



Public Water System Annual Report -2015-

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Name of the legal owner: **Cartier Regional Water Co-op Inc.**

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Date prepared: **May 11, 2016**

Robert Poirier
Secretary/Treasurer CRWC Inc.

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Introduction

The main water treatment facility in St. Eustache, MB strives to provide high quality drinking water in sufficient quantity to meet public demand. It is our goal to do so in a safe, cost effective manner while remaining in compliance with the regulatory requirements governing the provision of drinking water.

It is our belief that the public has a right to easily access information related to the drinking water they consume and the system through which it is provided. To that end the Cartier Regional Water Co-op has prepared the following report.

1. *Description of the Water System*

The Cartier Regional Water System provides potable drinking water to a population of approximately 10500 residents. Treated water produced from the Cartier Regional Water Treatment Plant meets all health and aesthetic objectives as stated in the Guidelines for Canadian Drinking Water Quality, with the exception of the level of the Trihalomethanes (THM). This is further discussed in the Office of Drinking Water Annual Audit, which is included in this report as Appendix G.

1.1. Water supply source

The Cartier Regional Water Treatment Plant (WTP) receives surface water from the Assiniboine River.

1.2. Intake structures:

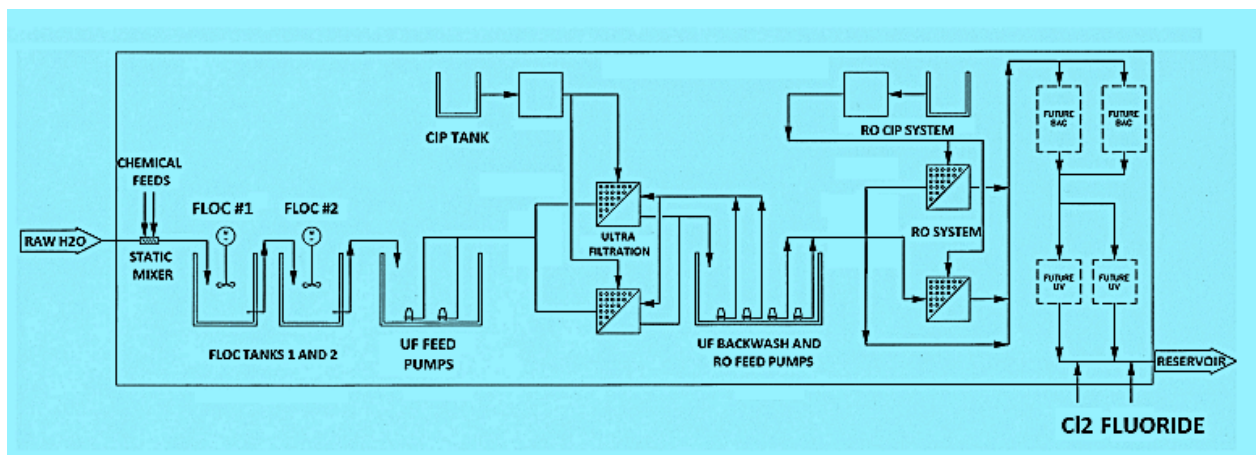
The stainless steel intake structure is specially designed to prevent injury to fish. It is located immediately east of the Baie St. Paul bridge and flows through a 400 mm pipe into a concrete wetwell on the south shore of the river. Two submersible pumps are available to pump the raw water through a 300 mm to the WTP. Raw water can be pumped either to the aerated raw water storage pond, or directly to the WTP raw water wetwell located beneath the water plant. Normal operational strategy is to pump to the storage pond for pre-settling, and pre-treatment in the summer season when required with potassium permanganate. The pond provides a buffer when river water quality may not be optimal. Currently, the intake is flushed using gravity flow, and does not provide a sufficient flow of water to adequately flush the intake screens of silt build up. When needed, we contract out to have the intake screen cleared of silt and debris.

1.3. Water treatment process:

A powerful oxidant, potassium permanganate (KMnO_4), *can* be fed at the river intake or the raw storage pond inlet, or in any combination required, but is only being fed during periods of high manganese and organics. The KMnO_4 breaks down organic substances which contribute to taste and odour problems and which can lead to the formation of chlorinated organic compounds known as trihalomethanes.

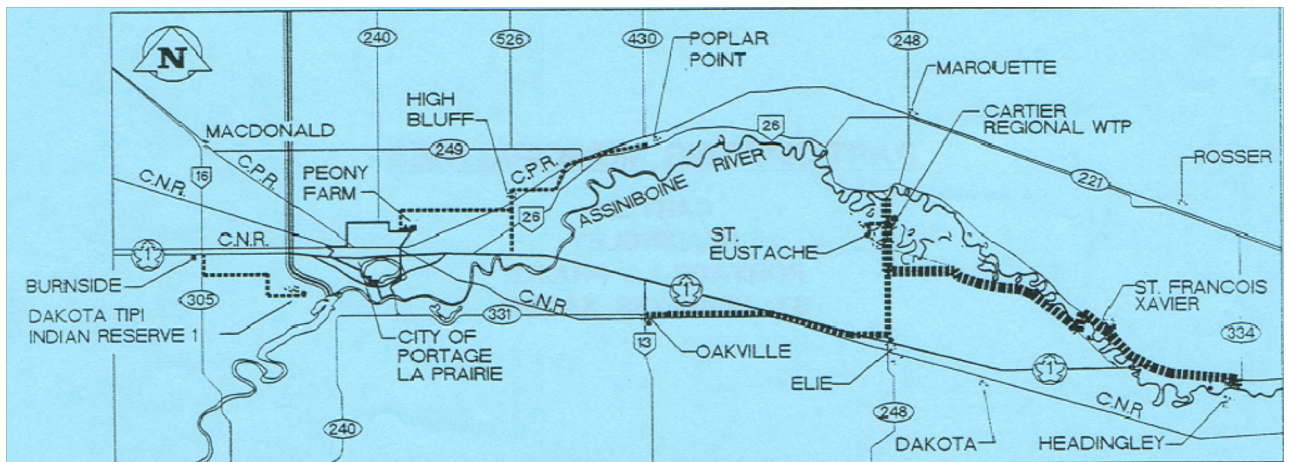
Raw water flows from the storage pond into the WTP raw wet well. The water is pumped through a magnetic flow meter & a rate control valve into a three-stage break tank process (advanced coagulation). Coagulant, pH control chemicals and sodium hypochlorite are added up stream of the initial break tank where it is pumped through two in-line static mixers. The three break tanks provide added mixing and coagulation before the raw water enters the ultra-filtration (UF) process. A pre-filter to the UF skids remove bigger floc (debris) created in the three-stage coagulation process. The UF provides 0.04 micron filtration and removes virtually all particulate matter before reaching the reverse osmosis (RO) process. The UF effluent serves two purposes. It is used to feed the RO process for finishing and to backwash the UF system from a UF break tank. RO treated water is so pure that an RO by-pass line was installed to “add” hardness to the finished water from the UF process and to stabilize water chemistry.

Turbidity is a measure of the clarity of water, and there is 24 hour online monitoring of the UF treated water and final plant effluent going to the distribution system. After the RO process the water pH is adjusted with sodium hydroxide and a small dosage of chlorine is added to kill pathogenic organisms (bacteria, viruses, etc.). The free chlorine residual in our treated water entering the distribution system is also monitored continuously. Fluoride is added to a 0.70 PPM concentration for dental health purposes.



1.4. Distribution system:

Treated water from the reservoir is pumped throughout the Cartier regional distribution system via one 5 horsepower jockey pump, two 25 horsepower duty pumps, one 30 horsepower duty pump, & one stand-by, 75 horsepower standby-by pump. These pumps are controlled with variable frequency drives. The distribution system is partially looped and has an approximate piped length of 580 kilometres. Piping is comprised of a mix of polyethylene (PE) & polyvinylchloride (PVC) pipe.



1.5. Storage reservoirs:

Cartier Regional WTP:	Raw Storage Reservoir Capacity:	60,000 M ³
Cartier Regional WTP:	Treated Reservoir Capacity:	3000 M ³
Headingley Reservoir:	Treated Reservoir Capacity:	2400 M ³
St. Francois Xavier Reservoir:	Treated Reservoir Capacity:	400 M ³
Elie Reservoir:	Treated Reservoir Capacity:	230 M ³
St. Eustache Reservoir:	Treated Reservoir Capacity:	76 M ³
Oakville Reservoir:	Treated Reservoir Capacity:	228 M ³
Fannystelle Reservoir:	Treated Reservoir Capacity:	150 M ³
Grosse Isle Reservoir:	Treated Reservoir Capacity:	400 M ³

1.6. Number of connections, population served and types of water users:

The Cartier regional distribution system is comprised of 2995 service connections (all metered). We serve a population of greater than 10500 people in 7 different rural municipalities; the RM of Cartier, RM of Portage la Prairie, RM of St. François Xavier, RM of Headingley, RM of Grey, R.M. of Rockwood, and the RM of Rosser.

1.7. Classification and Certification:

<i>Treatment Facility</i>		
	Water Treatment	Class 4
	Water Distribution	Class 2
<i>Operators</i>		
Danielle Vaillant	Water Treatment	Class 4
	Water Distribution	Class 2
	Wastewater Treatment	Class 2
	Wastewater Collection	Class 2
Grant McGorman	Water Treatment	Class 4
	Water Distribution	Class 2
	Wastewater Treatment	Class 2
	Wastewater Collection	Class 2
David Epler	Water Treatment	Class 4
	Water Distribution	Class 2
	Wastewater Treatment	Class 2
	Wastewater Collection	Class 2
Kaylan Rae	Water Treatment	Class 4
<i>Operators in Training</i>		
Shannon Skehen <i>Until Mar 19, 2015</i>	Water Treatment	O-I-T
	Water Distribution	O-I-T
Colter Milne <i>Started April 27, 2015</i>	Water Treatment	O-I-T
	Water Distribution	O-I-T
Joel Adesina <i>Until Jan 20, 2016</i>	Water Treatment	O-I-T
	Water Distribution	O-I-T

2. *Disinfection System in Use:*

The final step in the treatment of safe water is disinfection. Disinfection is the selective destruction or inactivation of potential disease causing organisms in water. As per the licence issued under the *Drinking Water Safety Act* the Cartier regional water Co-op must ensure that the water has a measureable free chlorine residual of at least:

- 0.5 mg/L in water entering the distribution system following a minimum contact time of 20 minutes
- 0.1 mg/L at all times at any point in the water distribution system

2.1. Type of disinfection system used:

The Cartier Regional WTP disinfects by adding chlorine gas to the treated water via a Regal gas chlorinator. Sodium hypochlorite can also be added at all of the reservoirs.

2.2. Equipment redundancy and monitoring requirements:

As required by the *Drinking Water Safety Act*, the Cartier Regional WTP ensures continuous disinfection is maintained at the plant by keeping in stock all spare parts required for the chlorinator. As additional backup, a complete spare chlorinator is also kept at the plant. Two identical trains of UF and RO treated water are now in place, each with a capacity of 30 litres per second.

Disinfectant residuals are monitored continuously, capturing readings every 5 minutes at the water treatment plant and at the reservoirs. Residuals are also monitored on a regular basis when water samples are taken for bacterial analysis in the distribution system and recorded on the appropriate monitoring forms. Monthly chlorination report forms are sent to the regional Drinking Water Officer at the end of each month.

2.3. Disinfectant residual overall performance / results:

The Cartier Regional Water System has met all regulatory requirements in 2015 for monitoring and reporting disinfection residuals leaving the water treatment plant and in the distribution system.

3. *List of Water Quality Standards:*

The Province of Manitoba has adopted a number of water quality standards from the *Guidelines for Canadian Drinking Water Quality* developed by Health Canada. The health-based parameters express the maximum acceptable concentration. Concentration values in

excess constitute a health-related issue and require corrective actions. The 2015 results for the Cartier Regional Water System are summarized in the following tables:

Sample #1 – Spring 2015

Parameter	Standard	Frequency	Test Results
Bacterial; TC & EC **	0 TC, 0 EC	Weekly	100 % passed
Disinfectant Residual	WTP (> 0.5 mg/L)	Continuously	100 % compliance
“ “	Distribution (> 0.1 mg/L)	Continuously	100 % compliance
Turbidity	0.30 NTU *	Continuously	100 % compliance
Lead	0.01 mg/L	Bi-annual	0.000260 mg/L
Fluoride	1.5 mg/L	“	0.249 mg/L
Arsenic	0.01 mg/L	“	0.00071 mg/L
Iron	0.30 mg/L	“	<0.10 mg/L
Nitrate	As Nitrogen; 10 mg/L	“	0.128 mg/L
Uranium	0.02 mg/L	“	0.001097mg/L
Trihalomethane (THM) ***	0.100 mg/L	Quarterly	See appendix D

Sample #2 – Fall - 2015

Parameter	Standard	Frequency	Test Results
Bacterial; TC & EC **	0 TC, 0 EC	Weekly	100 % passed
Disinfectant Residual	WTP (> 0.5 mg/L)	Continuously	100 % compliance
“ “	Distribution (> 0.1 mg/L)	Continuously	100 % compliance
Turbidity	0.30 NTU *	Continuously	100 % compliance
Lead	0.01 mg/L	Bi-annual	0.000133 mg/L
Fluoride	1.50 mg/L	“	0.470 mg/L
Arsenic	0.01 mg/L	“	0.00078 mg/L
Iron	0.30 mg/L	“	<0.10 mg/L
Nitrate	As Nitrogen; 10 mg/L	“	0.0126 mg/L
Uranium	0.02 mg/L	“	0.00082 mg/L
Trihalomethane (THM) ***	0.100 mg/L	Quarterly	See appendix D

* NTU (Nephelometric turbidity unit)

** Bacterial testing: The raw water (untreated surface water), the treated water (leaving the water treatment facility) and the water in the distribution system is tested weekly (bi-weekly) for the presence of Total Coliform (TC) and *E. coli* (EC) bacteria. If these bacteria are present in the water it is an indication that disease-causing organisms may also be present. Please see Appendix A, B, C, D, E & F for a summary of results.

*** THM: Trihalomethanes are formed when chlorine reacts with naturally occurring organic matter in the water. Studies have shown a link between high levels of THM's and cancer. For that reason, the province has set a health based standard for THM's of 0.100 mg/L. The THM standard is based on an average of four samples per year. THM levels in four locations in the distribution system are tested on a quarterly basis every year. Please see Appendix G for a summary of results.

3.1. Result Improvement

The Cartier Regional Water Co-op has been monitoring Trihalomethanes (THM) for the past several years and has met the Provincial and Federal guidelines on an intermittent basis. However, as the summary table above indicates, one area of our treatment system did not meet the standard for THM's in 2015. The THM standard of 0.1 mg/L is based on a running average of quarterly samples and the health risks associated with elevated THM's are based on a life time exposure. The average THM result for 2015 was 0.127 mg/L which is an improvement over 2013's averages, where 3 out of 4 areas exceed the THM limit. We continue to work towards optimizing our new treatment system and the quality of water that is delivered to our customers.

4. *Water System Incidents and Corrective Actions*

There were no major water system incidents in 2015. Corrective actions were taken and reported as required for normal minor variations during the course of routine operations.

5. *Additional records required*

As part of Manitoba Health's fluoridation program, water samples are collected on a daily basis from the treated water reservoir and tested on site. Daily fluoride results are recorded and a 14 day composite sample is submitted bi-weekly for analysis. The recommended level of fluoride in drinking water is 0.70 mg/L and the operating range set by Manitoba Health is 0.50-0.90 mg/L.

6. *Drinking Water Safety Orders on your System and Actions Taken in Response*

In 2015, no Drinking Water Safety Orders were issued for the Cartier Regional Water System.

7. *Boil Water Advisories Issued and Actions Taken in Response*

In 2015, no Boil Water Advisories were issued for the Cartier Regional Water System.

8. *Warnings Issued or Charges Laid on the System in Accordance with The Drinking Water Safety Act:*

In accordance with the Drinking Water Safety Act, no warnings or charges were issued for the Cartier Regional Water System in 2015.

9. *Major Expenses Incurred*

We purchased a new forklift for the facility to improve the safety of transferring chemical. We have been purchasing several spare parts for the equipment and trying to maintain a basic inventory to ensure we minimize downtime of equipment.

10. *Future System Expansion and/or Increased Production*

The Cartier Regional Water Co-op has constructed a new 150 L/s membrane filtration facility. It is due to be commissioned and operational by spring 2016. It is located adjacent to the water pollution control facility at the Headingley Correctional Facility. The new treatment facility is intended to supply potable water to the community of Headingley, the Headingley Correctional Centre, CenterPort, Rosser, the Stoney Mountain and Rockwood correctional institutions, the Rural Municipality of West St. Paul and to provide redundancy to the Cartier Regional Water Plant located in St. Eustache

In 2015, a design was drafted up for a new Oakville reservoir. Construction of this facility will be completed in 2016.

In late 2014, a new chemical room was added to the Cartier WTP. A second raw water storage pond was designed and will be constructed in 2016 or 2017.

Appendix A: Cartier WTP Bacteriological results

Date	Raw EC / TC	Treated EC / TC	Free Cl ₂ residual
Jan. 6 / 15	9 / 38	0 / 0	1.36 mg/L
Jan. 13 / 15	11 / 66	0 / 0	1.37 mg/L
Jan. 20 / 15	9 / 29	0 / 0	1.13 mg/L
Jan. 27 / 15	14 / 70	0 / 0	1.24 mg/L
Feb. 3 / 15	10 / 74	0 / 0	1.36 mg/L
Feb. 10 / 15	9 / 48	0 / 0	1.50 mg/L
Feb. 17 / 15	6 / 78	0 / 0	1.34 mg/L
Feb. 24 / 15	6 / 62	0 / 0	1.47 mg/L
Mar. 3 / 15	8 / 59	0 / 0	1.49 mg/L
Mar. 10 / 15	24 / 109	0 / 0	1.23 mg/L
Mar. 17 / 15	9 / 200	0 / 0	1.39 mg/L
Mar. 24 / 15	4 / >200	0 / 0	1.23 mg/L
Apr. 1 / 15	0 / >200	0 / 0	1.10 mg/L
Apr. 7 / 15	5 / >200	0 / 0	1.05 mg/L
Apr. 14 / 15	1 / >200	0 / 0	1.34 mg/L
Apr. 20 / 15	0 / 200	0 / 0	1.25 mg/L
Apr. 28 / 15	4 / 89	0 / 0	0.86 mg/L
May 5 / 15	1 / 36	0 / 0	1.37 mg/L
May 12 / 15	0 / 74	0 / 0	1.31 mg/L
May 19 / 15	11 / >200	0 / 0	1.42 mg/L
May 26 / 15	5 / 56	0 / 0	1.26 mg/L
June 2 / 15	8 / >200	0 / 0	1.30 mg/L
June 9 / 15	2 / >200	0 / 0	1.20 mg/L
June 16 / 15	10 / >200	0 / 0	1.33 mg/L
June 23 / 15	19 / >200	0 / 0	1.23 mg/L
June 30 / 15	6 / >200	0 / 0	1.28 mg/L
July 7 / 15	41 / >200	0 / 0	1.42 mg/L
July 14 / 15	21 / >200	0 / 0	0.97 mg/L
July 21 / 15	5 / >200	0 / 0	1.25 mg/L
July 28 / 15	6 / >200	0 / 0	1.22 mg/L
Aug. 4 / 15	5 / >200	0 / 0	1.41 mg/L
Aug. 11 / 15	19 / >200	0 / 0	1.40 mg/L
Aug. 18 / 15	11 / >200	0 / 0	1.38 mg/L
Aug. 25 / 15	12 / 165	0 / 0	1.40 mg/L
Sept. 1 / 15	12 / >200	0 / 0	1.28 mg/L
Sept. 8 / 15	27 / >200	0 / 0	1.25 mg/L

Sept. 14 / 15	25 / >200	0 / 0	1.34 mg/L
Sept. 22 / 15	6 / >200	0 / 0	1.39 mg/L
Sept. 29 / 15	11 / >200	0 / 0	1.43 mg/L
Oct. 6 / 15	6 / >200	0 / 0	1.35 mg/L
Oct. 13 / 15	25 / >200	0 / 0	1.32 mg/L
Oct. 20 / 15	9 / 165	0 / 0	1.19 mg/L
Oct. 27 / 15	1 / 89	0 / 0	1.40 mg/L
Nov. 3 / 15	2 / 109	0 / 0	1.31 mg/L
Nov. 10 / 15	1 / 36	0 / 0	1.36 mg/L
Nov. 17 / 15	2 / 31	0 / 0	1.19 mg/L
Nov. 24 / 15	2 / 50	0 / 0	1.34 mg/L
Dec. 1 / 15	1 / 41	0 / 0	1.14 mg/L
Dec. 8 / 15	0 / 19	0 / 0	1.41 mg/L
Dec. 15 / 15	0 / 16	0 / 0	1.41 mg/L
Dec. 22 / 15	1 / 32	0 / 0	1.38 mg/L
Dec. 29 / 15	0 / 27	0 / 0	1.41 mg/L

Appendix B: Headingley Reservoir Bacteriological results (Incoming flow, sampled every 5 weeks)

Date	Reservoir Inlet	Free Cl ₂ residual
Jan.13 /15	0 / 0	1.07
Feb. 17 /15	0 / 0	1.23
Mar. 24 /15	0 / 0	1.15
Apr. 28 /15	0 / 0	1.19
Jun. 2 /15	0 / 0	1.11
Aug. 11 /15	0 / 0	1.30
Oct. 20 / 15	0 / 0	1.08
Nov. 24 /15	0 / 0	1.13
Dec 29 /15	0 / 0	1.28

Appendix C: St Francois Xavier Reservoir Bacteriological results (incoming flow, sampled every 5 weeks)

Date:	Reservoir Inlet	Free Cl ₂ residual (mg/L)
Jan. 6 /15	0 / 0	1.29
Feb. 10 /15	0 / 0	1.27
Mar. 17 /15	0 / 0	1.20
Apr. 20 /15	0 / 0	1.00
May 26 /15	0 / 0	1.17
June 30 /15	0 / 0	1.14
Aug 4 /15	0 / 0	1.32

Sep. 8 /15	0 / 0	0.77
Oct. 13 /15	0 / 0	1.17
Nov. 17 /15	0 / 0	1.09
Dec. 22 /15	0 / 0	1.24

Appendix D: Elie Reservoir Bacteriological results (incoming flow, sampled every 5 weeks)

Date:	Reservoir Inlet	Free Cl ₂ residual (mg/L)
Jan. 20 /15	0 / 0	1.22
Feb. 24 /15	0 / 0	1.39
Apr. 1 /15	0 / 0	1.05
May. 4 /15	0 / 0	1.38
Jun. 9 /15	0 / 0	1.24
Jul. 13 /15	0 / 0	1.32
Aug. 18 /15	0 / 0	1.37
Sep. 21/15	0 / 0	1.30
Oct. 27 /15	0 / 0	1.20
Nov. 30 / 15	0 / 0	1.29

Appendix E: St. Eustache Reservoir Bacteriological results (incoming flow, sampled every 5 weeks)

Date:	Reservoir Inlet	Free Cl ₂ residual (mg/L)
Feb. 3 /15	0 / 0	1.47
Mar. 10 / 15	0 / 0	1.24
Apr. 14 /15	0 / 0	1.32
May. 19 /15	0 / 0	1.38
Jun. 23 /15	0 / 0	1.29
Jul. 27 /15	0 / 0	1.44
Sept. 1 /15	0 / 0	1.30
Oct. 5 /15	0 / 0	1.32
Nov. 10 /15	0 / 0	1.15
Dec. 14 /15	0 / 0	1.35

Appendix F: Oakville Reservoir Bacteriological results (incoming flow, sampled every 5 weeks)

Date:	Reservoir Inlet	Free Cl ₂ residual (mg/L)
Feb. 2 /15	0 / 0	1.19
Mar. 2 /15	0 / 0	1.04
Mar. 9 /15	0 / 0	1.14
Mar. 30 /15	0 / 0	0.99
Apr. 6 /15	0 / 0	1.04
May. 11 /15	0 / 0	1.15
May. 25 /15	0 / 0	
Jun. 15 /15	0 / 0	
Aug. 24 /15	0 / 0	1.08
Sep. 28 /15	0 / 0	0.90
Nov. 2 / 15	0 / 0	1.19
Dec. 7 /15	0 / 0	1.24

Appendix G: Cartier Regional Water System THM Results

Water System Name	Code	Feb	May	Aug	Nov	Avg. THM (µg/L)
Grosse Isle Distribution	188.25	96	112	186	114	127
R.M. of Portage La Prairie - Oakville - Beck	36.00	86	80	79	104	87
R.M. of Headingley - Firehall	89.50	68	96	121	70	89
Springstein Distribution (now in code 36.50)	205.25	67	89	130	90	94

Appendix H: Cartier WTP Audit 2015

Please see accompanying attached file in PDF format. (Cartier Regional Co-op Audit_2015)