

CITY OF PORTAGE LA PRAIRIE

PUBLIC WATER SYSTEM ANNUAL REPORT FOR 2008

Name: City of Portage la Prairie Public Water System

Name of Owner: City of Portage la Prairie

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City Manager: Dale Lyle Phone: (204) 239-8336

Water Treatment Plant

Manager: Doug Campbell Phone: (204) 239-8373

Foreman: Michael Sandney Phone: (204) 239-8372

Operator: Richard Annable Phone: (204) 239-8374

Operator: Jeff Sing Phone: (204) 239-8374

Operator: Ron Forbes Phone: (204) 239-8374

Maintenance Foreman: Rick Ingram Phone: (204) 239-8362

Public Works

Manager: Brian Taylor Phone: (204) 239-8352

Engineering Manager: Ian Milne Phone: (204) 239-8349

Emergency Number: (204) 239-8340

All reports for sampling and the 2008 Year End Audit received from the Office of Drinking Water will be posted on the City of Portage la Prairie's website.

CITY OF PORTAGE LA PRAIRIE

GENERAL DESIGN DATA AND OPERATIONAL INFORMATION

1.1 Background Data

The City of Portage la Prairie Water Treatment Plant is situated on the north bank of the Assiniboine River, southwest of the City, near the site of the original Fort la Reine.

The Water Treatment Plant Design report was prepared in March of 1974 by Wardrop and Associates Ltd for construction of the Water Treatment Plant at the present day location. The plant construction was started in the fall of 1976 and completed in April of 1978. The plant replaced the previous Water Treatment Plant that was constructed in 1953. The new plant was one of the first in Canada to use Ozone in its treatment process.

In the late 1990's, the City, in partnership with the Manitoba Water Services Board, undertook studies to evaluate the capacity and ability of the existing plant to meet current and proposed Drinking Water Quality Guidelines and projected demands. The plant had been challenged at times to maintain water quality due to poor and highly variable river water quality and increasing demands on an aging plant. As a result the City identified a schedule of upgrades that would increase capacity to meet short-term projected demands, and that would meet current and anticipated Canadian Drinking Water Guidelines.

Major improvements to the plant since 2001 include the addition of pre-clarification, improved rapid sand filtration, backwash and filter-to-waste processes, improved Ozone disinfection, expanded softening capabilities, granular activated carbon adsorption filters, enhanced automated control, increased treated water storage facility, improved chlorine contact time; enhanced pumping capacity to both raw water to the plant and out to the distribution system, residuals management via sludge drying beds, and addition of a larger Lime storage facility. Most of the major components have also been designed to be easily expanded to meet future needs.

1.2 Design Capacity

The upgraded Water Treatment Facility has a rated capacity of 34 million litres per day.

1.3 General Plant Description

A schematic of the Water Treatment Plant is available on the City of Portage la Prairie website, www.city-plap.com.

The City obtains its water from the Assiniboine River. Three 100-hp pumps transfer raw water from the river control structure intake to the water treatment plant. The first stage of treatment is a pre-clarification process.

Ballasted Flocculation Clarification is a unique process, where, in addition to various chemicals that are added to promote the coagulation and flocculation (sticking together in big clumps), very fine sand is added to the mix to make the floc (clumps) settle very quickly. This process removes a large portion of turbidity, organics and algae reducing taste and odour issues. The pre-clarified water is then passed through to the next process.

The softening clarifiers are large circular basins, where hydrated lime and synthetic polymers are added for further coagulation and flocculation. Lime raises the pH to a point where calcium and magnesium are settled out, thus removing hardness from the water.

Re-carbonation is the next step, where carbon dioxide is bubbled through the water to lower the pH. Stabilizing the pH prevents corrosion or scaling throughout the City's water distribution system. The lowering of the pH also aids in the Ozone process.

Ozone is a strong oxidant that is effective at destroying parasitic organisms such as giardia lamblia and cryptosporidium cysts, and at breaking down of organics. It is also effective in the destruction of viruses and bacteria. This process involves the bubbling of Ozone gas that is produced on site into the water prior to the filters.

The Dual Media Filtration follows the Ozone disinfection process. The broken down organics promote biologically active filtration which significantly improves further organics removal. The Filters contain Anthracite and Sand media in separate layers for longer filter life and filtering of the water. In 2008, a new stainless steel under-drain system was installed in the sand filters to promote better filtration and the backwashing of the filters. Organics removal is crucial to the reduction of distribution by-products found in the drinking water supply after chlorination. The filtered water is then passed to a under floor reservoir where the water is then either pumped to the Granular Activated Carbon (GAC) Contactors, continued treatment process, or it is diverted for back washing the dual media filters or the GAC contactors. Using non-chlorinated water for backwashing respects the environment, as the backwash waste is ultimately returned to the river. The first several minutes of a filter run is diverted to waste to ensure no backwash contaminates enter the treated water process stream.

Granular Activated Carbon Adsorption Contactors are utilized as a final polishing step for the ultimate reduction in organics, and for the final taste and odour elimination. The adsorption of organic matter by the activated carbon reduces the amount of chlorine required for final disinfection, which ultimately minimizes disinfection by-products such as trihalomethanes in the drinking water system. New Granular Activated Carbon media was installed in the fall of 2008 and the spent GAC was returned for regeneration and reuse instead of shipping to a landfill site.

Disinfection Storage Reservoir is where the final treatment occurs by adding Chlorine to the influent and allowing contact time in the reservoir. Chlorine is added for final disinfection, and a residual is maintained in the distribution system to eliminate any re-growth of pathogenic organisms.

Reservoir Effluent

Fluoride is added into the effluent for dental health. Fluoride feed is automatic to maintain residuals of 0.8 – 1.0 mg/l, thus increasing existing residual background levels.

An orthophosphate is added to the City distribution to reduce corrosion in the pipes and reduce absorption of metals into the water.

The City of Portage la Prairie has two Reservoirs; the first is located at the Water Treatment Plant and the second, the McKay Reservoir, is located in the Northwest area of the city. The reservoir located at the Water Treatment Plant has four 40 horsepower driven pumps to supply water to the McKay Reservoir and the City of Portage la Prairie and Regional Water distribution systems. The Water Treatment Plant reservoir also has two 100 horsepower variable speed driven pumps to supply water to the Poplar Bluff Industrial Park and Regional Water Systems. The McKay Reservoir has eight 40 horsepower driven pumps to supply water to the City of Portage la Prairie distribution system and other regional water systems. The Reservoir at the Water Treatment Plant has a capacity of 4.64 ML and the McKay Reservoir has 9.25 ML.

Residuals Management is accomplished via sludge drying beds. The waste sludge, comprised of “unwanted” material removed from the raw water, as well as the chemicals and lime used through the treatment process, is collected and pumped to two 45,000 cubic meter ponds. In these ponds, the sludge settles to the bottom and clarified water is returned to the River.

Plant Specifications

Plant type: Conventional lime softening plant with Pre-clarification, biologically active dual media filtration, ozone, carbon dioxide for pH adjustment and Granular Activated Carbon filters with chlorine disinfection for the distribution system.
Design capacity of 34 Million litres/day (net).

1.4 Distribution System

Current population of approximately 13,000 persons has water service supplied by 115 km of pipe in the distribution system with 5000 metered services. Several thousand more people are serviced by Regional Water System Co-operatives, as is the Poplar Bluff Industrial Park.

1.5 Classification and Certification

The Portage la Prairie Water Treatment Plant is designated a Class 4 Facility by the Province of Manitoba.

Manager Certification Level is:

Doug Campbell: Level 4 Certification (Conditional)

The Foreman Certification level is:

Michael Sandney: Level 4 Certification (Conditional)

The Operators Certification level is:

Richard Annable: Level 4 Certification (Conditional)

Jeff Sing: Level 4 Certification (Conditional)

Ron Forbes: Level 3 Certification

The water distribution system is designated as a Class 2 facility.

Manager Certification Level:

Brian Taylor: Level 2

Foreman Certification level:

Keith Barron: Level 2

The Operators Certification level is:

Keith Ellwood: Level 2 Certification

Terry Lowdon: Level 2 Certification (Conditional)

Charles Ward: Level 2 Certification

2.0 Disinfection System in use:

The final step in the treatment of safe drinking 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 Portage la Prairie PWS must insure that a disinfection residual of at least:

- 0.5 mg of free chlorine per liter (litre) of water is detectable at the point where water enters the distribution system, after a minimum contact time of 20 minutes.
- 0.10 mg of free chlorine per liter (litre) of water is detectable at all times at any point in the distribution system.

2.1 Type of disinfection used:

The Portage la Prairie Water Treatment Plant disinfects by adding gas chlorine solution via an induction system direct from chlorine cylinders, into the influent for the onsite water reservoir.

There is a backup system for re-chlorination at the McKay Reservoir with a liquid 12% sodium hypochlorite chlorine solution.

Ozone is used in the treatment system for destruction of organisms such as giardia lamblia and cryptosporidium cysts.

2.2 Equipment redundancy and monitoring requirements:

As required by the Drinking Water Safety Act the Portage la Prairie PWS ensures continuous disinfection is maintained at the plant by keeping in stock all spare parts required for the chlorine feed system. A complete spare chlorinator is also kept in the plant. Two back-up liquid sodium hypochlorite feed pumps are also available.

Disinfection residuals are monitored continuously at the plant by online instrumentation, with alarms for out-of-range chlorine concentrations. They are also manually tested three times per day for quality control.

Testing is done weekly at a number of different locations throughout the distribution system to insure water safety. The results are recorded on appropriate government forms and sent to the Office of Drinking Water at the end of each month.

2.3 Disinfection overall performance/results:

For 2008, the Portage la Prairie PWS has met all regulatory requirements in regard to monitoring and reporting disinfection residuals leaving the water treatment plant and in the distribution areas.

1. Disinfection Monitoring and Reporting

	Regulatory Requirement	PWS Performance
Free chlorine residual entering the distribution system Section 21(1) a - MR 40/2007	≥ 0.5 mg/L	99.5 *
Frequency of testing entering the distribution system Schedule A - MR 40/2007	Daily	100%
Free chlorine residual in the distribution system Section 22 a - MR 40/2007	≥ 0.1 mg/L	100%
Frequency of testing in the distribution system Schedule A - MR 40/2007	Weekly	100%
Report submissions Section 25(2) - MR 40/2007	Monthly	100%
<u>Comments:</u>		

The City of Portage la Prairie PWS met the regulatory requirements for 2008.

* Corrective Action Report forms were submitted for both days.

2. Bacteriological Monitoring and Reporting

	Regulatory Requirement	PWS Performance
Number of raw/incoming water samples - one sample each week Schedule A - MR 40/2007	53	100%
Number of treated water samples - one sample each week Schedule A - MR 40/2007	53	100%
Number of distribution water samples - two samples each week Schedule A - MR 40/2007 - 301 samples submitted (see comment)	106	284%
Frequency of testing Schedule A - MR 40/2007	Weekly	100%
Total Coliform present in samples Section 3(1) b - MR 41/2007	0 TC per 100mL	100%
E. Coli present in samples Section 3(1) a - MR 41/2007	0 EC per 100mL	100%
<p><u>Comments:</u> Summary of test results attached. The City of Portage la Prairie PWS met and exceeded the regulatory requirements for 2008. Voluntary extra distribution samples are submitted at each sampling period.</p>		

3. Physical Standards Monitoring and Reporting

Turbidity Standards	Regulatory Requirement	PWS Performance
Chemically assisted, rapid gravity filtration process Section 6(1) a - MR 41/2007	≤ 0.3 NTU in at least 95% of the samples taken per month	100%
on-line measurement to start in 2009	not to exceed 0.3 NTU for more than 12 continuous hours where continuous measurements are taken	TBA - 2009
	not to exceed 1.0 NTU at any time	99.7% *
Frequency of testing Schedule B - MR 40/2007	<u>Daily portable</u> (continuous on-line TBA)	100%
Report submissions Section 31(2) - MR 40/2007	Monthly	100%
<p><u>Comments:</u> The City of Portage la Prairie PWS met the regulatory requirements for turbidity standards for 2008. * Corrective Action Report form was submitted for April 2, 2008. The WTP installed the continuous turbidity monitoring system, and upgraded the filter under-drain and backwash mechanical system in 2008.</p>		

4. Disinfection By-products Monitoring and Reporting

	Regulatory Requirement	PWS Performance
note: 1 mg/l = 1000 µg/L		
Trihalomethane sampling requirements Section 5(1) - MR 41/2007	4 times per year	100%
Total Trihalomethane Standard Schedule B - MR 41/2007	100 µg/L	Average - 65 µg/L
Bromodichloromethane sampling requirements Section 5(1) - MR 41/2007	4 times per year	100%
Bromodichloromethane Standard (see comment) Schedule B - MR 41/2007	16 µg/L	Highest - 40 µg/L
<p><u>Comments:</u> summary of test results attached The City of Portage la Prairie PWS met the regulatory requirements for disinfection by-products for 2008.</p> <p>The maximum BDCM value for 2008 was 40µg/L, taken in the furthest reach of the distribution system, exceeding the BDCM standard of 16µg/L (0.016 mg/L). However, recent scientific research has caused Health Canada to question the health effects associated with the 16µg/L guideline (MB standard). Health Canada is now reviewing the guideline and it might be dropped entirely. As changes to the BDCM guideline (MB standard) are imminent, the Director advises that compliance with the BDCM standard is in abeyance until Health Canada completes its review. Therefore no action is required to address BDCM exceedence at this time. Note that BDCM continues to be a component of Total THMs. Accordingly, utilities must continue to make every effort to reduce THM concentrations (including BDCM) to as low a level as possible.</p>		

	Regulatory Requirement	PWS Performance
Haloacetic Acids (HAA)	TBA	n/a
2008 ODW Chemical Analysis - 29/8/08	-	24.2 µg/L
<p><u>Comments:</u> Haloacetic acids (HAA's) are also chlorine disinfection by-products found in drinking water. In 2008, Health Canada established a guideline of 80µg/L for HAA's. It is anticipated that this guideline will be adopted as a standard in Manitoba in the near future. Utilities will be notified when they will be required to start a monitoring and reporting routine. The Office of Drinking Water has included HAA analysis in the yearly water chemistry testing to compile background data.</p>		

3.0 List of Water Quality Standards:

The Office of Drinking Water submitted water samples from the **City of Portage la Prairie PWS** for chemical analysis on January 7, April 8, and July 29, 2008. Letters providing assessment comments and recommendations on the test results were sent to Mr. Doug Campbell, WTP Manager. **The treated water met all the applicable GCDWQ health-based maximum acceptable concentrations (MAC).**

The link to Health Canada's *Guidelines for Canadian Drinking Water Quality* website is:

http://www.hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index_e.html

4.0 Water System Incidents and Corrective Actions:

Low chlorine entering the distribution system on January 15th and August 28th was due to feeder failure. Units were repaired and levels of chlorine were returned to normal within four hours. Chlorine within the distribution remained at required levels. All high HPC samples were retested and passed. Dead end water lines are flushed to maintain water quality.

5.0 Additional Reports Required:

Section two of Operating Licence PWS-08-147 specifies submission dates for:

- Engineering Assessment: September 1, 2008 (extension granted to March 31, 2009)
- Compliance Plan: December 1, 2008 - received
- Emergency Response Plan: June 1, 2010

Co-operation in meeting the above submission dates will assist in processing applications and reports and enabling our water system to meet compliance deadlines for water quality standards.

6.0 Drinking Water Safety Orders on the Portage la Prairie PWS and Actions Taken:

In 2008, no Drinking Water Safety Orders were issued for the Portage la Prairie Public Water System.

7.0 Boil Water Orders and Actions Taken in Response:

In 2008, no Boil Water Orders were issued for the Portage la Prairie Water System.

8.0 Warnings issued or Charges Laid on the System in Accordance with The Drinking Water Act:

None issued.

9.0 Major Expenses Incurred:

Water distribution system pipe renewal, Granular Activated Carbon media replacement, dual media filters had the under drain system replaced and media upgraded. A Public Water System Engineering Assessment is being processed by Genivar. An amount of \$25,000 is being spent on the engineering assessment as required by the Portage la Prairie Public Water System's Operating License. This

assessment is to be completed every 5 years by an independent engineering company.

City Water Treatment Plant staff received post-secondary education through NAIT.

City Waterworks staff members received educational upgrades through Red River College, correspondence and related seminars.

Watermain looping:
Prince Avenue, 2nd St NE

10.0 Future Expansion and/or Increased Production:

No expansion or upgrade is anticipated for the Water Treatment Plant in 2009. A replacement ozone generator will be installed, and distribution system piping renewal and looping will be completed to improve distribution system water quality and enhance fire protection flows.