44 (430)	<0.10		<0.50	<0.50	<0.10		<5.0	<0.25	<0.10		<10	<10
EthylBenzene	µg/L	2,300	<0.10		<0.50	<0.50	<0.10		<5.0	<0.25	<0.10		<10	<10
Toluene	µg/L	18,000	<0.20		<1.0	<1.0	<0.20		<10	<0.50	<0.20		<20	<20
Xylene (Total)	µg/L	4,200	<0.10		<0.50	0.57	<0.10		<5.0	0.72	<0.10		<10	<10
Volatile Organic Carbons														
Vinyl chloride	µg/L	0.5 (1.7)	<0.20		<1.0	<1.0	<0.20		<10	<0.50	<0.20		<20	<20
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 insufficient sample volume
**na - not analysed due to lab error

Table 2. 2015 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	9-Jun-15	15-Oct-15	4-Jun-15	21-Oct-15	4-Jun-15	4-Jun-15	3-Jun-15	22-Oct-15	10-Jun-15	10-Jun-15
Inorganic Parameters												
Alkalinity - Bicarbonate	mg/L		357	388	152	179	582	345	151	153	530	362
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		293	318	124	147	477	283	123	126	434	297
Dissolved Hardness (CaCO3)	mg/L		1,860	1,980	1,340	1,320	2,500	2,630	1,590	1,360	2,970	2,520
pH	units		7.21	7.44	7.53	7.55	7.86	7.06	7.55	7.72	7.05	7.04
Specific Conductivity	(µS/cm)		4,990	4,750	7,890	8,250	4,710	6,570	9,220	9,910	5,610	5,680
Turbidity	(ntu)		3,880	9,580	995	39.7	18.7	2,980	10.9	9.22	27.9	5,600
Total Dissolved Solids	mg/L		3,960	4,280	5,570	5,090	1,720	5,450	6,520	6,300	5,360	4,640
Total Suspended Solids	mg/L		9,640	20,120	4,380	50	60	7,550	50	20	130	8,360
Total Solids	mg/L		13,600	24,400	9,950	5,140	1,780	13,000	6,570	6,320	5,490	13,000
Dissolved Chloride (Cl)	mg/L	2,300	950	1,000	2,000	1,900	740	1,500	2,800	2,700	820	1,100
Dissolved Sulphate (SO4)	mg/L		1,080	1,100	756	762	1,120	1,160	874	900	2,350	1,530
Nutrients												
Ammonia - Dissolved	mg/L N		0.798	0.789	1.25	0.712	0.068	0.832	1.02	1.26	0.021	0.987
Nitrate - Dissolved	mg/L N		0.115	0.045	<0.003	<0.003	0.027	0.011	0.009	<0.003	1.94	0.011
Total Kjeldahl Nitrogen	mg/L N		5.5	11.4	2.4	2.7	<0.5	2.6	2.4	3.2	1.3	4.3
Phosphorus - Dissolved	mg/L P		0.06	0.09	<0.01	0.03	0.03	0.04	0.02	0.03	<0.01	0.06
Other												
Cyanide - Total (CN)	mg/L	0.066	na*		0.00077	0.00053			<0.00050	<0.00050		
Organic Indicators												
Carbonaceous Oxygen Demand	mg/L		191	505	126	150	25	152	168	128	82	308
Biochemical Oxygen Demand	mg/L		<3	5	<3	>33	<3	<3	<3	<3	<3	<3
Total Organic Carbon	mg/L		3.0	456	<1.0	26.8	13.0	3.0	3.0	1.8	22.0	10.0
Metals												
Arsenic (As)- Dissolved	ug/L	1,900	1.17	2.53	5.01	1.28	0.519	4.94	7.47	6.97	0.543	1.42
Barium (Ba)- Dissolved	ug/L	29,000	20.4	18.5	11.5	22.5	16.7	12.2	12.9	12.4	10.3	10.5
Beryllium (Be)- Dissolved	ug/L	67	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)- Dissolved	ug/L	2.7	2.12	0.186	0.0071	0.0270	0.133	<0.010	0.0112	0.0160	0.124	0.116
Calcium (Ca)- Dissolved	mg/L		469	480	286	294	561	559	364	316	769	640
Chromium (Cr)- Dissolved	ug/L	810	<0.10	<0.10	<0.10	0.11	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10
Copper (Cu)- Dissolved	ug/L	87	2.48	1.28	0.160	0.388	4.10	0.110	0.198	0.098	2.23	1.10
Iron (Fe)- Dissolved	ug/L		8.70	83.0	462	81.6	4.60	2,100	955	767	11.2	26.0
Lead (Pb)- Dissolved	ug/L	25	0.0465	0.1490	0.0341	0.0650	0.0754	<0.010	0.0247	0.0390	0.0418	0.0199
Magnesium (Mg)- Dissolved	mg/L		167	191	151	142	267	299	165	139	254	223
Manganese (Mn)- Dissolved	ug/L		453	515	35.3	55.0	1,480	251	20.2	20.3	2,230	526
Mercury (Hg)- Total	ug/L	0.29 (2.8)	<0.010	<0.010	<0.010	<0.002	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel (Ni)- Dissolved	ug/L	490	4.87	5.70	1.20	2.05	8.62	3.45	1.45	1.36	10.2	5.51
Potassium (K)- Dissolved	mg/L		9.62	10.0	31.8	30.4	8.98	10.9	39.7	36.0	12.1	13.7
Selenium (Se)- Dissolved	ug/L	63	0.575	0.590	<0.040	0.275	0.831	<0.080	0.077	0.103	0.381	0.062
Silver (Ag)- Dissolved	ug/L	1.5	<0.0050	<0.0050	<0.0050	<0.0050	0.0057	<0.010	<0.0050	<0.0050	0.0056	0.0056
Sodium (na)- Dissolved	mg/L	490	451	519	1,200	1,080	518	550	1,600	1,350	623	646
Zinc (Zn)- Dissolved	ug/L	1,100	8.23	9.10	2.41	11.5	10.1	1.57	1.29	1.43	6.60	2.49
Bacteria												
Total Coliforms (MTF)	MPN/100mL				<3	230			<3	<3		
Fecal Coliforms (MTF)	MPN/100mL				<3	23			<3	<3		
E. coli (MTF)	MPN/100mL				<3	23			<3	<3		
Field Parameters												
pH	units		6.89	7.58	6.13	8.46	6.07	6.07	7.15	6.42	6.80	7.10
Specific Conductivity	(µS/cm)		5,610	2,000	6,160	3,060	6,270	6,270	6,290	9,465	9,900	3,888
Polycyclic Aromatic Hydrocarbons												
Naphthalene	µg/L	1400 (6400)	<0.050		<0.050	0.500			<0.050	<0.050		
Benzo(a)pyrene	µg/L	0.81	<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		
Petroleum Hydrocarbons												
F1 (C6-C10 Hydrocarbons)	µg/L	750	<25		770	700			<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	<200		
F4 (C34-C50 Hydrocarbons)	µg/L	500	<200		<200	<200			<200	<200		
Benzene	µg/L	44 (430)	<0.10		<2.5	<2.5			<0.10	<0.10		
EthylBenzene	µg/L	2,300	<0.10		<2.5	<2.5			<0.10	<0.10		
Toluene	µg/L	18,000	<0.20		<5.0	<5.0			<0.20	<0.20		
Xylene (Total)	µg/L	4,200	<0.10		<2.5	<2.5			0.12	<0.10		
Volatile Organic Carbons												
Vinyl chloride	µg/L	0.5 (1.7)	<0.20		<5.0	<5.0			<0.20	<0.20		
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.
*na - not analysed due to lab error

Table 2. 2015 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	3-Jun-15	22-Oct-15	2-Jun-15	26-Oct-15	8-Jun-15	8-Jun-15	3-Jun-15	26-Oct-15	8-Jun-15	8-Jun-15
Inorganic Parameters												
Alkalinity - Bicarbonate	mg/L		146	150	137	138	530	421	150	154	783	463
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		120	123	112	113	434	345	123	126	642	380
Dissolved Hardness (CaCO3)	mg/L		1,300	1,250	994	966	2,600	2,140	1,610	1,450	3,660	3,560
pH	units		7.61	7.63	9.00	7.47	6.93	7.00	7.61	7.36	6.93	6.96
Specific Conductivity	(µS/cm)		8,760	9,380	5,960	8,800	4,610	4,280	8,750	9,150	5,780	5,750
Turbidity	(ntu)		10.8	17.6	15.5	8.80	9.46	637	39.6	23.6	127	107
Total Dissolved Solids	mg/L		5,990	5,840	4,520	5,530	4,200	3,620	6,030	5,760	5,770	5,820
Total Suspended Solids	mg/L		10	130	90	40	130	3,290	20	110	1,200	1,380
Total Solids	mg/L		6,000	5,970	4,610	5,570	4,330	6,910	6,050	5,870	6,970	7,200
Dissolved Chloride (Cl)	mg/L	2,300	2,600	2,400	1,700	1,700	580	690	2,700	2,400	640	520
Dissolved Sulphate (SO4)	mg/L		800	708	646	583	1,530	1,140	841	850	2,460	3,130
Nutrients												
Ammonia - Dissolved	mg/L N		1.11	1.29	1.13	1.01	<0.003	0.574	0.858	1.08	0.985	<0.003
Nitrate - Dissolved	mg/L N		<0.003	<0.003	0.079	<0.003	0.099	0.044	<0.003	0.010	0.004	0.097
Total Kjeldahl Nitrogen	mg/L N		2.2	3.0	2.8	2.7	1.0	1.1	2.8	3.2	1.4	1.2
Phosphorus - Dissolved	mg/L P		0.02	0.05	0.02	0.03	0.04	0.04	0.03	0.03	0.02	0.04
Other												
Cyanide - Total (CN)	mg/L	0.066	0.00050	0.00050	<0.00050	0.00157			0.00050	<0.00050		0.00085
Organic Indicators												
Carbonaceous Oxygen Demand	mg/L		134	118	58	91	41	64	101	95	65	75
Biochemical Oxygen Demand	mg/L		<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Total Organic Carbon	mg/L		3.0	1.3	1.0	2.2	10.0	na*	4.0	2.4	13.0	15.0
Metals												
Arsenic (As)- Dissolved	ug/L	1,900	5.16	5.20	2.03	0.264	0.660	0.738	4.77	5.05	0.686	1.03
Barium (Ba)- Dissolved	ug/L	29,000	15.7	14.1	31.3	43.9	12.0	11.3	13.8	16.4	10.9	16.9
Beryllium (Be)- Dissolved	ug/L	67	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	0.023	<0.010	<0.010	<0.010
Cadmium (Cd)- Dissolved	ug/L	2.7	0.0250	<0.0050	<0.010	<0.0050	0.101	0.0934	0.0052	0.0140	0.0668	0.0262
Calcium (Ca)- Dissolved	mg/L		300	293	274	339	643	469	367	326	663	541
Chromium (Cr)- Dissolved	ug/L	810	<0.10	<0.10	19.3	31.8	<0.10	<0.10	<0.10	0.17	0.16	<0.10
Copper (Cu)- Dissolved	ug/L	87	1.42	0.147	0.200	0.839	2.41	1.22	0.452	0.570	2.58	2.34
Iron (Fe)- Dissolved	ug/L		816	760	14.0	11.5	6.80	17.8	594	575	18.6	18.0
Lead (Pb)- Dissolved	ug/L	25	0.0478	0.0450	<0.010	0.0130	0.0477	0.0165	0.0810	0.0320	0.0663	0.0257
Magnesium (Mg)- Dissolved	mg/L		135	125	75.2	29.4	241	235	168	155	488	536
Manganese (Mn)- Dissolved	ug/L		16.5	14.5	1.92	0.237	1,530	38.4	24.3	29.4	30.1	96.6
Mercury (Hg)- Total	ug/L	0.29 (2.8)	<0.010	0.014	<0.010	<0.010	<0.002	<0.002	<0.010	<0.010	<0.002	<0.002
Nickel (Ni)- Dissolved	ug/L	490	1.75	1.51	0.417	0.854	9.40	3.71	1.43	1.58	14.0	8.36
Potassium (K)- Dissolved	mg/L		36.3	35.4	26.5	22.4	10.4	9.72	40.0	38.1	11.7	19.6
Selenium (Se)- Dissolved	ug/L	63	<0.040	0.122	<0.080	0.071	0.162	<0.040	<0.040	<0.040	0.250	0.092
Silver (Ag)- Dissolved	ug/L	1.5	<0.0050	<0.0050	<0.010	<0.0050	0.0077	<0.0050	<0.0050	<0.0050	0.0064	0.0052
Sodium (na)- Dissolved	mg/L	490	1,360	1,270	869	695	407	313	1,520	1,460	397	657
Zinc (Zn)- Dissolved	ug/L	1,100	5.09	0.890	1.08	7.74	5.23	4.10	1.67	5.88	2.87	6.70
Bacteria												
Total Coliforms (MTF)	MPN/100mL		<3	<3	<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		7.79	7.62	7.30	7.54	6.75	6.93	7.50	7.80	6.76	6.42
Specific Conductivity	(µS/cm)		8,560	2,000	1,599	7,840	4,700	4,310	7,990	2,910	5,840	5,390
Polycyclic Aromatic Hydrocarbons												
Naphthalene	µg/L	1400 (6400)	<0.050	<0.050	<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	<0.010	<0.010
Anthracene	µg/L	2.4	<0.050	<0.050	<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		<25
F2 (C10-C16 Hydrocarbons)	µg/L	150	<100	<100	<100	<100			<100	<100		<100
F3 (C16-C34 Hydrocarbons)	µg/L	500	<200	<200	<200	<200			<200	<200		<200
F4 (C34-C50 Hydrocarbons)	µg/L	500	<200	<200	<200	<200			<200	<200		<200
Benzene	µg/L	44 (430)	<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
Toluene	µg/L	18,000	0.69	<0.20	<0.20	<0.20			<0.20	<0.20		<0.20
Xylene (Total)	µg/L	4,200	0.12	<0.10	<0.10	0.12			<0.10	<0.10		<0.10
Volatile Organic Carbons												
Vinyl chloride	µg/L	0.5 (1.7)	<0.20	<0.20	<2.0	<0.20			<0.20	<0.20		<0.20
Pesticides												
Diazinon	µg/L		<2	<2	<2	<2			<2	<2		<2
Herbicides												
2,4-D	µg/L		<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 lab error

Table 2. 2015 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		8-Jun-15	10-Jun-15	2-Jun-15	26-Oct-15	9-Jun-15	10-Jun-15	2-Jun-15	26-Oct-15	
Inorganic Parameters												
Alkalinity - Bicarbonate	mg/L		ns*	535	281	88.7	88.7	520	371	149	150	
Alkalinity - Carbonate	mg/L		ns*	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Alkalinity - Hydroxide	mg/L		ns*	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Alkalinity - Total	mg/L		ns*	438	230	72.7	72.7	427	304	122	123	
Dissolved Hardness (CaCO3)	mg/L		ns*	3,020	2,380	901	892	2,770	2,300	1,460	1,470	
pH	units		ns*	6.79	7.14	7.78	7.74	6.82	7.29	7.49	7.39	
Specific Conductivity	(µS/cm)		ns*	6,070	543	6,990	7,590	5,740	5,880	8,190	8,570	
Turbidity	(ntu)		ns*	6.36	16,100	28.7	19.8	32.3	71.8	21.1	20.9	
Total Dissolved Solids	mg/L		ns*	5,650	4,510	4,510	4,410	5,090	4,580	5,610	5,360	
Total Suspended Solids	mg/L		ns*	80	40,390	140	<3	180	310	150	60	
Total Solids	mg/L		ns*	5,730	44,900	4,650	4,410	5,270	4,890	5,760	5,420	
Dissolved Chloride (Cl)	mg/L	2,300	ns*	1,100	1,300	2,000	1,900	930	1,300	2,400	2,300	
Dissolved Sulphate (SO4)	mg/L		ns*	1,810	1,170	522	541	1,760	1,260	815	834	
Nutrients												
Ammonia - Dissolved	mg/L N		ns*	0.680	1.09	0.068	0.756	<0.003	0.838	0.832	0.986	
Nitrate - Dissolved	mg/L N		ns*	0.034	<0.003	0.007	<0.003	1.55	0.166	<0.003	<0.003	
Total Kjeldahl Nitrogen	mg/L N		ns*	1.5	5.8	3.7	0.7	1.0	3.4	3.6	2.7	
Phosphorus - Dissolved	mg/L P		ns*	0.04	0.02	0.02	0.02	0.02	<0.01	0.02	0.03	
Other												
Cyanide - Total (CN)	mg/L	0.066	ns*			0.00056	<0.00050			<0.00050	<0.00050	
Organic Indicators												
Carbonaceous Oxygen Demand	mg/L		ns*	75	710	63	61	111	55	18	89	
Biochemical Oxygen Demand	mg/L		ns*	<3	<3	<3	<3	<3	<3	<3	<3	
Total Organic Carbon	mg/L		ns*	19.0	4.0	3.0	1.1	15.0	3.0	10.0	2.6	
Metals												
Arsenic (As)- Dissolved	ug/L	1,900	ns*	0.524	9.17	<0.040	0.097	0.472	1.69	5.50	5.17	
Barium (Ba)- Dissolved	ug/L	29,000	ns*	11.6	14.0	11.3	13.5	13.0	27.0	17.1	19.0	
Beryllium (Be)- Dissolved	ug/L	67	ns*	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	
Cadmium (Cd)- Dissolved	ug/L	2.7	ns*	0.157	<0.0050	<0.010	0.0070	0.196	0.113	0.0270	<0.0050	
Calcium (Ca)- Dissolved	mg/L		ns*	754	420	205	196	746	562	313	321	
Chromium (Cr)- Dissolved	ug/L	810	ns*	<0.10	<0.10	<0.20	<0.10	<0.10	0.18	<0.20	<0.10	
Copper (Cu)- Dissolved	ug/L	87	ns*	4.45	0.190	0.130	0.412	3.54	3.07	1.22	0.068	
Iron (Fe)- Dissolved	ug/L		ns*	4.40	1,240	2,540	2,800	2.30	7.00	723	647	
Lead (Pb)- Dissolved	ug/L	25	ns*	0.0297	<0.0050	<0.010	0.0090	0.0349	0.0440	0.0130	0.0110	
Magnesium (Mg)- Dissolved	mg/L		ns*	276	323	94.5	97.6	219	218	164	163	
Manganese (Mn)- Dissolved	ug/L		ns*	3,830	104	40.9	43.5	2,070	876	34.6	24.3	
Mercury (Hg)- Total	ug/L	0.29 (2.8)	ns*	<0.002	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Nickel (Ni)- Dissolved	ug/L	490	ns*	13.1	2.84	0.221	0.407	7.59	6.80	1.75	1.16	
Potassium (K)- Dissolved	mg/L		ns*	12.5	12.5	29.7	29.3	11.3	16.4	35.3	35.4	
Selenium (Se)- Dissolved	ug/L	63	ns*	0.278	0.058	<0.080	<0.040	0.150	0.629	<0.080	<0.040	
Silver (Ag)- Dissolved	ug/L	1.5	ns*	0.0052	0.0053	<0.010	<0.0050	<0.0050	0.0075	<0.010	<0.0050	
Sodium (na)- Dissolved	mg/L	490	ns*	567	613	1,200	1,190	482	775	1,290	1,280	
Zinc (Zn)- Dissolved	ug/L	1,100	ns*	9.54	1.27	0.610	5.30	11.7	21.5	55.8	12.6	
Bacteria												
Total Coliforms (MTF)	MPN/100mL		ns*			9	<3			<3	<3	
Fecal Coliforms (MTF)	MPN/100mL		ns*			<3	<3			<3	<3	
E. coli (MTF)	MPN/100mL		ns*			<3	<3			<3	<3	
Field Parameters												
pH	units		ns*	7.28	7.07	8.03	8.48	6.64	6.65	7.63	8.03	
Specific Conductivity	(µS/cm)		ns*	5,640	5,360	6,087	2,360	5,610	5,550	7,095	1,286	
Polycyclic Aromatic Hydrocarbons												
Naphthalene	µg/L	1400 (6400)	ns*			0.065	0.080			<0.050	<0.050	
Benzo(a)pyrene	µg/L	0.81	ns*			<0.010	<0.010			<0.010	<0.010	
Anthracene	µg/L	2.4	ns*			<0.050	<0.050			<0.050	<0.050	
Petroleum Hydrocarbons												
F1 (C6-C10 Hydrocarbons)	µg/L	750	ns*			<25	<25			<25	<25	
F2 (C10-C16 Hydrocarbons)	µg/L	150	ns*			<100	<100			<100	<100	
F3 (C16-C34 Hydrocarbons)	µg/L	500	ns*			<200	<200			<200	<200	
F4 (C34-C50 Hydrocarbons)	µg/L	500	ns*			<200	<200			<200	<200	
Benzene	µg/L	44 (430)	ns*			<0.10	<0.10			<0.10	<0.10	
EthylBenzene	µg/L	2,300	ns*			<0.10	<0.10			<0.10	<0.10	
Toluene	µg/L	18,000	ns*			<0.20	<0.20			<0.20	<0.20	
Xylene (Total)	µg/L	4,200	ns*			0.15	0.12			<0.10	<0.10	
Volatile Organic Carbons												
Vinyl chloride	µg/L	0.5 (1.7)	ns*			<0.20	<0.20			<0.20	<0.20	
Pesticides												
Diazinon	µg/L		ns*			<2	<2			<2	<2	
Herbicides												
2,4-D	µg/L		ns*			<1	<2			<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.
*ns - no sample due to the well collapse

Table 3. 2015 Upgradient Ground Water Quality Comparison

	Units	Criteria	2014 Average	2014 Minimum	2014 Maximum	2015 Average	2015 Minimum	2015 Maximum
Inorganic Parameters								
Alkalinity - Bicarbonate	mg/L		328	129	582	399	150	606
Alkalinity - Carbonate	mg/L		173	<0.50	533	<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		152	<0.50	477	327	124	496
Dissolved Hardness (CaCO3)	mg/L		1,680	1,440	2,110	1,830	1,580	2,640
pH	units		7.88	7.57	8.23	7.22	6.96	7.56
Specific Conductivity	(µS/cm)		6,910	3,670	9,700	6,482	3,940	10,400
Turbidity	(ntu)		112	3.22	370	391	11.6	1760
Total Dissolved Solids	mg/L		5,305	3,160	7,020	4,956	3,620	6,860
Total Suspended Solids	mg/L		1,068	220	2,120	868	30	3,600
Total Solids	mg/L		6,373	5,280	7,240	5,824	4,120	7,220
Dissolved Chloride (Cl)	mg/L	2,300	1,270	460	3,200	1,438	410	3,000
Dissolved Sulphate (SO4)	mg/L		1,139	919	1,680	1,283	924	1,710
Nutrients								
Ammonia - Dissolved	mg/L N		0.905	0.250	1.40	0.739	<0.003	1.37
Nitrate - Dissolved	mg/L N		0.407	0.006	1.57	0.318	<0.003	1.35
Total Kjeldahl Nitrogen	mg/L N		2.5	1.4	3.6	1.8	0.5	3.5
Phosphorus - Dissolved	mg/L P		0.45**	<0.20**	0.80**	0.02	0.02	0.03
Other								
Cyanide - Total (CN)	mg/L	0.066	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00083
Organic Indicators								
Carbonaceous Oxygen Demand	mg/L		100*	45*	155*	115	32	290
Biochemical Oxygen Demand	mg/L		<3*	<3*	<3*	3	<3	7
Total Organic Carbon	mg/L		11*	2*	24*	26.0	2.0	106
Metals								
Arsenic (As)- Dissolved	ug/L	1,900	3.27	0.37	5.29	3.48	0.42	6.34
Barium (Ba)- Dissolved	ug/L	29,000	15.0	9.5	24.5	13.6	11.8	15.6
Beryllium (Be)- Dissolved	ug/L	67	<0.10	<0.10	<0.20	<0.010	<0.010	<0.010
Cadmium (Cd)- Dissolved	ug/L	2.7	0.052	<0.05	<0.10	0.056	0.011	0.143
Calcium (Ca)- Dissolved	mg/L		389	330	536	446	364	700
Chromium (Cr)- Dissolved	ug/L	810	<1.0	<1.0	<2.0	<0.10	<0.10	<0.10
Copper (Cu)- Dissolved	ug/L	87	1.62	<0.50	2.40	1.91	0.46	3.19
Iron (Fe)- Dissolved	ug/L		674	10.0	1,570	567	2.7	1,400
Lead (Pb)- Dissolved	ug/L	25	0.353	0.084	0.927	0.105	0.018	0.226
Magnesium (Mg)- Dissolved	mg/L		172	149	187	174	155	216
Manganese (Mn)- Dissolved	ug/L		467	31.3	1,550	555	30.7	1,680
Mercury (Hg)- Total	ug/L	0.29 (2.8)	0.003*	<0.002*	<0.010*	0.004	<0.002	<0.010
Nickel (Ni)- Dissolved	ug/L	490	5.1	1.4	9.5	5.0	1.4	7.5
Potassium (K)- Dissolved	mg/L		28.4	9.7	45.5	24.0	9.36	45.9
Selenium (Se)- Dissolved	ug/L	63	<0.40	<0.40	<0.80	0.13	<0.040	0.38
Silver (Ag)- Dissolved	ug/L	1.5	<0.05	<0.05	<0.10	<0.0050	<0.0050	<0.0050
Sodium (na)- Dissolved	mg/L	490	1,014	313	1,750	1,007	362	1,790
Zinc (Zn)- Dissolved	ug/L	1,100	5.3	2.5	10.6	12.8	2.3	34.5
Bacteria								
Total Coliforms (MTF)	MPN/100mL		<3	<3	<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		6.69	6.24	7.51	7.33	6.24	7.94
Specific Conductivity	(µS/cm)		7,073	3,833	9,995	4,759	1,825	9,995
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	<200
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	<0.10	0.13	<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	<2	<2	<2	<2	<2
Herbicides								
2,4-D	µg/L		<2	<2	<2	<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: 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.
*Results not included in 2014 Annual Report
**Total phosphorus results reported, dissolved phosphorus was not analysed

Table 3. 2015 Downgradient and Crossgradient Ground Water Quality Comparison

	Units	Criteria	2014			2015		
			Average	Minimum	Maximum	Average	Minimum	Maximum
Inorganic Parameters								
Alkalinity - Bicarbonate	mg/L		280	77	820	272	89	783
Alkalinity - Carbonate	mg/L		73	<0.50	378	<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		181	<0.50	672	223	73	642
Dissolved Hardness (CaCO3)	mg/L		2,056	856	5,080	1,910	892	3,660
pH	units		7.79	7.05	8.37	7.42	6.79	9.00
Specific Conductivity	(µS/cm)		7,098	4,120	9,170	7,159	543	9,910
Turbidity	(ntu)		1,226	4.91	19,500	1,871	3.29	16,100
Total Dissolved Solids	mg/L		5,729	4,170	7,450	5,266	1,720	7,370
Total Suspended Solids	mg/L		3,967	<3	33,830	4,911	<3	42,950
Total Solids	mg/L		9,696	4,570	38,800	10,177	1,780	48,400
Dissolved Chloride (Cl)	mg/L	2,300	1,529	520	2,900	1,801	520	2,800
Dissolved Sulphate (SO4)	mg/L		1,128	524	2,930	1,072	522	3,130
Nutrients								
Ammonia - Dissolved	mg/L N		1.5	0.07	18	0.827	<0.003	1.29
Nitrate - Dissolved	mg/L N		0.196	<0.003	2.11	0.105	<0.003	1.94
Total Kjeldahl Nitrogen	mg/L N		3.5	0.6	11.2	3.1	<0.5	11.4
Phosphorus - Dissolved	mg/L P		1.3**	<0.20**	9.6**	0.03	<0.01	0.09
Other								
Cyanide - Total (CN)	mg/L	0.066	<0.00050	<0.00050	<0.00050	0.00053	<0.00050	<0.0050
Organic Indicators								
Carbonaceous Oxygen Demand	mg/L		226*	77*	326*	159	18	710
Biochemical Oxygen Demand	mg/L		<3*	<3*	<3*	3	<3	33
Total Organic Carbon	mg/L		79*	3*	543*	26.4	<1.0	456
Metals								
Arsenic (As)- Dissolved	ug/L	1,900	3.03	<0.20	10.0	3.15	<0.04	9.17
Barium (Ba)- Dissolved	ug/L	29,000	24.2	10.4	209	19.0	10.3	97.1
Beryllium (Be)- Dissolved	ug/L	67	0.11	<0.05	1.6	<0.010	<0.010	0.055
Cadmium (Cd)- Dissolved	ug/L	2.7	0.113	<0.05	1.03	0.092	<0.005	2.12
Calcium (Ca)- Dissolved	mg/L		505	191	1,520	452	196	976
Chromium (Cr)- Dissolved	ug/L	810	2.40	<0.50	54.3	2.41	<0.10	59.1
Copper (Cu)- Dissolved	ug/L	87	1.99	<0.50	21.9	1.21	0.068	4.45
Iron (Fe)- Dissolved	ug/L		1,539	<10	15,300	441	2.3	2,800
Lead (Pb)- Dissolved	ug/L	25	1.07	<0.05	30.1	0.047	<0.005	0.404
Magnesium (Mg)- Dissolved	mg/L		193	<0.25	430	190	0.338	536
Manganese (Mn)- Dissolved	ug/L		646	<0.50	3,600	452	0.093	3,830
Mercury (Hg)- Total	ug/L	0.29 (2.8)	0.004*	<0.002*	0.021*	0.004	<0.002	0.014
Nickel (Ni)- Dissolved	ug/L	490	5.9	<0.2	31.3	3.7	0.2	14.0
Potassium (K)- Dissolved	mg/L		23.9	9.3	42.7	23.7	8.98	40.0
Selenium (Se)- Dissolved	ug/L	63	0.37	<0.20	3.48	0.15	<0.04	0.83
Silver (Ag)- Dissolved	ug/L	1.5	0.031	<0.025	<0.10	<0.005	<0.005	0.011
Sodium (na)- Dissolved	mg/L	490	905	53	1,610	951	313	1,600
Zinc (Zn)- Dissolved	ug/L	1,100	11.2	<1.0	86.6	9.6	0.6	55.8
Bacteria								
Total Coliforms (MTF)	MPN/100mL		5	<3	43	128	<3	930
Fecal Coliforms (MTF)	MPN/100mL		<3	<3	<3	16	<3	230
E. coli (MTF)	MPN/100mL		<3	<3	<3	16	<3	230
Field Parameters								
pH	units		6.64	5.06	7.97	7.26	6.07	8.48
Specific Conductivity	(µS/cm)		7,229	2,843	9,465	5,372	1,286	9,900
Polycyclic Aromatic Hydrocarbons								
Naphthalene	µg/L	1400 (6400)	0.040	<0.050	0.160	0.111	<0.050	1.10
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	176	<25	1500
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	<200
Benzene	µg/L	44 (430)	<0.10	<0.10	<0.10	0.56	<0.10	<10
EthylBenzene	µg/L	2,300	<0.10	<0.10	<0.10	0.56	<0.10	<10
Toluene	µg/L	18,000	0.21	<0.20	1.70	1.16	<0.20	<20
Xylene (Total)	µg/L	4,200	<0.10	<0.10	0.17	0.61	<0.10	<10
Volatile Organic Carbons								
Vinyl chloride	µg/L	0.5 (1.7)	<0.20	<0.20	<0.20	1.15	<0.20	<20
Pesticides								
Diazinon	µg/L		<2	<2	<2	<2	<2	<2
Herbicides								
2,4-D	µg/L		<2	<2	<2	<1	<1	<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
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.
*Results not included in 2014 Annual Report
**Total phosphorus results reported, dissolved phosphorus was not analysed

4.2 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 2015, a total of 30 surface water samples were analyzed – 6 upstream samples, 17 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. The 4R depot did not open until January 2016, as such there are no 2015 samples for SW-25-13a or 13b; in addition, the retention pond for the 4R depot (SW-25-10) was indicated in the Surface Water SAP, but was not included in the final design plan. The dry ponds (SW-25-15a and 15b) were under construction until fall 2015, and were not included in the spring sampling event. In 2015, there were no deviations from the Surface Water SAP or from normal sample collection and preservation practices. Weekly weir data is provided in Table 4 and a summary of the 2015 surface water results are provided in Table 5.

The analytical results for surface water obtained in 2015 were found to be highly variable compared to those obtained in 2014. A comparison of the average, minimum, and maximum values obtained in 2014 and 2015 are provided in Table 6. The data collected in 2015 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 2015. At this time we have no recommendations for changes in the surface water monitoring program.

Table 4. 2015 Weekly Weir Data

Date	Flow (m/s)	pH (units)	Conductivity (m/s)	DO	Temp (°C)
2-Apr-15	0.0	7.44	0.750	0.18	4.7
13-Apr-15	0.0	8.66	0.808	nr	7.6
24-Apr-15	0.0	8.77	1.020	nr	7.7
1-May-15	0.0	8.68	1.010	11.13	7.5
8-May-15	0.0	8.59	1.230	10.15	7.4
15-May-15	0.0	8.48	1.040	12.13	7.1
22-May-15	0.0	7.91	0.640	10.80	17.9
29-May-15	0.0	8.45	1.023	10.92	17.7
1-Jun-15	0.0	10.68	1.062	10.83	17.9
5-Jun-15	0.0	8.93	0.870	12.05	17.3
12-Jun-15	0.0	8.43	0.900	11.36	16.4
19-Jun-15	0.0	7.92	0.870	9.21	16.2
26-Jun-15	0.0	8.01	0.910	10.00	22.1
3-Jul-15	0.1	7.95	0.850	9.33	14.1
10-Jul-15	0.0	8.59	0.870	nr	18.1
17-Jul-15	0.0	7.88	0.890	9.51	21.3
24-Jul-15	0.0	7.93	0.920	9.81	19.4
31-Jul-15	0.1	8.02	1.010	10.13	16.3
7-Aug-15	0.0	7.51	0.850	9.99	14.1
14-Aug-15	0.0	7.15	1.630	10.90	23.7
21-Aug-15	0.0	7.81	0.930	8.51	18.1
28-Aug-15	0.0	7.32	0.850	8.23	23.8
8-Sep-15	0.0	7.10	0.950	6.89	7.6
11-Sep-15	0.0	8.90	0.369	8.17	13.5
18-Sep-15	0.4	6.00	0.473	6.15	14.6
25-Sep-15	0.0	6.90	0.930	12.18	16.5

nr - no result due to instrument malfunction

Table 5. 2015 Surface Water Monitoring

			Ponds							Upstream						Downstream				
			SW25-7		SW25-8			SW25-11		SW25-1			SW25-12			SW25-2			SW25-16	
Sampling date	Units	Criteria	30-Aug-15	28-Oct-15	22-Apr-15	21-Jul-15	28-Oct-15	25-Jun-15	20-Jul-15	16-Apr-15	20-Jul-15	28-Oct-15	16-Apr-15	20-Jul-15	28-Oct-15	16-Apr-15	20-Jul-15	28-Oct-15	16-Apr-15	20-Jul-15
Inorganic Parameters																				
Alkalinity - Bicarbonate	mg/L		133	172	467	359	351	343	253	172	211	282	168	198	295	215	197	209	176	227
Alkalinity - Carbonate	mg/L		162	210	544	417	428	398	240	210	258	344	205	242	360	236	182	244	215	267
Alkalinity - Hydroxide	mg/L		<0.50	<0.50	12.9	9.80	<0.50	9.97	33.6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	12.5	28.6	5.50	<0.50	5.11
Alkalinity - Total	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
Dissolved Hardness (CaCO3)	mg/L		858	928	701	746	574	765	631	216	311	331	233	322	399	333	432	383	269	487
pH	units	6.5-9.0	8.03	8.19	8.60	8.55	8.22	8.55	9.31	7.69	7.38	7.57	7.80	7.64	7.61	9.19	9.19	8.94	7.93	8.42
Specific Conductivity	(µS/cm)		1,940	1,890	na*	2,150	1,760	2,210	2,190	487	793	787	524	834	902	811	1,440	916	741	1,630
Turbidity	(ntu)		18	102	32.8	64.2	226	18.7	92.4	9.94	239	1660	6.66	12.0	90.6	88.0	38.0	91.0	39.1	17.7
Total Dissolved Solids	mg/L		2,340	1,580	1,480	1,800	1,430	1,650	1,950	326	686	537	354	726	592	556	1,200	628	476	1,340
Total Suspended Solids	mg/L		680	190	110	380	200	130	110	32	474	1,573	68	0	88	100	130	106	116	120
Total Solids	mg/L		3,020	1,770	1,590	2,180	1,630	1,780	2,060	358	1,160	2,110	422	726	680	656	1,330	734	592	1,460
Dissolved Chloride (Cl)	mg/L	120	180	180	210	290	210	270	270	30	93	39	30	100	62	84	190	75	120	220
Dissolved Sulphate (SO4)	mg/L		573	562	238	311	191	360	344	27	35	45	41	60	68	80	193	140	32	218
Nutrients																				
Ammonia - Dissolved	mg/L N		6.28	5.29	4.49	0.28	<0.003	0.336	0.089	<0.003	<0.003	<0.003	<0.003	0.006	1.66	0.013	0.011	<0.003	0.006	0.025
Nitrate - Dissolved	mg/L N	13	2.82	0.021	0.811	0.145	0.005	2.19	0.154	0.011	<0.003	<0.003	<0.003	0.005	2.07	<0.003	0.004	<0.003	<0.003	0.019
Total Kjeldahl Nitrogen	mg/L N		10.8	5.8	10.9	7.4	14.6	4.7	3.6	<0.5	1.8	10.9	<0.5	0.6	1.8	2.5	1.9	2.5	1.3	1.8
Phosphorus - Dissolved	ug/L P		168	123	395	149	1750	54.1	54.8	171	181	52.3	130	163	92.9	44.9	30.8	32.0	122	48.4
Other																				
Cyanide - Total (CN)	mg/L	5	0.00450	0.00268	0.00544	0.00690	0.00879	0.00459	0.00411	0.00153	0.00156	0.00100	0.00164	0.00132	0.00129	0.00183	0.00318	0.00126	0.00208	0.00315
Organic Indicators																				
Carbonaceous Oxygen Demand	mg/L		97	117	241	306	315	167	164	43	115	303	45	52	68	43	102	88	71	100
Biochemical Oxygen Demand	mg/L		na**	<3	14	25	18	7	25	<3	<6	24	<3	4	<3	17	5	7	5	<3
Metals																				
Arsenic (As)- Dissolved	ug/L	5	2.53	2.36	9.10	12.9	14.7	7.52	8.54	3.85	3.43	1.72	3.30	2.84	2.17	4.80	10.3	3.84	2.05	8.76
Barium (Ba)- Dissolved	ug/L		59.3	48.3	63.4	88.6	76.7	144	69.5	46.7	55.9	69.9	51.3	57.8	77.6	59.8	60.0	30.3	63.3	68.5
Beryllium (Be)- Dissolved	ug/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.052	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)- Dissolved	ug/L	0.09	0.0370	0.0220	0.0316	1.15	0.0880	0.0139	0.0116	0.0056	0.0665	0.0100	0.0666	0.115	0.0060	0.0099	0.0404	<0.0050	0.0171	0.0675
Calcium (Ca)- Dissolved	mg/L		139	148	101	82.6	83.2	76.2	52.6	45.3	58.2	61.1	47.1	59.4	70.7	49.7	38.7	49.7	53.1	44.8
Chromium (Cr)- Dissolved	ug/L		0.35	0.22	0.42	0.54	0.64	0.63	1.27	0.10	0.24	<0.10	0.11	0.14	<0.10	0.17	0.65	<0.10	0.20	0.77
Copper (Cu)- Dissolved	ug/L		20.9	15.3	5.30	6.88	16.0	7.64	4.98	1.82	1.97	1.14	2.33	1.99	0.918	2.77	3.79	1.16	3.08	2.86
Iron (Fe)- Dissolved	ug/L	300	15.0	5.70	69.4	39.2	229	11.6	13.2	57.2	183	59.9	84.4	98.8	141	58.6	17.1	13.4	71.0	39.5
Lead (Pb)- Dissolved	ug/L		0.0700	0.0330	0.0760	0.1120	0.2760	0.0166	0.0681	0.0519	0.0935	0.0300	0.0884	0.0339	0.0810	0.1450	0.0387	0.0270	0.0823	0.0371
Magnesium (Mg)- Dissolved	mg/L		124	136	109	131	88.9	140	121	24.9	40.2	43.4	28.1	42.2	53.9	50.6	81.3	62.8	33.1	91.1
Manganese (Mn)- Dissolved	ug/L		55.1	224	424	26.0	324	20.2	38.7	20.6	111	24.2	29.2	57.8	98.0	12.6	3.61	78.9	42.1	21.8
Mercury (Hg)- Total	ug/L	0.026	<0.010	<0.010	0.0024	<0.010	<0.010	<0.010	<0.010	<0.002	<0.010	<0.010	<0.002	<0.010	<0.010	<0.002	<0.010	<0.010	<0.002	<0.010
Nickel (Ni)- Dissolved	ug/L		11.6	12.9	24.8	32.4	41.2	30.1	31.9	2.44	3.16	2.46	2.69	2.92	3.02	7.39	17.6	8.40	2.62	20.1
Potassium (K)- Dissolved	mg/L		33.2	33.4	109	159	226	33.8	34.1	12.1	9.20	12.8	12.5	9.20	16.2	13.5	27.7	20.6	13.2	31.6
Selenium (Se)- Dissolved	ug/L	1	1.73	1.43	0.675	1.06	1.09	0.833	0.826	0.104	0.166	0.083	0.099	0.153	0.093	0.259	0.410	0.255	0.131	0.409
Sodium (Na)- Dissolved	mg/L		99	110	73	102	62	182	230	17	37	26	18	41	35	48	129	47	57	146
Zinc (Zn)- Dissolved	ug/L	30	6.54	1.65	4.85	14.9	10.6	2.26	7.44	1.96	5.88	7.74	31.3	36.1	29.6	1.91	5.96	7.41	7.57	6.33
Bacteria																				
Total Coliforms (MTF)	MPN/100mL		23,000	>11,000	930	11,000	>11,000	>11,000	11,000	2,400	4,600	>11,000	>11,000	2,400	2,400	11,000	2,400	2,400	>11,000	11,000
Fecal Coliforms (MTF)	MPN/100mL		930	11,000	930	11,000	>11,000	>11,000	2,400	15	430	230	23	930	430	93	93	93	<3	150
E. coli (MTF)	MPN/100mL		930	11,000	na**	4,600	>11,000	>11,000	2,400	15	460	230	23	150	230	93	93	43	<3	150
Field Parameters																				
pH	units	6.5-9.0	8.03	8.32	8.64	6.80	8.30	8.48	9.40	7.44	6.49	8.16	7.78	6.63	8.49	8.28	9.34	9.02	8.00	8.51
Specific Conductivity	(µS/cm)		1,790	1,729	1,910	2,140	1,589	2,210	2,030	610	810	685	610	790	765	880	1,340	780	840	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)
*na - not analysed due to insufficient sample volume
**na - not analysed due to lab error

Table 5. 2015 Surface Water Monitoring

			Intermediate															
			SW25-9A			SW25-9B			SW25-13A*	SW25-13B*	SW25-14A		SW25-14B		SW25-15A*		SW25-15B*	
Sampling date	Units	Criteria	16-Apr-15	20-Jul-15	28-Oct-15	16-Apr-15	20-Jul-15	28-Oct-15	16-Apr-15	20-Jul-15	16-Apr-15	20-Jul-15	16-Apr-15	20-Jul-15	16-Apr-15	20-Jul-15	16-Apr-15	20-Jul-15
Inorganic Parameters																		
Alkalinity - Bicarbonate	mg/L		226	142	246	279	142	233	ns	ns	188	192	278	141	ns	255	ns	156
Alkalinity - Carbonate	mg/L		276	129	300	333	127	284	ns	ns	229	222	322	125	ns	206	ns	190
Alkalinity - Hydroxide	mg/L		<0.50	21.4	<0.50	3.59	22.8	<0.50	ns	ns	<0.50	5.80	8.40	22.8	ns	51.6	ns	<0.50
Alkalinity - Total	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	ns	ns	<0.50	<0.50	<0.50	<0.50	ns	<0.50	ns	<0.50
Dissolved Hardness (CaCO3)	mg/L		307	245	268	373	228	289	ns	ns	296	275	352	228	ns	633	ns	251
pH	units	6.5-9.0	8.16	9.35	7.83	8.63	9.34	7.98	ns	ns	8.27	8.31	8.77	9.42	ns	9.38	ns	8.24
Specific Conductivity	(µS/cm)		778	751	719	878	685	794	ns	ns	727	734	867	706	ns	2,070	ns	808
Turbidity	(ntu)		135	45.2	22.8	39.4	263	111	ns	ns	458	868	122	219	ns	176	ns	3160
Total Dissolved Solids	mg/L		480	650	479	568	755	540	ns	ns	478	757	548	652	ns	1,940	ns	940
Total Suspended Solids	mg/L		114	24	5	94	1,265	240	ns	ns	1,252	1,633	256	346	ns	260	ns	18,460
Total Solids	mg/L		594	674	484	662	2,020	780	ns	ns	1,730	2,390	804	998	ns	2,200	ns	19,400
Dissolved Chloride (Cl)	mg/L	120	66	64	49	78	66	65	ns	ns	68	68	79	62	ns	270	ns	67
Dissolved Sulphate (SO4)	mg/L		59	70	33	56	60	56	ns	ns	64	41	54	59	ns	300	ns	67
Nutrients																		
Ammonia - Dissolved	mg/L N		4.19	0.020	5.27	3.26	0.077	2.89	ns	ns	0.022	0.041	2.71	0.017	ns	0.008	ns	0.445
Nitrate - Dissolved	mg/L N	13	0.179	<0.003	0.043	0.145	0.016	1.98	ns	ns	0.017	0.013	0.138	<0.003	ns	0.030	ns	0.008
Total Kjeldahl Nitrogen	mg/L N		3.9	1.2	8.1	5.4	4.6	8.2	ns	ns	2.7	5.4	5.1	9.0	ns	6.0	ns	14.1
Phosphorus - Dissolved	ug/L P		464	35.1	916	282	60.4	613	ns	ns	45.7	22.9	260	46.4	ns	85.0	ns	61.6
Other																		
Cyanide - Total (CN)	mg/L	5	0.00172	0.00200	0.00161	0.00112	0.00222	0.00196	ns	ns	0.00164	0.00134	0.00199	0.00325	ns	0.00242	ns	0.00194
Organic Indicators																		
Carbonaceous Oxygen Demand	mg/L		50	70	71	83	135	93	ns	ns	148	243	92	198	ns	230	ns	301
Biochemical Oxygen Demand	mg/L		<3	9	6	10	15	<3	ns	ns	3	7	11	45	ns	7	ns	13
Metals																		
Arsenic (As)- Dissolved	ug/L	5	5.53	8.43	6.31	7.64	10.2	6.97	ns	ns	2.18	3.20	7.44	10.4	ns	11.4	ns	12.8
Barium (Ba)- Dissolved	ug/L		45.9	50.7	81.2	48.3	52.3	100	ns	ns	78.7	64.6	53.4	55.5	ns	99.3	ns	69.5
Beryllium (Be)- Dissolved	ug/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	ns	ns	<0.010	<0.010	<0.010	<0.010	ns	<0.010	ns	<0.010
Cadmium (Cd)- Dissolved	ug/L	0.09	0.0063	0.0147	0.0080	<0.0050	0.0104	0.0120	ns	ns	0.0057	0.0211	0.0078	0.0096	ns	0.0131	ns	0.0110
Calcium (Ca)- Dissolved	mg/L		53.3	33.1	49.1	63.3	27.8	50.2	ns	ns	56.4	47.3	58.1	28.4	ns	41.6	ns	31.5
Chromium (Cr)- Dissolved	ug/L		0.11	<0.10	<0.10	0.11	<0.10	0.12	ns	ns	0.12	0.12	0.24	0.11	ns	0.70	ns	<0.10
Copper (Cu)- Dissolved	ug/L		1.38	2.96	1.45	1.25	3.35	1.51	ns	ns	3.34	3.21	1.83	3.84	ns	6.00	ns	2.98
Iron (Fe)- Dissolved	ug/L	300	23.1	26.3	75.1	42.1	14.8	68.7	ns	ns	39.3	33.5	130	18.7	ns	59.8	ns	8.10
Lead (Pb)- Dissolved	ug/L		0.0341	0.0993	0.0420	0.0397	0.0733	0.0500	ns	ns	0.0884	0.0591	0.1860	0.0751	ns	0.0875	ns	0.0822
Magnesium (Mg)- Dissolved	mg/L		42.1	39.5	35.2	52.2	38.5	39.7	ns	ns	37.6	38.0	50.3	38.0	ns	129	ns	41.9
Manganese (Mn)- Dissolved	ug/L		30.7	34.1	219	416	30.3	569	ns	ns	73.1	9.54	308	9.89	ns	11.5	ns	71.0
Mercury (Hg)- Total	ug/L	0.026	<0.002	<0.010	<0.010	<0.002	<0.010	<0.010	ns	ns	<0.002	<0.010	<0.002	<0.010	ns	<0.010	ns	<0.010
Nickel (Ni)- Dissolved	ug/L		6.57	5.07	8.94	9.97	6.14	10.3	ns	ns	4.33	3.57	9.95	6.21	ns	28.3	ns	8.93
Potassium (K)- Dissolved	mg/L		13.2	13.8	23.5	15.1	14.3	22.6	ns	ns	11.7	8.81	14.3	14.5	ns	95.7	ns	14.3
Selenium (Se)- Dissolved	ug/L	1	0.227	0.309	0.180	0.256	0.269	0.202	ns	ns	0.178	0.174	0.230	0.298	ns	0.797	ns	0.315
Sodium (Na)- Dissolved	mg/L		36	33	22	48	35	31	ns	ns	30	30	46	35	ns	158	ns	39
Zinc (Zn)- Dissolved	ug/L	30	1.56	4.96	1.14	0.760	5.01	3.94	ns	ns	3.57	12.1	1.17	6.03	ns	5.61	ns	0.930
Bacteria																		
Total Coliforms (MTF)	MPN/100mL		230	930	4,600	2,400	2,400	1,500	ns	ns	1,100	4,600	210	430	ns	>11,000	ns	>11,000
Fecal Coliforms (MTF)	MPN/100mL		23	930	1,500	230	930	1,500	ns	ns	11,000	4,600	75	230	ns	>11,000	ns	>11,000
E. coli (MTF)	MPN/100mL		9	930	1,500	230	430	750	ns	ns	4,600	2,400	75	230	ns	>11,000	ns	>11,000
Field Parameters																		
pH	units	6.5-9.0	8.20	8.53	8.48	8.78	9.45	8.46	ns	ns	8.31	8.28	8.96	9.84	ns	9.58	ns	9.01
Specific Conductivity	(µS/cm)		850	610	642	960	580	695	ns	ns	820	650	950	570	ns	1,920	ns	650

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)
*ns - no sample due to the location being under construction

Table 6. Upstream Surface Water Quality Comparison

	Units	Criteria	2014			2015		
			Average	Minimum	Maximum	Average	Minimum	Maximum
Inorganic Parameters								
Alkalinity - Bicarbonate	mg/L		421	93.2	799	221	168	295
Alkalinity - Carbonate	mg/L		273	<0.50	975	270	205	360
Alkalinity - Hydroxide	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Alkalinity - Total	mg/L		162	<0.50	629	<0.50	<0.50	<0.50
Dissolved Hardness (CaCO3)	mg/L		723	83.7	1,700	302	216	399
pH	units	6.5-9.0	7.72	7.40	8.14	7.62	7.38	7.80
Specific Conductivity	(µS/cm)		1,667	194	4,370	721	487	902
Turbidity	(ntu)		388	20.3	1,200	336	6.66	1,660
Total Dissolved Solids	mg/L		1,340	178	3,310	537	326	726
Total Suspended Solids	mg/L		1,099	14	2,516	373	<3	1,573
Total Solids	mg/L		2,439	192	4,750	909	358	2,110
Dissolved Chloride (Cl)	mg/L	120	172	8.8	530	59	30	100
Dissolved Sulphate (SO4)	mg/L		289	<0.50	784	46	27	68
Nutrients								
Ammonia - Dissolved	mg/L N		7.5	0.042	37	0.279	<0.003	1.66
Nitrate - Dissolved	mg/L N	13	0.99	<0.003	3.8	0.348	<0.003	2.07
Total Kjeldahl Nitrogen	mg/L N		10.0	2.6	24.7	2.6	<0.5	10.9
Phosphorus - Dissolved	mg/L P		190	127	253	132	52.3	181
Other								
Cyanide - Total (CN)	mg/L	5	0.00363	0.00120	0.00847	0.00139	0.00100	0.00164
Organic Indicators								
Carbonaceous Oxygen Demand	mg/L		283	31	532	104	43	303
Biochemical Oxygen Demand	mg/L		12	3	31	6	<3	24
Metals								
Arsenic (As)- Dissolved	ug/L	5	5.14	2.05	8.94	2.89	1.72	3.85
Barium (Ba)- Dissolved	ug/L		104	44.3	135	59.9	46.7	77.6
Beryllium (Be)- Dissolved	ug/L		0.018	<0.010	0.050	0.013	<0.010	0.052
Cadmium (Cd)- Dissolved	ug/L	0.09	0.057	0.008	0.149	0.0450	0.0056	0.1150
Calcium (Ca)- Dissolved	mg/L		144	57.5	209	57.0	45.3	70.7
Chromium (Cr)- Dissolved	ug/L		3.63	0.15	10.5	0.12	<0.10	0.24
Copper (Cu)- Dissolved	ug/L		6.73	0.409	19.3	1.69	0.918	2.33
Iron (Fe)- Dissolved	ug/L	300	146	29.6	301	104	57.2	183
Lead (Pb)- Dissolved	ug/L		0.177	0.041	0.426	0.0631	0.0300	0.0935
Magnesium (Mg)- Dissolved	mg/L		189	40.9	287	38.8	24.9	53.9
Manganese (Mn)- Dissolved	ug/L		416	320	540	56.8	20.6	111
Mercury (Hg)- Total	ug/L	0.026	0.0031	<0.0020	0.0045	0.004	<0.002	<0.010
Nickel (Ni)- Dissolved	ug/L		34.5	1.95	95.0	2.78	2.44	3.16
Potassium (K)- Dissolved	mg/L		27.8	7.14	59.1	12.0	9.2	16.2
Selenium (Se)- Dissolved	ug/L	1	0.952	<0.20	2.60	0.116	0.083	0.166
Sodium (Na)- Dissolved	mg/L		243	26.5	486	29	17	41
Zinc (Zn)- Dissolved	ug/L	30	4.90	2.12	10.1	18.8	1.96	36.1
Bacteria								
Total Coliforms (MTF)	MPN/100mL		5,886	430	>11,000	5633	2400	>11,000
Fecal Coliforms (MTF)	MPN/100mL		3,207	43	>11,000	343	15	930
E. coli (MTF)	MPN/100mL		3,207	43	11,000	185	15	460
Field Parameters								
pH	units	6.5-9.0	7.71*	7.00*	8.64*	7.50	6.49	8.49
Specific Conductivity	(µS/cm)		1,460*	231*	4,363*	712	610	810

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.

*Results not included in 2014 Annual Report

Table 6. Intermediate/Downstream Surface Water Quality Comparison

	Units	Criteria	2014			2015		
			Average	Minimum	Maximum	Average	Minimum	Maximum
Inorganic Parameters								
Alkalinity - Bicarbonate	mg/L		260	145	569	206	141	279
Alkalinity - Carbonate	mg/L		100	<0.50	323	229	125	333
Alkalinity - Hydroxide	mg/L		15.2	<0.50	79.7	11.2	<0.50	51.6
Alkalinity - Total	mg/L		127	<0.50	475	<0.50	<0.50	<0.50
Dissolved Hardness (CaCO3)	mg/L		327	145	790	332	228	633
pH	units	6.5-9.0	8.35	7.63	9.41	8.67	7.83	9.42
Specific Conductivity	(µS/cm)		877	373	2,020	944	685	2,070
Turbidity	(ntu)		539	34.4	2,210	347	17.7	3,160
Total Dissolved Solids	mg/L		653	280	1,580	764	476	1,940
Total Suspended Solids	mg/L		1,650	38	5,490	1,442	5	18,460
Total Solids	mg/L		2,304	356	6,210	2,206	484	19,400
Dissolved Chloride (Cl)	mg/L	120	90	28	270	99	49	270
Dissolved Sulphate (SO4)	mg/L		82	26	238	93	32	300
Nutrients								
Ammonia - Dissolved	mg/L N		1.027	0.100	2.40	1.118	<0.003	5.27
Nitrate - Dissolved	mg/L N	13	0.276	<0.003	0.716	0.153	<0.003	1.98
Total Kjeldahl Nitrogen	mg/L N		6.0	3.6	8.0	4.9	1.2	14.1
Phosphorus - Dissolved	mg/L P		151	89.4	214	186	22.9	916
Other								
Cyanide - Total (CN)	mg/L	5	0.00198	0.00122	0.00278	0.002041765	0.00112	0.00325
Organic Indicators								
Carbonaceous Oxygen Demand	mg/L		178	38	493	125	43	301
Biochemical Oxygen Demand	mg/L		15	3	>52	10	<3	45
Metals								
Arsenic (As)- Dissolved	ug/L	5	7.78	2.72	10.9	7.19	2.05	12.8
Barium (Ba)- Dissolved	ug/L		91.8	57.6	172	63.6	30.3	100
Beryllium (Be)- Dissolved	ug/L		<0.010	<0.010	<0.050	<0.010	<0.010	<0.010
Cadmium (Cd)- Dissolved	ug/L	0.09	0.018	<0.005	0.041	0.0153	<0.0050	0.0675
Calcium (Ca)- Dissolved	mg/L		57.4	41.6	100	45.7	27.8	63.3
Chromium (Cr)- Dissolved	ug/L		0.74	0.11	2.4	0.22	<0.10	0.77
Copper (Cu)- Dissolved	ug/L		2.18	1.24	3.18	2.75	1.16	6.00
Iron (Fe)- Dissolved	ug/L	300	61.2	17.6	160	43.5	8.10	130
Lead (Pb)- Dissolved	ug/L		0.119	<0.025	0.263	0.0733	0.0270	0.1860
Magnesium (Mg)- Dissolved	mg/L		65.7	36.5	131	53.0	33.1	129
Manganese (Mn)- Dissolved	ug/L		184	29.9	640	114.2	3.61	569
Mercury (Hg)- Total	ug/L	0.026	0.0034	<0.0020	0.0045	0.004	<0.002	<0.010
Nickel (Ni)- Dissolved	ug/L		13.7	5.87	28.9	9.67	2.62	28.3
Potassium (K)- Dissolved	mg/L		22.7	12.6	43.0	21.7	8.81	95.7
Selenium (Se)- Dissolved	ug/L	1	0.357	0.281	0.409	0.288	0.131	0.797
Sodium (Na)- Dissolved	mg/L		69.6	31.4	142	57	22	158
Zinc (Zn)- Dissolved	ug/L	30	5.23	1.91	10.4	4.47	0.76	12.1
Bacteria								
Total Coliforms (MTF)	MPN/100mL		4,473	930	11,000	4,600	210	>11,000
Fecal Coliforms (MTF)	MPN/100mL		591	93	1,500	2,556	<3	>11,000
E. coli (MTF)	MPN/100mL		591	93	1,500	1,973	<3	>11,000
Field Parameters								
pH	units	6.5-9.0	8.21*	7.46*	9.34*	8.77	8.00	9.84
Specific Conductivity	(µS/cm)		1,850*	427*	9,790*	853	570	1920

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.

*Results not included in 2014 Annual Report

4.3 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 2015 was 46,610kL. There were no occurrences of leachate breakout in 2015, and the maximum leachate head in the new waste cell was not exceeded in 2015.

In 2015, eight leachate samples were analyzed. With the exception of five parameters which were inadvertently omitted from the lab contract, there were no deviations from the Leachate SAP or from normal sample collection and preservation practices in 2015; the missing parameters will be requested for 2016. Monthly leachate levels are provided in Table 7 and a summary of the 2015 leachate results are provided in Table 8.

The analytical results for leachate obtained in 2015 were found to be highly variable compared to those obtained in 2014. A comparison of the average, minimum, and maximum values obtained in 2014 and 2015 are provided in Table 9. The data collected in 2015 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 2015.

At this time we have no recommendations for changes in the leachate monitoring program, with the exception of removing oil and grease, leachable lead and extractable selenium from the list of analyses because oil and grease is captured in the CCME Petroleum Hydrocarbon Fraction testing and leachable lead and extractable selenium are not applicable to liquid samples.

Table 7. Leachate Levels 2015

	Date	21-Jan-15	13-Feb-15	10-Mar-15	9-Apr-15	20-May-15	11-Jun-15	30-Jul-15	24-Aug-15	8-Sep-15	25-Sep-15	19-Oct-15	13-Nov-15	23-Dec-15
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	233.66
	Depth to Leachate (m)	3.08	2.87	3.76	2.58	2.12	3.68	1.85	1.48	1.34	5.43	3.16	2.37	6.15
	Manhole Leachate Elevation (m)	230.58	230.79	229.90	231.08	231.54	229.98	231.81	232.18	232.32	228.23	230.50	231.29	227.51
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	236.61
	Depth to Leachate (m)	6.61	7.49	9.04	9.91	8.35	5.45	5.64	3.12	1.74	4.67	5.30	7.35	7.77
	Manhole Leachate Elevation (m)	231.11	230.23	228.68	226.70	228.26	231.16	232.08	234.60	235.98	233.05	232.42	230.37	229.95
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	234.89
	Depth to Leachate (m)	5.96	7.44	7.42	8.00	8.62	6.45	7.26	7.03	7.84	7.51	5.26	4.69	5.13
	Manhole Leachate Elevation (m)	228.93	227.45	227.47	226.89	226.27	228.44	227.63	227.86	227.05	227.38	229.63	230.20	229.76
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	235.00
	Depth to Leachate (m)	0.53	1.75	1.80	2.92	4.41	1.56	9.80	0.55	1.44	5.49	3.99	1.10	1.54
	Manhole Leachate Elevation (m)	234.47	233.25	233.20	232.08	230.59	233.44	225.20	234.45	233.56	229.51	231.01	233.90	233.46
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	235.71
	Depth to Leachate (m)	3.08	3.81	3.51	4.40	6.75	4.32	3.20	2.74	2.70	2.58	2.40	2.42	2.17
	Manhole Leachate Elevation (m)	232.63	231.90	232.20	231.31	228.96	231.39	232.51	232.97	233.01	233.13	233.31	233.29	233.54
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	234.74
	Depth to Leachate (m)	2.00	5.25	2.00	5.25	0.80	1.92	0.93	0.75	1.74	0.97	0.73	1.94	0.75
	Manhole Leachate Elevation (m)	232.74	229.49	232.74	229.49	233.94	232.82	233.81	233.99	233.00	233.77	234.01	232.80	233.99
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	235.42
	Depth to Leachate (m)	6.45	7.29	7.24	6.43	6.10	5.50	5.40	5.29	5.14	5.13	5.00	4.92	4.54
	Manhole Leachate Elevation (m)	228.97	228.13	228.18	228.99	229.32	229.92	230.02	230.13	230.28	230.29	230.42	230.50	230.88
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	235.18
	Depth to Leachate (m)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	23.76	21.50	21.40	21.90	21.51	20.90
	Riser Leachate Elevation (m)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	229.24	229.81	229.83	229.71	229.81	229.96

Table 8. 2015 Leachate Monitoring

			LQ25-MH3	LQ25-MH8	LQ25-MH13	LQ25-MH24	LQ25-MH27	LQ25-MH31	LQ25-MH34	RISER 1	Composite
Sampling Date	Units	Criteria	2-Sep-15	2-Sep-15	2-Sep-15	2-Sep-15	2-Sep-15	2-Sep-15	2-Sep-15	29-Oct-15	2-Sep-15
Field Parameters											
pH	units		6.91	7.30	6.97	7.55	6.30	7.23	6.99	6.60	
Turbidity - NTU	ntu		48.7	22.7	48.7	2.47	8.65	15.0	8.65	16.0	
Specific Conductivity	uS/cm		10.1	2.80	12.96	11.49	2.48	6.41	1.29	4.41	
Inorganic Parameters											
Alkalinity - Bicarbonate	mg/L		4,890	911	6,350	5,380	826	2,880	519	1,740	
Alkalinity - Carbonate	mg/L		<5.0	<0.5	<5.0	<5.0	<0.5	<5.0	<0.5	<0.5	
Alkalinity - Hydroxide	mg/L		<5.0	<0.5	<5.0	<5.0	<0.5	<5.0	<0.5	<0.5	
Alkalinity - Total	mg/L		4,000	747	5,210	4,410	677	2,360	425	1,420	
Hardness (as CaCO3)	mg/L		1,950	746	3,360	2,090	696	1,460	555	1,760	
pH - units	units		7.65	8.10	7.62	7.51	7.84	7.37	8.02	6.43	
Specific Conductivity	uS/cm		10,900	2,780	13,400	12,000	2,650	6,790	1,260	4,430	
Turbidity - NTU	ntu		62.8	13.9	41.0	146.0	9.0	98.0	15.3	475	
Total Dissolved Solids	mg/L		6,260	1,860	9,610	7,850	1,530	4,360	974	4,230	
Total Suspended Solids	mg/L		230	50	490	840	50	130	46	120	
Chloride (dissolved)	mg/L	2300	1,300	340	1,600	1,200	340	720	140	310	
Sulphate (dissolved)	mg/L		<0.5	183	<0.5	198	124	145	60	315	
Other											
Cyanide (CN)	mg/L	0.066	0.0182	0.0079	0.0121	0.0136	0.0048	0.0175	0.0026	0.0061	
Nutrients											
Dissolved Ammonia	mg/L		460	35.5	545	590	58.6	290	0.279	18.9	
Nitrate Nitrite Nitrogen	mg/L		0.036	0.024	0.005	<0.003	0.420	0.031	0.751	<0.003	
Total Kjeldhal Nitrogen	mg/L		570.0	53.4	640.0	700.1	74.7	314.2	12.5	67.9	
Phosphorus (Total)	mg/L		2.00	0.269	4.27	3.62	0.483	2.67	0.053	1.57	
Organic Indicators											
Biological Oxygen Demand	mg/L		109	18.0	99.0	120	35	na*	5.0	na*	
Chemical Oxygen Demand	mg/L		1140	317	1290	1270	160	615	97	2330	
Metals											
Total Arsenic (As)	mg/L	1.9	0.0166	0.0122	0.0118	0.0227	0.0030	0.0134	0.0029	0.0091	
Total Barium (Ba)	mg/L	29	0.719	0.165	0.842	0.495	0.202	0.355	0.184	0.246	
Total Beryllium (Be)	mg/L	0.067	<0.100000	0.000010	<0.100000	<0.100000	<0.100000	<0.100000	0.000016	0.000069	
Total Cadmium (Cd)	mg/L	0.0027	0.000254	0.000128	0.000575	0.000216	0.000124	0.000091	0.000012	0.000159	
Total Calcium (Ca)	mg/L		159	85.3	230	197	83.6	164	110	0.513	
Total Chromium (Cr)	mg/L	0.81	0.0752	0.0111	0.0559	0.0472	0.0048	0.0311	0.0011	0.0258	
Total Chromium (Hexavalent)	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0029	
Total Copper (Cu)	mg/L	0.087	0.01320	0.00787	0.00360	0.01570	0.00769	0.00530	0.00161	0.00895	
Total Iron (Fe)	mg/L		9.84	0.233	6.76	6.40	3.66	30.1	1.19	27.3	
Total Lead (Pb)	mg/L	0.025	0.01210	0.00113	0.02190	0.00802	0.00922	0.00137	0.00019	0.00353	
Total Magnesium (Mg)	mg/L		358	114	679	392	118	255	65.2	0.144	
Total Manganese (Mn)	mg/L		0.337	0.192	0.293	0.741	0.188	0.524	0.232	5.64	
Total Mercury (Hg)	mg/L	0.00029	0.0000024	0.0000094	0.0000028	<0.0000020	0.0000052	<0.0000020	<0.0000020	0.0000112	
Total Nickel (Ni)	mg/L	0.49	0.2320	0.0624	0.2530	0.1950	0.0213	0.1040	0.0070	0.1030	
Total Potassium (K)	mg/L		450	62.2	612	523	75.5	245	63.3	0.062	
Dissolved Selenium (Se)	mg/L	0.063	0.001150	0.001170	1.38	0.001860	0.000338	0.001410	0.000268	0.000569	
Total Silver (Ag)	mg/L	0.0015	0.000161	0.000118	0.000097	0.000139	0.000019	0.000072	0.000014	0.00014	
Total Sodium (Na)	mg/L	0.49	1090	282	1400	1070	240	647	56.9	0.438	
Total Zinc (Zn)	mg/L	1.1	0.1030	0.0343	0.1320	0.0510	0.0278	0.0170	0.0080	0.0626	
Extractables											
Benzo (a) Pyrene (PAH)	ug/L	0.81	<0.005	<0.005	<0.050	<0.050	<0.005	<0.050	<0.005	<0.050	
Anthracene	ug/L	2.4	<0.005	<0.005	<0.050	<0.050	<0.005	<0.050	<0.005	<0.050	
3'3' Dichlorobenzidine**	ug/L	640	na	na	na	na	na	na	na	na	
4'4' Methylenebis 2 Chloroaniline**	ug/L		na	na	na	na	na	na	na	na	
Benzo (a) anthracene (PAH)	ug/L	4.7	<0.005	<0.005	<0.050	<0.050	<0.005	<0.050	<0.005	<0.050	
Benzo (b) fluoroanthene (PAH)	ug/L	0.75	<0.005	<0.005	<0.050	<0.050	<0.005	<0.050	<0.005	<0.050	
Benzo (g,h,i) Perylene (PAH)	ug/L	0.2	<0.005	<0.005	<0.050	<0.050	<0.005	<0.050	<0.005	<0.050	
Dinitropyrene**	ug/L		na	na	na	na	na	na	na	na	
Hexachlorobenzene	ug/L	3.1	<0.005	<0.005	<0.050	<0.050	<0.005	<0.050	<0.005	<0.050	
Octachlorostyrene	ug/L		<0.005	<0.005	<0.050	<0.050	<0.005	<0.050	<0.005	<0.050	
Pentachlorophenol**	ug/L	62	na	na	na	na	na	na	na	na	
Perylene**	ug/L		na	na	na	na	na	na	na	na	
Phenanthrene	mg/L	0.58	0.00064	0.00048	0.00260	0.00089	<0.00005	0.00028	0.00004	<0.00003	
Phenol	ug/L	12,000	0.224	0.046	0.350	0.183	0.035	0.107	0.011	0.810	
Toxaphene	ug/L		<0.4	<0.4	<2.0	<2.0	<0.4	<2.0	<0.2	<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

*na - not analysed due to lab technician error

**na - not currently included in lab contract, will be added in 2016.

Table 8. 2015 Leachate Monitoring

			LQ25-MH3	LQ25-MH8	LQ25-MH13	LQ25-MH24	LQ25-MH27	LQ25-MH31	LQ25-MH34	RISER 1	Composite
Sampling Date	Units	Criteria	2-Sep-15	2-Sep-15	2-Sep-15	2-Sep-15	2-Sep-15	2-Sep-15	2-Sep-15	29-Oct-15	2-Sep-15
Petroleum Hydrocarbons											
CCME Petroleum Hydrocarbon Fraction F	ug/L	750	310	<25	460	80	61	<25	<25	540	
CCME Petroleum Hydrocarbon Fraction F	ug/L	150	<100	<100	270	<100	<100	<100	<100	150	
CCME Petroleum Hydrocarbon Fraction F	ug/L	500	<200	<200	<200	<200	<200	<200	<200	<200	
CCME Petroleum Hydrocarbon Fraction F	ug/L	500	<200	<200	<200	<200	<200	<200	<200	<200	
Volatile Organic Carbons											
BTEX	ug/L		<25	<25	<50	47	<25	<25	<25	470	
Vinyl Chloride	ug/L	0.5	<5.0	<4.0	<10	<2.0	<2.0	<2.0	<0.5	<4.0	
1,4 Dichlorobenzene	ug/L	8	5.5	<4.0	<10	2.8	<2.0	<2.0	<0.5	<4.0	
Chloroform	ug/L	2.4	<2.5	<2.0	<5.0	<1.0	<1.0	<1.0	<0.25	<2.0	
Trichloroethylene	ug/L	1.6	<2.5	<2.0	<5.0	<1.0	<1.0	<1.0	<0.25	<2.0	
Tetrachloroethylene	ug/L	1.6	<2.5	<2.0	<5.0	<1.0	<1.0	<1.0	<0.25	<2.0	
Dioxins and Furans											
2378 TeCDD	pg/L	14,000									<1.25
12378 PeCDD	pg/L	14,000									<1.53
123478 HxCDD	pg/L	14,000									<1.53
123678 HxCDD	pg/L	14,000									4.45
123789 HxCDD	pg/L	14,000									2.22
1234678 HpCDD	pg/L	14,000									94.7
OCDD	pg/L	14,000									953
Total TCDDs	pg/L	14,000									<1.4
Total PeCDD	pg/L	14,000									<1.53
Total HxCDD	pg/L	14,000									41.5
Total HpCDD	pg/L	14,000									197
2378 TeCDF	pg/L	14,000									1.29
12378 PeCDF	pg/L	14,000									<1.31
23478 PeCDF	pg/L	14,000									<1.32
123478 HxCDF	pg/L	14,000									1.47
123678 HxCDF	pg/L	14,000									<1.19
123789 HxCDF	pg/L	14,000									<1.26
234678 HxCDF	pg/L	14,000									<1.37
1234678 HpCDF	pg/L	14,000									<17.4
1234789 HpCDF	pg/L	14,000									<1.39
OCDF	pg/L	14,000									54.3
Total TCDF	pg/L	14,000									1.29
Total PeCDF	pg/L	14,000									<1.31
Total HxCDF	pg/L	14,000									21.9
Total HpCDF	pg/L	14,000									32.5
Polychlorinated Biphenyls											
Aroclor 1016	mg/L	7.8	<0.000050	<0.000050	<0.00050	<0.00050	<0.000050	<0.00050	<0.000050	<0.00050	
Aroclor 1221	mg/L	7.8	<0.000050	<0.000050	<0.00050	<0.00050	<0.000050	<0.00050	<0.000050	<0.00050	
Aroclor 1232	mg/L	7.8	<0.000050	<0.000050	<0.00050	<0.00050	<0.000050	<0.00050	<0.000050	<0.00050	
Aroclor 1242	mg/L	7.8	<0.000050	0.000100	<0.00050	<0.00050	<0.000050	<0.00050	<0.000050	<0.00050	
Aroclor 1248	mg/L	7.8	<0.000050	<0.000050	<0.00050	<0.00050	<0.000050	<0.00050	<0.000050	<0.00050	
Aroclor 1254	mg/L	7.8	0.000060	<0.000050	<0.00050	<0.00050	0.000060	<0.00050	0.000060	<0.00050	
Aroclor 1260	mg/L	7.8	<0.000050	<0.000050	<0.00050	<0.00050	<0.000050	<0.00050	<0.000050	<0.00050	
Total PCBs	mg/L	7.8	0.000160	<0.000050	<0.000050	<0.00050	0.000070	<0.00050	<0.000050	<0.00050	
Pesticides and Herbicides											
Diazinon	ug/L		<8.0	<8.0	<8.0	<8.0	<2.0	<8.0	<2.0	<40	
2, 4-D	ug/L		<10	<1.0	<20	<20	<1.0	<4.0	<1.0	<10	
Aldrin	ug/L	8.5	<0.005	<0.005	<0.050	<0.050	<0.005	<0.050	<0.005	<0.05	
Chlordane	ug/L	28	<0.010	<0.005	<0.050	<0.050	<0.010	<0.050	<0.010	<0.05	
Hexachlorocyclohexane (Lindane)	ug/L	1.2	<0.003	<0.003	<0.030	<0.030	<0.003	<0.030	<0.003	<0.03	
MCPA	ug/L		<20	<2.0	<40	<40	<2.0	<8.0	<2.0	<20	
Mirex	ug/L		<0.005	<0.005	<0.050	<0.050	<0.005	<0.050	<0.005	<0.05	
Methoxyclor	ug/L		<0.01	<0.01	<0.10	<0.10	<0.01	<0.10	<0.01	<0.10	
DDT	ug/L	2.8	<0.005	<0.005	<0.050	<0.050	<0.005	<0.050	<0.005	<0.050	
Bacteria											
Total Coliforms	MPN/100mL		>11,000	11,000	9	>1,100,000	>11,000	930	43	23	
Fecal Coliforms	MPN/100mL		4,600	750	93	>1,100,000	>11,000	43,000	9	93	
E. coli	MPN/100mL		4,600	750	9	1,100,000	>11,000	930	9	23	

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. 2015 Leachate Quality Comparison

Sampling Date	Units	Criteria	2014 Average	2014 Minimum	2014 Maximum	2015 Average	2015 Minimum	2015 Maximum
Field Parameters								
pH	units		na*	na*	na*	6.98	6.30	7.55
Turbidity - NTU	ntu		na*	na*	na*	21.4	2.47	48.7
Specific Conductivity	uS/cm		na*	na*	na*	6.49	1.29	13.0
Inorganic Parameters								
Alkalinity - Bicarbonate	mg/L		5,363	2,570	6,860	2,937	519	6,350
Alkalinity - Carbonate	mg/L		191	<5.0	593	1.38	<0.50	<5.0
Alkalinity - Hydroxide	mg/L		<5.0	<5.0	<5.0	1.38	<0.50	<5.0
Alkalinity - Total	mg/L		4,713	2,160	6,610	2,406	425	5,210
Hardness (as CaCO3)	mg/L		2,526	1,560	3,640	1,575	555	3,360
pH - units	units		7.29	7.02	7.66	7.57	6.43	8.10
Specific Conductivity	uS/cm		13,031	7,220	15,400	6,776	1,260	13,400
Turbidity - NTU	ntu		257	60.8	833	108	9.0	475
Total Dissolved Solids	mg/L		8,493	4,030	13,800	4,584	974	9,610
Total Suspended Solids	mg/L		1,327	20	7,400	245	46	840
Chloride (dissolved)	mg/L	2300	1,757	1,200	3,000	744	140	1,600
Sulphate (dissolved)	mg/L		45.8	<0.50	174	128	<0.50	315
Other								
Cyanide (CN)	mg/L	0.066	0.0128	0.0094	0.0181	0.0103	0.0026	0.0182
Nutrients								
Dissolved Ammonia	mg/L		342	139	520	250	0.279	590
Nitrate Nitrite Nitrogen	mg/L		0.237	<0.003	1.38	0.159	<0.003	0.751
Total Kjeldhal Nitrogen	mg/L		750.6	299.9	1,162	304.1	12.5	700.1
Phosphorus (Total)	mg/L		4.4	1.2	8.8	1.87	0.053	4.27
Organic Indicators								
Biological Oxygen Demand	mg/L		229	<35	916	64.3	5.0	120
Chemical Oxygen Demand	mg/L		1,610	741	3,140	902	97.0	2,330
Metals								
Total Arsenic (As)	mg/L	1.9	0.0149	0.0048	0.0295	0.0115	0.0029	0.0227
Total Barium (Ba)	mg/L	29	0.720	0.261	1.38	0.401	0.165	0.842
Total Beryllium (Be)	mg/L	0.067	<0.00005	<0.00005	<0.00010	0.03126	0.00001	<0.10
Total Cadmium (Cd)	mg/L	0.0027	0.000320	0.000099	0.000545	0.000195	0.000012	0.000575
Total Calcium (Ca)	mg/L		237	130	589	129	0.5	230
Total Chromium (Cr)	mg/L	0.81	0.0671	0.0165	0.1270	0.0315	0.0011	0.0752
Total Chromium (Hexavalent)	mg/L		0.0012	<0.0010	<0.0050	<0.0010	<0.0010	0.0029
Total Copper (Cu)	mg/L	0.087	0.00684	<0.00050	0.02100	0.00799	0.00161	0.01570
Total Iron (Fe)	mg/L		19.8	3.07	70.6	10.7	0.233	30.1
Total Lead (Pb)	mg/L	0.025	0.01682	0.00031	0.04810	0.00718	0.00019	0.02190
Total Magnesium (Mg)	mg/L		469	299	603	248	0.1	679
Total Manganese (Mn)	mg/L		0.492	0.186	1.910	1.018	0.188	5.640
Total Mercury (Hg)	mg/L	0.00029	0.0000204	<0.0000020	0.0000640	0.0000043	<0.0000020	0.0000112
Total Nickel (Ni)	mg/L	0.49	0.1713	0.0398	0.3650	0.1222	0.0070	0.2530
Total Potassium (K)	mg/L		494	221	643	254	0.1	612
Dissolved Selenium (Se)	mg/L	0.063	0.00094	<0.00040	0.00147	0.17335	0.00027	1.38
Total Silver (Ag)	mg/L	0.0015	0.000102	<0.000025	0.000202	0.000095	0.000014	0.000161
Total Sodium (Na)	mg/L	0.49	1,352	786	1,700	598	0.438	1,400
Total Zinc (Zn)	mg/L	1.1	0.5891	0.0143	3.14	0.0545	0.0080	0.1320
Extractables								
Benzo (a) Pyrene (PAH)	ug/L	0.81	0.00008	<0.00001	0.00014	0.0138	<0.0050	<0.050
Anthracene	ug/L	2.4	0.00038	0.00008	0.00110	0.0138	<0.0050	<0.050
3'3' Dichlorobenzidine	ug/L	640	na**	na**	na**	na**	na**	na**
4'4' Methylenebis 2 Chloroaniline	ug/L		na**	na**	na**	na**	na**	na**
Benzo (a) anthracene (PAH)	ug/L	4.7	0.00022	<0.00005	0.00052	0.0138	<0.0050	<0.050
Benzo (b) fluoroanthene (PAH)	ug/L	0.75	0.00016	<0.00005	0.00035	0.0138	<0.0050	<0.050
Benzo (g,h,i) Perylene (PAH)	ug/L	0.2	0.00010	<0.00005	<0.00050	0.0138	<0.0050	<0.050
Dinitropyrene	ug/L		na**	na**	na**	na**	na**	na**
Hexachlorobenzene	ug/L	3.1	0.0218	<0.0050	<0.050	0.0138	<0.0050	<0.050
Octachlorostyrene	ug/L		0.0218	<0.0050	<0.050	0.0138	<0.0050	<0.050
Pentachlorophenol	ug/L	62	na**	na**	na**	na**	na**	na**
Perylene	ug/L		na**	na**	na**	na**	na**	na**
Phenanthrene	mg/L	0.58	0.00161	0.00040	0.00560	0.00062	<0.00003	0.00260
Phenol	ug/L	12,000	0.389	0.094	1.21	0.221	0.011	0.810
Toxaphene	ug/L		0.87	<0.20	<2.0	0.59	<0.20	<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

*na - not analysed in 2014 because sampling and analysis plan was not fully implemented
**na - not currently included in lab contract, will be added in 2016.

Table 9. 2015 Leachate Quality Comparison

			2014			2015		
Sampling Date	Units	Criteria	Average	Minimum	Maximum	Average	Minimum	Maximum
Petroleum Hydrocarbons								
CCME Petroleum Hydrocarbon Fraction	ug/L	750	3,881	<250	22,000	186	<25	540
CCME Petroleum Hydrocarbon Fraction	ug/L	150	566	<100	1,300	<100	<100	270
CCME Petroleum Hydrocarbon Fraction	ug/L	500	11,129	<200	75,000	<200	<200	<200
CCME Petroleum Hydrocarbon Fraction	ug/L	500	1,561	<200	10,000	<200	<200	<200
Volatile Organic Carbons								
BTEX	ug/L		3,529	<25	21,000	76	<25	470
Vinyl Chloride	ug/L	0.5	<5.0	<5.0	<20	1.84	<0.50	<10
1,4 Dichlorobenzene	ug/L	8	5.5	<5.0	11	2.44	<0.50	5.50
Chloroform	ug/L	2.4	<2.5	<2.5	<10	0.93	<0.30	<5.0
Trichloroethylene	ug/L	1.6	2.5	<2.5	<10	0.93	<0.30	<5.0
Tetrachloroethylene	ug/L	1.6	<2.5	<2.5	<10	0.93	<0.30	<5.0
Dioxins and Furans								
2378 TeCDD	pg/L	14,000	na*	na*	na*	<1.25	<1.25	<1.25
12378 PeCDD	pg/L	14,000	na*	na*	na*	<1.53	<1.53	<1.53
123478 HxCDD	pg/L	14,000	na*	na*	na*	<1.53	<1.53	<1.53
123678 HxCDD	pg/L	14,000	na*	na*	na*	4.45	4.45	4.45
123789 HxCDD	pg/L	14,000	na*	na*	na*	2.22	2.22	2.22
1234678 HpCDD	pg/L	14,000	na*	na*	na*	94.7	94.7	94.7
OCDD	pg/L	14,000	na*	na*	na*	953	953	953
Total TCDDs	pg/L	14,000	na*	na*	na*	<1.4	<1.4	<1.4
Total PeCDD	pg/L	14,000	na*	na*	na*	<1.53	<1.53	<1.53
Total HxCDD	pg/L	14,000	na*	na*	na*	41.5	41.5	41.5
Total HpCDD	pg/L	14,000	na*	na*	na*	197	197	197
2378 TeCDF	pg/L	14,000	na*	na*	na*	1.29	1.29	1.29
12378 PeCDF	pg/L	14,000	na*	na*	na*	<1.31	<1.31	<1.31
23478 PeCDF	pg/L	14,000	na*	na*	na*	<1.32	<1.32	<1.32
123478 HxCDF	pg/L	14,000	na*	na*	na*	1.47	1.47	1.47
123678 HxCDF	pg/L	14,000	na*	na*	na*	<1.19	<1.19	<1.19
123789 HxCDF	pg/L	14,000	na*	na*	na*	<1.26	<1.26	<1.26
234678 HxCDF	pg/L	14,000	na*	na*	na*	<1.37	<1.37	<1.37
1234678 HpCDF	pg/L	14,000	na*	na*	na*	<17.4	<17.4	<17.4
1234789 HpCDF	pg/L	14,000	na*	na*	na*	<1.39	<1.39	<1.39
OCDF	pg/L	14,000	na*	na*	na*	54.3	54.3	54.3
Total TCDF	pg/L	14,000	na*	na*	na*	1.29	1.29	1.29
Total PeCDF	pg/L	14,000	na*	na*	na*	<1.31	<1.31	<1.31
Total HxCDF	pg/L	14,000	na*	na*	na*	21.9	21.9	21.9
Total HpCDF	pg/L	14,000	na*	na*	na*	32.5	32.5	32.5
Polychlorinated Biphenyls								
Aroclor 1016	mg/L	7.8	0.00022	<0.00005	<0.00050	0.00014	<0.00005	<0.00050
Aroclor 1221	mg/L	7.8	0.00022	<0.00005	<0.00050	0.00014	<0.00005	<0.00050
Aroclor 1232	mg/L	7.8	0.00022	<0.00005	<0.00050	0.00014	<0.00005	<0.00050
Aroclor 1242	mg/L	7.8	0.00057	<0.00005	0.00210	0.00015	<0.00005	<0.00050
Aroclor 1248	mg/L	7.8	0.00022	<0.00005	<0.00050	0.00014	<0.00005	<0.00050
Aroclor 1254	mg/L	7.8	0.00023	<0.00005	0.00030	0.00015	<0.00005	<0.00050
Aroclor 1260	mg/L	7.8	0.00022	<0.00005	<0.00050	0.00014	<0.00005	<0.00050
Total PCBs	mg/L	7.8	0.00058	<0.00005	0.0021000	0.00013	<0.00005	<0.00050
Pesticides and Herbicides								
Diazinon	ug/L		na*	na*	na*	5.3	<2.0	<40
2, 4-D	ug/L		<4	<4	<8	4.2	<1.0	<20
Aldrin	ug/L	8.5	0.019	<0.005	<0.050	0.014	<0.005	<0.050
Chlordane	ug/L	28	0.022	<0.005	<0.050	0.015	<0.005	<0.050
Hexachlorocyclohexane (Lindane)	ug/L	1.2	0.013	<0.003	<0.030	0.008	<0.003	<0.030
MCPA	ug/L		<8	<8	<16	8.4	<2.0	<40
Mirex	ug/L		0.02893	<0.00005	<0.20	0.014	<0.005	<0.050
Methoxyclor	ug/L		0.044	<0.010	<0.10	0.028	<0.010	<0.10
DDT	ug/L	2.8	0.022	<0.005	<0.050	0.014	<0.005	<0.050
Bacteria								
Total Coliforms	MPN/100mL		3,130	150	11,000	141,751	9	>1,100,000
Fecal Coliforms	MPN/100mL		1,718	11	11,000	144,943	9	>1,100,000
E. coli	MPN/100mL		186	<3	750	139,665	9	>1,100,000

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 - not analysed in 2014 because sampling and analysis plan was not fully implemented

4.4 LANDFILL GAS

4.4.1 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 2015, the BRRMF Gas Collection and Flaring System operated as intended and there were no events that caused a shutdown or malfunction of the system. The recommendations identified in the Annual Flare Report are being evaluated for feasibility. In 2016, the landfill gas collection and flaring system will continue to be managed according to the Landfill Gas Operating Plan.

The 2015 Landfill Gas Collection and Flaring Report, prepared by Integrated Gas Recovery Services Inc, is attached in Appendix D.

4.4.2 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. In 2015, the contingency plan was not activated, indicating that the collection and flaring system is operating effectively.

The 2015 subsurface gas migration probe data is provided in Table 10.

Table 10. 2015 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
1	15-Jan-15	0.0	20.9	0.0	0.0
1	17-Feb-15	0.0	20.9	0.0	0.0
1	23-Mar-15	0.0	20.9	0.0	0.0
1	8-Apr-15	0.0	20.9	0.0	0.0
1	19-May-15	0.0	20.6	0.0	0.0
1	11-Jun-15	0.0	19.1	0.0	0.0
1	30-Jul-15	0.0	16.8	0.0	0.0
1	26-Aug-15	0.0	19.5	2.0	1.0
1	28-Sep-15	0.0	20.4	0.0	0.0
1	22-Oct-15	0.0	20.6	0.0	0.0
1	25-Nov-15	0.1	23.2	0.0	0.0
1	15-Dec-15	0.1	21.4	0.0	0.0
2	15-Jan-15	0.1	20.9	0.0	0.0
2	17-Feb-15	0.0	20.9	0.0	0.0
2	23-Mar-15	0.0	20.9	0.0	0.0
2	8-Apr-15	0.0	20.9	0.0	0.0
2	19-May-15	0.0	21.0	0.0	0.0
2	11-Jun-15	0.0	19.5	0.0	0.0
2	30-Jul-15	0.0	19.8	0.0	0.0
2	26-Aug-15	0.0	20.3	2.0	1.0
2	28-Sep-15	0.0	20.9	0.0	0.0
2	22-Oct-15	0.0	20.9	0.0	0.0
2	25-Nov-15	0.1	22.6	0.0	0.0
2	15-Dec-15	0.1	22.4	0.0	0.0
3	15-Jan-15	0.0	20.9	5.0	0.0
3	17-Feb-15	0.0	20.9	0.0	0.0
3	23-Mar-15	0.0	20.9	0.0	0.0
3	8-Apr-15	0.0	20.9	0.0	0.0
3	19-May-15	0.0	21.2	0.0	0.0
3	11-Jun-15	0.0	19.8	0.0	0.0
3	30-Jul-15	0.0	19.9	0.0	0.0
3	26-Aug-15	0.0	20.3	2.0	0.0
3	28-Sep-15	0.0	20.5	0.0	2.0
3	22-Oct-15	0.0	20.9	0.0	0.0
3	25-Nov-15	0.1	23.1	0.0	0.0
3	15-Dec-15	0.1	21.6	0.0	0.0

Table 10. 2015 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
4	**15-Jan-15**	0.0	20.9	0.0	0.0
4	**17-Feb-15**	0.0	20.9	0.0	0.0
4	**23-Mar-15**	0.0	20.9	0.0	0.0
4	**8-Apr-15**	0.0	20.9	0.0	0.0
4	**19-May-15**	0.0	20.9	0.0	0.0
4	**11-Jun-15**	0.0	19.8	0.0	0.0
4	**30-Jul-15**	0.0	20.2	0.0	0.0
4	**26-Aug-15**	0.1	21.2	0.0	0.0
4	**28-Sep-15**	0.0	20.8	0.0	0.0
4	**22-Oct-15**	0.0	20.9	0.0	0.0
4	**25-Nov-15**	0.1	23.5	0.0	0.0
4	**15-Dec-15**	0.1	21.8	0.0	0.0
5	**15-Jan-15**	0.0	20.9	0.0	0.0
5	**17-Feb-15**	0.0	20.9	0.0	0.0
5	**23-Mar-15**	0.0	20.9	0.0	0.0
5	**8-Apr-15**	0.0	20.9	0.0	0.0
5	**19-May-15**	0.0	20.9	0.0	0.0
5	**11-Jun-15**	0.0	19.6	0.0	0.0
5	**30-Jul-15**	0.0	20.9	0.0	0.0
5	**26-Aug-15**	0.0	20.9	0.0	0.0
5	**28-Sep-15**	0.0	20.3	2.0	0.0
5	**22-Oct-15**	0.0	20.9	0.0	0.0
5	**25-Nov-15**	0.1	23.6	0.0	0.0
5	**15-Dec-15**	0.1	21.7	0.0	0.0
6	**15-Jan-15**	0.1	19.6	11.0	0.0
6	**17-Feb-15**	0.0	20.9	0.0	0.0
6	**23-Mar-15**	0.0	20.9	0.0	0.0
6	**8-Apr-15**	0.0	20.9	0.0	0.0
6	**19-May-15**	0.0	20.9	0.0	0.0
6	**11-Jun-15**	0.0	19.9	0.0	0.0
6	**30-Jul-15**	0.0	19.9	0.0	0.0
6	**26-Aug-15**	0.0	20.5	1.0	0.0
6	**28-Sep-15**	0.0	20.9	0.0	0.0
6	**22-Oct-15**	0.0	20.9	0.0	0.0
6	**25-Nov-15**	0.1	22.8	0.0	0.0
6	**15-Dec-15**	0.1	22.9	0.0	0.0

Table 10. 2015 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
7	**15-Jan-15**	0.1	20.3	11.0	0.0
7	**17-Feb-15**	0.0	20.9	0.0	0.0
7	**23-Mar-15**	0.0	20.9	0.0	0.0
7	**8-Apr-15**	0.0	20.9	0.0	0.0
7	**19-May-15**	0.1	21.3	0.0	0.0
7	**11-Jun-15**	0.0	19.1	0.0	0.0
7	**30-Jul-15**	0.0	20.2	0.0	0.0
7	**26-Aug-15**	0.0	19.8	1.0	0.0
7	**28-Sep-15**	0.0	20.9	0.0	0.0
7	**22-Oct-15**	0.0	20.9	0.0	0.0
7	**25-Nov-15**	0.1	23.2	0.0	0.0
7	**15-Dec-15**	0.1	20.1	0.0	0.0
8	**15-Jan-15**	0.1	20.8	1.0	0.0
8	**17-Feb-15**	0.0	20.9	0.0	0.0
8	**23-Mar-15**	0.0	20.9	0.0	0.0
8	**8-Apr-15**	0.0	20.9	0.0	0.0
8	**19-May-15**	0.1	21.1	0.0	0.0
8	**11-Jun-15**	0.0	19.3	0.0	0.0
8	**30-Jul-15**	0.0	18.9	0.0	0.0
8	**26-Aug-15**	0.0	20.5	2.0	0.0
8	**28-Sep-15**	0.0	19.2	0.0	0.0
8	**22-Oct-15**	0.0	20.9	0.0	0.0
8	**25-Nov-15**	0.1	23.0	0.0	0.0
8	**15-Dec-15**	0.1	22.5	0.0	0.0
9	**15-Jan-15**	0.1	20.9	0.0	0.0
9	**17-Feb-15**	0.0	20.9	0.0	0.0
9	**23-Mar-15**	0.0	20.9	0.0	0.0
9	**8-Apr-15**	0.0	20.9	0.0	0.0
9	**19-May-15**	0.0	21.3	0.0	0.0
9	**11-Jun-15**	0.0	19.6	0.0	0.0
9	**30-Jul-15**	0.0	19.9	0.0	0.0
9	**26-Aug-15**	0.0	20.7	2.0	0.0
9	**28-Sep-15**	0.0	20.9	0.0	0.0
9	**22-Oct-15**	0.0	20.9	0.0	0.0
9	**25-Nov-15**	0.0	20.9	0.0	0.0
9	**15-Dec-15**	0.0	20.9	0.0	0.0

Table 10. 2015 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
10	**15-Jan-15**	0.1	20.9	0.0	0.0
10	**17-Feb-15**	0.0	20.9	0.0	0.0
10	**23-Mar-15**	0.0	20.9	0.0	0.0
10	**8-Apr-15**	0.0	20.9	0.0	0.0
10	**19-May-15**	0.0	21.4	0.0	0.0
10	**11-Jun-15**	0.0	19.9	0.0	0.0
10	**30-Jul-15**	0.0	19.9	0.0	0.0
10	**26-Aug-15**	0.0	20.6	2.0	0.0
10	**28-Sep-15**	0.0	20.9	0.0	0.0
10	**22-Oct-15**	0.0	20.9	0.0	0.0
10	**25-Nov-15**	0.1	23.0	0.0	0.0
10	**15-Dec-15**	0.1	22.5	0.0	0.0
P28E	**15-Jan-15**	0.1	20.9	0.0	0.0
P28E	**17-Feb-15**	0.1	20.9	0.0	0.0
P28E	**23-Mar-15**	0.1	20.9	0.0	0.0
P28E	**8-Apr-15**	0.1	20.9	0.0	0.0
P28E	**19-May-15**	0.1	20.9	0.0	0.0
P28E	**11-Jun-15**	0.1	20.9	0.0	0.0
P28E	**30-Jul-15**	0.1	20.9	0.0	0.0
P28E	**26-Aug-15**	0.1	20.9	0.0	0.0
P28E	**28-Sep-15**	0.1	20.9	0.0	0.0
P28E	**22-Oct-15**	0.1	21.9	0.0	0.0
P28E	**25-Nov-15**	0.2	20.9	0.0	0.0
P28E	**15-Dec-15**	0.1	21.9	0.0	0.0
P30E	**15-Jan-15**	0.1	20.8	0.0	0.0
P30E	**17-Feb-15**	0.1	20.8	0.0	0.0
P30E	**23-Mar-15**	0.1	20.8	0.0	0.0
P30E	**8-Apr-15**	0.1	20.8	0.0	0.0
P30E	**19-May-15**	0.1	20.8	0.0	0.0
P30E	**11-Jun-15**	0.1	20.8	0.0	0.0
P30E	**30-Jul-15**	0.1	20.8	0.0	0.0
P30E	**26-Aug-15**	0.1	20.8	0.0	0.0
P30E	**28-Sep-15**	0.1	20.8	0.0	0.0
P30E	**22-Oct-15**	0.1	20.8	0.0	0.0
P30E	**25-Nov-15**	0.7	20.0	0.0	0.0
P30E	**15-Dec-15**	1.8	22.1	0.0	0.0

Table 10. 2015 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
P34E	**15-Jan-15**	0.0	20.9	0.0	0.0
P34E	**17-Feb-15**	0.1	20.9	0.0	0.0
P34E	**23-Mar-15**	0.0	20.9	0.0	0.0
P34E	**8-Apr-15**	0.0	20.9	0.0	0.0
P34E	**19-May-15**	0.1	20.9	0.0	0.0
P34E	**11-Jun-15**	0.0	20.9	0.0	0.0
P34E	**30-Jul-15**	0.1	20.9	0.0	0.0
P34E	**26-Aug-15**	0.0	20.9	0.0	0.0
P34E	**28-Sep-15**	0.0	20.9	0.0	0.0
P34E	**22-Oct-15**	0.0	20.9	0.0	0.0
P34E	**26-Nov-15**	0.3	20.0	0.0	0.0
P34E	**15-Dec-15**	0.1	22.9	0.0	0.0
P106E	**15-Jan-15**	0.1	20.8	3.0	0.0
P106E	**17-Feb-15**	0.0	20.9	0.0	0.0
P106E	**23-Mar-15**	0.0	20.9	0.0	0.0
P106E	**8-Apr-15**	0.0	20.9	0.0	0.0
P106E	**19-May-15**	0.2	19.0	0.0	0.0
P106E	**11-Jun-15**	0.1	18.2	8.0	0.0
P106E	**30-Jul-15**	0.0	20.6	0.0	0.0
P106E	**26-Aug-15**	0.1	19.2	19.0	0.0
P106E	**28-Sep-15**	0.0	19.1	0.0	1.0
P106E	**22-Oct-15**	0.0	20.9	0.0	0.0
P106E	**25-Nov-15**	0.0	20.9	0.0	0.0
P106E	**15-Dec-15**	0.2	21.4	0.0	0.0
P107E	**15-Jan-15**	0.1	20.4	0.0	0.0
P107E	**17-Feb-15**	0.0	20.9	0.0	0.0
P107E	**23-Mar-15**	0.0	20.4	0.0	0.0
P107E	**8-Apr-15**	0.0	20.9	0.0	0.0
P107E	**19-May-15**	0.3	20.7	0.0	0.0
P107E	**11-Jun-15**	0.1	19.8	10.0	0.0
P107E	**30-Jul-15**	0.0	20.3	0.0	0.0
P107E	**26-Aug-15**	0.0	20.9	0.0	0.0
P107E	**28-Sep-15**	0.0	20.6	0.0	0.0
P107E	**22-Oct-15**	0.0	20.9	0.0	0.0
P107E	**25-Nov-15**	0.3	21.6	0.0	0.0
P107E	**15-Dec-15**	0.2	21.5	0.0	0.0

Table 10. 2015 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
P108E	**15-Jan-15**	0.0	20.9	0.0	0.0
P108E	**17-Feb-15**	0.0	20.9	0.0	0.0
P108E	**23-Mar-15**	0.0	20.9	0.0	0.0
P108E	**8-Apr-15**	0.0	20.9	0.0	0.0
P108E	**19-May-15**	0.0	21.4	0.0	0.0
P108E	**11-Jun-15**	0.0	20.0	0.0	0.0
P108E	**30-Jul-15**	0.0	20.3	0.0	0.0
P108E	**26-Aug-15**	0.0	20.7	1.0	0.0
P108E	**28-Sep-15**	0.0	18.8	0.0	0.0
P108E	**22-Oct-15**	0.0	20.9	0.0	0.0
P108E	**25-Nov-15**	0.3	22.0	1.0	0.0
P108E	**15-Dec-15**	0.0	20.9	0.0	0.0
P109E	**15-Jan-15**	0.1	20.9	0.0	0.0
P109E	**17-Feb-15**	0.0	20.9	0.0	0.0
P109E	**23-Mar-15**	0.0	20.9	0.0	0.0
P109E	**8-Apr-15**	0.0	20.9	0.0	0.0
P109E	**19-May-15**	0.0	21.2	0.0	0.0
P109E	**11-Jun-15**	0.0	19.6	0.0	0.0
P109E	**30-Jul-15**	0.0	20.2	0.0	0.0
P109E	**26-Aug-15**	0.0	20.6	1.0	1.0
P109E	**28-Sep-15**	Probe has flooded to the top			
P109E	**22-Oct-15**	0.0	20.9	0.0	0.0
P109E	**25-Nov-15**	0.2	22.4	1.0	0.0
P109E	**15-Dec-15**	0.2	22.2	0.0	0.0
P110E	**15-Jan-15**	0.1	20.7	0.0	0.0
P110E	**17-Feb-15**	0.0	20.9	0.0	0.0
P110E	**23-Mar-15**	0.0	18.2	0.0	0.0
P110E	**8-Apr-15**	0.0	20.9	0.0	0.0
P110E	**19-May-15**	0.0	21.0	0.0	0.0
P110E	**11-Jun-15**	0.0	19.3	0.0	0.0
P110E	**30-Jul-15**	0.0	16.8	0.0	0.0
P110E	**26-Aug-15**	0.0	19.7	2.0	0.0
P110E	**28-Sep-15**	0.0	19.1	0.0	0.0
P110E	**22-Oct-15**	0.0	20.9	0.0	0.0
P110E	**25-Nov-15**	0.2	22.9	0.0	0.0
P110E	**15-Dec-15**	0.2	22.1	0.0	0.0

Table 10. 2015 External Gas Probe Monitoring

Well No.	Date	CH4	O2	CO	H2S
		% LEL	(%)	PPM	PPM
P111E	**15-Jan-15**	0.0	20.9	2.0	0.0
P111E	**17-Feb-15**	0.0	20.9	0.0	0.0
P111E	**23-Mar-15**	0.0	20.9	0.0	0.0
P111E	**8-Apr-15**	0.0	20.9	0.0	0.0
P111E	**19-May-15**	0.0	21.1	0.0	0.0
P111E	**11-Jun-15**	0.1	19.8	0.0	0.0
P111E	**30-Jul-15**	0.0	19.9	0.0	0.0
P111E	**26-Aug-15**	0.0	20.3	1.0	1.0
P111E	**28-Sep-15**	0.0	20.9	1.0	0.0
P111E	**22-Oct-15**	0.0	20.9	0.0	0.0
P111E	**25-Nov-15**	0.2	23.3	0.0	0.0
P111E	**15-Dec-15**	0.2	22.2	0.0	0.0
P112E	**15-Jan-15**	0.0	20.9	0.0	0.0
P112E	**17-Feb-15**	0.0	20.9	0.0	0.0
P112E	**23-Mar-15**	0.0	20.9	1.0	0.0
P112E	**8-Apr-15**	0.0	20.9	0.0	0.0
P112E	**19-May-15**	0.0	21.0	0.0	0.0
P112E	**11-Jun-15**	0.0	19.9	0.0	0.0
P112E	**30-Jul-15**	0.0	20.0	0.0	0.0
P112E	**26-Aug-15**	0.0	20.3	1.0	1.0
P112E	**28-Sep-15**	0.0	19.1	0.0	0.0
P112E	**22-Oct-15**	0.0	20.9	0.0	0.0
P112E	**25-Nov-15**	0.2	23.2	0.0	0.0
P112E	**15-Dec-15**	0.1	21.6	0.0	0.0

5.0 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 distance from surrounding homes. Fugitive dust emissions are minimized through proper operating procedures which include spraying site roads with uncontaminated surface water.

Thirteen odour complaints from 4 customers were received in 2015; no litter or vermin complaints were received.

Table 11 provides a summary of nuisance complaints received in 2015 and the corrective actions taken to resolve the complaints.

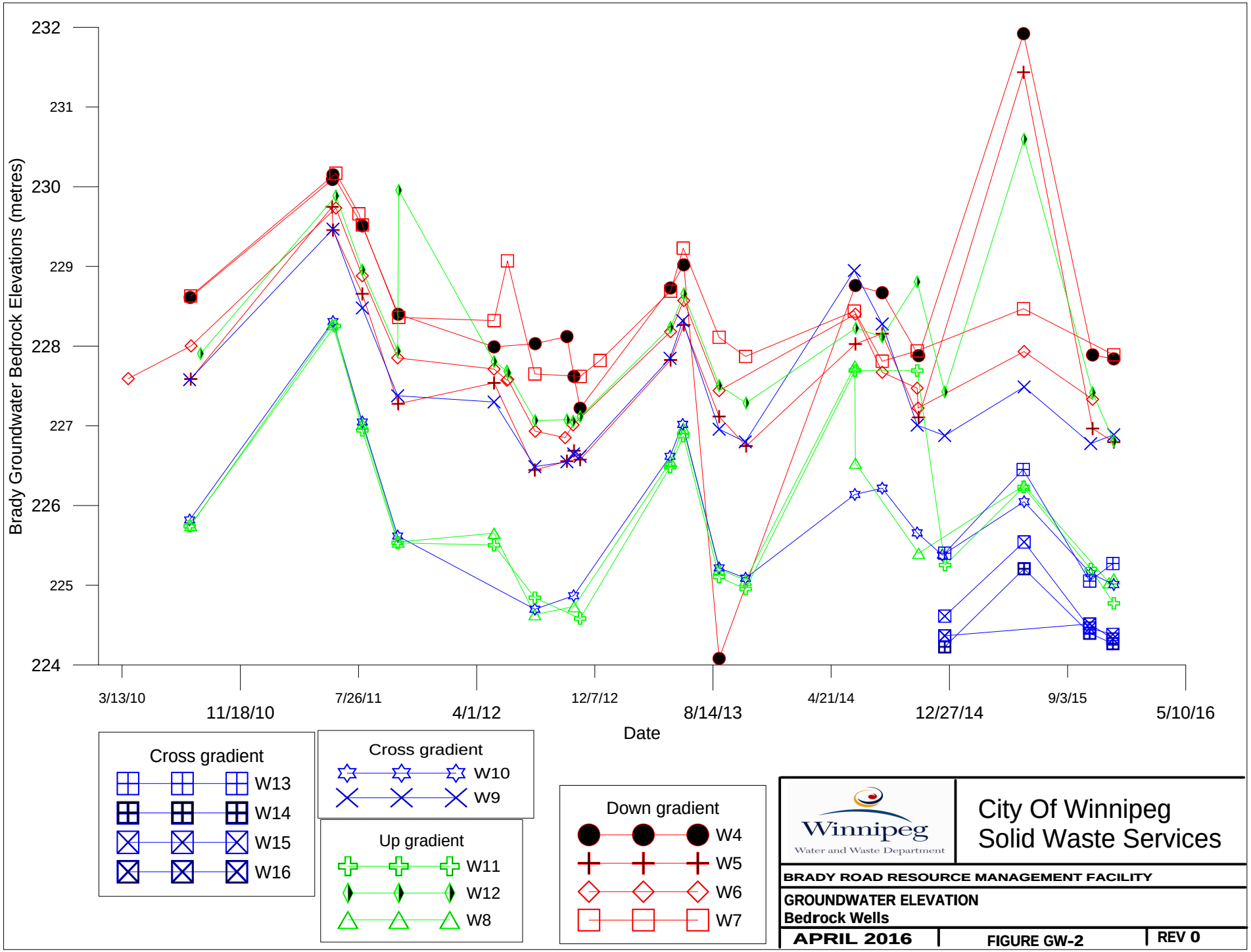
6.0 CONCLUSION

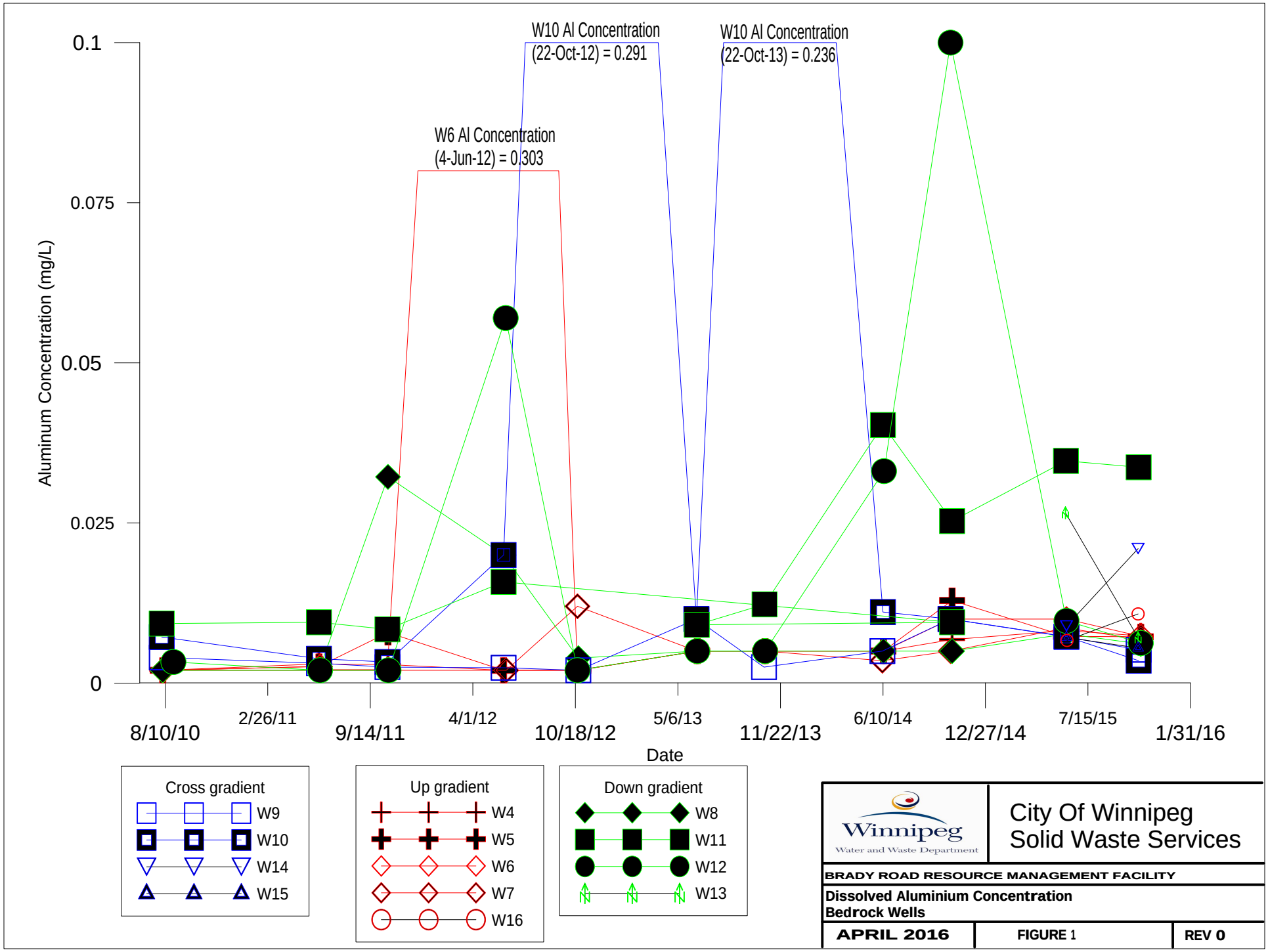
The diversion operations taking place at the BRRMF have been effective in diverting tens of thousands of metric tonnes of material from the landfill. The 4R depot, which opened in January 2016, is expected to greatly improve the diversion rate. Continuing current diversion operations and improving them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

Ground water monitoring, surface water monitoring, leachate monitoring and subsurface gas monitoring followed the sampling and analysis plans identified in the BRRMF Operating Plan in 2015. 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


Brady Groundwater Bedrock Elevations (metres)
232
231
230
229
228
227
226
225
224
3/13/10
11/18/10
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
W13
W14
W15
W16
Cross gradient
W10
W9
Up gradient
W11
W12
W8
Down gradient
W4
W5
W6
W7
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
GROUNDWATER ELEVATION
Bedrock Wells
APRIL 2016
FIGURE GW-2
REV 0


W10 Al Concentration
(22-Oct-12) = 0.291
W10 Al Concentration
(22-Oct-13) = 0.236
W6 Al Concentration
(4-Jun-12) = 0.303
0.1
0.075
0.05
0.025
0
Aluminum Concentration (mg/L)
8/10/10
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
Date
Cross gradient
W9
W10
W14
W15
Up gradient
W4
W5
W6
W7
W16
Down gradient
W8
W11
W12
W13
Winnipeg
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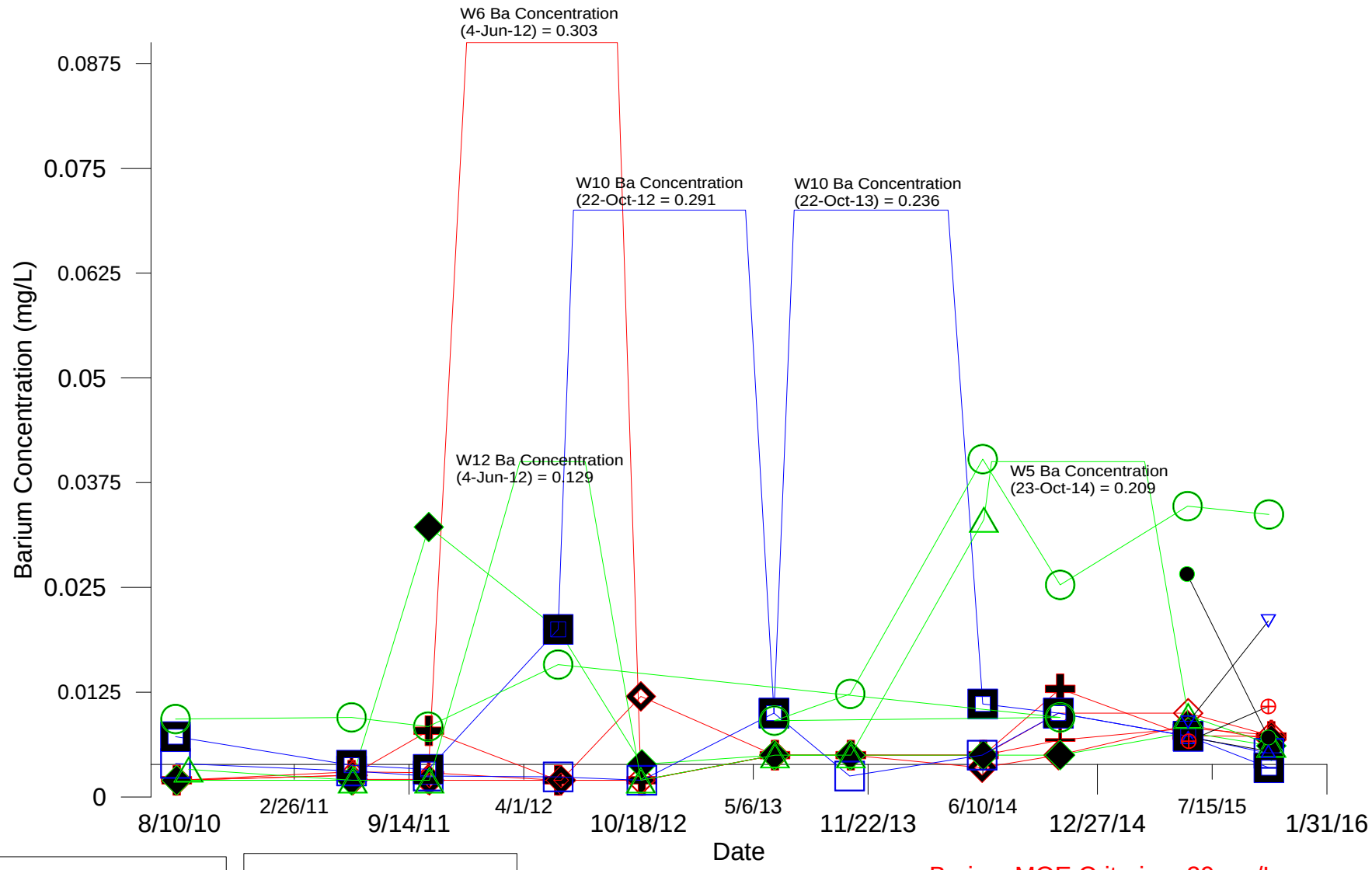
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Aluminium Concentration
Bedrock Wells
APRIL 2016
FIGURE 1
REV 0



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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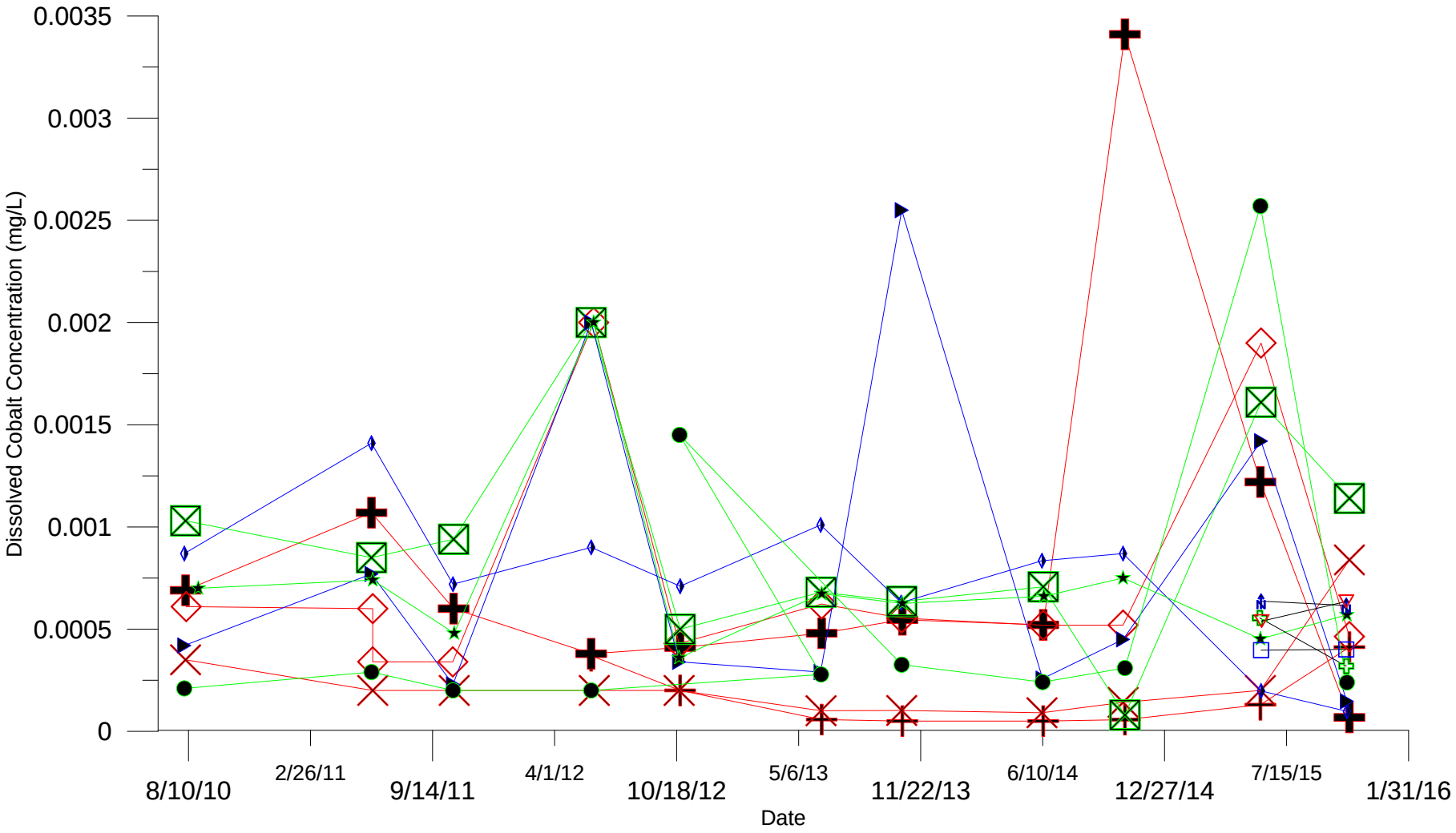
Dissolved Barium Concentration
Bedrock Wells

APRIL 2016	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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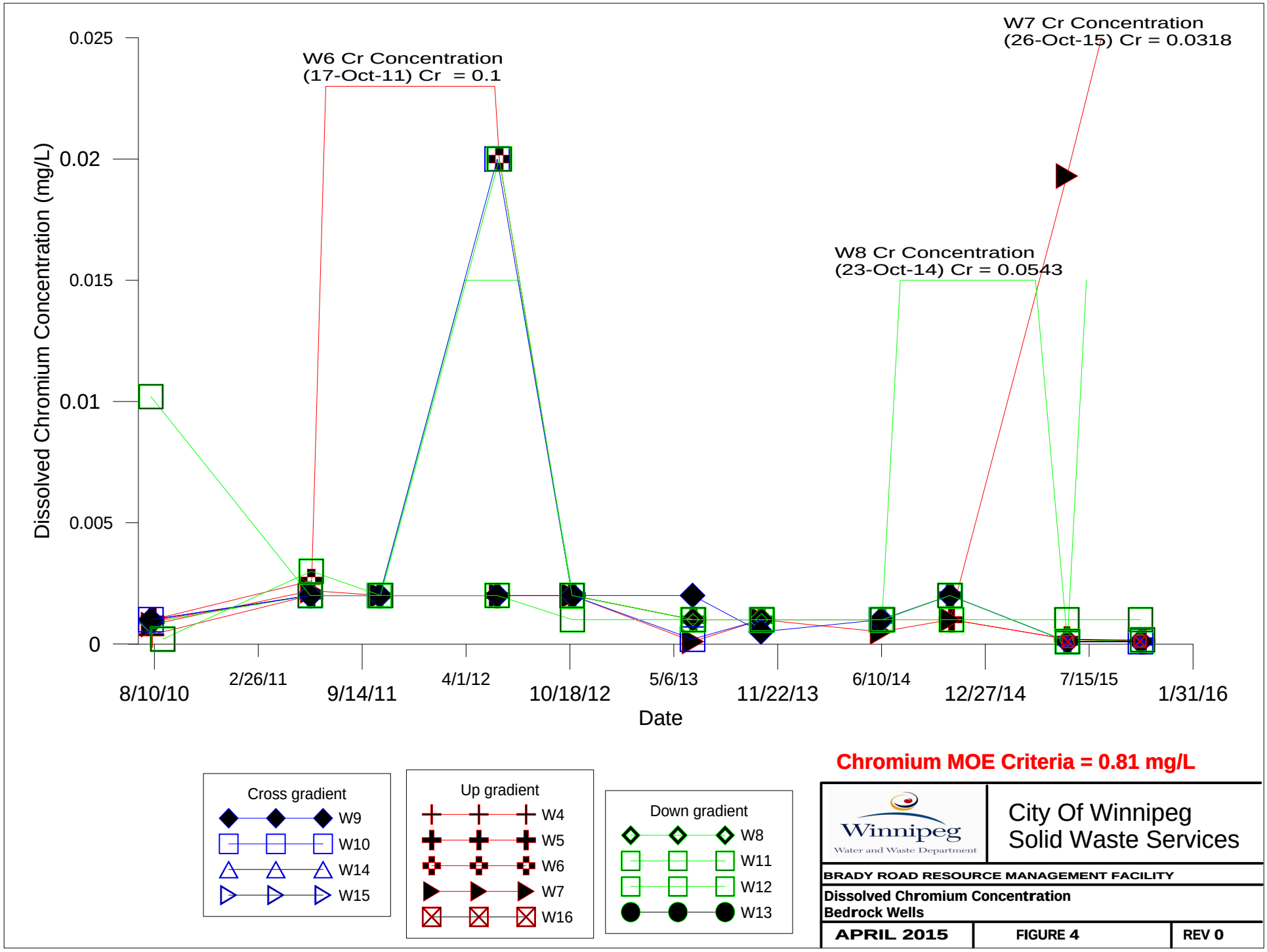
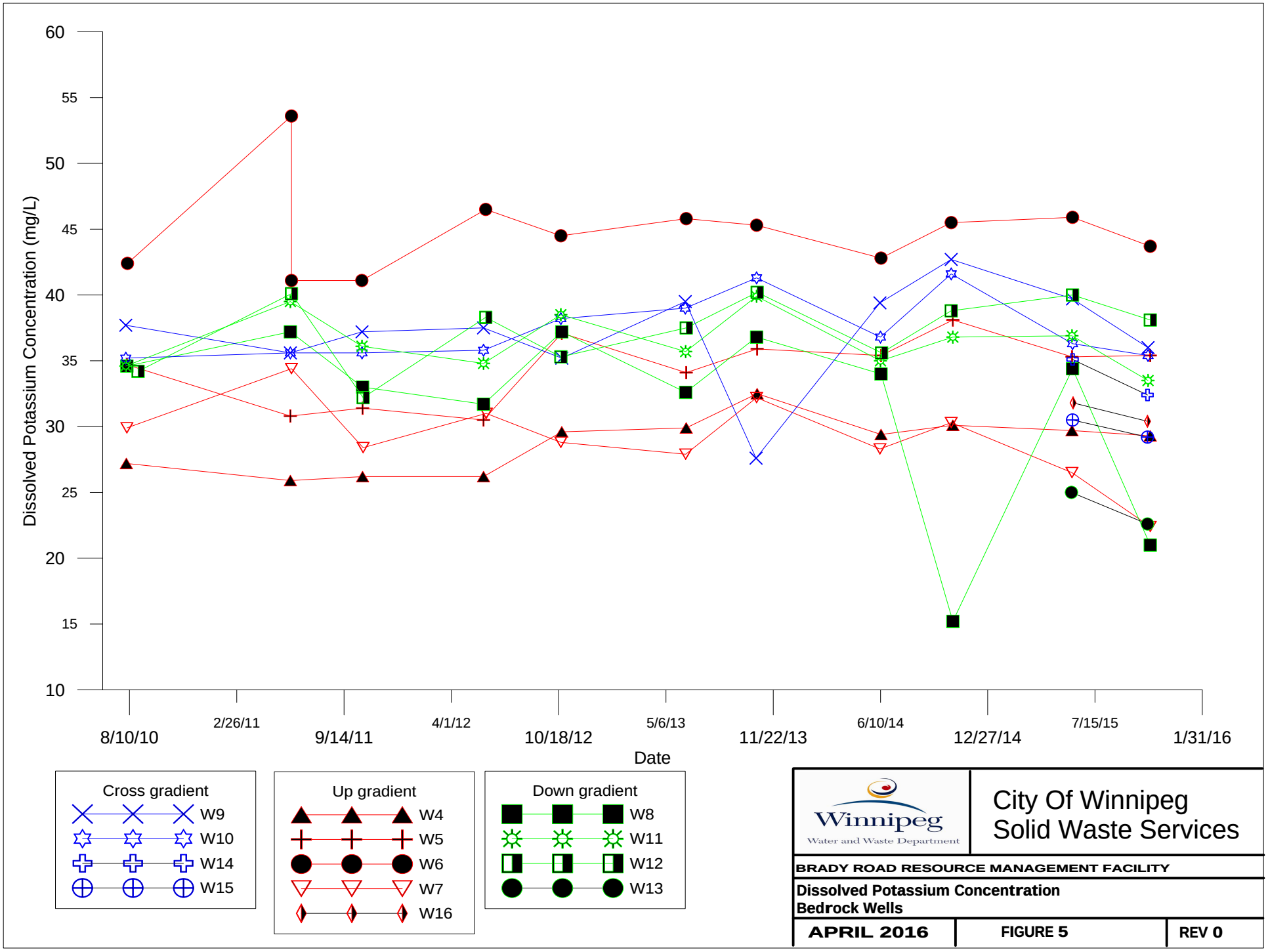
Solid Waste Services

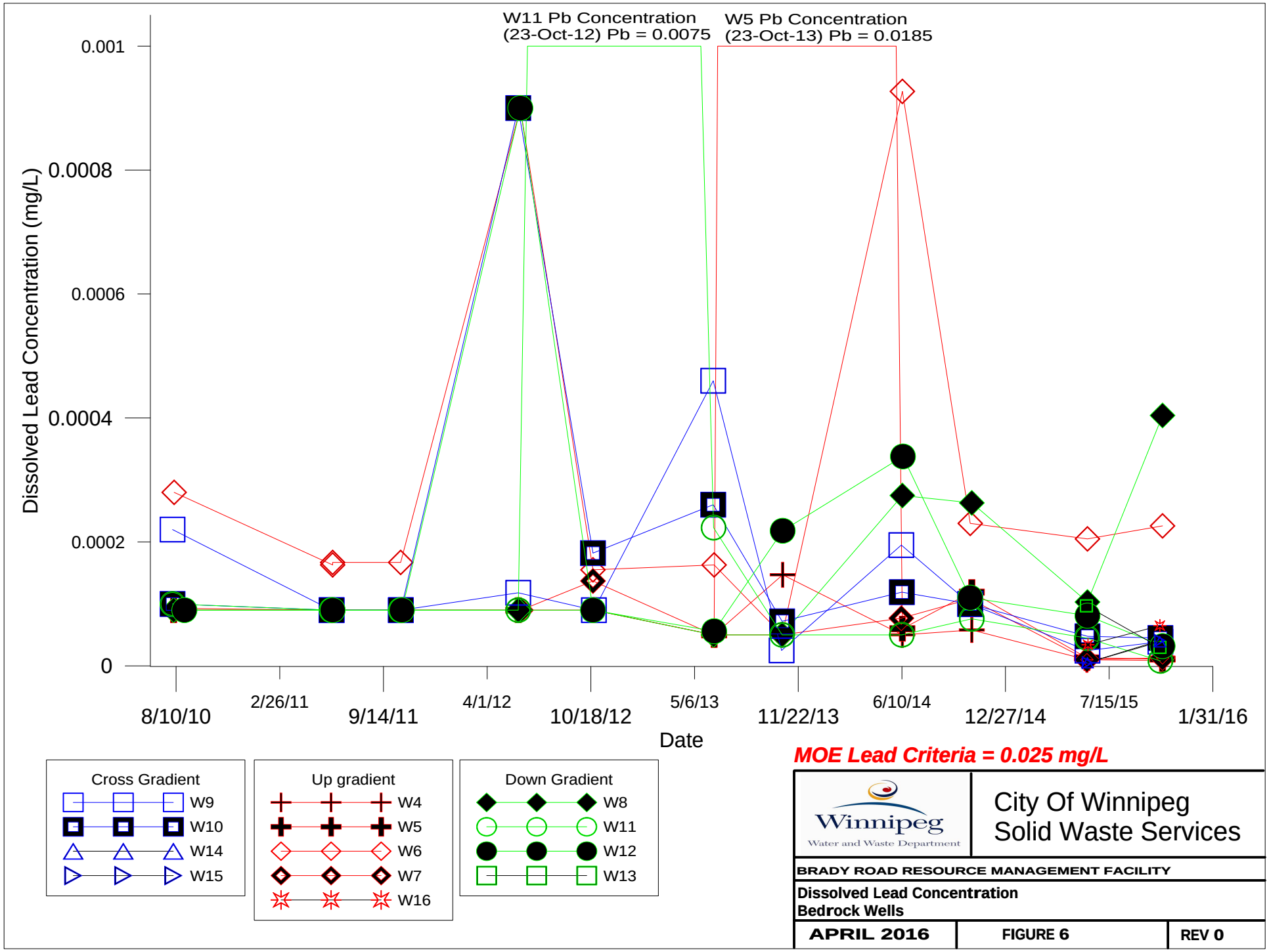
BRADY ROAD RESOURCE MANAGEMENT FACILITY

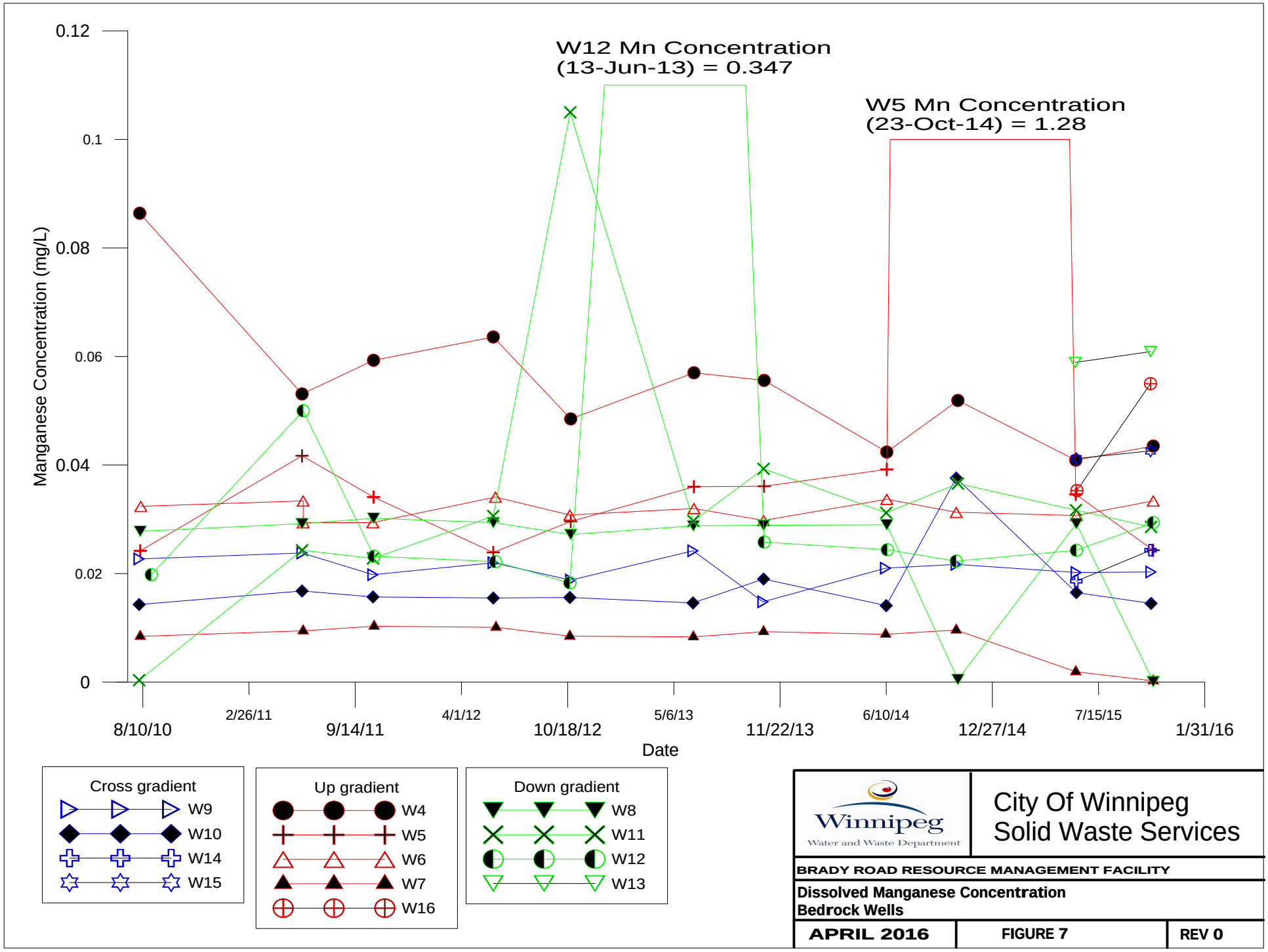
Dissolved Cobalt Concentration
Bedrock Wells

APRIL 2016	FIGURE 3	REV 0


W7 Cr Concentration
(26-Oct-15) Cr = 0.0318
W6 Cr Concentration
(17-Oct-11) Cr = 0.1
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
8/10/10
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
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
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Chromium Concentration
Bedrock Wells
APRIL 2015
FIGURE 4
REV 0


Dissolved Potassium Concentration (mg/L)
60
55
50
45
40
35
30
25
20
15
10
8/10/10
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
Date
Cross gradient
W9
W10
W14
W15
Up gradient
W4
W5
W6
W7
W16
Down gradient
W8
W11
W12
W13
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Potassium Concentration
Bedrock Wells
APRIL 2016
FIGURE 5
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
8/10/10
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
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
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Lead Concentration
Bedrock Wells
APRIL 2016
FIGURE 6
REV 0



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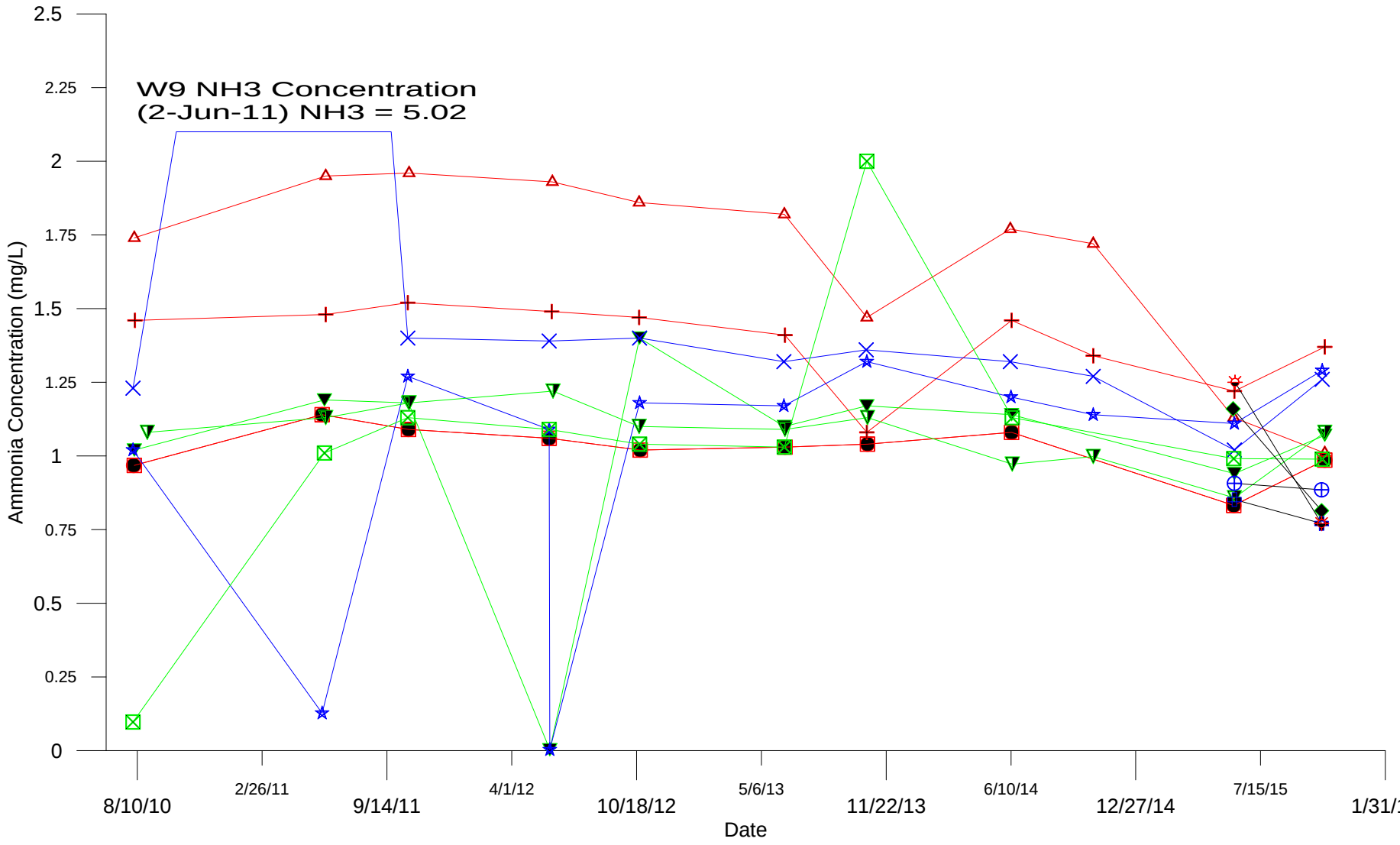
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Manganese Concentration
Bedrock Wells

APRIL 2016	FIGURE 7	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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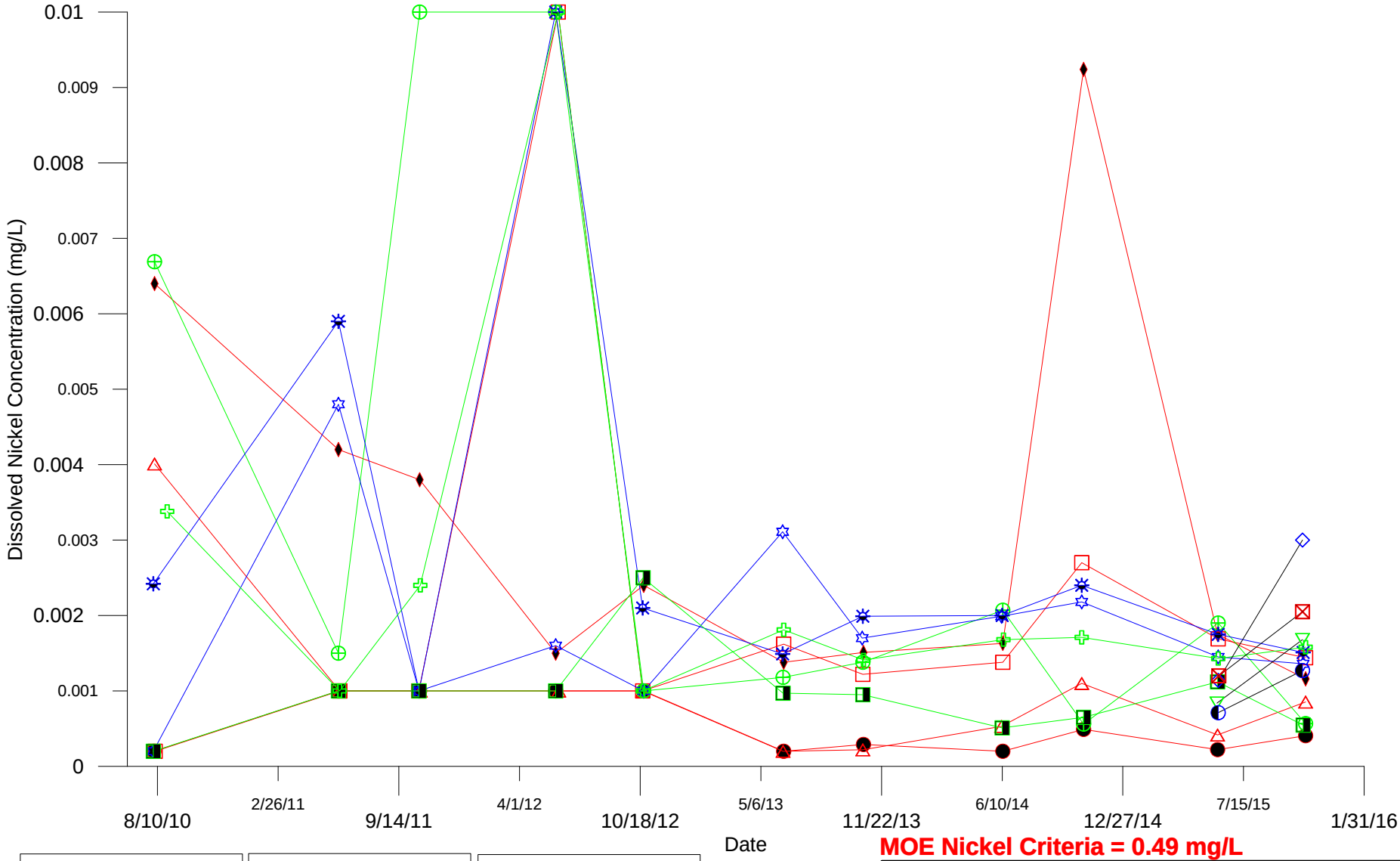
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Ammonia Concentration
Bedrock Wells

APRIL 2016	FIGURE 8	REV 0



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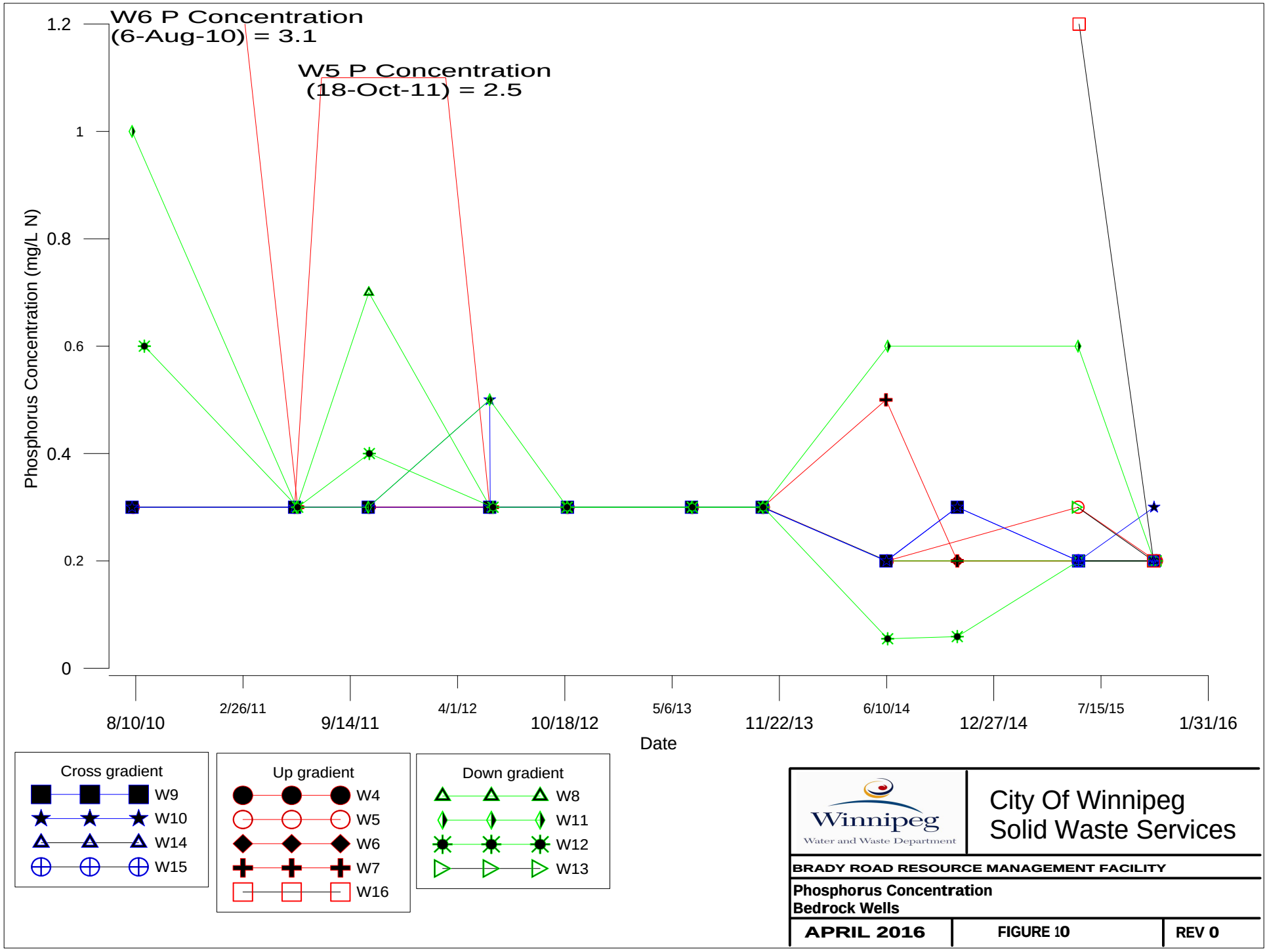
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Nickel Concentration
Bedrock Wells

APRIL 2016	FIGURE 9	REV 0


W6 P Concentration
(6-Aug-10) = 3.1
W5 P Concentration
(18-Oct-11) = 2.5
Phosphorus Concentration (mg/L N)
1.2
1
0.8
0.6
0.4
0.2
0
8/10/10
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
Date
Cross gradient
W9
W10
W14
W15
Up gradient
W4
W5
W6
W7
W16
Down gradient
W8
W11
W12
W13
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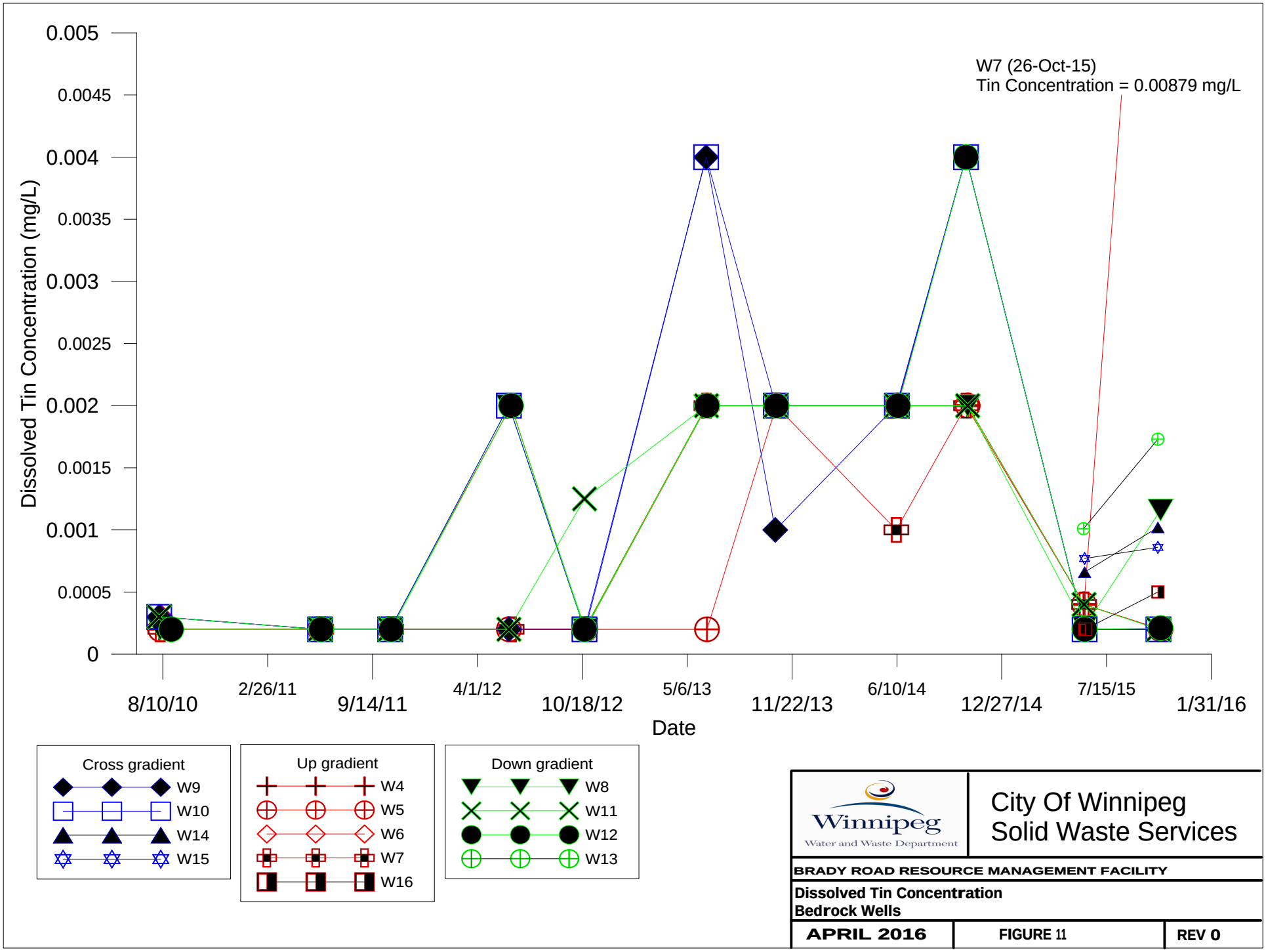
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Phosphorus Concentration
Bedrock Wells
APRIL 2016
FIGURE 10
REV 0


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
8/10/10
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
Date
Cross gradient
W9
W10
W14
W15
Up gradient
W4
W5
W6
W7
W16
Down gradient
W8
W11
W12
W13
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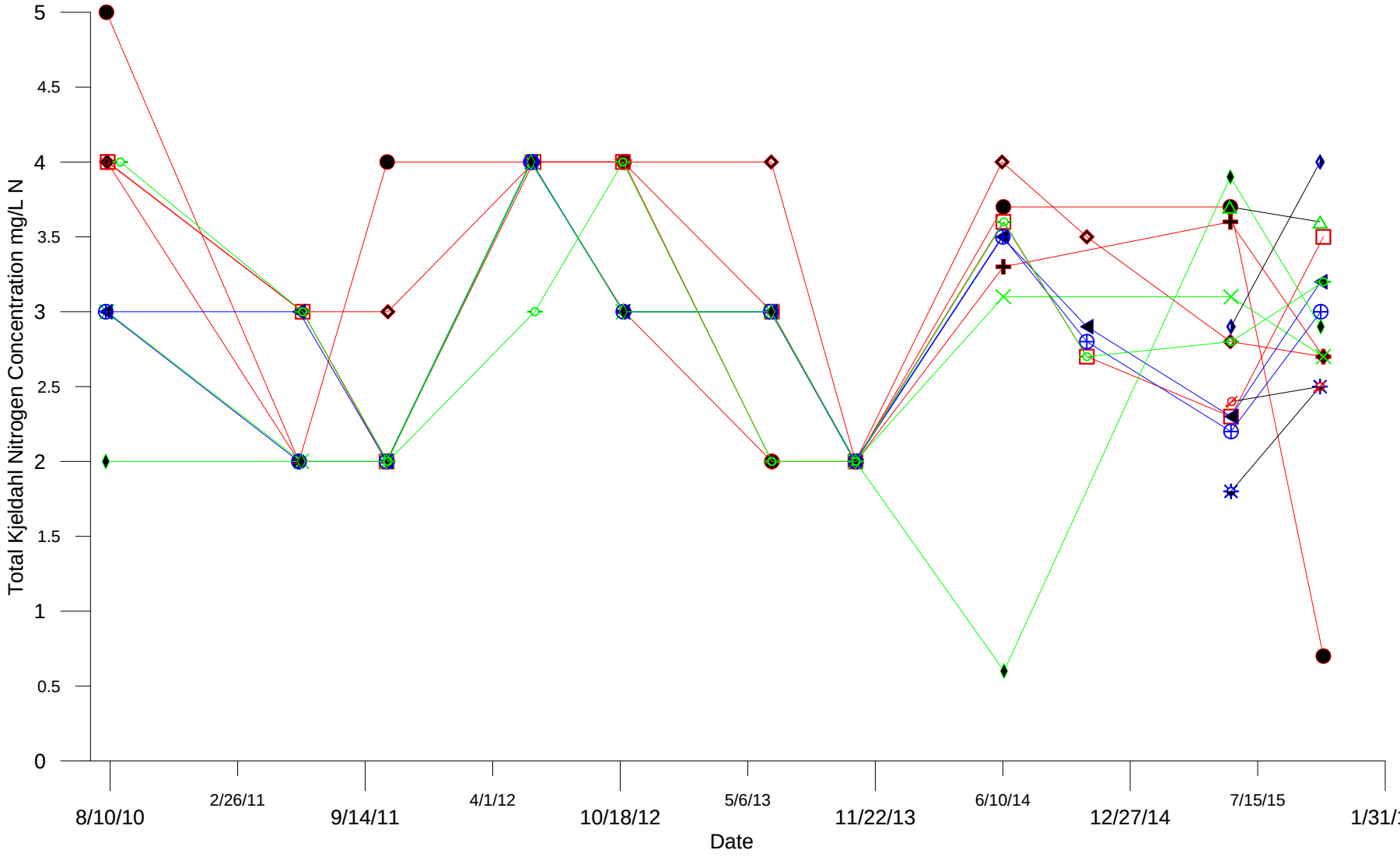
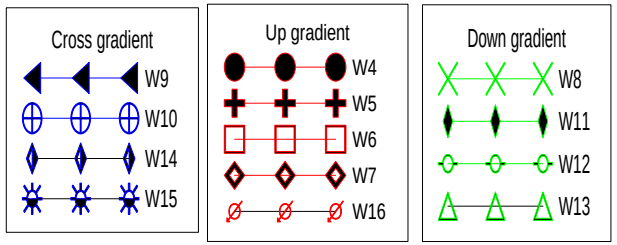
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Tin Concentration
Bedrock Wells
APRIL 2016
FIGURE 11
REV 0





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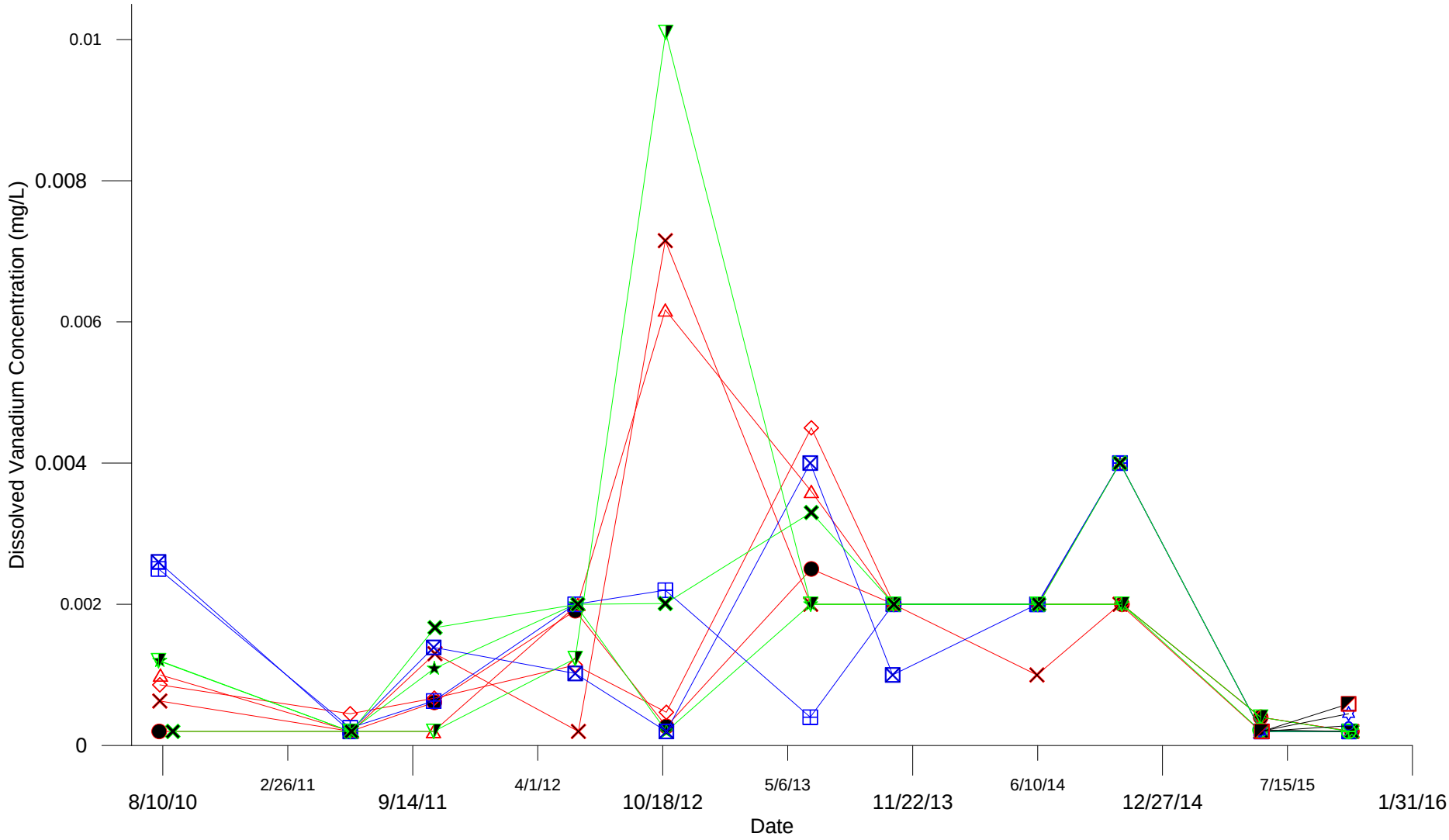
BRADY ROAD RESOURCE MANAGEMENT FACILITY

TKN Concentration
Bedrock Wells

APRIL 2016	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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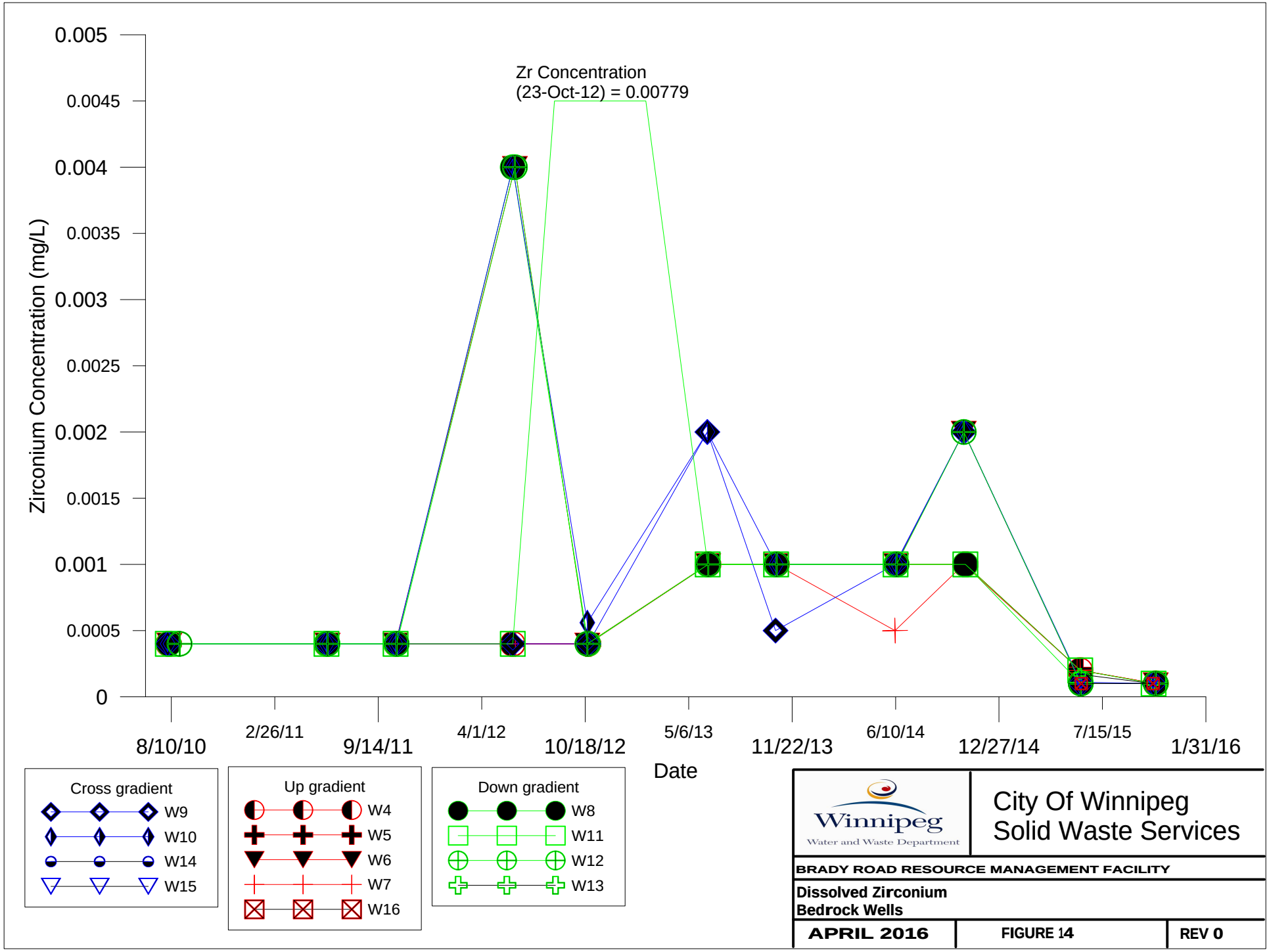
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Vanadium
Bedrock Wells

APRIL 2016	FIGURE 13	REV 0



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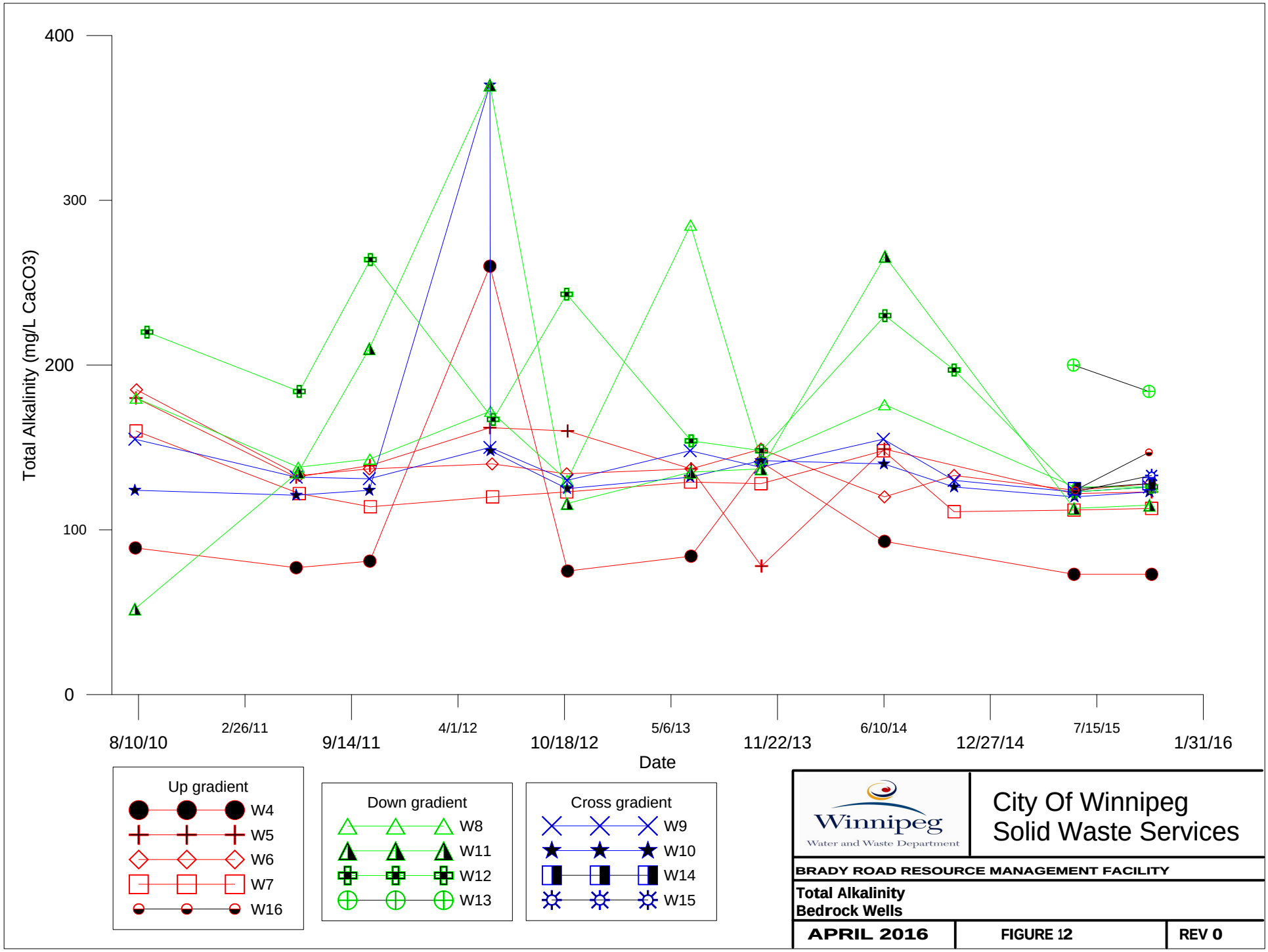
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Zirconium
Bedrock Wells

APRIL 2016 | FIGURE 14 | REV 0



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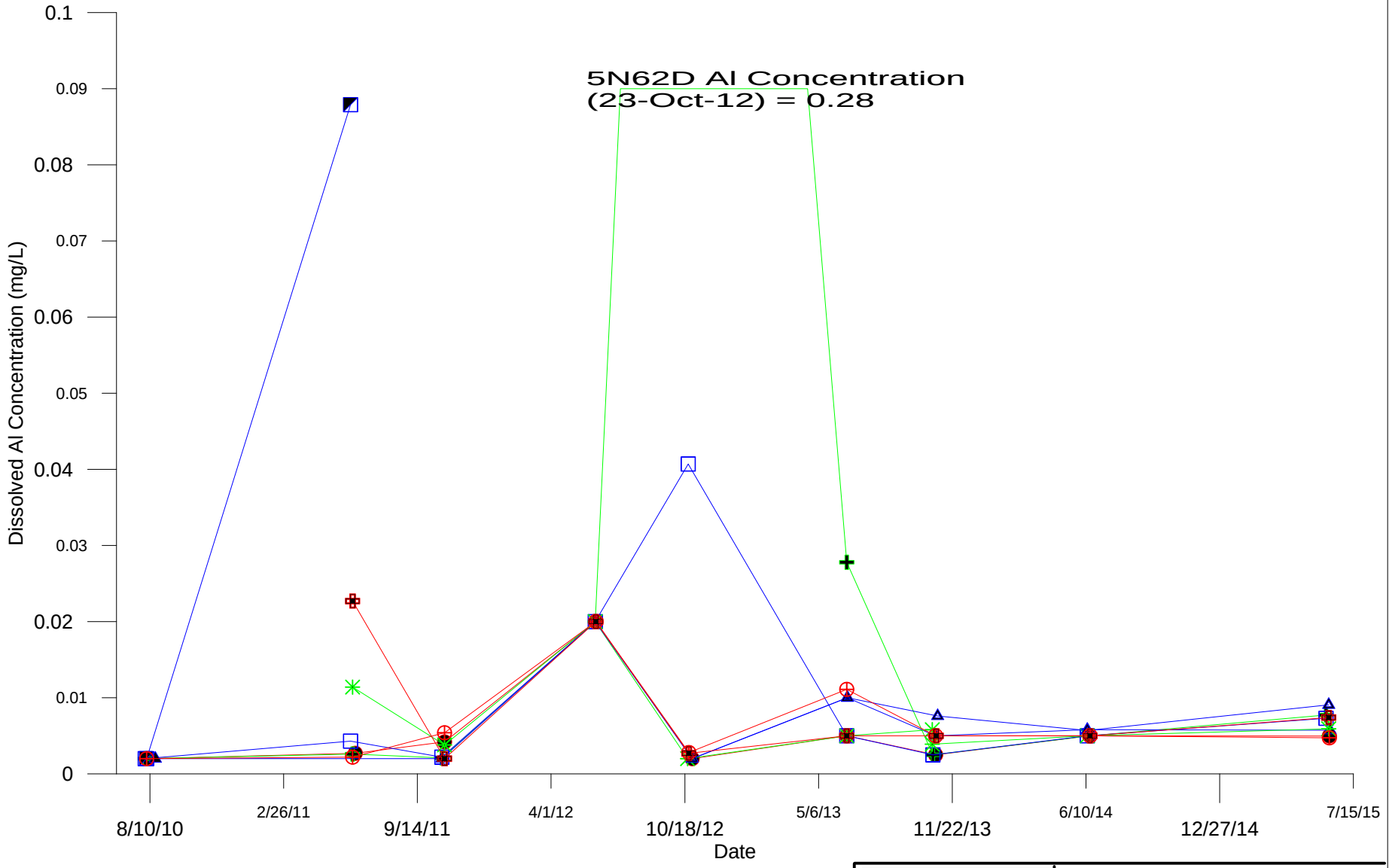
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Total Alkalinity
Bedrock Wells

APRIL 2016	FIGURE 12	REV 0



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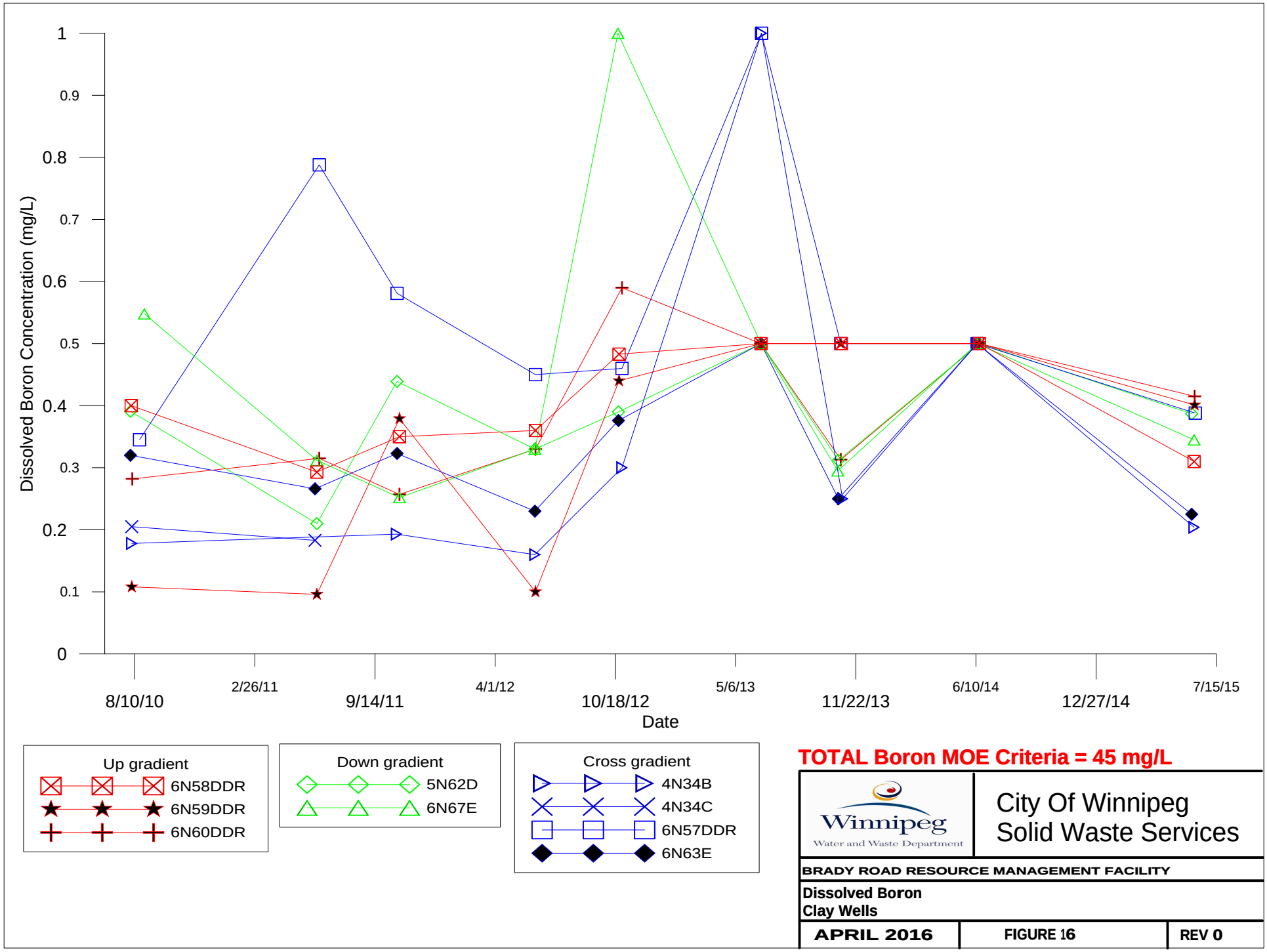
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Aluminium
Clay Wells

APRIL 2016	FIGURE 15	REV 0



TOTAL Boron MOE Criteria = 45 mg/L

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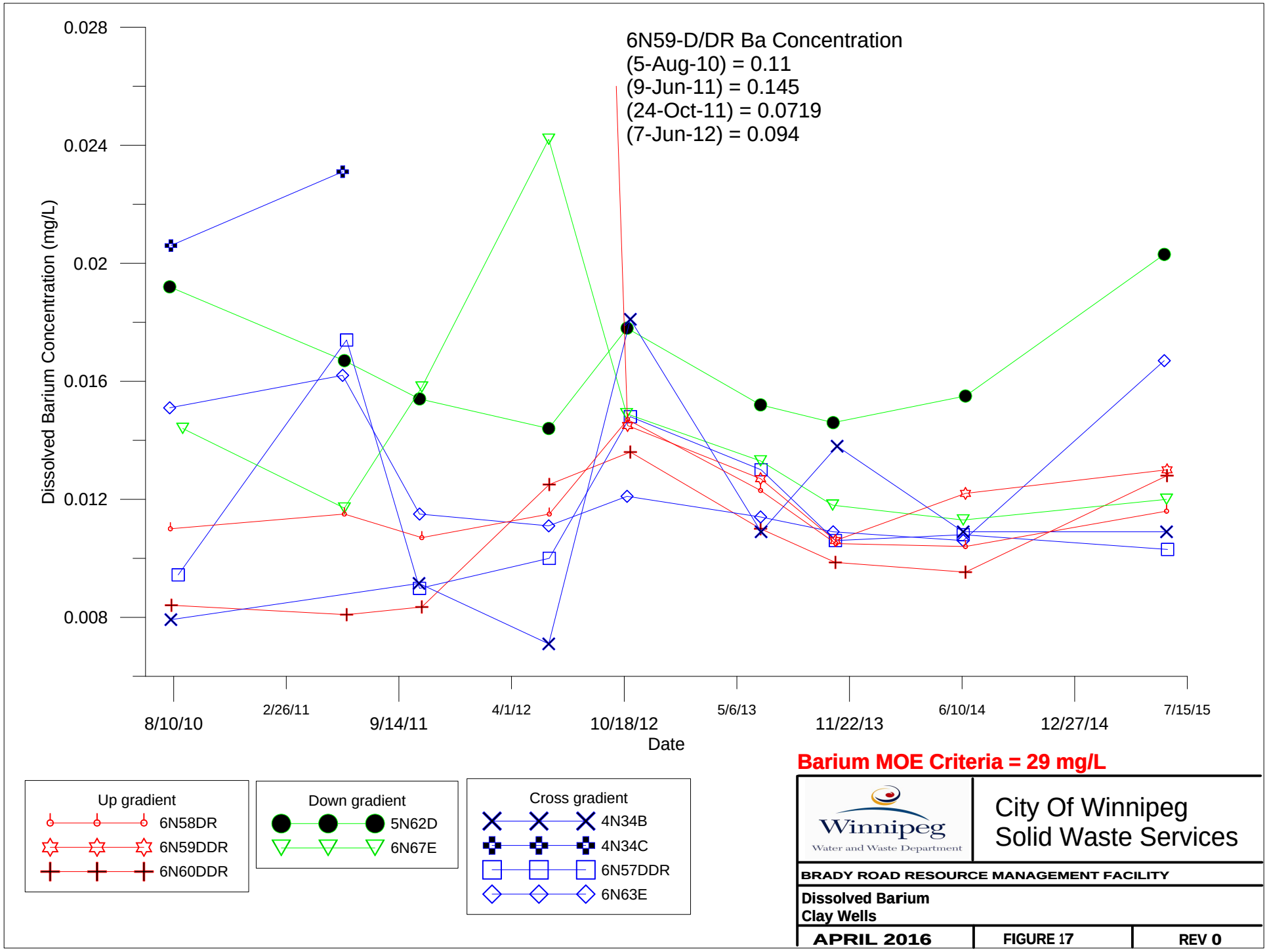
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Boron
Clay Wells

APRIL 2016	FIGURE 16	REV 0


6N59-D/DR Ba Concentration
(5-Aug-10) = 0.11
(9-Jun-11) = 0.145
(24-Oct-11) = 0.0719
(7-Jun-12) = 0.094
Dissolved Barium Concentration (mg/L)
0.028
0.024
0.02
0.016
0.012
0.008
8/10/10
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
Date
Barium MOE Criteria = 29 mg/L
Up gradient
6N58DR
6N59DDR
6N60DDR
Down gradient
5N62D
6N67E
Cross gradient
4N34B
4N34C
6N57DDR
6N63E
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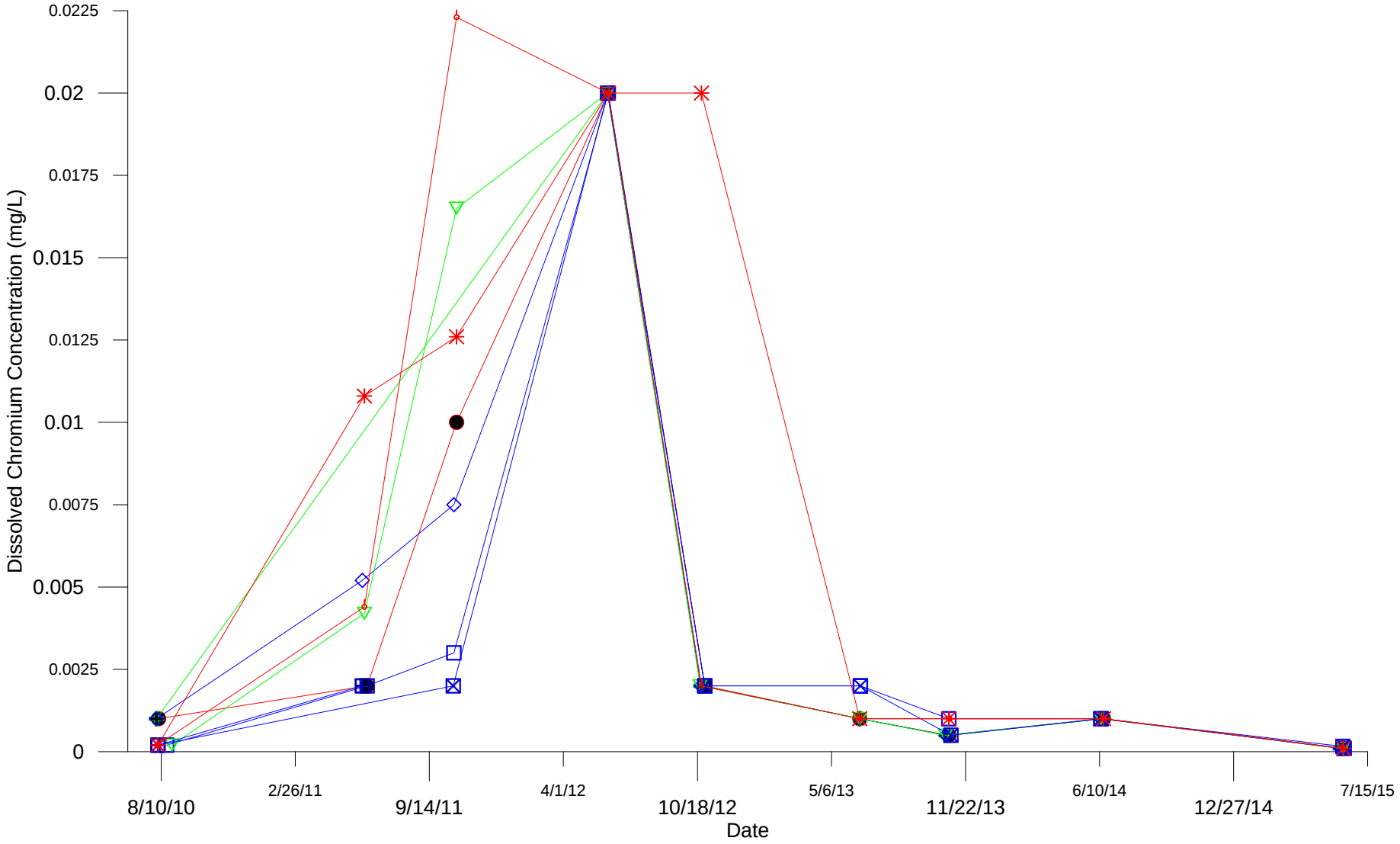
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Barium
Clay Wells
APRIL 2016
FIGURE 17
REV 0



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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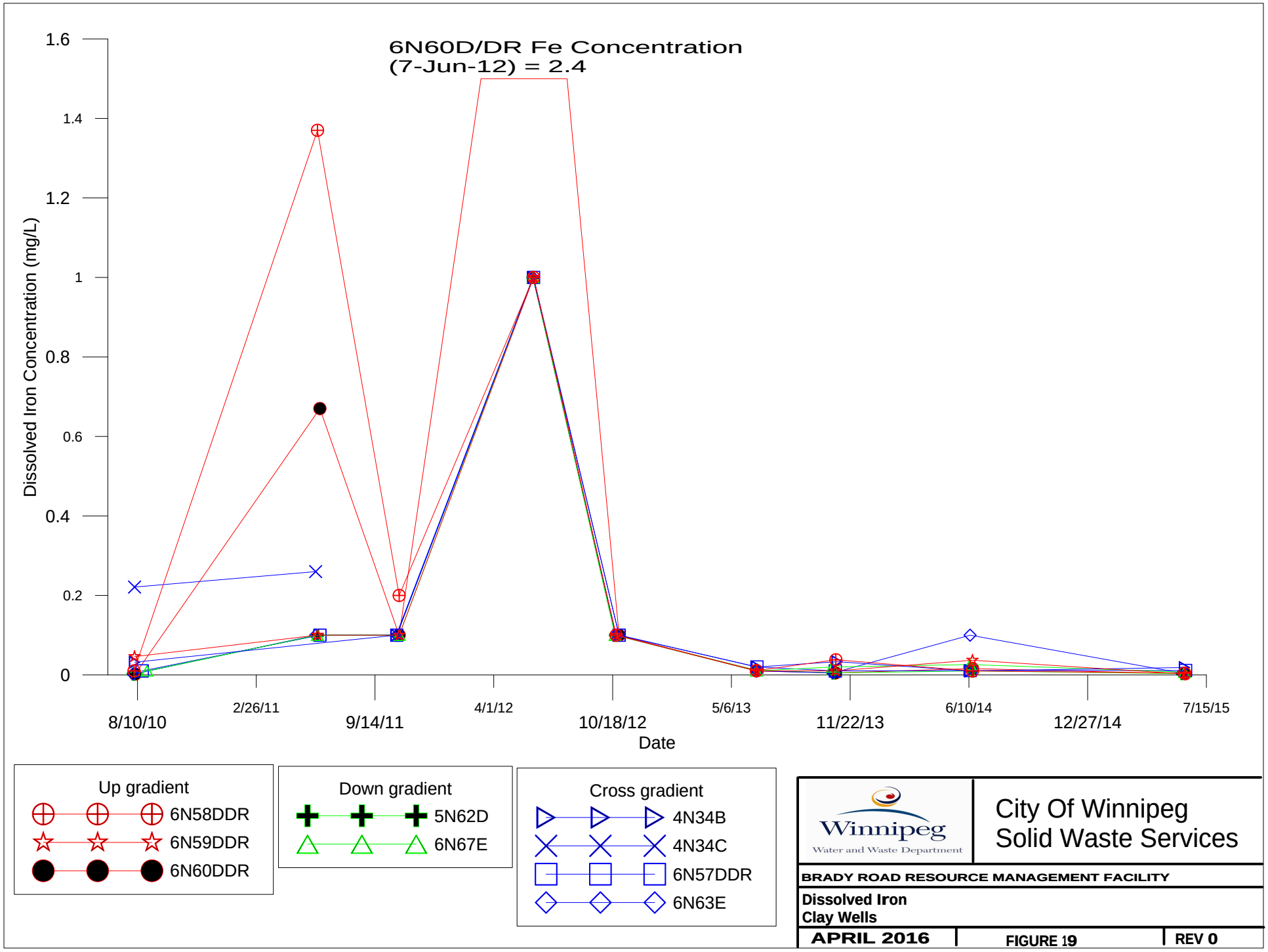
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Chromium
Clay Wells

APRIL 2016 | FIGURE 18 | 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
8/10/10
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
Date
Up gradient
6N58DDR
6N59DDR
6N60DDR
Down gradient
5N62D
6N67E
Cross gradient
4N34B
4N34C
6N57DDR
6N63E
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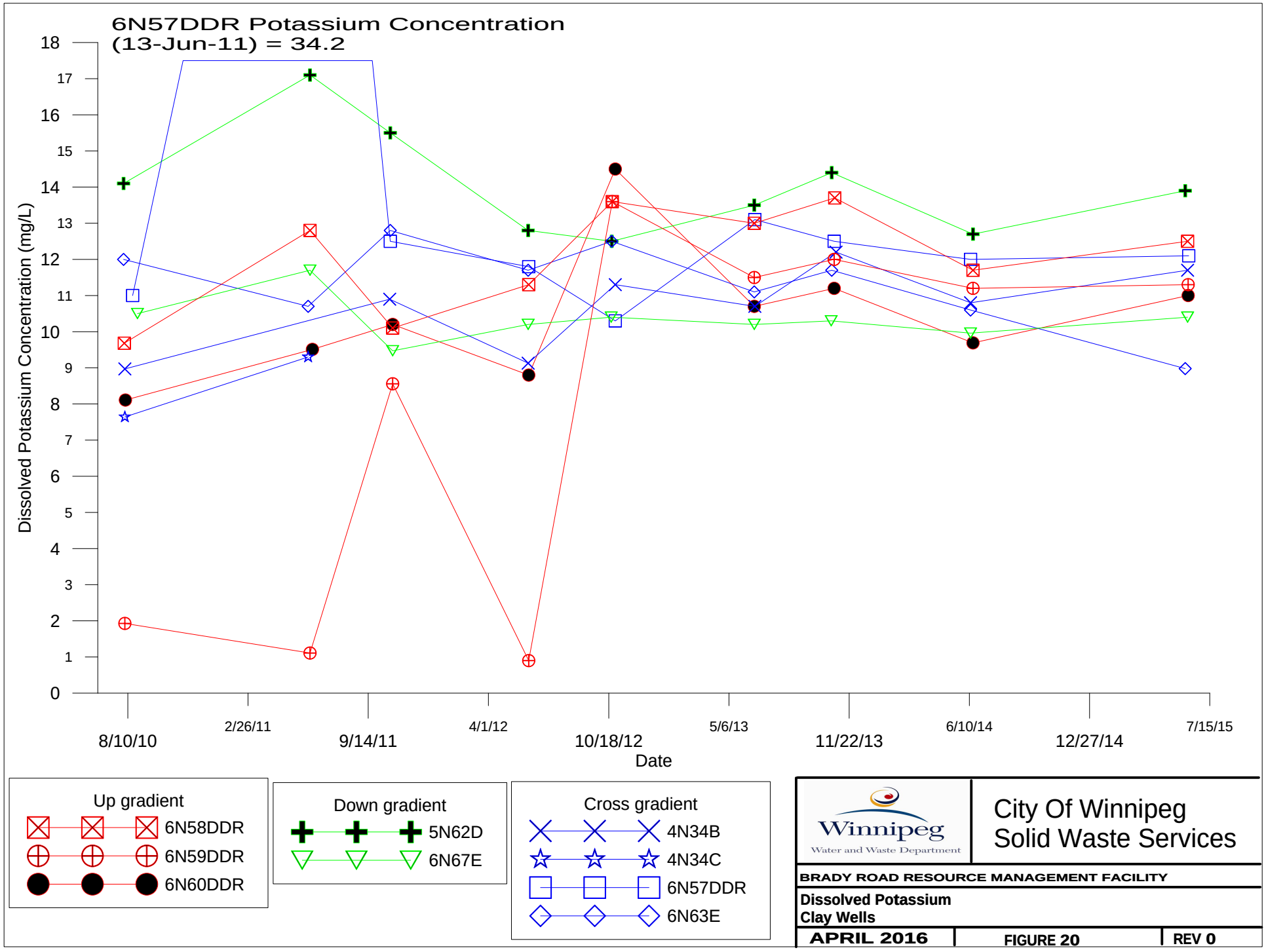
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Iron
Clay Wells
APRIL 2016
FIGURE 19
REV 0



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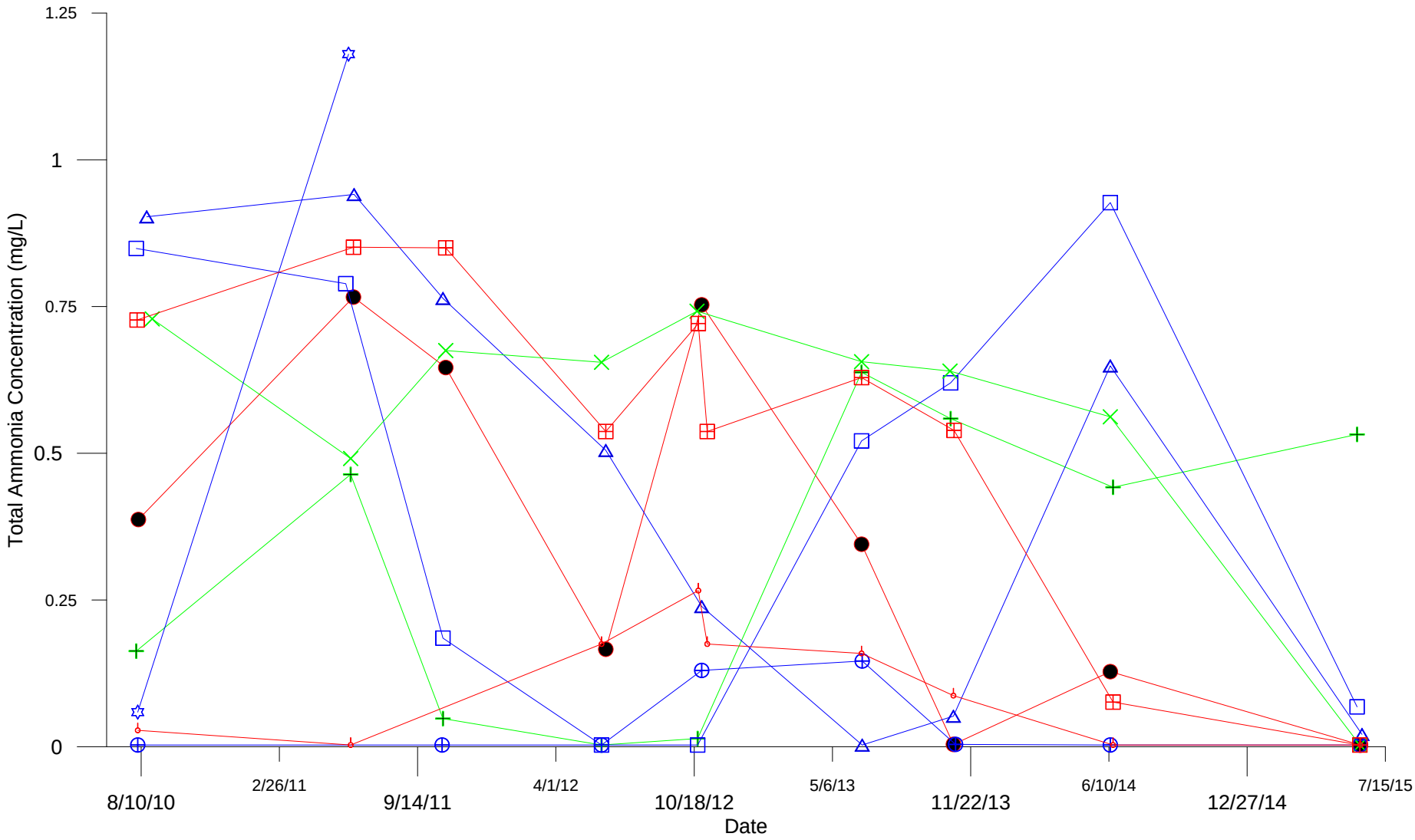
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Potassium
Clay Wells

APRIL 2016	FIGURE 20	REV 0



Up gradient
6N58DDR
6N59DDR
6N60DDR

Down gradient
5N62D
6N67E

Cross gradient
4N34B
4N34C
6N57DDR
6N63E

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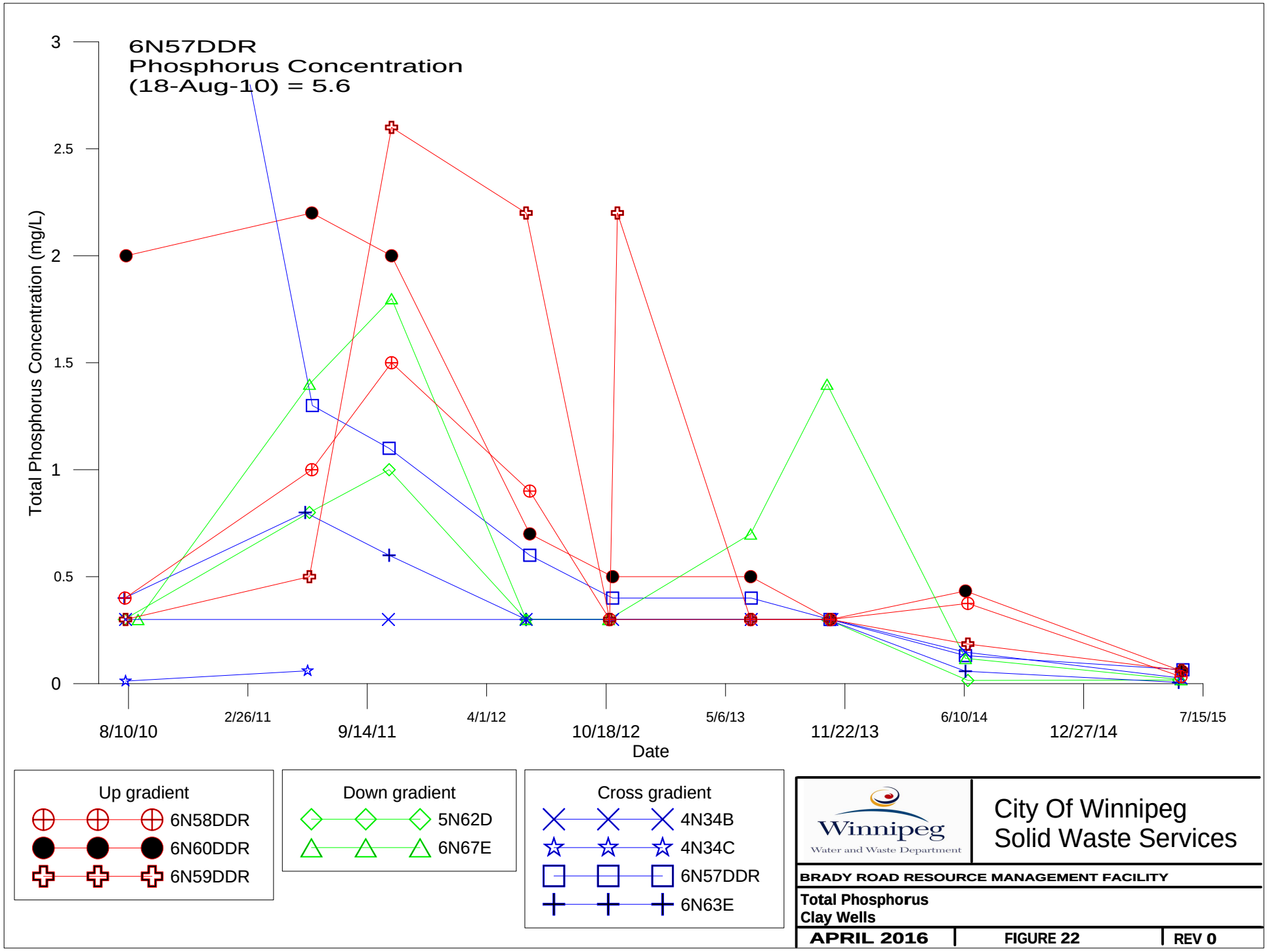
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Total Ammonia
Clay Wells

APRIL 2016	FIGURE 21	REV 0


6N57DDR
Phosphorus Concentration
(18-Aug-10) = 5.6
Total Phosphorus Concentration (mg/L)
3
2.5
2
1.5
1
0.5
0
8/10/10
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
Date
Up gradient
6N58DDR
6N60DDR
6N59DDR
Down gradient
5N62D
6N67E
Cross gradient
4N34B
4N34C
6N57DDR
6N63E
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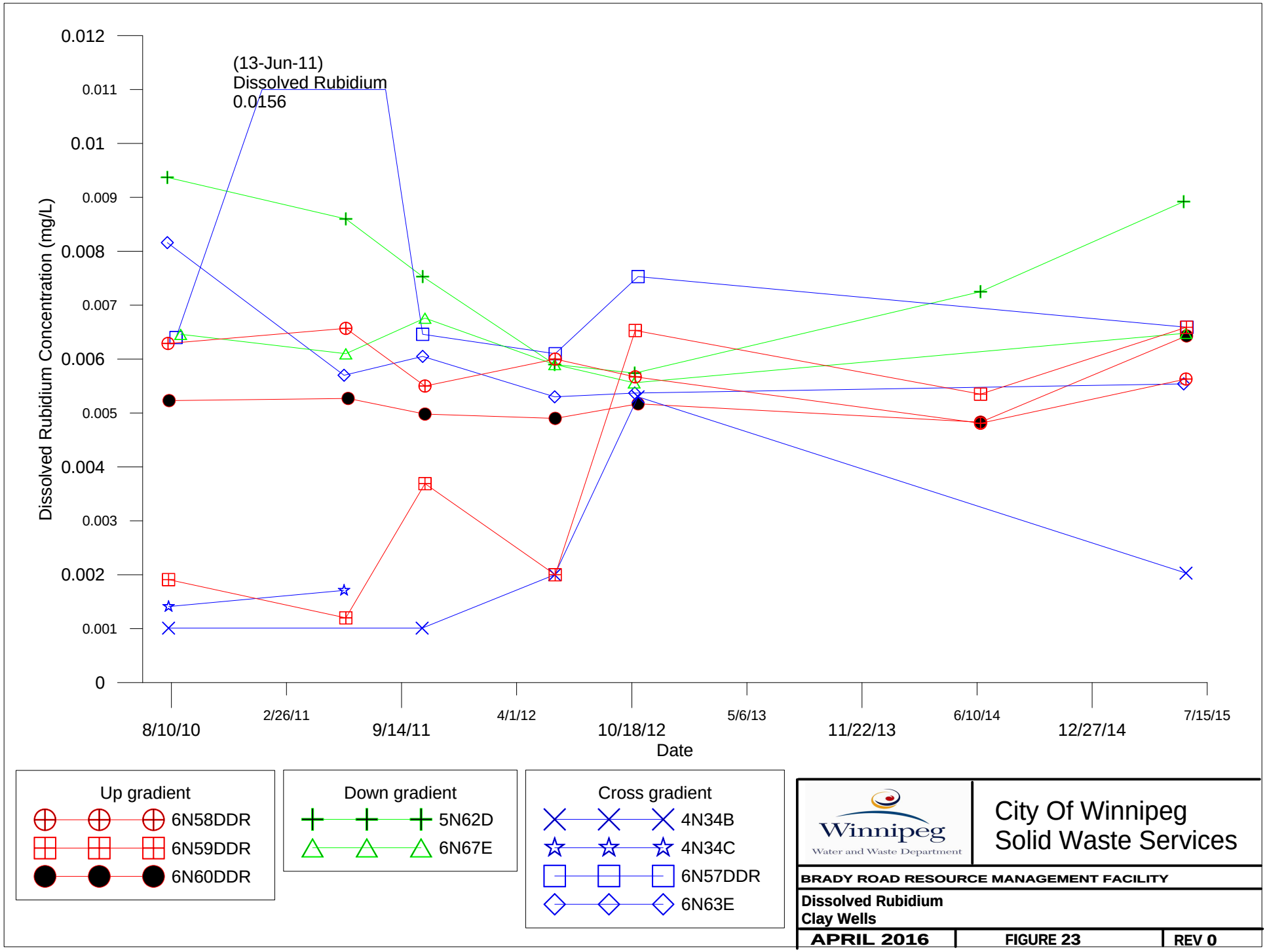
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Total Phosphorus
Clay Wells
APRIL 2016
FIGURE 22
REV 0



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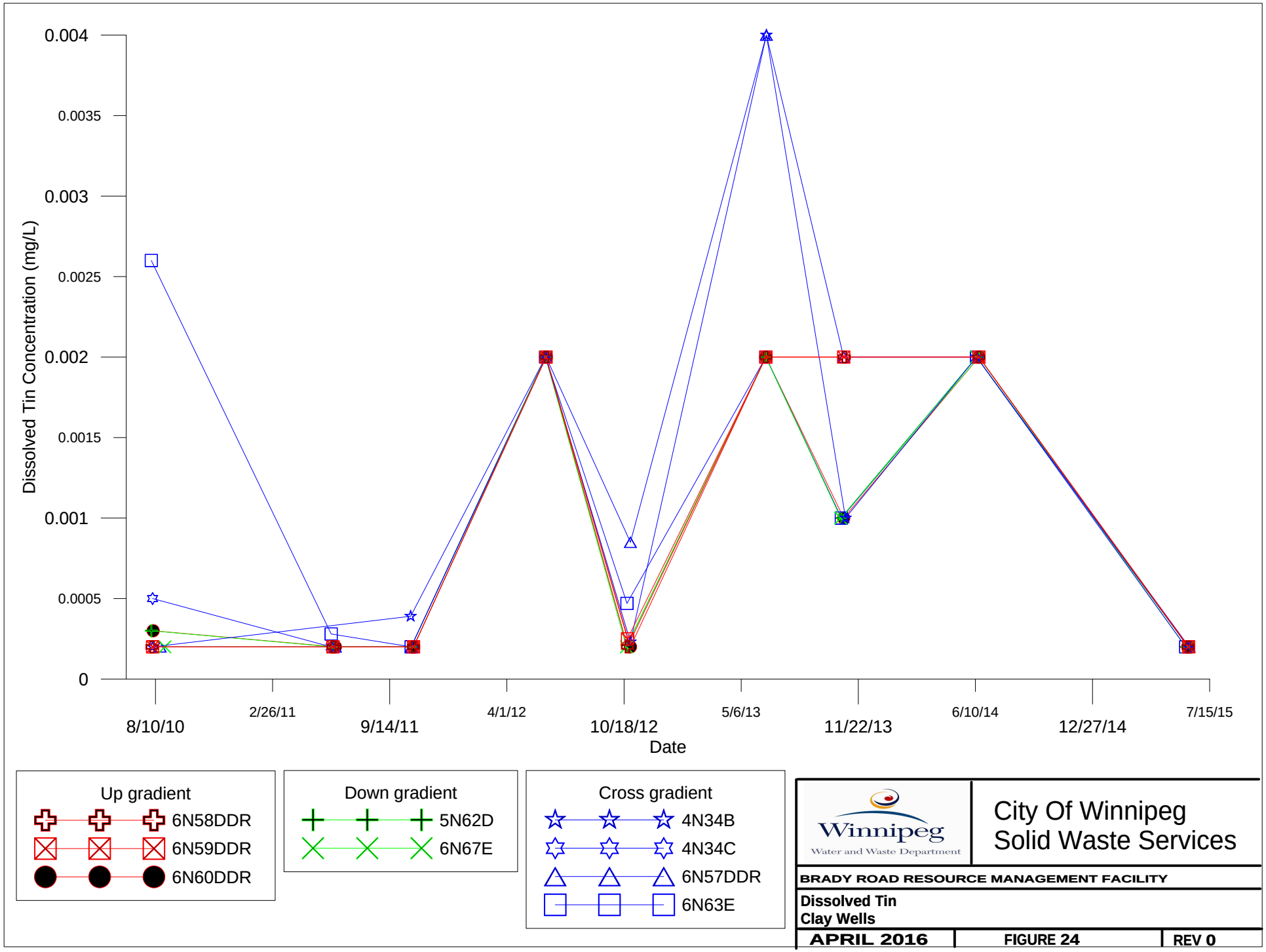
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Rubidium
Clay Wells

APRIL 2016	FIGURE 23	REV 0



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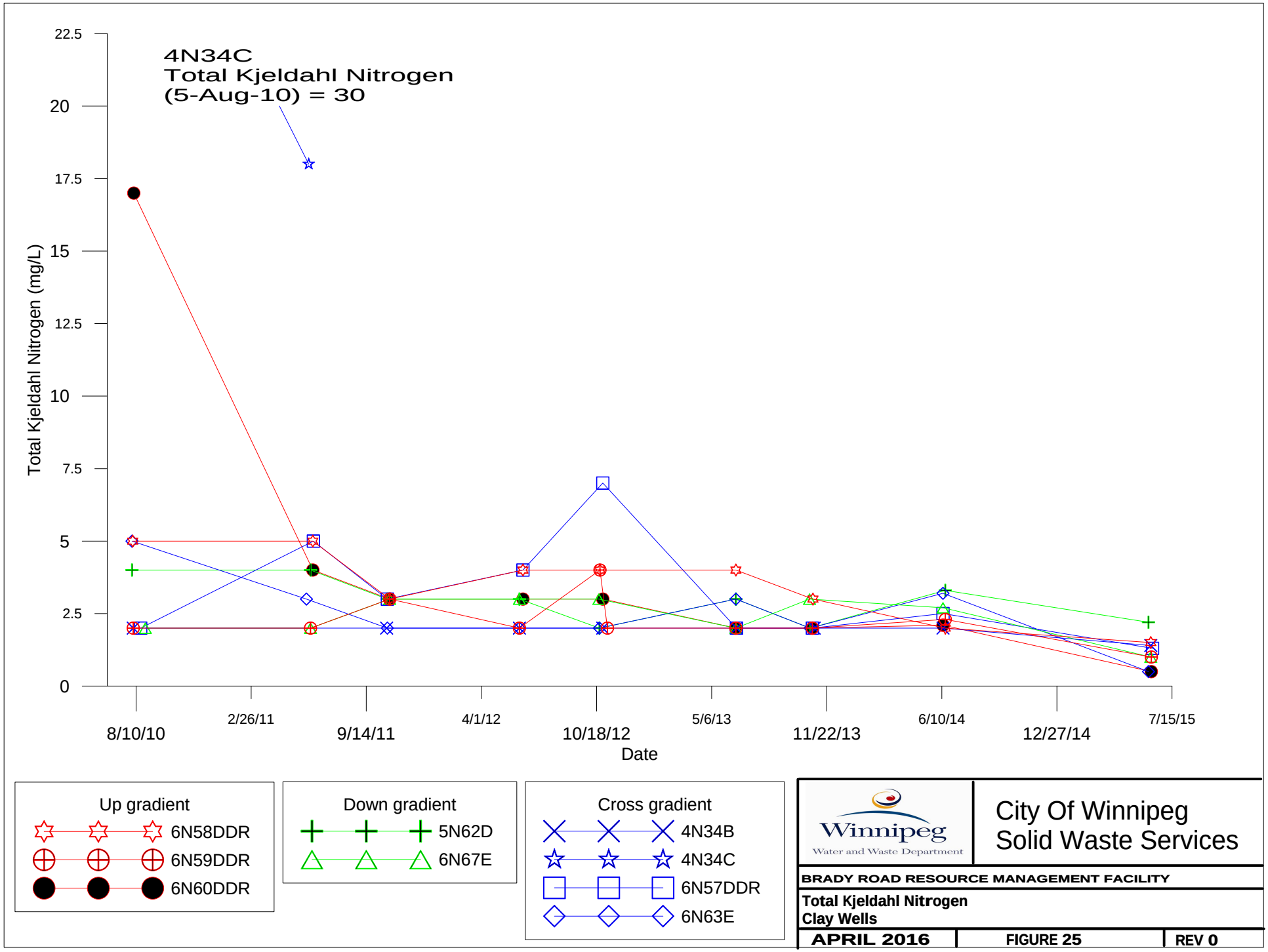
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Tin
Clay Wells

APRIL 2016	FIGURE 24	REV 0


4N34C
Total Kjeldahl Nitrogen
(5-Aug-10) = 30
Total Kjeldahl Nitrogen (mg/L)
22.5
20
17.5
15
12.5
10
7.5
5
2.5
0
8/10/10
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
Date
Up gradient
6N58DDR
6N59DDR
6N60DDR
Down gradient
5N62D
6N67E
Cross gradient
4N34B
4N34C
6N57DDR
6N63E
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City Of Winnipeg
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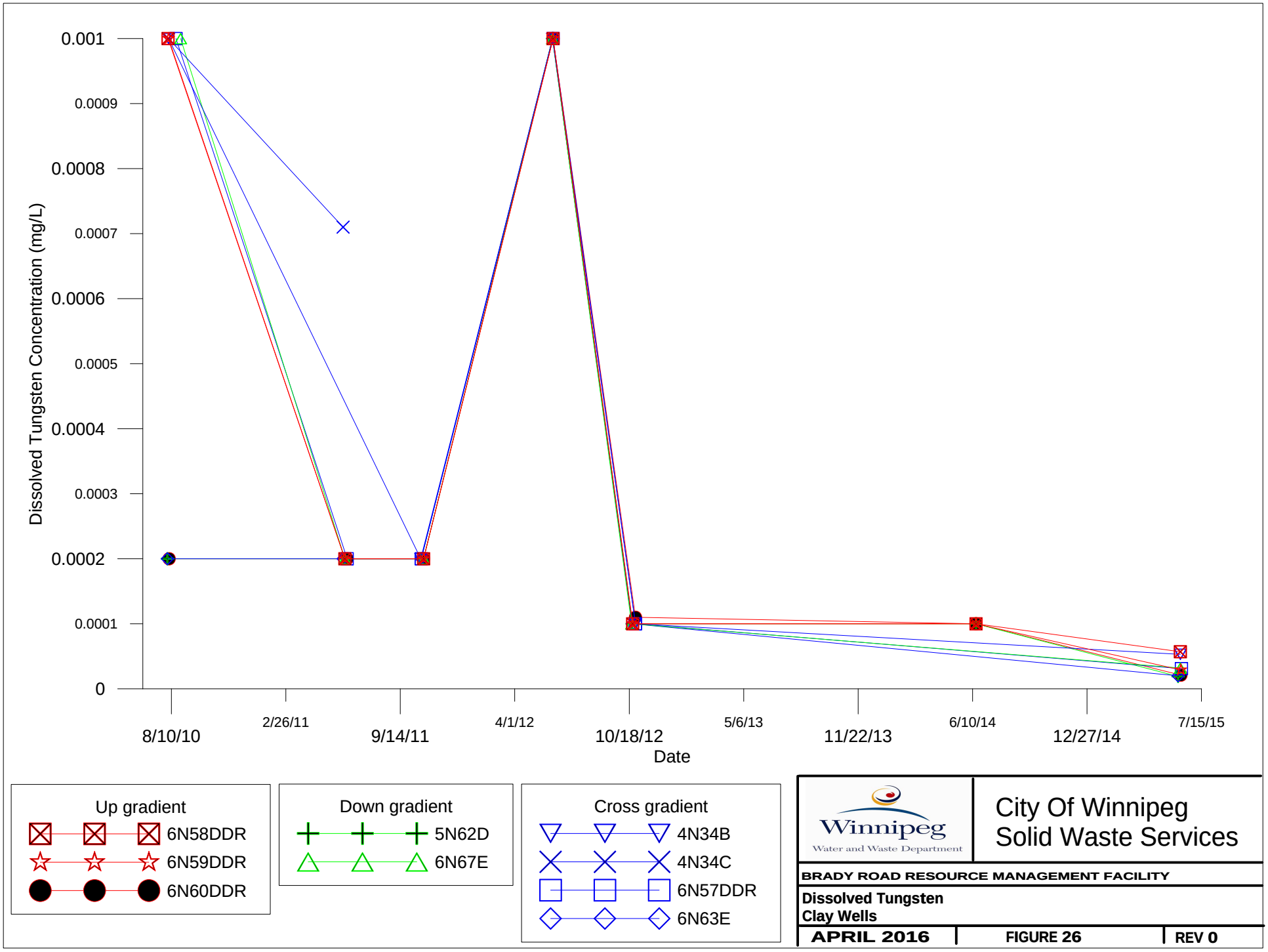
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Total Kjeldahl Nitrogen
Clay Wells
APRIL 2016
FIGURE 25
REV 0


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)
8/10/10
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
Date
Up gradient
6N58DDR
6N59DDR
6N60DDR
Down gradient
5N62D
6N67E
Cross gradient
4N34B
4N34C
6N57DDR
6N63E
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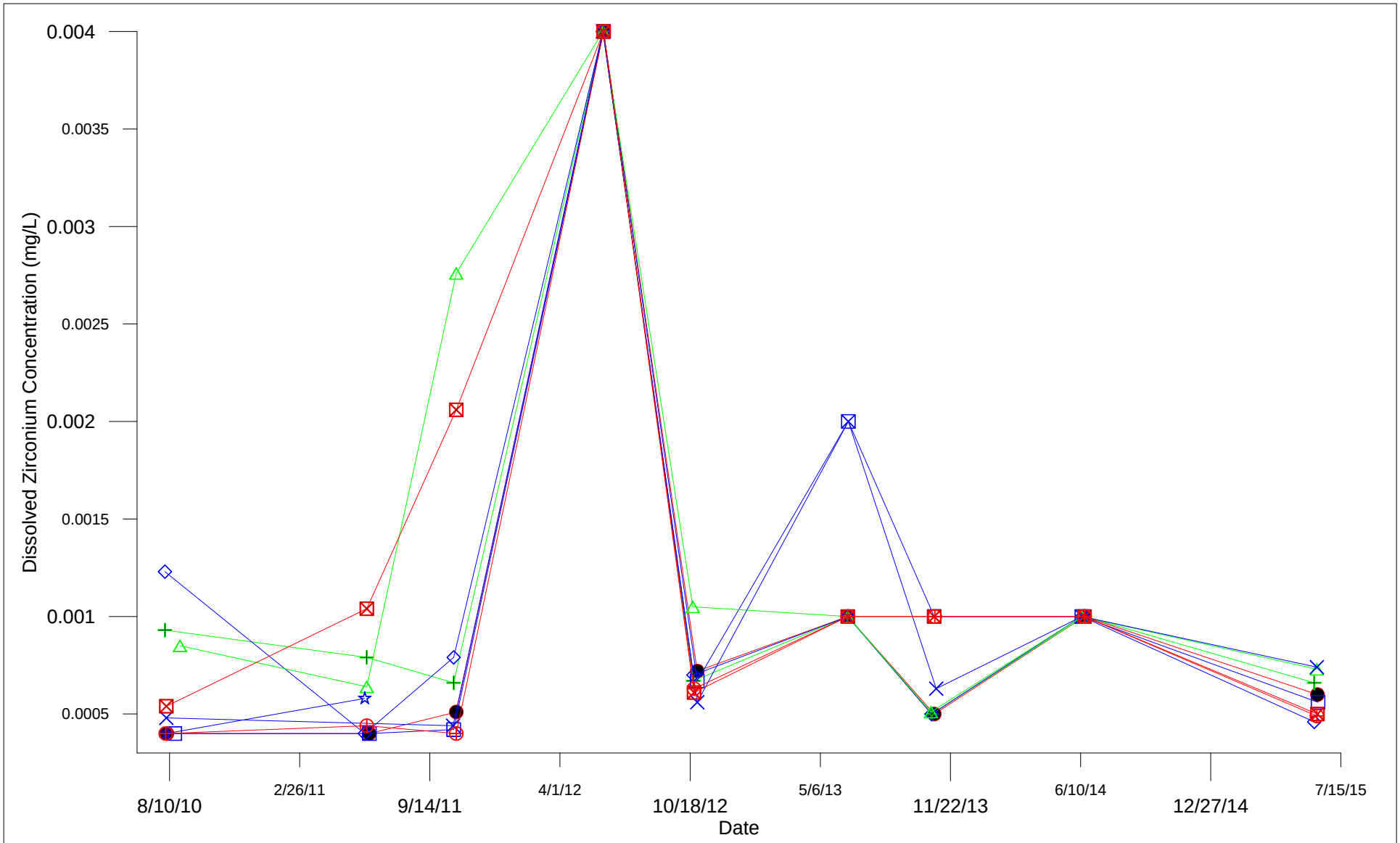
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Tungsten
Clay Wells
APRIL 2016
FIGURE 26
REV 0



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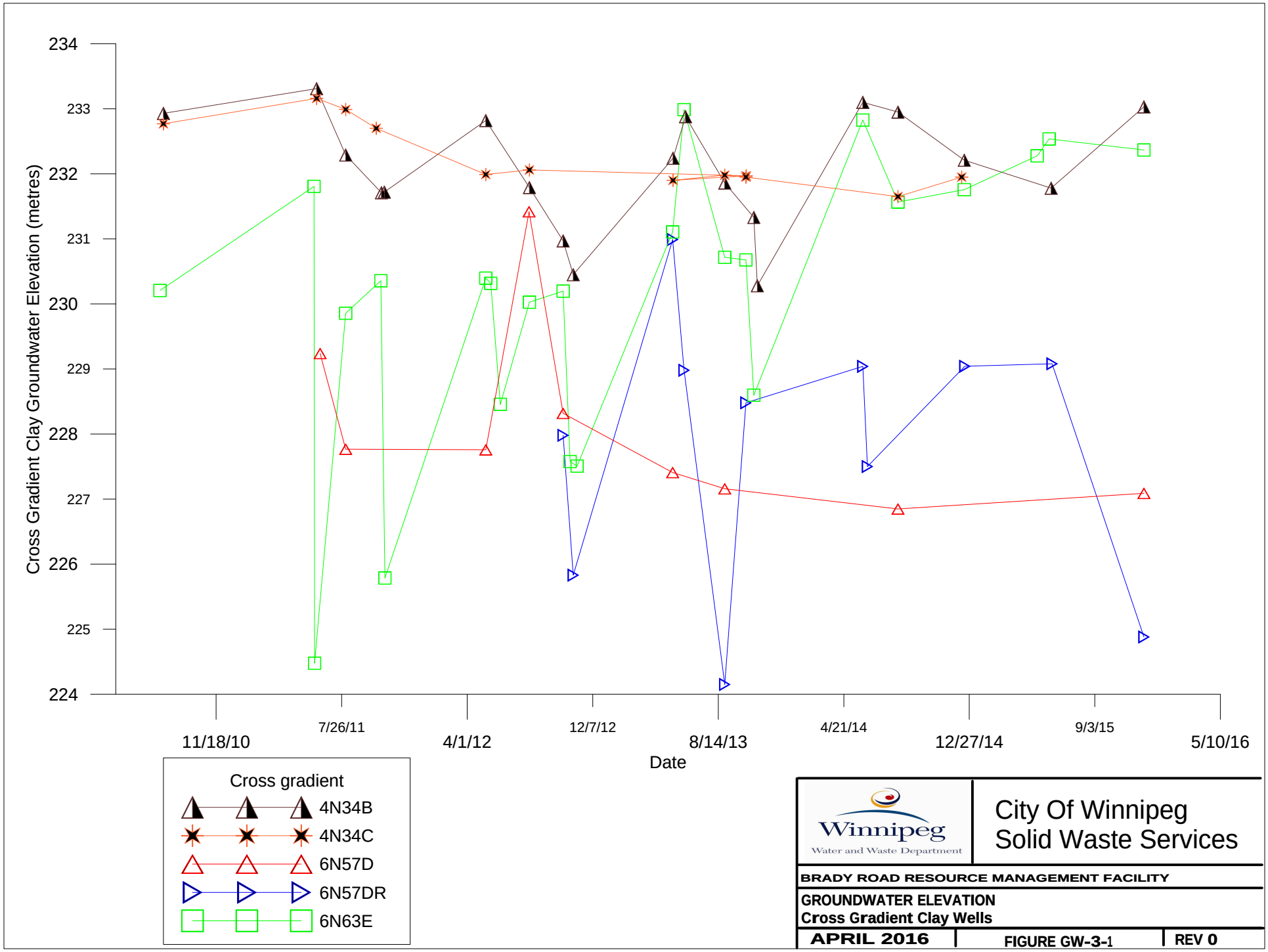
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Zirconium
Clay Wells

APRIL 2015 | **FIGURE 27** | **REV 0**



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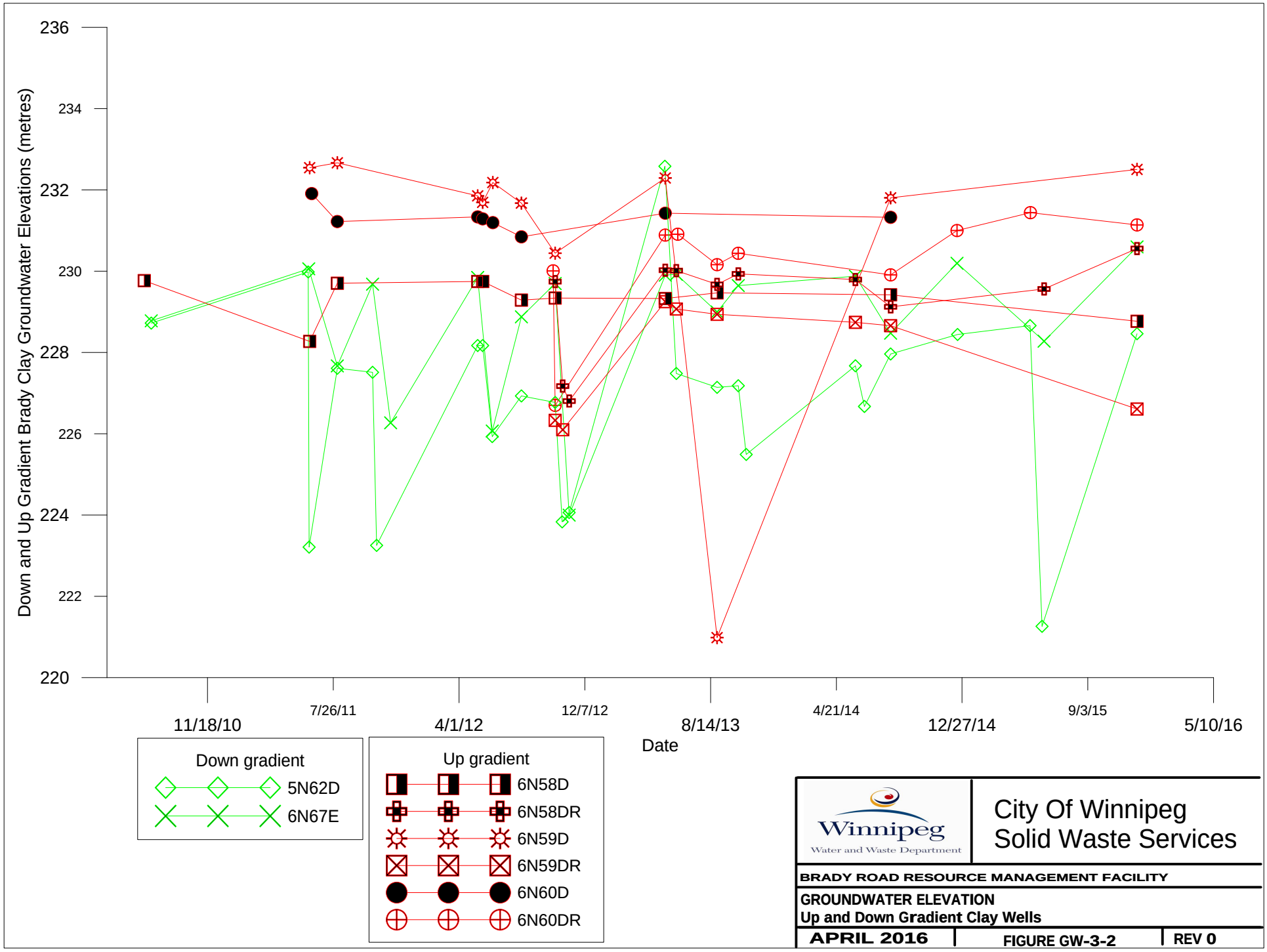
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

GROUNDWATER ELEVATION
Cross Gradient Clay Wells

APRIL 2016 | FIGURE GW-3-1 | REV 0



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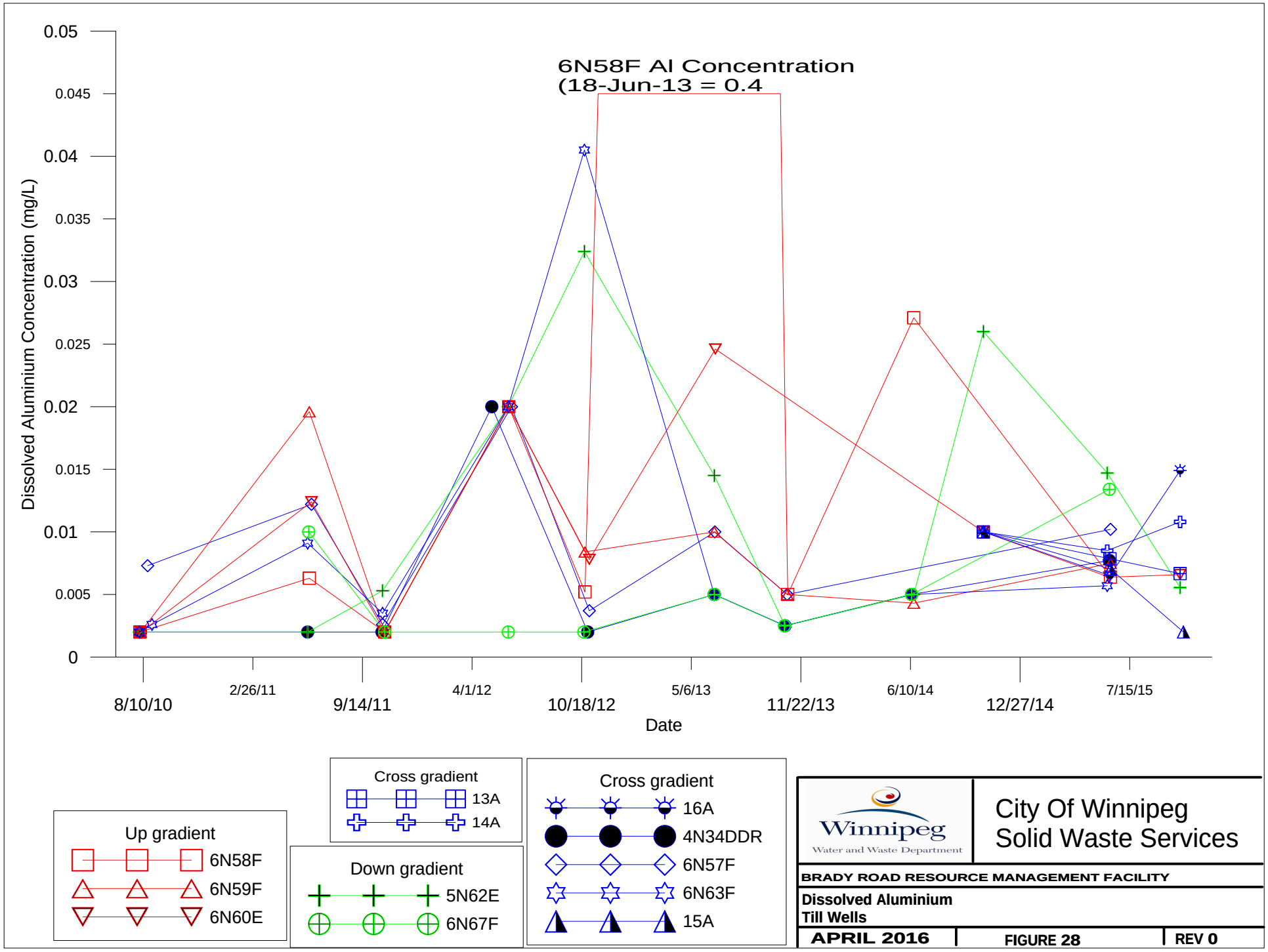
BRADY ROAD RESOURCE MANAGEMENT FACILITY

GROUNDWATER ELEVATION
Up and Down Gradient Clay Wells

APRIL 2016 | FIGURE GW-3-2 | REV 0


6N58F Al Concentration
(18-Jun-13 = 0.4
Dissolved Aluminium Concentration (mg/L)
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
8/10/10
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
Date
Up gradient
6N58F
6N59F
6N60E
Cross gradient
13A
14A
Down gradient
5N62E
6N67F
Cross gradient
16A
4N34DDR
6N57F
6N63F
15A
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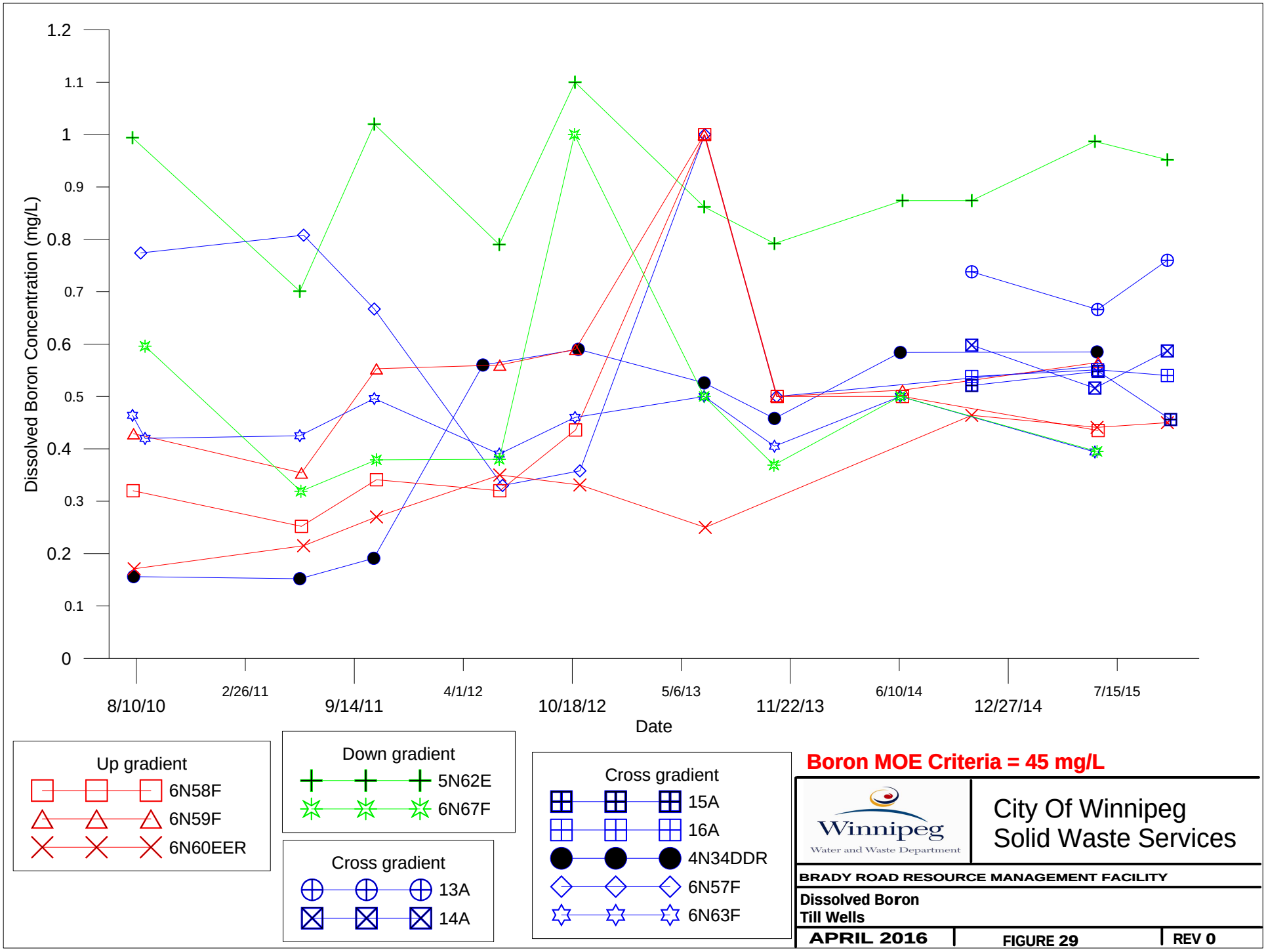
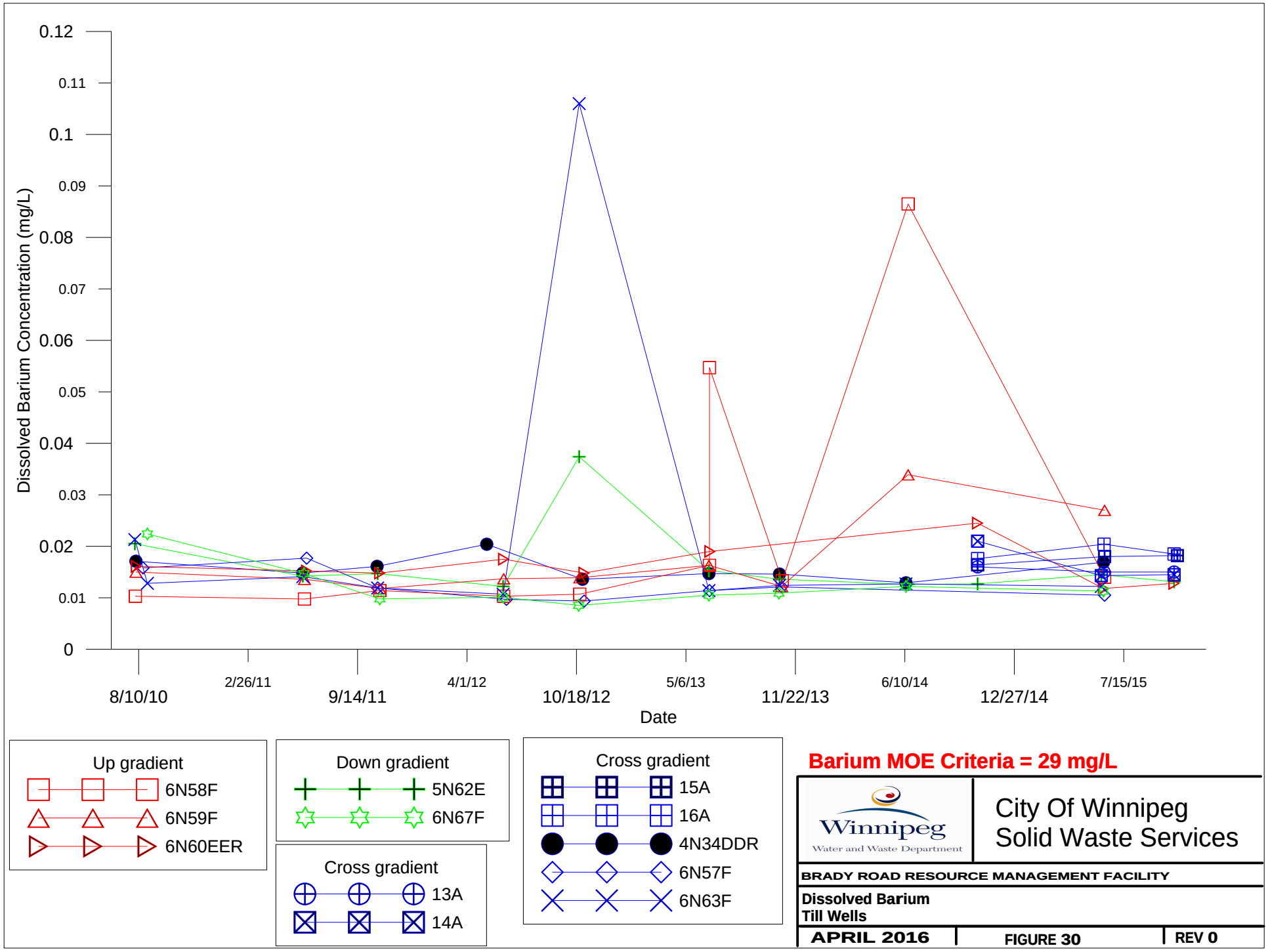
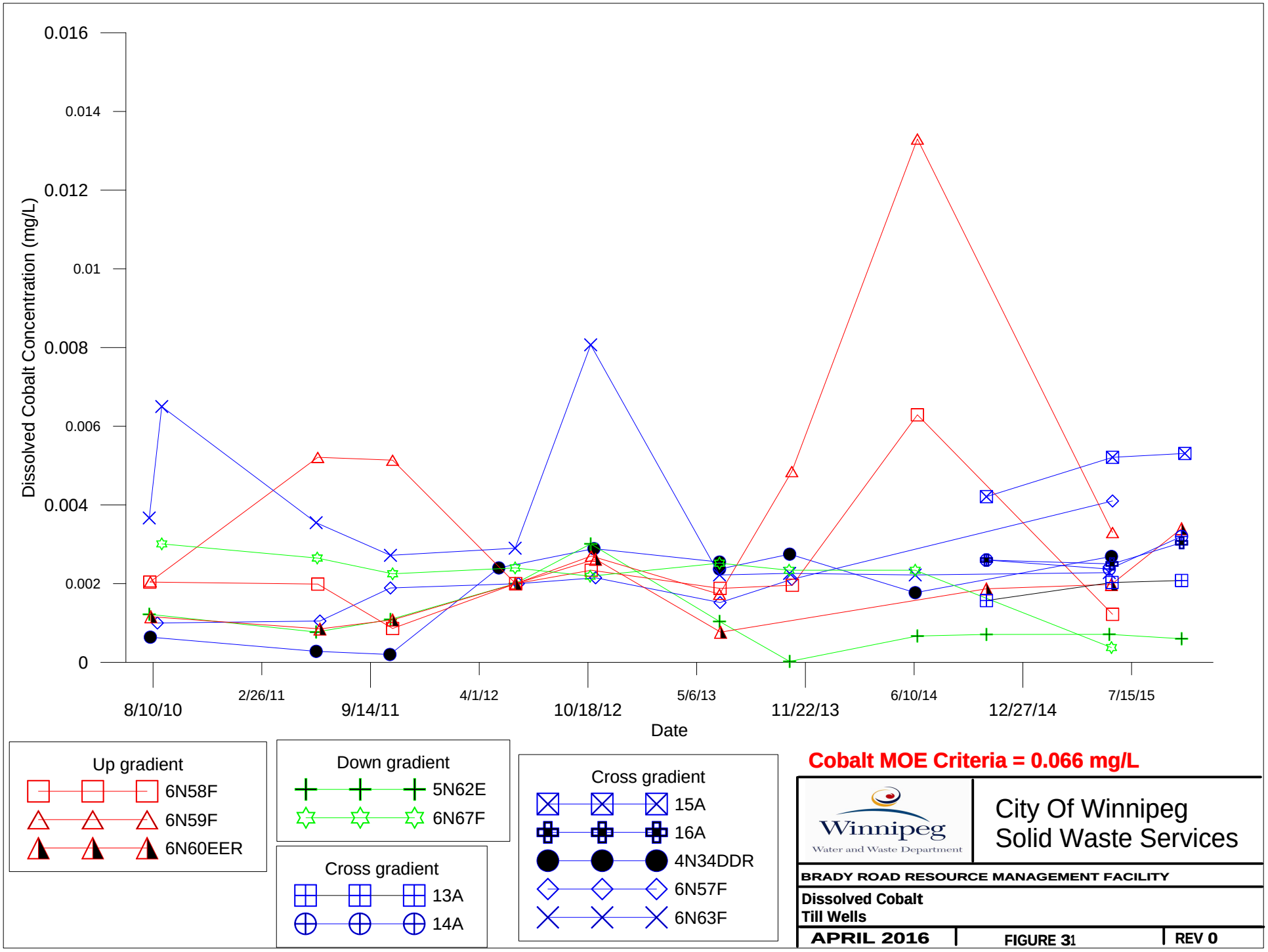
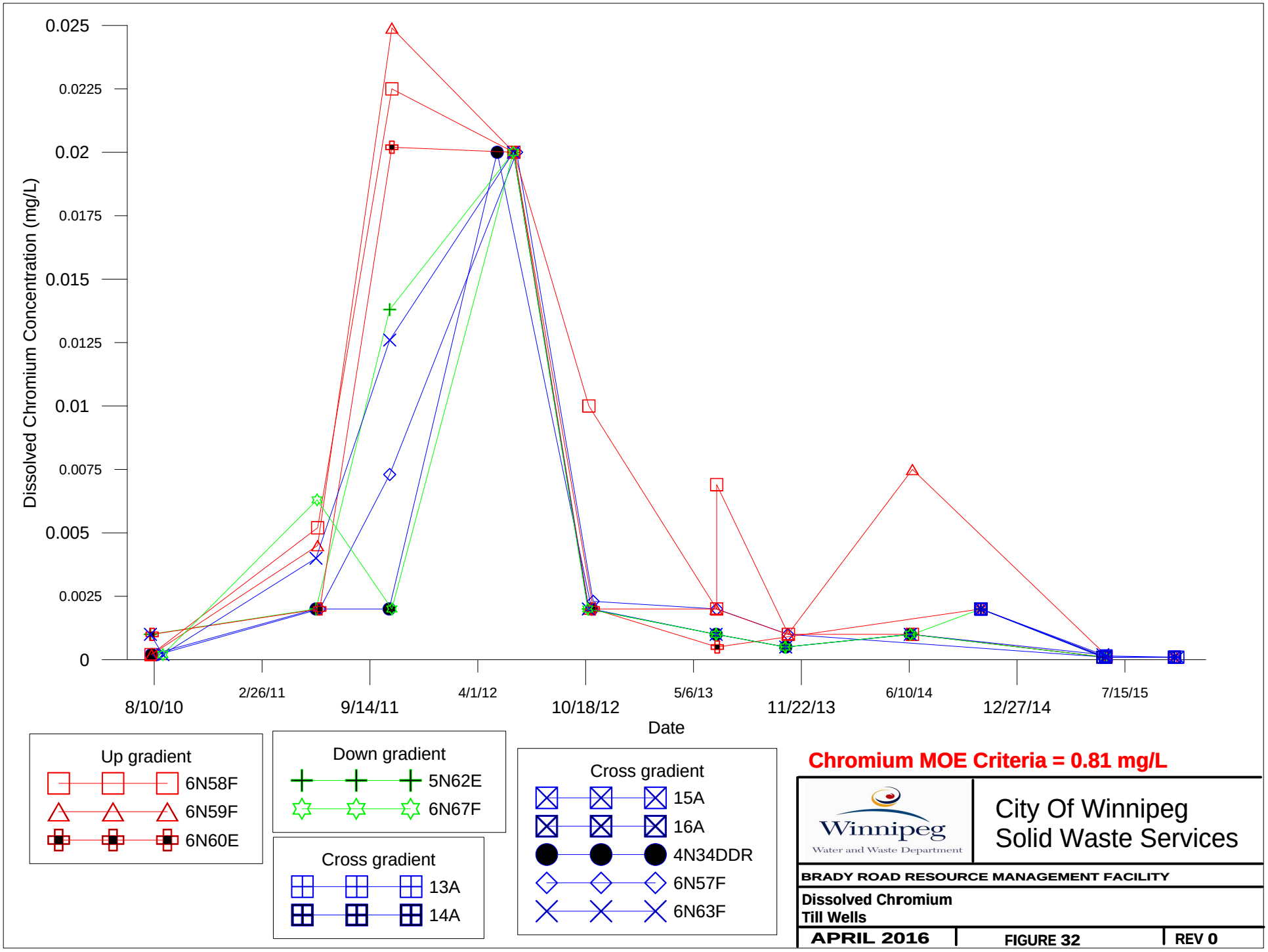
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Aluminium
Till Wells
APRIL 2016
FIGURE 28
REV 0


Dissolved Boron Concentration (mg/L)
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
8/10/10
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
Date
Up gradient
6N58F
6N59F
6N60EER
Down gradient
5N62E
6N67F
Cross gradient
13A
14A
Cross gradient
15A
16A
4N34DDR
6N57F
6N63F
Boron MOE Criteria = 45 mg/L
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Boron
Till Wells
APRIL 2016
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)
8/10/10
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
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
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Barium
Till Wells
APRIL 2016
FIGURE 30
REV 0


0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
Dissolved Cobalt Concentration (mg/L)
8/10/10
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
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 2016
FIGURE 31
REV 0



Chromium MOE Criteria = 0.81 mg/L

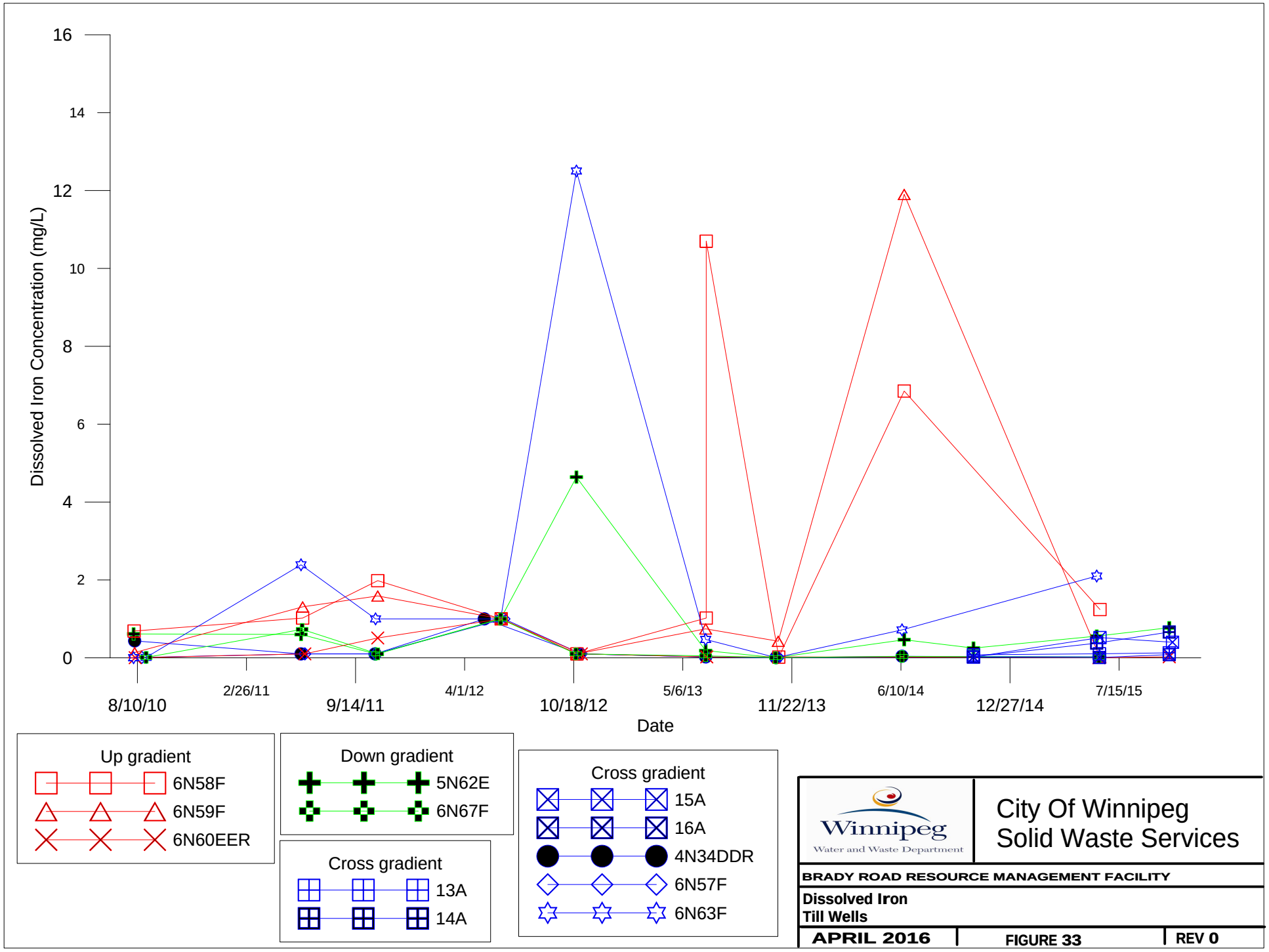
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Chromium
Till Wells

APRIL 2016	FIGURE 32	REV 0



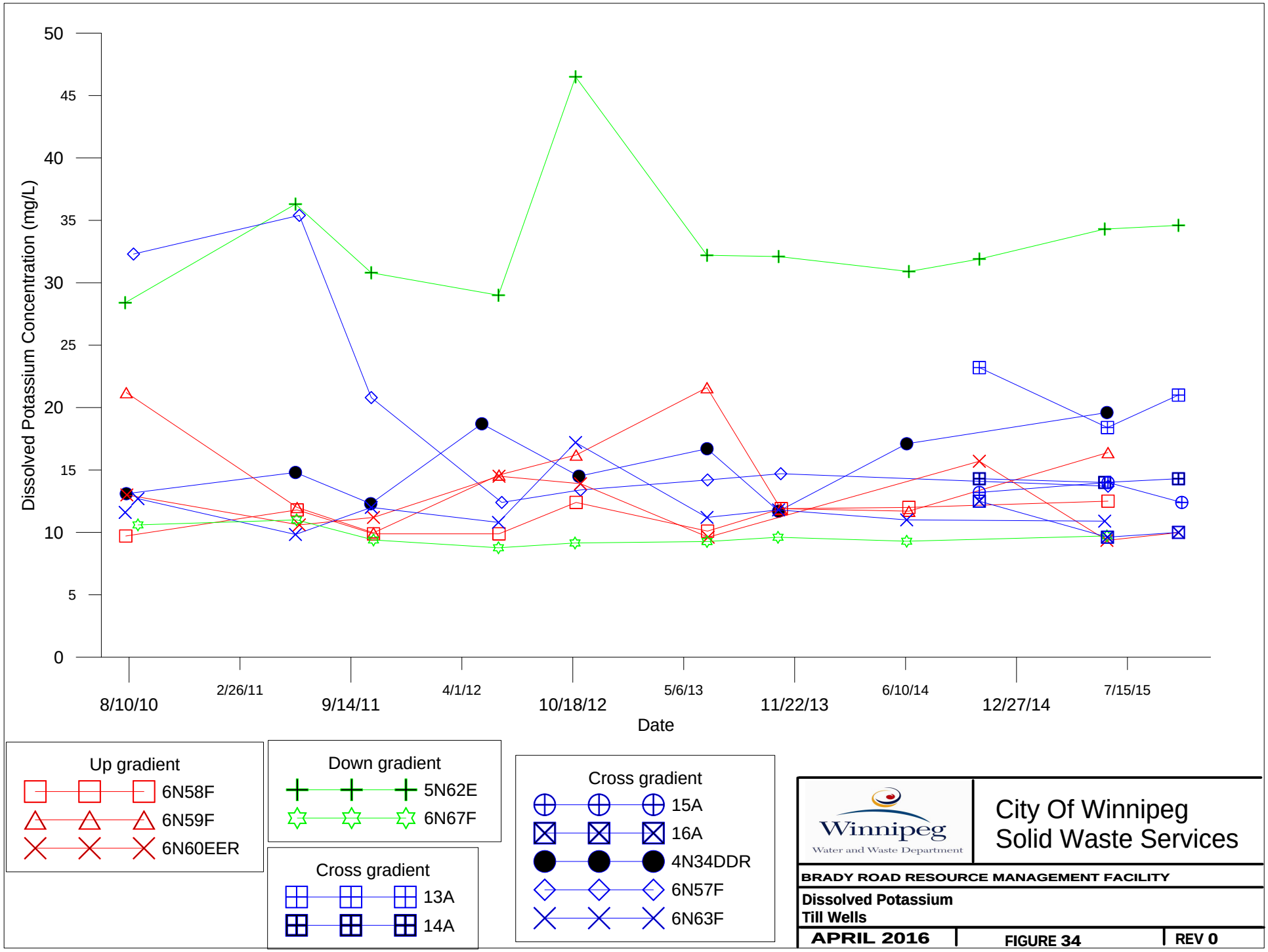
Winnipeg
Water and Waste Department

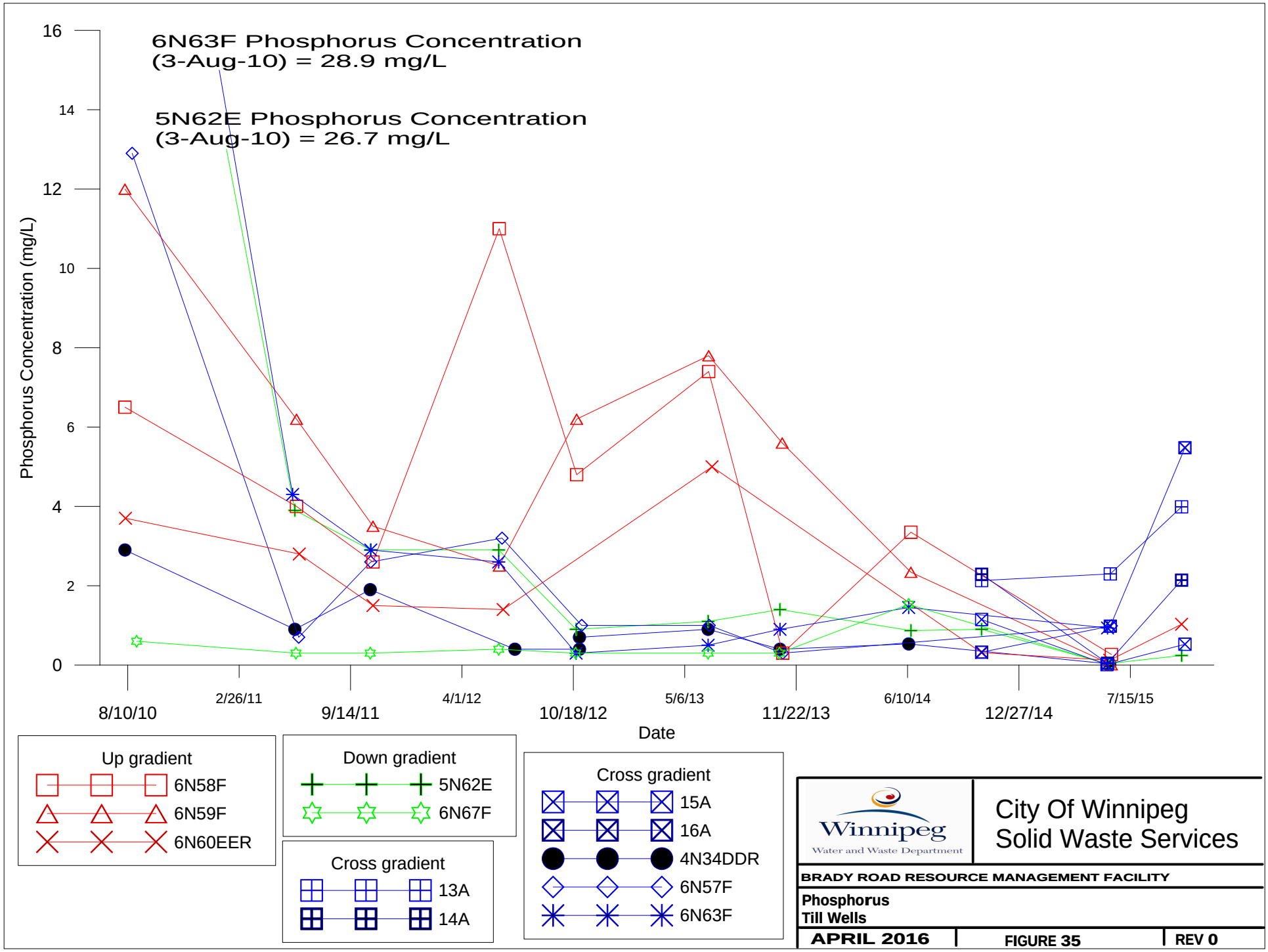
City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Iron
Till Wells

APRIL 2016 | **FIGURE 33** | **REV 0**


Dissolved Potassium Concentration (mg/L)
50
45
40
35
30
25
20
15
10
5
0
8/10/10
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
Date
Up gradient
6N58F
6N59F
6N60EER
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
Dissolved Potassium
Till Wells
APRIL 2016
FIGURE 34
REV 0



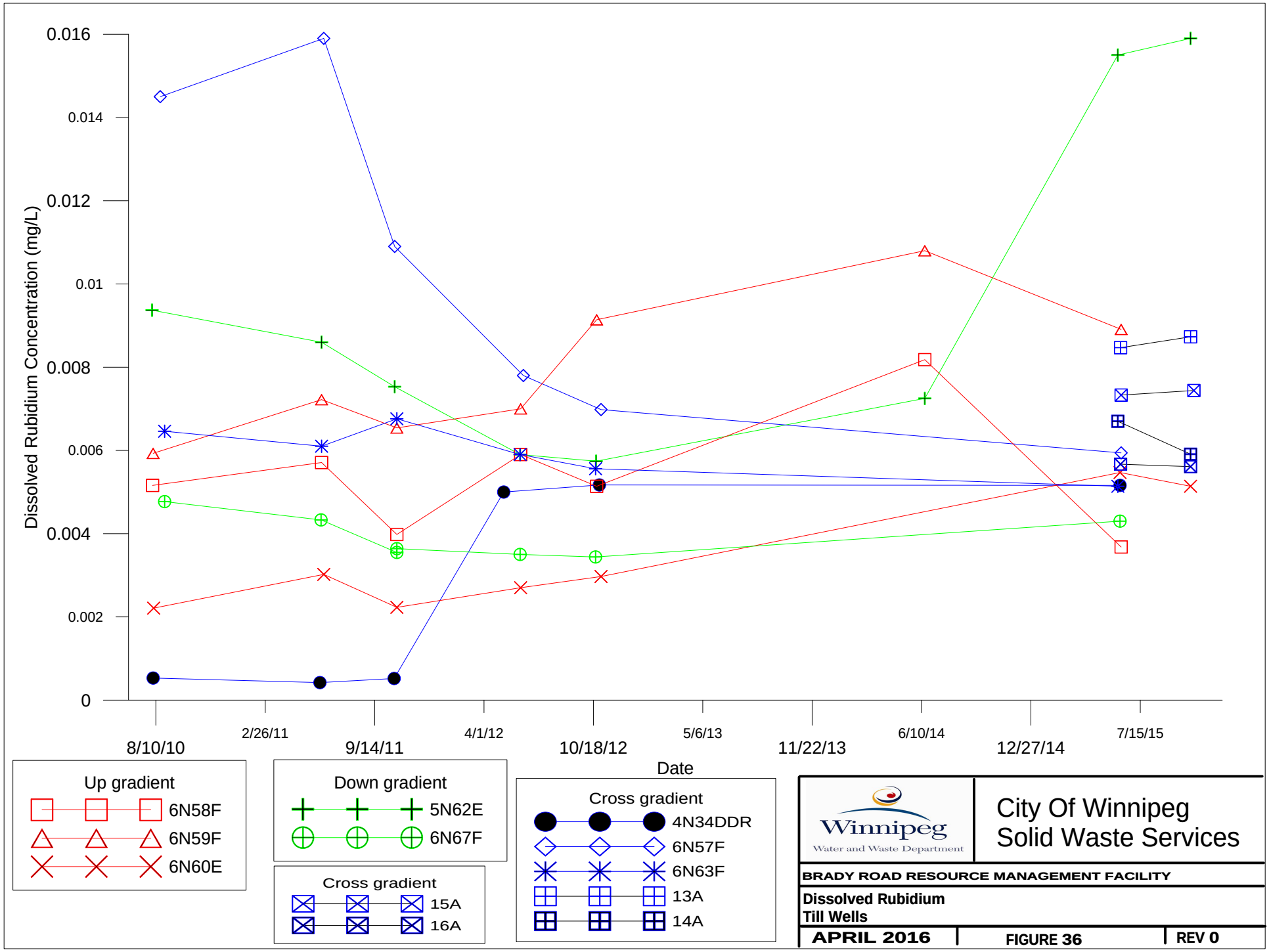
Winnipeg
Water and Waste Department

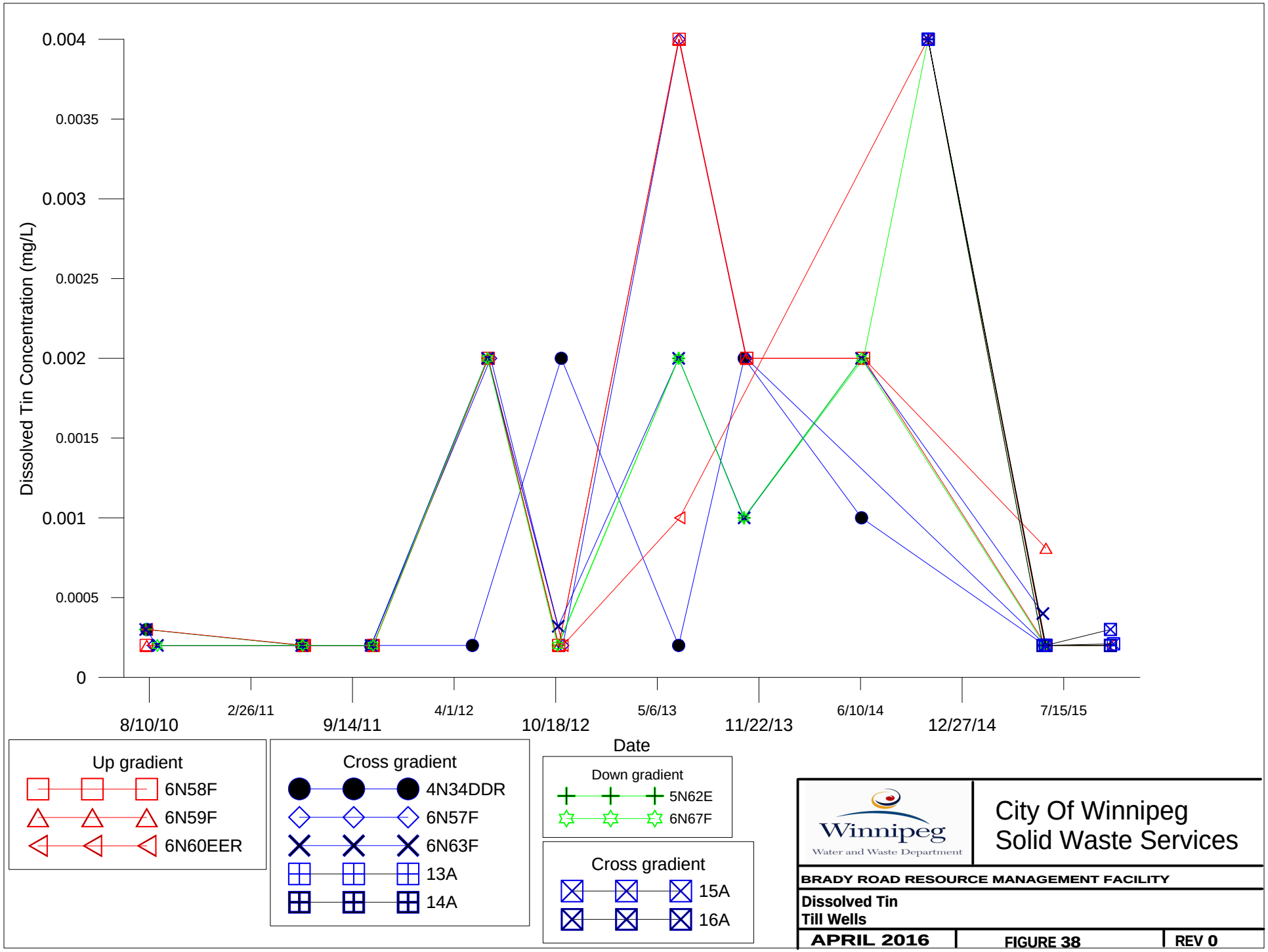
City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Phosphorus
Till Wells

APRIL 2016	FIGURE 35	REV 0


Dissolved Rubidium Concentration (mg/L)
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
8/10/10
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
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 2016
FIGURE 36
REV 0



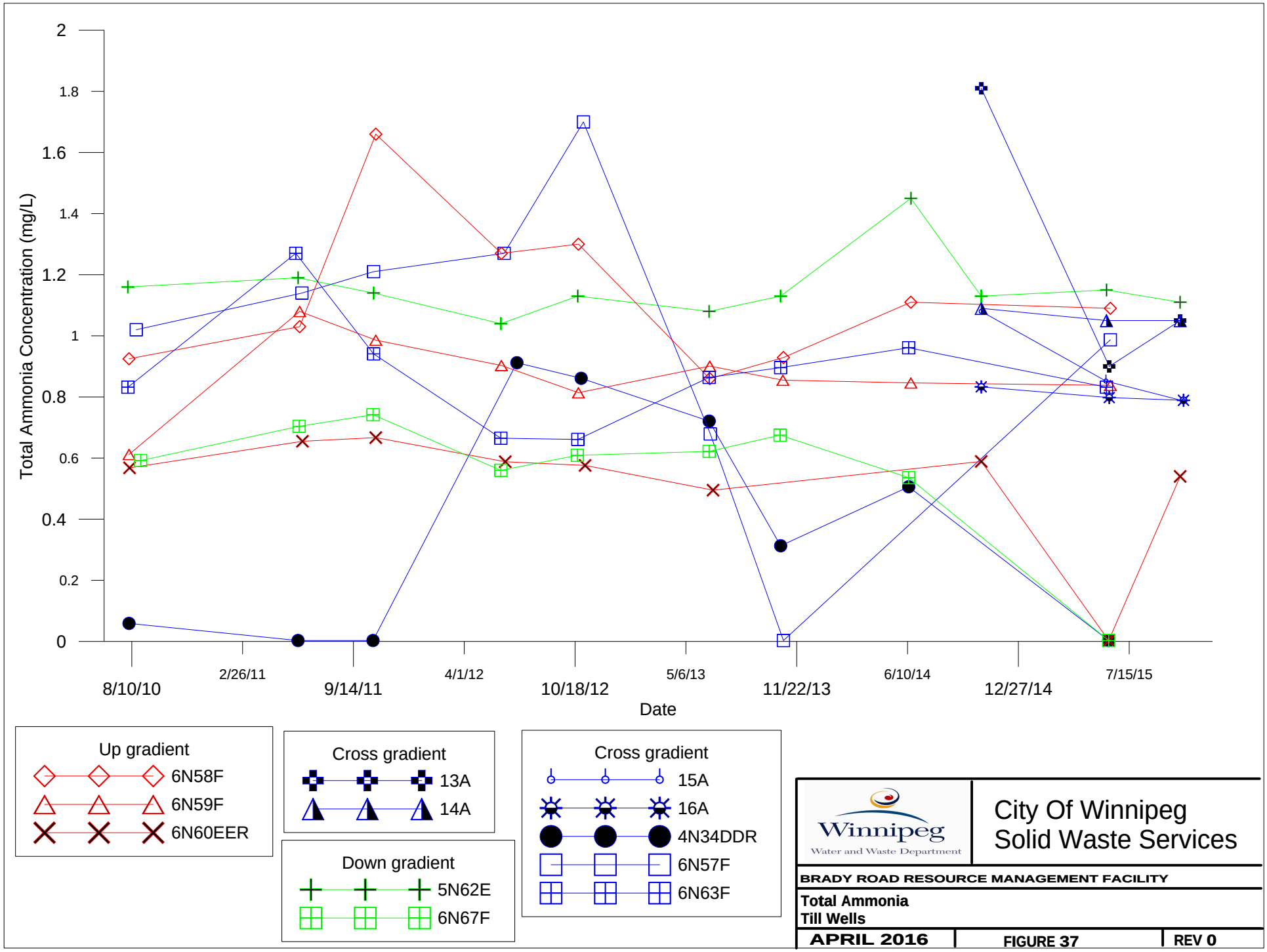
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Tin
Till Wells

APRIL 2016 | **FIGURE 38** | **REV 0**



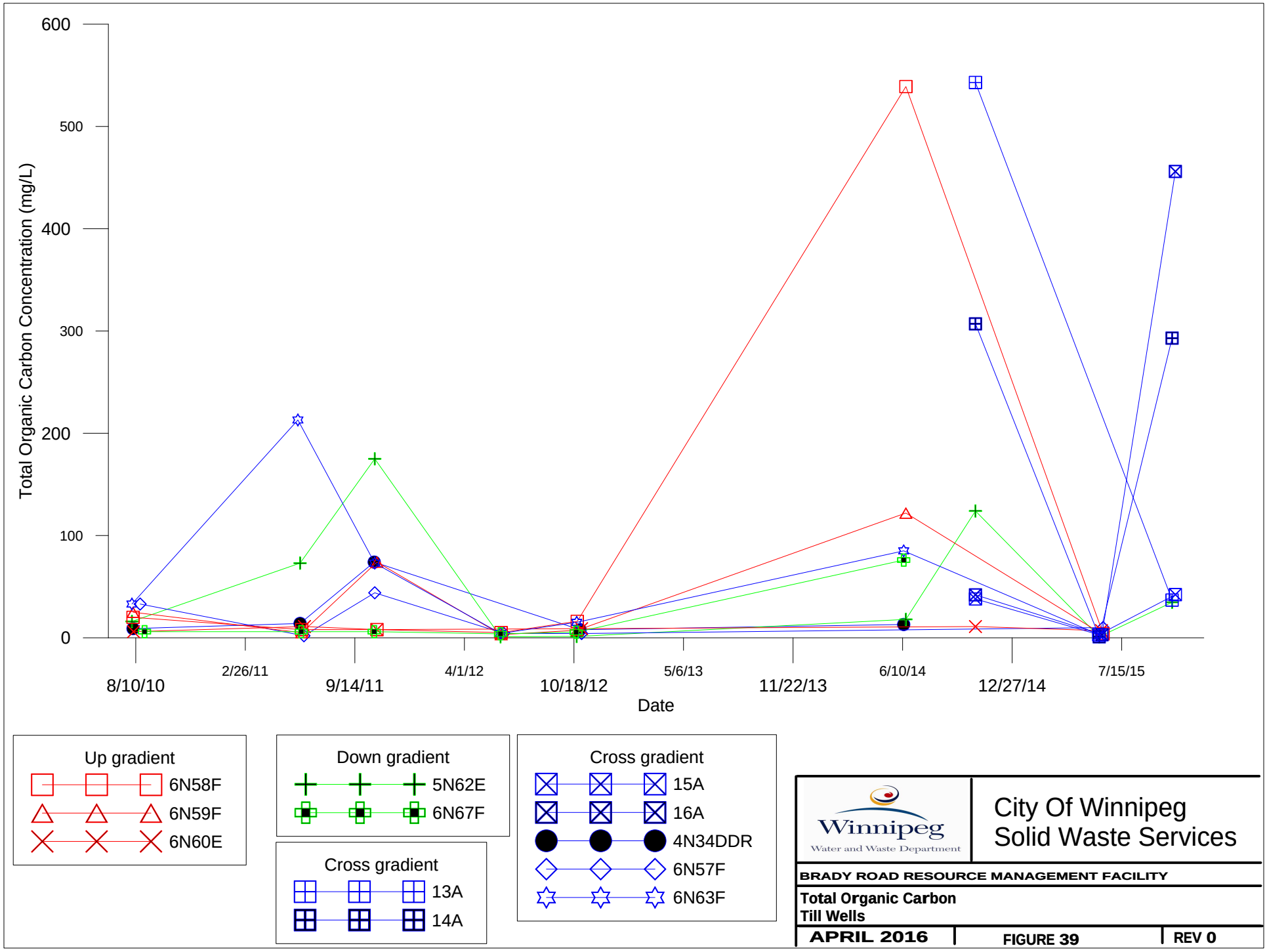
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Total Ammonia
Till Wells

APRIL 2016	FIGURE 37	REV 0



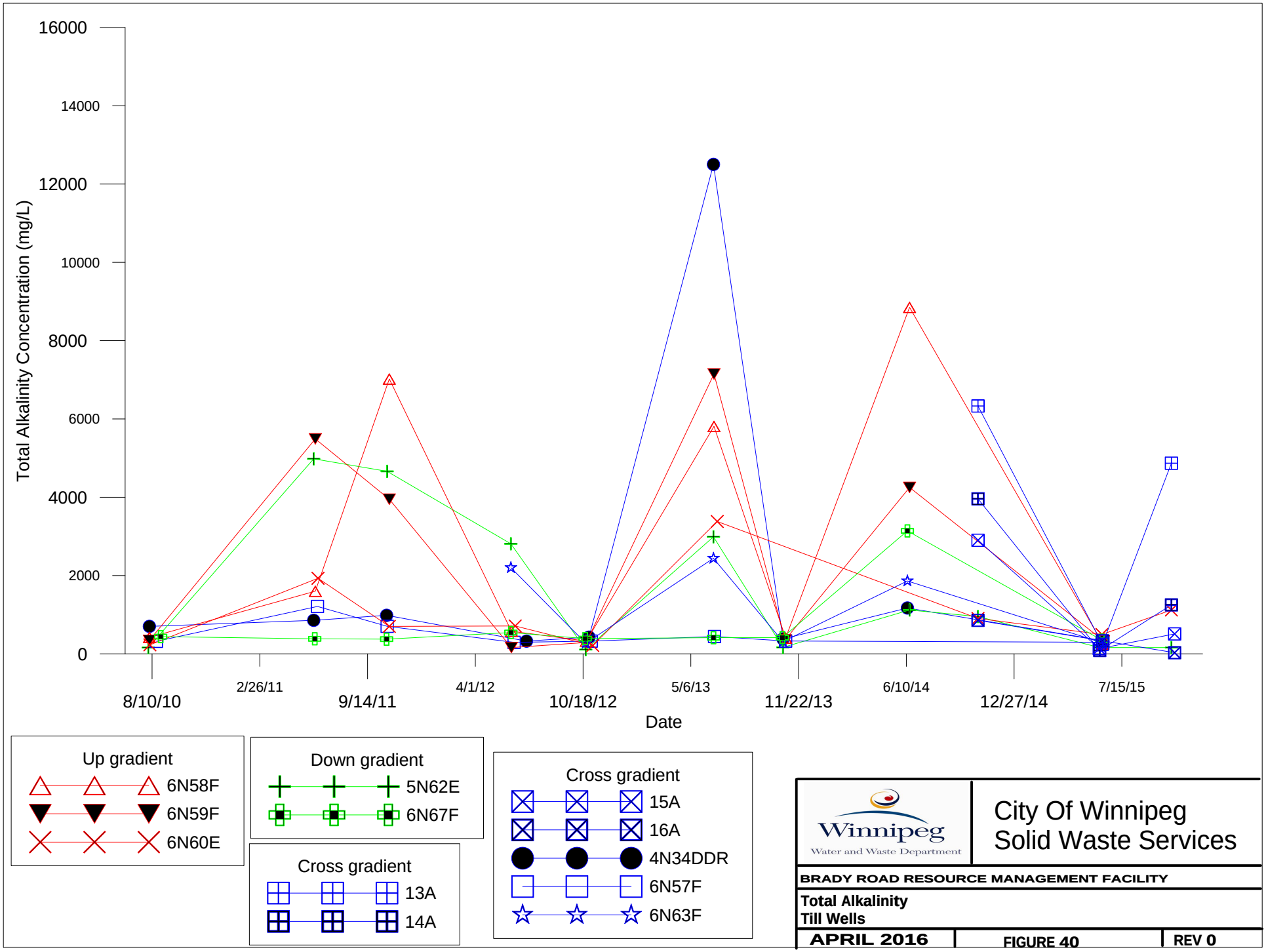
Winnipeg
Water and Waste Department

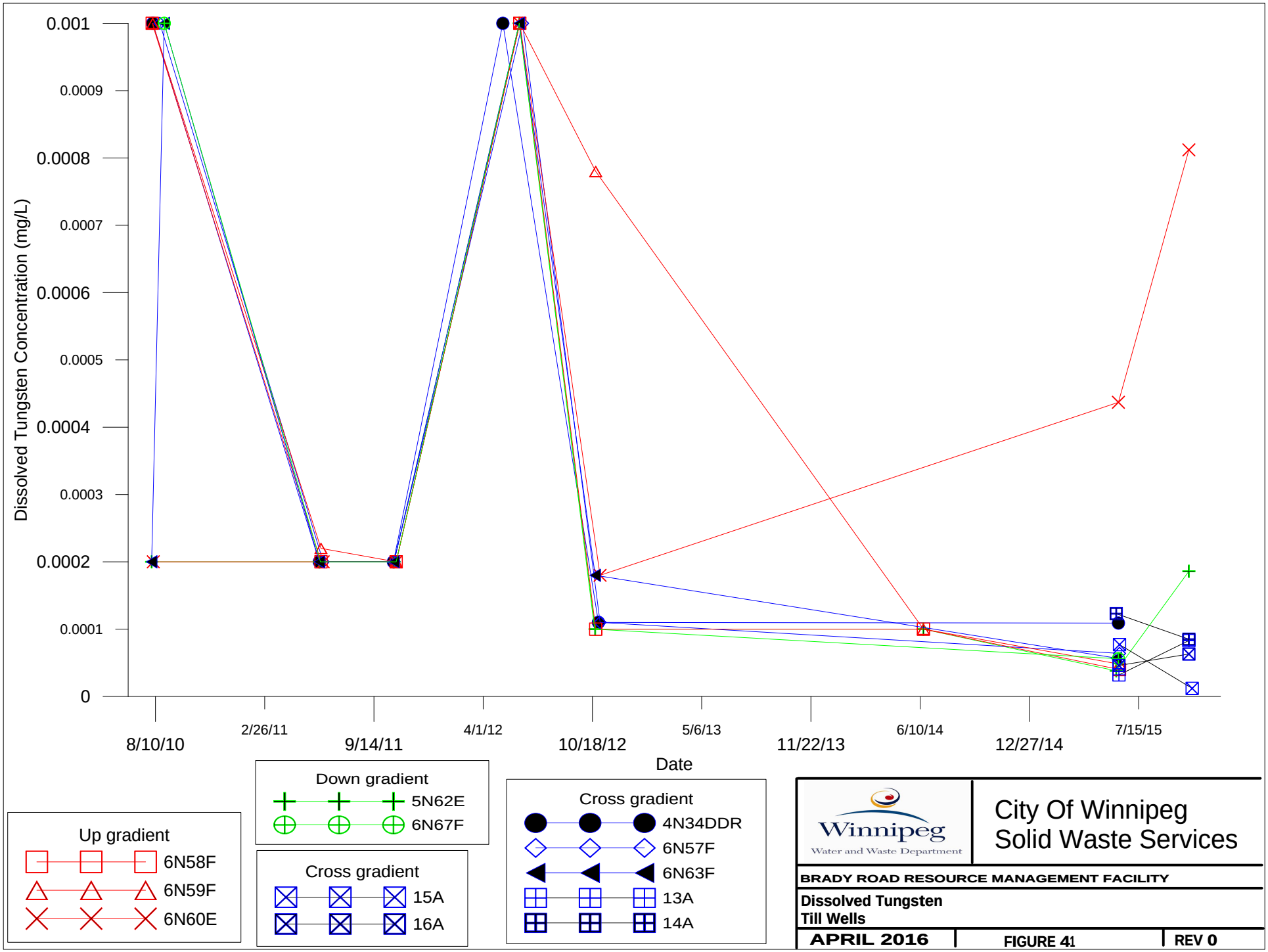
City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Total Organic Carbon
Till Wells

APRIL 2016	FIGURE 39	REV 0


16000
14000
12000
10000
8000
6000
4000
2000
0
Total Alkalinity Concentration (mg/L)
8/10/10
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
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 2016
FIGURE 40
REV 0



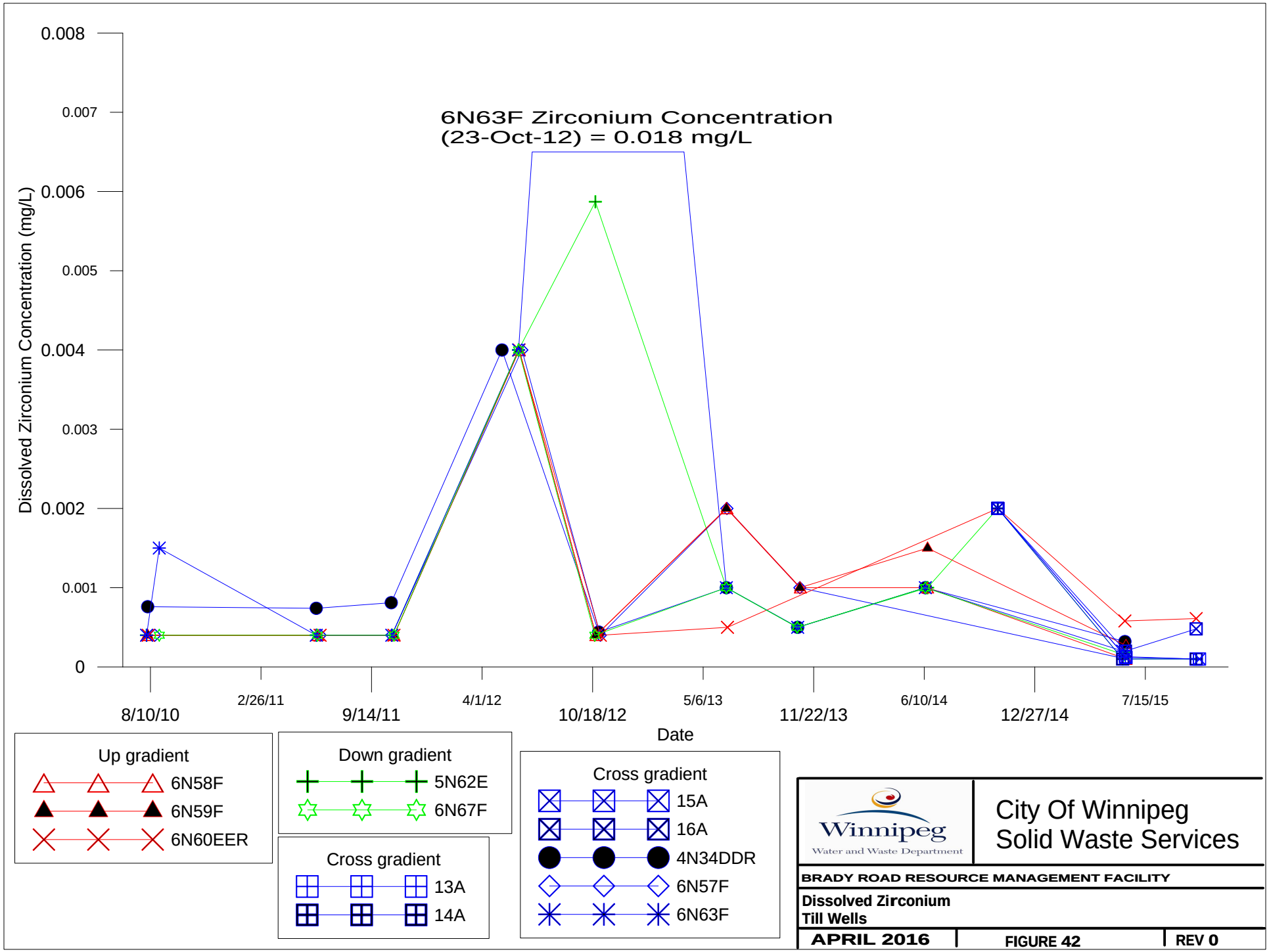
Winnipeg
Water and Waste Department

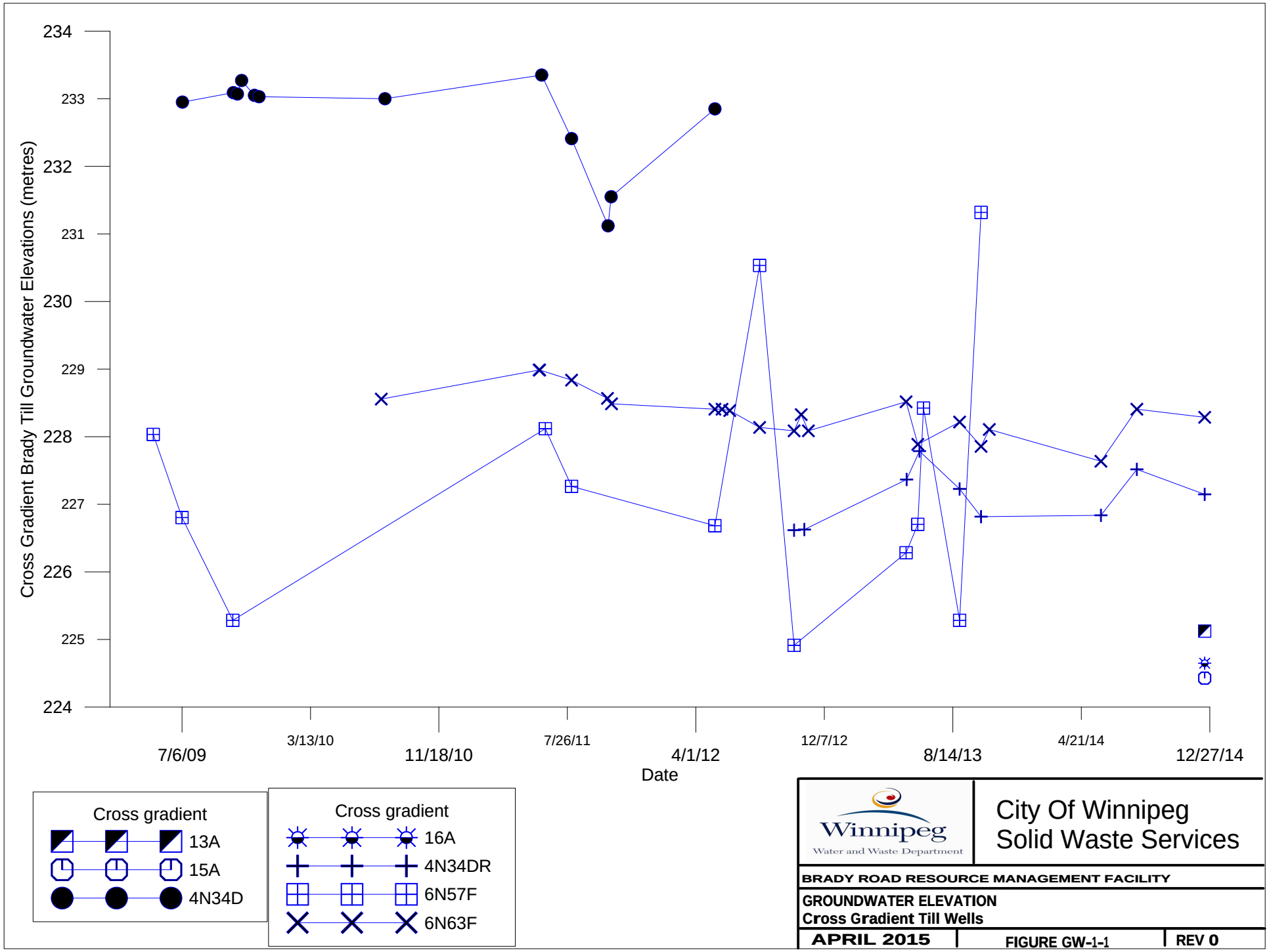
City Of Winnipeg
Solid Waste Services

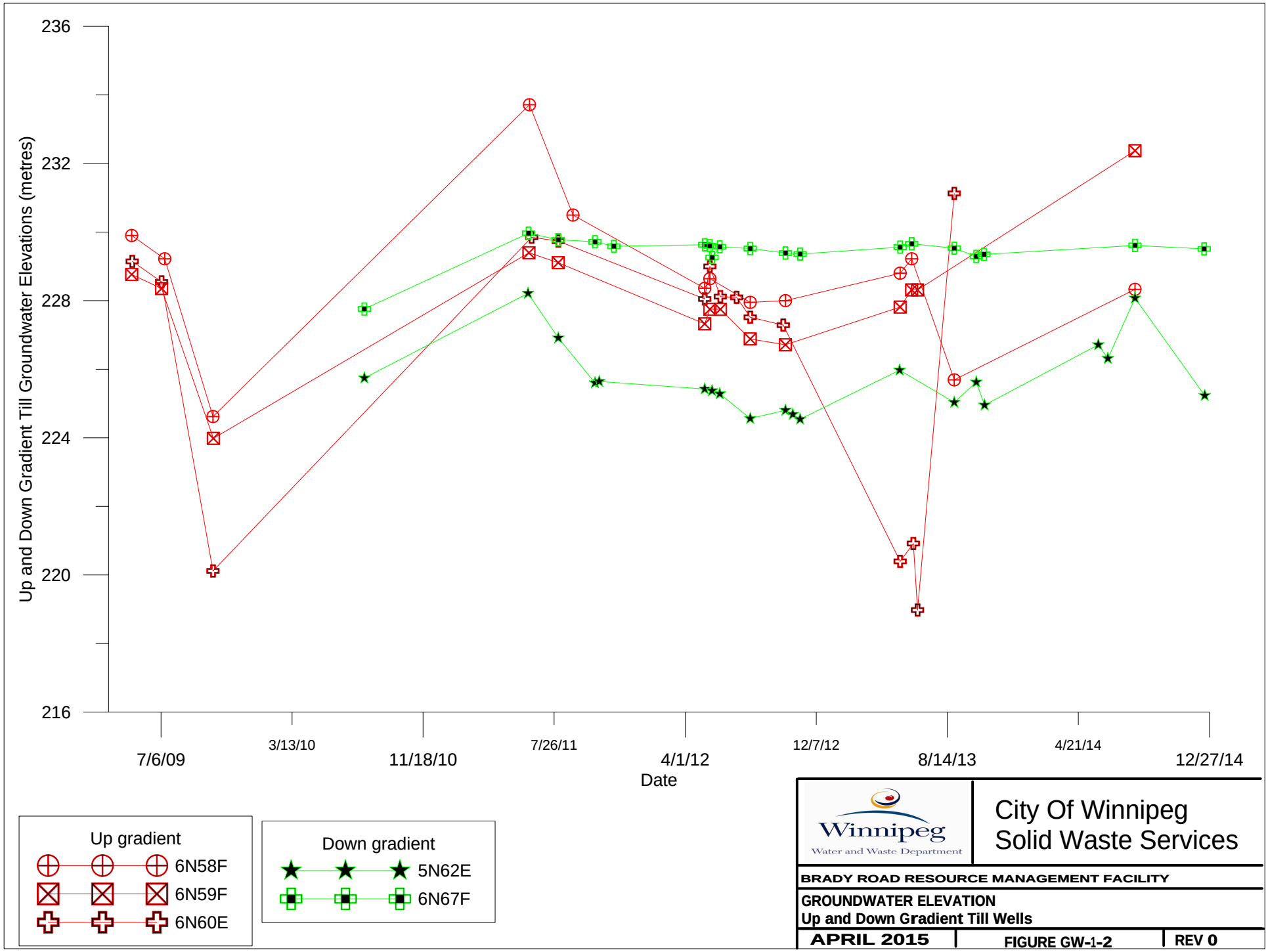
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Tungsten
Till Wells

APRIL 2016 | **FIGURE 41** | **REV 0**


6N63F Zirconium Concentration
(23-Oct-12) = 0.018 mg/L
Dissolved Zirconium Concentration (mg/L)
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
8/10/10
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
Date
Up gradient
6N58F
6N59F
6N60EER
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
Dissolved Zirconium
Till Wells
APRIL 2016
FIGURE 42
REV 0


Cross Gradient Brady Till Groundwater Elevations (metres)
234
233
232
231
230
229
228
227
226
225
224
7/6/09
3/13/10
11/18/10
7/26/11
4/1/12
12/7/12
8/14/13
4/21/14
12/27/14
Date
Cross gradient
13A
15A
4N34D
Cross gradient
16A
4N34DR
6N57F
6N63F
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

GROUNDWATER ELEVATION
Up and Down Gradient Till Wells

APRIL 2015 | FIGURE GW-1-2 | REV 0

Site: Brady
Well #: W4

Dates:
4-Aug-10
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

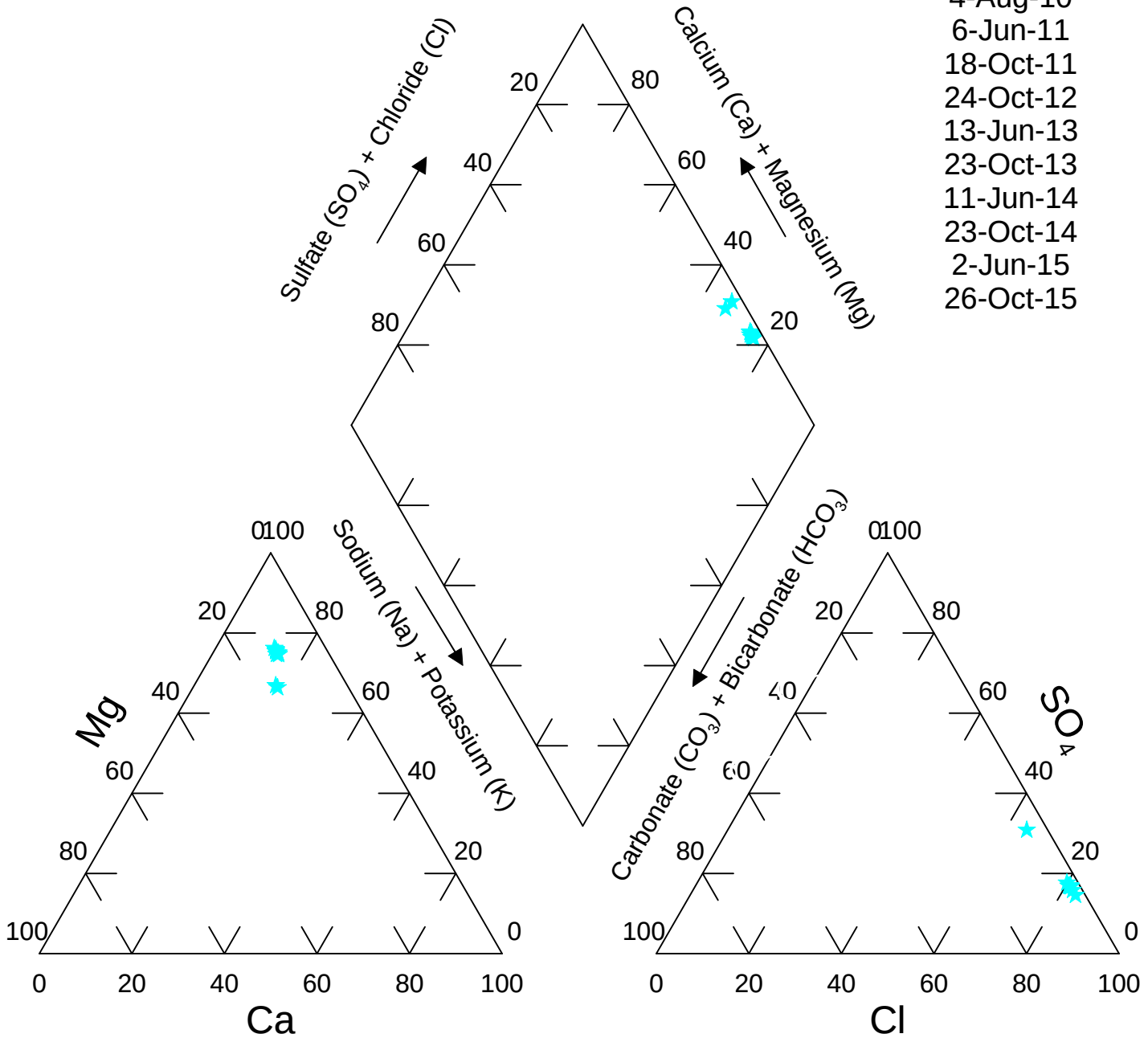


FIGURE: 1P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W5

Dates:
5-Aug-10
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

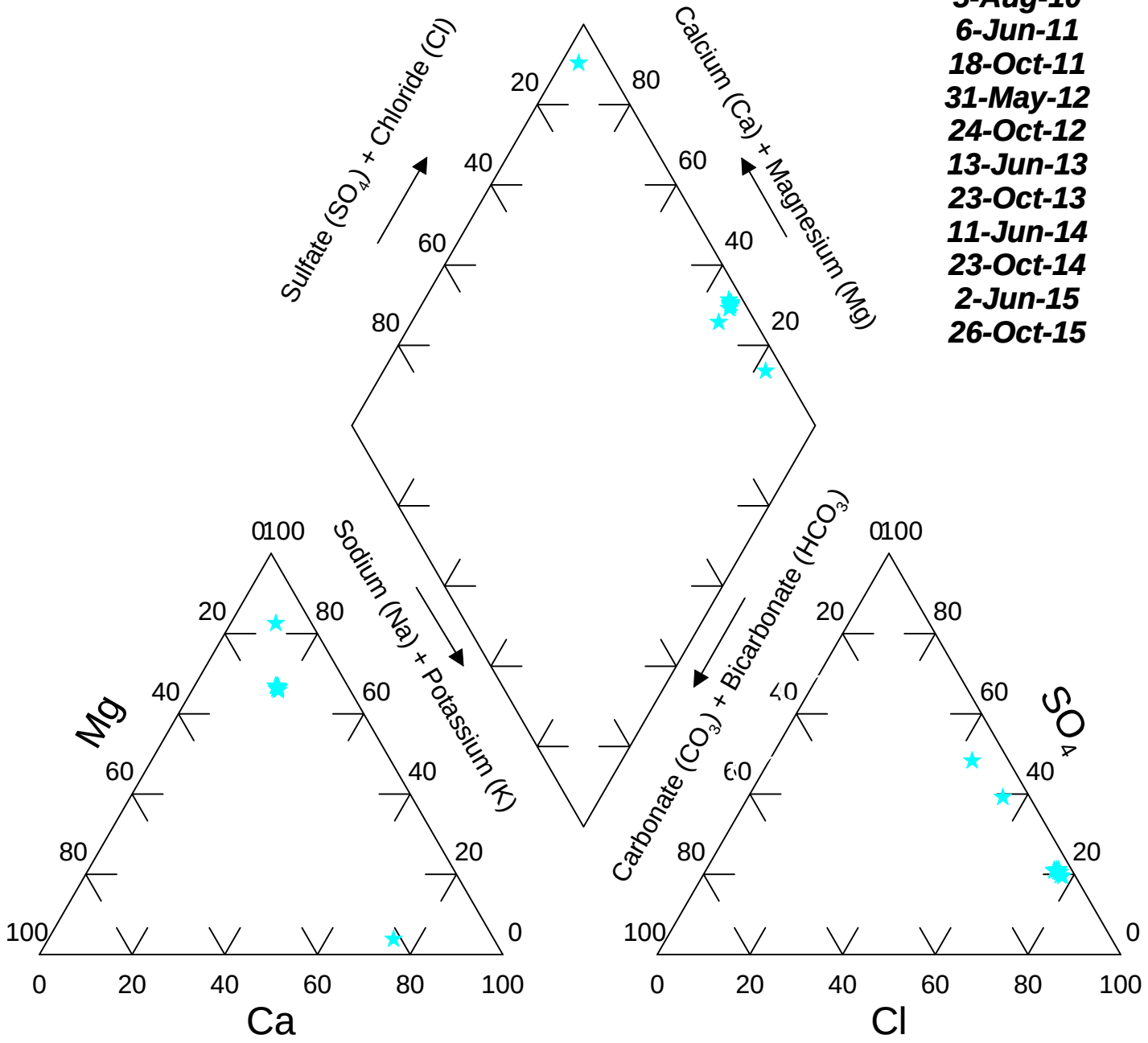


FIGURE: 2P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W6

Dates:

6-Aug-10
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

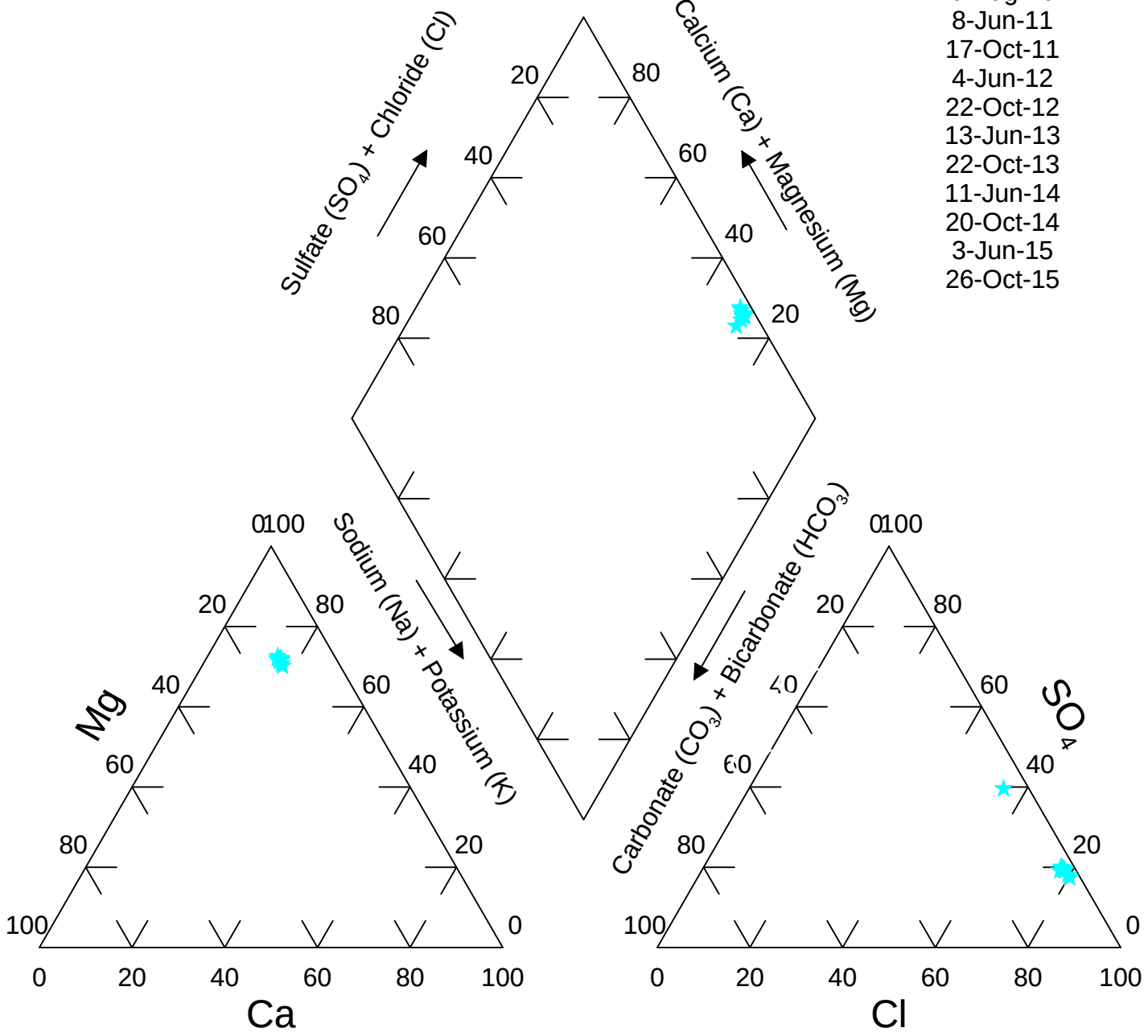
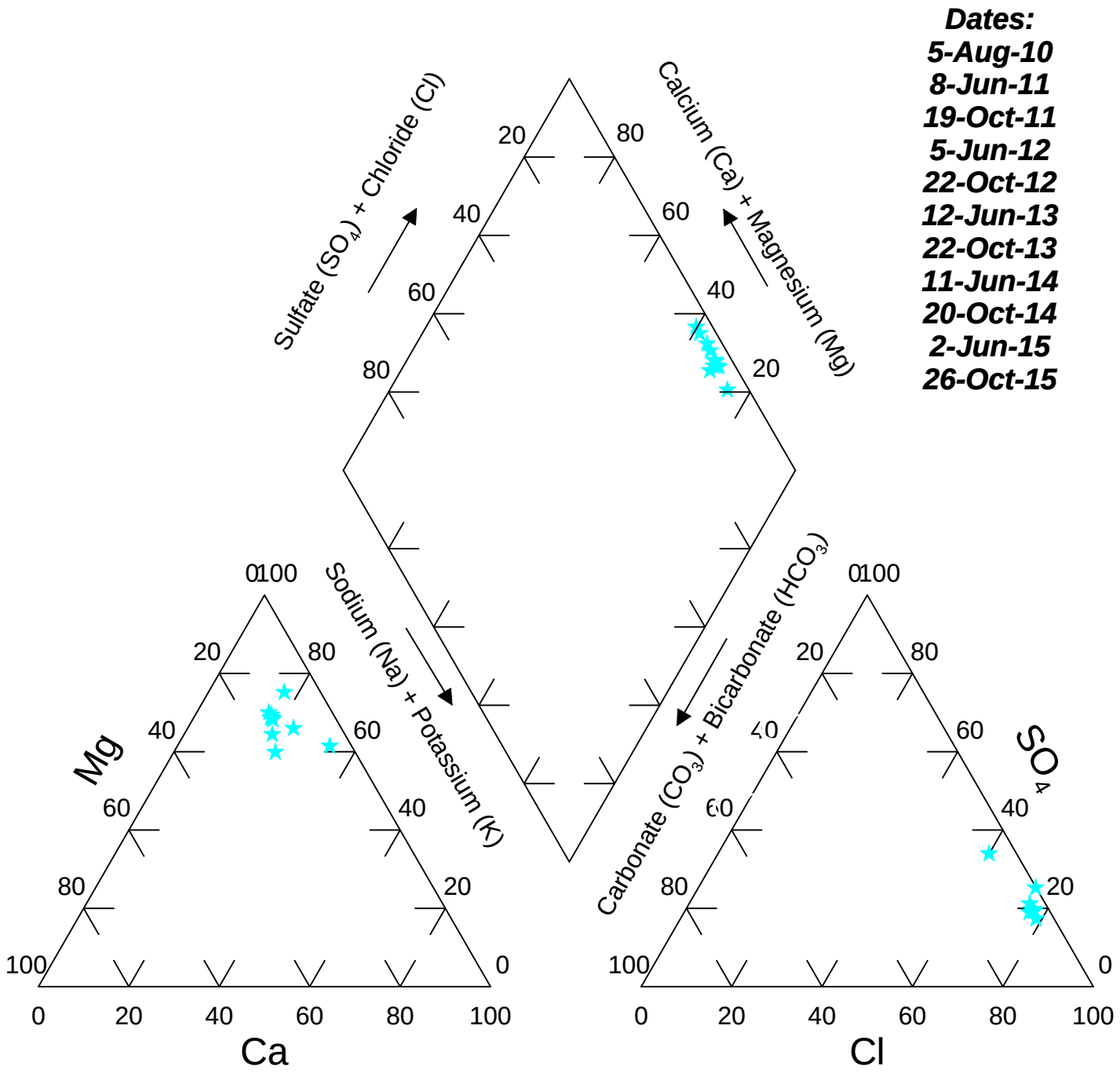


FIGURE: 3P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W7



Dates:
5-Aug-10
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

FIGURE: 4P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W8

Dates:
5-Aug-10
6-Jun-11
18-Oct-11
1-Jun-12
23-Oct-12
12-Jun-13
22-Oct-13
11-Jun-14

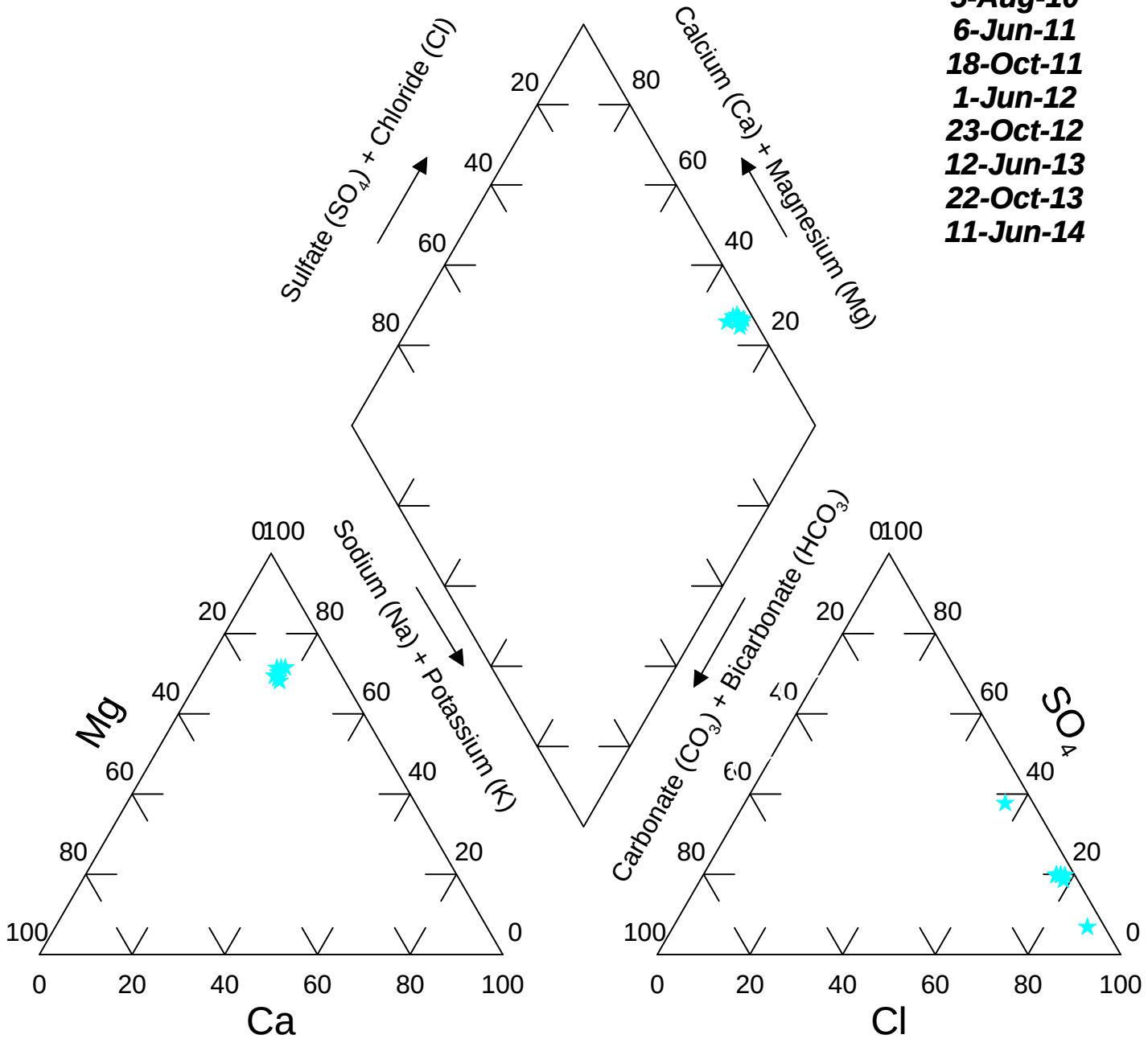


FIGURE: 5P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W9

Dates:
3-Aug-10
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

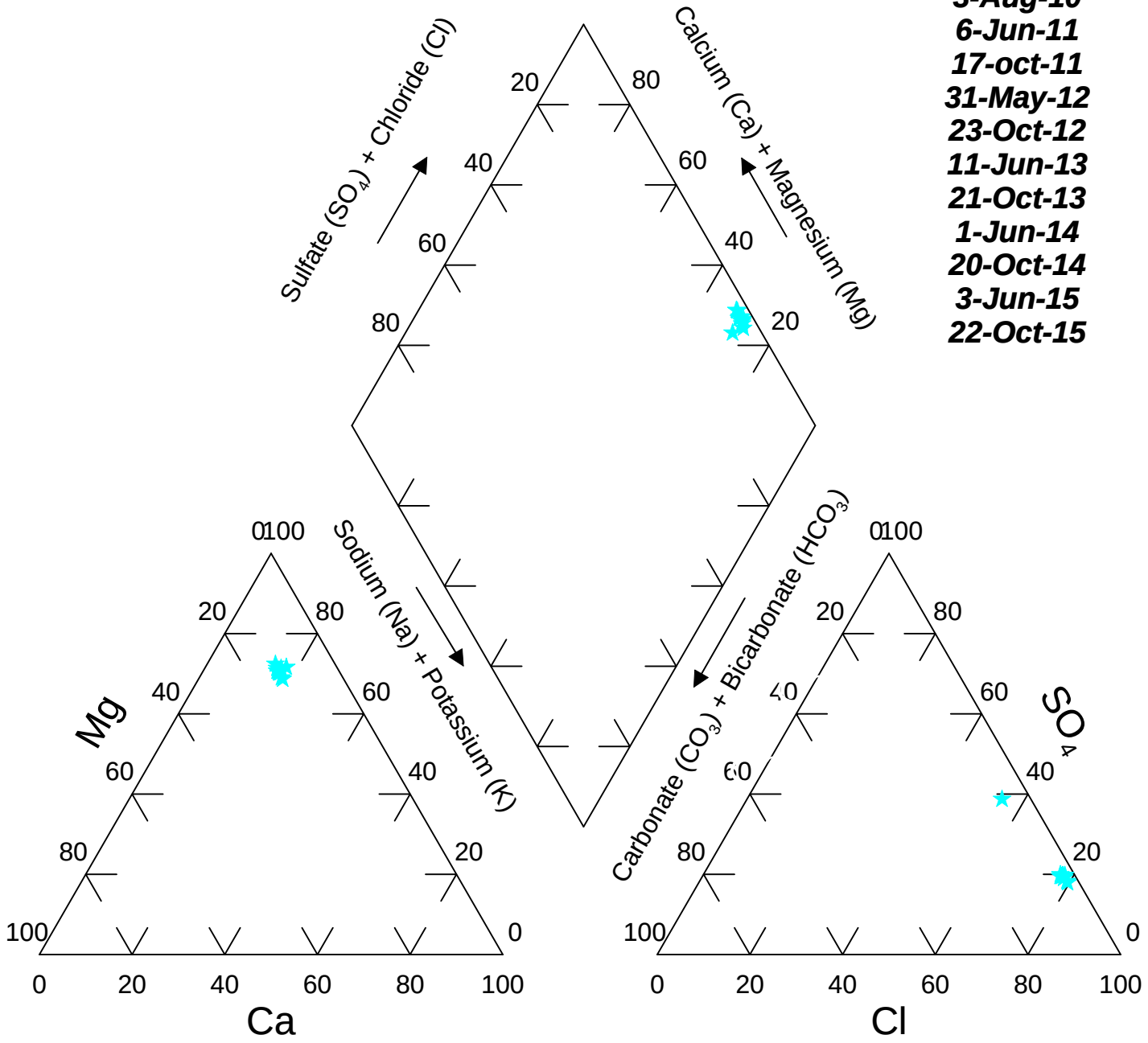


FIGURE: 6P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W10

Dates:

3-Aug-10
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

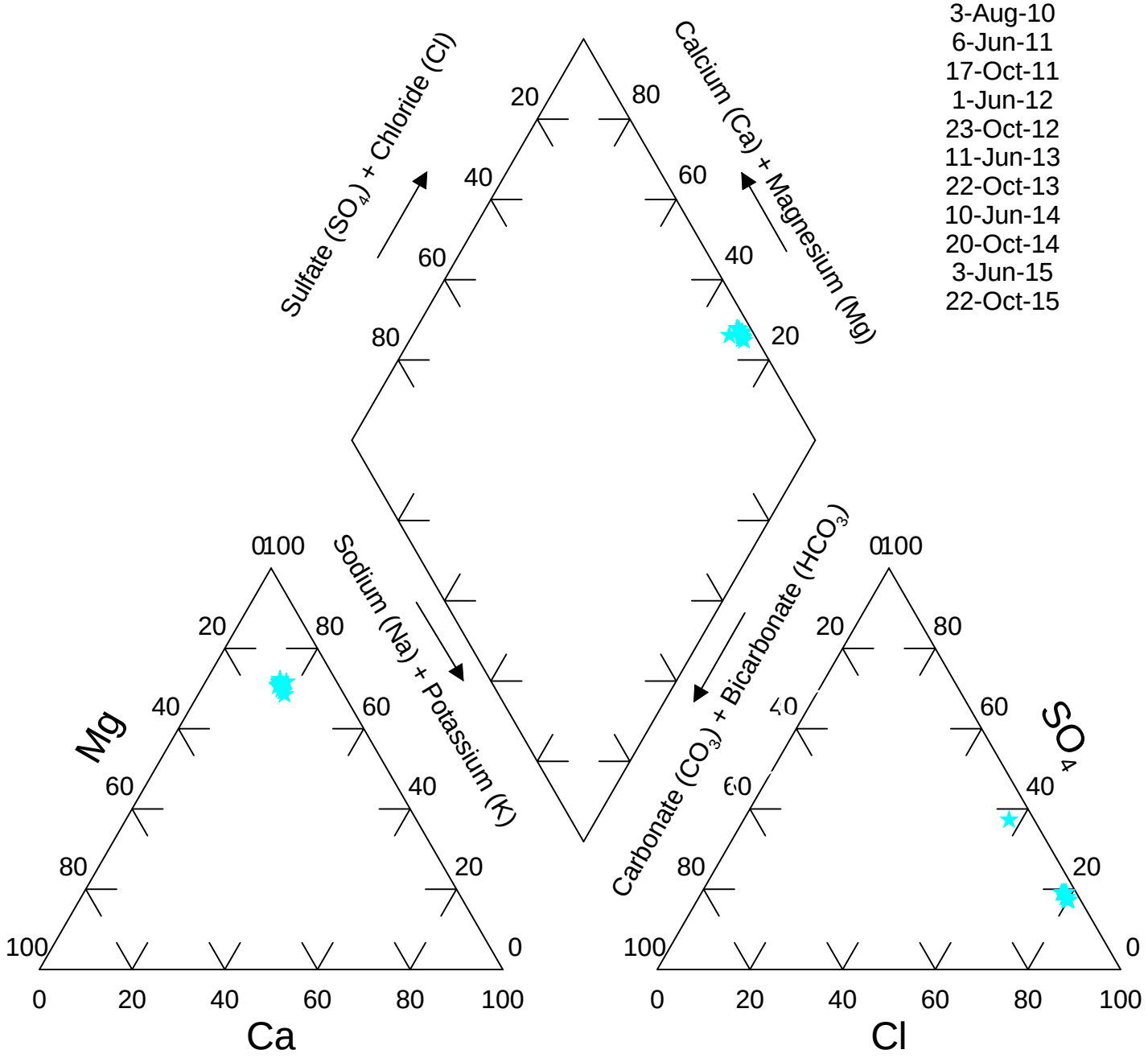


FIGURE: 7P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W11

Dates:

3-Aug-10
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

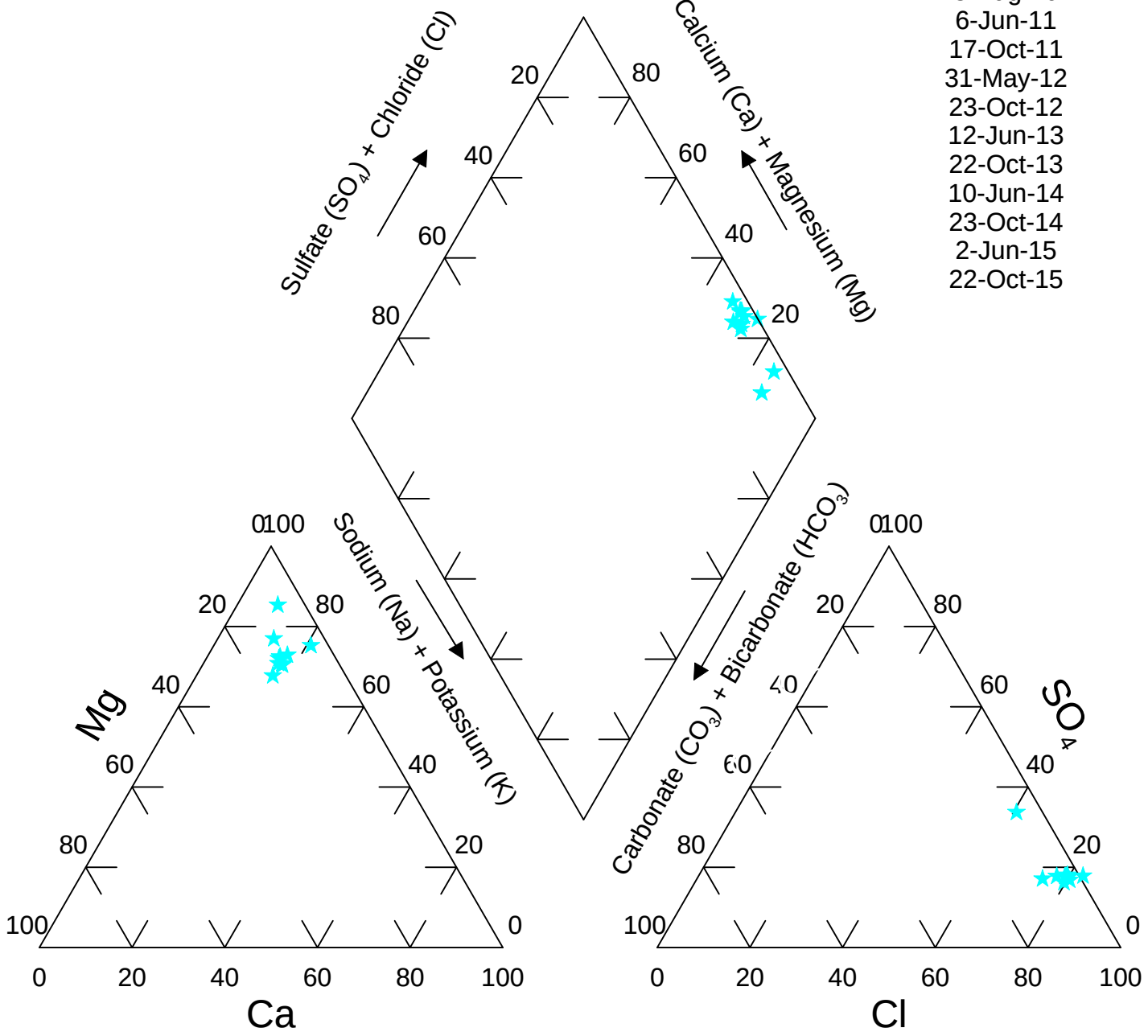


FIGURE: 8P

Winnipeg
Water and Waste Department

Site: Brady
Well #: W12

Dates:

26-Aug-10
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

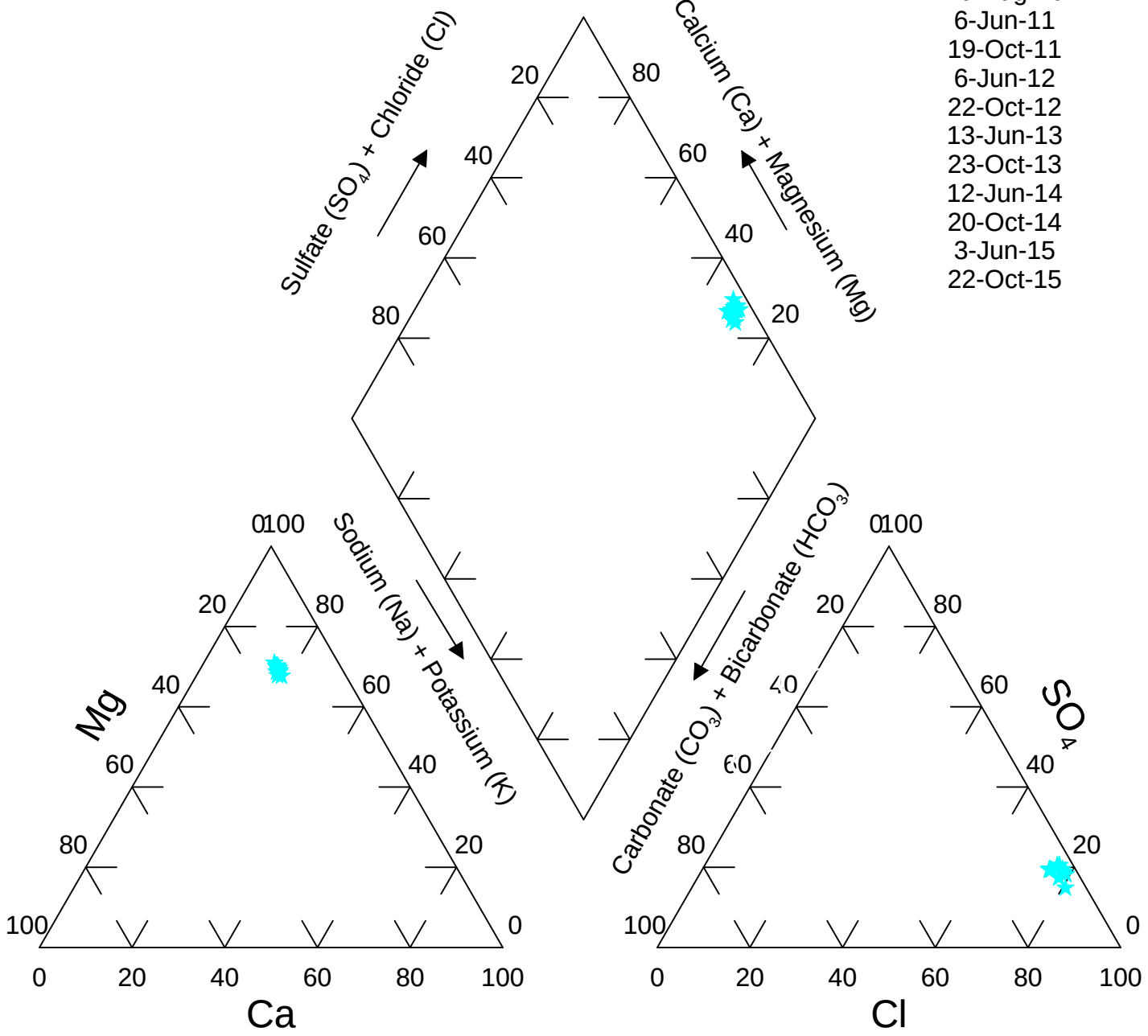


FIGURE: 9P

Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-W13

Dates:
1-Jun-15
21-Oct-15

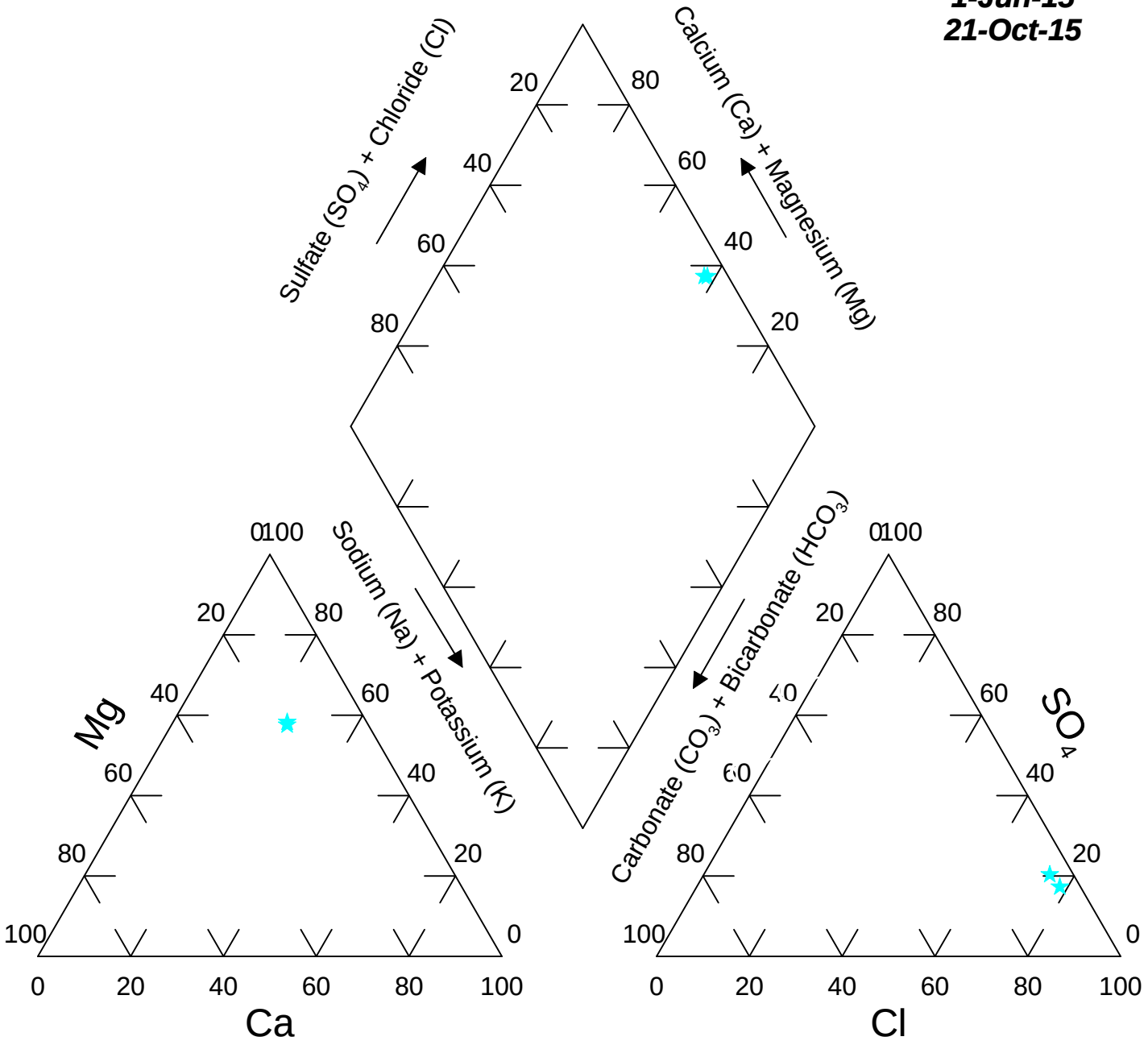


FIGURE: 1z

Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-W14

Dates:
3-Jun-15
21-Oct-15

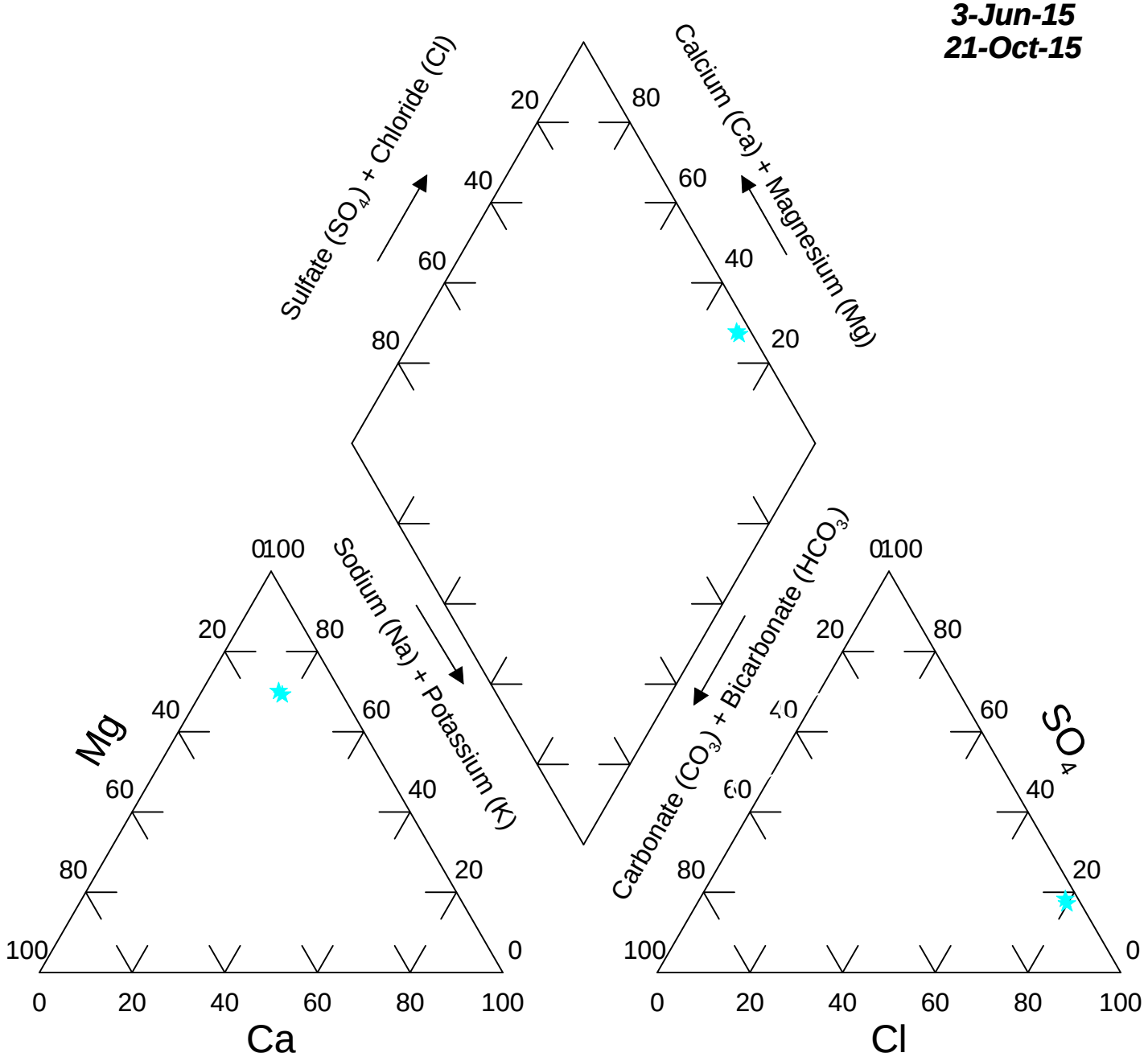


FIGURE: 2z

Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-W15

Dates:
3-Jun-15
21-Oct-15

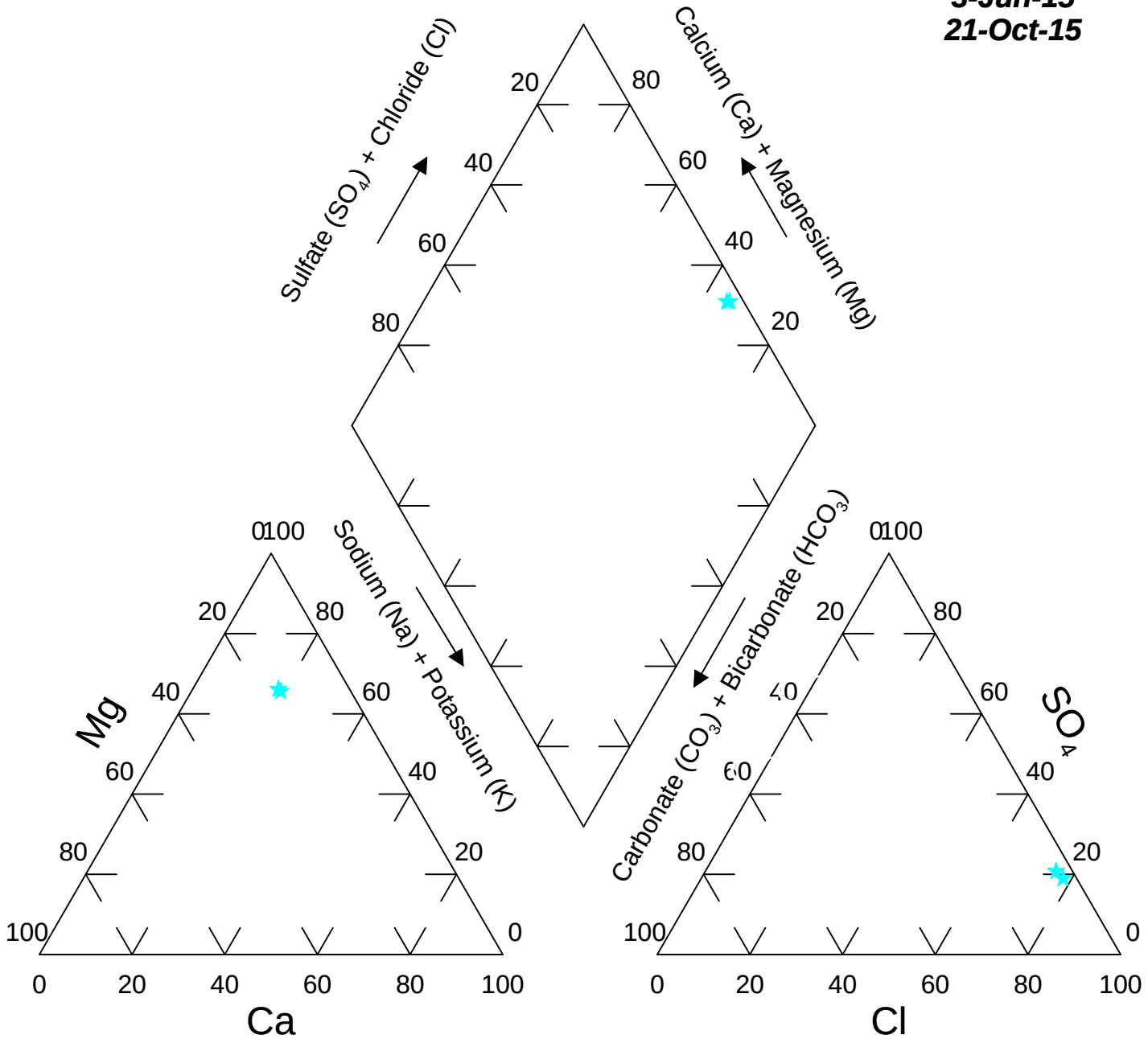


FIGURE: 3z

Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-W16

Dates:
4-Jun-15
21-Oct-15

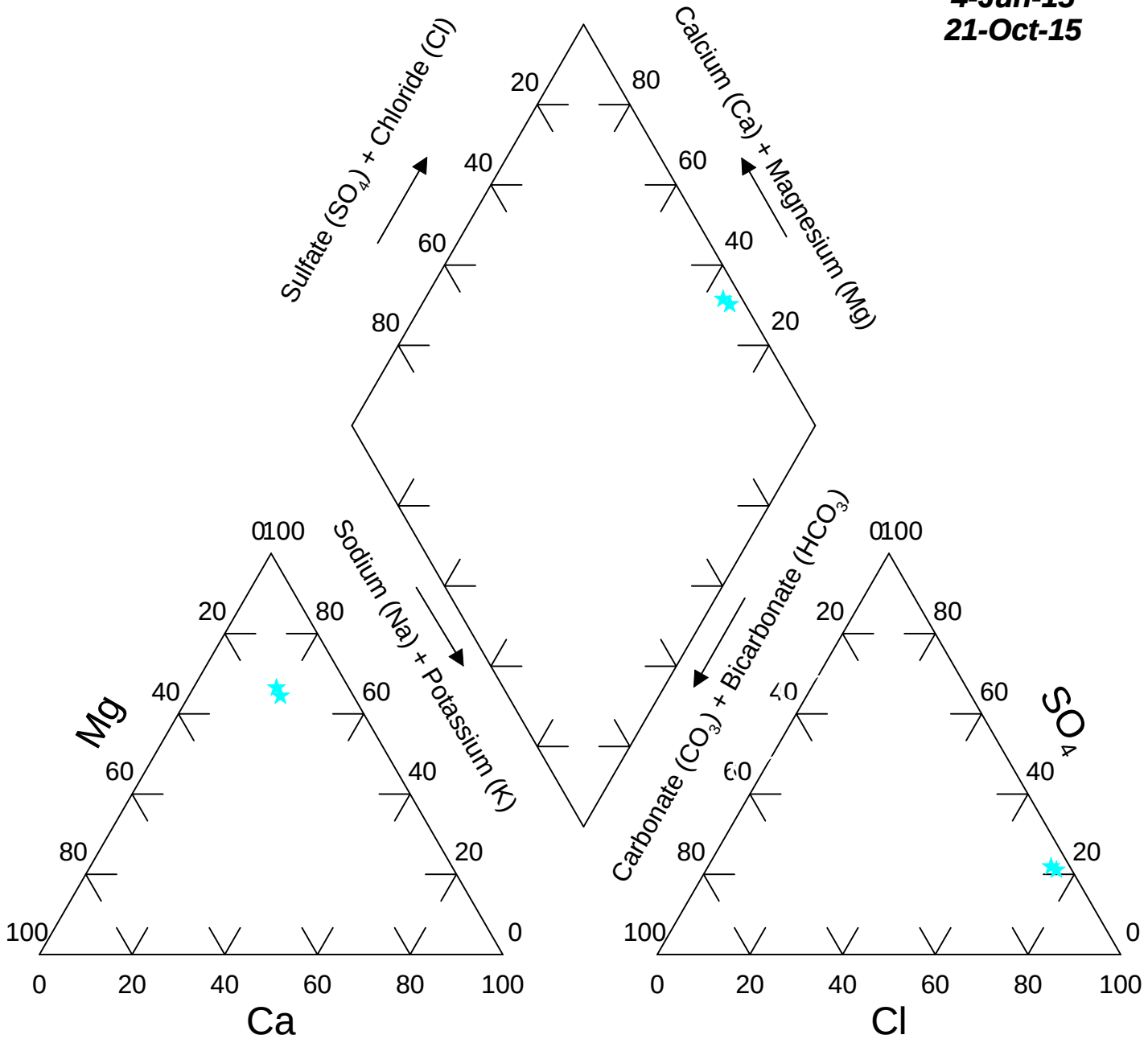
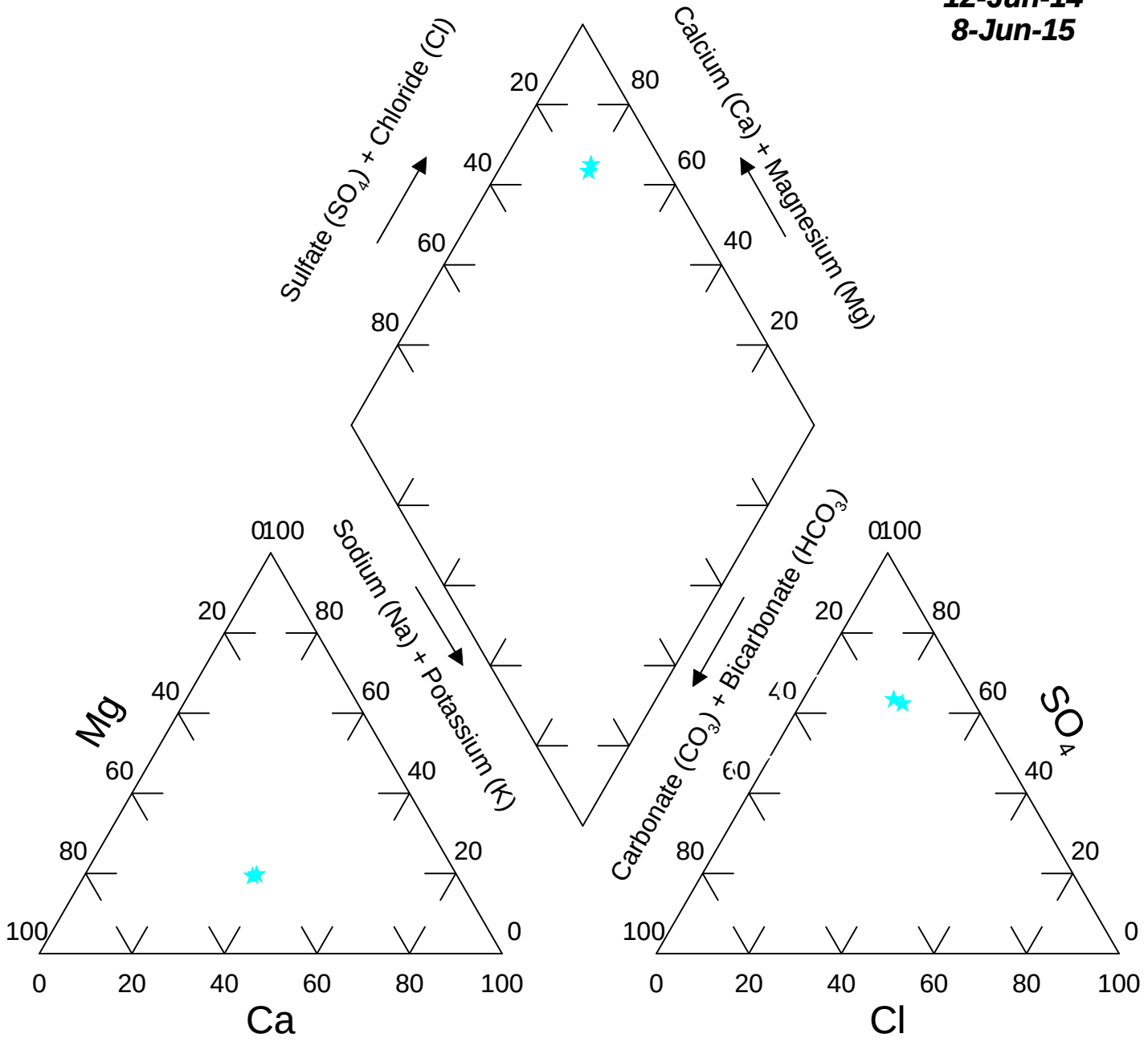


FIGURE: 4z

Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-4N34-B

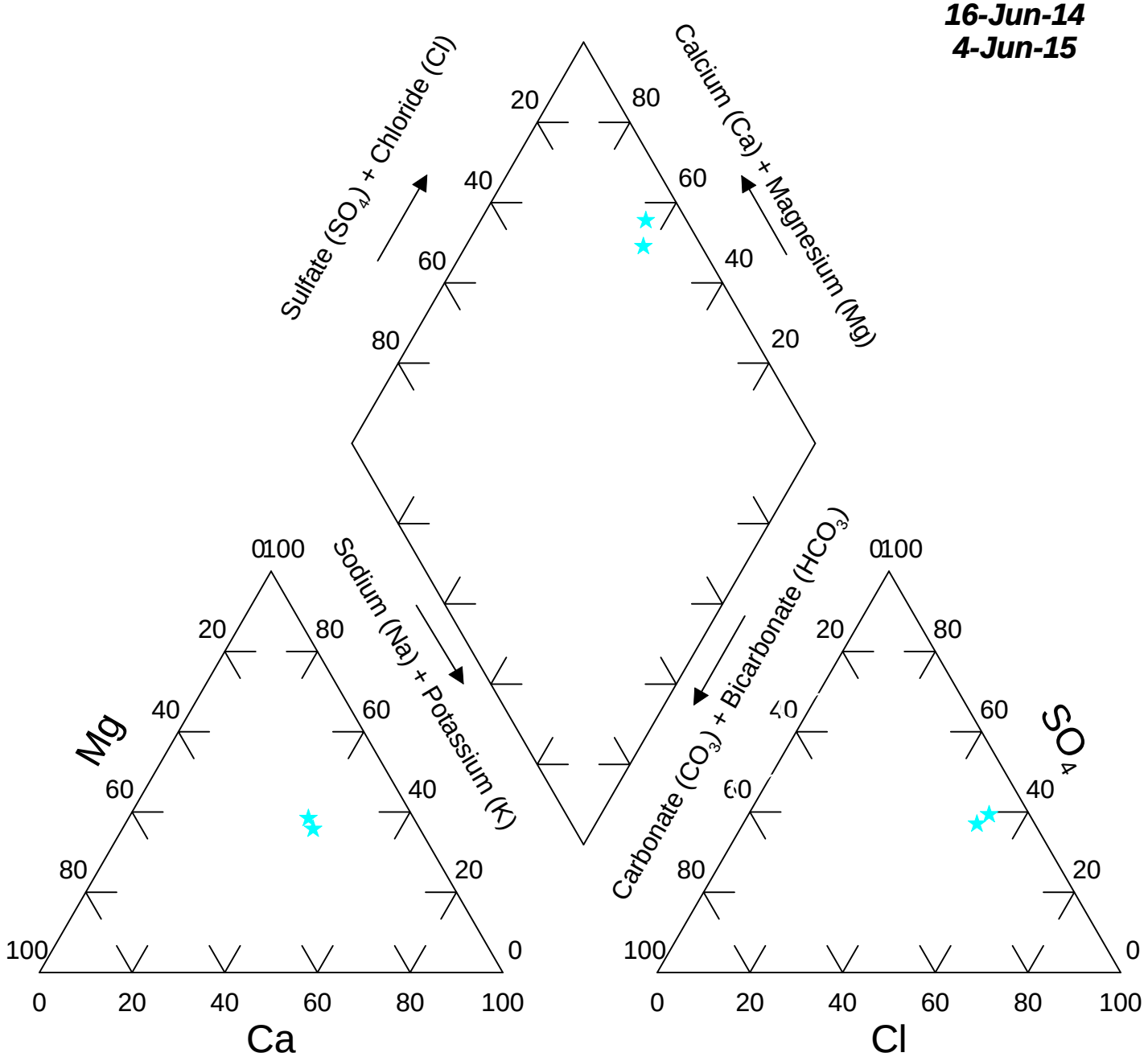
Dates:
12-Jun-14
8-Jun-15



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-5N62-D

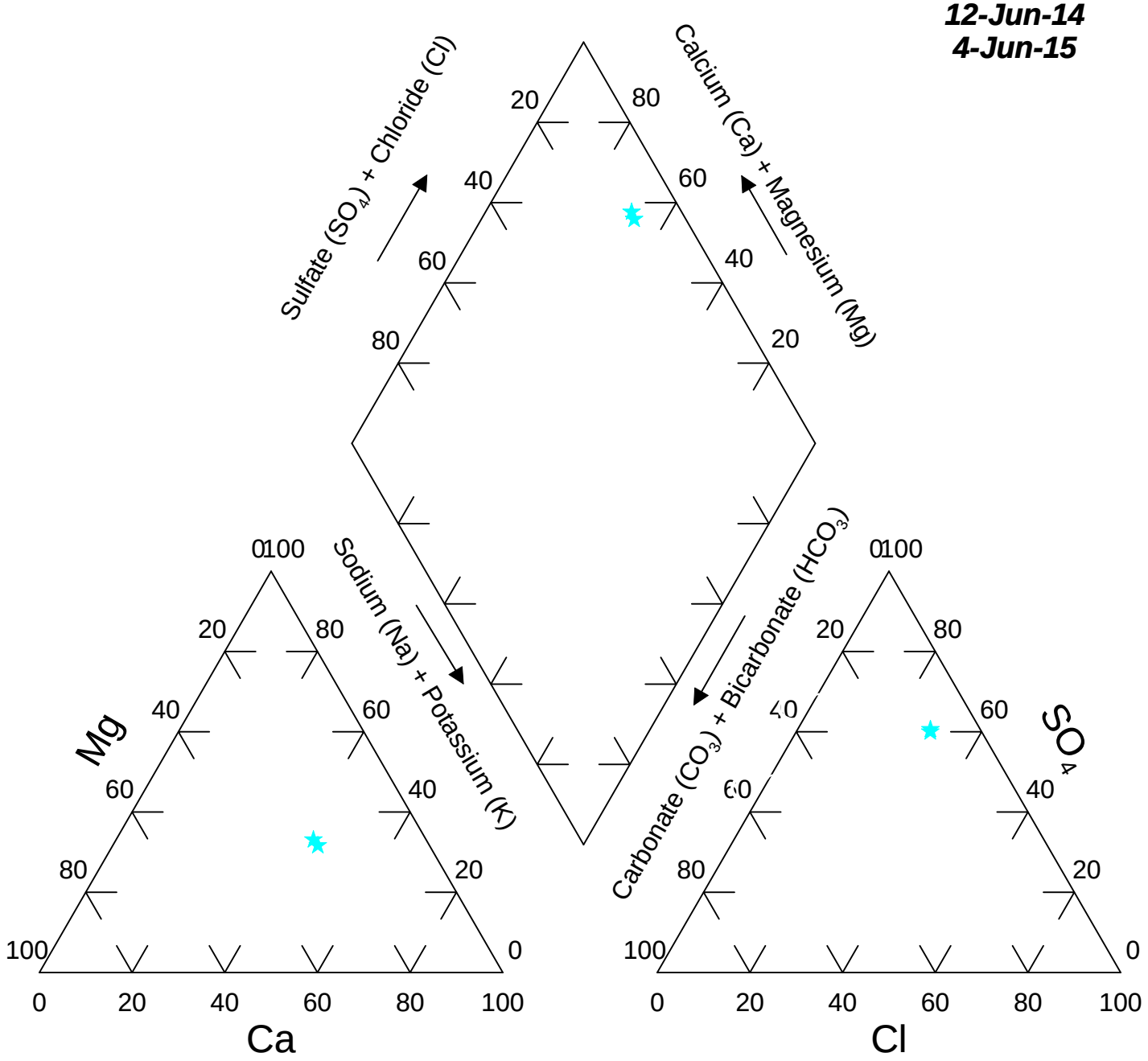
Dates:
16-Jun-14
4-Jun-15



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-6N57-DR

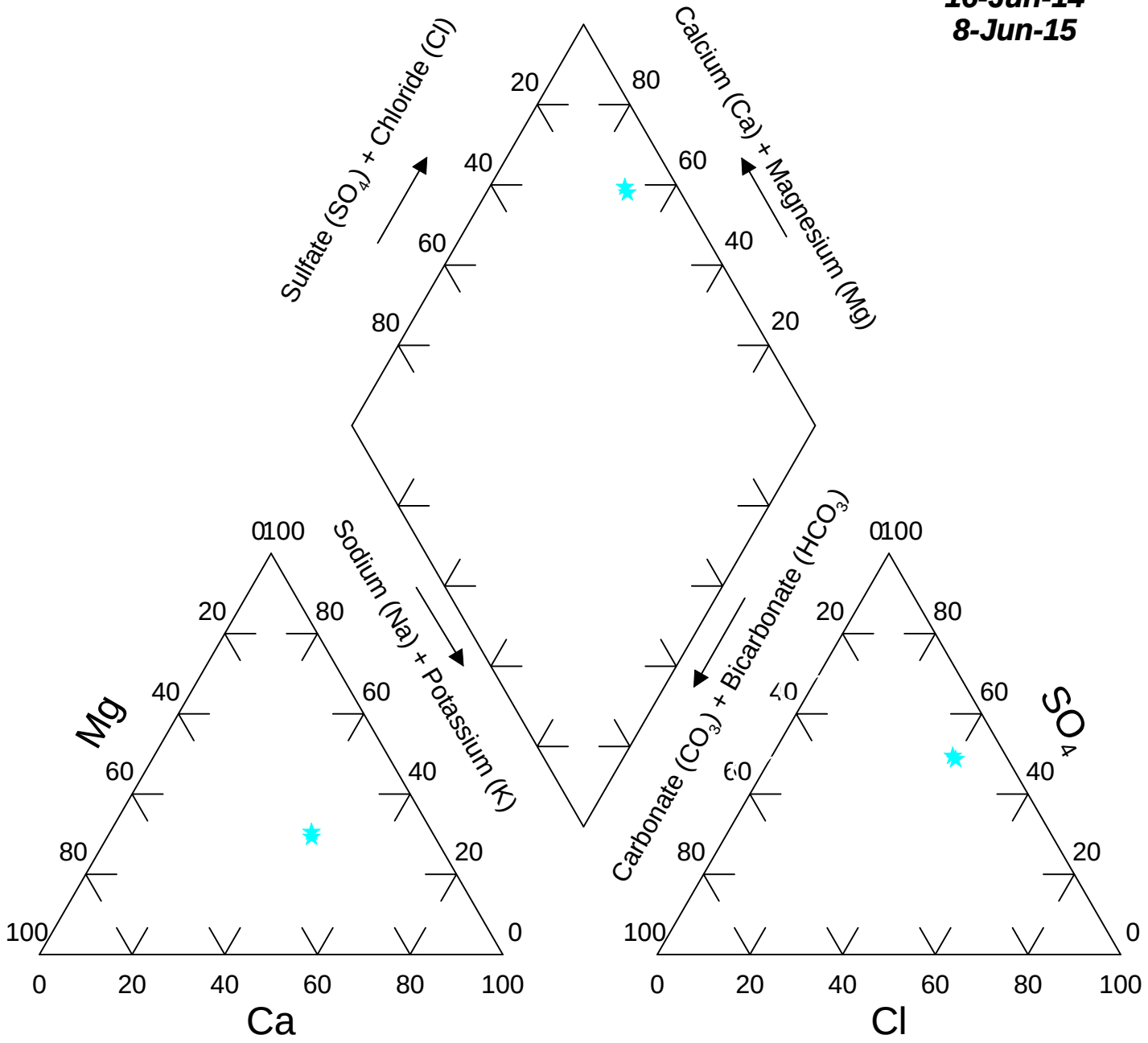
Dates:
12-Jun-14
4-Jun-15



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-6N58-DR

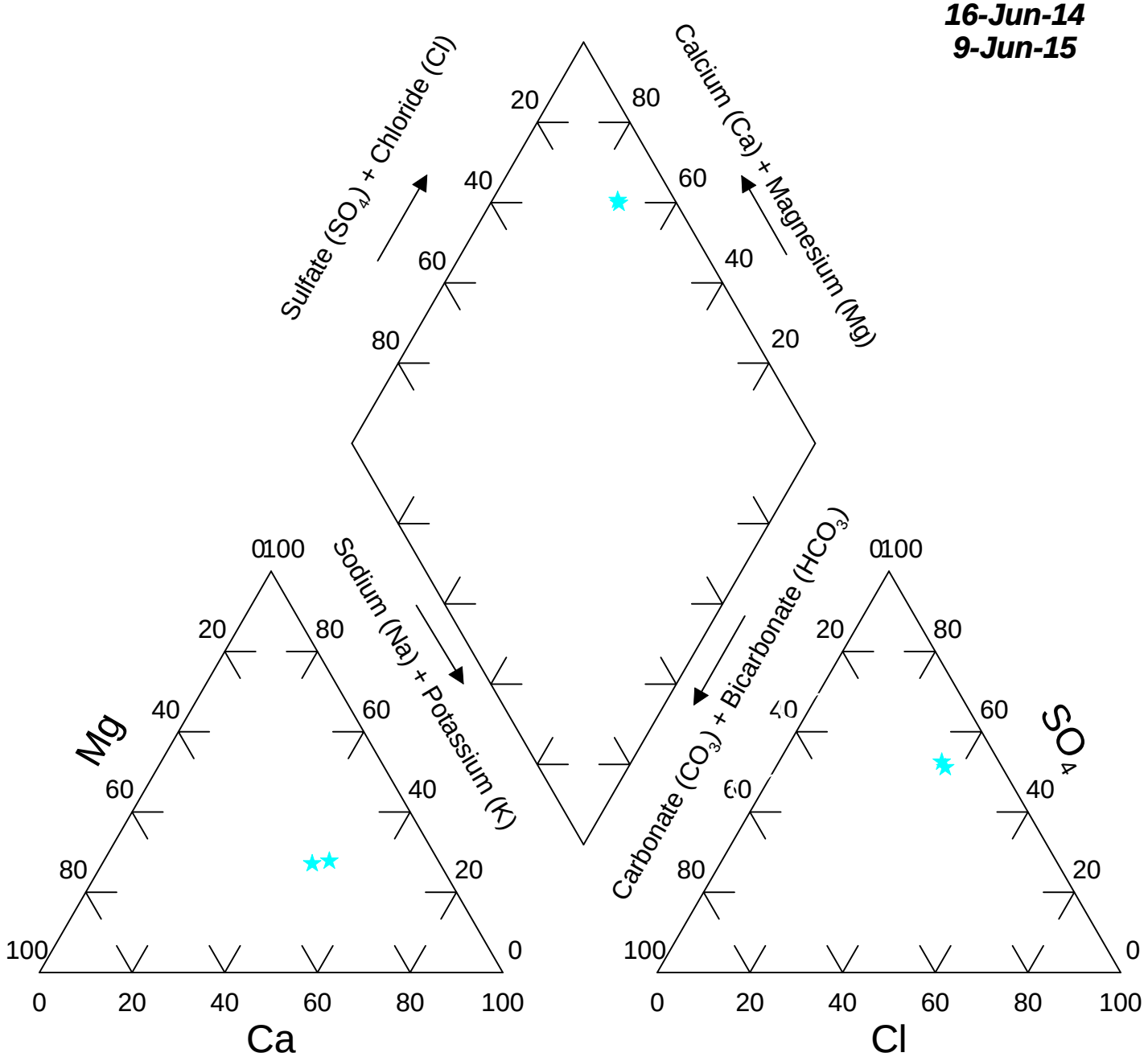
Dates:
16-Jun-14
8-Jun-15



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-6N59-DR

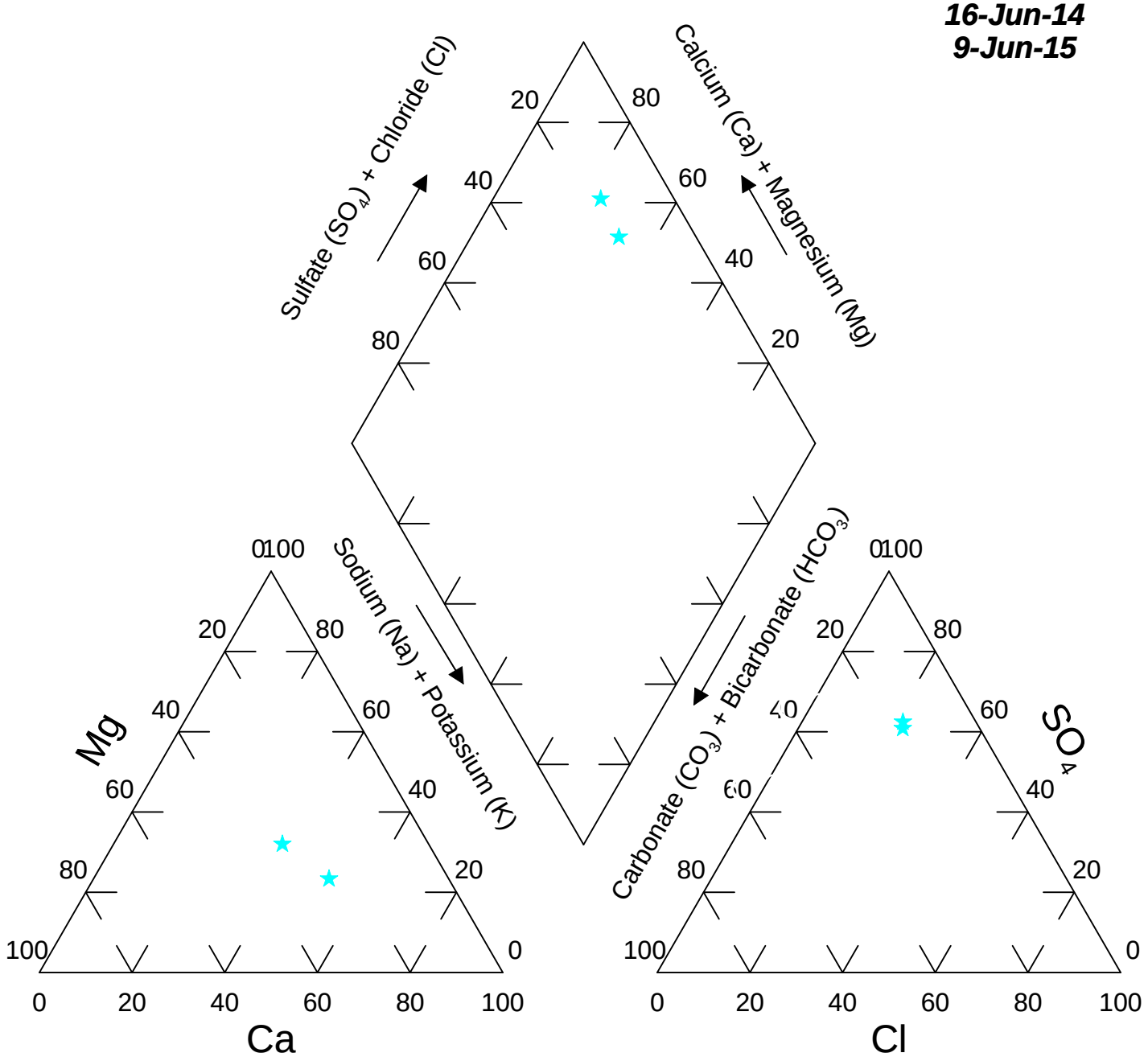
Dates:
16-Jun-14
9-Jun-15



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-6N60-DR

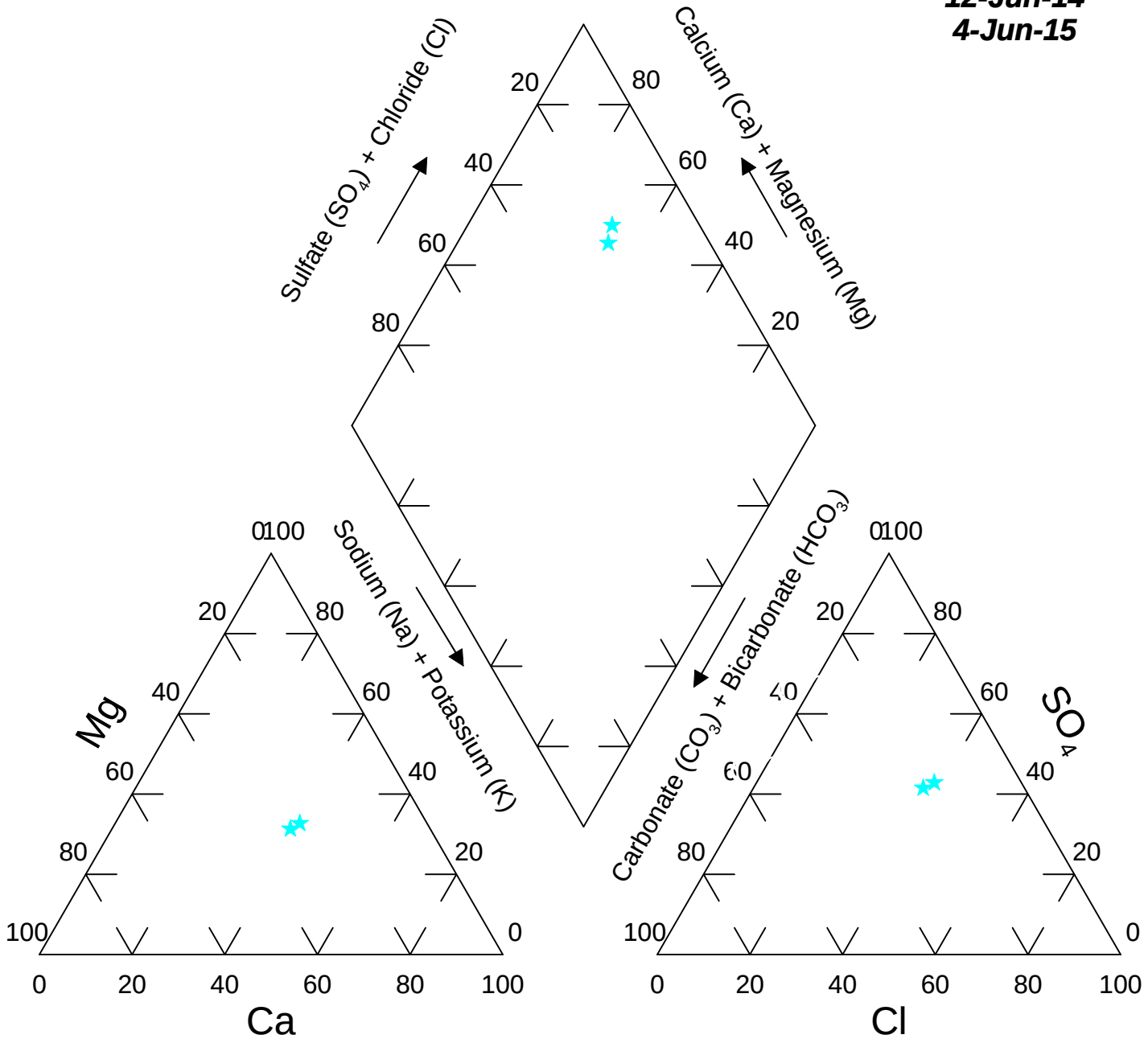
Dates:
16-Jun-14
9-Jun-15



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-6N63-E

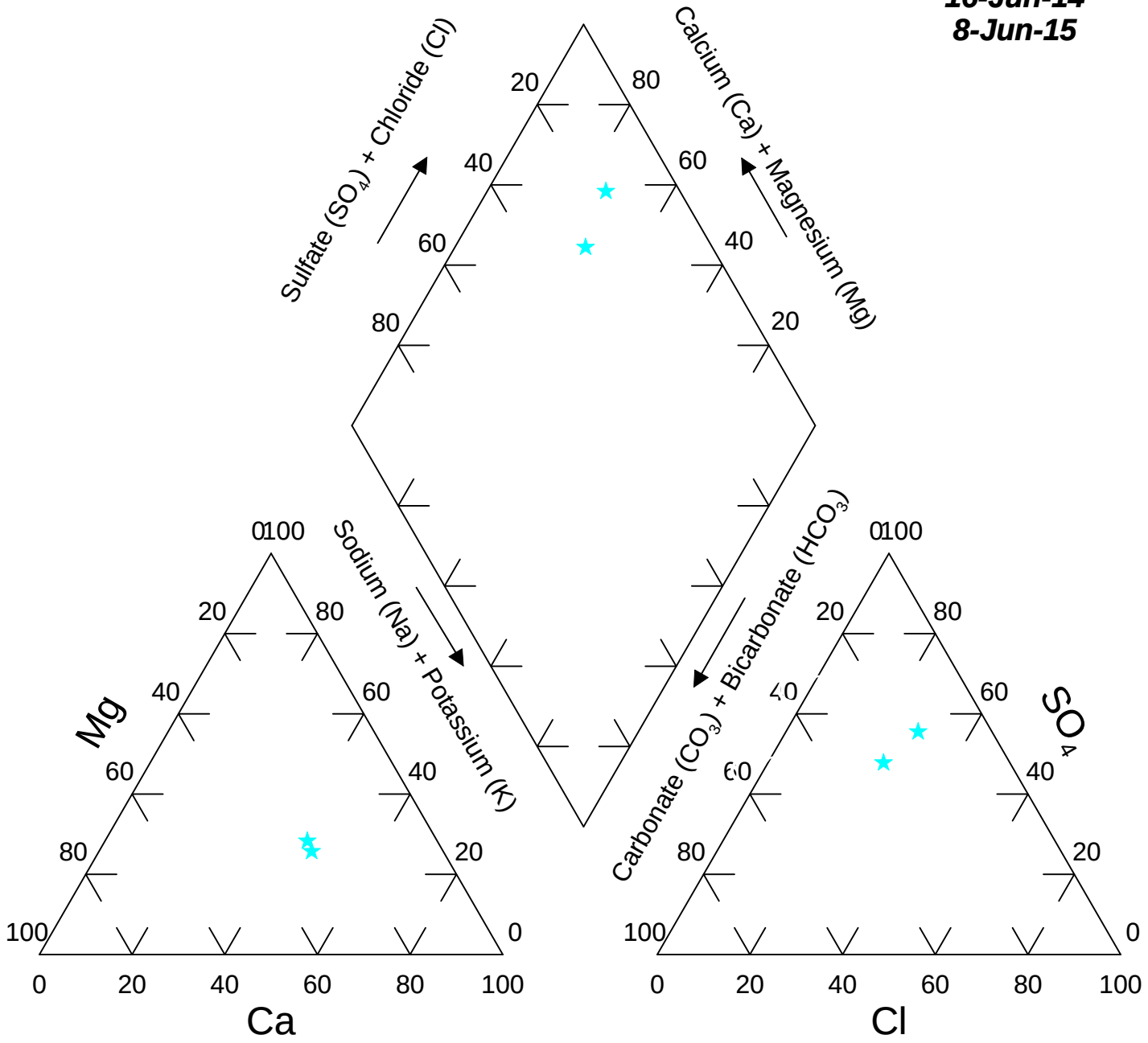
Dates:
12-Jun-14
4-Jun-15



Winnipeg
Water and Waste Department

Site: Brady
Location : GWQ25-6N67-E

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



Winnipeg
Water and Waste Department

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

Dates:

5-Aug-10
6-Jun-11
19-Oct-11
5-Jul-12
29-Oct-12
17-Jun-13
24-Oct-13
12-Jun-14
8-Jun-15

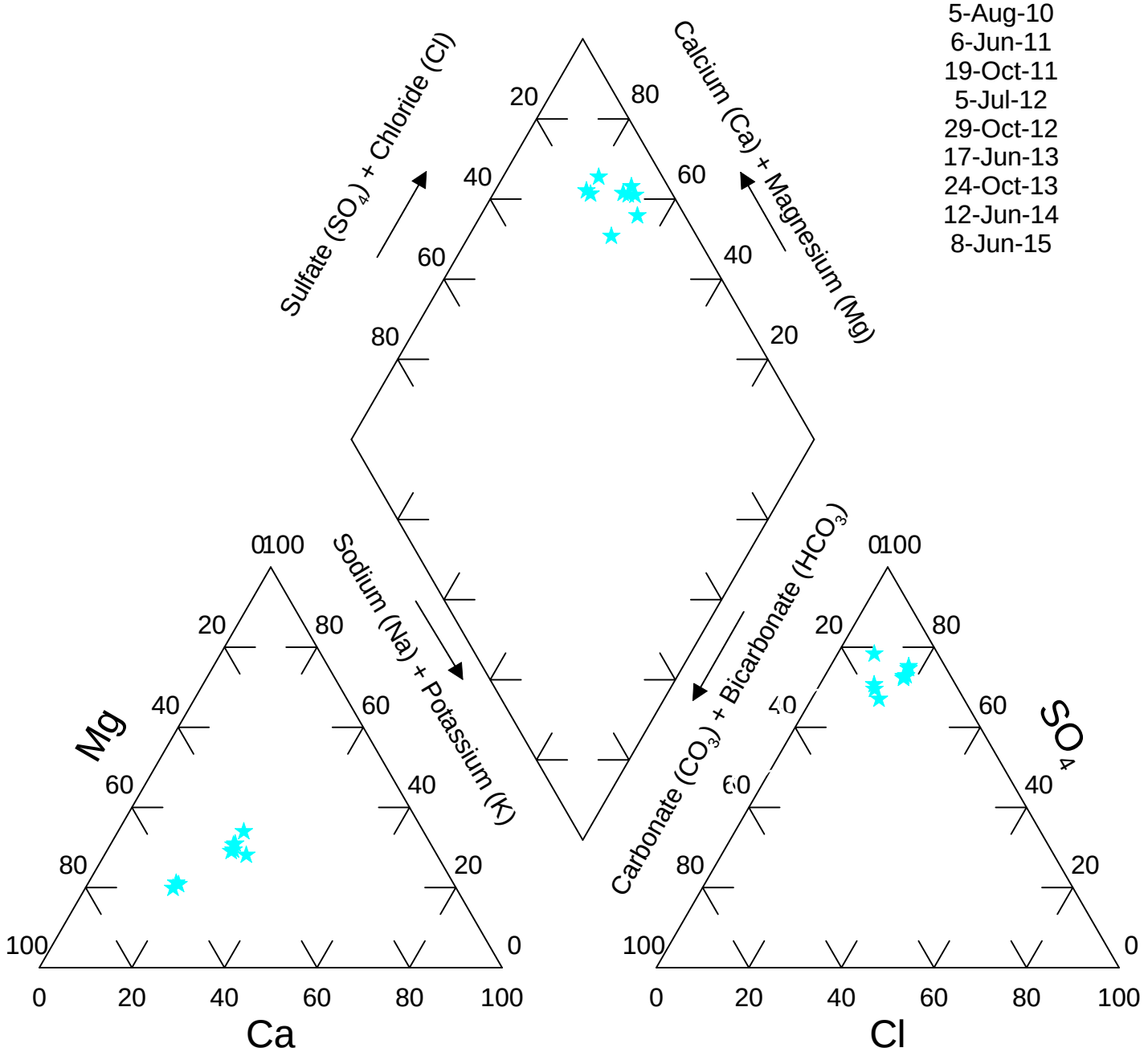


FIGURE: 10P

Winnipeg
Water and Waste Department

Site: Brady
Well #: 5N62-E

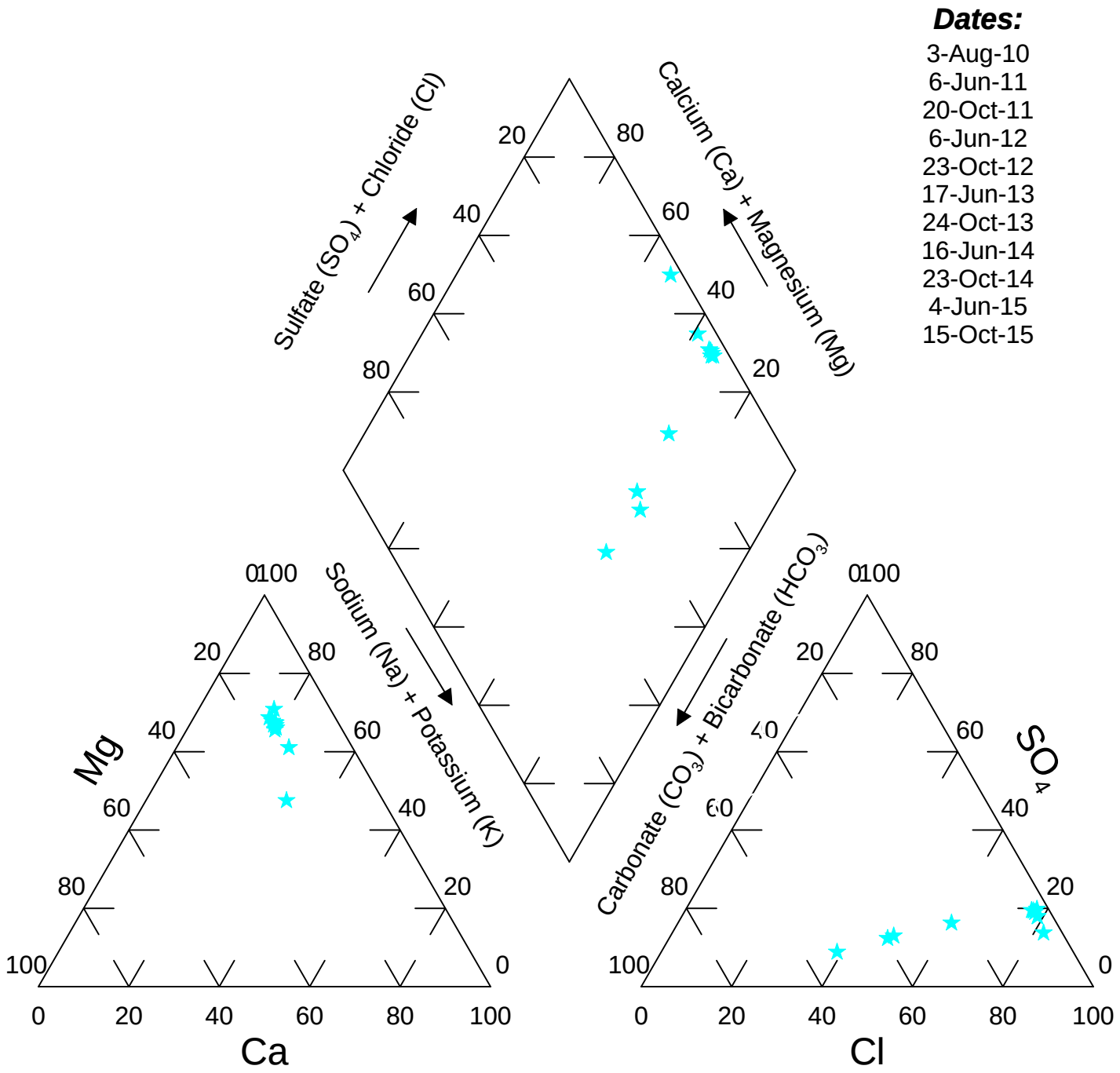


FIGURE: 11P

Winnipeg
Water and Waste Department

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

Dates:
18-Aug-10
13-Jun-11
20-Oct-11
12-Jun-12
1-Nov-12
19-Jun-13
28-Oct-13
10-Jun-15

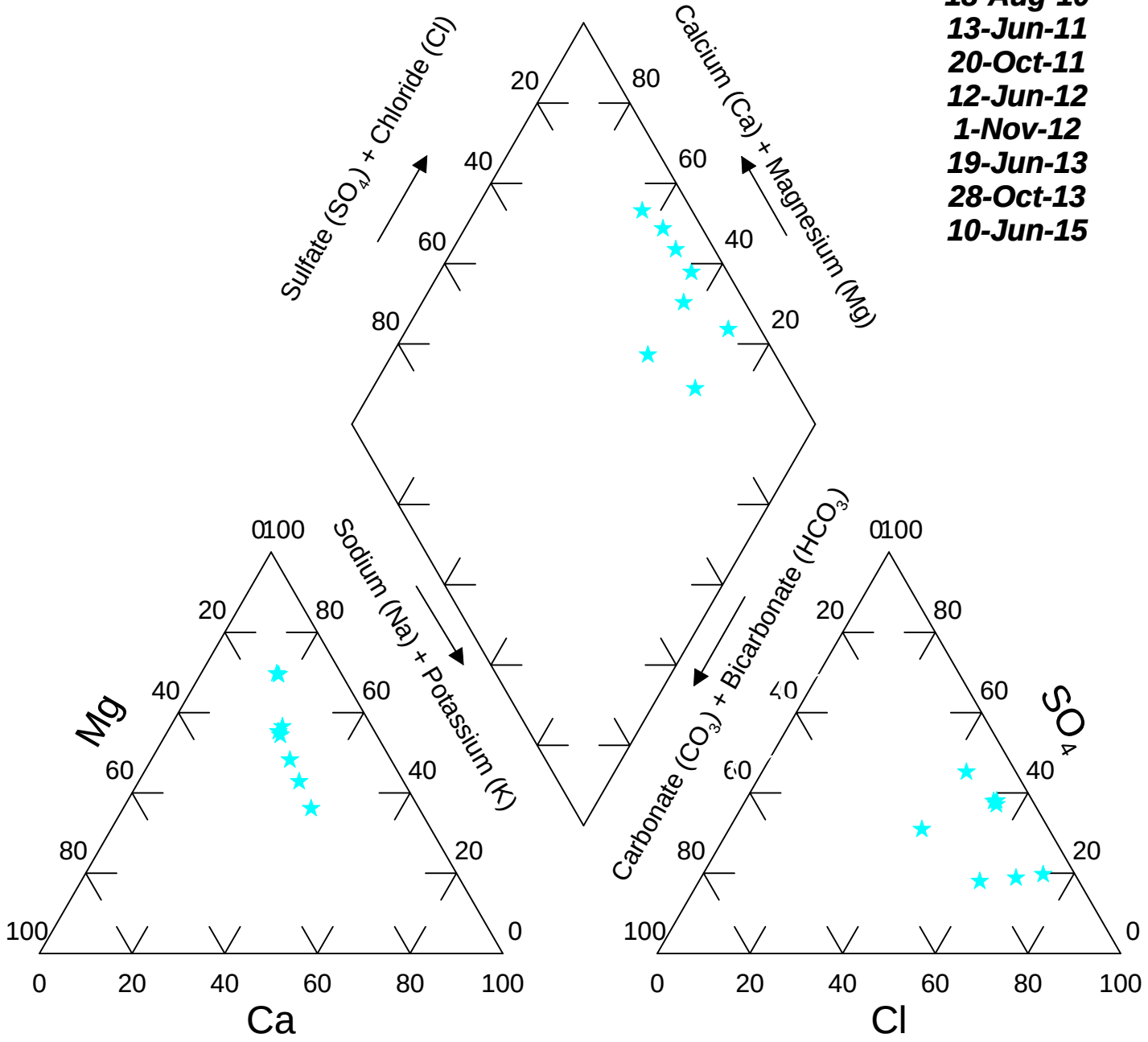


FIGURE: 12P

Winnipeg
Water and Waste Department

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

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

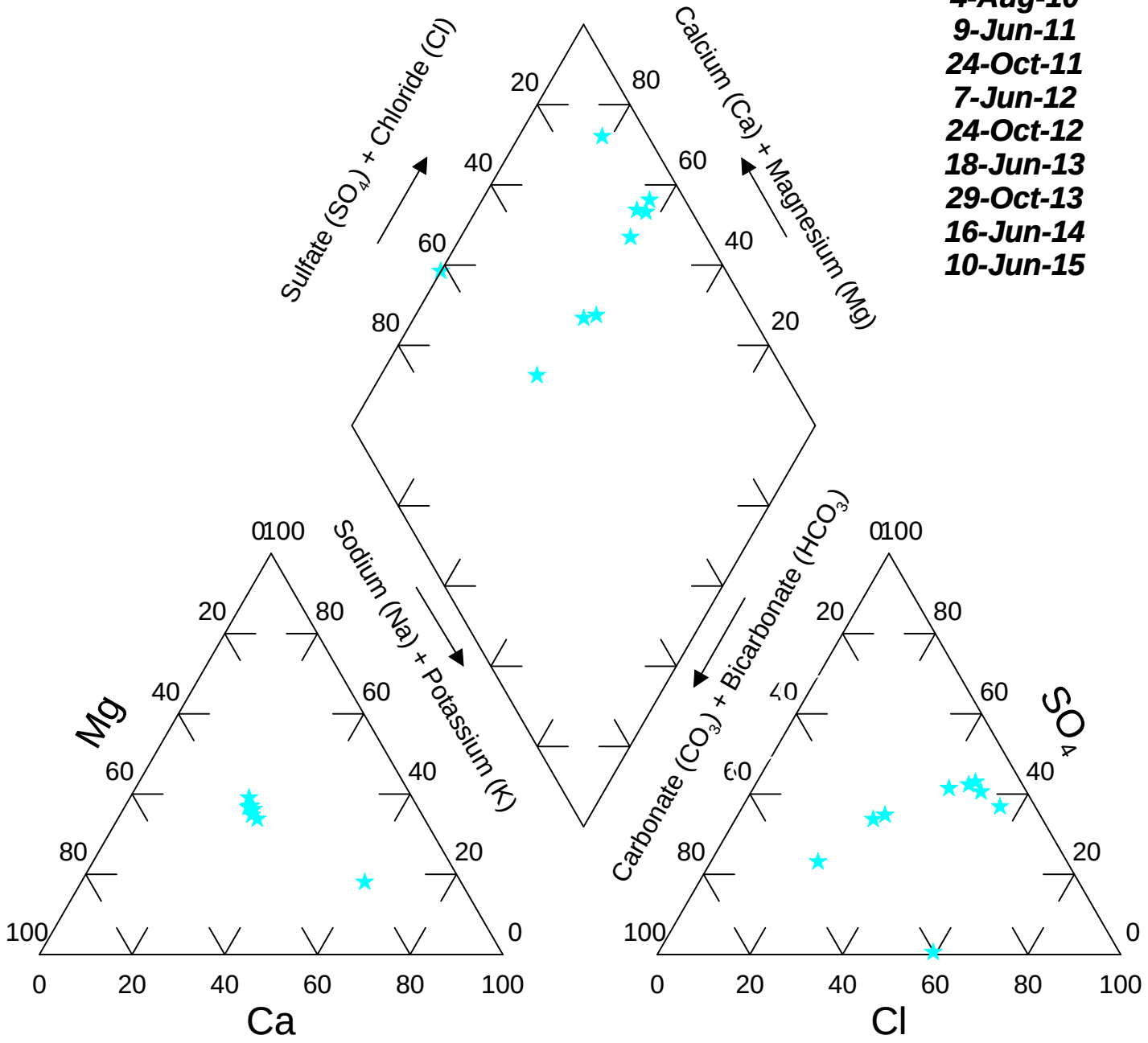


FIGURE: 13P

Winnipeg
Water and Waste Department

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

Dates:
5-Aug-10
9-Jun-11
24-Oct-11
7-Jun-12
24-Oct-12
17-Jun-13
28-Oct-13
16-Jun-14
11-Jun-15

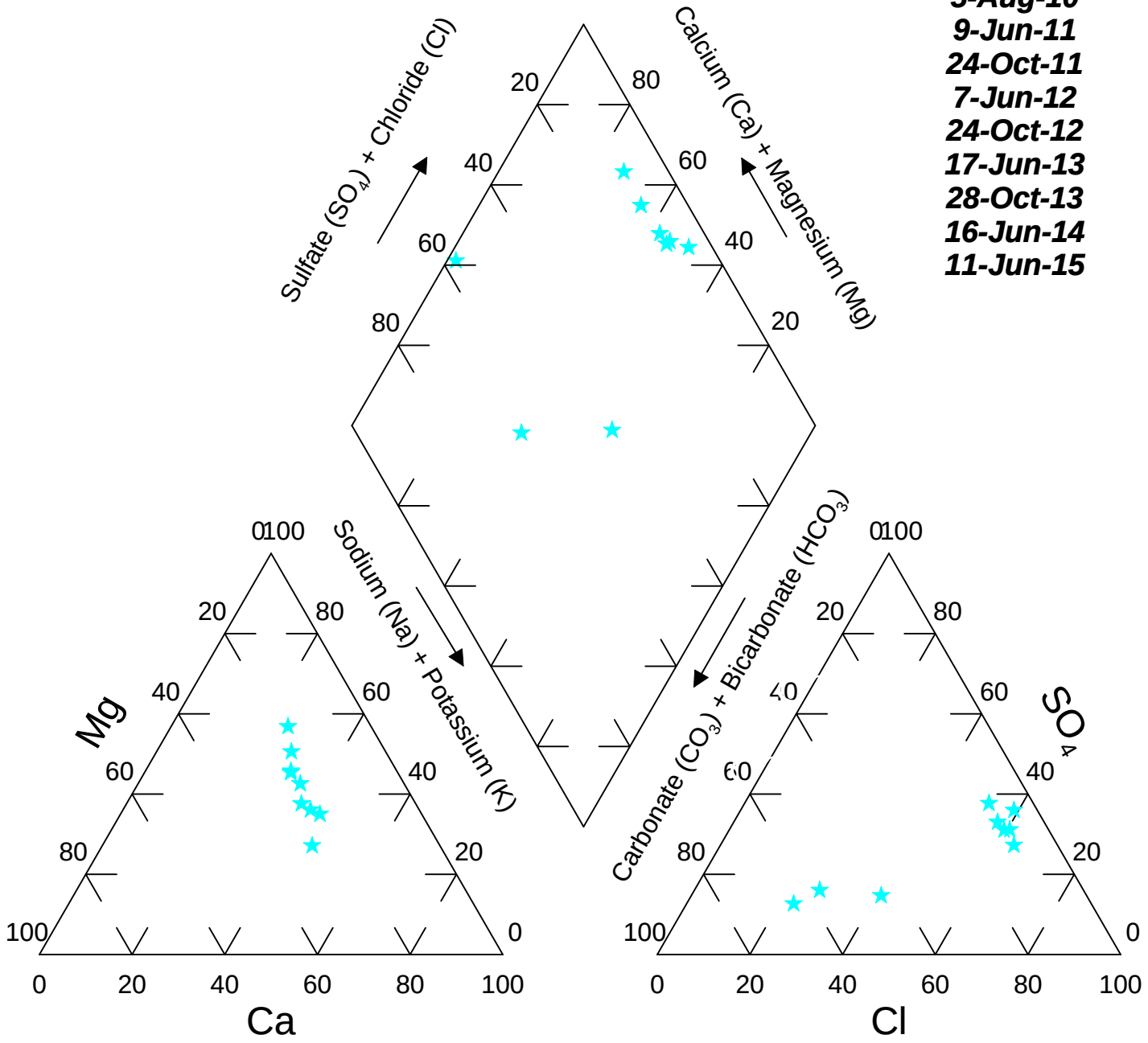


FIGURE: 14P

Winnipeg
Water and Waste Department

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

Dates:
6-Aug-10
14-Jun-11
24-Oct-11
7-Jun-12
1-Nov-12
19-Jun-13
21-Oct-14
8-Jun-15
15-Oct-15

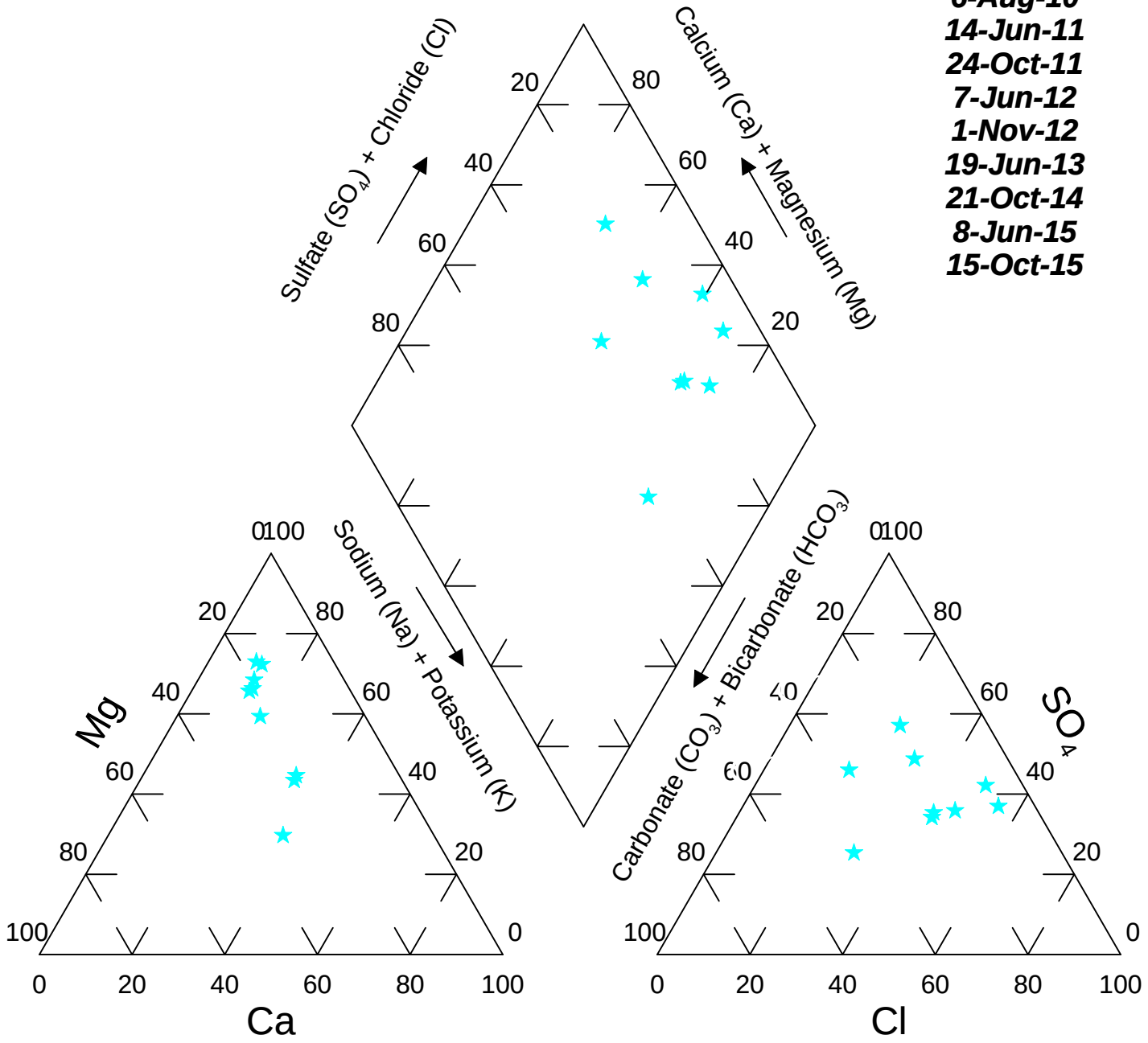


FIGURE: 15P

Winnipeg
Water and Waste Department

Site: Brady
Well #: 6N63-F

Dates:
3-Aug-10
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

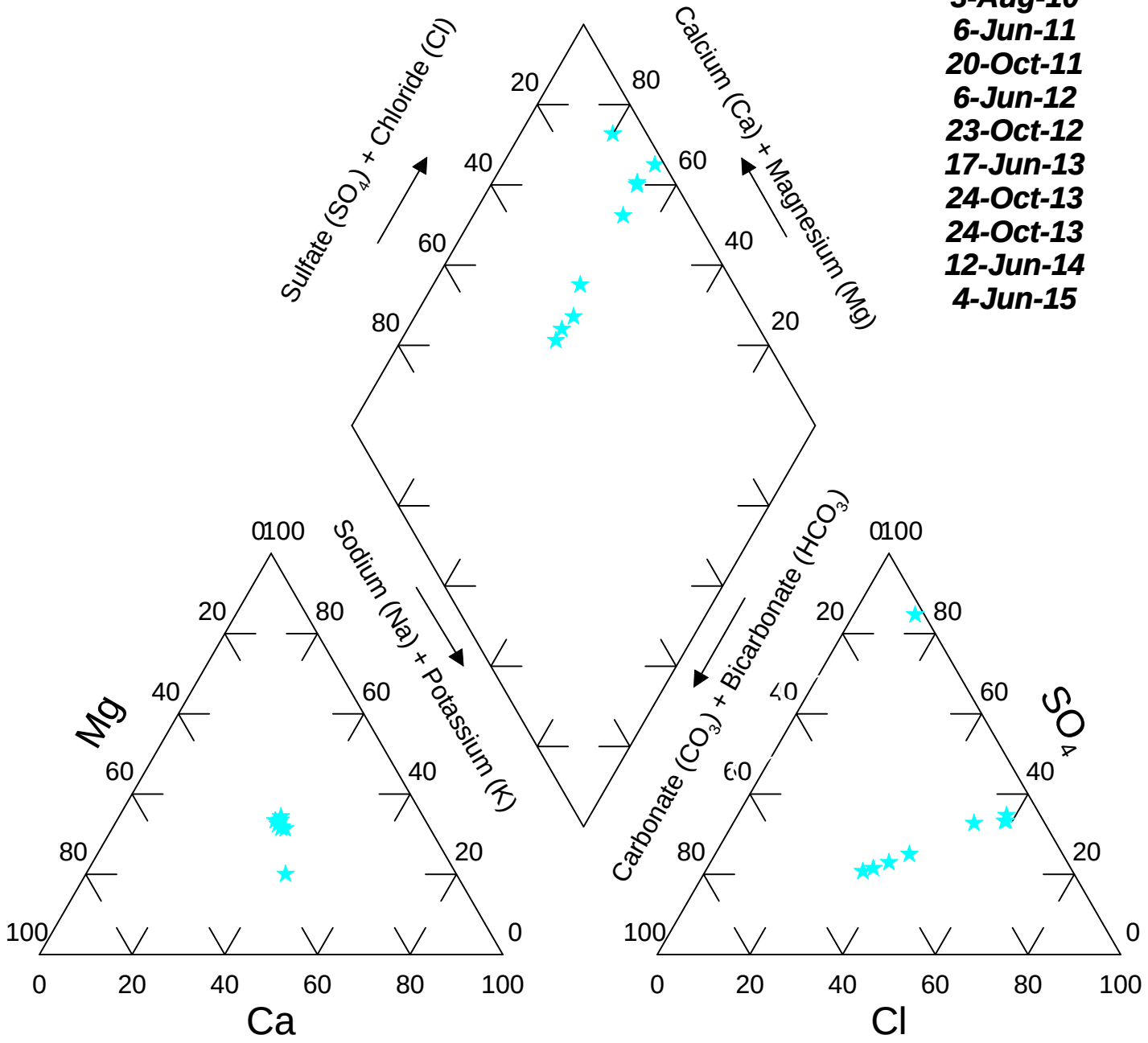


FIGURE: 16P

Winnipeg
Water and Waste Department

Site: Brady
Well #: 6N67-F

Dates:
26-Aug-10
8-Jun-11
24-oct-11
6-Jun-12
22-Oct-12
17-Jun-13
23-Oct-13
12-Jun-14
8-Jun-15

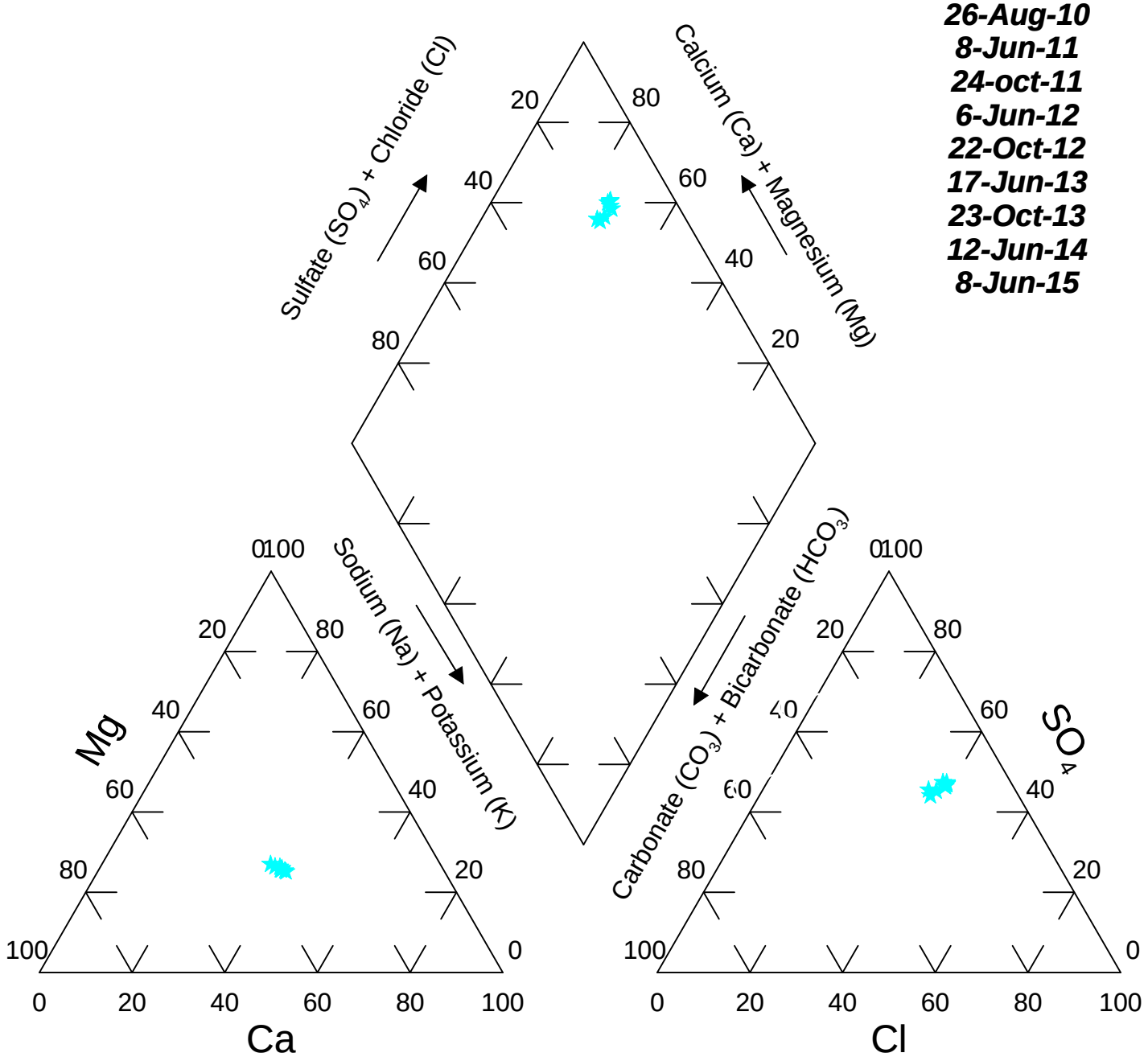
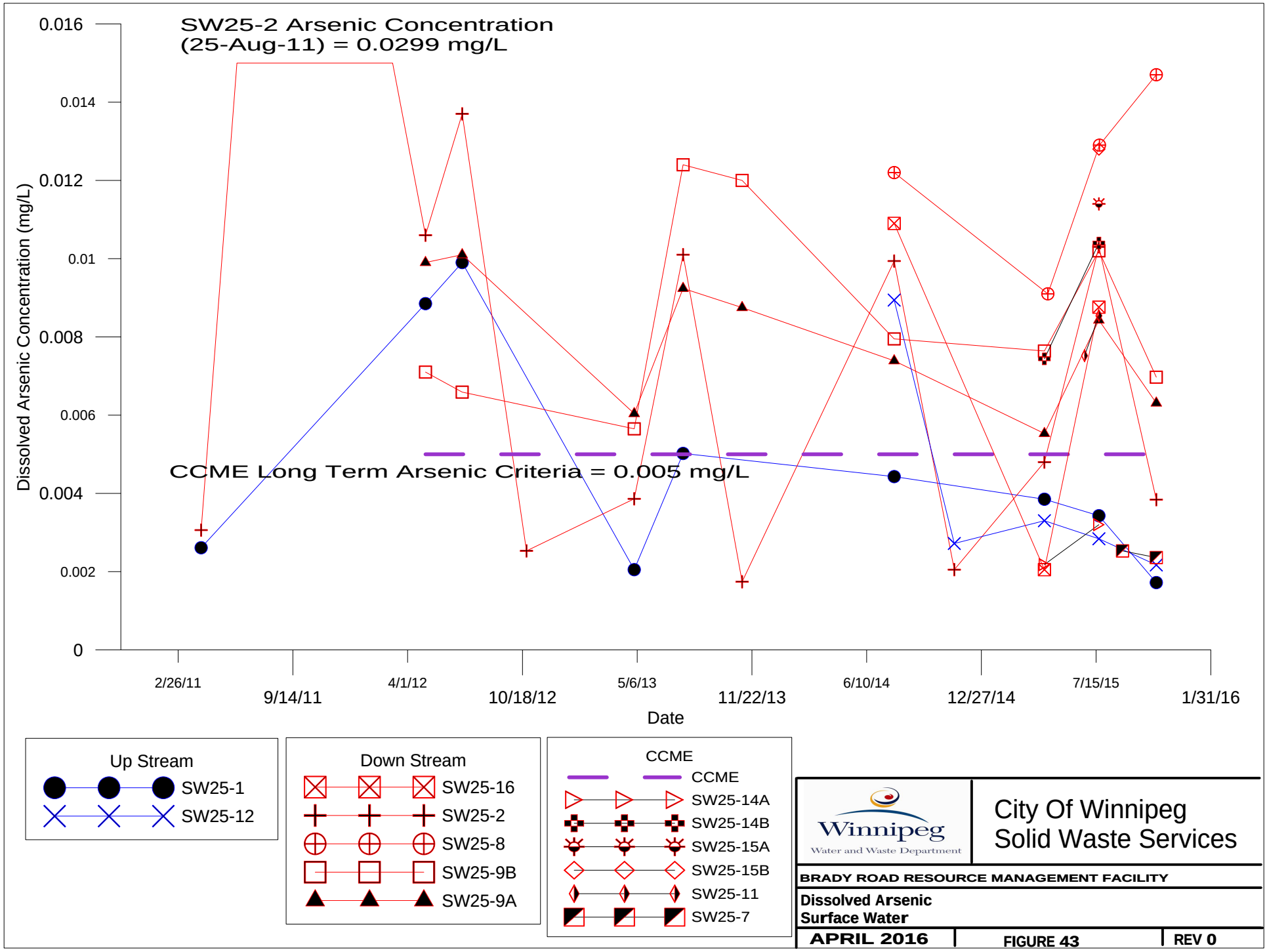


FIGURE: 17P

Winnipeg
Water and Waste Department

APPENDIX C
STATISTICAL ANALYSIS OF SURFACE WATER QUALITY



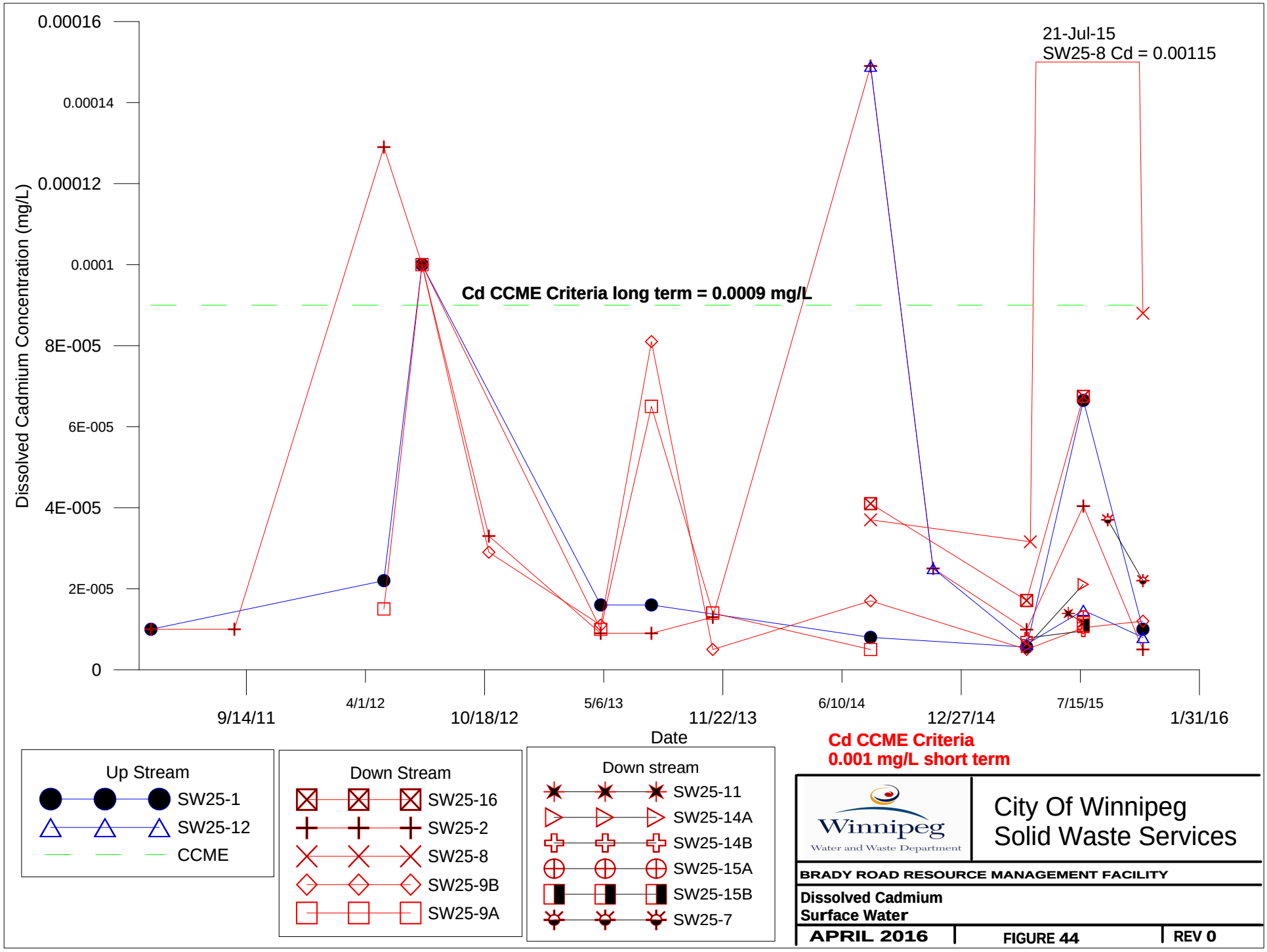
Winnipeg
Water and Waste Department

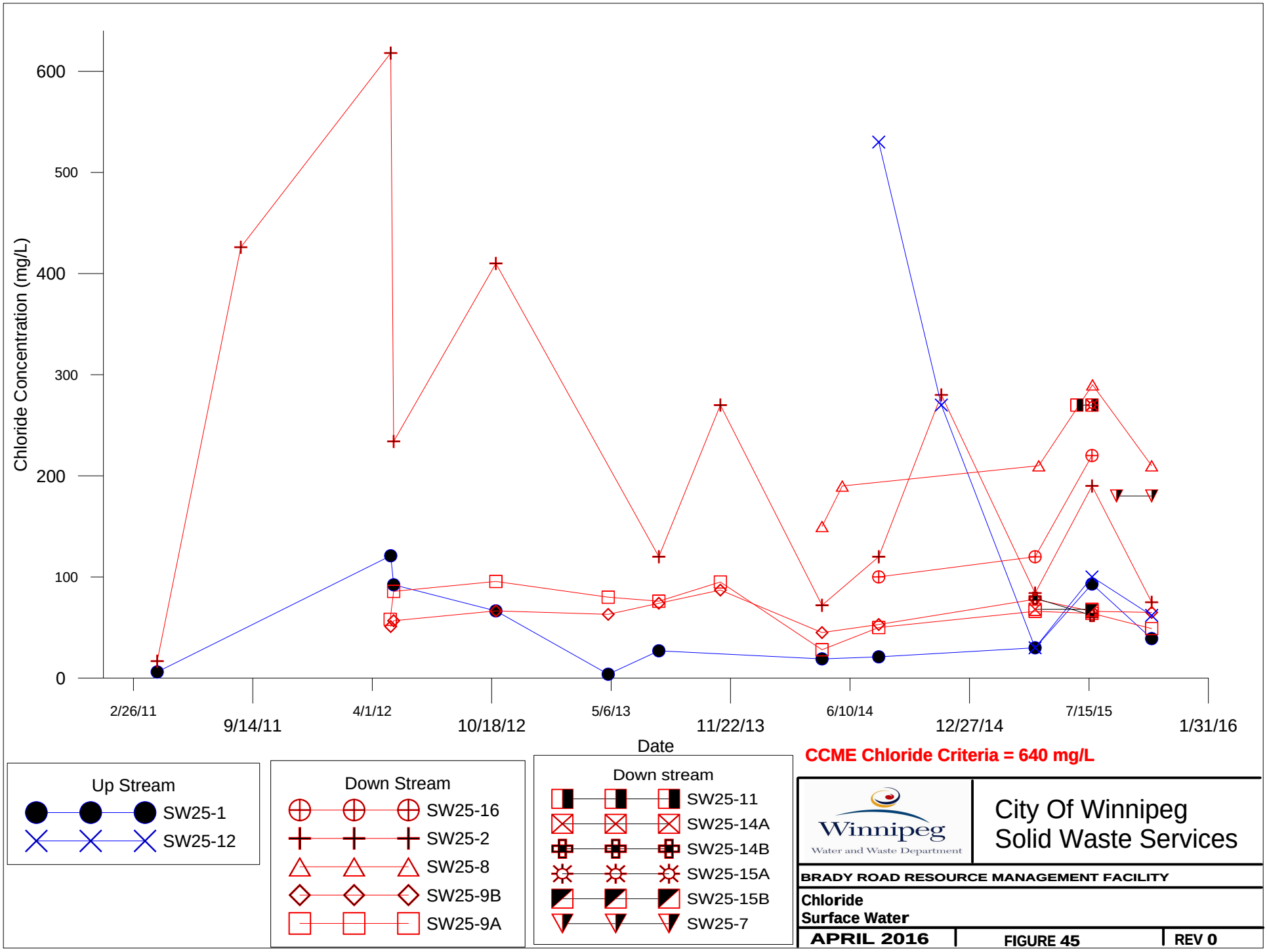
City Of Winnipeg
Solid Waste Services

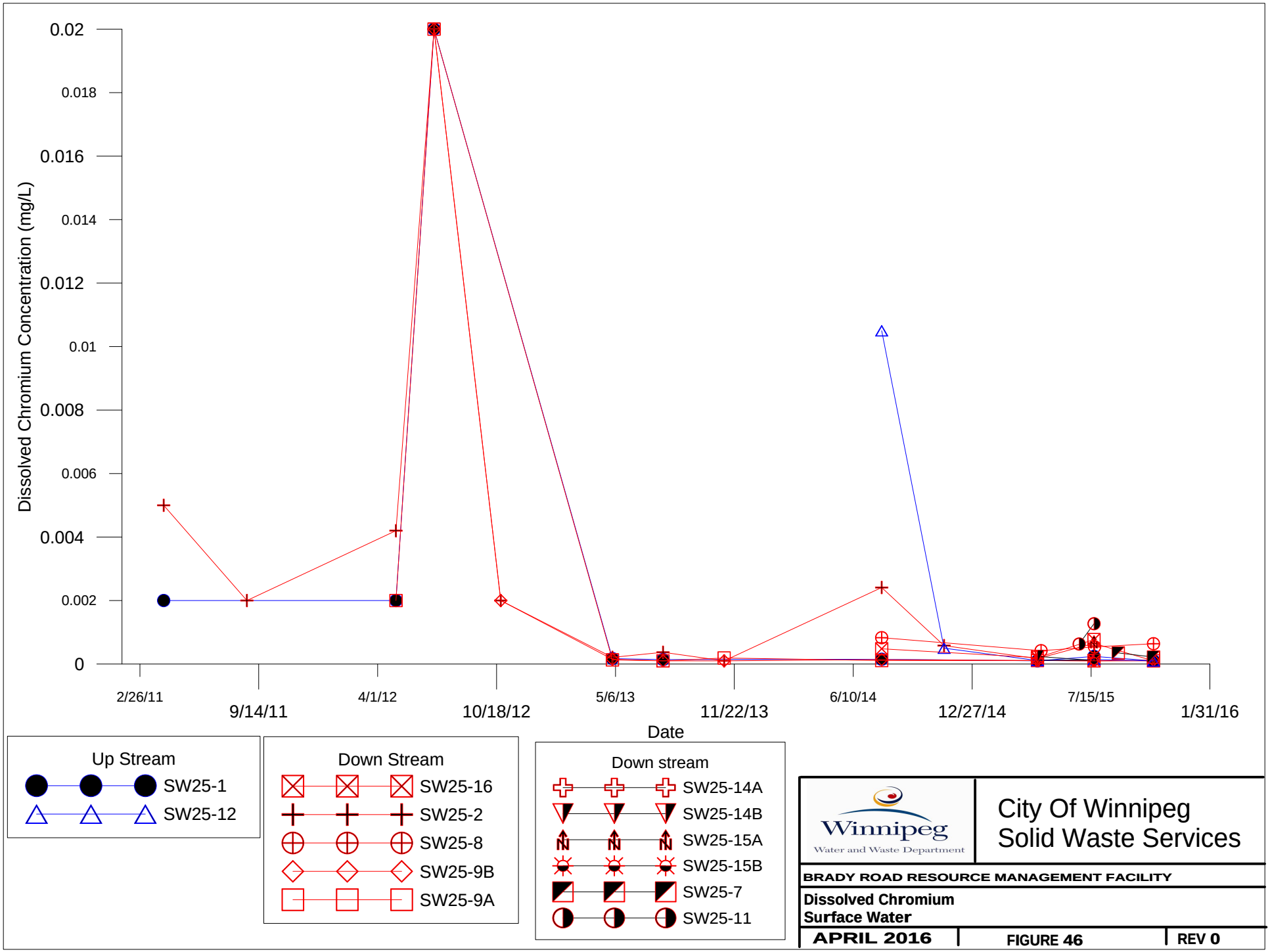
BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Arsenic
Surface Water

APRIL 2016	FIGURE 43	REV 0


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
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
Cd CCME Criteria
0.001 mg/L short term
Up Stream
SW25-1
SW25-12
CCME
Down Stream
SW25-16
SW25-2
SW25-8
SW25-9B
SW25-9A
Down stream
SW25-11
SW25-14A
SW25-14B
SW25-15A
SW25-15B
SW25-7
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Cadmium
Surface Water
APRIL 2016
FIGURE 44
REV 0


Chloride Concentration (mg/L)
600
500
400
300
200
100
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
Date
Up Stream
SW25-1
SW25-12
Down Stream
SW25-16
SW25-2
SW25-8
SW25-9B
SW25-9A
Down stream
SW25-11
SW25-14A
SW25-14B
SW25-15A
SW25-15B
SW25-7
CCME Chloride Criteria = 640 mg/L
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Chloride
Surface Water
APRIL 2016
FIGURE 45
REV 0



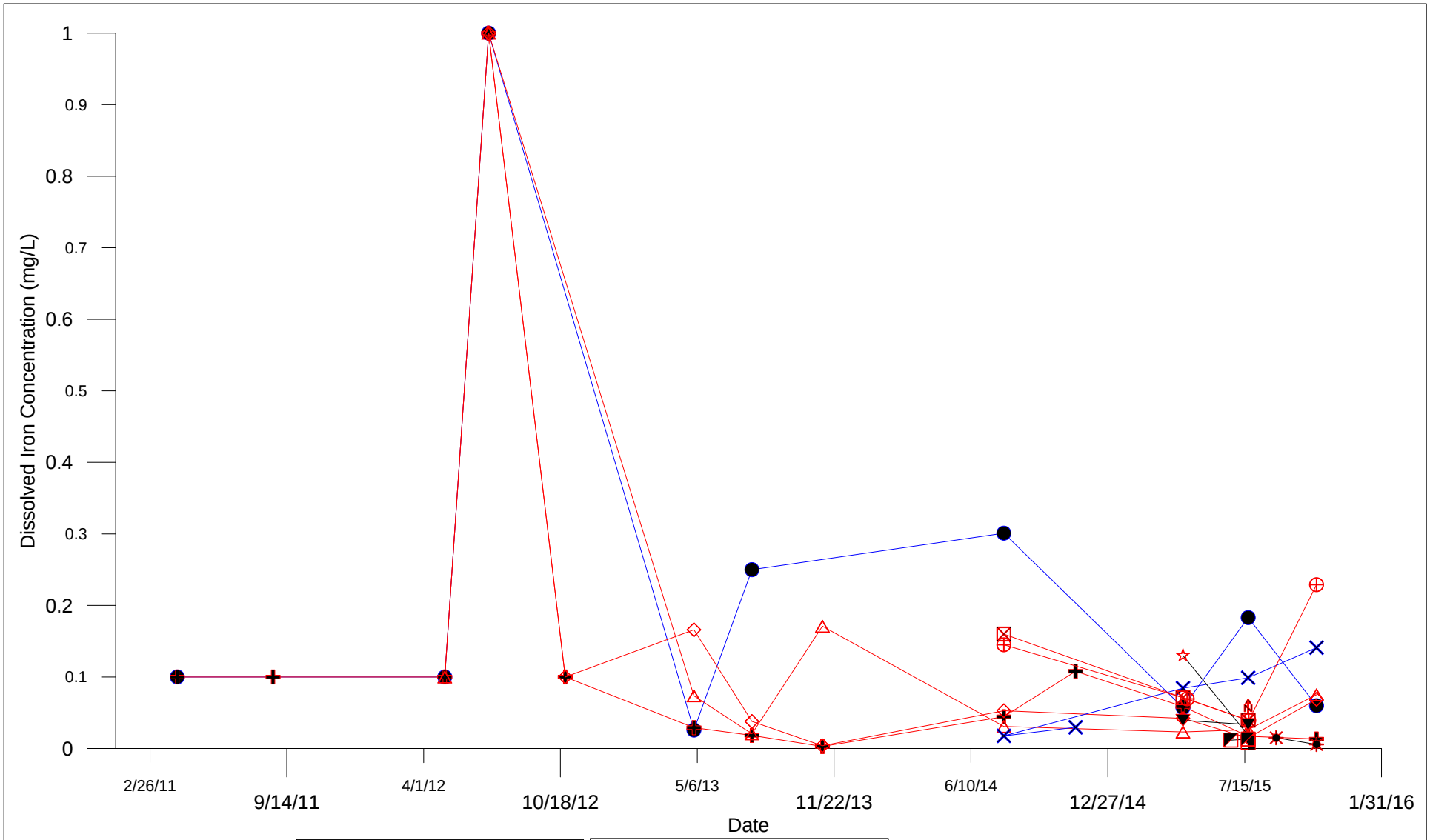
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Chromium
Surface Water

APRIL 2016 | **FIGURE 46** | **REV 0**



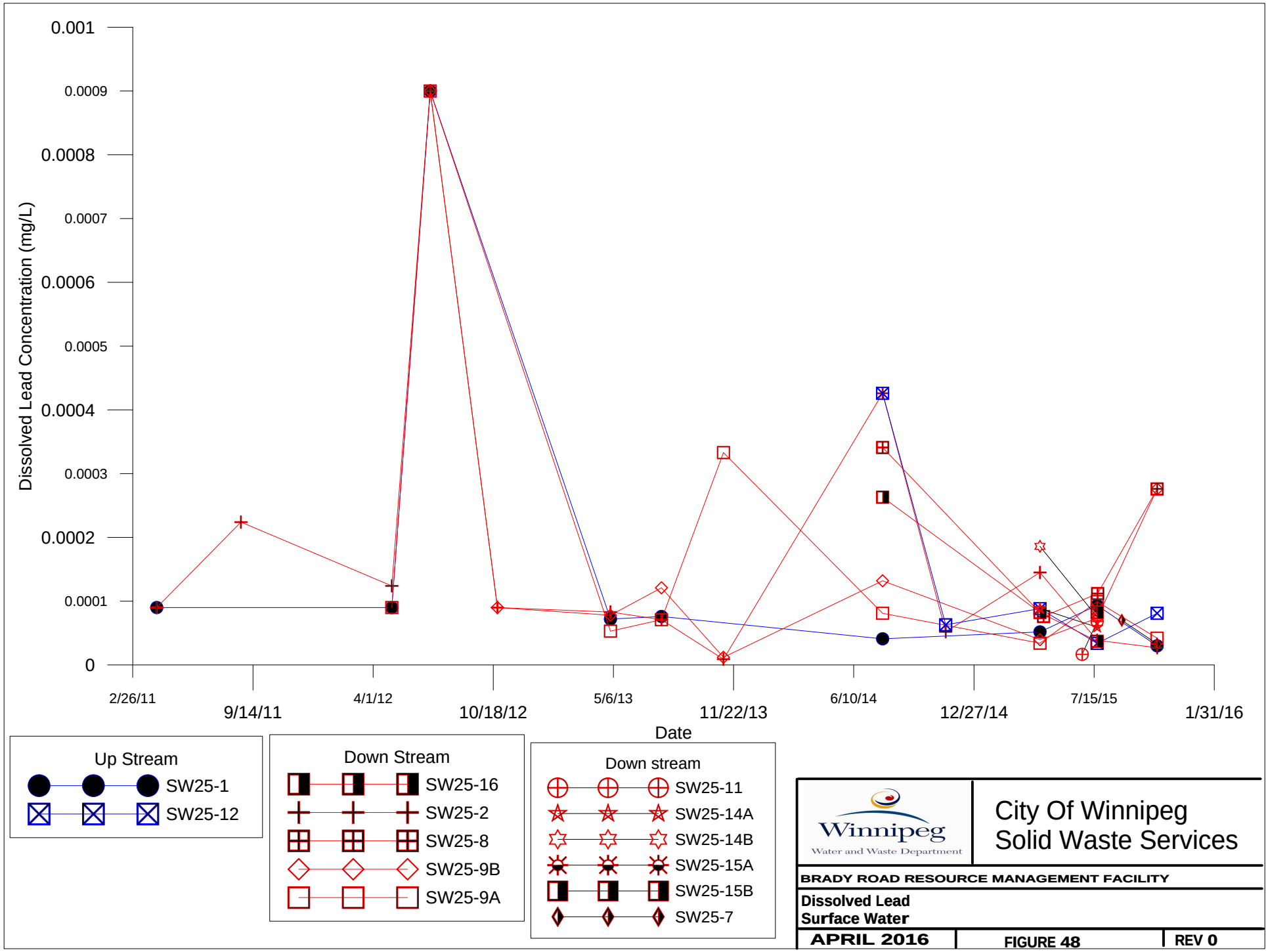
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Iron
Surface Water

APRIL 2016 | **FIGURE 47** | **REV 0**



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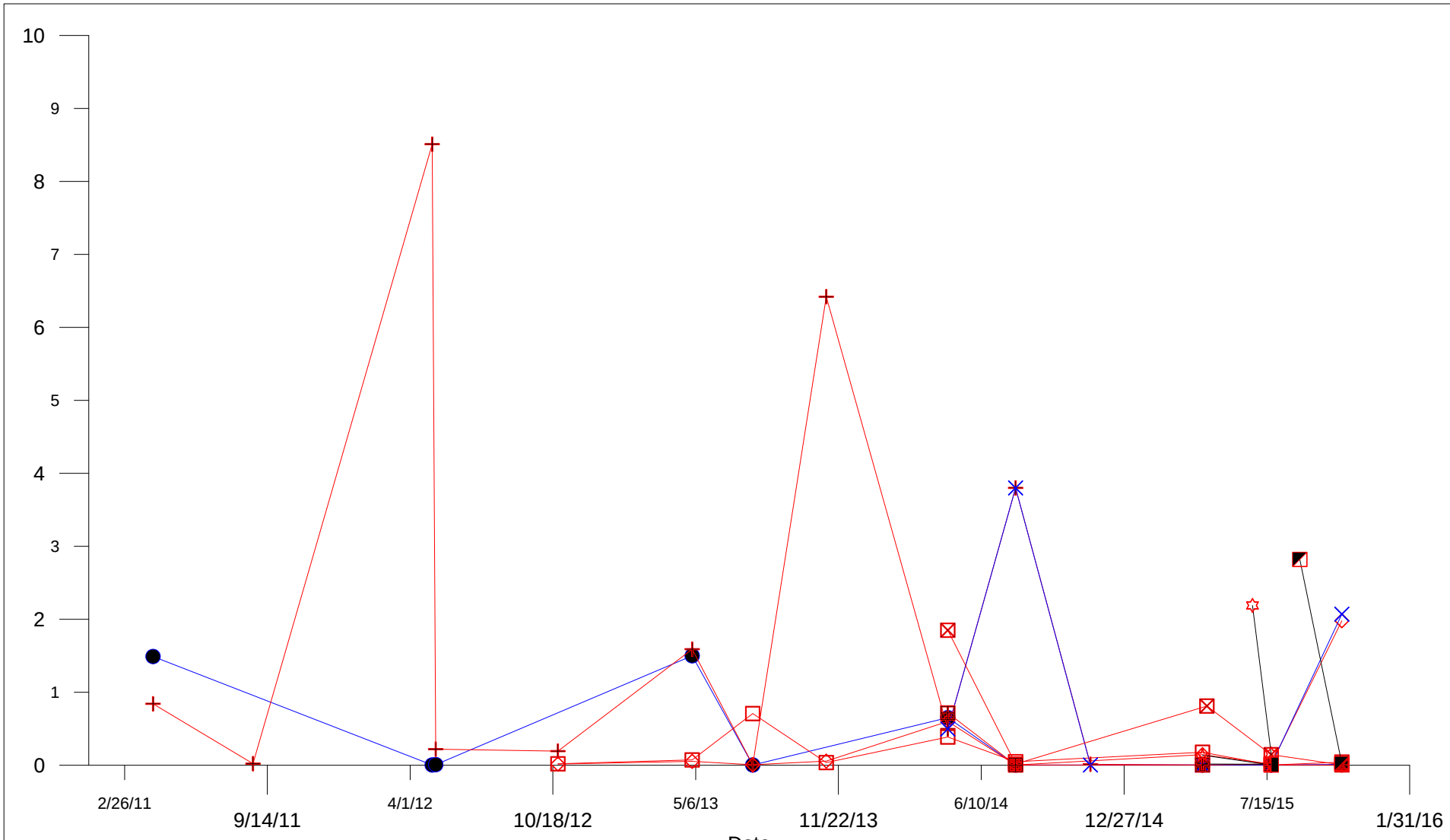
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Dissolved Lead
Surface Water

APRIL 2016	FIGURE 48	REV 0



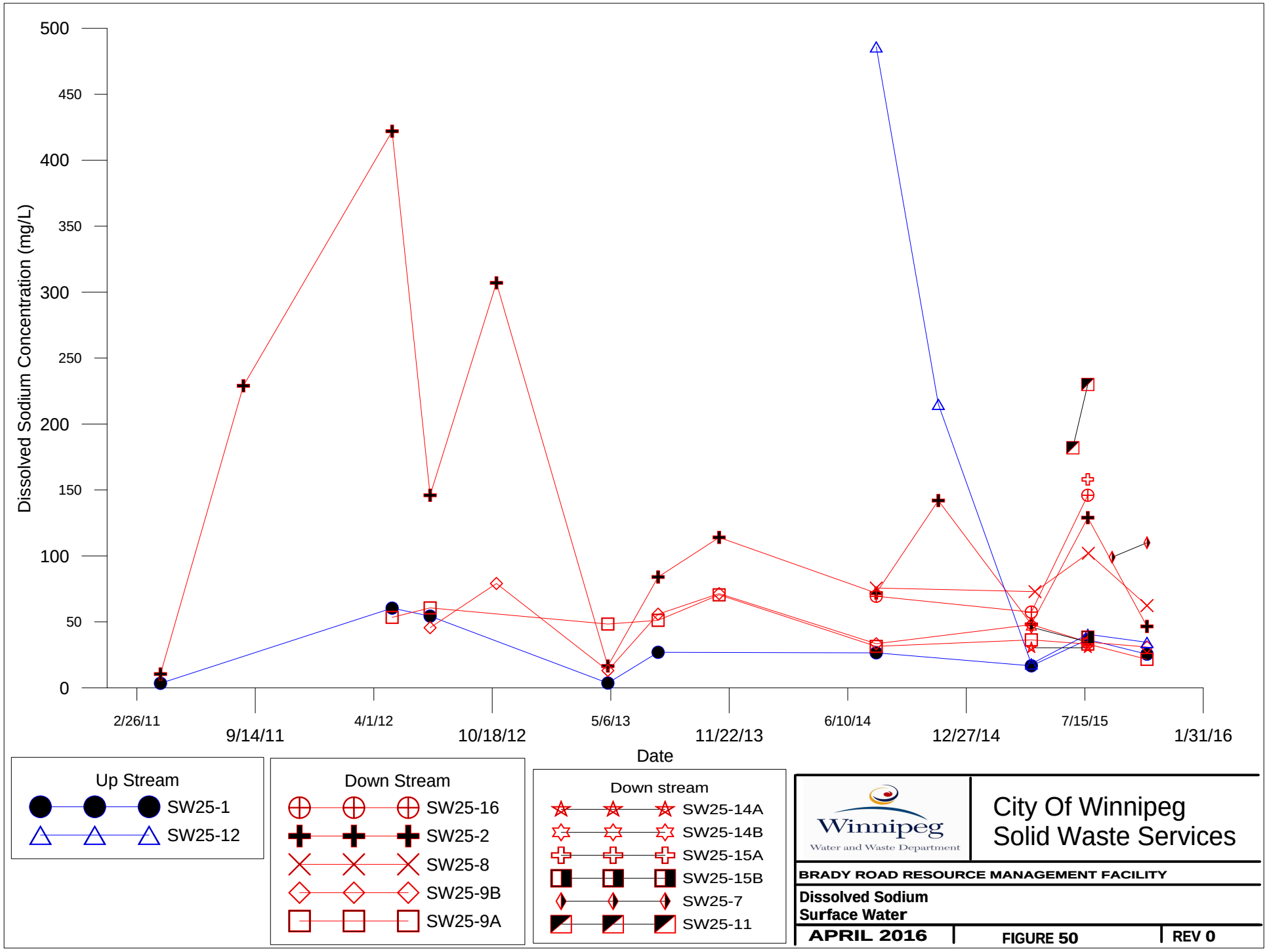
Winnipeg
Water and Waste Department

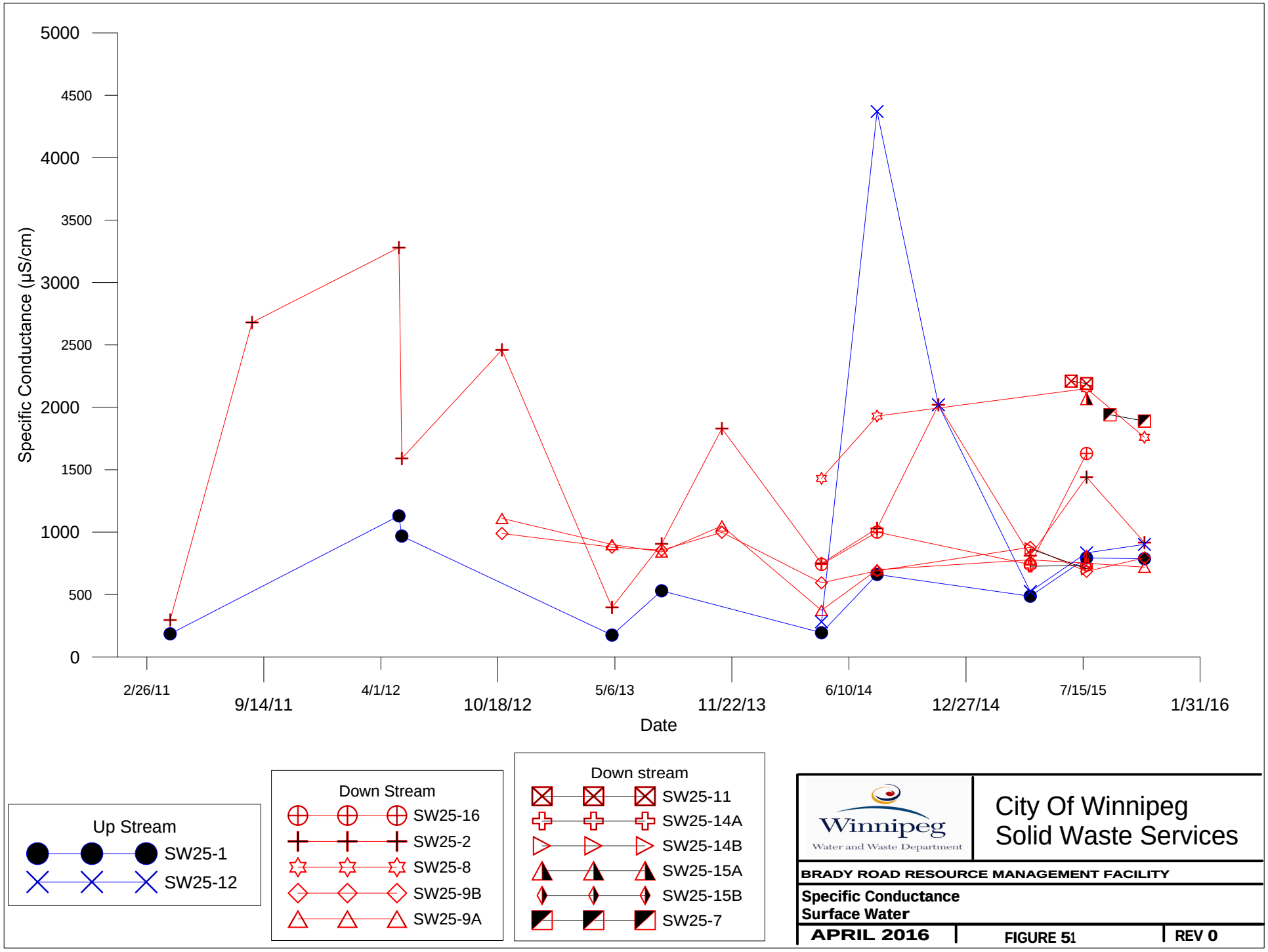
City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Nitrate Nitrite as Nitrogen
Surface Water

APRIL 2016	FIGURE 49	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
Date
Up Stream
SW25-1
SW25-12
Down Stream
SW25-16
SW25-2
SW25-8
SW25-9B
SW25-9A
Down stream
SW25-14A
SW25-14B
SW25-15A
SW25-15B
SW25-7
SW25-11
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Dissolved Sodium
Surface Water
APRIL 2016
FIGURE 50
REV 0



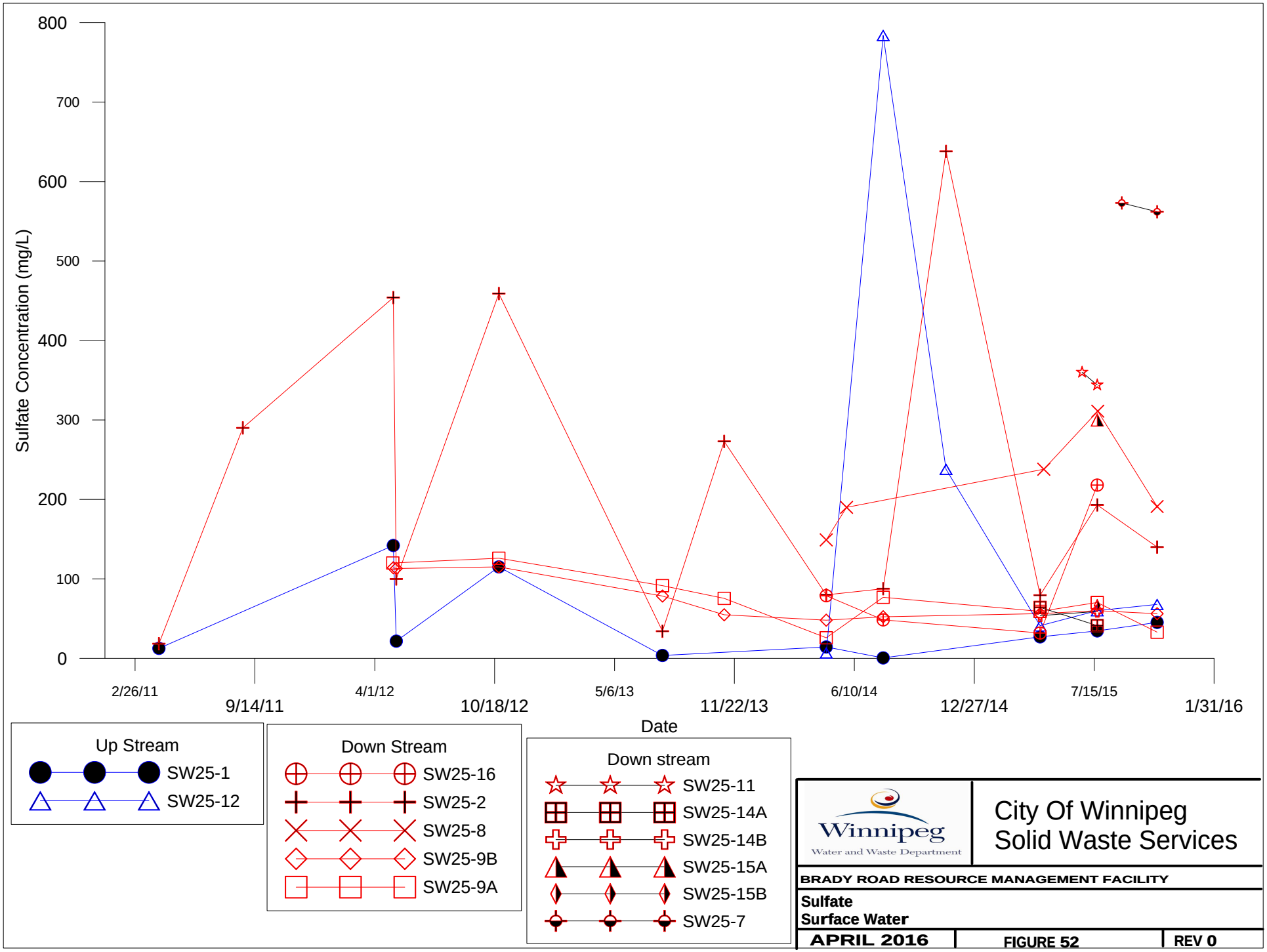
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

Specific Conductance
Surface Water

APRIL 2016 | **FIGURE 51** | **REV 0**



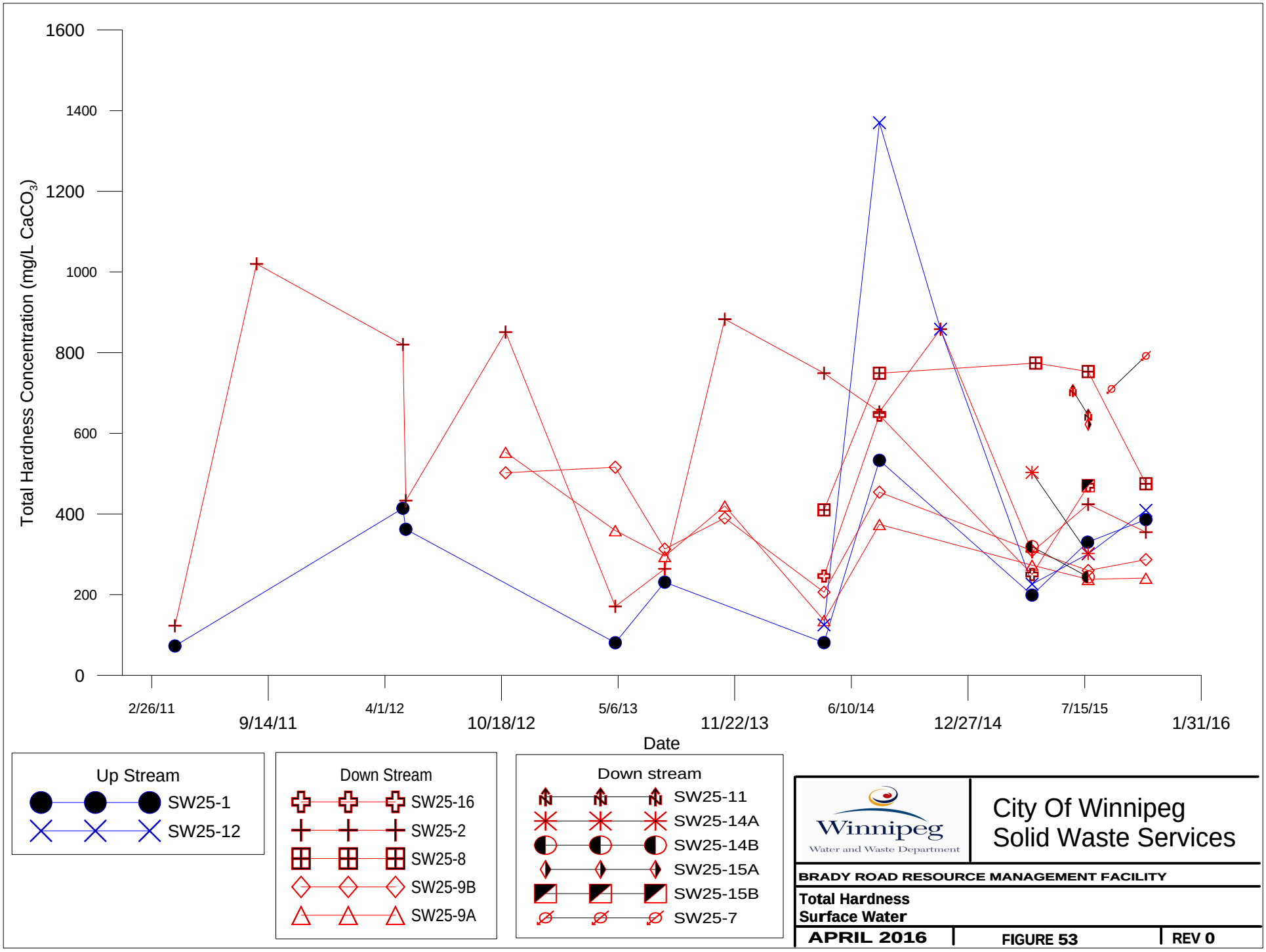
Winnipeg
Water and Waste Department

City Of Winnipeg
Solid Waste Services

BRADY ROAD RESOURCE MANAGEMENT FACILITY

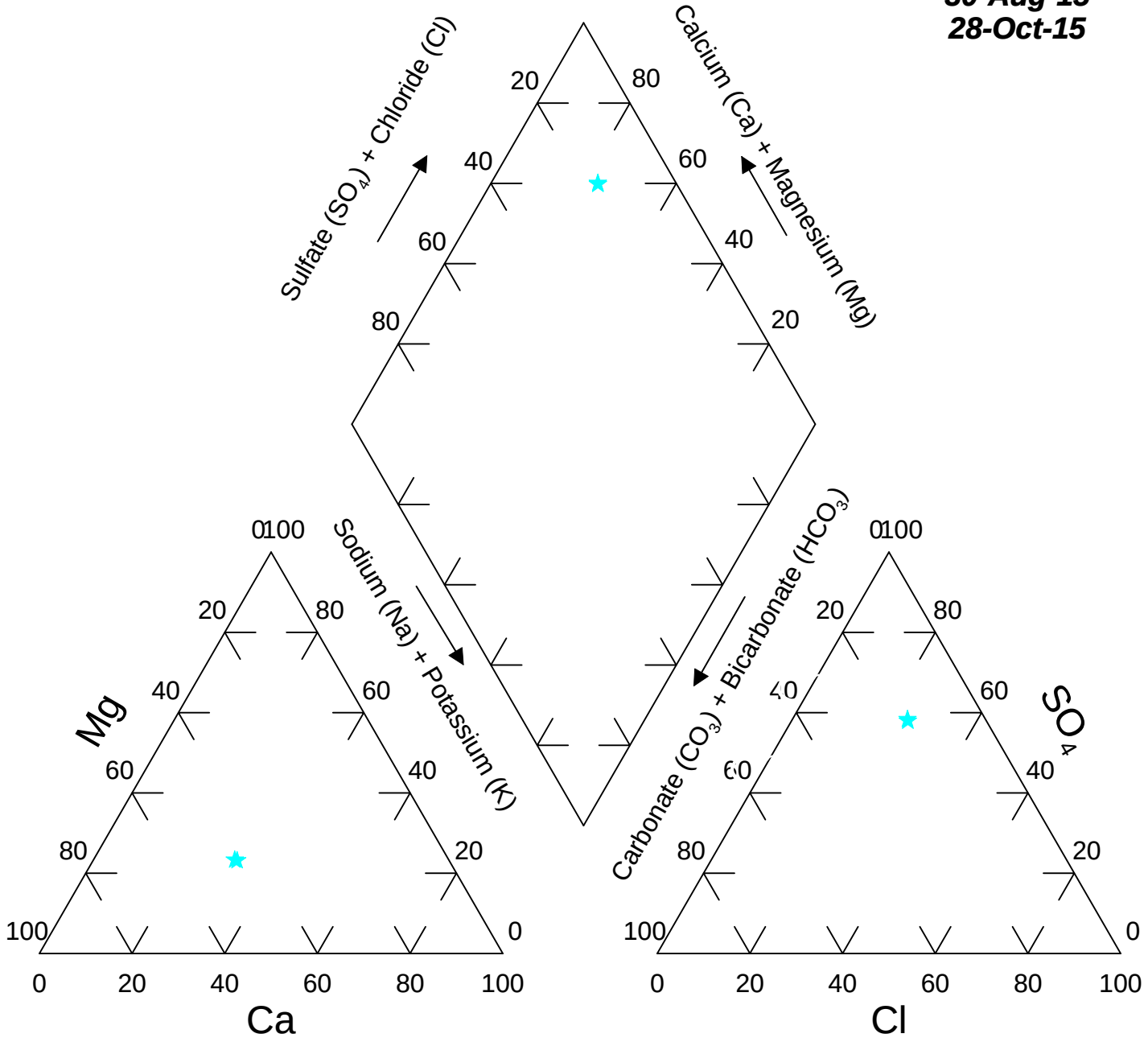
Sulfate
Surface Water

APRIL 2016	FIGURE 52	REV 0


1600
1400
1200
1000
800
600
400
200
0
Total Hardness Concentration (mg/L $CaCO_3$)
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
Date
Up Stream
SW25-1
SW25-12
Down Stream
SW25-16
SW25-2
SW25-8
SW25-9B
SW25-9A
Down stream
SW25-11
SW25-14A
SW25-14B
SW25-15A
SW25-15B
SW25-7
Winnipeg
Water and Waste Department
City Of Winnipeg
Solid Waste Services
BRADY ROAD RESOURCE MANAGEMENT FACILITY
Total Hardness
Surface Water
APRIL 2016
FIGURE 53
REV 0

Site: Brady
Location : SW25-7

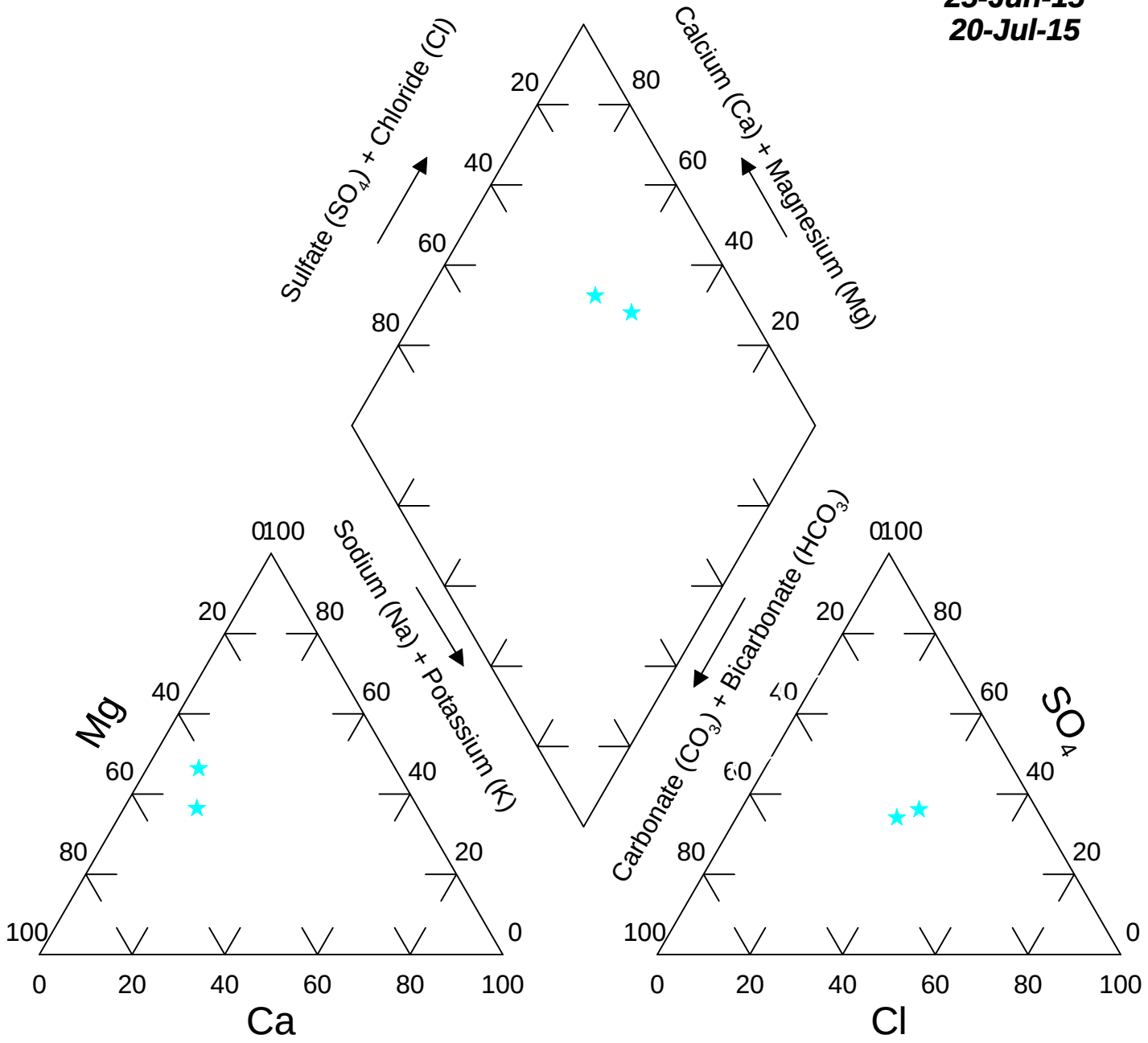
Dates:
30-Aug-15
28-Oct-15



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-11

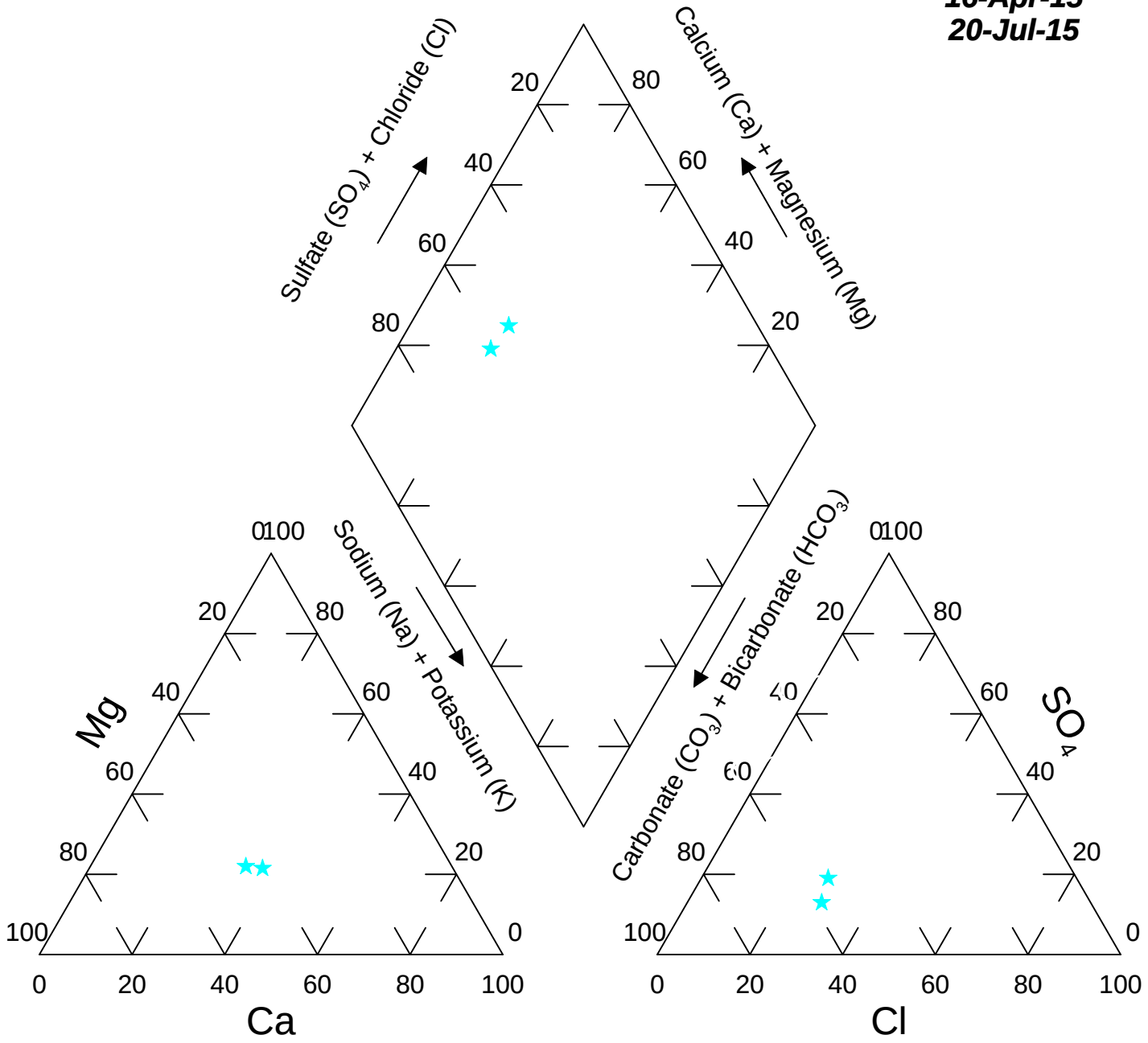
Dates:
25-Jun-15
20-Jul-15



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-14A

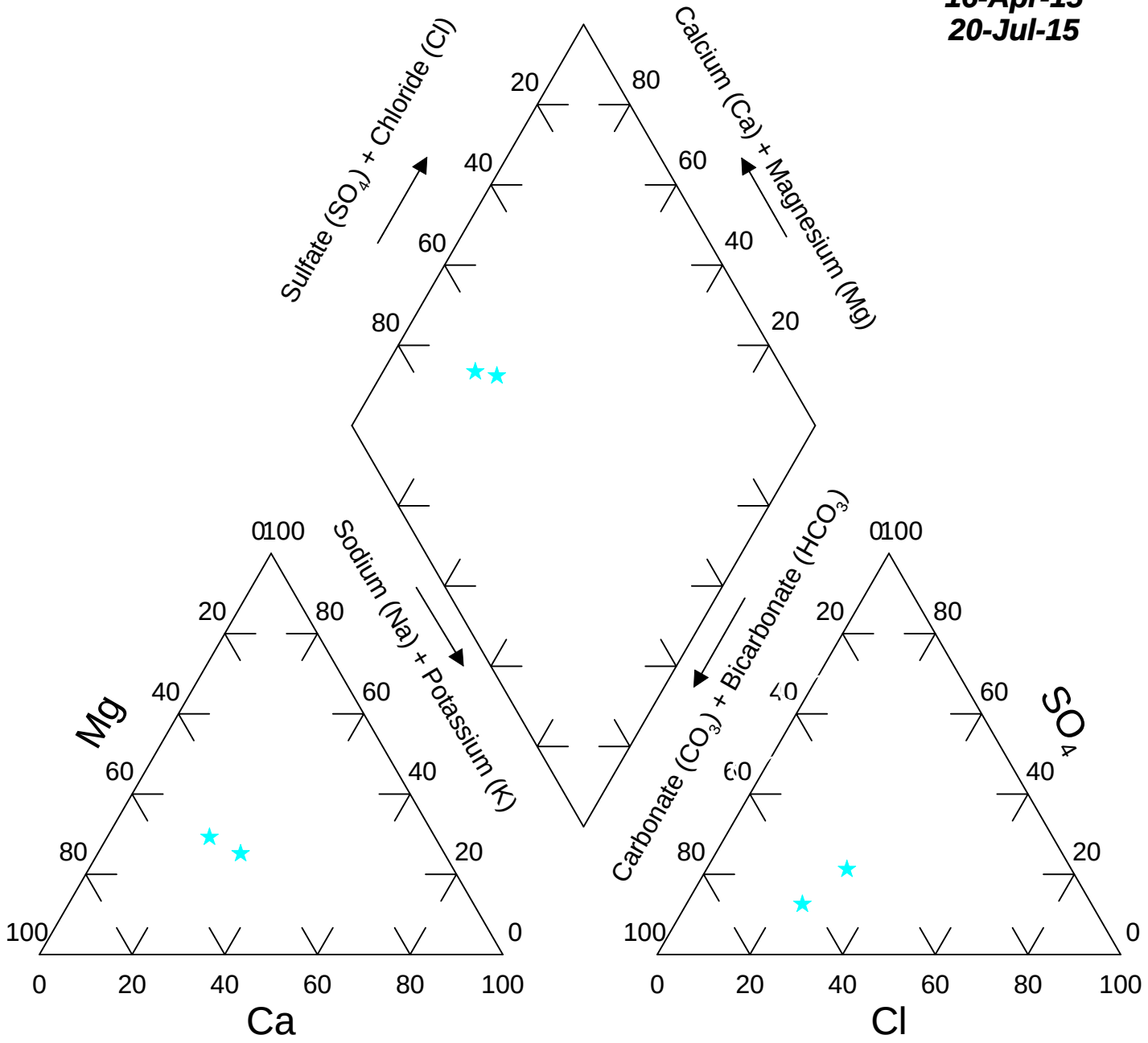
Dates:
16-Apr-15
20-Jul-15



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-14B

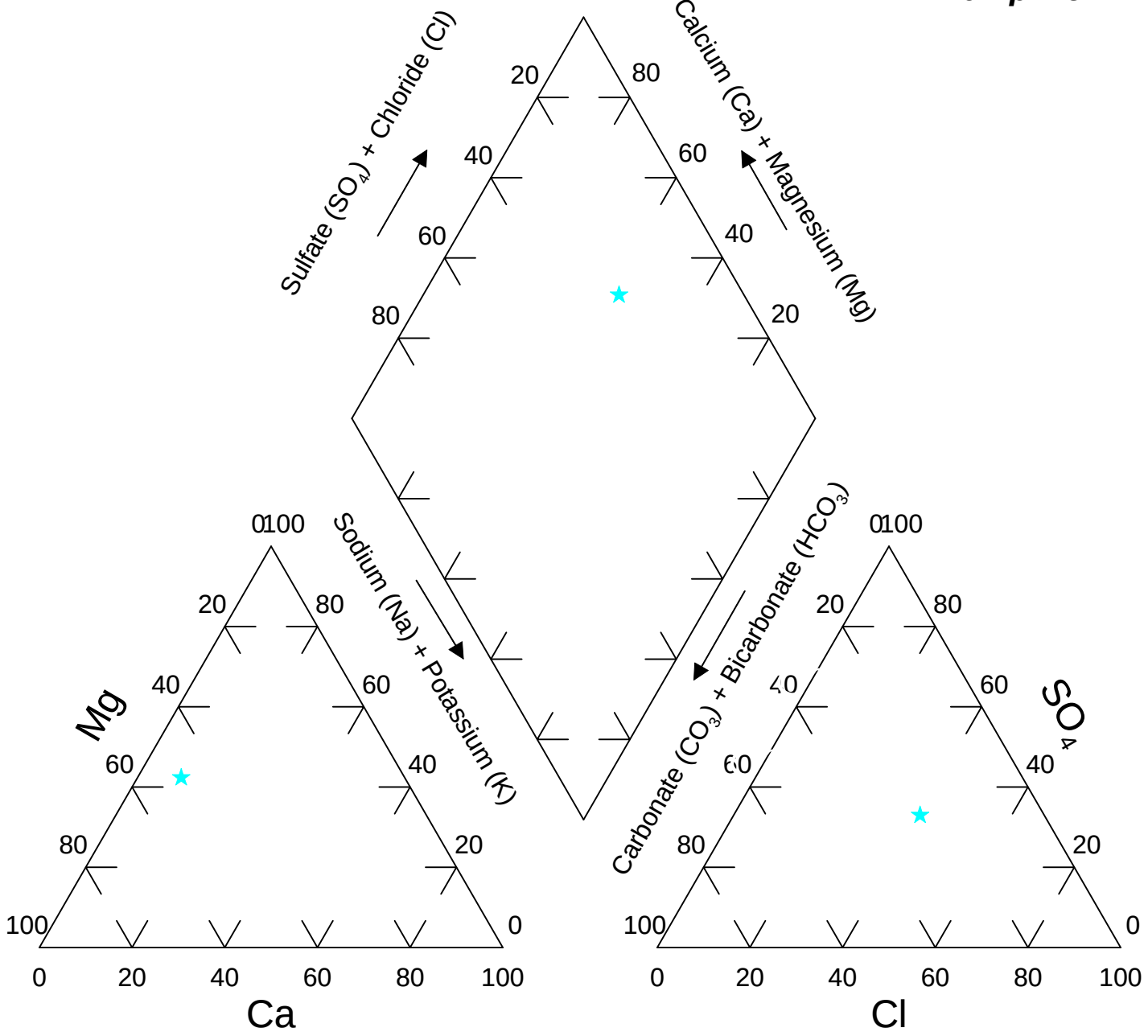
Dates:
16-Apr-15
20-Jul-15



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-15A

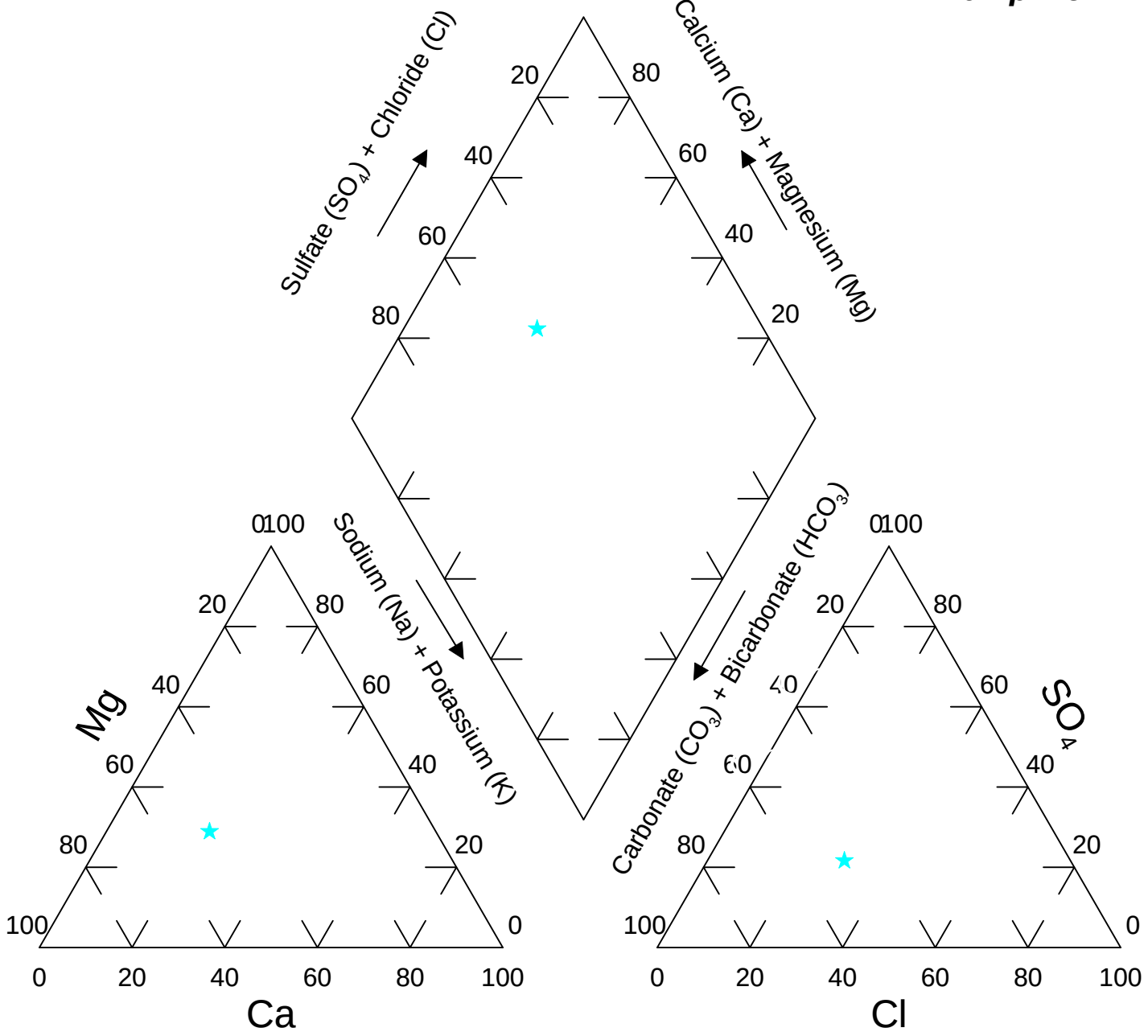
Dates:
16-Apr-15



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-15B

Dates:
16-Apr-15



Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-1

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

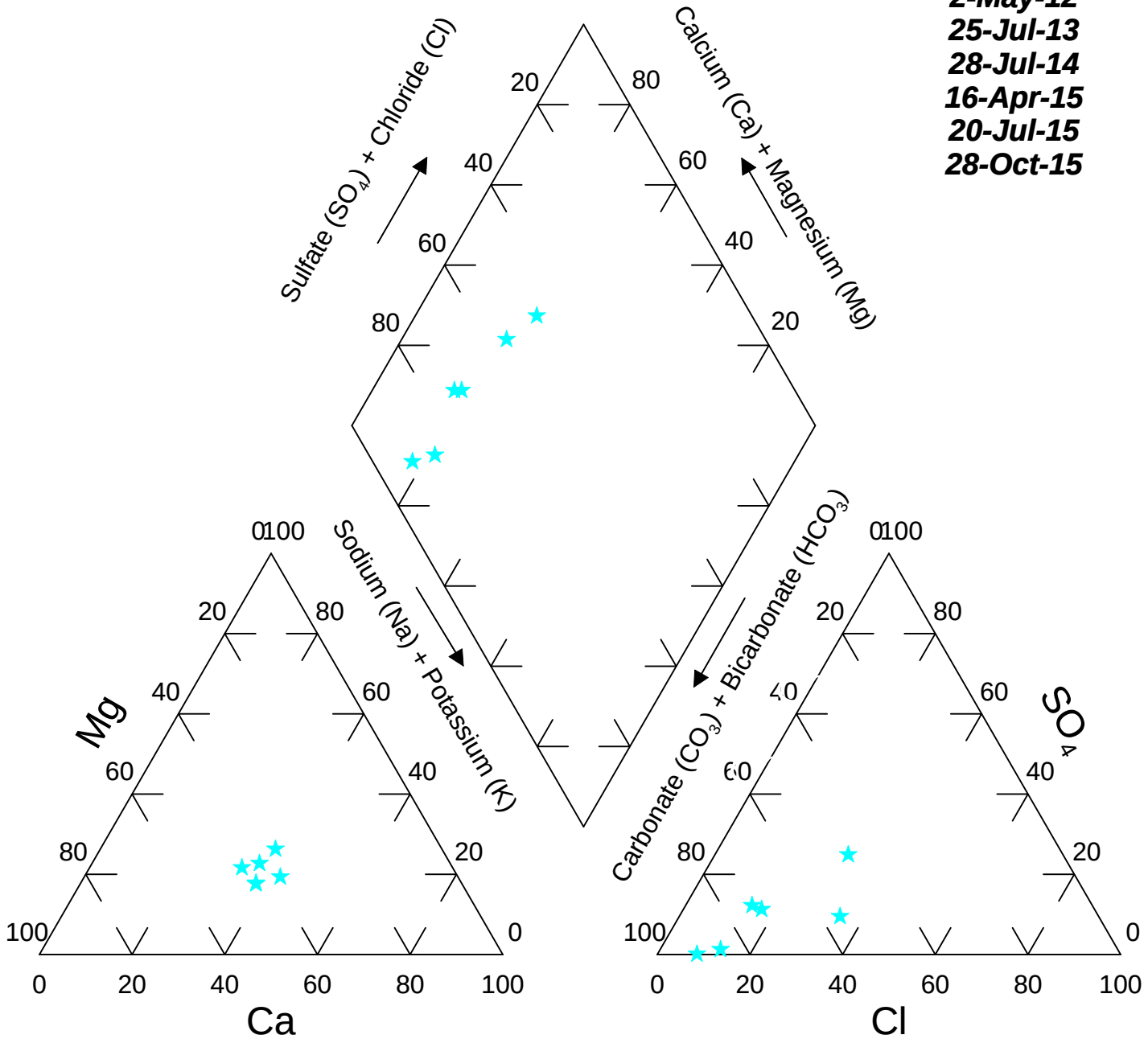


FIGURE: 25P

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

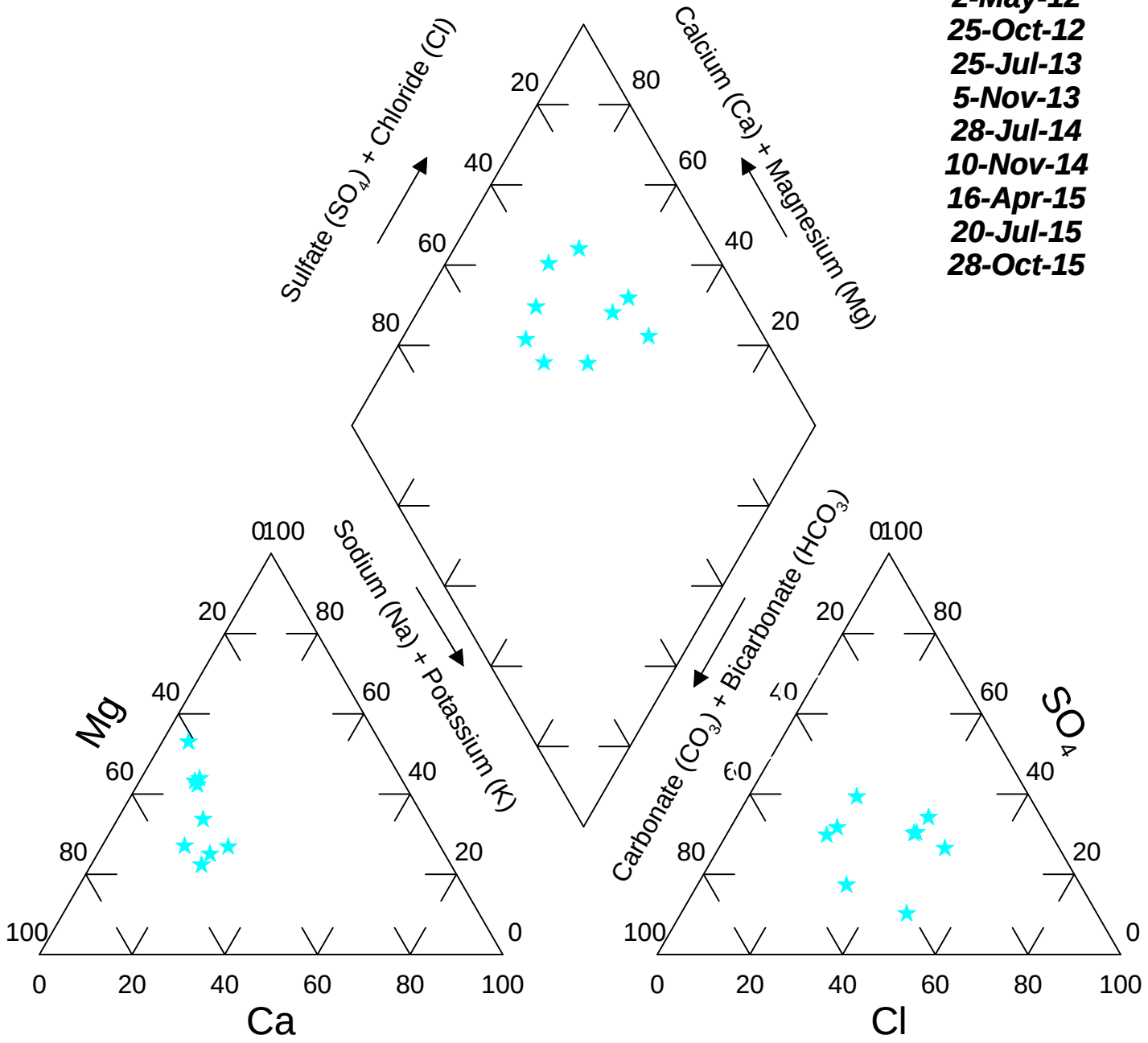


FIGURE: 26P

Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-8

Dates:
28-Jul-14
22-Apr-15
21-Jul-15
28-Oct-15

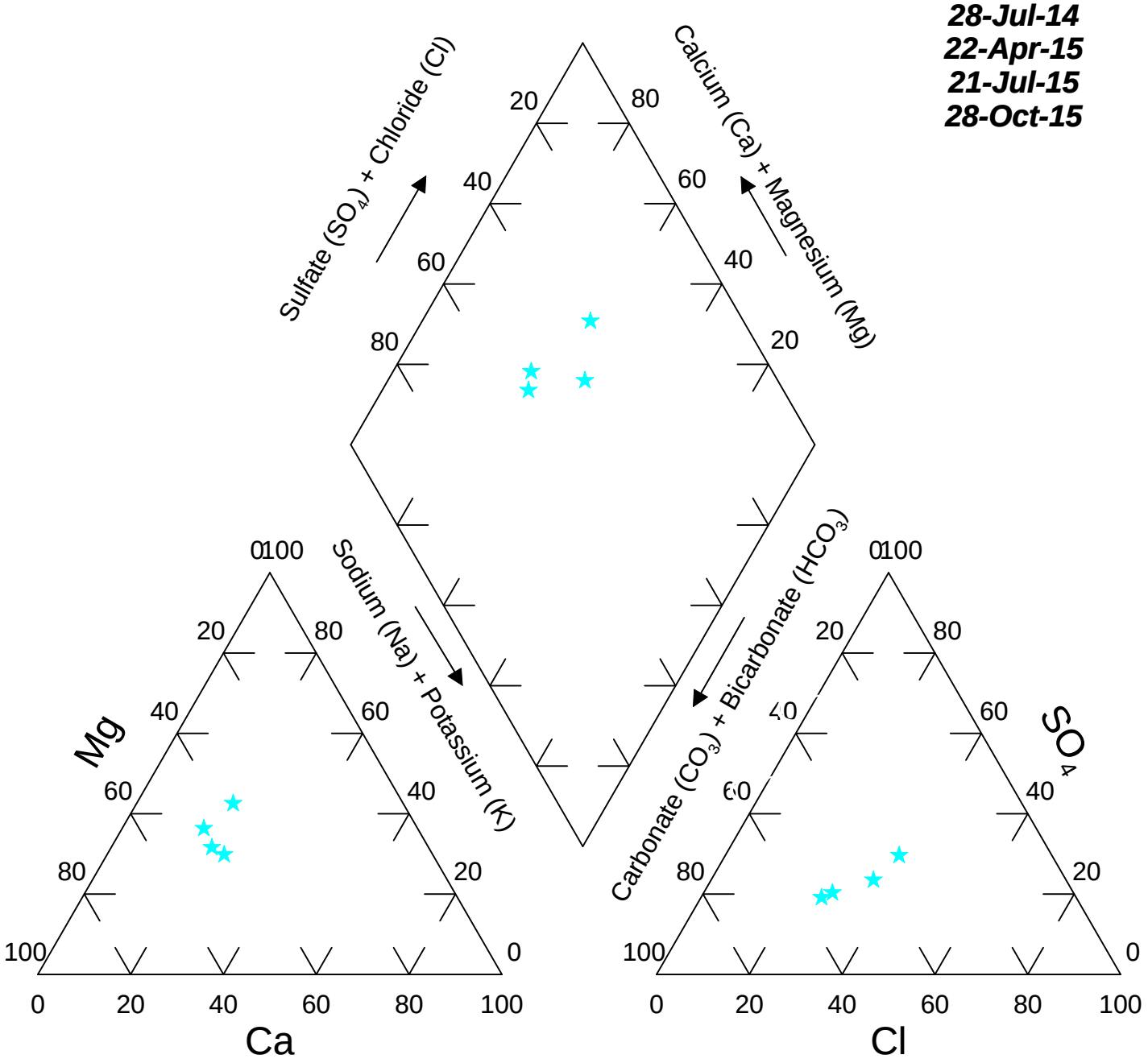


FIGURE: 27P

Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-12

Dates:
28-Jul-14
16-Apr-15
20-Jul-15
28-Oct-15

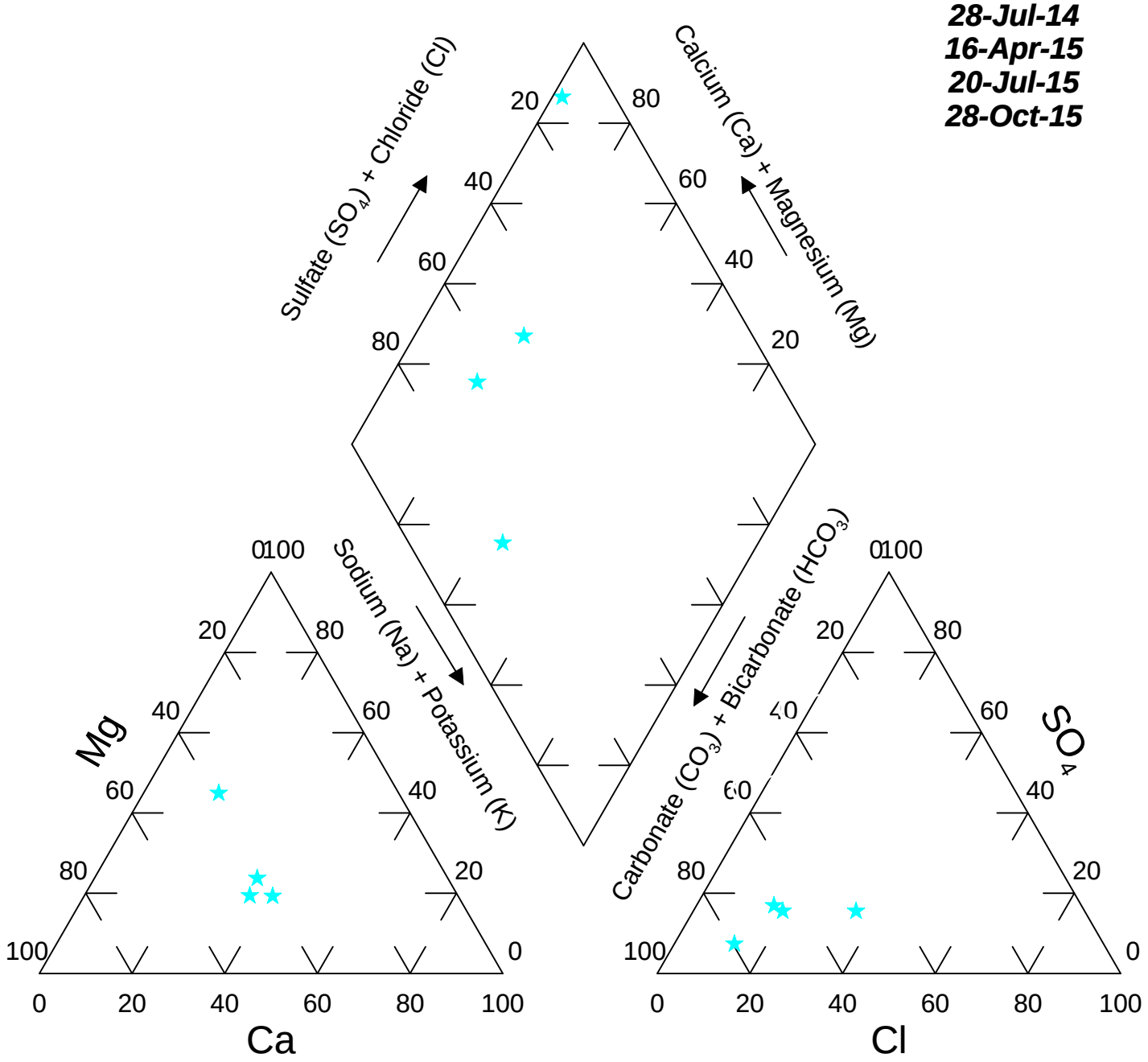


FIGURE: 28P

Winnipeg
Water and Waste Department

Site: Brady
Location : SW25-16

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

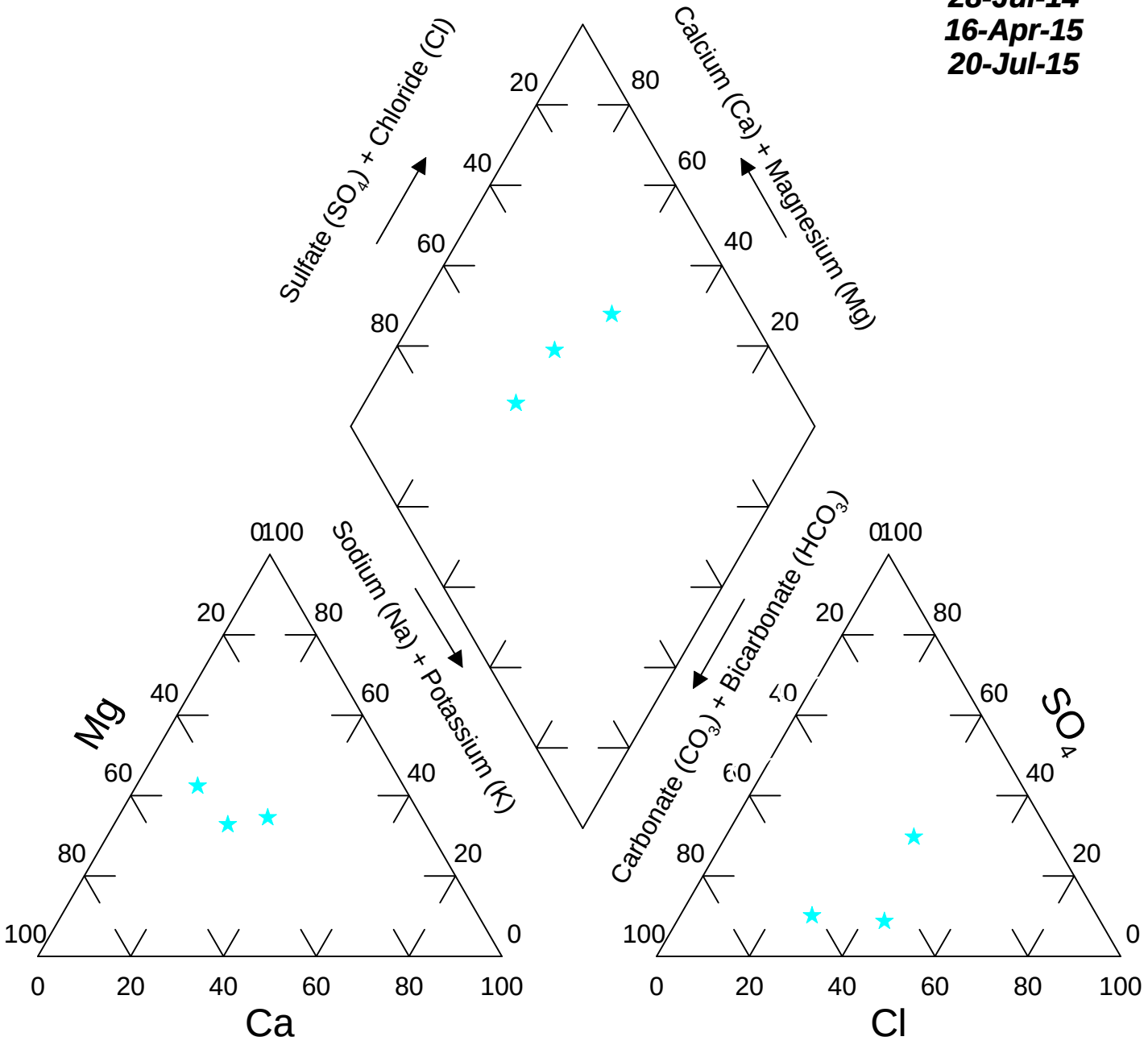


FIGURE: 29P

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

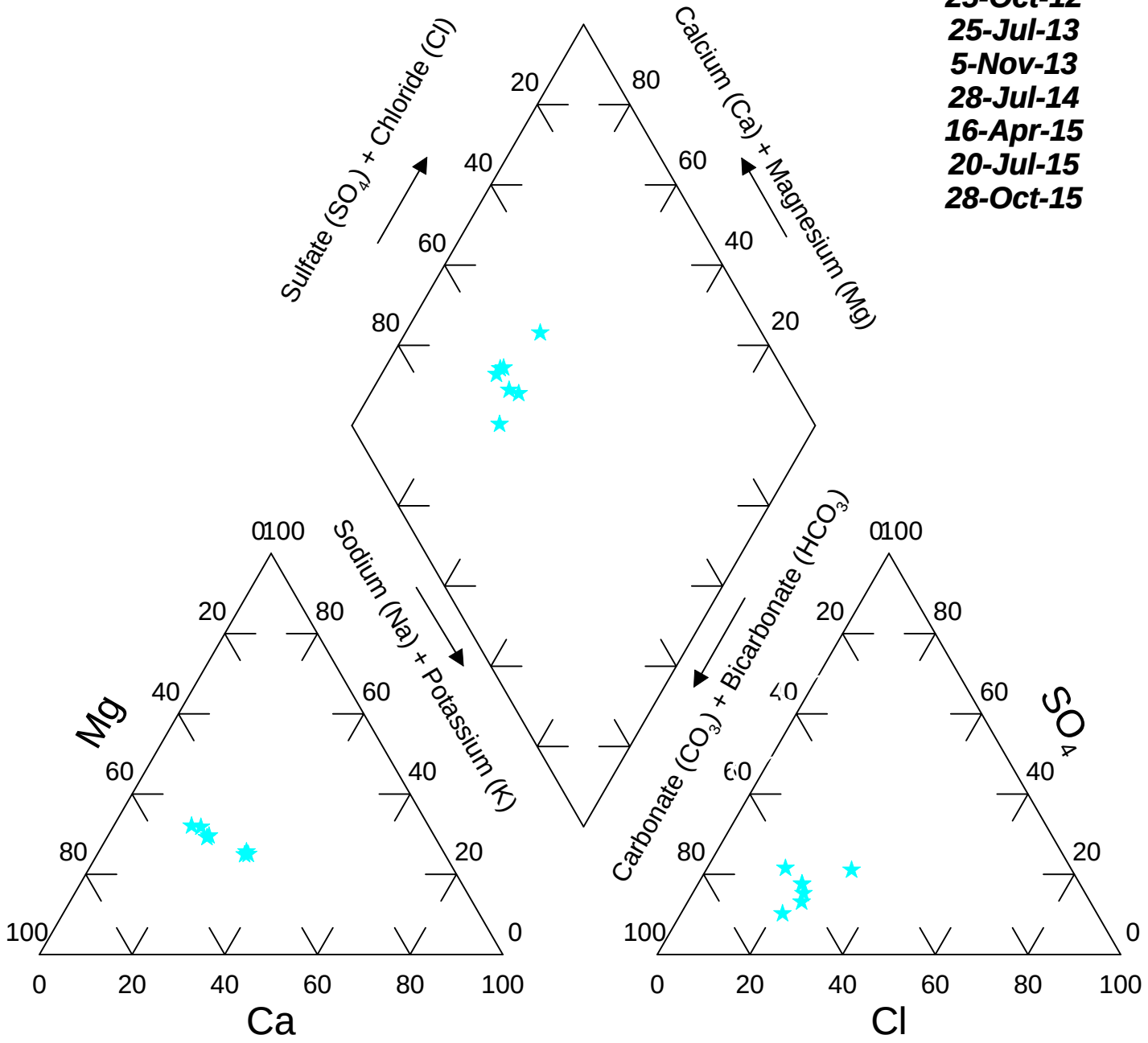


FIGURE: 30P

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

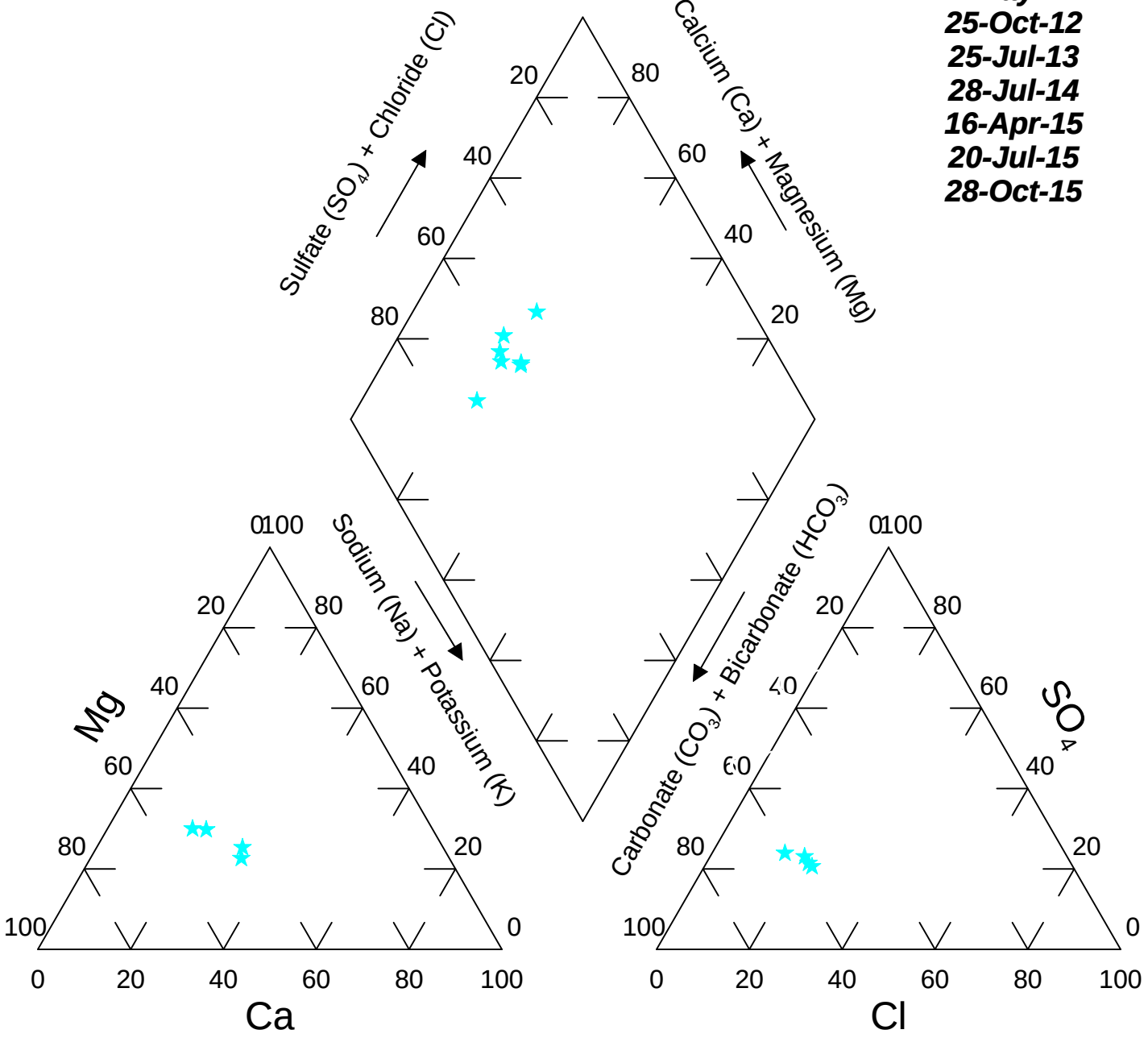


FIGURE: 31P

Winnipeg
Water and Waste Department

APPENDIX D
2015 LANDFILL GAS COLLECTION AND FLARING REPORT

2015 ANNUAL MONITORING REPORT
CITY OF WINNIPEG

BRADY ROAD RESOURCE MANAGEMENT FACILITY
LANDFILL GAS COLLECTION AND FLARING SYSTEM
2015

Prepared for

THE CITY OF WINNIPEG

Prepared by

INTEGRATED GAS RECOVERY SERVICES INC.

2015 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 2015.

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 2015, elevated levels of Carbon Monoxide (CO) had continuously been found at GW 2-13, but were significantly lower at GW 5-42 compared to 2014 levels. 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. In some cases, wells that were fitted with wellbore seals showed some improvement in gas quality, gas flow, or both. Of the eight wells fitted with seals, most show reduced oxygen concentrations after Spring 2015 (H-1, 1-5, H-12, 2-14, 3-22, 5-39, 5-41). However, fluctuations of gas quality are typically observed throughout the year due to weather conditions and seasonal changes. Additional measurements and observations throughout 2015 and 2016 will further confirm whether the borehole seals have improved wellfield collection and balancing.

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 2015. 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. During 2015, the average open screen at all wells was approximately 45%.

Based on pump counters and water levels recorded throughout 2015, dual purpose well pumps continue to remove leachate consistently. Most of the dual purpose wells have open screen percentages on average 59%. The pump at 3-27 shows no operation throughout 2015. 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.

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.

Table 2:
Wellfield Monitoring Data

		21-Jan-15	25-Feb-15	30-Mar-15	16-Apr-15	11-May-15	12-May-15	3-Jun-15	23-Jul-15	19-Aug-15	29-Sep-15	29-Oct-15	27-Nov-15	15-Dec-15
Weather Conditions		Mostly Cloudy	Mainly Sunny	Mostly Cloudy	Mainly Sunny	Cloudy	Partially Cloudy	Mostly Cloudy	Mostly Cloudy	Partially Cloudy	Partially Clody	Cloudy	Mainly Sunny	Mostly Cloudy
Ambient Temperature (deg C)		-15	-22	3	9	7	7	14	23	17	3	3	-14	-8
Location														
Control Panel	*Flow Rate*	900	906	899	1000	1008		1013	1004	1001	984	1019	1004	1005
	CH4	48.9	46.7	52.0	49.2	48.6		52.2	52.9	51.9	51.9	51.6	47.3	48.7
	O2	1.6	2.1	0.8	1.8	1.4		0.8	0.8	0.7	0.5	0.7	2.2	1.8
	Wellfield Vac	-12.7	-18.1	-10.2	-13.4	-13.7		-11.5	-11.0	-11.5	-11.2	-13.5	-13.4	-14.7
	Outlet Press.	3.1	3.0	3.6	4.2	4.5		3.0	3.3	4.2	3.3	4.3	4.7	4.5
H-1	*Well*	-6.56	-1.06	-3.05	-4.39	-4.35		-4.69	-3.15	-3.49	-3.7	-3.61	-3.92	-4.7
well bore seal	*Lateral*	-12.17	-16.91	-8.84	-10.68	-11.75		-10.49	-8.46	-10.26	-10.15	-12.05	-13.24	-15.48
	CH4	35.3	0.7	52.4	47.6	42.2		44	43.9	46.3	47.2	50.3	46.9	42.3
	CO2	26.3	0.6	36.6	35.4	33.8		34	34.7	35.5	36.3	37.8	37.4	36
	O2	6.0	23.0	0.4	0.3	0.3		0.4	0.3	0.3	0.3	0.2	0.3	0.7
	BAL (N2)	32.4	75.4	10.6	16.7	23.7		21.6	21.1	17.7	16.2	11.5	15.4	20.9
	CO	1	8	14	19	15		15	23	11	Out of Range	0	0	0
	H2S	21	0	43	46	43		41	42	35	36	28	32	28
	Vel Max (m/s)	2.15	-	1.60	1.58	1.88		1.62	1.44	1.94	1.52	1.9	1.75	2.05
	Vel Min (m/s)	2.07	-	1.53	1.55	1.78		1.58	1.38	1.86	1.45	1.85	1.62	1.95
	Flow (cfm)	19.94	#VALUE!	14.78836969	14.78836969	17.29247063	0	15.1191	13.32370688	17.95393125	14.03241469	17.71769531	15.92230219	18.898875
	Temp	7.8	-	16.6	21.8	14.9		21.5	30	21.9	18.6	14.2	11.5	9.5
	Comments	closed 1/4T	Frozen	no change	no change	no change		no change	no change	no change	no change	no change	no change	no change
H-2	*Well*	-0.40	0.51	0.75	-0.86	-1.37		-1.38	-0.72	-0.91	-0.94	-0.62	-0.94	-2.44
	Lateral	-12.29	-16.02	-9.00	-10.95	-11.50		-9.79	-8.13	-10.21	-10.02	-11.73	-13.15	-15.13
	CH4	31.6	48.7	58.3	56.2	47.6		57.7	52.9	51.5	54.5	54.3	53.8	49.4
	CO2	21.6	32.9	41.4	40.0	35.9		41.9	40	39.3	39.8	40.9	40.9	38.8
	O2	10.4	4.6	0.2	0.7	3.1		0.3	0.5	1	0.6	0.4	0.4	1.3
	BAL (N2)	36.0	13.8	0.0	3.0	13.4		0	6.6	8.2	5.2	4.3	4.9	10.5
	CO	0	9	12	17	17		22	20	21	0	1	0	0
	H2S	0	143	135	45	20		30	22	17	22	22	22	14
	Vel Max (m/s)	0.58	0.68	0.69	1.59	3.43		2.22	2.57	2.5	2.19	2.72	2.8	4.09
	Vel Min (m/s)	0.52	0.00	0.62	1.56	3.33		2.13	2.45	2.31	2.09	2.57	2.68	3.98
	Flow (cfm)	5.20	3.21280875	6.189381563	14.88286406	31.93909875	0	20.55252656	23.71808813	22.72589719	20.22179625	24.99376219	25.89145875	38.12848031
	Temp	2.3	3.9	14.5	25.7	22.8		25.4	30	27.3	24.8	21	19	21
	Comments	no change	no change	opened 1/4T	opened 1/4T	closed 1/4T		opened 1/4T	no change	no change	no change	no change	opened 1/4T more	no change
H-3	*Well*	-2.20	-3.32	-2.04	-3.76	-2.04		-2.87	-2.15	-2.05	-2.21	-2.8	-4.2	-7.29
	Lateral	-12.37	-17.10	-8.87	-11.28	-11.64		-9.94	-8.14	-10.35	-9.9	-11.86	-15.67	-15.14
	CH4	57.6	45.4	45.9	51.5	53.4		55.6	55.2	53.9	55.4	55.7	55.1	55.5
	CO2	40.6	35.4	35.9	39.5	40.9		41.6	42.3	42.2	42	43.6	44.1	43
	O2	1.2	4.8	4.3	2.3	1.9		1.3	0.7	1.1	0.9	0.6	0.7	1.4
	BAL (N2)	0.8	14.2	13.8	6.6	3.8		1.3	1.8	2.7	1.5	0	0	0
	CO	32	5	22	19	38		92	51	58	97	19	0	0
	H2S	4	15	10	12	14		19	26	18	18	15	14	11
	Vel Max (m/s)	2.47	2.71	1.87	2.16	2.45		2.04	1.97	2.25	2.27	2.17	2.55	3.16
	Vel Min (m/s)	2.24	2.56	1.80	1.96	2.33		1.99	1.78	2.17	2.14	2.01	2.44	3.09
	Flow (cfm)	22.25	24.89926781	17.33971781	19.46584125	22.58415563	0	19.04061656	17.71769531	20.88325688	20.83600969	19.74932438	23.57634656	29.52949219
	Temp	3.5	5.1	10	14.7	9.6		14.7	24.1	19.8	16.8	10.7	11.4	10
	Comments	opened 1/4T	no change	no change	no change	no change		no change	no change	no change	no change	no change	opened 1/4T more	no change
H-4 DP	*Well*	-0.93	-0.16	0.62	-0.61	0.32		0.78	1.09	0.6	0.46	0.44	0.04	-0.31
	Lateral	-12.24	-16.93	-9.09	-11.15	-11.74		-9.81	-8.11	-10.15	-10.45	-11.77	-15.4	-15.19
	CH4	44.1	42.9	57.8	47.2	57.8		57.1	57.3	55.4	56.9	56.4	55.3	51.6
	CO2	30.2	31.5	41.3	35.6	41.1		42.4	42.4	41.9	42.7	43	44.5	38.3
	O2	5.6	6.3	0.9	3.7	1.1		0.6	0.3	0.7	0.3	0.5	0.2	3.4
	BAL (N2)	20.0	19.6	0.0	13.4	0.5		0	0	1.6	0	0	0	6.8
	CO	4	5	13	11	11		27	27	13	41	0	0	0
	H2S	2	16	25	13	35		36	52	28	27	24	33	21
	Max	2.1	1.72	1.46	1.83	1.20		0.96	0.74	1.08	0.83	1.05	1.03	1.44
	Min	2.01	1.58	1.41	1.72	1.13		0.92	0.67	1.05	0.72	0.99	0.97	1.26
	Flow (cfm)	19.42	15.59157188	13.55994281	16.77275156	11.00859469	0	8.88247125	6.661853438	10.06365094	7.323314063	9.63842625	9.4494375	12.75674063
	Temp	6.5	0.4	10.2	15.0	10.5		17.1	28.9	23.8	15.6	9.6	12.1	6.7
	Comments	closed 1/4T	no change	opened 1/4T	closed 1/4T	no change		no change	no change	no change	no change	no change	no change	no change
1-5	*Well*	-1.58	0.54	-0.99	-1.37	-0.49		-0.51	0.13	-0.1	0.02	0.4	-0.32	-0.87
well bore seal	*Lateral*	-12.50	-17.03	-9.86	-11.12	-11.68		-10	-8.25	-10.44	-9.91	-11.93	-15.52	-15.17
	CH4	38.6	38.3	55.0	54.7	52.3		57.3	56.8	55.3	56.7	55.8	55.2	55.4
	CO2	30.6	27.2	39.9	39.7	38.6		41.9	42.8	42.3	42.9	43.8	44.5	44.2
	O2	4.7	8.1	1.4	1.2	2.0		0.7	0.4	0.7	0.4	0.3	0.4	0.4
	BAL (N2)	26.1	25.4	3.8	4.4	7.1		0	0	1.7	0	0	0	0
	CO	13	7	13	6	14		21	17	16	29	16	0	0
	H2S	9	99	31	29	30		35	38	31	33	28	27	25
	Max	1.81	0.78	1.56	1.64	1.73		1.48	1.38	1.62	1.38	1.56	1.83	1.74
	Min	1.55	0.48	1.52	1.5	1.65		1.44	1.35	1.55	1.33	1.48	1.69	1.68
	Flow (cfm)	15.88	5.953145625	14.55213375	14.83561688	15.96954938	0	13.79617875	12.89848219	14.97735844	12.80398781	14.363145	16.63101	16.15853813
	Temp	4.4	5.0	13.6	19.4	12.5		20.2	30.5	24.1	21.40	12.40	11.70	8.80
	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
1-6 DP	*Well*	-2.59	-0.96	-1.53	-0.71	-0.36		-0.6	0.09	-0.06	0.18	0.68	0.29	0.09
	Lateral	-12.16	-16.53	-10.22	-10.18	-10.47		-9.97	-7.95	-10.31	-9.41	-11.23	-12.44	-14.72
	CH4	31.8	42.6	51.0	43.9	46.4		53.1	44.2	39.8	58.8	58	55.6	44.9
	CO2	26.9	33.2	36.7	34.6	35.1		37.5	31.8	29.4	40.8	41.8	39.5	34.8
	O2	3.2	2.3	0.6	1.0	0.8		1.1	4	5.7	0.3	0.2	1.3	3.2
	BAL (N2)	38.1	21.7	11.7	20.6	17.7		8.3	20	25.1	0	0	3.5	17.1
	CO	5	11	13	14	11		11	12	7	15	5	0	0
	H2S	59	123	151	157	145		149	113	89	177	177	104	93
	Max	3.47	2.99	2.16	2.26	2.39		2.27	2.01	2.35	1.44	1.75	2.04	2.36
	Min	3.34	2.83	2.04	2.18	2.34		2.22	1.94	2.21	1.37	1.66	1.98	2.24
	Flow (cfm)	32.18	27.49786313	19.84381875	20.97775125	22.34791969	0	21.21398719	18.66263906	21.5447175	13.27645969	16.11129094	18.99336938	21.73370625
	Temp	18.0	16.3	20.7	24.7	20.2		24.6	32.5	26.8	23.8	18.3	16.9	17
	Comments	closed 1/2T	no change	no change	no change	no change		no change	no change	closed 1/4T	no change	opened 1/4T more	no change	no change
1-7	*Well*	0.00	-0.38	0.27	0.00	-0.09		-0.16	0.07	0.14	-0.12	0.23	0.21	0.02
	Lateral	-11.53	-15.97	-8.97	-12.29	-12.14		-10.19	-8.16	-10.17	-10.01	-11.85	-13.1	-15.6
	CH4	53.5	41.0	50.9	46.1	34.8		39.4	48.5	50.9	46.3	46.4	46.5	42.2
	CO2	45.5	33.2	49.1	46.8	41.8		41.6	51.1	48.7	53.2	53.1	53.1	46.1
	O2	0.8	6.7	0.2	1.0	0.7		0.9	0.3	0.3	0.3	0.5	0.3	3
	BAL (N2)	0.1	19.7	0.0	5.8	22.8		18.1	0	0	0	0	0	8.6
	CO	56	11	116	87	118		169	350	430	953	87	0	0
	H2S	1	11	37	31	31		40	105	105	114	76	82	71
	Max	1.38	0.00	0.88	1.02	1.21		0.84	0.82	0.9	0.79	0	0.86	0
	Min	1.05	0.00	0.78	0.99	1.18		0.81	0.8	0.88	0.75	0	0.82	0
	Flow (cfm)	11.48	0	7.843033125	9.496684688	11.29207781	0	7.795785938	7.654044375	8.409999375	7.276066875	0	7.9375275	0
	Temp	-1.0	-9.0	13.7	17.8	15.3		18.7	32.9	28.9	20.3	13.6	7.4	3.9
	Comments	no change	no change	no change	no change	no change		no change	no change	no change	closed 1/4T	no change	no change	no change
1-8	*Well*	-0.03	-0.07	0.27	-0.29	-0.28		-0.46	-0.01	0.07	-0.23	0.09	0.05	-0.16
	Lateral	-11.51	-16.40	-9.01	-12.52	-12.37		-10.31	-8.44	-10.29	-10.12	-12.02	-13.28	-15.53
	CH4	0.4	26.6	46.7	0.1	0.2		3.7	3.9	44.4	22.9	44.8	45.5	8.5
	CO2	0.0	22.4	53.0	0.1	0.5		5	3.9	55.2	25.1	55	51.2	9.2
	O2	22.0	13.0	0.4	21.1	20.9		18.8	17.7	0.3	10.3	0.2	1.7	18.3
	BAL (N2)	77.6	37.9	0.0	78.6	78.3		72.5	74.5	0	41.7	0	1.4	64
	CO	4	7	20	1	2		9	0	40	267	48	0	0
	H2S	1	27	69	1	1		7	8	61	49	62	59	12
	Max	-	-	-	-	-		-	-	-	-	-	-	-
	Min	-	-	-	-	-		-	-	-	-	-	-	-
	Flow (cfm)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	Temp	-	-	-	-	-		-	-	-	-	-	-	-
	Comments	closed	closed	closed	closed	closed		closed	closed	closed	closed	closed	closed	closed

Table 2:
Wellfield Monitoring Data

		21-Jan-15	25-Feb-15	30-Mar-15	16-Apr-15	11-May-15	12-May-15	3-Jun-15	23-Jul-15	19-Aug-15	29-Sep-15	29-Oct-15	27-Nov-15	15-Dec-15
1-9 DP	*Well*	-11.26	-15.16	-8.63	-10.17	-10.63		-9.6	-7.68	-9.43	-9.45	-11.02	-12.27	-14.27
	Lateral	-11.67	-15.89	-9.10	-10.53	-11.27		-10.03	-8	-10.01	-10.02	-11.62	-12.82	-14.84
	CH4	53.8	46.9	49.3	52.3	49.1		52.7	39.7	37.1	37.6	37.1	37.3	34.4
	CO2	36.5	34.8	37.0	39.0	39.1		40.5	34.3	33.8	33.9	34.6	35.3	33.9
	O2	1.1	2.1	1.4	0.2	0.2		0.3	0.7	0.6	0.5	0.3	0.3	0.6
	BAL (N2)	8.5	16.1	12.1	8.7	11.5		6.5	25.3	28.4	27.9	27.9	26.9	31.2
	CO	6	15	15	20	18		18	40	41	25	49	0	0
	H2S	25	30	31	40	41		37	27	19	29	26	34	27
	Max	9.73	14.61	8.92	9.73	9.66		8.84	8.61	10.59	10.87	9.98	10.34	11.6
	Min	9.06	12.93	8.45	9.25	9.51		8.67	8.49	10.24	8.5	9.62	9.91	11.04
	Flow (cfm)	88.78	130.1187544	82.06836469	89.67516188	90.57285844	0	82.72982531	80.79269063	98.41589156	91.51780219	92.6044875	95.67555469	106.9676325
	Temp	24.9	26.9	28.2	28.4	27.5		28	31.4	30.5	30.6	30.6	35.1	37.9
	Comments	opened 1/2T	Full Open	Full Open	Full Open	Full Open		full open	closed 1T	no change	closed 1T	no change	opened 1/4T more	open to full
1-10 DP	*Well*	-4.76	0.17	-4.44	-5.83	-5.06		-5	-3.67	-3.76	-4.75	-4.88	-7.35	-7.98
	Lateral	-12.68	-16.90	-9.43	-12.85	-11.93		-10.6	-8.37	-10.31	-10.5	-12.4	-13.35	-15.47
	CH4	41.7	58.8	55.5	55.4	47.3		53.4	59.3	60.2	60.1	59.1	55.9	55.3
	CO2	25.4	31.1	35.8	36.4	32.7		34.4	37.7	38.2	39.4	40.3	40.6	40.8
	O2	6.6	3.0	1.5	0.6	1.6		0.3	0.4	0.5	0.5	0.4	0.6	0.9
	BAL (N2)	25.3	9.7	7.4	7.5	18.7		11.9	2.3	0.9	0	0.1	2.8	3.2
	CO	9	9	17	17	22		22	17	23	25	55	0	0
	H2S	23	65	64	59	59		59	46	51	21	45	42	33
	Max	1.25	0.56	1.13	1.44	1.29		1.27	1.14	1.19	1.27	1.31	1.59	1.88
	Min	1.23	0.46	1.05	1.22	1.24		1.04	1.07	1.16	1.22	1.21	1.51	1.76
	Flow (cfm)	11.72	4.819213125	10.29988688	12.56775188	11.95353844	0	10.91410031	10.44162844	11.10308906	11.76454969	11.90629125	14.64662813	17.19797625
	Temp	2.3	4.9	18.4	19.2	15.6		21	32	27.7	19.8	14	13.5	11.1
	Comments	no change	no change	no change	no change	no change		no change	no change	no change	no change	opened 1/4T more	no change	no change
H-11 DP	*Well*	-4.40	-4.07	6.23	-10.26	-5.90		-5.46	-1.17	-2.44	-3.51	6.55	-11.07	-11.34
	Lateral	-12.22	-16.14	-9.72	-11.19	-11.69		-9.78	-8.17	-10.23	-10.07	-12.13	-15.28	-15.17
	CH4	43.2	38.2	56.2	36.6	40.5		44.1	51.7	50.9	48.3	54.6	37.6	36.3
	CO2	31.5	29.3	43.0	29.8	31.5		33.6	39.5	39.6	37.2	45	29.9	28.8
	O2	4.2	5.7	0.7	4.7	4.6		3.9	1.1	1.2	2.4	0.3	5.9	6.6
	BAL (N2)	20.9	27.1	0.0	28.8	23.7		18.3	7.8	7.9	12	0	26.5	28.2
	CO	2	5	10	2	11		13	15	12	0	83	0	0
	H2S	70	45	216	104	76		38	78	70	62	198	35	24
	Max	3.49	2.80	8.34	4.07	2.82		2.15	1.12	1.46	1.32	2.07	2.53	2.55
	Min	3.44	2.67	7.87	3.92	2.65		2.12	1.11	1.34	1.31	1.92	2.37	2.35
	Flow (cfm)	32.74	25.84421156	76.58769094	37.75050281	25.84421156	0	20.17454906	10.53612281	13.2292125	12.42601031	18.85162781	23.15112188	23.15112188
	Temp	15.0	17.6	20.7	22.3	19.7		23.2	29.5	26.4	19.5	14.8	17.6	15.4
	Comments	closed 1/4T	closed 1/4T	opened 1-1/2T	closed 1T	closed 1/4T		closed 1/4T	no change	no change	no change	opened 1/2T more	no change	closed 1/4T
H-12	*Well*	Frozen	4.73	1.83	-0.80	-1.81		-1.92	-0.43	-1.37	-2.69	-1.73	-7.07	frozen
well bore seal	*Lateral*	-12.26	4.59	-9.40	-10.55	-11.17		-9.4	-7.91	-9.77	-9.85	-11.83	-14.36	-14.82
	CH4	60.3	56.7	58.5	57.3	56.9		55.4	58.4	55.7	54.9	57.3	53.2	54.2
	CO2	38.7	43.1	41.0	38.5	38.1		37.2	39.9	39.2	37.9	39.2	37.3	37.1
	O2	0.7	0.3	0.4	1.2	1.6		1.9	0.4	0.9	1.5	1.1	2	2.4
	BAL (N2)	0.1	0.0	0.0	3.0	3.4		5.5	1.2	4.1	5.6	2.3	7.5	6.3
	CO	4	16	13	9	12		11	13	12	19	8	0	0
	H2S	53	98	95	59	57		73	95	67	64	61	53	48
	Max	1.18	-	1.15	1.53	1.83		1.69	1.58	1.56	1.38	1.73	1.93	1.85
	Min	1.15	-	1.02	1.47	1.68		1.62	1.52	1.48	1.33	1.34	1.85	1.81
	Flow (cfm)	11.01	#VALUE!	10.25263969	14.17415625	16.58376281	0	15.63881906	14.64662813	14.363145	12.80398781	14.50488656	17.85943688	17.29247063
	Temp	4.5	-	13.8	19.4	14.5		20.8	27.1	24.2	18.9	11.9	13.2	11.4
	Comments	20T->no change	no lateral vac	20T->25T	25T->30T	30T -> nc		30T -> nc	30T -> nc	30T -> nc	30T -> nc	30T -> 35T	35T	35T
2-13	*Well*	-2.16	-1.27	-0.31	DNM	-1.92		-1.84	-1.92	-1.86	-1.78	-1.79	-1.67	-0.68
	Lateral	-11.96	-16.23	-8.42	H2	-10.47		-9.97	-10.47	-9.81	-9.48	-11.86	-12.73	-13.32
	CH4	51.8	51.2	50.8	levels	DNM		53.4	DNM	DNM	DNM	DNM	46.2	46.9
	CO2	44.1	46.8	49.0	reading	H2		46	H2	H2	H2	H2	41	41.4
	O2	0.4	0.5	0.3	too	levels		0.5	levels	levels	levels	levels	3.2	3.3
	BAL (N2)	3.7	1.3	0.0	high	reading too		0	reading too	reading too	reading too	reading too	9.7	8.2
	CO	203	80	1069	on	high on		1218	high on	high on	high on	high on	0	0
	H2S	0	27	93	GEM	GEM		126	GEM	GEM	GEM	GEM	163	167
	Max	4.01	3.63	2.06	-	-		3.2	-	3.19	2.93	3.64	3.43	2.66
	Min	3.87	3.30	1.96	-	-		3.11	-	3.11	2.81	3.52	3.24	2.53
	Flow (cfm)	37.23	32.74230094	18.99336938	#VALUE!	#VALUE!	0	29.81297531	#VALUE!	29.76572813	27.11988563	33.82898625	31.51387406	24.52129031
	Temp	12.0	-1.7	14.9	-	-		19.7	-	27	21.7	18.4	16.1	11.2
	Comments	no change	no change	opened 1/4T	DNM	DNM		no change	DNM	no change	no change	no change	closed 1/4T	no change
2-14	*Well*	-1.14	-3.26	-0.13	0.24	-0.28	0.04	0.13	0.63	0.71	0.13	0.23	0.05	-0.41
well bore seal	*Lateral*	-11.06	-11.01	-8.54	-12.36	-9.80	-11.72	-10.29	-8.56	-9.69	-9.4	-11.71	-12.69	-13.17
	CH4	39.5	25.2	37.6	57.1	34.3	46.9	57.5	56.1	57.5	56.9	55.9	54.9	55.4
	CO2	33.5	26.7	28.9	42.5	27.1	34.7	42.5	41.4	42.1	42.7	43.7	44.7	43.2
	O2	1.2	3.4	6.7	0.3	7.6	3.5	0.3	0.3	0.3	0.3	0.3	0.3	0.5
	BAL (N2)	25.9	44.7	26.8	0.0	30.8	14.9	0	2.1	0	0	0	0	0.8
	CO	24	8	18	15	20	32	23	17	22	42	0	0	0
	H2S	3	138	17	26	12	18	25	26	29	21	18	24	20
	Max	8.15	15.84	3.24	7.49	2.68	1.27	1.17	0.85	1.79	2.84	3.15	5.6	6.02
	Min	7.9	15.30	3.20	7.33	2.62	1.19	1.07	0.78	1.74	2.78	3.11	5.41	5.91
	Flow (cfm)	75.83	147.1277419	30.42718875	70.02033188	25.04100938	11.62280813	10.58337	7.701291563	16.67825719	26.55291938	29.57673938	52.01915344	56.36589469
	Temp	19.5	26.4	20.6	24.2	20.2	21.9	21.5	28.9	27.6	25	20.7	22.6	22
	Comments	opened 1T	closed 1-1/4T	closed 3/4T	opened 1T	closed 3/4T	sed then opened 1	no change	no change	opened 1/2T	no change	opened 1/4T more	opened 1/4T more	opened 1/4T more
2-15	*Well*	-0.15	-0.19	-0.09	-0.11	-0.03		-0.16	0.29	0.14	-0.13	0.19	0.09	0.1
	Lateral	Frozen	-16.76	-9.15	-11.53	-11.13		-10.34	-8.62	-9.63	-9.72	-11.98	-12.86	-13.53
	CH4	58.9	21.7	56.7	57.1	57.4		57	56.3	56.3	56.7	55.5	55	55.1
	CO2	39.8	15.6	42.9	42.5	41.3		42.1	42.8	43.4	43	44.2	44.6	44.3
	O2	1.0	15.9	0.3	0.5	1.1		0.8	0.3	0.4	0.3	0.3	0.3	0.5
	BAL (N2)	0.1	46.7	0.0	0.0	0.4		0	0.4	0	0	0	0	0
	CO	13	6	21	26	57		93	41	86	234	6	0	0
	H2S	5	20	49	24	44		58	42	55	46	36	38	36
	Max	-	0.00	1.33	1.78	1.30		1.3	1.18	0.93	1.17	1.36	1.14	1.59
	Min	-	0.00	1.23	1.45	1.20		1.23	1.12	0.86	1.13	1.24	1.06	1.5
	Flow (cfm)	#VALUE!	0	12.09528	15.26084156	11.81179688	0	11.95353844	10.86685313	8.457246563	10.86685313	12.28426875	10.39438125	14.59938094
	Temp	-	-8.9	11.6	14.9	13.0		18.1	28.9	28.8	18.7	10.7	8.6	3.3
	Comments	no change	no change	no change	no change	no change		no change	no change	no change	no change	no change	no change	opened 1/4T more
2-16	*Well*	-0.05	-0.22	0.19	-0.63	-0.11		0.13	-0.02	-0.2	-0.52	-0.34	-0.43	-0.64
	Lateral	-10.81	-15.18	-8.36	-10.97	-11.15		-9.71	-8.25	-9.34	-9.18	-11.09	-11.99	-14.1
	CH4	59.3	44.3	56.8	36.1	42.2		57.3	56.4	54.6	54.6	53.4	52.9	49.3
	CO2	38.5	33.2	43.1	28.3	32.0		42.2	42	41	41	41.1	41.2	38.6
	O2	1.8	5.3	0.1	6.6	4.9		0.4	0.4	0.8	0.9	1	1.2	2.5
	BAL (N2)	0.4	17.2	0.0	29.0	20.8		0	1.1	3.6	3.5	4.3	4.7	9.6
	CO	15	8	22	17	23		52	42	64	104	88	0	0
	H2S	9	29	48	31	39		54	46	46	34	31	32	26
	Max	5.23	6.34	4.88	8.41	5.52		3.69	5.26	7.05	6.6	7.36	7.06	8.01
	Min	5.03	6.20	4.75	8.21	5.41		3.62	5.14	6.95	6.43	7.24	6.92	7.8
	Flow (cfm)	48.48	59.24797313	45.49904156	78.52482563	51.64117594	0	34.53769406	49.137075	66.1460625	61.56308531	68.98089375	66.05156813	74.69780344
	Temp	12.5	11.1	19.2	18.9	19.5		20.7	26.4	25.3	23.2	19.7	19	19
	Comments	opened 1/4T	no change	opened 1/4T	closed 1/4T	closed 1/4T		opened 1/4T	opened 1/4T	no change	no change	no change	no change	no change
2-17	*Well*	-0.07	1.51	0.33	-0.95	-0.74		-2.33	1.02	1.11	-0.12	0.13	0.08	-0.38
	Lateral	-11.93	-16.52	-9.12	-11.73	-10.85		-10.25	-8.72	-9.56	-9.38	-11.87	-12.72	-13.45
	CH4	52.1	48.8	58.5	58.5	57.9		57.4	58.5	58.9	58.7	57.8	57.1	56.4
	CO2	33.2	33.3	41.0	40.9	41.5		42	40.1	40.5	40.8	41.9	42.5	43.2
	O2	3.6	4.9	0.3	0.5	0.5		0.5	0.3	0.3	0.4	0.3	0.4	0.3
	BAL (N2)	3.3	13.8	0.0	0.0	0.0		0	1.2	0.4	0	0	0	0
	CO	2	9	12	13	15		12	>>>>	14	1	4	0	0
	H2S	7	27	21	18	17		15	33	24	14	13	15	14
	Max	1.78	0.00	1.37	2.63	3.44		4.03	0.85	2.13	1.63	1.91	1.64	1.7
	Min	1.74	0.00	1.30	2.51	3.37		3.8	0.47	1.97	1.56	1.83	1.57	1.6
	Flow (cfm)	16.63	0	12.61499906	24.28505438	32.17533469	0	36.99454781	6.23662875	19.37134688	15.07185281	17.67044813	15.16634719	15.59157188
	Temp	1.1	-6.3	14.7	17.6	15.0		18.3	27.3	25.1	19.3	13	11.5	4.2
	Comments	no change	no change	opened 1/4T	opened 1/4T	opened 1/4T		opened 1/4t	closed->1/4T	1/4T -> 1/2T	no change	no change	no change	no change

Table 2:
Wellfield Monitoring Data

		21-Jan-15	25-Feb-15	30-Mar-15	16-Apr-15	11-May-15	12-May-15	3-Jun-15	23-Jul-15	19-Aug-15	29-Sep-15	29-Oct-15	27-Nov-15	15-Dec-15
2-18	*Well*	-1.86	0.53	-1.97	-2.82	-2.26		-2.12	-1.46	-1.83	-2.97	-2.93	-3.18	-4.21
	Lateral	-11.55	0.49	-8.51	-11.31	-10.24		-9.71	-8.5	-9.42	-9.32	-11.22	-12.16	-12.67
	CH4	47.0	60.3	44.6	37.1	37.1		41.3	54.2	52.7	48.4	43.9	43.1	37.7
	CO2	35.1	39.3	36.6	33.4	32.8		35.2	39.9	40.2	38.3	38.6	38.1	35.6
	O2	1.0	0.3	0.7	1.0	0.6		0.8	0.5	0.5	0.5	0.5	0.5	0.7
	BAL (N2)	16.9	0.0	17.9	28.5	29.4		22.6	5.4	6.5	12.9	17	18.1	26
	CO	23	9	27	26	29		22	14	18	18	3	0	0
	H2S	33	73	49	42	47		57	52	50	34	27	35	29
	Max	6.19	0.44	7.09	7.22	7.96		5.1	5.55	7.76	8.7	10.25	10.06	3.93
	Min	5.99	0.00	6.82	6.98	7.64		4.81	5.41	7.64	8.58	9.88	9.69	3.6
	Flow (cfm)	57.55	2.07887625	65.72083781	67.09100625	73.7056125	0	46.82196281	51.7829175	72.76066875	81.64314	95.10858844	93.31319531	35.57713219
	Temp	29.4	1.6	33.0	33.7	33.6		32.6	34.3	34.7	32.2	32.8	33.5	31.1
	Comments	opened 1/4T	no lateral vac	no change	no change	closed 1/4T		no change	opened 1/4T	opened 1/4T	no change	no change	opened 1/4T more	opened 1T more
3-19	*Well*	1.72	3.62	4.37	-7.83	-4.62		-6.56	-4.92	2.11	-1.93	-1.4	-1.03	-1.79
	Lateral	-10.54	3.85	-10.83	-9.63	-11.20		-8.19	-6.26	-9.09	-9.15	-12.25	-14.31	-14.18
	CH4	43.4	57.1	57.7	47.4	51.6		54.6	37.3	57.7	45.9	49.7	47.6	43.5
	CO2	30.1	42.5	42.0	36.0	37.8		39.3	28.2	42	34.6	36.8	36.1	32.7
	O2	6.0	0.4	0.3	2.6	1.9		1.7	6.6	0.3	3.7	3.1	3.9	5.9
	BAL (N2)	21.1	0.0	0.0	14.0	8.78		4.5	27.9	0	15.8	10.4	12.3	18.1
	CO	2	10	13	21	13		16	13	10	10	2	0	0
	H2S	10	10	17	6	18		31	18	91	26	27	35	21
	Max	2.13	-	10.89	8.58	9.28		8.62	10.06	6.9	6.31	5.29	5.7	6.8
	Min	2.02	-	10.60	8.19	9.09		8.45	9.87	6.76	6.23	5.09	5.46	6.51
	Flow (cfm)	19.61	#VALUE!	101.5342059	79.23353344	86.79308344	0	80.65094906	94.16364469	64.53965813	59.24797313	49.04258063	52.72786125	62.88600656
	Temp	2.7	-	10.6	14.1	11.2		14.6	19.1	20.8	15.5	11.4	10.9	9.3
	Comments	no change	no lateral vac	opened 2T	closed 1T	opened 1T		opened 1T	closed 3T	opened 1T	closed 1/4T	no change	no change	closed 1/4T
3-20	*Well*	-9.40	-11.40	-8.07	-9.76	-9.80	-10.58	-8.21	-6.52	-8.74	-8.43	-10.33	-13.22	-12.66
	Lateral	-9.73	-12.15	-8.37	-10.24	-10.51	-11.12	-8.74	-7.31	-9.19	-9.35	-10.94	-13.68	-13.67
	CH4	58.9	56.5	56.5	56.8	56.3	56.7	56.5	56.9	56.1	56.4	55.6	54.6	54.5
	CO2	40.2	42.9	43.1	42.7	43.4	43.0	43.2	42.8	43.5	43.1	43.9	45	42.2
	O2	0.6	0.5	0.4	0.5	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.4	0.3
	BAL (N2)	0.2	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
	CO	26	23	22	20	29	17	48	42	38	48	0	0	0
	H2S	2	7	8	8	9	8	11	16	13	9	10	9	7
	Max	7.68	9.63	9.99	7.90	8.93	8.33	8.22	7.39	8.36	7.12	8.54	10.53	9.86
	Min	7.51	9.33	8.41	7.76	8.69	8.04	8.03	7.18	8.11	6.79	8.23	10.02	9.64
	Flow (cfm)	71.77	89.5806675	86.934825	73.98909563	83.24954438	77.34364594	76.77667969	68.83915219	77.81611781	65.72083781	79.23353344	97.09297031	92.13201563
	Temp	7.9	8.7	10.6	10.5	9.5	10.1	11.2	13.7	12.2	10.8	9.3	9.6	9.2
	Comments	opened 1/2T	opened 1/2T	opened 1/2T	opened 1T	opened 1T	opened full	opened full	Full Open	Full Open	Full Open	Full Open	Full Open	Full Open
3-21	*Well*	-3.74	0.01	-1.61	-0.16	0.05		0.31	0.15	0.07	-0.02	0.61	0.91	1.02
	Lateral	-10.61	-13.17	-10.78	-11.08	-12.00		-9.54	-7.88	-9.55	-10.03	-12.74	-14.86	-13.55
	CH4	35.4	43.9	33.5	55.1	39.3		56.6	57.1	55.6	52.6	55.9	55.2	54.4
	CO2	24.9	32.3	25.0	40.2	29.2		43.1	42.6	41.8	40.5	43.8	44.5	45.3
	O2	8.6	5.4	9.2	1.5	6.6		0.3	0.3	1	1.4	0.2	0.2	0.2
	BAL (N2)	31.0	18.4	33.2	3.2	24.8		0	0	1.2	5.3	0	0	0
	CO	2	8	17	11	10		15	16	6	1	2	0	0
	H2S	5	18	6	17	0		33	31	25	8	39	29	27
	Max	2.34	0.48	0.98	0.55	0.00		0	0	0	0	-	-	0
	Min	2.19	0.42	0.92	0.00	0.00		0	0	0	0	-	-	0
	Flow (cfm)	21.40	4.252246875	8.976965625	2.598595313	0	0	0	0	0	0	#VALUE!	#VALUE!	0
	Temp	2.2	12.3	10.9	21.4	15.0		22.6	26.2	29.2	14.7	-	-	10
	Comments	closed 1/4T	no change	closed 1/4T	no change	closed well		cracked	no change	no change	closed well	closed	closed	cracked open
3-22	*Well*	0.64	-0.13	-0.33	-0.05	-0.03		-8.05	-0.07	-0.02	-0.05	0.14	0.15	-0.4
well bore seal	*Lateral*	-12.27	-13.70	-10.11	-10.32	-10.68		-9.21	-7.98	-8.17	-9.91	-11.62	-12.75	-13.21
	CH4	59.1	57.6	48.0	50.5	54.2		57.2	52	56.8	49.3	55.6	55.9	46.6
	CO2	40.5	40.3	37.1	37.7	39.2		41.3	40	42.8	38.1	44.1	43.7	35.8
	O2	0.3	1.5	3.4	2.7	2.3		0.4	1.5	0.4	2.8	0.3	0.4	4.5
	BAL (N2)	0.1	0.5	11.2	8.7	4.7		1.1	6.5	0	9.8	0	0	12.9
	CO	0	12	48	25	30		5	90	58	0	4	0	0
	H2S	162	276	209	287	284		95	285	297	219	259	337	240
	Max	3.90	3.67	4.61	2.99	3.13		6.6	2.78	2.76	2.9	2.09	2.11	3.01
	Min	3.79	3.32	4.49	2.91	3.07		6.37	2.74	2.69	2.82	2.02	2.05	2.91
	Flow (cfm)	36.33	33.02578406	42.99494063	27.87584063	29.29325625	0	61.27960219	26.0804475	25.74971719	27.02539125	19.41859406	19.65483	27.970335
	Temp	11.7	11.6	20.4	23.9	20.2		20.7	28.3	25.9	20.2	18.2	16	14.5
	Comments	closed->1T	opened 1/4T	closed 1/4T	no change	no change		+1/2T	no change	no change	closed 1/4T	no change	opened 1/4T more	closed 1/4T
3-23	*Well*	-2.21	-3.30	-5.24	-6.92	-7.89		-8.05	-6.52	-6.83	-8.44	-0.2	-0.64	-5.15
	Lateral	-9.88	-15.70	-9.41	-9.78	-9.77		-9.21	-7.23	-7.42	-9.06	-11.03	-13.19	-13.26
	CH4	55.0	52.9	53.5	52.6	52.7		57.2	53.2	51.1	54.3	57.2	57	54.5
	CO2	36.1	37.6	39.0	38.7	39.3		41.3	40.8	40	41.8	42.3	42.3	41.3
	O2	2.1	2.1	0.9	1.1	0.7		0.4	0.5	0.6	0.3	0.4	0.4	0.6
	BAL (N2)	6.8	7.4	6.4	7.4	7.2		1.1	5.5	8.2	3.5	0	0	3.4
	CO	0	6	11	13	10		5	11	13	55	9	0	0
	H2S	56	109	89	83	72		95	94	81	83	121	124	61
	Max	4.55	5.47	5.82	6.44	7.66		6.6	6.17	6.74	6.48	2.71	2.68	4.87
	Min	4.3	5.10	5.13	6.16	7.55		6.37	5.86	6.38	5.99	2.5	2.64	4.54
	Flow (cfm)	41.81	49.94027719	51.73567031	59.53145625	71.86297219	0	61.27960219	56.83836656	61.98831	58.91724281	24.61578469	25.13550375	44.45960344
	Temp	12.6	12.8	19.4	21.6	19.0		20.7	25.4	25.1	23	16.2	16.7	18.1
	Comments	no change	opened 1/2T	opened 1/4T	opened 1/2T	opened 1/4T		opened 1/2T	opened 1/4T	no change	opened 1/4T	no change	opened 1/2T more	opened 1/2T more
3-24	*Well*	-2.40	1.32	-1.73	0.11	0.05	-0.02	0.5	0.37	0.41	0.36	0.29	0.3	0.12
	Lateral	-9.83	-15.72	-9.92	-10.53	-10.75	-11.74	-10.02	-7.93	-8.18	-10.05	-11.86	-13.08	-13.33
	CH4	32.9	57.1	37.9	56.8	49.4	40.6	56.8	57.1	56.9	56.4	55.9	55.2	50.9
	CO2	23.5	42.8	29.2	43.0	36.7	29.8	42.8	42.6	42.7	43.3	43.8	44.4	38.6
	O2	9.5	0.1	7.0	0.3	3.6	6.6	0.3	0.3	0.3	0.3	0.3	0.3	3.1
	BAL (N2)	34.0	0.0	25.9	0.0	9.9	23.0	0	0	0	0	0	0	7.5
	CO	11	14	25	40	39	31	177	95	83	2	4	0	0
	H2S	8	87	34	91	63	74	104	93	94	93	82	91	104
	Max	-	6.21	2.58	2.52	3.68	8.73	1.06	0.73	0.9	1.1	1.09	1.44	2.22
	Min	-	5.67	2.47	2.46	3.60	8.49	1	0.71	0.85	1.02	0.98	1.38	2.14
	Flow (cfm)	#VALUE!	56.12965875	23.85982969	23.52909938	34.3959525	81.35965688	9.732920625	6.803595	8.268257813	10.01640375	9.780167813	13.32370688	20.59977375
	Temp	-	7.7	12.6	20.3	15.8	16.8	18.7	28.7	25.8	15.9	11.4	10.5	10.2
	Comments	closed well	opened 1-1/2T	closed 2T	opened 1/4T	closed 1/4T	closed well	opened 1/4t	no change	no change	no change	no change	opened 1/4T more	no change
3-25	*Well*	-1.13	-0.74	-2.15	-3.62	-4.69	-6.64	-7.24	-5.94	-6.59	-7.95	-9.29	-11.25	-12.61
	Lateral	-11.76	-16.08	-10.33	-10.52	-10.96	-11.75	-9.92	-8.02	-8.25	-9.76	-10.97	-12.99	-13.78
	CH4	58.5	57.0	52.7	52.3	52.2	49.7	52.1	50.9	51.7	53	55.7	55.5	48.3
	CO2	38.6	42.6	40.7	39.7	40.1	38.7	41	41.9	42	42.9	43.7	44.2	41.6
	O2	1.4	0.4	0.4	1.5	1.6	2.2	1.3	0.4	0.5	0.4	0.6	0.3	1
	BAL (N2)	1.6	0.0	6.3	6.5	5.4	9.6	5.6	6.9	5.8	3.7	0	0	9.2
	CO	2	6	31	11	10	10	9	0	13	1	0	0	0
	H2S	113	261	202	194	115	96	93	91	91	63	65	63	54
	Max	2.27	2.14	2.86	4.28	4.85	7.18	6.12	5.92	5.87	6.6	8.36	7.6	8.67
	Min	1.92	2.02	2.78	4.19	4.75	6.97	5.98	5.83	5.75	6.48	8.16	7.23	8.33
	Flow (cfm)	19.80	19.65483	26.64741375	40.01836781	45.3573	66.85477031	57.16909688	55.51544531	54.90123188	61.79932125	78.05235375	70.06757906	80.32021875
	Temp	9.0	9.6	20.1	24.7	21.5	24.1	23.6	27.6	25.8	23.5	21.6	21.7	21.7
	Comments	no change	opened 1/4T	opened 1/4T	opened 1/4T	opened 1/4T	opened 1/2T	no change	opened 1/4T	no change	opened 1/4T	opened 1/4T more	opened 1/4T more	no change
3-26	*Well*	-10.40	-12.92	-8.49	-12.58	-10.37		-10.05	-8.78	-8.29	-9.52	-10.89	-11.87	-14.03
	Lateral	-10.71	-13.08	-8.56	-12.49	-10.35		-9.96	-8.74	-8.2	-9.69	-10.94	-11.88	-13.89
	CH4	54.7	53.4	57.9	57.9	57.4		57.5	55.6	56.3	57.5	57	56.6	56
	CO2	36.3	38.5	41.4	41.8	42.4		42.1	41.2	41.5	42	42.6	41	43.4
	O2	2.2	2.4	0.7	0.4	0.3		0.3	0.3	0.5	0.4	0.4	1.4	0.5
	BAL (N2)	6.7	5.9	0.0	0.0	0.0		0	2.7	1.7	0	0	0.9	0
	CO	0	4	4	5	8		8	6	10	10	30	0	0
	H2S	112	150	170	163	152		145	132	148	134	129	120	119
	Max	3.41	3.79	3.24	3.44	3.41		3.67	3.23	3.57	3.33	2.74	2.49	3.7
	Min	2.89	3.38	2.70	3.20	3.02		3.15	2.95	3.09	2.9	2.42	2.15	2.89
	Flow (cfm)	29.77	33.87623344	28.06482938	31.3721325	30.37994156	0	32.22258188	29.19876188	31.46662688	29.43499781	24.37954875	21.922695	31.13589656
	Temp	14.8	13.5	18.0	21.7	19.5		21.9	26.7	26.8	23.1	19.8	16.1	15.9
	Comments	opened 1/4T	Full Open	Full Open	Full Open	Full Open		Full Open	Full Open	Full Open	Full Open	Full Open	no change	Full Open

Table 2:
Wellfield Monitoring Data

		21-Jan-15	25-Feb-15	30-Mar-15	16-Apr-15	11-May-15	12-May-15	3-Jun-15	23-Jul-15	19-Aug-15	29-Sep-15	29-Oct-15	27-Nov-15	15-Dec-15
3-27 DP	*Well*	-7.29	-3.98	-2.17	-1.95	-1.05		-6.54	-5.36	-5.3	-7.54	-6.57	-7.02	-8.87
	Lateral	-9.46	-16.44	-9.83	-10.30	-10.91		-10.13	-7.64	-8.25	-9.79	-10.9	-13.21	-14.04
	CH4	40.6	45.1	52.2	44.8	55.9		52.9	55.4	54.6	55.7	54.9	54.4	54.7
	CO2	29.6	35.1	40.2	35.0	42.2		41.9	43.2	43.1	43.9	44.7	45.1	44.5
	O2	6.8	4.8	1.8	4.0	0.9		1.2	0.4	0.5	0.4	0.4	0.4	0.6
	BAL (N2)	23.1	14.8	5.8	16.2	0.8		4.3	0.9	1.7	0	0	0	0
	CO	1	6	12	20	11		0	9	7	1	18	0	0
	H2S	53	141	195	154	95		184	227	163	212	262	275	247
	Max	2.40	2.98	2.45	2.42	2.02		2.34	1.92	1.94	1.41	2.38	2.97	3.18
	Min	2.25	2.84	2.28	2.37	1.91		2.25	1.81	1.81	1.29	2.28	2.88	3.05
	Flow (cfm)	21.97	27.49786313	22.34791969	22.63140281	18.56814469	0	21.68645906	17.62320094	17.71769531	12.75674063	22.01718938	27.63960469	29.43499781
	Temp	28.4	23.4	31.3	32.6	24.3		28.5	32.6	32.5	24.4	27.9	32.2	28.8
	Comments	1T->cracked	no change	no change	no change	opened 1/4T		no change	no change	no change	no change	no change	opened 1/4T more	opened 1/2T more
3-28	*Well*	-2.07	-0.74	-5.31	-7.14	-4.68	-7.80	-8.62	-7.42	-2.08	0.12	0.97	-2.34	0.42
	Lateral	-11.33	-12.74	-7.78	-11.83	-9.90	-11.26	-9.26	-7.76	-4.71	-9.5	-11.38	-9.89	-13.66
	CH4	55.8	58.3	54.5	53.6	58.3	56.3	58.3	55.2	15.2	58	57.2	28.1	55.9
	CO2	35.1	40.8	38.4	37.9	40.7	38.6	40.9	39.7	11.4	41.6	42.6	20.6	43.8
	O2	3.1	0.9	2.1	2.3	0.9	1.8	0.9	1.1	14.6	0.3	0.2	11.1	0.3
	BAL (N2)	6.0	0.0	5.0	6.1	0.0	3.2	0	4	58.7	0	0	40.2	0
	CO	4	13	12	14	24	16	39	22	11	57	40	0	0
	H2S	10	55	47	48	55	52	54	52	21	71	68	30	69
	Max	4.94	4.43	6.14	6.64	7.26	8.80	7.02	6.97	17.89	3.06	3.5	3.09	3.51
	Min	4.79	4.08	5.93	6.42	7.08	8.49	6.7	6.64	17.49	2.97	2.42	2.95	3.39
	Flow (cfm)	45.97	40.20735656	57.02735531	61.70482688	67.75246688	81.69038719	64.82314125	64.30342219	167.1605494	28.49005406	27.970335	28.53730125	32.60055938
	Temp	12.9	11.5	17.3	19.3	18.5	20.2	20	24.7	20.5	21.5	17.9	12.6	15.3
	Comments	closed 1/4T	opened 1T	closed 1/4T	no change	opened 1/4T	opened 2T	opened 1/2T	opened 1/4T	closed 3-3/4T	no change	opened 1T more	closed 1T	opened 1/4T more
3-29 DP	*Well*	-0.40	-0.82	5.71	-4.63	0.58	-3.82	-1.51	-2.43	-3.69	-2.59	-4.23	-6.32	-5.43
	Lateral	-10.57	-12.84	-9.16	-11.65	-10.73	-12.00	-9.94	-8.7	-8.21	-9.68	11.08	-11.88	-13.33
	CH4	44.9	37.6	57.8	26.8	58.1	43.1	58.6	56.4	53.2	58.4	57.3	57.7	38.6
	CO2	29.9	26.6	41.9	19.1	41.5	29.9	41	39.8	38	41.2	42.3	40.9	27.7
	O2	5.6	8.6	0.3	11.1	0.3	5.8	0.4	0.6	1.6	0.4	0.4	1.2	7.7
	BAL (N2)	19.6	27.4	0.0	43.1	0.0	21.1	0	3.3	7.2	0	0	0.2	26
	CO	0	3	4	3	11	5	8	5	10	9	27	0	0
	H2S	147	185	277	90	230	151	199	189	186	197	193	178	110
	Max	4.89	3.63	3.62	8.79	5.32	6.47	4.06	4.66	4.44	3.9	4.72	5.46	8.07
	Min	4.57	3.46	3.49	8.32	4.96	6.26	3.8	4.29	4.19	3.69	4.58	5.18	7.52
	Flow (cfm)	44.70	33.49825594	33.59275031	80.83993781	48.57010875	60.14566969	37.13628938	42.28623281	40.77432281	35.86061531	43.93988438	50.2710075	73.65836531
	Temp	22.5	11.1	30.1	22.6	25.9	23.2	27.9	30.1	30.8	28	29.9	28.8	24.5
	Comments	closed 1/4T	closed 1/4T	opened 1T	closed 1T	opened 1/4T	closed 1/4T	no change	no change	closed 1/4T	opened 1/4T	opened 1/4T more	opened 1/4T more	closed 3/4T
3-30 DP	*Well*	-0.04	-0.60	0.06	-4.30	-0.15	-2.38	0.04	0.89	-0.31	-1.57	-1.35	-1.41	-1.84
	Lateral	-10.99	-13.14	-9.89	-11.01	-11.20	-11.53	-10.05	-8.83	-8.31	-9.6	-10.88	-11.92	-13.73
	CH4	54.2	38.6	57.6	36.2	57.9	44.0	58.3	57.8	57.6	52	47.8	47.3	46.8
	CO2	35.6	27.8	42.0	29.6	41.8	34.6	41.3	41	41	38.7	37.5	36.8	35.4
	O2	2.4	6.8	0.3	3.5	0.3	1.5	0.4	0.3	0.4	0.8	1.1	1.4	1.9
	BAL (N2)	7.7	26.8	0.0	30.7	0.0	20.1	0	0.9	1	8.6	13.6	14.4	16
	CO	1	4	4	18	12	13	7	6	11	8	22	16	0
	H2S	241	168	341	74	259	124	264	234	238	130	117	110	98
	Max	3.63	5.38	4.27	10.84	5.20	4.79	4.9	4.7	5.69	6.38	6.02	5.93	6.71
	Min	3.47	5.19	4.18	10.68	4.99	4.59	4.69	4.55	5.58	6.11	5.71	5.59	6.58
	Flow (cfm)	33.55	49.94027719	39.92387344	101.6759475	48.14488406	44.31786188	45.31005281	43.70364844	53.24758031	59.01173719	55.42095094	54.42876	62.79151219
	Temp	21.6	19.6	29.4	41.4	32.0	34.9	33.1	35	34.4	34.1	35.3	37.5	40.2
	Comments	opened 1/4T	closed 1/4T	opened 1T	closed 1T	opened 1/2T	closed 1/2T	no change	opened 1/4T	opened 1/4T	no change	no change	no change	no change
4-31	*Well*	-2.25	-0.28	-0.84	-5.15	-3.46		-1.94	-3.02	-5.33	-6.71	-8.79	-4.96	0.24
	Lateral	-8.74	-12.01	-8.20	-9.54	-10.17		-8.22	-7.72	-7.61	-8.6	-10.89	-10.6	-14.75
	CH4	46.4	57.1	57.0	45.5	48.5		57.5	57.5	52.3	50.4	48.2	37.6	55.5
	CO2	31.7	42.5	42.7	33.6	35.4		41.3	42	39.3	38.1	36.5	29.3	44.4
	O2	5.0	0.5	0.3	4.3	3.6		0.8	0.4	1.7	2.3	3.4	7.2	0.1
	BAL (N2)	16.9	0.0	0.0	16.5	12.5		0.4	0.3	6.5	9.2	11.8	25.9	0
	CO	2	11	13	11	10		15	15	9	6	2	0	0
	H2S	11	32	38	20	22		34	55	36	37	33	18	50
	Max	9.57	8.55	8.75	10.14	8.41		7.98	8.61	9.78	9.85	10.4	13.66	4.79
	Min	7.82	7.90	8.54	9.77	8.06		7.71	8.41	9.63	9.7	10.27	13.43	4.45
	Flow (cfm)	82.16	77.72162344	81.69038719	94.06915031	77.81611781	0	74.13083719	80.41471313	91.70679094	92.36825156	97.65993656	127.9926309	43.65640125
	Temp	7.2	10.6	12.5	15.7	13.8		17.8	22.2	20.9	18.1	16	12.4	12
	Comments	closed 1/2T	opened 1/4T	opened 1/2T	closed 1/2T	closed 1/4T		opened 1/4T	opened 1T	no change	no change	closed 1/2T	2T -> 1/4T	opened 1T more
4-32	*Well*	-9.06	0.56	-8.53	-10.94	-10.67		0.22	0.14	0.16	0.5	1.21	2.34	1.61
	Lateral	-11.3	-12.60	-8.85	-11.84	-11.66		-9.25	-8.74	-8.73	-9.82	-12.54	-12.83	-13.45
	CH4	28.1	61.9	57.9	56.3	57.9		65.1	64.4	65.2	66.5	67.9	68.2	67.5
	CO2	20.1	37.5	41.1	40.8	41.4		34.6	32.6	32.8	33.1	31.5	31.5	32.2
	O2	11.3	0.6	0.9	0.9	0.8		0.3	0.5	0.4	0.3	0.5	0.3	0.3
	BAL (N2)	38.9	0.0	0.0	2.1	0.0		0	2.4	1.5	0	0	0	0
	CO	1	7	13	12	12		11	11	6	5	1	0	0
	H2S	29	76	133	133	130		394	8	19	62	47	42	46
	Max	-	0.51	0.00	0.00	0.00		0	-	-	-	-	-	-
	Min	-	0.00	0.00	0.00	0.00		0	-	-	-	-	-	-
	Flow (cfm)	#VALUE!	2.409606563	0	0	0	0	0	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	Temp	-	10.0	11.7	21.5	15.8		-	-	-	-	-	-	-
	Comments	closed well	cracked open	no change	no change	closed well		closed	closed	closed	closed	closed	closed	closed
4-33	*Well*	1.24	1.24	1.58	1.90	-3.73	0.35	-0.9	-0.26	0.09	0	0.02	-0.03	-0.07
	Lateral	-10.26	-16.23	-0.41	1.94	-8.03	-11.54	-9.69	-7.04	-8.17	-9.41	-10.39	-12.99	-13.5
	CH4	59.6	58.0	58.0	58.3	40.9	57.7	53.2	37	57.7	50.2	54.9	50.5	44.6
	CO2	39.9	41.5	41.7	41.4	31.4	42.1	39.4	28.8	41.9	37.8	40.4	37.6	34
	O2	0.4	0.4	0.3	0.3	5.5	0.3	1.7	6	0.3	2.6	1.5	3.1	5.1
	BAL (N2)	0.1	0.0	0.0	0.0	22.3	0.0	5.7	28	0	9.4	3.2	8.7	16.4
	CO	0	4	8	11	17	16	25	13	18	34	19	0	0
	H2S	105	201	194	190	55	121	98	87	139	152	152	138	119
	Max	0.00	0.94	-	-	10.04	6.06	5.22	5.63	4.12	4.3	4.41	3.62	4.91
	Min	0.00	0.91	-	-	9.54	5.55	4.81	5.49	3.96	4.1	4.27	3.47	4.69
	Flow (cfm)	0.00	8.740729688	#VALUE!	#VALUE!	92.50999313	54.85398469	47.38892906	52.5388725	38.1757275	39.6876375	41.01055875	33.49825594	45.3573
	Temp	-0.7	-7.4	-	-	24.6	26.3	25.5	28.6	28.6	25	22.8	22.2	19.6
	Comments	no change	no change	no lateral vac!!!	no lateral vac!!!	closed 1-3/4T	opened 1/2T	opened 1/4T	closed 1/2T	opened 1/4T	no change	no change	no change	closed 1/4T
4-34	*Well*	-1.25	-5.88	-4.12	-2.91	-3.17	-2.16	-5.22	-5.25	-5.24	-6.61	-6.99	-7.28	-0.7
	Lateral	-11.09	-14.83	-7.65	-10.06	-8.44	-11.12	-8.17	-7.83	-7.64	-9.49	-10.8	-11.73	-15.2
	CH4	51.9	28.9	40.7	47.1	41.6	43.4	41.7	38.2	42.2	41.9	39.5	33.9	47.1
	CO2	38.2	29.5	36.7	39.5	37.5	37.7	38.1	37.1	38.3	38.9	37.4	31.1	38
	O2	0.7	4.1	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4	1	4.3	2.6
	BAL (N2)	9.1	37.7	22.1	13.0	20.5	18.5	19.9	24.4	19	18.8	22.1	30.7	12.2
	CO	7	11	15	15	13	36	3	15	16	49	14	0	0
	H2S	78	63	98	112	111	120	114	116	117	130	111	69	176
	Max	7.09	15.82	11.49	9.32	9.74	15.13	12.99	13.17	12.3	11.02	12.73	4.12	4.69
	Min	6.55	15.2	11.21	8.90	9.44	14.11	12.3	12.62	11.99	10.4	11.89	3.99	4.48
	Flow (cfm)	64.45	146.5607756	107.2511156	86.08437563	90.62010563	138.1507763	119.4881372	121.8504966	114.7634184	101.2034756	116.3225756	38.31746906	43.32567094
	Temp	18.2	20.4	23.6	24.0	22.2	23.4	23.4	26	25.4	26.6	27.9	29.6	29.2
	Comments	opened 1T	no change	closed 1/2T	opened 1/4T	closed 1/2T	opened 1T	opened 1/2T	no change	no change	no change	no change	closed 2T	opened 1T more
4-35	*Well*	1.33	-0.67	0.42	-0.15	-0.31		-0.5	-0.86	-0.85	-2.37	-2.21	-0.61	-0.64
well bore seal	*Lateral*	Frozen	-14.46	-8.75	-11.63	-9.46		-10.61	-8.58	-8.86	-10.21	-11.68	-11.99	-14.87
	CH4	59.1	41.4	57.0	55.9	56.5		56	53.1	55.8	44.7	38.5	46.1	45.9
	CO2	40.3	31.8	42.5	40.5	40.6		41	40.4	40.8	37.1	31.4	36.1	35.4
	O2	0.3	6.5	0.5	1.4	1.4		1.3	1.3	1.2	2.2	5.7	3.8	4.5
	BAL (N2)	0.2	20.1	0.0	2.2	1.5		1.5	5.1	2.1	15.9	24.3	13.9	14.1
	CO	74	19	33	29	32		54	53	50	33	18	17	0
	H2S	26	23	37	39	40		40	43	51	48	48	55	61
	Max	-	4.56	2.00	3.63	4.19		4.28	4.77	5.02	6.33	6.96	4.41	4.8
	Min	-	4.19	1.95	3.56	4.07		4.2	4.66	4.79	6.05	6.75	4.31	4.7
	Flow (cfm)	#VALUE!	41.34128906	18.66263906	33.97072781	39.02617688	0	40.065615	44.55409781	46.34949094	58.49201813	64.77589406	41.1995475	44.88482813
	Temp	-	5.3	14.5	16.6	13.2		16.1	21.6	21.8	15.8	11.7	10.8	9
	Comments	no change	closed 1/4T	opened 1/4T	opened 1/4T	no change		opened 1/4T	no change	opened 1/4T	no change	closed 1/2T	no change	closed 1/4T

Table 2:
Wellfield Monitoring Data

		21-Jan-15	25-Feb-15	30-Mar-15	16-Apr-15	11-May-15	12-May-15	3-Jun-15	23-Jul-15	19-Aug-15	29-Sep-15	29-Oct-15	27-Nov-15	15-Dec-15
4-36	*Well*	0.32	0.13	0.05	0.06	0.08		0.03	-0.01	0.05	0.13	-10.13	0.14	0.13
	Lateral	-10.19	-14.23	-8.40	-11.62	-8.43		-10.52	-8.8	-8.26	-9.57	-10.14	-10.91	-14.13
	CH4	27.9	55.9	56.0	53.8	56.5		49.3	56	56.4	55.5	55.1	54.9	54.6
	CO2	20.3	43.4	43.2	41.3	42.3		39	43.2	43.2	44.2	44.5	44.8	45
	O2	11.1	0.6	0.8	1.6	1.2		2.5	0.4	0.3	0.3	0.3	0.3	0.4
	BAL (N2)	40.8	0.0	0.0	3.2	0.0		9.1	0.5	0	0	0	0	0
	CO	37	16	16	17	20		29	42	39	3	19	16	0
	H2S	58	171	112	102	109		94	110	112	108	134	139	136
	Max	0.00	0.42	1.54	1.82	1.52		1.61	1.62	1.51	1.46	1.74	1.56	1.97
	Min	0.00	0.00	1.45	1.73	1.42		1.54	1.58	1.4	1.41	1.64	1.52	1.88
	Flow (cfm)	0.00	1.984381875	14.12690906	16.77275156	13.89067313	0	14.88286406	15.1191	13.74893156	13.55994281	15.96954938	14.55213375	18.19016719
	Temp	-2.8	8.8	17.1	20.2	14.0		18.9	26	26	18.9	11	8.3	7.8
	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
4-37	*Well*	-0.53	0.20	-0.09	-0.03	-0.02		0.02	-0.03	-0.01	0.07	0.01	0.01	-0.11
	Lateral	-10.33	-14.53	-8.75	-11.59	-9.37		-10.74	-8.83	-8.66	-10.3	-11.02	-11.6	-14.68
	CH4	40.0	58.2	57.2	43.9	55.8		49	57.1	57	55.8	56	55.1	50.3
	CO2	29.0	40.7	42.1	32.4	39.4		36.8	42.6	42.6	43.8	43.5	40.9	37.6
	O2	5.7	1.1	0.7	4.9	2.0		3.3	0.3	0.3	0.3	0.4	1.7	3.2
	BAL (N2)	25.2	0.0	0.0	18.6	2.5		11.1	0	0	0	0	2.2	8.9
	CO	27	9	13	11	12		24	23	19	29	20	19	0
	H2S	124	Out of Range	244	203	245		175	273	237	260	221	218	150
	Max	2.60	0.58	1.43	1.76	1.10		1.38	1.11	1.17	0.87	1.36	1.39	1.53
	Min	2.47	0.00	1.38	1.64	0.96		1.31	1.01	1.13	0.84	1.34	1.32	1.46
	Flow (cfm)	23.95	2.740336875	13.27645969	16.06404375	9.732920625	0	12.70949344	10.01640375	10.86685313	8.079269063	12.75674063	12.80398781	14.12690906
	Temp	11.1	-5.8	17.0	20.0	15.7		17.8	26.1	26.4	16.4	13.4	9	10.5
	Comments	closed 1/4T	no change	no change	no change	no change		no change	no change	no change	no change	no change	no change	no change
5-38	*Well*	1.96	0.94	0.34	-0.30	0.09		0.69	0.26	0.09	0.07	0.22	0.06	0.16
	Lateral	-11.31	-12.51	-9.25	-11.56	-11.54		-8.99	-8.16	-8.49	-9.77	-12.26	-12.49	-13.15
	CH4	70.6	70.6	70.0	69.3	69.3		67	72.2	72.6	57.2	67.9	51.7	56
	CO2	25.6	28.5	29.2	28.9	30.0		32	26.5	26.9	22.5	31.2	30.4	34.2
	O2	1.5	0.9	0.7	0.9	0.6		0.8	0.5	0.4	3.9	0.7	3.7	2.8
	BAL (N2)	2.3	0.0	0.1	0.7	0.0		0.2	0.9	0.1	16.2	0.2	14.1	6.7
	CO	0	5	8	7	6		12	13	7	6	1	0	0
	H2S	243	Out of Range	Out of Range	Out of Range	Out of Range		Out of Range	Out of Range	Out of Range	Out of Range	269	8	12
	Max	-	-	-	-	-		-	-	-	-	-	-	-
	Min	-	-	-	-	-		-	-	-	-	-	-	-
	Flow (cfm)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	Temp	-	-	-	-	-		-	-	-	-	-	-	-
	Comments	closed	closed	closed	closed	closed		closed	closed	closed	closed	closed	closed	closed
5-39	*Well*	-5.79	-7.17	-8.25	-9.67	-9.19		-7.47	-6.95	-7.11	-8.44	-11.02	-11.17	-11.91
well bore seal	*Lateral*	-10.21	-10.90	-8.85	-10.94	-10.97		-8.38	-7.69	-7.7	-9	-11.48	-11.83	-12.35
	CH4	54.5	52.7	56.2	51.8	53.6		55.9	56.4	56.2	56.1	57.4	56.2	55.6
	CO2	35.8	38.2	40.4	38.0	38.7		40.1	41.4	41.6	41.3	41.8	43	43.6
	O2	2.8	2.5	1.3	2.5	2.2		1.5	0.7	0.8	0.9	0.7	0.8	0.7
	BAL (N2)	6.9	6.6	2.2	7.8	5.3		2.6	1.4	1.5	1.6	0	0	0
	CO	17	15	20	16	19		42	37	26	0	2	0	0
	H2S	8	25	25	27	28		116	55	44	21	25	30	30
	Max	6.13	6.88	3.51	4.24	4.75		4.62	5.11	5.27	4.84	4.74	4.79	4.9
	Min	5.93	6.45	3.43	4.04	4.48		4.43	4.76	5.04	4.61	4.42	4.47	4.7
	Flow (cfm)	56.98	62.98050094	32.78954813	39.12067125	43.60915406	0	42.75870469	46.63297406	48.71185031	44.64859219	43.27842375	43.75089563	45.3573
	Temp	7.7	10.4	7.4	12.4	10.5		13.2	21.4	18.2	13.1	10.3	10.4	9
	Comments	opened 1/4T	no change	no change	no change	opened 1/2T		opened 1/4T	opened 1/4T	no change	no change	no change	opened 1/2T more	opened 1T more
5-40	*Well*	-0.74	-4.80	-3.35	0.54	-1.13	-0.12	-0.18	-0.07	-0.68	-1.13	-1.09	-1.07	-0.83
	Lateral	-11.09	-7.28	-5.64	-10.35	-7.67	-9.89	-9.57	-7.91	-7.74	-9.28	-9.71	-10.87	-14.29
	CH4	52.1	27.3	31.8	57.3	42.1	49.9	50.3	51	49.4	43.3	43.2	44.4	46.5
	CO2	37.6	26.4	28.5	42.3	34.4	38.3	39.8	40.4	40.7	37	37.1	37.1	38.4
	O2	0.8	6.1	4.6	0.3	2.6	0.7	0.8	0.4	0.6	1.9	2.2	2	1.9
	BAL (N2)	9.5	40.1	35.0	0.0	20.9	11.1	9	8.2	9.3	17.7	17.4	16.5	13.3
	CO	1	14	15	13	12	21	29	5	24	2	5	0	0
	H2S	64	32	44	292	60	124	114	122	93	79	67	57	78
	Max	4.76	13.36	1.54	6.88	6.79	3.42	4.12	3.71	4.52	5.11	5.68	4.39	5.28
	Min	7.36	13.04	1.48	6.65	6.44	3.36	3.99	3.64	4.34	4.88	5.41	3.92	4.99
	Flow (cfm)	57.26	124.732575	14.26865063	63.92544469	62.50802906	32.03359313	38.31746906	34.72668281	41.86100813	47.19994031	52.39713094	39.26241281	48.52286156
	Temp	24.9	39.6	30.5	36.4	38.3	35.8	34.5	35.8	33.7	37.4	35.2	34.8	34.8
	Comments	opened 1T	closed 1-1/2T	closed 2-1/4T	opened 1T	closed 1/2T	opened 1/4T	no change	no change	opened 1/4T	no change	no change	closed 1/4T	no change
5-41	*Well*	-2.63	-5.06	-2.03	-4.55	-3.20		-4.34	-3.02	-3.49	-5.18	-6.37	-6.41	-8.49
well bore seal	*Lateral*	-3.97	-7.45	-3.95	-6.27	-4.77		-5.76	-4.62	-4.65	-6.18	-7.64	-7.5	-10.06
	CH4	47.1	49.5	53.1	55.5	58.4		57.4	54.4	57.1	57.8	57.3	57.5	51.6
	CO2	31.4	36.2	37.8	39.2	40.5		40.5	39.7	40	41.8	41.8	41.7	38.1
	O2	4.8	3.5	2.2	1.5	1.1		1	0.8	0.8	0.3	0.7	0.7	2.7
	BAL (N2)	16.7	10.7	6.8	3.7	0.0		1.2	5.1	2	0	0	0	7.5
	CO	Out of Range	12	15	15	12		36	25	16	19	19	8	0
	H2S	210	278	307	290	290		265	254	247	243	203	204	196
	Max	14.54	18.94	13.93	13.82	14.35		15.16	13.47	12.98	11.65	14.66	13.58	14.22
	Min	13.82	17.84	12.7	13.35	13.72		14.33	12.97	12.45	10.75	13.37	13.2	13.43
	Flow (cfm)	133.99	173.7751556	125.8192603	128.3706084	132.6228553	0	139.3319559	124.9215638	120.1495978	105.8337	132.4338666	126.5279681	130.6384734
	Temp	19.8	18.4	22.5	24.0	22.7		23.8	26.8	25.8	24.3	22	21.8	20.7
	Comments	closed 6T	opened 2T	Full Open	Full Open	Full Open		Full Open	Full Open	Full Open	Full Open	Full Open	Full Open	closed 1T
5-42	*Well*	Frozen	Frozen	-0.18	-1.37	-0.23		-0.42	-0.44	-0.43	-0.45	-0.28	-0.83	frozen
	Lateral	-10.06	-14.79	-8.66	-11.53	-9.34		-10.48	-8.82	-8.65	-10.14	-12.08	-12.01	-15.11
	CH4	57.9	4.3	56.1	41.3	55.5		56	55.8	56.4	55.6	55.6	55.7	41.5
	CO2	41.5	3.7	43.3	31.9	43.9		43.6	42.7	43.2	44.1	43.6	43.6	32.2
	O2	0.4	22.1	0.6	5.5	0.6		0.4	0.5	0.4	0.3	0.7	0.6	6.3
	BAL (N2)	0.1	69.9	0.0	21.2	0.0		0	0.8	0	0	0	0	19.9
	CO	195	8	41	24	67		150	154	135	9	25	21	0
	H2S	69	5	74	41	95		96	108	125	153	128	124	66
	Max	1.98	-	1.68	3.59	1.59		2.35	2.08	2.17	2.15	2.59	3.06	3.49
	Min	1.78	-	1.63	3.33	1.52		2.24	2.04	2.09	2.08	1.86	2.83	3.24
	Flow (cfm)	17.76	#VALUE!	15.63881906	32.69505375	14.69387531	0	21.68645906	19.46584125	20.12730188	19.98556031	21.02499844	27.82859344	31.79735719
	Temp	6.5	-	15.2	17.0	12.8		18	25.2	23.4	16.1	9	11.8	8.1
	Comments	20T->25T	Frozen	20T->25T	25T->15T	15T -> 20T		20T N/C	20T->nc	20T -> nc	20T -> nc	20T -> 25T	25T	25T -> 20T

Table 3: Pump Counters

	29-Jan-15			26-Feb-15			30-Mar-15			30-Apr-15			26-May-15			8-Jun-15		
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
PDT 1	1083	50	130	1083	0	0	1135	52	135.2	1144	9	23.4	1173	29	75.4	1188	15	39
PDT 2	11897	1082	2813.2	13198	1301	3382.6	14256	1058	2750.8	14707	451	1172.6	15305	598	1554.8	15564	259	673.4
PDT 3	4639	3	7.8	4650	11	28.6	4753	103	267.8	4782	29	75.4	4885	103	267.8	4957	72	187.2
PDT 4	4024	8	20.8	4024	0	0	CNM	Flooded	in area	CNM	Flooded	in area	CNM	Flooded	in area	CNM	Flooded	in area
PDT 5	9149	308	800.8	9149	0	0	9891	742	1929.2	10067	176	457.6	10309	242	629.2	10485	176	457.6
PDT 6	22934	173	449.8	22945	11	28.6	26778	3833	9965.8	27858	1080	2808	29250	1392	3619.2	29798	548	1424.8
PDT 7	5606	102	265.2	5607	1	2.6	5630	23	59.8	5630	0	0	5630	0	0	5630	0	0
PDT 8	1189	16	41.6	1189	0	0	1251	62	161.2	1252	1	2.6	1252	0	0	1253	1	2.6
PDT 9	15463	3097	8052.2	17407	1944	5054.4	23040	5633	14645.8	25206	2166	5631.6	CNM	Chamber	flooded	30211		
H-4	102296	67	174.2	102297	1	2.6	102994	697	1812.2	106834	3840	9984	108579	1745	4537	109456	877	2280.2
1-9	328138	1	2.6	328140	2	5.2	340905	12765	33189	353253	12348	32104.8	366818	13565	35269	372904	6086	15823.6
1-10	272561	13890	36114	272561	0	0	289450	16889	43911.4	301007	11557	30048.2	309777	8770	22802	314510	4733	12305.8
H-11	398466	45889	119311.4	398466	0	0	460502	62036	161293.6	474346	13844	35994.4	474346	0	0	474346	0	0
2-18	950809	87366	227151.6	951164	355	923	56842	105677	274760.2	58067	1225	3185	58067	0	0	58067	0	0
3-27	238272	0	0	238272	0	0	238272	0	0	238273	1	2.6	238273	0	0	238273	0	0
3-29	23361	42084	109418.4	23361	0	0	68975	45614	118596.4	80684	11709	30443.4	80684	0	0	80684	0	0
3-30	422379	15053	39137.8	422406	27	70.2	454754	32348	84104.8	486964	32210	83746	516244	29280	76128	530952	14708	38240.8

	27-Jul-15			25-Aug-15			24-Sep-15			27-Oct-15			25-Nov-15			16-Dec-15		
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
PDT 1	1205	17	44.2	1215	10	26	1245	30	78	1283	38	98.8	1381	98	254.8	1391	10	26
PDT 2	16531	967	2514.2	16763	232	603.2	17227	464	1206.4	18026	799	2077.4	19064	1038	2698.8	19400	336	873.6
PDT 3	5065	108	280.8	5158	93	241.8	5348	190	494	5651	303	787.8	5796	145	377	5818	22	57.2
PDT 4	CNM	Flooded	in area	CNM	Flooded in	a Pond	CNM	Flooded in	a Pond	CNM	Flooded in	a Pond	CNM	Flooded in	a Pond	CNM	Flooded in	a Pond
PDT 5	11743	1258	3270.8	12072	329	855.4	12716	644	1674.4	13495	779	2025.4	13836	341	886.6	13943	107	278.2
PDT 6	31820	2022	5257.2	32166	346	899.6	32804	638	1658.8	33627	823	2139.8	34987	1360	3536	35309	322	837.2
PDT 7	5630	0	0	5630	0	0	5630	0	0	5632	2	5.2	5827	195	507	5855	28	72.8
PDT 8	1253	0	0	1253	0	0	1253	0	0	1257	4	10.4	1332	75	195	1368	36	93.6
PDT 9	CNM	Chamber	flooded	CNM	Chamber	flooded	CNM	Chamber	flooded	47686	-	-	52589	4903	12747.8	53746	1157	3008.2
H-4	113434	3978	10342.8	114123	689	1791.4	114962	839	2181.4	115595	633	1645.8	139925	24330	63258	139929	4	10.4
1-9	397496	24592	63939.2	404185	6689	17391.4	416203	12018	31246.8	429227	13024	33862.4	440245	11018	28646.8	443149	2904	7550.4
1-10	334040	19530	50778	339282	5242	13629.2	348926	9644	25074.4	358984	10058	26150.8	367673	8689	22591.4	370212	2539	6601.4
H-11	474346	0	0	474346	0	0	474346	0	0	525326	50980	132548	525336	10	26	525338	2	5.2
2-18	58067	0	0	58067	0	0	58067	0	0	161519	103452	268975.2	175275	13756	35765.6	175275	0	0
3-27	238273	0	0	238273	0	0	238273	0	0	238273	0	0	238274	1	2.6	238274	0	0
3-29	155975	75291	195756.6	155975	0	0	155975	0	0	179462	23487	61066.2	225157	45695	118807	242503	17346	45099.6
3-30	583806	52854	137420.4	602352	18546	48219.6	636383	34031	88480.6	666488	30105	78273	684443	17955	46683	692270	7827	20350.2

Table 4:
Leachate Levels

Location	Screen Length	Installed Depth	26-Mar-15				26-May-15				29-Sep-15				7-Dec-15			
	meter	mbgs	D.T.W	D.T.B.	Temp	% Open Screen	D.T.W	D.T.B.	Temp	% Open Screen	D.T.W	D.T.B.	Temp	% Open Screen	D.T.W	D.T.B.	Temp	% Open Screen
H-1	12	14.63	7.21	13.70	28.2	39.12	7.23	14.22	28.7	39.29	7.47	13.97	26.7	41.25	7.27	14.20	25.3	39.61
H-2	14	16.77	10.21	17.45	31.1	52.2	10.17	17.84	31.3	51.9	9.98	17.65	30.0	50.5	9.96	18.01	28.0	50.4
H-3	12	15.24	8.50	15.75	11.5	44.7	8.39	16.05	12.8	43.8	8.23	15.64	11.6	42.5	8.07	15.92	10.0	41.2
H-4	11	14.02	7.66	8.65	12.6	42.0	7.42	8.90	14.2	39.8	7.34	8.02	12.9	39.1	7.16	7.63	11.6	37.5
1-5	11	13.72	9.49	13.91	19.7	60.4	9.31	14.34	19.9	58.7	9.14	14.04	19.4	57.1	9.10	14.29	17.0	56.7
1-6	12	15.55	11.35	15.86	24.9	65.6	11.16	16.27	25.4	64.0	11.03	16.02	25.0	62.9	8.29	16.15	21.7	40.5
1-7	18	21.34	15.89	21.06	27.6	70.2	16.11	20.97	28.3	71.4	16.33	20.66	27.2	72.6	16.70	21.06	24.3	74.6
1-8	21	24.39	16.33	24.17	34.1	62.2	16.27	24.73	33.7	62.0	16.38	24.50	33.8	62.5	16.47	24.30	30.3	62.9
1-9	12	14.63	8.95	14.72	33.1	53.4	12.97	14.99	34.2	86.4	12.48	14.73	33.7	82.3	13.20	15.05	29.5	88.2
1-10	9	12.20	9.50	11.38	27.4	70.5	11.42	11.97	30.6	91.5	9.79	10.17	25.4	73.7	9.74	11.47	25.7	73.2
H-11	9	12.80	7.28	8.04	21.2	39.6	6.11	12.29	22.3	26.8	4.37	12.18	22.0	7.8	4.41	10.95	20.4	8.2
H-12	13	16.16	9.12	15.56	22.2	46.3	7.98	16.22	23.1	37.6	8.48	15.84	22.4	41.4	6.62	16.08	19.4	27.2
2-13	21	25.00	7.63	20.18	39.4	18.6	7.48	20.20	38.2	17.9	8.04	17.46	38.9	20.5	8.40	Blocked at 9.8	39.7	22.2
2-14	20	22.56	11.85	22.27	22.1	46.0	11.70	22.47	23.4	45.2	11.58	22.05	23.4	44.6	11.73	22.27	23.1	45.3
2-15	18	21.65	13.86	22.16	15.5	57.4	13.90	22.10	17.0	57.7	14.07	21.72	16.1	58.6	13.94	21.98	15.7	57.9
2-16	26	28.35	22.71	29.59	15.4	78.2	22.65	29.77	16.9	78.0	22.16	29.45	15.9	76.1	22.45	29.56	15.8	77.2
2-17	15	18.29	13.18	17.77	22.4	66.5	12.93	17.99	23.3	64.8	12.89	17.56	22.0	64.6	13.44	17.83	19.6	68.2
2-18	15	18.29	15.19	18.83	29.7	79.6	15.04	19.21	30.3	78.7	14.69	18.69	29.5	76.4	14.78	19.10	27.8	77.0
3-19	12	14.94	10.20	15.08	13.1	61.1	9.05	15.18	13.1	51.7	9.00	14.82	12.9	51.3	8.92	15.15	12.3	50.6
3-20	11	13.26	10.02	11.00	12.4	69.6	10.41	11.19	13.8	73.3	10.24	10.87	9.9	71.7	9.67	10.90	7.3	66.3
3-21	5	7.62	5.84	7.48	8.1	61.0	5.73	7.53	9.8	58.6	5.48	7.49	7.4	53.2	5.76	7.68	7.3	59.3
3-22	24	26.68	9.71	25.89	28.8	29.6	8.65	26.37	28.9	25.2	6.95	25.40	28.6	18.1	5.37	25.95	28.0	11.5
3-23	23	25.91	8.87	22.84	26.7	25.5	8.21	23.04	32.7	22.6	7.85	22.67	32.3	21.0	8.08	22.93	34.0	22.0
3-24	21	23.48	12.37	22.31	25.1	48.0	10.90	22.33	26.1	41.1	11.25	22.05	25.4	42.7	12.31	22.30	27.3	47.7
3-25	18	21.34	3.42	21.18	25.7	2.0	6.75	21.34	29.8	20.2	7.67	21.04	30.7	25.3	7.98	21.37	30.6	27.0
3-26	9	12.20	1.92	12.34	24.7	0.0	2.36	12.24	23.6	0.0	2.63	12.12	24.4	0.0	2.44	12.51	23.6	0.0
3-27	21	24.09	7.52	23.92	44.5	22.4	6.90	23.85	41.0	19.5	6.83	23.60	39.8	19.1	2.87	23.88	42.5	0.6
3-28	12	15.24	9.54	14.88	23.8	53.2	9.55	14.88	24.3	53.3	7.58	14.51	23.1	37.2	7.37	14.80	22.7	35.4
3-29	12	14.63	5.49	13.68	38.1	25.0	4.71	14.10	39.3	18.6	5.52	13.98	38.5	25.3	6.04	14.17	32.1	29.5
3-30	7	9.76	8.21	9.00	38.3	78.9	7.91	9.19	38.2	74.8	7.90	9.06	37.4	74.6	8.11	9.21	35.9	77.5
4-31	16	18.75	9.88	14.94	19.6	45.1	9.47	18.77	19.8	42.6	9.23	14.57	20.8	41.1	9.03	18.75	18.8	39.8
4-32	10	12.50	3.47	11.54	14.8	7.4	2.38	11.36	12.7	0.0	2.94	11.12	15.8	2.0	3.31	11.04	14.9	5.8
4-33	24	26.68	4.46	19.88	31.1	8.9	4.26	20.09	32.7	8.1	3.88	19.40	30.7	6.5	4.02	20.13	31.1	7.1
4-34	20	22.56	5.82	21.81	23.4	15.5	6.88	21.77	33.1	20.9	7.20	21.82	33.8	22.5	6.90	21.84	33.0	21.0
4-35	15	17.38	12.47	16.96	17.4	67.8	12.68	17.33	15.3	69.2	12.18	17.16	15.5	65.9	12.22	17.42	15.2	66.2
4-36	15	18.29	5.60	17.28	24.3	16.7	8.24	17.85	30.4	34.1	8.20	17.36	33.4	33.8	8.52	17.72	34.8	35.9
4-37	12	14.94	4.29	13.67	21.1	12.7	5.48	14.06	37.4	22.4	2.98	12.48	35.2	1.9	8.64	13.81	41.5	48.3
5-38	8	10.67	2.48	10.64	9.8	0.0	1.72	10.81	9.5	0.0	1.88	10.70	13.4	0.0	2.95	11.13	12.9	0.0
5-39	8	10.67	4.44	10.67	8.7	18.3	4.33	11.03	9.8	16.8	4.34	10.61	11.6	16.9	4.12	10.96	12.5	14.1
5-40	18	21.95	6.16	22.35	21.8	13.7	9.40	22.69	39.0	31.4	4.53	22.05	37.7	4.8	8.64	22.24	38.2	27.2
5-41	17	18.90	15.03	17.37	27.9	76.9	11.87	17.31	27.1	58.1	11.10	16.90	28.6	53.5	4.30	15.61	25.1	12.9
5-42	12	16.16	12.40	14.85	17.1	69.2	12.53	15.39	18.1	70.2	12.22	15.18	18.9	67.7	12.14	14.94	16.8	67.0

Dual purpose

n/a - not available

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 2015.

Data for 2015 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 2015 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 2015, 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 2015 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 2015.

5.0 SITE ACTIVITIES

A number of minor upgrades were made in the wellfield in 2015 to improve landfill gas collection and overall operations. Maintenance items included the following:

- QED Quick-Change Orifice Plate Wellheads were placed on wells H-12 and 5-42 in October 2014 as a trial to observe if the expense of the wellheads was worthwhile. The QED wellheads are designed to improve flow adjustments and overall operator control. In the winter months of 2015, these QED wellhead ports froze up preventing monitoring of the vacuum on the well side. The benefits of the QED wellheads will continue to be assessed during the 2015 monitoring year.

- Leachate samples were obtained at Manholes 8, 13 and 24 and sent to Encon Evaporators for testing in June.

- Wells 5-38 and 5-39 were each raised approximately three feet due to clay filling in June.

- Wells 2-14, 2-17 and 3-29 were cut down due to ground sinking in June.

- Repaired well 5-40 due to being broken and replaced kanaflex in August.

- Confined Space Entry of all PDT's (except PDT 4) was completed to check operation and condition of pneumatic pumps in October.

- Repaired well 3-23 in October due to being broken.

At the plant, there were also numerous minor maintenance jobs that had been completed in 2015 to improve overall plant safety and efficiency. Maintenance items included the following:

- Annual Preventative Maintenance and Calibration was completed on the Gas Analyzer by Novatech Analytical Solutions during the months of February and December. Regular PM service will occur once annual, in December in the future.

- Air Compressor Fuses (600V/20A) were replaced in March with new fuses (600V/30A) to fix Amperage spikes from shorting out fuses and shutting down Air Compressor.

- Air Compressor Service and Preventative Maintenance completed by Dynamic Machine in March and October of 2015 as per the service schedule.

- The IR Emitter Bulb was replaced on ambient sensors twice during 2015. The first one was in April for The Electrical Room and the second was in the Blower Room in July.

- A new electrical contactor with overloads switch was installed for the air compressor room exhaust fan in April of 2015.

- Installed new bowl filter on gas analyzer as per request by Novatech in May.

- Two thermocouple elements were replaced on the flare in July due to failing.

- The IR flame detectors on the flare were switched around due to detection issues in July.

- The flame ignitor on the flare had to be pulled and reconnected twice to check that it is operating properly. The first time was in October, and then again in December.

No major maintenance or construction activities were required in 2015.

6.0 CONCLUSIONS AND RECOMMENDATIONS

1. During operation in 2015, 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

	CO2 Equivalents			Landfill Gas Flow								Flare	Flare	Temp			Blower 1		Blower 2	
Date	Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)	Hours		°C	°C	°C	Hours	Hours	Hours	Hours
Jan 1 2015	293	293	293	1295723	1295723	1295723	36705	900	647	49.4	2.2	23:59	0	877	900	924	25.5	5102.2	0	6432.4
Jan 2 2015	589	589	296	2591766	2591766	1296043	36714	900	653	49.8	2	23:58	0	885	900	915	23.1	5125.4	0	6432.4
Jan 3 2015	875	875	286	3887452	3887452	1295686	36704	900	632	48.2	2.4	23:59	0	887	900	915	24	5149.4	0	6432.4
Jan 4 2015	1162	1162	287	5184189	5184189	1296737	36734	901	633	48.2	2.4	23:58	0	882	900	924	24.1	5173.5	0	6432.4
Jan 5 2015	1421	1421	259	6337581	6337581	1153392	32673	900	570	48.9	2.3	21:20	1	-4	895	941	21.4	5194.9	0	6432.4
Jan 6 2015	1698	1698	277	7633087	7633087	1295506	36699	900	611	46.6	3	23:58	0	884	900	913	24.1	5219	0	6432.4
Jan 7 2015	1976	1976	278	8929151	8929151	1296064	36715	900	613	46.8	2.8	23:58	0	881	900	922	24	5243.1	0	6432.4
Jan 8 2015	2258	2258	282	10224409	10224409	1295258	36692	899	622	47.5	2.8	23:59	0	880	900	914	24.1	5267.2	0	6432.4
Jan 9 2015	2535	2535	277	11519617	11519617	1295208	36691	899	611	46.6	3	23:58	0	889	900	915	24	5291.2	0	6432.4
Jan 10 2015	2808	2808	273	12814070	12814070	1294453	36669	899	602	45.9	3.2	23:59	0	882	900	921	24.1	5315.3	0	6432.4
Jan 11 2015	3075	3075	267	14108354	14108354	1294284	36664	899	588	44.9	3.5	23:58	0	886	900	920	24	5339.4	0	6432.4
Jan 12 2015	3339	3339	264	15404697	15404697	1296343	36723	900	583	44.4	3.6	23:58	0	881	900	920	24.1	5363.5	0	6432.4
Jan 13 2015	3615	3615	276	16699646	16699646	1294949	36683	899	609	46.5	3.1	23:58	0	882	900	916	24	5387.5	0	6432.4
Jan 14 2015	3895	3895	280	17995421	17995421	1295775	36707	900	617	47.1	3	23:58	0	885	900	917	24.1	5411.6	0	6432.4
Jan 15 2015	4171	4171	276	19291049	19291049	1295628	36703	900	609	46.4	3.2	23:58	0	882	900	916	24	5435.7	0	6432.4
Jan 16 2015	4453	4453	282	20586895	20586895	1295846	36709	900	623	47.5	2.8	23:59	0	888	900	914	24.1	5459.8	0	6432.4
Jan 17 2015	4741	4741	288	21883298	21883298	1296403	36725	900	636	48.5	2.7	23:58	0	834	900	923	24	5483.8	0	6432.4
Jan 18 2015	5027	5027	286	23179721	23179721	1296423	36725	900	630	48	2.8	23:59	0	886	900	911	24.1	5507.9	0	6432.4
Jan 19 2015	5318	5318	291	24475744	24475744	1296023	36714	900	641	48.9	2.5	23:59	0	874	900	918	24	5532	0	6432.4
Jan 20 2015	5606	5606	288	25771535	25771535	1295791	36707	900	635	48.4	2.7	23:59	0	879	900	936	24.1	5556.1	0	6432.4
Jan 21 2015	5891	5891	285	27067591	27067591	1296056	36715	900	629	47.9	2.5	23:59	0	886	900	920	23	5579.1	0	6432.4
Jan 22 2015	6189	6189	298	28364284	28364284	1296693	36733	900	657	50	1.2	23:59	0	881	900	922	24.1	5603.2	0	6432.4
Jan 23 2015	6480	6480	291	29660399	29660399	1296115	36716	900	641	48.9	1.4	23:59	0	884	900	917	24	5627.2	0	6432.4
Jan 24 2015	6764	6764	284	30951280	30951280	1290881	36568	900	627	48	1.5	23:47	1	0	899	916	24.8	5652.1	0	6432.4
Jan 25 2015	7047	7047	283	32247675	32247675	1296395	36724	900	625	47.7	1.5	23:59	0	876	900	915	24.1	5676.2	0	6432.4
Jan 26 2015	7323	7323	276	33523103	33523103	1275428	36130	899	609	47.2	1.7	23:43	3	0	894	924	23.1	5699.3	0	6432.4
Jan 27 2015	7604	7604	281	34818542	34818542	1295439	36697	900	621	47.4	1.5	23:59	0	888	900	912	24	5723.3	0	6432.4
Jan 28 2015	7883	7883	279	36114064	36114064	1295522	36700	900	615	46.9	1.6	23:58	0	882	900	923	24.1	5747.5	0	6432.4
Jan 29 2015	8149	8149	266	37409169	37409169	1295105	36688	899	587	44.8	2.1	23:59	0	882	900	921	24	5771.5	0	6432.4
Jan 30 2015	8432	8432	283	38705610	38705610	1296441	36726	900	624	47.5	1.2	23:59	0	885	900	913	24	5795.5	0	6432.4
Jan 31 2015	8702	8702	270	40000863	40000863	1295253	36692	899	595	45.4	1.7	23:59	0	890	900	914	24.1	5819.6	0	6432.4
Feb 1 2015	8975	273	273	41296722	1295859	1295859	36709	900	603	46	1.4	23:59	0	878	900	924	24	5843.7	0	6432.4
Feb 2 2015	9250	548	275	42592776	2591913	1296054	36715	900	607	46.3	1.4	23:59	0	878	900	921	24	5867.7	0	6432.4
Feb 3 2015	9527	825	277	43865767	3864904	1272991	36061	900	611	47.4	1.5	23:30	2	0	894	932	24	5891.7	0	6432.4
Feb 4 2015	9786	1084	259	45160741	5159878	1294974	36684	899	572	43.6	1.8	23:59	0	885	900	922	24.1	5915.8	0	6432.4
Feb 5 2015	10052	1350	266	46456326	6455463	1295585	36701	900	587	44.7	1.6	23:58	0	883	900	914	24	5939.8	0	6432.4
Feb 6 2015	10315	1613	263	47751797	7750934	1295471	36698	900	581	44.3	1.7	23:59	0	883	900	921	24	5963.9	0	6432.4
Feb 7 2015	10581	1879	266	49048166	9047303	1296369	36724	900	588	44.8	1.6	23:58	0	885	900	920	24.1	5988	0	6432.4
Feb 8 2015	10834	2132	253	50343837	10342974	1295671	36704	900	559	42.6	2.2	23:59	0	884	900	916	24	6012	0	6432.4
Feb 9 2015	11090	2388	256	51639367	11638504	1295530	36700	900	565	43.1	2	23:58	0	881	900	918	24	6036	0	6432.4
Feb 10 2015	11351	2649	261	52934917	12934054	1295550	36700	900	575	43.8	1.9	23:59	0	873	900	921	24.1	6060.2	0	6432.4
Feb 11 2015	11595	2893	244	54229707	14228844	1294790	36679	899	539	41.1	2.7	23:58	0	887	900	910	24	6084.2	0	6432.4
Feb 12 2015	11853	3151	258	55525426	15524563	1295719	36705	900	569	43.4	1.9	23:58	0	883	900	920	23.1	6107.3	0	6432.4
Feb 13 2015	12078	3376	225	56666810	16665947	1141384	32333	900	496	43	2.3	21:06	0	884	900	923	22.1	6129.4	0	6432.4
Feb 14 2015	12078	3376	0	56666810	16665947	0	0	0	0	0	0	00:00	0	0	0	0	0	6129.4	0	6432.4
Feb 15 2015	12078	3376	0	56666810	16665947	0	0	0	0	0	0	00:00	0	0	0	0	0	6129.4	0	6432.4
Feb 16 2015	12078	3376	0	56666810	16665947	0	0	0	0	0	0	00:00	0	0	0	0	0	6129.4	0	6432.4
Feb 17 2015	12246	3544	168	57389254	17388391	722444	20465	898	371	50.6	1.6	13:25	1	-14	890	948	12.6	6142	0	6432.4
Feb 18 2015	12517	3815	271	58685168	18684305	1295914	36711	900	597	45.5	2.1	23:58	0	883	900	923	24	6166.1	0	6432.4
Feb 19 2015	12784	4082	267	59981149	19980286	1295981	36713	900	588	44.9	2	23:59	0	885	900	920	24.1	6190.2	0	6432.4

	CO2 Equivalents			Landfill Gas Flow								Flare	Flare	Temp			Blower 1		Blower 2	
Date	Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)	Hours		°C	°C	°C	Hours	Hours	Hours	Hours
Feb 20 2015	13048	4346	264	61276612	21275749	1295463	36698	900	582	44.4	2.2	23:59	0	885	900	917	24	6214.2	0	6432.4
Feb 21 2015	13302	4600	254	62572743	22571880	1296131	36717	900	561	42.8	2.5	23:59	0	888	900	914	24	6238.2	0	6432.4
Feb 22 2015	13556	4854	254	63869578	23868715	1296835	36737	901	561	42.8	2.4	23:59	0	880	900	918	24.1	6262.4	0	6432.4
Feb 23 2015	13827	5125	271	65165754	25164891	1296176	36718	900	597	45.5	1.8	23:59	0	880	900	914	24	6286.4	0	6432.4
Feb 24 2015	14086	5384	259	66461785	26460922	1296031	36714	900	572	43.6	2.3	23:58	0	886	900	913	24.1	6310.5	0	6432.4
Feb 25 2015	14341	5639	255	67757146	27756283	1295361	36695	900	563	42.9	2.5	23:59	0	885	900	915	24	6334.5	0	6432.4
Feb 26 2015	14609	5907	268	69053017	29052154	1295871	36709	900	592	45.1	2.2	23:58	0	886	900	919	24	6358.6	0	6432.4
Feb 27 2015	14888	6186	279	70348493	30347630	1295476	36698	900	614	46.9	2.1	23:59	0	876	900	915	24.1	6382.7	0	6432.4
Feb 28 2015	15168	6466	280	71644398	31643535	1295905	36710	900	618	47.1	2	23:58	0	879	900	919	24	6406.7	0	6432.4
Mar 1 2015	15445	277	277	72940346	1295948	1295948	36712	900	610	46.5	2.2	23:59	0	882	900	922	24	6430.7	0	6432.4
Mar 2 2015	15731	563	286	74236375	2591977	1296029	36714	900	630	48	1.8	23:59	0	883	900	921	24.1	6454.9	0	6432.4
Mar 3 2015	16012	844	281	75532519	3888121	1296144	36717	900	620	47.3	2.1	23:59	0	884	900	918	24	6478.9	0	6432.4
Mar 4 2015	16283	1115	271	76827911	5183513	1295392	36696	900	598	45.6	2.5	23:58	0	884	900	923	24.1	6503	0	6432.4
Mar 5 2015	16515	1347	232	77910577	6266179	1082666	30670	900	512	46.5	2.2	16:05	0	887	900	910	16	6519	0	6432.4
Mar 6 2015	16744	1576	229	78946830	7302432	1036253	29355	900	505	48.4	1.9	14:24	1	0	898	922	31.8	6550.8	0	6432.4
Mar 7 2015	17029	1861	285	80242668	8598270	1295838	36709	900	629	48	2.1	23:58	0	876	900	922	24.1	6575	0	6432.4
Mar 8 2015	17318	2150	289	81538891	9894493	1296223	36719	900	638	48.6	1.9	23:59	0	875	900	919	23.1	6598.1	0	6432.4
Mar 9 2015	17564	2396	246	82608646	10964248	1069755	30304	899	543	50.1	1.6	19:48	1	10	896	957	19.8	6617.9	0	6432.4
Mar 10 2015	17857	2689	293	83905209	12260811	1296563	36729	900	647	49.3	1.9	23:59	0	889	900	919	24.1	6642	0	6432.4
Mar 11 2015	18146	2978	289	85182869	13538471	1277660	36194	900	638	49.3	1.7	23:40	1	107	897	958	12.9	6654.9	10.8	6443.2
Mar 12 2015	18446	3278	300	86478652	14834254	1295783	36707	900	661	50.4	1.4	23:59	0	882	900	914	0	6654.9	23.1	6466.4
Mar 13 2015	18741	3573	295	87774548	16130150	1295896	36710	900	651	49.6	1.6	23:59	0	886	900	941	0	6654.9	24	6490.4
Mar 14 2015	19040	3872	299	89069895	17425497	1295347	36695	900	659	50.3	1.3	23:58	0	882	900	922	0	6654.9	24.1	6514.5
Mar 15 2015	19336	4168	296	90365538	18721140	1295643	36703	900	653	49.8	1.5	23:59	0	886	900	918	0	6654.9	24.1	6538.6
Mar 16 2015	19620	4452	284	91661608	20017210	1296070	36715	900	626	47.7	2.1	23:58	0	877	900	921	0	6654.9	24	6562.7
Mar 17 2015	19910	4742	290	92957344	21312946	1295736	36706	900	639	48.7	1.7	23:58	0	880	900	916	0	6654.9	24.1	6586.8
Mar 18 2015	20203	5035	293	94252660	22608262	1295316	36694	900	647	49.3	1.5	23:58	0	886	900	914	0	6654.9	24	6610.8
Mar 19 2015	20477	5309	274	95444892	23800494	1192232	33774	899	605	50.2	1.4	22:06	1	20	897	918	0	6654.9	22.2	6633
Mar 20 2015	20763	5595	286	96740841	25096443	1295949	36712	900	631	48.1	2	23:58	0	886	900	916	0	6654.9	24.1	6657.1
Mar 21 2015	21047	5879	284	98036093	26391695	1295252	36692	899	626	47.8	2	23:58	0	886	900	915	0	6654.9	24	6681.2
Mar 22 2015	21336	6168	289	99332176	27687778	1296083	36715	900	637	48.5	1.8	23:58	0	886	900	912	0	6654.9	24.1	6705.3
Mar 23 2015	21627	6459	291	100627117	28982719	1294941	36683	899	642	49	1.7	23:58	0	888	900	915	0	6654.9	24.1	6729.4
Mar 24 2015	21921	6753	294	101923061	30278663	1295944	36712	900	649	49.5	1.5	23:59	0	883	900	918	0	6654.9	24	6753.4
Mar 25 2015	22162	6994	241	102983567	31339169	1060506	30042	899	531	49.5	1.6	19:38	1	-6	894	953	0	6654.9	19.7	6773.2
Mar 26 2015	22449	7281	287	104280030	32635632	1296463	36726	900	632	48.2	2	23:59	0	883	900	915	0	6654.9	24.1	6797.3
Mar 27 2015	22740	7572	291	105575672	33931274	1295642	36703	900	643	49	1.7	23:58	0	888	900	920	0	6654.9	24.1	6821.4
Mar 28 2015	23037	7869	297	106871008	35226610	1295336	36694	900	655	50	1.4	23:59	0	885	900	909	0	6654.9	24	6845.4
Mar 29 2015	23324	8156	287	108167010	36522612	1296002	36713	900	633	48.2	2	23:59	0	884	900	914	0	6654.9	23.1	6868.6
Mar 30 2015	23619	8451	295	109462920	37818522	1295910	36711	900	651	49.6	1.6	23:59	0	879	900	927	0	6654.9	24	6892.6
Mar 31 2015	23920	8752	301	110758566	39114168	1295646	36703	900	665	50.7	1.3	23:59	0	888	900	913	0	6654.9	24.1	6916.7
Apr 1 2015	24175	255	255	111828494	1069928	1069928	30309	900	560	51.7	1.1	19:46	0	885	900	919	0	6654.9	20.6	6937.3
Apr 2 2015	24368	448	193	112659953	1901387	831459	23554	899	425	50.6	1.9	15:27	1	4	893	963	0	6654.9	14.8	6952.1
Apr 3 2015	24663	743	295	113956121	3197555	1296168	36718	900	649	49.5	1.7	23:59	0	872	900	926	0	6654.9	24	6976.2
Apr 4 2015	24958	1038	295	115252143	4493577	1296022	36714	900	650	49.5	1.7	23:59	0	888	900	913	0	6654.9	24.1	7000.3
Apr 5 2015	25253	1333	295	116548107	5789541	1295964	36712	900	650	49.5	1.7	23:59	0	888	900	915	0	6654.9	24	7024.3
Apr 6 2015	25546	1626	293	117843784	7085218	1295677	36704	900	643	49.1	1.9	23:59	0	885	900	920	0	6654.9	24.1	7048.4
Apr 7 2015	25834	1914	288	119105319	8346753	1261535	35737	899	634	49.6	1.7	23:23	1	29	896	939	0	6654.9	23.5	7072
Apr 8 2015	26131	2211	297	120401149	9642583	1295830	36708	900	653	49.8	1.7	23:58	0	876	900	926	0	6654.9	24	7096
Apr 9 2015	26428	2508	297	121697573	10939007	1296424	36725	900	654	49.9	1.7	23:58	0	880	900	920	0	6654.9	24.1	7120.1
Apr 10 2015	26721	2801	293	122993295	12234729	1295722	36705	900	643	49.1	1.9	23:59	0	883	900	920	0	6654.9	24	7144.1

	CO2 Equivalents			Landfill Gas Flow								Flare	Flare	Temp			Blower 1		Blower 2	
Date	Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)	Hours		°C	°C	°C	Hours	Hours	Hours	Hours
Apr 11 2015	27021	3101	300	124288159	13529593	1294864	36681	899	661	50.4	1.5	23:58	0	883	900	914	0	6654.9	24.1	7168.2
Apr 12 2015	27317	3397	296	125583721	14825155	1295562	36701	900	651	49.6	1.8	23:59	0	865	900	919	0	6654.9	24.1	7192.4
Apr 13 2015	27602	3682	285	126879976	16121410	1296255	36720	900	626	47.7	2.5	23:59	0	882	900	918	0	6654.9	24	7216.4
Apr 14 2015	27898	3978	296	128219054	17460488	1339078	37933	933	651	48	2.4	23:52	1	880	900	936	0	6654.9	24	7240.4
Apr 15 2015	28219	4299	321	129659607	18901041	1440553	40808	1000	705	48.4	2.2	23:58	0	884	900	914	0	6654.9	23	7263.4
Apr 16 2015	28537	4617	318	131099534	20340968	1439927	40790	1000	699	48	2.2	23:59	0	869	900	923	0	6654.9	24.1	7287.6
Apr 17 2015	28863	4943	326	132539091	21780525	1439557	40780	1000	716	49.2	1.8	23:58	0	870	900	921	0	6654.9	24	7311.6
Apr 18 2015	29194	5274	331	133978923	23220357	1439832	40788	1000	727	49.9	1.4	23:58	0	881	900	919	0	6654.9	24.1	7335.7
Apr 19 2015	29524	5604	330	135418995	24660429	1440072	40794	1000	725	49.8	1.4	23:58	0	883	900	920	0	6654.9	24	7359.7
Apr 20 2015	29853	5933	329	136860012	26101446	1441017	40821	1001	723	49.6	1.4	23:59	0	886	900	913	0	6654.9	24.1	7383.9
Apr 21 2015	30171	6251	318	138299770	27541204	1439758	40785	1000	700	48.1	1.8	23:58	0	885	900	915	0	6654.9	24	7407.9
Apr 22 2015	30487	6567	316	139739910	28981344	1440140	40796	1000	695	47.7	1.8	23:59	0	886	900	916	0	6654.9	24.1	7432
Apr 23 2015	30752	6832	265	140916653	30158087	1176743	33335	997	582	48.9	1.5	19:37	3	25	890	950	0	6654.9	19.7	7451.7
Apr 24 2015	31078	7158	326	142353134	31594568	1436481	40693	1000	717	49.3	1.5	23:58	1	0	899	925	0	6654.9	24.2	7475.9
Apr 25 2015	31398	7478	320	143793549	33034983	1440415	40804	1000	703	48.2	1.8	23:59	0	865	900	959	0	6654.9	24	7500
Apr 26 2015	31715	7795	317	145233381	34474815	1439832	40788	1000	697	47.8	1.9	23:59	0	874	900	924	0	6654.9	24.1	7524.1
Apr 27 2015	32027	8107	312	146673744	35915178	1440363	40803	1000	685	47	2.1	23:58	0	879	900	913	0	6654.9	24	7548.1
Apr 28 2015	32339	8419	312	148109662	37351096	1435918	40677	1001	685	47.2	2.1	23:57	1	0	899	920	0	6654.9	23.8	7571.9
Apr 29 2015	32657	8737	318	149549424	38790858	1439762	40786	1000	700	48.1	1.9	23:59	0	880	900	918	0	6654.9	24.1	7596.1
Apr 30 2015	32975	9055	318	150989849	40231283	1440425	40804	1000	699	47.9	2	23:59	0	880	900	926	0	6654.9	24	7620.1
May 1 2015	33292	317	317	152430060	1440211	1440211	40798	1000	696	47.8	2	23:59	0	879	900	921	0	6654.9	24.1	7644.2
May 2 2015	33613	638	321	153866100	2876251	1436040	40680	1000	706	48.6	1.8	23:57	1	0	899	922	0	6654.9	24.1	7668.3
May 3 2015	33920	945	307	155306981	4317132	1440881	40817	1001	675	46.3	2.5	23:58	0	888	900	914	0	6654.9	24	7692.4
May 4 2015	34226	1251	306	156746646	5756797	1439665	40783	1000	673	46.2	2.4	23:58	0	884	900	920	0	6654.9	24.1	7716.5
May 5 2015	34541	1566	315	158186066	7196217	1439420	40776	1000	693	47.5	2	23:58	0	879	900	916	0	6654.9	24	7740.5
May 6 2015	34860	1885	319	159625362	8635513	1439296	40772	999	702	48.2	1.9	23:58	0	864	900	932	0	6654.9	24.1	7764.6
May 7 2015	35177	2202	317	161064952	10075103	1439590	40781	1000	698	47.9	2	23:59	0	882	900	921	0	6654.9	23	7787.7
May 8 2015	35481	2506	304	162504475	11514626	1439523	40779	1000	668	45.8	2.5	23:58	0	884	900	918	0	6654.9	24.1	7811.8
May 9 2015	35787	2812	306	163944236	12954387	1439761	40786	1000	674	46.3	2.3	23:59	0	877	900	920	0	6654.9	24	7835.8
May 10 2015	36100	3125	313	165385416	14395567	1441180	40826	1001	689	47.3	2	23:58	0	866	900	925	0	6654.9	24.1	7859.9
May 11 2015	36422	3447	322	166825971	15836122	1440555	40808	1000	708	48.6	1.8	23:59	0	881	900	929	0	6654.9	24	7883.9
May 12 2015	36740	3765	318	168265610	17275761	1439639	40782	1000	700	48.1	1.8	23:59	0	875	900	928	0	6654.9	24	7908
May 13 2015	37058	4083	318	169681434	18691585	1415824	40107	999	699	48.8	1.4	23:37	1	100	899	928	0	6654.9	23.7	7931.7
May 14 2015	37388	4413	330	171120680	20130831	1439246	40771	999	726	49.8	1	23:59	0	886	900	918	0	6654.9	24.1	7955.8
May 15 2015	37701	4726	313	172457485	21467636	1336805	37869	998	688	50.9	0.8	22:18	2	108	897	960	7.1	6662.1	15.3	7971.1
May 16 2015	38041	5066	340	173896791	22906942	1439306	40773	1000	749	51.4	0.8	23:59	0	867	900	931	24	6686.1	0	7971.1
May 17 2015	38387	5412	346	175337498	24347649	1440707	40812	1001	762	52.3	0.5	23:59	0	867	900	932	24.1	6710.2	0	7971.1
May 18 2015	38577	5602	190	176132556	25142707	795058	22522	1000	419	52	0.6	02:35	0	873	900	922	3	6713.2	0	7971.1
May 19 2015	38855	5880	278	177282490	26292641	1149934	32575	999	611	52.6	0.5	14:25	1	0	898	918	45.1	6758.3	0	7971.1
May 20 2015	39205	6230	350	178722193	27732344	1439703	40784	1000	769	52.8	0.6	23:59	0	869	900	932	24	6782.4	0	7971.1
May 21 2015	39465	6490	260	179802350	28812501	1080157	30599	1000	571	52.2	0.7	17:58	0	872	900	921	18.4	6800.8	0	7971.1
May 22 2015	39654	6679	189	180540130	29550281	737780	20900	998	416	55.7	0.5	12:20	1	30	897	945	12.1	6812.9	0	7971.1
May 23 2015	40011	7036	357	181980215	30990366	1440085	40795	1000	785	53.9	0.7	23:59	0	884	900	921	24	6836.9	0	7971.1
May 24 2015	40366	7391	355	183420284	32430435	1440069	40794	1000	780	53.5	0.6	23:59	0	884	900	924	24.1	6861	0	7971.1
May 25 2015	40721	7746	355	184859552	33869703	1439268	40772	1000	781	53.6	0.6	23:58	0	875	900	923	24	6885.1	0	7971.1
May 26 2015	41073	8098	352	186298900	35309051	1439348	40774	1000	775	53.2	0.7	23:59	0	881	900	918	24	6909.1	0	7971.1
May 27 2015	41419	8444	346	187738179	36748330	1439279	40772	999	761	52.2	0.9	23:59	0	876	900	932	23.1	6932.2	0	7971.1
May 28 2015	41769	8794	350	189177353	38187504	1439174	40769	999	770	52.9	0.6	23:58	0	870	900	924	24.1	6956.3	0	7971.1
May 29 2015	42110	9135	341	190618257	39628408	1440904	40818	1001	750	51.4	1	23:58	0	865	900	930	24	6980.4	0	7971.1
May 30 2015	42452	9477	342	192057662	41067813	1439405	40775	1000	752	51.6	0.9	23:59	0	873	900	917	24.1	7004.5	0	7971.1

	CO2 Equivalents			Landfill Gas Flow								Flare	Flare	Temp			Blower 1		Blower 2	
Date	Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)	Hours		°C	°C	°C	Hours	Hours	Hours	Hours
May 31 2015	42798	9823	346	193497169	42507320	1439507	40778	1000	762	52.3	0.7	23:59	0	853	900	946	24	7028.5	0	7971.1
Jun 1 2015	43147	349	349	194936777	1439608	1439608	40781	1000	768	52.7	0.6	23:59	0	874	900	927	24.1	7052.6	0	7971.1
Jun 2 2015	43489	691	342	196345362	2848193	1408585	39902	999	752	52.8	0.7	23:28	1	95	897	934	23.5	7076.2	0	7971.1
Jun 3 2015	43834	1036	345	197785028	4287859	1439666	40783	1000	758	52.1	0.8	23:58	0	886	900	918	24.1	7100.3	0	7971.1
Jun 4 2015	44177	1379	343	199224842	5727673	1439814	40787	1000	755	51.8	0.9	23:59	0	846	900	927	24	7124.3	0	7971.1
Jun 5 2015	44522	1724	345	200663982	7166813	1439140	40768	999	758	52.1	0.8	23:59	0	864	900	936	24.1	7148.4	0	7971.1
Jun 6 2015	44874	2076	352	202102352	8605183	1438370	40746	999	774	53.2	0.5	23:58	0	872	900	921	24	7172.5	0	7971.1
Jun 7 2015	45227	2429	353	203541589	10044420	1439237	40771	999	776	53.3	0.5	23:59	0	865	900	933	24.1	7196.6	0	7971.1
Jun 8 2015	45577	2779	350	204980894	11483725	1439305	40773	1000	770	52.8	0.6	23:59	0	886	900	918	24	7220.6	0	7971.1
Jun 9 2015	45913	3115	336	206358771	12861602	1377877	39033	999	738	52.9	0.6	22:58	1	53	897	925	10.6	7231.2	12.5	7983.6
Jun 10 2015	46237	3439	324	207696597	14199428	1337826	37898	999	713	52.6	0.7	22:19	2	57	894	952	0	7231.2	22.4	8006.1
Jun 11 2015	46568	3770	331	209064879	15567710	1368282	38761	999	729	52.6	0.7	22:51	3	130	896	1059	0	7231.2	22.9	8029
Jun 12 2015	46917	4119	349	210504799	17007630	1439920	40790	1000	768	52.7	0.7	23:59	0	883	900	928	0	7231.2	24	8053
Jun 13 2015	47265	4467	348	211944648	18447479	1439849	40788	1000	765	52.5	0.8	23:59	0	880	900	922	0	7231.2	24.1	8077.1
Jun 14 2015	47609	4811	344	213384486	19887317	1439838	40788	1000	756	51.9	0.9	23:59	0	879	900	918	0	7231.2	23.1	8100.3
Jun 15 2015	47948	5150	339	214824358	21327189	1439872	40789	1000	747	51.2	1	23:59	0	884	900	916	0	7231.2	24	8124.3
Jun 16 2015	48290	5492	342	216263811	22766642	1439453	40777	1000	753	51.7	0.9	23:59	0	872	900	927	0	7231.2	24.1	8148.4
Jun 17 2015	48634	5836	344	217704629	24207460	1440818	40815	1001	757	51.9	0.9	23:58	0	884	900	920	0	7231.2	24.1	8172.5
Jun 18 2015	48972	6174	338	219143669	25646500	1439040	40765	999	744	51.1	1.1	23:59	0	887	900	916	0	7231.2	24	8196.5
Jun 19 2015	49317	6519	345	220583203	27086034	1439534	40779	1000	758	52.1	0.8	23:59	0	870	900	934	0	7231.2	24	8220.5
Jun 20 2015	49661	6863	344	222023364	28526195	1440161	40797	1000	756	51.9	0.9	23:59	0	880	900	922	0	7231.2	23.9	8244.4
Jun 21 2015	50004	7206	343	223462279	29965110	1438915	40762	999	754	51.8	0.9	23:58	0	884	900	918	0	7231.2	24	8268.4
Jun 22 2015	50345	7547	341	224902219	31405050	1439940	40791	1000	751	51.5	1	23:59	0	881	900	916	0	7231.2	24	8292.5
Jun 23 2015	50684	7886	339	226340972	32843803	1438753	40757	999	746	51.3	1	23:58	0	877	900	919	0	7231.2	23.9	8316.4
Jun 24 2015	50955	8157	271	227457243	33960074	1116271	31622	999	597	52.8	0.8	18:40	2	0	893	956	0	7231.2	18.2	8334.6
Jun 25 2015	51299	8501	344	228897143	35399974	1439900	40789	1000	757	51.9	1	23:58	0	885	900	917	0	7231.2	23.9	8358.5
Jun 26 2015	51642	8844	343	230336554	36839385	1439411	40776	1000	754	51.8	1	23:59	0	879	900	916	0	7231.2	24	8382.5
Jun 27 2015	51988	9190	346	231775982	38278813	1439428	40776	1000	760	52.2	0.9	23:58	0	870	900	926	0	7231.2	23.9	8406.4
Jun 28 2015	52332	9534	344	233214999	39717830	1439017	40764	999	758	52	0.9	23:59	0	881	900	913	0	7231.2	24	8430.4
Jun 29 2015	52674	9876	342	234654503	41157334	1439504	40778	1000	752	51.6	1	23:58	0	885	900	910	0	7231.2	23.9	8454.3
Jun 30 2015	53015	10217	341	236094719	42597550	1440216	40798	1000	751	51.5	1	23:59	0	884	900	922	0	7231.2	24	8478.3
Jul 1 2015	53356	341	341	237534942	1440223	1440223	40799	1000	750	51.5	1.1	23:59	0	888	900	912	0	7231.2	23.9	8502.2
Jul 2 2015	53697	682	341	238974296	2879577	1439354	40774	1000	750	51.5	1.1	23:59	0	882	900	917	0	7231.2	24	8526.2
Jul 3 2015	54036	1021	339	240414299	4319580	1440003	40792	1000	746	51.2	1.2	23:59	0	887	900	915	0	7231.2	24	8550.2
Jul 4 2015	54316	1301	280	241595315	5500596	1181016	33456	1000	616	51.6	1.1	19:39	0	873	900	918	0	7231.2	20	8570.3
Jul 5 2015	54316	1301	0	241595315	5500596	0	0	0	0	0	0	00:00	0	0	0	0	0	7231.2	0	8570.3
Jul 6 2015	54472	1457	156	242202373	6107654	607058	17197	998	342	55.7	0.7	10:09	1	15	889	949	0	7231.2	9.8	8580
Jul 7 2015	54733	1718	261	243247988	7153269	1045615	29620	998	575	54.3	0.8	17:25	1	22	896	940	4.7	7235.9	12.9	8592.9
Jul 8 2015	55091	2076	358	244687286	8592567	1439298	40772	1000	788	54.1	0.8	23:59	0	882	900	916	24	7259.9	0	8592.9
Jul 9 2015	55445	2430	354	246126149	10031430	1438863	40760	999	779	53.5	0.9	23:59	0	886	900	915	24.1	7284.1	0	8592.9
Jul 10 2015	55795	2780	350	247565338	11470619	1439189	40769	999	771	52.9	1	23:59	0	884	900	916	23	7307.1	0	8592.9
Jul 11 2015	56146	3131	351	249004926	12910207	1439588	40781	1000	771	53	0.9	23:59	0	864	900	929	24.1	7331.2	0	8592.9
Jul 12 2015	56502	3487	356	250444779	14350060	1439853	40788	1000	782	53.7	0.7	23:59	0	872	900	933	24.1	7355.3	0	8592.9
Jul 13 2015	56855	3840	353	251884662	15789943	1439883	40789	1000	776	53.3	0.8	23:58	0	874	900	919	24	7379.4	0	8592.9
Jul 14 2015	57154	4139	299	253118543	17023824	1233881	34953	1000	657	52.5	1	17:09	0	874	900	925	18	7397.4	0	8592.9
Jul 15 2015	57434	4419	280	254264252	18169533	1145709	32456	1000	616	53.1	0.8	23:59	0	0	898	926	30.6	7428	0	8592.9
Jul 16 2015	57786	4771	352	255703347	19608628	1439095	40767	999	775	53.2	0.7	23:58	0	886	900	916	24.1	7452.1	0	8592.9
Jul 17 2015	58135	5120	349	257142615	21047896	1439268	40772	999	767	52.6	0.9	23:58	0	881	900	919	24	7476.1	0	8592.9
Jul 18 2015	58482	5467	347	258581176	22486457	1438561	40752	999	763	52.4	0.9	23:58	0	881	900	926	24.1	7500.3	0	8592.9
Jul 19 2015	58828	5813	346	260020264	23925545	1439088	40766	999	761	52.2	1	23:58	0	878	900	923	24	7524.3	0	8592.9

	CO2 Equivalents			Landfill Gas Flow								Flare	Flare	Temp			Blower 1		Blower 2	
Date	Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)	Hours		°C	°C	°C	Hours	Hours	Hours	Hours
Jul 20 2015	59166	6151	338	261459893	25365174	1439629	40782	1000	744	51.1	1.3	23:58	0	885	900	917	23.1	7547.4	0	8592.9
Jul 21 2015	59506	6491	340	262899015	26804296	1439122	40767	999	748	51.4	1.3	23:58	0	885	900	916	24	7571.4	0	8592.9
Jul 22 2015	59847	6832	341	264338695	28243976	1439680	40783	1000	750	51.5	1.2	23:59	0	863	900	923	24.1	7595.6	0	8592.9
Jul 23 2015	60187	7172	340	265778352	29683633	1439657	40783	1000	748	51.4	1.3	23:58	0	860	900	936	24	7619.6	0	8592.9
Jul 24 2015	60537	7522	350	267217982	31123263	1439630	40782	1000	769	52.8	0.8	23:59	0	877	900	924	24.1	7643.7	0	8592.9
Jul 25 2015	60889	7874	352	268657371	32562652	1439389	40775	1000	774	53.2	0.7	23:58	0	884	900	921	24	7667.7	0	8592.9
Jul 26 2015	61241	8226	352	270097411	34002692	1440040	40793	1000	774	53.1	0.8	23:59	0	878	900	923	24.1	7691.9	0	8592.9
Jul 27 2015	61592	8577	351	271537375	35442656	1439964	40791	1000	772	53	0.8	23:58	0	872	900	930	24	7715.9	0	8592.9
Jul 28 2015	61950	8935	358	272977206	36882487	1439831	40788	1000	788	54.1	0.5	23:58	0	872	900	930	24.1	7740	0	8592.9
Jul 29 2015	62301	9286	351	274415560	38320841	1438354	40746	999	772	53	0.8	23:58	0	877	900	924	24.1	7764.1	0	8592.9
Jul 30 2015	62650	9635	349	275854944	39760225	1439384	40775	1000	767	52.7	0.8	23:59	0	882	900	923	24	7788.2	0	8592.9
Jul 31 2015	62998	9983	348	277294222	41199503	1439278	40772	999	766	52.6	0.8	23:58	0	885	900	912	24.1	7812.3	0	8592.9
Aug 1 2015	63349	351	351	278733863	1439641	1439641	40782	1000	771	52.9	0.8	23:59	0	886	900	919	24	7836.3	0	8592.9
Aug 2 2015	63692	694	343	280173384	2879162	1439521	40779	1000	755	51.9	1.1	23:58	0	886	900	924	24.1	7860.4	0	8592.9
Aug 3 2015	64029	1031	337	281612789	4318567	1439405	40775	1000	741	50.9	1.5	23:58	0	885	900	918	24	7884.4	0	8592.9
Aug 4 2015	64360	1362	331	283052126	5757904	1439337	40774	1000	728	50	1.8	23:59	0	882	900	916	24.1	7908.6	0	8592.9
Aug 5 2015	64692	1694	332	284491056	7196834	1438930	40762	999	730	50.2	1.7	23:58	0	870	900	924	24	7932.6	0	8592.9
Aug 6 2015	65030	2032	338	285929632	8635410	1438576	40752	999	743	51.1	1.5	23:59	0	876	900	927	24.1	7956.7	0	8592.9
Aug 7 2015	65369	2371	339	287368125	10073903	1438493	40750	999	745	51.2	1.5	23:59	0	879	900	931	24	7980.7	0	8592.9
Aug 8 2015	65705	2707	336	288807023	11512801	1438898	40761	999	740	50.8	1.6	23:58	0	883	900	917	23.1	8003.9	0	8592.9
Aug 9 2015	66038	3040	333	290246682	12952460	1439659	40783	1000	732	50.2	1.8	23:58	0	883	900	916	24	8027.9	0	8592.9
Aug 10 2015	66371	3373	333	291685817	14391595	1439135	40768	999	732	50.3	1.7	23:59	0	878	900	922	24.1	8052	0	8592.9
Aug 11 2015	66708	3710	337	293125222	15831000	1439405	40775	1000	742	50.9	1.4	23:58	0	884	900	919	24	8076	0	8592.9
Aug 12 2015	67032	4034	324	294515639	17221417	1390417	39388	999	712	50.6	1.6	23:09	1	87	897	969	23.3	8099.4	0	8592.9
Aug 13 2015	67358	4360	326	295955396	18661174	1439757	40785	1000	717	49.2	2.1	23:58	0	882	900	923	24	8123.4	0	8592.9
Aug 14 2015	67680	4682	322	297388987	20094765	1433591	40611	1000	709	48.9	2.2	23:48	1	0	899	923	24.2	8147.6	0	8592.9
Aug 15 2015	68007	5009	327	298828844	21534622	1439857	40788	1000	719	49.3	2.1	23:58	0	885	900	921	24.1	8171.7	0	8592.9
Aug 16 2015	68319	5321	312	300267954	22973732	1439110	40767	999	687	47.1	2.7	23:58	0	884	900	912	24	8195.7	0	8592.9
Aug 17 2015	68626	5628	307	301693527	24399305	1425573	40384	1000	675	46.8	2.8	23:45	1	240	897	929	16.7	8212.5	7	8599.8
Aug 18 2015	68937	5939	311	303133712	25839490	1440185	40798	1000	685	47	2.8	23:59	0	874	900	924	0	8212.5	23.9	8623.8
Aug 19 2015	69262	6264	325	304573017	27278795	1439305	40773	1000	715	49.1	1.8	23:59	0	868	900	916	0	8212.5	24	8647.8
Aug 20 2015	69600	6602	338	306013333	28719111	1440316	40801	1000	742	50.9	0.8	23:58	0	874	900	930	0	8212.5	23.9	8671.7
Aug 21 2015	69937	6939	337	307453325	30159103	1439992	40792	1000	741	50.8	0.9	23:58	0	876	900	922	0	8212.5	24	8695.7
Aug 22 2015	69947	6949	10	307498345	30204123	45020	1275	997	23	50.6	0.9	00:43	0	882	901	918	0	8212.5	0.9	8696.6
Aug 23 2015	69947	6949	0	307498345	30204123	0	0	0	0	0	0	00:00	0	0	0	0	0	8212.5	0	8696.6
Aug 24 2015	70166	7168	219	308344587	31050365	846242	23972	997	481	56.2	0.3	14:09	1	10	892	942	0	8212.5	14	8710.5
Aug 25 2015	70524	7526	358	309784093	32489871	1439506	40778	1000	788	54.1	0.5	23:59	0	882	900	917	0	8212.5	24	8734.5
Aug 26 2015	70879	7881	355	311224466	33930244	1440373	40803	1000	780	53.5	0.5	23:59	0	874	900	920	0	8212.5	23.9	8758.4
Aug 27 2015	71234	8236	355	312665489	35371267	1441023	40821	1001	781	53.6	0.4	23:59	0	877	900	919	0	8212.5	23	8781.4
Aug 28 2015	71587	8589	353	314105065	36810843	1439576	40780	1000	777	53.4	0.5	23:59	0	852	900	935	0	8212.5	23.9	8805.3
Aug 29 2015	71938	8940	351	315543480	38249258	1438415	40747	999	772	53	0.5	23:58	0	878	900	921	0	8212.5	24	8829.3
Aug 30 2015	72291	9293	353	316982708	39688486	1439228	40770	999	777	53.3	0.4	23:58	0	861	900	936	0	8212.5	23.9	8853.3
Aug 31 2015	72614	9616	323	318300546	41006324	1317838	37332	1000	710	53.3	0.5	21:57	1	127	897	941	0	8212.5	22	8875.3
Sep 1 2015	72961	347	347	319739710	1439164	1439164	40769	999	765	52.5	0.6	23:59	0	884	900	914	0	8212.5	23.9	8899.2
Sep 2 2015	73308	694	347	321179320	2878774	1439610	40781	1000	766	52.6	0.6	23:58	0	875	900	925	0	8212.5	24	8923.2
Sep 3 2015	73656	1042	348	322619498	4318952	1440178	40797	1000	767	52.6	0.5	23:58	0	856	900	953	0	8212.5	23.9	8947.1
Sep 4 2015	73985	1371	329	323977360	5676814	1357862	38466	999	726	52.8	0.5	22:37	1	21	896	949	0	8212.5	22.6	8969.7
Sep 5 2015	74340	1726	355	325417297	7116751	1439937	40791	1000	782	53.7	0.2	23:59	0	878	900	913	0	8212.5	24	8993.7
Sep 6 2015	74697	2083	357	326856018	8555472	1438721	40756	999	787	54.1	0.2	23:59	0	877	900	927	0	8212.5	23.9	9017.6
Sep 7 2015	75051	2437	354	328295517	9994971	1439499	40778	1000	780	53.5	0.3	23:58	0	884	900	919	0	8212.5	24	9041.6

	CO2 Equivalents			Landfill Gas Flow								Flare	Flare	Temp			Blower 1		Blower 2	
Date	Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)	Hours		°C	°C	°C	Hours	Hours	Hours	Hours
Sep 8 2015	75404	2790	353	329734747	11434201	1439230	40771	999	780	53.5	0.3	23:59	0	875	900	920	0	8212.5	23.9	9065.5
Sep 9 2015	75753	3139	349	331169525	12868979	1434778	40644	1000	770	53.1	0.4	23:50	1	0	899	920	0	8212.5	23.4	9088.9
Sep 10 2015	76098	3484	345	332608929	14308383	1439404	40775	1000	762	52.3	0.6	23:59	0	883	900	915	0	8212.5	23.9	9112.8
Sep 11 2015	76445	3831	347	334049000	15748454	1440071	40794	1000	766	52.6	0.5	23:59	0	884	900	917	0	8212.5	24	9136.8
Sep 12 2015	76797	4183	352	335488088	17187542	1439088	40766	999	777	53.4	0.3	23:59	0	881	900	918	0	8212.5	23.9	9160.7
Sep 13 2015	77006	4392	209	336339640	18039094	851552	24123	999	462	53.6	0.3	04:02	0	884	900	917	0	8212.5	4	9164.7
Sep 14 2015	77336	4722	330	337682359	19381813	1342719	38037	1018	728	0	0	00:00	0	0	0	0	0	0	0	0
Sep 15 2015	77609	4995	273	338794138	20493592	1111779	31494	1000	602	53.4	0.3	23:59	1	862	900	929	0	8212.5	67.6	9232.4
Sep 16 2015	77951	5337	342	340228517	21927971	1434379	40633	999	755	52	0.7	23:57	1	0	899	915	0	8212.5	23.9	9256.3
Sep 17 2015	78295	5681	344	341668049	23367503	1439532	40779	1000	758	52	0.6	23:58	0	871	900	919	0	8212.5	24	9280.3
Sep 18 2015	78635	6021	340	343108343	24807797	1440294	40801	1000	750	51.5	0.7	23:58	0	883	900	913	0	8212.5	23.9	9304.2
Sep 19 2015	78979	6365	344	344547203	26246657	1438860	40760	999	758	52.1	0.6	23:58	0	882	900	913	0	8212.5	23.9	9328.1
Sep 20 2015	79323	6709	344	345982689	27682143	1435486	40664	1000	759	52.2	0.5	23:57	1	0	899	919	0	8212.5	24.3	9352.4
Sep 21 2015	79663	7049	340	347407992	29107446	1425303	40376	1000	750	52	0.6	23:44	1	215	898	926	8	8220.4	15.7	9368.1
Sep 22 2015	79995	7381	332	348847714	30547168	1439722	40784	1000	732	50.3	1	23:58	0	884	900	919	23.9	8244.3	0	9368.1
Sep 23 2015	80333	7719	338	350287763	31987217	1440049	40794	1000	746	51.2	0.7	23:58	0	873	900	937	24	8268.3	0	9368.1
Sep 24 2015	80673	8059	340	351727445	33426899	1439682	40783	1000	750	51.5	0.7	23:59	0	883	900	921	23.9	8292.3	0	9368.1
Sep 25 2015	81016	8402	343	353166225	34865679	1438780	40758	999	757	52	0.6	23:59	0	877	900	921	24	8316.3	0	9368.1
Sep 26 2015	81366	8752	350	354605324	36304778	1439099	40767	999	771	52.9	0.4	23:58	0	884	900	919	23.9	8340.2	0	9368.1
Sep 27 2015	81711	9097	345	356044396	37743850	1439072	40766	999	758	52.1	0.6	23:59	0	881	900	916	24	8364.2	0	9368.1
Sep 28 2015	82047	9433	336	357485157	39184611	1440761	40814	1001	739	50.7	0.9	23:58	0	886	900	917	22.9	8387.1	0	9368.1
Sep 29 2015	82383	9769	336	358924913	40624367	1439756	40785	1000	739	50.7	0.8	23:59	0	880	900	922	24	8411.1	0	9368.1
Sep 30 2015	82722	10108	339	360364687	42064141	1439774	40786	1000	746	51.2	0.7	23:58	0	873	900	934	23.9	8435	0	9368.1
Oct 1 2015	83056	334	334	361804778	1440091	1440091	40795	1000	734	50.4	0.9	23:59	0	869	900	933	24	8459	0	9368.1
Oct 2 2015	83392	670	336	363244776	2880089	1439998	40792	1000	739	50.7	0.8	23:59	0	860	900	943	23.9	8482.9	0	9368.1
Oct 3 2015	83730	1008	338	364684657	4319970	1439881	40789	1000	743	51	0.7	23:58	0	869	900	930	24	8506.9	0	9368.1
Oct 4 2015	84070	1348	340	366126062	5761375	1441405	40832	1001	748	51.3	0.6	23:59	0	884	900	925	23.9	8530.8	0	9368.1
Oct 5 2015	84410	1688	340	367567351	7202664	1441289	40829	1001	749	51.3	0.7	23:58	0	879	900	915	24	8554.8	0	9368.1
Oct 6 2015	84745	2023	335	369007482	8642795	1440131	40796	1000	736	50.5	0.8	23:58	0	883	900	914	23.9	8578.7	0	9368.1
Oct 7 2015	85049	2327	304	370363157	9998470	1355675	38404	997	668	48.7	1.9	22:37	5	109	881	963	22.6	8601.3	0	9368.1
Oct 8 2015	85368	2646	319	371791722	11427035	1428565	40468	999	702	48.6	1.8	23:48	1	233	897	954	14.7	8616.1	9.1	9377.2
Oct 9 2015	85702	2980	334	373231574	12866887	1439852	40788	1000	734	50.4	0.9	23:58	0	881	900	921	0	8616.1	23.9	9401.1
Oct 10 2015	86043	3321	341	374671319	14306632	1439745	40785	1000	750	51.5	0.7	23:58	0	885	900	914	0	8616.1	24	9425.1
Oct 11 2015	86382	3660	339	376111781	15747094	1440462	40805	1000	745	51.1	0.8	23:58	0	882	900	920	0	8616.1	23.9	9449
Oct 12 2015	86504	3782	122	376635842	16271155	524061	14846	1000	269	50.6	0.8	08:42	0	886	900	913	0	8616.1	9.1	9458.1
Oct 13 2015	86504	3782	0	376635842	16271155	0	0	0	0	0	0	00:00	0	0	0	0	0	8616.1	0	9458.1
Oct 14 2015	86573	3851	69	376903975	16539288	268133	7596	998	151	55.6	0.7	04:28	1	94	886	945	0	8616.1	4.3	9462.4
Oct 15 2015	86917	4195	344	378343949	17979262	1439974	40792	1000	756	51.9	1.1	23:58	0	886	900	926	0	8616.1	24	9486.4
Oct 16 2015	87252	4530	335	379784376	19419689	1440427	40804	1000	738	50.6	1.1	23:58	0	888	900	917	0	8616.1	23.9	9510.3
Oct 17 2015	87585	4863	333	381224509	20859822	1440133	40796	1000	733	50.3	1	23:59	0	883	900	917	0	8616.1	23	9533.3
Oct 18 2015	87926	5204	341	382661459	22296772	1436950	40706	999	751	51.4	0.7	23:59	0	0	899	920	0	8616.1	24.5	9557.8
Oct 19 2015	88258	5536	332	384100460	23735773	1439001	40764	999	730	50.2	1.1	23:58	0	884	900	915	0	8616.1	24	9581.8
Oct 20 2015	88587	5865	329	385540253	25175566	1439793	40786	1000	724	49.7	1.1	23:59	0	857	900	924	0	8616.1	23.9	9605.7
Oct 21 2015	88915	6193	328	386979843	26615156	1439590	40781	1000	722	49.6	1.1	23:58	0	887	900	912	0	8616.1	24	9629.7
Oct 22 2015	89242	6520	327	388420465	28055778	1440622	40810	1000	718	49.3	1.1	23:59	0	871	900	918	0	8616.1	24	9653.7
Oct 23 2015	89552	6830	310	389744200	29379513	1323735	37499	999	681	50.8	0.8	22:04	1	10	895	951	0	8616.1	22	9675.7
Oct 24 2015	89671	6949	119	390260410	29895723	516210	14623	1000	261	49.9	1.1	08:34	0	890	900	907	0	8616.1	8.7	9684.4
Oct 25 2015	89671	6949	0	390260410	29895723	0	0	0	0	0	0	00:00	0	0	0	0	0	8616.1	0	9684.4
Oct 26 2015	89855	7133	184	390985034	30620347	724624	20527	999	405	55.2	0.5	12:05	1	39	894	932	0	8616.1	11.2	9695.5
Oct 27 2015	90208	7486	353	392425267	32060580	1440233	40799	1000	776	53.3	0.6	23:59	0	877	900	933	0	8616.1	23.9	9719.5

	CO2 Equivalents			Landfill Gas Flow								Flare	Flare	Temp			Blower 1		Blower 2	
Date	Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)	Hours		°C	°C	°C	Hours	Hours	Hours	Hours
Oct 28 2015	90511	7789	303	393673542	33308855	1248275	35361	1001	667	52.8	0.7	20:46	1	12	896	942	0	8616.1	20.8	9740.3
Oct 29 2015	90846	8124	335	395113286	34748599	1439744	40785	1000	738	50.6	1.1	23:58	0	876	900	923	0	8616.1	23.9	9764.2
Oct 30 2015	91186	8464	340	396554287	36189600	1441001	40821	1001	747	51.3	0.8	23:58	0	882	900	919	0	8616.1	24	9788.2
Oct 31 2015	91524	8802	338	397994108	37629421	1439821	40787	1000	744	51.1	0.8	23:59	0	880	900	930	0	8616.1	23.9	9812.1
Nov 1 2015	91853	329	329	399434125	1440017	1440017	40793	1000	725	49.7	1.1	23:59	0	878	900	919	0	8616.1	25	9837.1
Nov 2 2015	92179	655	326	400874406	2880298	1440281	40800	1000	717	49.2	1.2	23:58	0	880	900	918	0	8616.1	23.9	9861
Nov 3 2015	92505	981	326	402314028	4319920	1439622	40782	1000	717	49.2	1.1	23:58	0	876	900	921	0	8616.1	24	9885
Nov 4 2015	92837	1313	332	403754552	5760444	1440524	40807	1000	730	50.1	0.9	23:59	0	881	900	917	0	8616.1	24	9909
Nov 5 2015	93169	1645	332	405195509	7201401	1440957	40819	1001	730	50.1	1.1	23:59	0	887	900	914	0	8616.1	23.9	9932.9
Nov 6 2015	93493	1969	324	406631186	8637078	1435677	40670	1000	712	49	1.4	23:59	0	0	899	911	0	8616.1	24	9956.9
Nov 7 2015	93821	2297	328	408072077	10077969	1440891	40818	1001	721	49.4	1.3	23:59	0	881	900	916	0	8616.1	23.9	9980.8
Nov 8 2015	94153	2629	332	409512379	11518271	1440302	40801	1000	731	50.2	1.2	23:59	0	882	900	917	0	8616.1	24	10004.8
Nov 9 2015	94328	2804	175	410283377	12289269	770998	21841	1000	384	49.3	1.4	12:49	0	886	900	915	0	8616.1	13	10017.8
Nov 10 2015	94543	3019	215	411160447	13166339	877070	24846	998	472	53.2	0.9	14:41	1	-1	892	958	0	8616.1	14.4	10032.2
Nov 11 2015	94879	3355	336	412600969	14606861	1440522	40807	1000	739	50.7	1.3	23:58	0	889	900	914	0	8616.1	24	10056.2
Nov 12 2015	95207	3683	328	414041047	16046939	1440078	40795	1000	722	49.5	1.5	23:59	0	890	900	910	0	8616.1	23.9	10080.1
Nov 13 2015	95486	3962	279	415269212	17275104	1228165	34791	1000	614	49.6	1.5	23:58	0	0	898	918	0	8616.1	23.3	10103.5
Nov 14 2015	95811	4287	325	416709105	18714997	1439893	40789	1000	715	49.1	1.7	23:59	0	886	900	913	0	8616.1	24	10127.5
Nov 15 2015	96137	4613	326	418149894	20155786	1440789	40815	1001	718	49.2	1.6	23:59	0	874	900	923	0	8616.1	23.9	10151.4
Nov 16 2015	96466	4942	329	419590282	21596174	1440388	40803	1000	723	49.6	1.5	23:58	0	878	900	917	0	8616.1	24	10175.4
Nov 17 2015	96793	5269	327	421031298	23037190	1441016	40821	1001	719	49.3	1.6	23:59	0	886	900	926	0	8616.1	24	10199.4
Nov 18 2015	97124	5600	331	422471131	24477023	1439833	40788	1000	727	49.9	1.4	23:59	0	883	900	915	0	8616.1	23.9	10223.3
Nov 19 2015	97434	5910	310	423910169	25916061	1439038	40765	999	682	46.8	2.3	23:58	0	884	900	915	0	8616.1	24	10247.3
Nov 20 2015	97734	6210	300	425349683	27355575	1439514	40779	1000	660	45.3	2.5	23:58	0	891	900	915	0	8616.1	24	10271.3
Nov 21 2015	98046	6522	312	426790111	28796003	1440428	40804	1000	687	47.1	2	23:58	0	885	900	919	0	8616.1	23.9	10295.2
Nov 22 2015	98367	6843	321	428230700	30236592	1440589	40809	1000	705	48.4	1.9	23:59	0	882	900	914	0	8616.1	24	10319.2
Nov 23 2015	98620	7096	253	429418274	31424166	1187574	33642	1000	557	46	2.6	23:57	1	0	898	912	0	8616.1	23.8	10343
Nov 24 2015	98932	7408	312	430858070	32863962	1439796	40787	1000	686	47.1	2.2	23:59	0	886	900	919	0	8616.1	23.9	10366.9
Nov 25 2015	99239	7715	307	432298031	34303923	1439961	40791	1000	674	46.3	2.6	23:58	0	886	900	916	0	8616.1	24	10390.9
Nov 26 2015	99536	8012	297	433738441	35744333	1440410	40804	1000	654	44.9	2.9	23:59	0	880	900	917	0	8616.1	22.9	10413.8
Nov 27 2015	99844	8320	308	435178342	37184234	1439901	40790	1000	678	46.5	2.4	23:59	0	885	900	912	0	8616.1	24	10437.8
Nov 28 2015	100150	8626	306	436618726	38624618	1440384	40803	1000	673	46.2	2.7	23:58	0	885	900	923	0	8616.1	23.9	10461.7
Nov 29 2015	100457	8933	307	438059036	40064928	1440310	40801	1000	676	46.4	2.7	23:58	0	880	900	917	0	8616.1	24	10485.8
Nov 30 2015	100767	9243	310	439498488	41504380	1439452	40777	1000	681	46.8	2.6	23:58	0	885	900	918	0	8616.1	23.9	10509.7
Dec 1 2015	101079	312	312	440937371	1438883	1438883	40761	999	685	47.1	2.6	23:59	0	886	900	913	0	8616.1	24	10533.7
Dec 2 2015	101384	617	305	442376616	2878128	1439245	40771	999	671	46.1	2.9	23:59	0	885	900	917	0	8616.1	23.9	10557.6
Dec 3 2015	101688	921	304	443816674	4318186	1440058	40794	1000	669	45.9	3	23:58	0	882	900	916	0	8616.1	24	10581.6
Dec 4 2015	102001	1234	313	445256447	5757959	1439773	40786	1000	688	47.3	2.5	23:59	0	884	900	915	0	8616.1	23.9	10605.5
Dec 5 2015	102309	1542	308	446695670	7197182	1439223	40770	999	677	46.5	2.6	23:58	0	888	900	916	0	8616.1	24	10629.5
Dec 6 2015	102622	1855	313	448136403	8637915	1440733	40813	1001	687	47.2	2.3	23:59	0	883	900	918	0	8616.1	23.9	10653.4
Dec 7 2015	102944	2177	322	449576462	10077974	1440059	40794	1000	709	48.6	1.9	23:59	0	885	900	917	0	8616.1	24	10677.4
Dec 8 2015	103263	2496	319	451016506	11518018	1440044	40794	1000	702	48.2	2.2	23:58	0	877	900	913	0	8616.1	24	10701.4
Dec 9 2015	103588	2821	325	452456246	12957758	1439740	40785	1000	714	49	1.6	23:58	0	877	900	916	0	8616.1	23.9	10725.3
Dec 10 2015	103903	3136	315	453895348	14396860	1439102	40767	999	692	47.5	1.4	23:58	0	886	900	911	0	8616.1	24	10749.3
Dec 11 2015	104207	3440	304	455335690	15837202	1440342	40802	1000	669	45.9	1.8	23:59	0	884	900	919	0	8616.1	23.9	10773.2
Dec 12 2015	104510	3743	303	456775585	17277097	1439895	40789	1000	667	45.8	1.8	23:58	0	881	900	917	0	8616.1	24	10797.2
Dec 13 2015	104823	4056	313	458215768	18717280	1440183	40798	1000	687	47.2	1.4	23:58	0	873	900	918	0	8616.1	23.9	10821.1
Dec 14 2015	105132	4365	309	459655869	20157381	1440101	40795	1000	680	46.6	1.8	23:58	0	875	900	923	0	8616.1	24	10845.1
Dec 15 2015	105431	4664	299	461049678	21551190	1393809	39484	1000	657	46.6	1.8	23:57	1	0	899	926	0	8616.1	23.4	10868.5
Dec 16 2015	105733	4966	302	462391548	22893060	1341870	38013	1000	665	49	1.1	22:19	1	63	897	919	7	8623.1	15.3	10883.9

	CO2 Equivalents			Landfill Gas Flow								Flare	Flare	Temp			Blower 1		Blower 2	
Date	Yearly	Monthly	Daily	Yearly	Monthly	Daily	Daily	Avg	Total	Avg	Avg	Run	Starts	Min.	Avg.	Max.	Daily	Cumu.	Daily	Cumu.
	Tonnes CO2	Tonnes CO2	Tonnes CO2	scf	scf	scf	meter3	scfm	MMBTU	(%)	(%)	Hours		°C	°C	°C	Hours	Hours	Hours	Hours
Dec 17 2015	106045	5278	312	463832246	24333758	1440698	40812	1001	686	47.1	1.9	23:59	0	890	900	910	24	8647.1	0	10883.9
Dec 18 2015	106349	5582	304	465270917	25772429	1438671	40755	1000	668	45.9	2.2	23:58	0	882	900	924	23.9	8671	0	10883.9
Dec 19 2015	106656	5889	307	466710206	27211718	1439289	40772	1000	675	46.3	2	23:59	0	876	900	920	24	8695	0	10883.9
Dec 20 2015	106965	6198	309	468146146	28647658	1435940	40677	1001	680	46.8	1.9	23:56	1	0	899	914	23.9	8718.9	0	10883.9
Dec 21 2015	107279	6512	314	469586553	30088065	1440407	40804	1000	691	47.4	1.7	23:58	0	883	900	921	23.9	8742.8	0	10883.9
Dec 22 2015	107598	6831	319	471026607	31528119	1440054	40794	1000	702	48.2	1.5	23:59	0	882	900	921	24	8766.8	0	10883.9
Dec 23 2015	107911	7144	313	472466976	32968488	1440369	40803	1000	688	47.2	1.9	23:58	0	886	900	915	23.9	8790.7	0	10883.9
Dec 24 2015	108207	7440	296	473906532	34408044	1439556	40780	1000	652	44.7	2.8	23:58	0	882	900	919	23.9	8814.6	0	10883.9
Dec 25 2015	108498	7731	291	475346595	35848107	1440063	40794	1000	639	43.9	3.1	23:59	0	888	900	915	23.9	8838.5	0	10883.9
Dec 26 2015	108794	8027	296	476786662	37288174	1440067	40794	1000	650	44.6	2.6	23:58	0	875	900	922	24	8862.5	0	10883.9
Dec 27 2015	109093	8326	299	478226805	38728317	1440143	40796	1000	657	45.1	2.6	23:59	0	881	900	919	23.9	8886.4	0	10883.9
Dec 28 2015	109402	8635	309	479666613	40168125	1439808	40787	1000	679	46.6	2.1	23:59	0	881	900	924	22.9	8909.3	0	10883.9
Dec 29 2015	109704	8937	302	481106859	41608371	1440246	40799	1000	665	45.6	2.6	23:59	0	882	900	922	23.9	8933.2	0	10883.9
Dec 30 2015	110009	9242	305	482546954	43048466	1440095	40795	1000	670	46	2.4	23:58	0	886	900	919	24	8957.2	0	10883.9
Dec 31 2015	110314	9547	305	483987215	44488727	1440261	40800	1000	670	46	2.5	23:59	0	883	900	911	23.9	8981.2	0	10883.9