

2009 Public Water System Annual Report

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Table of Contents

2009 Public Water System Annual Report	1
Table of Contents	2
Introduction:.....	3
1. Description of the Water System:	3
1.1. Water supply source.....	3
1.2. Intake structures:.....	3
1.3. Water treatment process:.....	3
1.4. Distribution system:	4
1.5. Storage reservoirs:	4
1.6. Number of connections, population served and types of water users:.....	4
1.7. Classification and Certification:	5
2. Disinfection System in Use:.....	5
2.1. Type of disinfection system used:.....	5
2.2. Equipment redundancy and monitoring requirements:.....	5
2.3. Disinfectant residual overall performance / results:	6
3. List of Water Quality Standards:	6
4. Water System Incidents and Corrective Actions	7
5. Additional records required	7
6. Drinking Water Safety Orders on your System and Actions Taken in Response	7
7. Boil Water Advisories Issued and Actions Taken in Response.....	8
8. Warnings Issued or Charges Laid on the System in Accordance with The Drinking Water Safety Act:	8
9. Future System Expansion and/or Increased Production	8
Appendix A; Cartier WTP Bacteriological results	9
Appendix B; Headingley Reservoir Bacteriological results	10
Appendix C; St Francois Xavier Reservoir Bacteriological results.....	11
Appendix D; Cartier WTP Fluoridation results	12
Appendix E; Cartier WTP Audit 2009.....	13

Introduction:

The 2009 Annual Report for the Cartier Regional Water System summarizes the Co-op's ability to produce safe potable water and meet provincial regulations.

1. Description of the Water System:

The Cartier Regional Water System provides potable drinking water to a population of app. 8900 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 THM; bromodichloromethane. This is further discussed in the Office of Drinking Water Annual Audit, which is included in this report as Appendix E.

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 Ste Paul bridge, & 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 pipeline about 2 kilometres south 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 (summer season; as required) with potassium permanganate. The pond provides a buffer when river water quality may not be optimal (spring breakup, etc).

1.3. Water treatment process:

The Cartier Regional WTP is a conventional cold lime softening system. A powerful oxidant, potassium permanganate (KMnO₄), can be fed at the river intake, the raw storage pond inlet, & in the treatment plant, or in any combination required. The KMnO₄ breaks down organic substances which contribute to taste & odour problems, & can lead to the formation of chlorinated organic compounds known as trihalomethanes.

Raw water flows from the pond into the WTP raw wetwell, into which Powdered Activated Carbon (PAC) is added. The PAC absorbs organics, again for taste & odour control. The water is pumped through a magnetic flow meter & a rate control valve, into the reaction zone of the clarifier, where it is rapidly mixed with recirculated sludge & a number of chemicals: lime to increase pH (relative alkalinity), which causes carbonate “hardness” minerals & many other dissolved substances to precipitate out; caustic soda, added as needed for non-carbonate hardness removal; coagulants, to bind precipitates & sediment together into a settleable “floc”; & occasionally PAC, again for taste & odour control. The water, sludge & chemicals pass from a rapid to a slow mix zone, & then into the clarification zone, where over a two hour period, clear water rises to the surface & solids settle down below. The clear effluent is collected & conveyed into a recarbonation tank where Carbon Dioxide is bubbled through the water to neutralize the high pH. The water then passes through gravity filters incorporating a 400 mm thick layer of Anthracite (crushed coal) over a 300 mm thick layer of crushed quartz sand. Turbidity is a measure of the clarity of water, & we have online 24 hr. monitoring of our 4 filter cell effluents, & also our treated water going to the distribution system. After filtration, 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 1 PPM concentration for dental health purposes.

The Cartier Regional water treatment process consists of one treatment train, with provision for expandability to meet future demands.

1.4. Distribution system:

Treated water from the reservoir is pumped throughout the Cartier regional distribution system via two 25 horsepower duty pumps, & a 50 horsepower duty pump. The distribution system is partially looped and has approximate piped length of 580 kilometres. Piping is comprised of a mix of PE & PVC.

1.5. Storage reservoirs:

Cartier Regional WTP: Raw Storage Reservoir Capacity: 60,000 M3

Cartier Regional WTP: Treated Reservoir Capacity: 1400 M3

Headingley Reservoir: Treated Reservoir Capacity: 1100 M3

St. Francois Xavier Reservoir: Treated Reservoir Capacity: 400 M3

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

The Cartier regional distribution system is comprised of 2890 service connections (all metered). We serve a population of app. 9600 in 7 different rural municipalities; the RM of

Cartier, RM of Portage la Prairie, RM of St. Francois Xavier, RM of Headingley, RM of Grey, R.M. of Rockwood, and the RM of Rosser.

1.7. Classification and Certification:

- Class 3 Water Treatment Facility Classification
- Certification level of operators:
 - Kale Black; Level 4 Water Treatment, Level 2 Water Distribution
 - Will Thomas, Level 2 Water Treatment & Water Distribution
 - Ryan Salter; Operator in training

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 Drinking Water Safety Act the Cartier Regional Water System must ensure that a disinfectant residual of at least:

0.5 mg of free chlorine per litre of water is detectable at the point where water enters the distribution system, after a minimum contact time of 20 minutes.

0.1 mg of free chlorine per litre of water is detectable at all times at any point in the distribution network.

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 is also added at the Peony and Headingley Reservoirs to boost chlorine residuals in those distribution systems.

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.

Disinfectant residuals are monitored daily at the water treatment plant, and at Headingley & St. Francois Xavier reservoirs. Residuals are also monitored periodically 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:

For 2009, the Cartier Regional Water System has met all regulatory requirements in regard to 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 parameters are health-based and they express the maximum acceptable concentration for a groundwater supply source. Concentration values in excess constitute a health-related issue and require corrective actions. The 2009 results for the Cartier Regional Water System are summarized in the following table:

Parameter	Standard	Frequency	Test Results
Bacterial; TC & EC **	0 TC, 0 EC	Bi-weekly	100 % passed
Disinfectant Residual	WTP (> 0.5 mg/L)	Daily	100 % compliance
“ “	Distribution (> 0.1 mg/L)	Periodically	100 % compliance
Turbidity	0.30 NTU *	Daily	100 % compliance
Lead	0.01 mg/L	Annual	0.0007 mg/L
Fluoride	1.50 mg/L	“	0.91 mg/L
Arsenic	0.01 mg/L	“	0.00092 mg/L
Iron	0.03 mg/L	“	<0.020 mg/L
Nitrate	As Nitrogen; 10 mg/L	“	0.436 mg/L
Uranium	0.02 mg/L	“	<0.00010 mg/L
Trihalomethane (THM) ***	0.100 mg/L	Quarterly	0.128 mg/L

* NTU (Nephelometric turbidity unit)

** Bacterial testing: We test the raw water (untreated surface water), the treated water (leaving the water treatment facility) and the water in the distribution system every two weeks (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.

*** 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 100 micrograms per litre, or 0.100 mg/L. The THM standard is based on an average of four

samples per year. We test THM levels in three locations in the distribution system on a seasonal basis

4. Water System Incidents and Corrective Actions

Headingley Reservoir Overflow (November 23, 2009)

Failure of a 3 inch Singer valve which is used to control the incoming flow to the Headingley reservoir failed in the open position. In the early morning of November 23, 2009, a resident of Headingley reported having no water pressure. Peter Berenz, a Headingley public works employee was on scene first and in turn called Kale Black, manager of the Cartier Regional Water Co-op. Power to the reservoir had already failed as the level of the water inside the reservoir building had risen to approximately 1.5 feet disrupting power supply. The manual valve which feeds the reservoir was immediately closed and the water slowly dissipated through the reservoir overflow. The stand by generator and pump were started, restoring water flow and pressure to the distribution system. Once power was restored, clean up inside the building began and work to restore power to the distribution pumps started. The ODW was notified shortly thereafter and emergency bacteriological samples were taken since some of the water flowed back into the reservoir. Also, the dosage of chlorine to the reservoir was increased as a precautionary measure. Much of the electrical equipment inside the reservoir was damaged and had to be replaced. New variable frequency drives were installed and much of the PLC and SCADA operating system also had to be replaced. The reservoir was filled manually until February 12, 2010 when a new controlling Singer valve was installed.

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 by-weekly for analysis (See Appendix "D" – 2009 Fluoridation Results). The Cartier Regional WTP strives to maintain a 1.00 mg/L fluoride level. The operating range for fluoride, as identified by Manitoba Health, is 0.80-1.20 mg/L. In 2009, fluoride levels never exceeded the 1.20 mg/L recommended limit.

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

In 2009, no Drinking Water Safety Orders were issued for the Cartier Regional Water System.

7. Boil Water Advisories Issued and Actions Taken in Response

In 2009, 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 2009.

9. Future System Expansion and/or Increased Production

The Cartier Regional Water Treatment Plant will be upgrading to an Ultra filtration / Reverse Osmosis treatment to better handle organics in the raw water responsible for high THM's. Work will begin on upgrading the storage capacity of the water treatment plant site in approximately June of 2010. When the new reservoir is complete, the treated storage capacity at the facility will approximately double. The planned expansion / upgrade will be built on top of the increased storage reservoir. Initial flows are expected to maintain the current design flow rate of 60 L/sec.

New stand-by generators are to replace current generators for the Cartier Water Treatment Plant, Peony Reservoir in Portage La Prairie, St. Francois Reservoir in the town of St. Francois Xavier and the Headingley Reservoir in the R.M. of Headingley.

In 2009, new water lines have been installed to feed the town of Marquette, in the R.M. of Rosser.

Appendix A; Cartier WTP Bacteriological results

Date	Raw TC / EC	Treated TC / EC	Free Cl2 residual	
Jan 14 / 09	>200 / 36	0 / 0	1.72 mg/L	
Jan 27 / 09	200 / 50	0 / 0	1.70 mg/L	
Feb 10 / 09	>200 / 41	0 / 0	2.20 mg/L	
Feb 25 / 09	>200 / 31	0 / 0	1.80 mg/L	
Mar 9 / 09	118 / 16	0 / 0	1.77 mg/L	
Mar 25 / 09	70 / 1	0 / 0	1.46 mg/L	
Apr 8 / 09	>200 / 5	0 / 0	1.62 mg/L	
Apr 23 / 09	118 / 0	0 / 0	1.37 mg/L	
May 6 / 09	145 / 0	0 / 0	2.20 mg/L	
May 19 / 09	89 / 2	0 / 0	2.01 mg/L	
Jun 2 / 09	83 / 2	0 / 0	2.02 mg/L	
Jun 16 / 09	>200 / 11	0 / 0	1.80 mg/L	
Jul 2 / 09	200 / 4	0 / 0	1.68 mg/L	
Jul 14 / 09	>200 / 6	0 / 0	1.63 mg/L	
Jul 29 / 09	>200 / 18	0 / 0	1.59 mg/L	
Aug 11 / 09	>200 / 50	0 / 0	1.77 mg/L	
Aug 26 / 09	>200 / 5	0 / 0	1.59 mg/L	
Sep 9 / 09	>200 / 1	0 / 0	1.53 mg/L	
Sep 22 / 09	>200 / 16	0 / 0	1.28 mg/L	
Oct 5 / 09	200 / 74	0 / 0	1.53 mg/L	
Oct 21 / 09	>200 / 3	0 / 0	1.58 mg/L	
Nov 4 / 09	140 / 3	0 / 0	2.01 mg/L	
Nov 16 / 09	118 / 2	0 / 0	1.51 mg/L	
Dec 1 / 09	32 / 1	0 / 0	2.00 mg/L	
Dec 16 / 09	27 / 2	0 / 0	1.65 mg/L	
Dec 30 / 09	144 / 8	0 / 0	1.89 mg/L	

Appendix B; Headingley Reservoir Bacteriological results

Date	Reservoir Inlet	Free Cl2 residual	Reservoir Outlet	Free Cl2 residual
Jan 15 / 09	0 / 0	1.43 mg/L	0 / 0	1.80 mg/L
Jan 27 / 09	0 / 0	1.52 mg/L	0 / 0	1.75 mg/L
Feb 10 / 09	0 / 0	1.49 mg/L	0 / 0	1.88 mg/L
Feb 25 / 09	0 / 0	1.47 mg/L	0 / 0	1.78 mg/L
Mar 10 / 09	0 / 0	1.19 mg/L	0 / 0	1.50 mg/L
Mar 25 / 09	0 / 0	0.92 mg/L	0 / 0	1.22 mg/L
Apr 8 / 09	0 / 0	1.52 mg/L	0 / 0	1.99 mg/L
Apr 23 / 09	0 / 0	1.10 mg/L	0 / 0	1.44 mg/L
May 6 / 09	0 / 0	1.28 mg/L	0 / 0	1.69 mg/L
May 19 / 09	0 / 0	1.62 mg/L	0 / 0	2.14 mg/L
Jun 2 / 09	0 / 0	1.05 mg/L	0 / 0	1.35 mg/L
Jun 16 / 09	0 / 0	1.06 mg/L	0 / 0	1.40 mg/L
Jul 2 / 09	0 / 0	1.51 mg/L	0 / 0	1.88 mg/L
Jul 14 / 09	0 / 0	1.36 mg/L	0 / 0	1.70 mg/L
Jul 29 / 09	0 / 0	1.17 mg/L	0 / 0	1.46 mg/L
Aug 11 / 09	0 / 0	1.07 mg/L	0 / 0	1.32 mg/L
Aug 26 / 09	0 / 0	1.42 mg/L	0 / 0	1.88 mg/L
Sep 8 / 09	0 / 0	0.70 mg/L	0 / 0	1.09 mg/L
Sep 22 / 09	0 / 0	0.80 mg/L	0 / 0	1.22 mg/L
Oct 6 / 09	0 / 0	0.69 mg/L	0 / 0	1.38 mg/L
Oct 21 / 09	0 / 0	0.42 mg/L	0 / 0	0.83 mg/L
Nov 4 / 09	0 / 0	0.53 mg/L	0 / 0	0.95 mg/L
Nov 16 / 09	0 / 0	1.04 mg/L	0 / 0	1.26 mg/L
Dec 1 / 09	0 / 0	1.33 mg/L	0 / 0	1.87 mg/L
Dec 16 / 09	0 / 0	0.63 mg/L	0 / 0	1.01 mg/L
Dec 30 / 09	0 / 0	1.06 mg/L	0 / 0	0.69 mg/L

Appendix C; St Francois Xavier Reservoir Bacteriological results

Date	Reservoir Inlet	Free Cl2 residual	Reservoir Outlet	Free Cl2 residual
Jan 14 / 09	0 / 0	1.48 mg/L	0 / 0	1.25 mg/L
Jan 27 / 09	0 / 0	1.54 mg/L	0 / 0	0.86 mg/L
Feb 10 / 09	0 / 0	1.36 mg/L	0 / 0	1.12 mg/L
Feb 25 / 09	0 / 0	1.37 mg/L	0 / 0	1.11 mg/L
Mar 10 / 09	0 / 0	1.27 mg/L	0 / 0	1.11 mg/L
Mar 25 / 09	0 / 0	1.18 mg/L	0 / 0	0.90 mg/L
Apr 8 / 09	0 / 0	1.78 mg/L	0 / 0	1.12 mg/L
Apr 23 / 09	0 / 0	1.27 mg/L	0 / 0	1.04 mg/L
May 6 / 09	0 / 0	1.53 mg/L	0 / 0	1.22 mg/L
May 19 / 09	0 / 0	1.97 mg/L	0 / 0	1.25 mg/L
Jun 2 / 09	0 / 0	1.21 mg/L	0 / 0	0.87 mg/L
Jun 16 / 09	0 / 0	1.17 mg/L	0 / 0	1.01 mg/L
Jul 2 / 09	0 / 0	1.34 mg/L	0 / 0	1.47 mg/L
Jul 16 / 09	0 / 0	1.03 mg/L	0 / 0	1.07 mg/L
Jul 30 / 09	0 / 0	1.39 mg/L	0 / 0	1.12 mg/L
Aug 12 / 09	0 / 0	1.19 mg/L	0 / 0	1.02 mg/L
Aug 26 / 09	0 / 0	1.59 mg/L	0 / 0	1.18 mg/L
Sep 8 / 09	0 / 0	1.25 mg/L	0 / 0	0.85 mg/L
Sep 22 / 09	0 / 0	0.82 mg/L	0 / 0	0.46 mg/L
Oct 6 / 09	0 / 0	0.85 mg/L	0 / 0	0.60 mg/L
Oct 21 / 09	0 / 0	0.92 mg/L	0 / 0	0.60 mg/L
Nov 4 / 09	0 / 0	1.05 mg/L	0 / 0	0.45 mg/L
Nov 16 / 09	0 / 0	1.37 mg/L	0 / 0	0.79 mg/L
Dec 1 / 09	0 / 0	1.72 mg/L	0 / 0	0.96 mg/L
Dec 16 / 09	0 / 0	1.10 mg/L	0 / 0	0.47 mg/L
Dec 30 / 09	0 / 0	1.21 mg/L	0 / 0	0.59 mg/L

Appendix D; Cartier WTP Fluoridation results

Dates / sampling period	Composite Result; mg/L
Period # 1; Mar 28 / 09 - Apr 10 / 09	1.10 mg/L
Period # 2; Apr 11 – 24 / 09	0.93 mg/L
Period # 3; Apr 25 – May 8 / 09	0.99 mg/L
Period # 4; May 9 – 22 / 09	0.98 mg/L
Period # 5; May 23 – Jun 5 / 09	0.94 mg/L
Period # 6; Jun 6 – 19 / 09	0.86 mg/L
Period # 7; Jun 20 – Jul 3 / 09	0.96 mg/L
Period # 8; Jul 4 – Jul 17 / 09	1.02 mg/L
Period # 9; Jul 18 - 31 / 09	0.89 mg/L
Period # 10; Aug 1 – Aug 14 / 09	1.09 mg/L
Period # 11; Aug 15 – Aug 28 / 09	0.90 mg/L
Period # 12; Aug 29 – Sept 11 / 09	0.96 mg/L
Period # 13; Sept 12 – Sept 25 / 09	1.01 mg/L
Period # 14; Sept 26 – Oct 9 / 09	0.95 mg/L
Period # 15; Oct 10 – 23 / 09	0.80 mg/L
Period # 16; Oct 24 - Nov 6 / 09	0.83 mg/L
Period # 17; Nov 7 – 20 / 09	0.90 mg/L
Period # 18; Nov 21 - Dec 4 / 09	0.94 mg/L
Period # 19; Dec 5 - 18 / 09	0.72 mg/L
Period # 20; Dec 19 / 09 – Jan 1 / 10	0.66 mg/L
Period # 21; Jan 2 – 15 / 10	0.59 mg/L
Period # 22; Jan 16 – 29 / 10	0.95 mg/L
Period # 23; Jan 30 – Feb 12 / 10	0.99 mg/L
Period # 24; Feb 13 – 26 / 10	0.77 mg/L
Period # 25; Feb 27 – Mar 12 / 10	
Period # 26; Mar 13 – 26 / 10	

Appendix E; Cartier WTP Audit 2009

Please see accompanying attached file in PDF format. (Cartier Regional Co-op Audit_2009)