Public Water System 2024 Annual Report

March 1, 2025

Lac du Bonnet Water Treatment Facility

Town of Lac du Bonnet

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Introduction:

The 2024 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 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 1064 residents (2016 Census) as well as 1230 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: High Density Polyethylene, PVC(series 160 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 541 connections to our distribution system. Users consist of commercial, home, and bulk fill users. The population served to date is 1064 as well as 1230 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 2024.

Darcy Henderson	Level 2 Water Treatment
	Level 1 Distribution
Jen Bellin	Level 2 Water Treatment
	Level 1 Distribution
Derrick Martin	Level 1 Water Treatment
	Level 1 Distribution

- The operator in charge holds all required licenses for the safe operation of this 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% 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 used 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 reach 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 1.5mg/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 days a year 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 2024, 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 regarding monitoring disinfection residuals leaving the facility have been corrected 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.

Parameters

	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 twelve consecutive hours of filter operation or for two consecutive daily measurements Not exceed 1.0 NTU for any continuous or daily measurement

Lead	Less than or equal to 0.005mg/L.
Manganese	Less than or equal to 0.12mg/L
Total Microcystins	Less than or equal to 0.0015mg/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**	**100%**

Ultraviolet Light		
Ultraviolet Light Monitoring	**Continuous**	**100%**
Report Submissions	**Daily**	**100%**
Report Submissions	**Monthly**	**100%**

3.2 Bacteriological Monitoring and reporting

	Regulatory requirement	**PWS Performance**
Number of raw/incoming water samples	27	27
Number of treated water samples	27	27
Number of distribution water samples	27	27
Frequency of testing	Bi-weekly	100%
Total Coliform present in samples	0 TC per 100ml	100%
E. Coli present in samples	0 EC per 100ml	100%

The Public Water System has met their regulatory requirements for 2024. There were no issues with bi-weekly samples this year.

Chart of the Bi-Weekly samples of 2024

Month	Raw	Treated	Distribution
January	>1 TC & E-coli	<1 TC / <1 E-coli	<1 TC / <1 E-coli
February	>1 TC & E-coli	<1 TC / <1 E-coli	<1 TC / <1 E-coli
March	>1 TC & E-coli	<1 TC / <1 E-coli	<1 TC / <1 E-coli
April	>1 TC & E-coli	<1 TC / <1 E-coli	<1 TC / <1 E-coli
May	>1 TC & E-coli	<1 TC / <1 E-coli	<1 TC / <1 E-coli
June	>1 TC & E-coli	<1 TC / <1 E-coli	<1 TC / <1 E-coli
July	>1 TC & E-coli	<1 TC / <1 E-coli	<1 TC / <1 E-coli
August	>1 TC & E-coli	<1 TC / <1 E-coli	<1 TC / <1 E-coli
September	>1 TC & E-coli	<1 TC / <1 E-coli	<1 TC / <1 E-coli
October	>1 TC & E-coli	<1 TC / <1 E-coli	<1 TC / <1 E-coli
November	>1 TC & E-coli	<1 TC / <1 E-coli	<1 TC / <1 E-coli
December	>1 TC & E-coli	<1 TC / <1 E-coli	<1 TC / <1 E-coli

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 twelve continuous Hours were continuous measurements are taken.	100%
Frequency of testing	Continuous	100%
Report Submissions	Monthly	100%

Monthly Averages for Chlorine, Filter #1 & Filter # 2 Turbdity

Month	Average Free Chlorine (mg/L)	Average Filter #1 Turbidity (NTU)	Average Filter # 2 Turbidity (NTU)
January	0.850 mg/L	0.053 NTU	0.052 NTU
February	0.894 mg/L	0.061 NTU	0.058 NTU
March	0.840 mg/L	0.050 NTU	0.044 NTU
April	0.813 mg/L	0.051 NTU	0.050 NTU
May	0.849 mg/L	0.058 NTU	0.055 NTU
June	0.916 mg/L	0.061 NTU	0.056 NTU
July	0.906 mg/L	0.068 NTU	0.063 NTU

August	1.062 mg/L	0.066 NTU	0.061 NTU
September	1.012 mg/L	0.066 NTU	0.062 NTU
October	1.077 mg/L	0.067 NTU	0.061 NTU
November	1.089 mg/L	0.056 NTU	0.050 NTU
December	1.041 mg/L	0.048 NTU	0.040 NTU

3.4 Disinfection By-products Monitoring and Reporting

	Regulatory Requirements	PWS performance
Trihalomethane sampling requirements	Quarterly every year	100%
Total Trihalomethane Standard	0.10 mg/L	
Annual quarterly average in distribution	0.082mg/L	100%
Haloacetic Acids	Quarterly every year	100%
Haloacetic Acids	0.08 mg/L	
Annual quarterly average in distribution	0.043 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 2025.

THM's are a chlorine disinfection by-product found in drinking water, acceptable amount being 0.1mg/L average over 4 quarterly samples. In 2024 our average was 0.082mg/L. Which is below the guidelines.

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 2024 and the results for our system were 0.043mg/L average which is below the guideline.

Lead	**Regulatory requirements**	**PWS Performance**
Lead	20 Residential Samples	100% Completed

Location #1	0.00559	✗
Location #2	0.000195	✓
Location #3	0.000741	✓
Location#4	0.00106	✓
Location#5	0.000421	✓
Location#6	0.00298	✓
Location#7	0.000911	✓
Location#8	0.000832	✓
Location#9	0.000762	✓
Location#10	0.00202	✓
Location#11	0.00159	✓
Location#12	0.00256	✓
Location#13	0.000090	✓
Location#14	0.00129	✓
Location#15	0.000413	✓
Location#16	0.00233	✓
Location#17	0.000158	✓
Location#18	0.00381	✓
Location#19	0.00183	✓
Location#20	0.00278	✓

Although lead is not present in the water produced by the WTP, it can enter the water as it passes through a lead service line (the pipe that connects a building to the water main) and/or plumbing systems and fixtures that contain lead. Buildings constructed before 1950 may have a lead service line and those constructed before 1990 may have lead solder or brass plumbing fixtures.

3.5 Water Chemistry Analyses

The operators did submit an annual water sample from the Lac du Bonnet PWS for chemical analyses for 2024. 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 2025 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.

Parameter	Water Quality Standard	Town of LDB Raw water	Town of LDB Treated water	Town of LDB Distribution
Hardness	80- 100mg/L	49.8.0 mg/L	47.9 mg/L	
pH	7.00 – 10.5pH	7.62	7.46	
Total Microcystin	0.0015 mg/L	0.0002 mg/L		
Total Dissolved Solids	500mg/L	44.2 mg/L	80.2 mg/L	
Nitrate	10 mg/L	0.07 mg/L	0.0688 mg/L	
Aluminum	2.9 mg/L	0.159 mg/L	0.037 mg/L	0.0322 mg/L
Arsenic	0.01 mg/L	0.00125 mg/L	0.00032mg/L	0.00034 mg/L
Antimony	0.006 mg/L	< 0.00010 mg/L	< 0.00010 mg/L	< 0.00010 mg/L
Barium	2 mg/L	0.00954 mg/L	0.0085 mg/L	0.00833mg/L
Boron	5 mg/L	< 0.01mg/L	0.013 mg/L	< 0.01 mg/L
Copper	2 mg/L	0.0016 mg/L	0.00865 mg/L	0.0146 mg/L
Cadmium	0.007 mg/L	0.000005mg/L	<0.0000050mg/L	<0.0000050mg/L
Chromium	0.05 mg/L	0.00050mg/L	<0.00050mg/L	<0.00050 mg/L
Lead	0.005 mg/L	0.000149 mg/L	0.000073mg/L	0.000552 mg/L
Manganese	0.12 mg/L	0.00945 mg/L	0.00048 mg/L	0.00041 mg/L
Selenium	0.05 mg/L	<0.00005 mg/L	<0.00005 mg/L	Not Detected
Uranium	0.02 mg/L	0.00013 mg/L	<0.000010 mg/L	<0.000010 mg/L
Chloride	250 mg/L	1.63 mg/L	23.0 mg/L	
Zinc	5 mg/L	0.0034 mg/L	< 0.003 mg/L	0.0039 mg/L

*****The Annual Chemistry attached is in ug/L which is 1000 times smaller than mg/L. In the chart above we have converted everything to mg/L for convenience of keeping all measurements the in the same units.

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 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.

On December 5, 2023 the UV system started to lose wattage, this led to the uv system under dosing the water. This problem with the UV system continued until March of 2024, when we received the proper replacement parts.

In August of 2024, a Raw water pump #2 browned out. On September 3rd we had it replaced with a new pump.

On October 5, 2024, the panel at the Truck bulk fill crashed and stopped working. We had to shut the truck fill down until we got replacement parts. Those part were installed on October 7th and the truck fill was open again.

5. Drinking water safety orders and actions taken:

In 2024, 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 2024, there were 3 boil water advisories.
On March 12, 2024, a Boil water advisory was issued at 8pm due to unexpectedly have to shut the entire PWS down for maintenance regarding out Truck bulk fill station. A ball valve had to be replaced as well as a new actuator valve that controls the bulk fill. The boil water was lifted on March 15, 2024.
On September 3, 2024, a Boil water advisory was issued at 8am. We had to shut down a section of water mains that run behind Hyw # 317, from 1st street to Hyw # 11. We found a water main leak behind the Vets office, therefore on Sept. 3rd we fixed the leak. The Boil water was lifted on September 5, 2024.
On September 10, 2024, a Boil water advisory was issued at 8am. We shut a section of watermains down from 1st street to Hyw #11, so that a 4-inch valve could be installed on the watermain. The Boil water was lifted on September 13th.

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

In 2024, no charges laid or warnings were received by the Lac du Bonnet Public water system.

8. System expansion and/or increased production

We will have another level 2 certified operator by 2025-2026. It is in the works to install a new raw water intake line and make the current line a secondary line to provide backup if one should fail in 2024-2025. We plan on upgrading our chemical feed lines and platforms in the next 5 years. Town is working on expanding our distribution system by increasing pipe sizes in certain areas of town to allow better flows. We are looking at upgrading our Jockey pump in the next year.

9. System Upgrades Preformed

During the year of 2024, we replaced a raw water pump in our raw water pump house. We replaced the old diaphragm valve on the bulk truck fill line to a new actuator valve. We also replaced our raw water turbidity meter to a new Lovibond meter. We installed a 4-inch watermain valve behind the vet's office, so we can now shut half of the watermain down instead of the whole line.

10. Summary:

The Water Treatment Plant's SCADA system provides accurate online monitoring of turbidity throughout the water treatment process and entering the distribution system. The SCADA system accurately monitors the Free Chlorine residuals entering the distribution system as well. This SCADA system takes online readings every minute to generate the best accuracy in its reporting. The treatment process removes 99.9% of harmful pathogens and the two-step disinfection takes care of the rest. While we strive to remove as much harmful minerals and metals from the water as possible through the treatment process. We perform all bi-weekly sampling as well as any other samples required in our license.

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.