Public Water System 2020 Annual Report

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Lac du Bonnet Water Treatment Facility

Town of Lac du Bonnet

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Introduction:

The 2020 Annual Report on the Lac du Bonnet Water Treatment Facility summarizes the Utilities ability to produce safe potable water to all users of the facility.

1. Description of the water system:

The Lac du Bonnet Public Water System (LDBPWS), consisting of raw water conveyance, treatment, storage and distribution, was originally constructed in 1976. A major expansion of the water treatment plant (WTP) was completed in 2003 to increase the reservoir capacity, change the treatment process to ballasted flocculation followed by UV disinfection and to provide a new distribution pumping system. The water treatment plant operates year-round to service the Town of Lac du Bonnet via a piped distribution system. The WTP also services customers outside of the Town through a truck fill. The Lac du Bonnet water system provides potable drinking water to a population of 1089 residents (2016 Census) as well as 698 bulk card users in the rural areas around the town of Lac du Bonnet. Treated water produced at our facility not only meets but exceeds all health and aesthetic objectives to date as stated in the *Guidelines for Canadian Drinking Water Quality.*

1.1 Water supply source + Intake Structures

The water source for the LDBPWS is the Winnipeg River. A barrel style intake screen is located approximately 30 meters from the shore and raw water is conveyed to a wet well via a 250 mm pipe. Raw water from the wet well is pumped to the WTP by submersible intake pumps (IP-1/2, each rated at 19 L/s) through a 150 mm dia. pipeline. The pipeline between the pumphouse and WTP is 519 m long. The pumps operate in a duty / standby configuration and a 25 kW diesel generator allows one pump to operate under power outages. The pumps are called to start based on the level in the reservoir at the WTP and communication to the WTP is through telemetry. The wet well is covered by a superstructure that houses the diesel generator and electrical panels. The diesel generator located over the wet well provides a potential contamination risk to the raw water. This risk has been mitigated by curbing the access hatch that provides access to the wet well. The pumphouse is located between residential properties located on the Winnipeg River. The Winnipeg River system is used for recreational purposes and there are no other methods of source protection.

1.2 Water Treatment Process

The treatment processes include chemically assisted ballasted flocculation and filtration, UV disinfection and chlorination. The chemically assisted ballasted flocculation process at the

Lac du Bonnet Water Treatment Plant (LDB WTP) uses a multi barrier treatment process to treat the raw water from the river, the raw water comes out of the river with an average turbidity between 6-15 nephelometric turbidity units (NTU). The chemically assisted ballasted flocculation process at the LDB WTP is an Actiflo ACP 300 followed by two Dusenflo 400 filters. The equipment was provided by John Meunier (now Veolia). The process is designed to meet the DWSA turbidity requirement of 0.3 NTU 95% of the time and always less than 1 NTU. The process also satisfies the DWSA requirement for a filtration barrier for a surface water source and can provide 2 log reduction for Giardia and Cryptosporidium so long as it is meeting the DWSA turbidity requirement (demonstrated by online monitoring), is designed in accordance with Ten State Standards and has an effective filter cleaning system.

It then flows through the UV system using ultra violet lights to neutralize or deactivate bacteria, and works with the filtration to get 3 log reduction. From this point the finished product flows into the Clear well at which point the water is chlorinated(disinfected) by sodium hypochlorite (liquid chlorine) pumped by a metering pump. It is then monitored and tested twice daily for chlorine residuals. As per the *Drinking water safety act* the Lac du Bonnet Water Treatment plant operator must ensure a disinfectant residual of at least:

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

*0.1 mg/L of free chlorine is detectable at all times at any point in the distribution system.

1.3 Water storage reservoirs:

The reservoirs contain treated water to be supplied to the residents and other users at all times, they consist of 3 chambers beneath the plant and one exterior reservoir directly south of the plant. The exterior chamber holds 1,246,000L, chamber 1 beneath the plant holds 278,000 L, chamber 2 beneath the plant holds, 99,600 L, and chamber 3 holds 91,000 L, to come to a total of 1,714,600 L of treated water. The water used is replenished every day and we have just over two day's supply based on history's worst-case scenario.

1.4 Distribution System

The distribution system consists of 4 turbine pumps at the treatment facility. One is the Jockey pump which maintains a consistent pressure in low demand situations and is smaller than duty pumps 1+2. Both duty pumps 1 and 2 are the same size but alternate pumping water only as required and jointly for higher demands. The 4th pump is a 60HP fire pump that can maintain

pressure from the lowest to the highest demands. All pumps have variable frequency drives so when the distribution system requires more water the pumps moderately increase in speed and when the system requires less, they gradually decrease in speed to ensure proper pressures and flow with minimal hammer.
The underground distribution system consists of many different sizes and types of piping including: Cast Iron, PVC(series160 and C900 Blue Brute) and Copper, and sizes vary from 3/4" up to 10" in diameter.

1.5 # of Connections, types of users and population served

There are 569 connections to our distribution system users consist of commercial, home, bulk fill users. The population served to date is 1089 as well as 698 bulk card users.

1.6 Classification and certification

The classification of Lac du Bonnet treatment facility is a Level 2.
Certification of operators is as follows for 20120

Geoff Blacklin	Level 2 Operator in Charge Level 1 Distribution
Jen Bellin	OIT (completed Level 1 Treatment exam)
Tim Maunder	Level 3 Operator (emergency backup) Level 2 Distribution

- The operator in charge holds all required licenses for the safe operation of this particular facility. Operators must attend other courses and conferences to maintain CEU'S (continuing education units). And apply for a license renewal every 5 years. They must obtain a certain limit of CEU's to be able to renew their license. The facility classification and operator certification fall under the Manitoba Conservation Water and Wastewater Facility Operators Regulation under Environment Act.

2. Disinfection system in use

2.1 Type of disinfection system

The Lac du Bonnet Water Treatment Plant uses two disinfection systems that include, a UV Disinfection system and a Chlorination System to meet government regulations. At this point filtration and UV gives a 3-log 99.9%0 reduction of crypto and giardia.

A single UV disinfection unit is located downstream of the filters for disinfection of the treated water. The purpose of the UV disinfection process is inactivation of pathogens. A Wedeco (B-120) low pressure UV Disinfection System is installed at the LDB WTP. The UV system is validated by OEVGW for a 40 mJ/cm2. No redundancy is provided for the UV disinfection process. UV intensity is monitored and tracked by the SCADA system. The UV dose is function of intensity and exposure time. The measured UV intensity multiplied by the known exposure time (flow and vessel geometry) gives an indication of the delivered dose. If the measured UV intensity is below that required to provide the design dose and alarm is generated.

The second disinfection system is chlorination. The Water plant uses sodium hypochlorite at a 12% solution which is added to the water after the UV system. A metering pump is used to inject the chlorine to the system at a specific dosage rate to maintain optimal free chlorine values in the reservoirs. Our reservoirs hold just over two day's supply and far exceed 20 minute contact time of chlorine which get our 4-log (99.99%) reduction of viruses. We have two metering pumps that are online and fully operational and used in rotation to ensure that both pumps are in good working order. If one of these pumps should fail, we carry a back-up pump on hand that could be quickly installed to maintain the two-pump system.

The Water Treatment system has a multi barrier alarm system that notifies the operator if the free chlorine limits reaches a certain level. This alarm is set above the regulation limit, this would signal the plant to shut down and allow the operator to get to the plant and correct the dosage to maintain compliance with the drinking water regulations. Alarm Set points for chlorine are a low alarm for 0.65mg/L and a high of 1.8mg/L

In the event of a power outage the water plant has a back-up generator to ensure uninterrupted and continuous power to the water treatment plant and distribution system to not only treat the water but supply safe drinking water at all times.

2.2 Equipment monitoring requirements and redundancy program:

Chlorine residuals are monitored 24/7/365. They are monitored continuously by an online analyzer every minute. Manual readings are taken twice daily from sample point by analyzer and also bi-weekly in the distribution system as per our operating license requirements. These readings are recorded on monthly chlorination forms which are sent to the drinking water officer for review at the end of every month.

As required by the drinking water safety act the Lac du Bonnet Water treatment operators ensure continuous disinfection is maintained at the plant by keeping stock of all spare parts for the chlorinator pump plus 1 complete back up chlorinator pump ready to use at all times.

2.3 Disinfectant residual overall performance and results

For 2020, the Lac du Bonnet Water Treatment facility has had a problem with SCADA recording and data all manual tests have been within license parameters, regulatory requirements in regards to monitoring disinfection residuals leaving the facility have been rectified with some improvements still to be made.

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 (MAC) Maximum Acceptable Concentrations for drinking water. Concentration values in excess constitute a health related issue and require corrective actions.

Summary of Water Quality Requirements Parameter Quality Standard
Total Coliform Less than one total coliform per 100 mL of all treated and distributed samples
E. coli Less than one E. coli per 100 mL of all treated and distributed samples
Chlorine Residual - Free chlorine residual > 0.5 mg/L in all treated water that enters the distribution system - Free chlorine residual > 0.1 mg/L at all times in the distribution system.
Turbidity - Less than 0.3 NTU 95% of the time in a month - Not exceed 0.3 NTU for 12 consecutive hours of filter operation or two consecutive daily samples - Not to exceed 1 NTU at any time.
THMs Less than or equal to 0.1 mg/L as a quarterly average (every second year)
Lead Less than or equal to 0.01 mg/L
HAAs Less tah or equal to 0.08mg/L as a quarterly average (every second year)
Giardia & Cryptosporidium 3 log reduction through filtration and disinfection equipment Viruses 4 log reduction filtration and disinfection equipment

Parameter

Quality Standard

Total coliform and E.coli	Less than one E.coli and total coliform bacteria detectable per 100 mL in all treated and distributed water
Chlorine residuals	* A free chlorine residual of at least 0.5mg/L in water entering the distribution system following a min. contact time of 20 minutes * A free chlorine residual of at least 0.1mg/L at all times at any point in the distribution system
Ultraviolet Disinfection	95% of water produced per month is disinfected within validated conditions
Total Trihalomethanes	Less than or equal to 0.10mg/L as locational annual average of quarterly samples as an annual
Total Haloacetic Acids	Less than or equal to 0.08mg/L as locational annual average of quarterly samples
Turbidity	Less than or equal to 0.3 NTU in 95% of the measurements in a month of the effluent from each operating particulate filter Not exceed 0.3 NTU for more than 12 consecutive hours of filter operation or for 2 consecutive daily measurements Not exceed 1.0 NTU for any continuous or daily measurement
Lead	Less than or equal to 0.010mg/L

3.1 Disinfection Monitoring and reporting	Regulatory Requirements	PWS Performance
Free chlorine residual entering distribution system	**> 0.5 mg/L**	**100%**
Frequency of testing entering distribution system	**Daily**	**100%**

Free Chlorine residual in distribution system	**>0.1 mg/L**	**100%**
Frequency of testing in distribution system	**Bi-weekly**	**100%**
Report Submissions	**Monthly**	**83%**

3.2 Bacteriological Monitoring and reporting

	Regulatory requirement	**PWS Performance**
Number of raw/incoming water samples	26	26
Number of treated water samples	26	26
Number of distribution water samples	26	26
Frequency of testing	Bi-weekly	
Total Coliform present in samples	0 TC per 100ml	100%
E. Coli present in samples	0 EC per 100ml	100%

The Pubic Water System has met their regulatory requirements for 2020 All but one separate bi-weekly sample that froze while being transport by a third party and was re sampled as soon as possible.

3.3 Physical Monitoring and Reporting

Chemically assisted, rapid gravity filtration process	Regulatory requirement < 0.3 NTU in at least 95% Of the samples taken per Month	PWS performance 100%
	Not to exceed 0.3 NTU For more than 12continuos Hours where continuous measurements Are taken	100%
Frequency of testing	Continuous	100%
Report Submissions	Monthly	84%

3.4 Disinfection By-products Monitoring and Reporting

	Regulatory Requirements	PWS performance
Trihalomethane sampling requirements	Quarterly every second year	100%
Total Trihalomethane Standard	0.10 mg/L	
Annual quarterly average in distribution	0.1078 mg/L	93%
Haloacetic Acids	Quarterly every second year	100%
Haloacetic acids	0.08 mg/L	
Annual quarterly average in distribution	0.052 mg/L	100%

Sampling THM's and HAA's are required on a Bi-annual basis but Town of Lac du Bonnet has been submitting on an annual basis and will be submitting quarterly in 2021

THM's are a chlorine disinfection by-product found in drinking water, acceptable amount being 0.1.mg/L average over 4 quartely samples. In 2020 our average was 0.1078mg/L the last time we were over was 2016 and we will continue to monitor and keep below the threshold.

Haloacetic Acids are also chlorine disinfection by-products found in drinking water. In 2008, Health Canada established a guideline of 0.08mg/L for HAA's. HAA analysis was submitted in 2020 and the results for our system were 0.052g/L average which is below the guideline.

3.5 Water Chemistry Analyses

The operators did submit an annual water sample from the Lac du Bonnet PWS for chemical analyses for 2020. This action is considered to fulfill the general chemistry monitoring requirement outlined in our Operating license. The report (attached) indicated that the treated water met all health related guidelines as stipulated in health Canada's Guidelines for Canadian Drinking Water Quality. (http//www.hc-sc.gc.ca/ewh-semt/water-eau/drink-

potb/guide/index_e.html), in addition in 2021 we will be submitting quarterly samples ourselves in February, May, June and November for THM's and HHA's as a part of our ongoing monitoring of the performance of the treatment facility along with annual chemical sampling.

4. Water System Incidents and corrective actions

This year, in all circumstances where the SCADA report showed non-compliance issues all subsequent reviews showed raw data that showed the system was compliant. The issues were momentary and were a result of deficient SCADA programming rather than a problem with the water treatment process.

5. Drinking water safety orders and actions taken:

In 2020, no drinking water safety orders were issued for the Lac du Bonnet Public Water System.

6. Boil Water advisories issued and actions taken in response

In 2020, no boil water advisories were issued for the Lac du Bonnet public water system.

7. Warnings issued or charges laid on the system in accordance with The Drinking Water Safety Act

In 2020, no charges laid or warnings were received by the Lac du Bonnet Public water system.

8. System expansion and/or increased production

We have started planning to replace the last of the cast waterlines in 2021, as well as increasing the line size from 4" to 6" and our mainline from 6" to 8" all planning and engineering has been completed put out to tender for completion in 2021

We hope to continue the training of our operators and have another level 2 certified operator by the end of 2021

We completed the installation of a new online Chlorine Analyzer in June of 2020

9. Summary:

Currently the Lac du Bonnet treatment plants new SCADA system allows for more accurate online monitoring of turbidity of its Actiflo and filters along with the distribution system. This new SCADA system takes online readings every minute to produce the upmost accuracy in its reporting. The one negative of this enhanced reading is that it will pick up a spike that lasts for seconds whereas readings taken every five minutes as per guidelines these spikes would be averaged and quite likely go un recorded, Instances where Free chlorine residual entering distribution system reported by our online monitoring the daily average was well above the regulatory limits. For 2021 we will be working with IT to improve the monitoring and give a more detailed report.

If you wish to obtain a copy of this report you can go to our website Web: lacduBonnet.com and download it or go to the Town office and request a copy of the report.