2020 Year End Report: Bala Potable Water Plant

Drinking Water Works Permit: 143-201

Municipal Drinking Water License: 143-101

Ministry of Environment, Conservation and Parks Waterworks #: 220001888

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Introduction

The Bala Potable Water Plant (PWP) serving the community of Bala is owned and operated by the District Municipality of Muskoka.

It constructed in 1994 and has an initial design capacity of 1942 m^3/d. At design capacity, the plant is capable of servicing a population of 1,725 people. The water system currently serves a population of approximately 1,000 people.

The plant operates under license 143-101 and permit 143-201, issued in September 2020 under the Municipal Drinking Water Licensing Program. The plant also presently operates under MOE permit to take water #7701-97GFKM (expires April 30, 2023), which permits the operation of up to 2,000 m^3/d.

The Raw Water intake structure is located in Weismiller Bay on Lake Muskoka approximately 18 meters deep and 500 meters from shore.

The plant process is a conventional package filtration plant, with supplementary pH adjustment. The facility includes an intake crib, intake pipe, fixed screen, and a low lift pumping station. The treatment plant consists of two pretreatment chambers, two flocculation chambers, two settling chambers, and two filters. Also located at the treatment plant are one baffled contact chamber, two clear wells, 4 high lift pumps, 2 backwash pumps, chemical storage, preparation, and feed equipment.

The treatment plant system features chemical treatment consisting of hydrated lime / carbon dioxide (corrosion control), provisions for taste and odour control using powdered activated carbon, Permanganate (Manganese control), polyaluminum chloride (coagulation), sodium hydroxide (pH control), and sodium hypochlorite for disinfection in a chlorine contact chamber followed by final pH adjustment. The addition of hydrofluorosilic acid (fluoridation) to prevent tooth decay completes the treatment process.

The distribution system includes a $1200m^3$ elevated storage tank.

All treatment control systems use a Supervisory Control and Data Acquisition (SCADA) system for process control and monitoring.

Legislation Requirements

Safe Drinking Water Act

In the Part Two Report of the Walkerton Inquiry, Commissioner Dennis O'Connor recommended that the Ontario Government enact a Safe Drinking Water Act to deal with matters related to treatment and distribution of drinking water. The Safe Drinking Water Act (SDWA) received royal assent in December, 2002.

The purpose of the Act is to gather in one place all legislation and regulations relating to the treatment and distribution of drinking water. The Act serves to protect human health through the control and regulation of drinking water systems and drinking water testing.

The foundation provisions of the Safe Drinking Water Act include:

- Purpose of the Act
- Definitions
- Minister's Powers and Duties
- Inspections
- Compliance and Enforcement
- Appeals and Offences

Ontario Regulations

The Ontario Government has enacted several supporting regulations under the SDWA (2002). These regulations combine previous requirements under the Ontario Water Resources Act and the new requirements under the SDWA. Key components of the regulations include:

- System Categories
- Groundwater Under Direct Influence of Surface Water (GUDI)
- Exemptions
- Approval of Systems
- Treatment
- Testing and Operational Checks (General Rules)
- Operational Checks
- Microbiological Testing
- Chemical Testing
- Adverse Conditions
- Corrective Action
- Engineer's and Summary Reports

Municipal Drinking Water Licenses / Certificates of Approval

The Municipal Drinking Water Licensing Program has replaced the Certificate of Approval program for municipal residential drinking water systems. The Ontario Government has implemented the Municipal Drinking Water Licensing Program (MDWLP) as recommended by Justice O'Connor in the Part II Report of the Walkerton Inquiry. Justice O'Connor recommended a new approvals framework for municipal drinking water systems, which would require owners to obtain a license to operate their systems as well as incorporate the concept of quality management into their operations.

A municipal drinking water license is an approval that is issued by the MOECP to owners under the Safe Drinking Water Act, 2002 for the operation of municipal residential drinking water systems. The District of Muskoka operated under various Certificates of Approval until October 2010 when the operating licenses were issued.

Previous Certificates of Approval were required for the establishment, replacement or alteration of all municipal drinking water systems. The MECP issued Certificates of Approval to ensure that all undertakings comply with the legislation (i.e. Acts and Regulations) and the Ministry's Environmental Guidelines and Procedures developed to provide consistency of approach to various aspects of environmental protection throughout the province. Municipal Drinking Water Licenses and Permits similar to previous Certificates of Approval provide specific details about the drinking water system including:

- Drinking Water System Description
- Definitions and Information
- General Information – Compliance, Other Legal Requirements, Adverse Effects, Inspections
- Performance – Rated Capacity, Management of Residue
- Monitoring and Recording – Flow Measuring Devices, Sampling
- Operations and Maintenance

Comparison to Rated Capacity and Flow Rates

The Bala PWP has a rated capacity of 1,942 m^3 per day. In 2020, the total monthly average flow for the year was 372.3 m^3 per day. The maximum day flow for the year was 874 m^3 per day, however the 3-year average for maximum day flow is 915 m^3 per day. This represents 47% of the plant design capacity. No problems have been associated with this flow.

Monthly flows are shown in the attached tab

The Permit to Take Water (PTTW #7701-97GFKM) permits 2,000 m^3 per day; therefore there were no exceedances of this permit.

Summary of Analytical Results

A total of 710 microbiological regulatory tests were performed in 2020 and compliance with Provincial standards was achieved throughout the entire year.

There were 168 free chlorine residual tests performed in the distribution system and all results were satisfactory. Staff continue to routinely sample all areas of the system to ensure adequate free chlorine residuals are available throughout the distribution system.

A summary of other analytical results is also shown in this report.

Summary of Treatment Chemicals

The following chemicals are used for the treatment of drinking water at the Bala PWP:

- Hydrated Lime: pH and Alkalinity Adjustment
- Carbon Dioxide: pH Adjustment
- Poly Aluminum Chloride: Primary Coagulant
- Sodium Hypochlorite: Disinfection

- Hydrofluosilicic Acid: Fluoride
- Sodium Hydroxide: pH Adjustment

A table summarizing the chemical use and average dosages is included in this report.

Documentation of System Repairs and Upgrades

No significant upgrades were carried out in 2020 at the facility

External Audits

MECP Inspection

An MECP inspection was completed on September 16th, 2020 and is attached to this report. The overall rating was 100%.

DWQMS Audit

In 2020 all drinking water systems within the District had an off-site external audit performed. There were no minor non-conformances reported and all drinking water systems have been recertified. Overall, all drinking water systems are performing satisfactorily.

Bala Water Distribution Summary 2020

New Services:

There were two (2) new water services connected in 2020.

Broken Watermains:

There was one (1) water main break in 2020.

Service Leaks:

There were seven (7) service leaks reported and repaired in 2020.

Service Relocation:

There were no service relocations to report in 2020.

Frozen Services:

No municipal water services were frozen in 2020.

Replacement Watermains:

No watermain replacement occurred in 2020.

New Watermains:

There were no new watermains installed in 2020.

Valve Replacement:

No mainline valve replacement took place in 2020.

Fire Hydrants:

There are 103 municipally assumed hydrants maintained by the District in the Town of Bala. They were inspected, operated, and/or flushed at least once, pumped dry in the fall, and scoped during the winter months to ensure they are not susceptible to freezing. There were no new fire hydrants replaced or repaired in 2020.

Meter Installations:

A total of nineteen (19) water meters were replaced in Bala in 2020 as part of the aged meter change out program.

Service Box Maintenance:

District field staff excavated and repaired 14 curb stop boxes in 2020. Field staff also responded to 182 water turn on/off requests in 2020.

Air-Vacuum Release Valves:

Four (4) air release valves were inspected and tested for proper operation in 2020. Each of the chambers was inspected and pumped out as required.

Table 1 Water Flow Summary - 2020

Month	Total Monthly (m^3)	Average Day Flow (m^3/d)	Maximum Day Flow (m^3/d)	Minimum Day Flow (m^3/d)
January	9,280	299	666	0
February	8,421	290	595	0
March	10,356	334	725	28
April	11,410	380	682	0
May	12,419	401	795	61
June	13,915	464	776	61
July	16,903	545	874	288
August	14,322	462	784	236
September	12,280	409	663	119
October	10,767	347	727	0
November	8,600	287	593	0
December	7,296	235	534	0

Total Flow: 135,969
Average Day: 372.3
Maximum Day: 873.8
Minimum Day: 0.0

Table 2 Raw Water Monthly Analysis Summary 2020 Part 1

Month	Alkalinity (mg/L)	Hardness (mg/L)	pH	Turbidity (ntu)	True Colour (tcu)	Temperature (Celsius)
January	9.4	13.0	7.00	0.36	15.25	6.8
February	9.3	11.2	6.95	0.36	17.75	4.9
March	8.5	16.0	7.10	0.37	22.00	4.5
April	7.2	8.5	6.97	0.47	19.75	4.9
May	7.7	6.0	7.17	0.40	19.50	8.6
June	7.4	7.8	6.84	0.41	16.00	11.1
July	6.9	10.5	6.62	0.44	17.75	12.0
August	7.9	7.6	6.33	0.51	23.40	13.7
September	9.0	9.0	6.85	0.44	19.00	17.5
October	8.4	11.0	7.09	0.50	13.25	15.1
November	8.4	11.6	7.02	0.50	15.80	10.1
December	8.9	10.0	7.05	0.48	11.20	8.4
Average	8.3	10.2	6.92	0.44	17.55	9.8

Table 3 Raw Water Monthly Analysis Summary 2020 Part 2

Month	Microcystin (ug/L)	TDS (mg/L)	Langliers Saturation Index	Total Coliforms (CFU/100mL)	E. Coli (CFU/100mL)	Total Number of Samples
January	Not Sampled	19	-3.3	6.00	0.0	4
February	Not Sampled	18.6	-3.2	4.00	0.5	4
March	Not Sampled	20.4	-3.1	7.00	1.4	5
April	Not Sampled	19.8	-3.6	6.00	0.5	4
May	<0.1	50.2	-3.4	4.00	0.0	4
June	<0.1	18.6	-3.3	3.00	0.0	5
July	<0.1	26.9	-3.6	34.00	0.5	4
August	<0.1	45.6	-3.5	35.00	0.4	5
September	<0.1	22.5	-2.7	8.00	0.3	4
October	<0.1	49.6	-3.0	16.00	1.5	4
November	<0.1	19.3	-2.9	15.00	0.4	5
December	Not Sampled	18.6	-3.5	7.00	0.8	4
Average	<0.1	27.4	-3.3	12.08	0.5	4

Table 4 Chemical Usage Summary: CO2

Month	Average Dosage mg/L	Total lbs
January	31.8	612.8
February	31.0	552.9
March	33.5	696.6
April	29.6	701.9
May	33.1	825.9
June	34.6	905.3
July	32.5	485.9
August	28.2	372.0
September	25.2	285.3
October	32.9	327.8
November	33.6	259.8
December	35.2	255.8
Average	31.8	612.8

Total Yearly Kilograms: 2850

Table 5 Chemical Usage Summary: Hydrated Lime

Month	Average Dosage mg/L	Total kg
January	18.8	163.7
February	18.1	143.6
March	20.9	184.4
April	21.9	235.0
May	28.4	343.5
June	22.0	275.8
July	22.6	351.7
August	21.9	283.6
September	19.8	227.0
October	21.2	209.9
November	18.2	156.2
December	19.8	148.4
Average	21	226.9

Total Yearly Kilograms: 2723

Table 6 Chemical Usage Summary: Coagulant

Month	Average Dosage mg/L	Total kg
January	18.9	148
February	21.9	142
March	20.8	61
April	19.7	98
May	21.5	56
June	20.1	157
July	22.6	139
August	22.7	279
September	20.3	212
October	21.3	110
November	18.5	87
December	20.1	122
Average	20.7	134

Total Yearly Kilograms: 1611

Table 7 Chemical Usage Summary: Sodium Hydroxide

Month	Average Dosage mg/L	Total kg
January	2.8	206
February	3.1	209
March	3.7	293
April	3.6	331
May	2.3	225
June	3.8	409
July	3.2	421
August	3.2	363
September	3.2	315
October	3.1	265
November	3.7	249
December	3.4	237
Average	3.3	294

Total Yearly Kilograms: 3523

Table 8 Chemical Usage Summary: Fluoride

Month	Average Dosage mg/L	Total kg
January	0.46	21.1
February	0.56	23.6
March	0.66	34.6
April	0.64	38.2
May	0.46	28.7
June	0.59	40.6
July	0.49	40.3
August	0.50	35.9
September	0.49	30.9
October	0.53	28.8
November	0.65	22.9
December	0.53	21.3
Average	0.55	31

Total Yearly Kilograms: 367

Table 9 Chemical Usage Summary: Chlorine

Month	Average Dosage mg/L	Total kg
January	2.87	26.7
February	2.84	24.2
March	3.33	32.6
April	3.03	34.7
May	3.12	37.7
June	3.44	49.7
July	3.27	55.6
August	3.13	44.9
September	3.46	42.9
October	3.46	36.9
November	3.63	30.9
December	2.79	24.1
Average	3.26	40

Total Yearly Kilograms: 441