

# **BRACEBRIDGE WATER SUMMARY 2016 REPORT**



**DRINKING WATER WORKS PERMIT: 143-206  
MUNICIPAL DRINKING WATER LICENCE: 143-106**

**M.O.E. WATERWORKS# 220007276**

## **INTRODUCTION**

The Kirby's Beach Water Treatment Plant (W.T.P.) was constructed in 1995 and is owned and operated by the District Municipality of Muskoka. The Bracebridge WTP has a rated capacity of 10,000 m<sup>3</sup>/day. The water system currently serves a population of approximately 9,000 people.

The plant operated under MOE Permit To Take Water #93-P-3017 dated May 21, 2003 and #8183-7EMQZL issued May 16, 2008, which permits the operation of up to 10,000 cubic meters per day (m<sup>3</sup>/day). In addition, the plant operates under licence 143-106 and permit 143-206 under the Municipal Drinking Water Licencing Program. The raw water intake structure is located in Lake Muskoka, two meters above the lakebed at a depth of 18 meters and about 500 meters from shore.

The treatment system features pre-treatment consisting of chemically assisted coagulation-flocculation, sedimentation and filtration using dual media filters with a combination of sand and anthracite coal. Disinfection in a post treatment chlorine contact chamber is followed by fluoridation and final pH adjustment before the treated water is pumped to our customers.

The water distribution system was also upgraded and expanded in 1995. A new 2,634 cubic metre above ground reservoir was constructed opposite the Hamblin subdivision. Extensive improvements were made to the trunk watermain network including a new main from the water treatment plant to the existing underground reservoir on Ecclestone Drive. This reservoir has a storage capacity of 4,086 cubic metres.

## Legislation Requirements

### Safe Drinking Water Act

In the Part Two Report in 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 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 Safe Drinking Water Act (2000) SDWA. 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 Licences / Certificates of Approval

The Municipal Drinking Water Licencing Program has replaced the Certificate of Approval program for municipal residential drinking water systems. The Ontario Government has implemented the Municipal Drinking Water Licencing 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 licence 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 MOE 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 licences were issued.

Previous Certificates of Approval were required for the establishment, replacement or alteration of all municipal drinking water systems. The Ministry of Environment (MOE) 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 Licences 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 Affects, Inspections

Performance – Rated Capacity, Management of Residue

Monitoring and Recording – Flow Measuring Devices, Sampling

Operations and Maintenance

### **Comparison to Rated Capacity and Flow Rates**

In 2016, the total daily average flow for the year was 3,583 m<sup>3</sup>/day. The maximum day flow for the year was 5,166 m<sup>3</sup>/day, however, the 3 year maximum day average is 5089 m<sup>3</sup>/day which represents 51% of the plant design capacity. (No problems have been associated with this flow). Monthly flows are shown in the attached table.

The Permit To Take Water (PTTW #8183-7EMQZL) permits 10,000 cubic metres/day; therefore there were no exceedances of this permit.

### **Summary of Analytical Results**

A total of 866 microbiological regulatory tests were performed in 2016 and all had acceptable results.

There were 247 free chlorine residual tests performed in 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 Kirby's Beach Road Water Treatment Plant:

Sodium Hypochlorite: Disinfectant

Aluminum Sulphate (alum): Primary coagulant

Hydrated Lime: Alkalinity adjustment

Carbon Dioxide: pH adjustment

Sodium Hydroxide: Final pH adjustment

Hydrofluosilicic Acid: Fluoride to prevent dental decay.

Powder Activated Carbon: Taste and Odour Control

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

## **Documentation of System Repairs and Upgrades**

There were no major upgrades started at Kirby's Beach WTP in 2016.

## **External Audits**

### **MOE Inspection**

A MOE inspection was completed on December 23, 2016 and is attached to this report. The overall compliance rating was 100%.

### **DWQMS Audit**

In 2016 all drinking water systems had an external recertification audit performed. There were Nine (9) minor non-conformances reported, all have subsequently been addressed and as a result all drinking water systems have been recertified. Overall, all drinking water systems are performing satisfactorily.

## **2016 BRACEBRIDGE WATER DISTRIBUTION SUMMARY**

### **New Services**

- During 2016 a total of 50 new water connection permits were issued for customers to hook to existing services.

### **Broken Water Mains**

- In 2016 District staff was called upon to repair five broken water mains at an average cost of \$8000.00 each.

### **Service Leaks/repairs**

- During 2016 staff repaired sixteen customer service leaks/repairs at an average cost of \$5200.00 each including repair and the restoration of each property.

### **New Water mains**

- Approximately 260m of new water main was installed in 2016

### **Fire Hydrants**

- No additional hydrants were added to our system.

### **Meter Installations**

- During our ongoing "Aged Meter Change out Program" a total of 993 meters were change out in 2016.

### **Air Relief Valves**

- All of our Air Relief Valves were inspected.

### **Locates**

- 1129 locate requests were completed in 2016.

### **Valves**

- No new valves were introduced to the water system in 2016.



**OPTIONAL ANNUAL REPORT TEMPLATE**

<b>Drinking-Water System Number:</b>	220007276
<b>Drinking-Water System Name:</b>	Kirby's Beach Water Treatment Plant
<b>Drinking-Water System Owner:</b>	District Municipality of Muskoka
<b>Drinking-Water System Category:</b>	Large Municipal Residential
<b>Period being reported:</b>	January 01 to December 31, 2016

<p><b><u>Complete if your Category is Large Municipal Residential or Small Municipal Residential</u></b></p> <p>Does your Drinking-Water System serve more than 10,000 people? Yes [ <input checked="" type="checkbox"/> ] No [ <input type="checkbox"/> ]</p> <p>Is your annual report available to the public at no charge on a web site on the Internet? Yes [ <input checked="" type="checkbox"/> ] No [ <input type="checkbox"/> ]</p> <p>Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.</p> <div style="border: 1px solid black; padding: 5px;"> <p>District Municipality of Muskoka 70 Pine Street Bracebridge, Ontario P1L 1N3 (705) 645-6764 www.muskoka.on.ca</p> </div>	<p><b><u>Complete for all other Categories.</u></b></p> <p>Number of Designated Facilities served: <div style="border: 1px solid black; padding: 2px; display: inline-block;">N.A.</div></p> <p>Did you provide a copy of your annual report to all Designated Facilities you serve? Yes [ <input type="checkbox"/> ] No [ <input type="checkbox"/> ]</p> <p>Number of Interested Authorities you report to: <div style="border: 1px solid black; width: 100px; height: 20px; display: inline-block;"></div></p> <p>Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility? Yes [ <input type="checkbox"/> ] No [ <input type="checkbox"/> ]</p>
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**Note: For the following tables below, additional rows or columns may be added or an appendix may be attached to the report**

List all Drinking-Water Systems (if any), which receive all of their drinking water from your system:

Drinking Water System Name	Drinking Water System Number
N.A.	

Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all of its drinking water?  
Yes [  ] No [  ]



Indicate how you notified system users that your annual report is available, and is free of charge.

- Public access/notice via the web
- Public access/notice via Government Office
- Public access/notice via a newspaper
- Public access/notice via Public Request
- Public access/notice via a Public Library
- Public access/notice via other method \_\_\_\_\_

**Describe your Drinking-Water System**

The Water Treatment Plant serving the community of Bracebridge was constructed in 1995. The system features pre-treatment consisting of chemically assisted coagulation-flocculation, sedimentation and filtration using dual media filters with a combination of sand and anthracite coal. Disinfection in a post treatment chlorine contact chamber is followed by fluoridation and final pH adjustment before the treated water is pumped to our customers. The water system currently serves a population of approximately 9000. The rated water production capacity of the plant is 10,000 cubic meters per day. Our raw water source is Lake Muskoka where the intake is located two meters above the lakebed at a depth of 18 meters and about 500 meters from shore.

**List all water treatment chemicals used over this reporting period**

Carbon Dioxide, Aluminum Sulphate, Powdered Activated Carbon, Hydrated Lime, Sodium Hypochlorite, Hydrofluosilicic Acid, and Sodium Hydroxide.

**Were any significant expenses incurred to?**

- Install required equipment
- Repair required equipment
- Replace required equipment

**Please provide a brief description and a breakdown of monetary expenses incurred**

**Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre**

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date



**Microbiological testing done under the Schedule 10, 11 or 12 of Regulation 170/03, during this reporting period.**

	Number of Samples	Range of E.Coli Or Fecal Results (min #)-(max #)	Range of Total Coliform Results (min #)-(max #)	Number of HPC Samples	Range of HPC Results (min #)-(max #)
Raw	52	0-25	0-44	0	n/a
Treated	52	0-0	0-0	52	0-0
Distribution	247	0-0	0-0	112	0-22

**Operational testing done under Schedule 7, 8 or 9 of Regulation 170/03 during the period covered by this Annual Report.**

	Number of Grab Samples	Range of Results (min #)-(max #)	Geomean
Turbidity	8760	0.07 – 0.20 NTU	0.08 NTU
Chlorine	8760	1.48 – 2.13 mg/L	1.69 mg/L
Fluoride (If the DWS provides fluoridation)	8760	0.38 – 0.86 mg/L	0.61 mg/L

*NOTE: For continuous monitors use 8760 as the number of samples.*

**Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.**

Date of legal instrument issued	Parameter	Date Sampled	Result	Unit of Measure

**Summary of Inorganic parameters tested during this reporting period or the most recent sample results**

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	May 09/16	0.02<MDL	µg/L	No
Arsenic	May 09/16	0.2<MDL	µg/L	No
Barium	May 09/16	11.3	µg/L	No
Boron	May 09/16	23.0	µg/L	No
Cadmium	May 09/16	0.009	µg/L	No
Chromium	May 09/16	0.4	µg/L	No
*Lead				
Mercury	May 09/16	0.01<MDL	µg/L	No
Selenium	May 09/16	0.17	µg/L	No
Sodium	May 09/16	15.9	mg/L	No
Uranium	May 09/16	0.009	µg/L	No

<b>Fluoride</b>	May 09/16	0.54	mg/L	No
<b>Nitrite</b>	Feb 01/16	0.003<MDL	mg/L	No
<b>Nitrate</b>	Feb 01/16	0.200	mg/L	No
<b>Nitrite</b>	May 09/16	0.003<MDL	mg/L	No
<b>Nitrate</b>	May 09/16	0.200	mg/L	No
<b>Nitrite</b>	Aug 02/16	0.003<MDL	mg/L	No
<b>Nitrate</b>	Aug/02/16	0.222	mg/L	No
<b>Nitrite</b>	Nov 07/16	0.003<MDL	mg/L	No
<b>Nitrate</b>	Nov 07/16	0.122	mg/L	No

\*only for drinking water systems testing under Schedule 15.2; this includes large municipal non-residential systems, small municipal non-residential systems, non-municipal seasonal residential systems, large non-municipal non-residential systems, and small non-municipal non-residential systems

### Summary of lead testing under Schedule 15.1 during this reporting period

(applicable to the following drinking water systems; large municipal residential systems, small municipal residential systems, and non-municipal year-round residential systems)

Location Type	Number of Samples	Range of Lead Results (min#) – (max #)	Unit of Measure	Number of Exceedances
<b>Plumbing</b>				
<b>Distribution</b>	1	0.03	µg/L	0

### Summary of Organic parameters sampled during this reporting period or the most recent sample results

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
<b>Alachlor</b>	May 09/16	0.02<MDL	µg/L	No
<b>Atrazine + N-dealkylated metabolites</b>	May 09/16	0.01<MDL	µg/L	No
<b>Azinphos-methyl</b>	May 09/16	0.05<MDL	µg/L	No
<b>Benzene</b>	May 09/16	0.32<MDL	µg/L	No
<b>Benzo(a)pyrene</b>	May 09/16	0.004<MDL	µg/L	No
<b>Bromoxynil</b>	May 09/16	0.33<MDL	µg/L	No
<b>Carbaryl</b>	May 09/16	0.05<MDL	µg/L	No
<b>Carbofuran</b>	May 09/16	0.01<MDL	µg/L	No
<b>Carbon Tetrachloride</b>	May 09/16	0.16<MDL	µg/L	No
<b>Chlorpyrifos</b>	May 09/16	0.02<MDL	µg/L	No
<b>Diazinon</b>	May 09/16	0.02<MDL	µg/L	No
<b>Dicamba</b>	May 09/16	0.20<MDL	µg/L	No
<b>1,2-Dichlorobenzene</b>	May 09/16	0.41<MDL	µg/L	No
<b>1,4-Dichlorobenzene</b>	May 09/16	0.36<MDL	µg/L	No
<b>1,2-Dichloroethane</b>	May 09/16	0.35<MDL	µg/L	No
<b>1,1-Dichloroethylene (vinylidene chloride)</b>	May 09/16	0.33<MDL	µg/L	No
<b>Dichloromethane</b>	May 09/16	0.35<MDL	µg/L	No
<b>2-4 Dichlorophenol</b>	May 09/16	0.15<MDL	µg/L	No
<b>2,4-Dichlorophenoxy acetic acid (2,4-D)</b>	May 09/16	0.19<MDL	µg/L	No
<b>Diclofop-methyl</b>	May 09/16	0.40<MDL	µg/L	No
<b>Dimethoate</b>	May 09/16	0.03<MDL	µg/L	No
<b>Diquat</b>	May 09/16	1<MDL	µg/L	No



<b>Diuron</b>	May 09/16	0.03<MDL	µg/L	No
<b>Glyphosate</b>	May 09/16	1<MDL	µg/L	No
<b>Malathion</b>	May 09/16	0.02<MDL	µg/L	No
<b>MCPA</b>	May 09/16	0.00012<MDL	µg/L	No
<b>Metolachlor</b>	May 09/16	0.01<MDL	µg/L	No
<b>Metribuzin</b>	May 09/16	0.02<MDL	µg/L	No
<b>Monochlorobenzene</b>	May 09/16	0.30<MDL	µg/L	No
<b>Paraquat</b>	May 09/16	1<MDL	µg/L	No
<b>Pentachlorophenol</b>	May 09/16	0.15<MDL	µg/L	No
<b>Phorate</b>	May 09/16	0.01<MDL	µg/L	No
<b>Picloram</b>	May 09/16	1<MDL	µg/L	No
<b>Polychlorinated Biphenyls(PCB)</b>	May 09/16	0.04<MDL	µg/L	No
<b>Prometryne</b>	May 09/16	0.03<MDL	µg/L	No
<b>Simazine</b>	May 09/16	0.01<MDL	µg/L	No
<b>THM</b> (NOTE: annual average from Distribution – 4 samples)	Samples Taken: Feb.01/16 May 09/16 Aug.02/16 Nov 07/16	34.25	µg/L	No
<b>Terbufos</b>	May 04/15	0.01<MDL	µg/L	No
<b>Tetrachloroethylene</b>	May 04/15	0.35<MDL	µg/L	No
<b>2,3,4,6-Tetrachlorophenol</b>	May 04/15	0.20<MDL	µg/L	No
<b>Triallate</b>	May 04/15	0.01<MDL	µg/L	No
<b>Trichloroethylene</b>	May 04/15	0.44<MDL	µg/L	No
<b>2,4,6-Trichlorophenol</b>	May 04/15	0.25<MDL	µg/L	No
<b>Trifluralin</b>	May 04/15	0.02<MDL	µg/L	No
<b>Vinyl Chloride</b>	May 04/15	0.17<MDL	µg/L	No
<b>HAA5</b>	Feb 1/16	13.0	µg/L	No

**List any Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.**

Parameter	Result Value	Unit of Measure	Date of Sample

## District of Muskoka - Bracebridge (Kirby's Beach) WTP

### 1.0 Water Flow Summary - 2016

Month	Total Monthly (m <sup>3</sup> )	Average Day Flow (m <sup>3</sup> /d)	Maximum Day Flow (m <sup>3</sup> /d)	Minimum Day Flow (m <sup>3</sup> /d)	Comments
January	98,771	3,186	3,418	2,870	
February	92,083	3,175	3,377	2,985	
March	96,046	3,098	3,288	2,912	
April	97,048	3,235	3,554	2,988	
May	115,563	3,728	4,254	3,182	
June	130,626	4,354	5,145	3,573	
July	135,432	4,369	4,886	3,572	
August	133,440	4,305	5,167	3,138	
September	109,146	3,638	4,302	3,346	
October	104,358	3,366	3,708	3,165	
November	96,935	3,231	3,771	3,035	
December	102,068	3,293	3,616	3,011	

Total 1,311,516

Average Day 3,583.3

Maximum Day 5,166.8

Minimum Day 2,869.5



## District of Muskoka - Bracebridge (Kirby's Beach) WTP

### 4.0 Treated Water Monthly Analysis Summary - 2016

Month	Alkalinity	Hardness	pH	Average	Turbidity High	Low	Colour	Iron	Manganese	Free	Chlorine High	Low	TDS	Langliers Saturation Index	Total Coliforms	E-coli	Total Number of Samples	HPC	Total Number of Samples
<i>Parameter</i>	<i>mg/L</i>	<i>mg/L</i>	<i>pH</i>	<i>NTU</i>	<i>NTU</i>	<i>NTU</i>	<i>TCU</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>		<i>CFU/100mL</i>	<i>CFU/100mL</i>		<i>CFU/1mL</i>	
January	40.0	37.0	7.8	0.05	0.06	0.04	0			1.7	1.7	1.6			0	0	4	0.00	4
February	42.6	38.0	7.7	0.05	0.06	0.04	0			1.6	1.7	1.5			0	0	5	0.00	5
March	43.9	35.0	7.8	0.04	0.05	0.04	0			1.6	1.7	1.5			0	0	4	0.00	4
April	41.8	40.0	7.9	0.05	0.06	0.04	0			1.8	2.1	1.6			0	0	4	0.00	4
May	40.1	39.2	8.0	0.05	0.06	0.04	0			1.7	1.8	1.6			0	0	5	0.00	5
June	41.7	41.5	7.7	0.06	0.08	0.05	0			1.8	1.8	1.6			0	0	4	0.00	4
July	38.5	38.5	7.8	0.05	0.06	0.04	0			1.7	1.8	1.6			0	0	4	0.00	4
August	41.1	41.0	8.0	0.06	0.09	0.04	0			1.9	2.1	1.7	83	-0.8	0	0	5	0.00	5
September	39.5	39.0	7.9	0.06	0.10	0.04	0			1.9	2.1	1.7			0	0	4	0.00	4
October	43.0	45.0	8.0	0.06	0.07	0.05	0			1.8	1.8	1.7			0	0	5	0.20	5
November	41.5	44.0	7.9	0.05	0.05	0.04	0			1.7	1.7	1.6			0	0	4	0.00	0
December	37.7	39.5	7.9	0.04	0.04	0.04	0			1.9	2.1	1.7			0	0	4	0.25	4
Average	40.9	39.8	7.9	0.1	0.1	0.0	0.0	0.0	0.0	1.7	1.9	1.6	83.1	-0.8	0.0	0.0	4.3	0.04	4.0

**District of Muskoka -Bracebridge WTP 220007276  
TREATED WATER SAMPLING SUMMARY - 2016  
Regulation Requirements**

Parameter	I.D.						TW BBW2 Kirby's WTP-Treated	TW BBW2 Kirby's WTP-Treated	TW BBW2 Kirby's WTP-Treated	TW BBW2 Kirby's WTP-Treated		
Schedule 23 Inorganics	Units	MAC	Half MAC	AO/OG	RDL	MDL	Feb 1/16 14:00	May 09/16 15:30	Aug 02/16 15:30		Average	Max
Antimony	µg/L	6	3	-	-	0.02		0.02<MDL				
Arsenic	µg/L	25	12.5	-	2.5	0.2		0.2<MDL				
Barium	µg/L	1000	500	-	100	0.01		11.3				
Boron	µg/L	5000	2500	-	500	2		23.0				
Cadmium	µg/L	5	2.5	-	1	0.003		0.009				
Chromium	µg/L	50	25	-	5	0.03		0.4				
Lead	µg/L	10	5	-	2	0.01						
Mercury	µg/L	1	0.5	-	0.1	0.01		0.01<MDL				
Selenium	µg/L	10	5	-	5	0.04		0.17				
Uranium	µg/L	20	10	-	10	0.002		0.009				
Nitrite	mg/L	1.0	0.5	-	0.1	0.003	0.003<MDL	0.003<MDL	0.003<MDL	0.003<MDL		
Nitrate	mg/L	10	5	-	1	0.006	0.200	0.200	0.222	0.122		
Schedule 24 Organics	Units	MAC	Half MAC	AO/OG	RDL	MDL	TW BBW2 Kirby's WTP-Treated	TW BBW2 Kirby's WTP-Treated	TW BBW2 Kirby's WTP-Treated	TW BBW2 Kirby's WTP-Treated	Average	Max
Alachlor	µg/L	5	2.5	-	0.5	0.02		0.02<MDL				
Azinphos-methyl	µg/L	5	2.5	-	1	0.01		0.01<MDL				
Benzene	µg/L	20	10	-	2	0.05		0.05<MDL				
Benzo(a)pyrene	µg/L	5	2.5	-	0.5	0.32		0.32<MDL				
Bromoxynil	µg/L	0.01	0.005	-	0.01	0.004		0.004<MDL				
Carbaryl	µg/L	5	2.5	-	0.5	0.33		0.33<MDL				
Carbofuran	µg/L	90	45	-	9	0.05		0.05<MDL				
Carbofuran	µg/L	90	45	-	12.5	0.01		0.01<MDL				
Carbon Tetrachloride	µg/L	5	2.5	-	0.5	0.16		0.16<MDL				
Chlorpyrifos	µg/L	90	45	-	9	0.02		0.02<MDL				
Diazinon	µg/L	20	10	-	2	0.02		0.02<MDL				
Dicamba	µg/L	120	60	-	12	0.20		0.20<MDL				
1,2 Dichlorobenzene	µg/L	200	100	3	20	0.41		0.41<MDL				
1,4 Dichlorobenzene	µg/L	5	2.5	1	0.5	0.36		0.36<MDL				
1,2 Dichloroethane	µg/L	5	2.5	-	0.5	0.35		0.35<MDL				
1,1 Dichloroethylene	µg/L	14	7	-	1.4	0.33		0.33<MDL				
Dichloromethane	µg/L	50	25	-	5	0.35		0.35<MDL				
2,4 Dichlorophenol	µg/L	900	450	0.3	90	0.15		0.15<MDL				
2,4-D	µg/L	100	50	-	10	0.19		0.19<MDL				
Diclofop-Methyl	µg/L	9	4.5	-	0.9	0.40		0.40<MDL				
Dimethoate	µg/L	20	10	-	2.5	0.03		0.03<MDL				
Diquat	µg/L	70	35	-	7	1		1<MDL				
Diuron	µg/L	150	75	-	1	0.03		0.03<MDL				
Glyphosate	µg/L	280	140	-	28	1		1<MDL				
Malathion	µg/L	190	95	-	19	0.02		0.02<MDL				
MCPA	mg/L	-	-	-	-	0.00012		0.00012<MDL				
Metolachlor	µg/L	50	25	-	5	0.01		0.01<MDL				
Metribuzin	µg/L	80	40	-	8	0.02		0.02<MDL				
Monochlorobenzene	µg/L	80	40	30	8	0.30		0.30<MDL				
Paraquat	µg/L	10	5	-	1	1		1<MDL				
Pentachlorophenol	µg/L	60	30	30	6	0.15		0.15<MDL				
Phorate	µg/L	2	1	-	0.5	0.01		0.01<MDL				
Picloram	µg/L	190	95	-	19	1		1<MDL				
PCB	µg/L	3	1.5	-	0.3	0.04		0.04<MDL				
Prometryne	µg/L	1	0.5	-	0.25	0.03		0.03<MDL				
Simazine	µg/L	10	5	-	1	0.01		0.01<MDL				
Trihalomethanes Total	µg/L	100	50	-	10	0.37	48	34	24	31		
Terbufos	µg/L	1	0.5	-	1	0.01		0.01<MDL				
Tetrachloroethylene	µg/L	30	15	-	3	0.35		0.35<MDL				
2,3,4,6 - Tetrachlorophenol	µg/L	100	50	1	10	0.20		0.20<MDL				
Triallate	µg/L	230	115	-	23	0.01		0.01<MDL				
Trichloroethylene	µg/L	50	25	-	5	0.44		0.44<MDL				
2,4,6,- Trichlorophenol	µg/L	5	2.5	2	0.5	0.25		0.25<MDL				
Trifluralin	µg/L	45	22.5	-	4.5	0.02		0.02<MDL				
Vinyl Chloride	µg/L	2	1	-	0.2	0.17		0.17<MDL				
Additional Parameters	Units	MAC	Half MAC	AO/OG	RDL	MDL	TW BBW2 Kirby's WTP-Treated	TW BBW2 Kirby's WTP-Treated			Average	Max
Fluoride	mg/L	1.5	0.75	-	0.15	0.06		0.54				
Sodium	mg/L	20	-	200	2	0.01		15.9				
HAA5	µg/L	-	-	-	-	5.3	13					
MAC - Maximum Acceptable Concentration							Half MAC - Half of the Maximum Acceptable Concentration					
OG - Operational Guideline							AO - Aesthetic Objective					
RDL - MOE Required Reporting Detection Limit							MDL - SGS Canada Inc. Method Detection Limit.					
* The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L.												

**District of Muskoka - Bracebridge (Kirby's Beach) WTP**

**7.0 Distribution Water Quarterly Sampling Summary - 2016**

<i>Parameter</i>	<i>ID</i>						DDW BBW20 Hydrant #328 Tap	DDW BBW20 Hydrant #328 Tap	DDW BBW20 Hydrant #328 Tap	DDW BBW20 Hydrant #328 Tap		
<i>DDW</i>	<i>Units</i>	<i>MAC</i>	<i>Half MAC</i>	<i>AO/OG</i>	<i>RDL</i>	<i>MDL</i>	<i>Feb 01/16 12:00</i>	<i>May 09/16 13:25</i>	<i>Aug 02/16 14:39</i>	<i>Nov 07/16</i>	<i>Average</i>	<i>Max</i>
Trihalomethanes Total	µg/L	100	50	-	10	0.37	28	52	58	64	51	64
Lead	µg/L	10	5	-	2	0.01		0.03				
HAAs	µg/L	-	-	-	-	5.3	50					
MAC - Maximum Acceptable Concentration							Half MAC - Half of the Maximum Acceptable Concentration					
OG - Operational Guideline							AO - Aesthetic Objective					
RDL - MOE Required Reporting Detection Limit							LRL MDL - SGS Lakefield Research Limited Method Detection Limit.					



## District of Muskoka - Bracebridge (Kirby's Beach) WTP

### 9.0 Chemical Usage Summary - 2016

Month	Powdered Activated Carbon			CO2			Hydrated Lime			Coagulant (Alum)		
	Average Dosage mg/L	Total kg	Estimated Monthly Cost	Average Dosage mg/L	Total kg	Estimated Monthly Cost+ Rental	Average Dosage mg/L	Total kg	Estimated Monthly Cost	Average Dosage mg/L	Total Kg	Estimated Monthly Cost
January	0.0	0.0	\$0	0.0	3,268.0	\$2,885	28.2	2,756.2	\$510	34.2	3,343	\$732
February	0.0	0.0	\$0	34.2	3,098.7	\$2,770	28.2	2,552.1	\$472	35.3	3,196	\$700
March	0.0	0.0	\$0	33.5	3,156.1	\$2,809	28.2	2,656.1	\$491	37.5	3,529	\$773
April	0.0	0.0	\$0	32.8	3,111.5	\$2,778	28.2	2,678.8	\$496	34.0	3,229	\$707
May	0.0	0.0	\$0	31.5	3,568.9	\$3,090	28.2	3,194.8	\$591	34.2	3,883	\$850
June	0.0	0.0	\$0	33.5	4,312.5	\$3,596	31.1	4,008.3	\$742	33.7	4,301	\$942
July	0.0	0.0	\$0	28.7	3,799.7	\$3,247	36.6	4,844.6	\$896	34.3	4,547	\$995
August	0.0	0.0	\$0	26.9	3,529.6	\$3,063	39.5	5,161.0	\$955	35.9	4,693	\$1,027
September	0.0	0.0	\$0	24.5	2,619.8	\$2,443	39.5	4,213.3	\$779	36.2	3,845	\$842
October	0.0	0.0	\$0	29.3	2,980.8	\$2,689	39.5	4,025.3	\$745	35.5	3,624	\$793
November	0.0	0.0	\$0	29.8	2,818.1	\$2,578	39.5	3,740.9	\$692	31.9	3,017	\$661
December	0.0	0.0	\$0	29.6	2,942.5	\$2,663	39.5	3,919.5	\$725	33.8	3,360	\$736
Average Monthly	0.0	0.0	\$0	27.9	3267.2	\$2,884	34	3645.9	\$674	34.7	3714	\$813
Unit Cost	\$1.49 per kg			659/Month + \$0.68 per kg			\$185.00 per MT			\$218.95 per MT		
Total Yearly	0 \$0			39,206 \$34,611			43,751 \$8,094			44,566 \$9,758		

Month	Sodium Hydroxide			Fluoride			Chlorine (NaOCl)			Soda Ash		
	Average Dosage mg/L	Total Kg	Estimated Monthly Cost	Average Dosage mg/L	Total kg	Estimated Monthly Cost	Average Dosage mg/L	Total Kg	Estimated Monthly Cost	Average Dosage mg/L	Total Kg	Estimated Monthly Cost
January	14.8	1,421	\$497	0.50	47.7	\$17	2.90	2,362.1	\$3,449	0.00	0.0	\$0
February	14.7	1,326	\$464	0.50	45.1	\$16	2.95	2,056.2	\$3,002	0.00	0.0	\$0
March	15.0	1,407	\$492	0.57	52.9	\$19	2.97	2,150.3	\$3,140	0.00	0.0	\$0
April	13.7	1,294	\$453	0.46	43.9	\$15	2.61	2,065.1	\$3,015	0.00	0.0	\$0
May	13.6	1,542	\$540	0.48	54.3	\$19	2.76	2,411.8	\$3,521	0.00	0.0	\$0
June	14.1	1,809	\$633	0.48	61.1	\$21	2.97	2,948.3	\$4,304	0.00	0.0	\$0
July	14.4	1,904	\$666	0.45	59.3	\$21	3.16	3,222.5	\$4,705	0.00	0.0	\$0
August	14.1	1,840	\$644	0.47	61.6	\$22	3.27	3,306.2	\$4,827	0.00	0.0	\$0
September	12.3	1,309	\$458	0.48	51.7	\$18	2.86	2,351.4	\$3,433	0.00	0.0	\$0
October	13.5	1,378	\$482	0.50	50.9	\$18	3.19	2,495.7	\$3,644	0.00	0.0	\$0
November	11.8	1,119	\$391	0.47	44.2	\$15	3.24	2,357.3	\$3,442	0.00	0.0	\$0
December	13.1	1,307	\$457	0.51	51.1	\$18	3.01	2,296.2	\$3,352	0.00	0.0	\$0
Average Monthly	13.8	1471	\$515	0.49	52	\$18	3.01	2,606	\$3,805	0	0	\$0
Unit Cost	\$0.35 per kg			\$0.35 per kg			\$1.46 per kg dry			per kg dry		
Total Yearly	17,654 \$6,179			624 \$218			30,023 \$43,834			0 \$0		

Month	Potassium Permanganate			Polymer		
	Average Dosage mg/L	Total Kg	Estimated Monthly Cost	Average Dosage mg/L	Total Kg	Estimated Monthly Cost
January	0.0	0	\$0	0.0	0	\$0
February	0.0	0	\$0	0.0	0	\$0
March	0.0	0	\$0	0.0	0	\$0
April	0.0	0	\$0	0.0	0	\$0
May	0.0	0	\$0	0.0	0	\$0
June	0.0	0	\$0	0.0	0	\$0
July	0.0	0	\$0	0.0	0	\$0
August	0.0	0	\$0	0.0	0	\$0
September	0.0	0	\$0	0.0	0	\$0
October	0.0	0	\$0	0.0	0	\$0
November	0.0	0	\$0	0.0	0	\$0
December	0.0	0	\$0	0.0	0	\$0
Average Monthly	0.0	0	\$0	0.0	0	\$0
Unit Cost	per kg			per kg		
Total Yearly	0 \$0			0 \$0		

**Overall total yearly cost of chemicals = \$102,694**

## District of Muskoka - Bracebridge (Kirby's Beach) WTP

### 10.0 Adverse Water Quality Summary - 2016

1	Sample		Lab ID #	Location	Parameter	Result	Mac / Imac	Comments
	Date	Time						
Adverse								
1st R1-AL								
1st R2-US								
1st R3-DS								
2nd R1- AL								
2nd R2-US								
2nd R3-DS								

2	Sample		Lab ID #	Location	Parameter	Result	Mac / Imac	Comments
	Date	Time						
Adverse								
1st R1-AL								
1st R2-US								
1st R3-DS								
2nd R1- AL								
2nd R2-US								
2nd R3-DS								

3	Sample		Lab ID #	Location	Parameter	Result	Mac / Imac	Comments
	Date	Time						
Adverse								
1st R1-AL								
1st R2-US								
1st R3-DS								
2nd R1- AL								
2nd R2-US								
2nd R3-DS								

Legend: R# = Repeat Sample Number    AL = Adverse Location    US = Upstream Sample    DS = Downstream Sample

Ministry of the Environment and  
Climate Change

Safe Drinking Water Branch

Barrie District Office  
Unit 1201  
54 Cedar Pointe Drive  
Barrie ON L4N 5R7

Ministère de l'Environnement et de  
l'Action en matière de changement  
climatique

Direction du contrôle de la qualité de l'eau  
potable

Bureau du district de Barrie  
Bureau 1201  
54, chemin Cedar Pointe  
Barrie (Ontario) L4N 5R7



January 3, 2017

The District Municipality of Muskoka  
70 Pine Street  
Bracebridge, Ontario  
P1L 1N3

**Attention:** Mr. Marcus Firman, Director of Water and Wastewater Engineering

**RE: 2016 Drinking Water Inspection Report  
Bracebridge (Kirby's Beach) Drinking Water System (DWS#220007276)  
Date of MOECC inspection: December 23, 2016**

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Please find enclosed the Ministry of the Environment and Climate Change's 2016 Inspection Report for the Bracebridge (Kirby's Beach) Drinking Water System (DWS#220007276), following an inspection of the water treatment plant and distribution system on December 23, 2016.

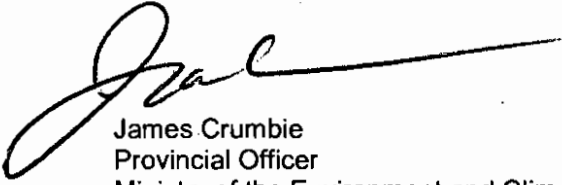
The primary focus of this inspection was to confirm compliance with Ministry of the Environment and Climate Change legislation and control documents, as well as conformance with Ministry drinking water related policies for the inspection period. The Ministry is implementing a rigorous and comprehensive approach in the inspection of water systems that focuses on the source, treatment, and distribution components as well as water system management practices.

In order to measure individual inspection results, the Ministry has established an inspection compliance risk framework based on the principles of the Inspection, Investigation & Enforcement (II&E) Secretariat and advice of internal and risk experts. The Inspection Summary Rating Record (IRR), included as Appendix D of the inspection report, provides the Ministry, the system Owner and the associated Public Health Units with a summarized quantitative measure of the drinking water system's annual inspection and regulated water quality testing performance. IRR ratings are published (for the previous inspection year) in the Ministry's Chief Drinking Water Inspector's Annual Report. If you have any questions or concerns regarding the rating, please contact Craig Seabrook, Water Program Supervisor, at 705-739-6392.

Section 19 of the Safe Drinking Water Act (Standard of Care) creates a number of obligations for individuals who exercise decision-making authority over municipal drinking water systems. Please be aware that the Ministry has encouraged such individuals, particularly municipal councillors, to take steps to be better informed about the drinking water systems over which they have decision-making authority. These steps could include asking for a copy of this inspection report and a review of its findings. Further information about Section 19 can be found in the Ministry's publication "Taking Care of Your Drinking Water: A guide for members of municipal council" found under the "Resources" tab on the Ministry's Drinking Water Ontario website at [www.ontario.ca/drinkingwater](http://www.ontario.ca/drinkingwater).

If you have any questions or concerns regarding this inspection report, please contact the undersigned at 705-739-6379.

Respectfully,



James Crumbie  
Provincial Officer  
Ministry of the Environment and Climate Change  
Barrie District Office  
(705) 739-6379 (Tel)  
(705) 739-6350 (Fax)  
[James.crumbie@ontario.ca](mailto:James.crumbie@ontario.ca)

CC Mike Mitchell, District of Muskoka (email: [mike.mitchell@muskoka.on.ca](mailto:mike.mitchell@muskoka.on.ca))  
Michael Currie, Chief Operator, District of Muskoka (email: [michael.currie@muskoka.on.ca](mailto:michael.currie@muskoka.on.ca))  
Medical Officer of Health, Simcoe Muskoka District Health Unit  
Barrie District Office File, Ministry of the Environment and Climate Change



**Ontario**

**Ministry of the Environment and Climate Change**

**BRACEBRIDGE (KIRBY'S BEACH) DRINKING WATER SYSTEM  
Inspection Report**

<b>Site Number:</b>	220007276
<b>Inspection Number:</b>	1-CLKZX
<b>Date of Inspection:</b>	Dec 23, 2016
<b>Inspected By:</b>	James Crumbie

**OWNER INFORMATION:**

<b>Company Name:</b>	MUSKOKA, THE CORPORATION OF THE DISTRICT MUNICIPALITY OF	<b>Unit Identifier:</b>	District Office
<b>Street Number:</b>	70		
<b>Street Name:</b>	PINE St N		
<b>City:</b>	BRACEBRIDGE		
<b>Province:</b>	ON	<b>Postal Code:</b>	P1L 1N3

**CONTACT INFORMATION**
**INSPECTION DETAILS:**

<b>Site Name:</b>	BRACEBRIDGE (KIRBY'S BEACH) DRINKING WATER SYSTEM
<b>Site Address:</b>	1601 BEAUMONT DR BRACEBRIDGE P1L 1W9
<b>County/District:</b>	Bracebridge
<b>MOECC District/Area Office:</b>	Barrie District
<b>Health Unit:</b>	SIMCOE MUSKOKA DISTRICT HEALTH UNIT
<b>Conservation Authority:</b>	
<b>MNR Office:</b>	
<b>Category:</b>	Large Municipal Residential
<b>Site Number:</b>	220007276
<b>Inspection Type:</b>	Announced
<b>Inspection Number:</b>	1-CLKZX
<b>Date of Inspection:</b>	Dec 23, 2016
<b>Date of Previous Inspection:</b>	Jan 29, 2016

**COMPONENTS DESCRIPTION**

<b>Site (Name):</b>	MOE DWS Mapping	<b>Sub Type:</b>	
<b>Type:</b>	DWS Mapping Point		

<b>Site (Name):</b>	RAW WATER INTAKE	<b>Sub Type:</b>	Surface Water
<b>Type:</b>	Source		

**Comments:**
**Raw Water Intake Facilities**

The intake is located approximately two metres above the lakebed of Lake Muskoka at a depth of approximately 18 metres, approximately 500 metres from shore at Kirby's Beach. The intake structure consists of an intake crib, a side entry intake hood extending from the intake crib and 825 m of 900 mm diameter intake pipe extending from the low lift pump well at the water treatment plant (WTP) to the intake structure. This provides for a raw water flow capacity of 347.2 L/s. A 50 mm diameter pipe installed inside the intake pipe can deliver sodium hypochlorite solution from the WTP to a 25 mm diameter diffuser ring located at the bell mouth of the intake pipe for zebra mussel control (if required in the future).

<b>Site (Name):</b>	LOW LIFT PUMPING	<b>Sub Type:</b>	Surface
<b>Type:</b>	Source		

**Comments:**

Low Lift Pumping Station (LLPS)

Two manually removable stainless steel screens are installed in series at the screen well downstream of the raw water intake well. The well fills by gravity. An on-line level sensor monitors well level. The LLPS located above a low lift pump well (LLPW) is equipped with three (two duty, one stand-by) vertical turbine pumps, each pump having a rated capacity of 58 L/s at a total dynamic head (TDH) of 12 m with a constant speed drive. The low lift pumps (LLP's) are all equipped with backflow prevention and automated flow control valves at discharge. The LLP's discharge to the common raw water header. Pump starts are triggered by a level sensor in the settled water conduit before the filters. Only two pumps can run at one time. While the LLP's operate, raw water samples are provided to the on-site lab and to on-line analysers for turbidity, pH and temperature. A continuously monitored magnetic flow meter records raw water flows and initiates chemical dosing if flows are registered. The supernatant recycling line ties into the raw water header just after the flow meter and injectors for hydrated lime, sodium hypochlorite, liquid alum, carbon dioxide (CO<sub>2</sub>) and powdered activated carbon (PAC) are located subsequent to that. Typically, only CO<sub>2</sub> and lime are added here.

#### Plant Drainage Chamber (PDC)

This chamber, located adjacent to the LLPW, has a volume of 65 m<sup>3</sup> and is joined to the LLPW by an overflow weir and pump discharge piping. In the past, returned water from various locations in the WTP was directed to this tank and was pumped into or allowed to overflow into the LLPW for recycling. This practice is no longer allowed. A level rising alarm is now in place in this tank which activates if this tank is receiving water. The pump is normally off and the valves closed.

A submersible pump with a rated capacity of 30 L/s at a TDH of 5 m discharges the contents of the PDC to the equalization tanks for discharge to sanitary sewers. Although valved off, emergency discharge provision to the stone lined swale on the east side of the plant is available if sanitary discharge is not available. Waters can enter the PDC from the equalization tanks (previously called the sludge thickening tanks and which are currently valved off) or as a result of emergency overflows from the chlorine contact chamber, backwash water holding/settling tanks and/or high lift wells/reservoir.

#### Pre-Treatment Facility

Three 50 m<sup>3</sup> pre-treatment tanks have been installed to facilitate the addition of powdered activated carbon, carbon dioxide, and chemicals. Each tank is equipped with a mechanical mixer to keep the tank's contents in suspension.

**Site (Name):** TREATED WATER - PART 1

**Type:** Treated Water POE

**Sub Type:** Other

#### Comments:

##### Pre-Treatment Facility

After the chemical addition point in the common raw water header, water is directed to any one of three tanks in the pre-treatment works. The three 50 m<sup>3</sup> pre-treatment tanks have been installed in series to facilitate the addition and mixing of PAC (if required), CO<sub>2</sub>, hydrated lime, liquid alum (coagulant) and any other required chemicals. Each tank is equipped with a mechanical mixer to keep the tank's contents in suspension. Each tank is individually valved to allow for isolation for maintenance or operational adjustments and each tank has a drain valve to the backwash holding tanks for removal of accumulated waste material. Water leaves these tanks through overflow weirs, enters a conduit and is directed to three separate flocculation tanks.

##### Flocculation Facility

The flocculation tanks are situated in parallel and are individually valved for maintenance and operational adjustments. The three flocculation tanks are each divided into three compartments and equipped with overflow weirs and inlet nozzles to provide hydraulic mixing for flocculation. All mixing is passive as water flows down gradient. Speed of mixing and flow decreases from the first to the last section in each tank through increasingly larger nozzles at the base of each overflow weir. Each tank provides a 30 minute retention time. Each tank has a drain valve to the backwash holding tanks for removal of accumulated waste material. Flocculated water leaves these tanks, flows into the flocculated water conduit and into two settling tanks.

##### Settling Facility

Two individually valved and parallel settling tanks with plate settlers of a minimum angle of inclination of 55 degrees provide a 1m/hr overflow rate and 40 minutes of retention time. The tanks have hopper bottoms with automatic sludge withdrawal systems consisting of one 9 L/s at 7 m TDH centrifugal pump to deliver settled sludge to the equalization tanks. Sample lines are provided for sludge sampling. Each settling tank has a valved line for

withdrawal of water to the backwash holding tanks. Water leaves these tanks and enters the Settled Water Conduit. The level in this conduit initiates stops and starts of the LLP's. Sodium hypochlorite can be added to the water in this conduit before it enters the two parallel and individually valved filter chambers.

#### Filtration Facility

The inlets to each of the filters are equipped with drain lines to the backwash holding tanks. A separate line off of the filter discharge lines can direct filtered water to the PDC. The two dual media filters, each having a filtration rate of 9.1 m/h, are equipped with a layer of 600 mm anthracite of effective size of 0.85 mm to 0.95 mm and uniformity coefficient not greater than 1.7, a layer of 375 mm silica sand of effective size of 0.45 mm to 0.55 mm and uniformity coefficient not greater than 1.7, and a layer of 250 mm graded supporting gravel covering the underdrains.

Two vertical turbine backwash pumps (one duty, one stand-by), each with a rated capacity of 243 L/s at a TDH of 12 m and constant speed drives, are installed in the high lift pumping station (HLPS). Filter backwashes can be initiated automatically but are typically manually initiated.

Two agitator control valves (one per filter) were installed to provide agitation of filter media during filter backwash. Each control valve has a rated capacity of 17.4 L/s at a discharge pressure of 550 kPa supplied by the high lift pumps (HLP's).

A stainless steel centrifugal pump, with a rated capacity of 23 L/hr at a TDH of 12 m, is installed in the filter rate gallery for sampling filtered water from the filtered water header. Each filter tank is equipped with an on-line level sensor. Each filter effluent discharge line is fitted with an on-line turbidity analyser and flow meter. A recorded turbidity value above a programmed level will result in the facility being shut down. Filtered water leaves the filters, enters a common header and enters the Chlorine Contact Chamber. A piping connection exists between the filters and the HLP chamber which would by-pass chlorination. This connection is valved closed so no by-pass is possible. Chlorine Contact Chamber (CCC)

The inlet to the CCC is valved. Just prior to the filtered water entering the CCC, it is dosed with sodium hypochlorite. The 220 m<sup>3</sup> CCC is equipped with baffle curtains located in such a way as to ensure effective mixing and no short circuiting of contact time. Water moves through the chamber in a serpentine pattern to the outlet pipe weir which maintains a constant water depth in the chamber. A second overflow weir provides for emergency overflows and drains to the PDC. An on-line free chlorine residual analyser, a pH analyser and a temperature probe are situated at the discharge from the CCC.

Hydrofluosilicic acid and sodium hydroxide (NaOH) are injected at the discharge from the CCC. Water leaving the CCC is directed to the high lift pump wells (HLPW's).

#### High Lift Pumping Station (HLPS) and Reservoirs

There are two joined tanks which are typically operated in series. Two 500 m<sup>3</sup> HLPW's /reservoirs located beneath the HLPS provide water storage. Each is equipped with an emergency overflow provision to the PDC.

Three vertical turbine high lift pumps (two duty, one stand-by) installed in the HLPS discharge treated water to the distribution system. One has a constant speed drive and a rated capacity of 58 L/s at a TDH of 75 m while the two others have VFD's and rated capacities of 58 L/s at a TDH of 75 m. The two previously described backwash pumps draw from these tanks - one from each tank. Each of these five pumps have backflow prevention and flow control. Sodium hypochlorite can be injected into the filter backwash supply water after discharge from the backwash pumps. The HLPW's are equipped with on-line level sensors and pressure relief return lines.

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**Site (Name):** TREATED WATER - PART 2  
**Type:** Treated Water POE                      **Sub Type:** Other

#### Comments:

##### High Lift Pumping Station (HLPS) and Reservoirs

There are two joined tanks which are typically operated in series. Two 500 m<sup>3</sup> HLPW's /reservoirs located beneath the HLPS provide water storage. Each is equipped with an emergency overflow provision to the PDC.

Three vertical turbine high lift pumps (two duty, one stand-by) installed in the HLPS discharge treated water to the distribution system. One has a constant speed drive, the other two have VFD's, and all three have rated capacities of 58 L/s at a TDH of 75 m. The two previously described backwash pumps draw from these tanks- one from each tank. Each of these five pumps is equipped with backflow prevention and flow control.

Sodium hypochlorite can be injected into the filter backwash supply water after discharge from the backwash pumps. The HLPW's are equipped with on-line level sensors and pressure relief return lines.



The discharge from the HLP's enters a common treated water header, passes through an on-line magnetic flow meter, past a pressure sensor, a sodium hypochlorite injection point, and through a static mixer. Just prior to discharge to the distribution system, water is supplied to on-line analysers for fluoride, free chlorine residual, turbidity and pH. A sample line provides water to the on-site laboratory.

Two access hatches with locked, plate metal tops are located outside of the building. The entry hatches are alarmed and are elevated above grade.

#### Stand-by Power Facility

A stand-by diesel generator, with a minimum continuous rating of 400 kW (500 kVA), and two contained 1,150 L diesel fuel storage tanks are installed in the diesel generator room to provide emergency power to critical process equipment. A cooling water line from the diesel generator discharges into the equalization tanks.

The entire system, from raw water inlet to the distribution system, is monitored by and in certain instances, can be controlled by, the WTP SCADA system. The control equipment for the various systems and facilities is all routed through the control panel at the WTP.

**Site (Name):** CHEMICAL STORAGE & FEED SYSTEMS  
**Type:** Treated Water POE **Sub Type:** Other

#### Comments:

##### Chemical Storage and Feed Systems

(note: all chemical metering pump ratings are accurate to +/- 10%)

The hydrated lime storage and feed system consists of one 40 tonne storage silo with a 450 kg/d volumetric feeder located at the bottom of the silo, a slurry storage tank with mechanical mixer and two (one duty, one stand-by) centrifugal pumps. Each pump has a rated capacity of 80 L/min at a TDH of 20 m and injects the lime slurry into the raw water header for alkalinity adjustment.

The carbon dioxide storage and feed system consists of one 7.3 tonne pressurized storage tank and a gas delivery system to inject carbon dioxide through diffusers in the raw water header or at the bottom of Pre-treatment Tank No. 1300 for pH adjustment.

The powdered activated carbon storage and feed system consists of one 40 tonne storage silo with a 1050 kg/d volumetric feeder located at the bottom of the silo, a wetting cone and eductor and a feed line to add powdered activated carbon to the inlet of Pre-treatment Tank No. 1200 for taste and odour control (as required).

The coagulant storage and feed system consists of two 20,000 L storage tanks with PVC liners and two (one duty, one stand-by) positive displacement metering pumps. Each pump has a rated capacity of 20 L/hr at a discharge pressure of 140 kPa and injects the coagulant into the raw water header or the inlet to Pre-treatment Tank No. 1100. The sodium hypochlorite solution storage and feed system consists of one 20,000 L storage tank with a PVC liner and three positive displacement metering pumps. Two (one duty, one stand-by) pumps, each pump having a rated capacity of 210 L/hr at a discharge pressure of 800 kPa, inject sodium hypochlorite solution into the common filter effluent header. One pump, having a capacity of 1.5 L/hr at a discharge pressure of 800 kPa, injects sodium hypochlorite solution into the high lift discharge header for provisional disinfectant residual adjustment. All three pumps are interconnected by a common header and can inject sodium hypochlorite at the intake bell mouth, the raw water header, the settled water conduit, common filter effluent header, high lift discharge header and filter wash water header with only two application points operating at any one time.

The sodium hydroxide storage and feed system consists of one 15,000 L storage tank with a PVC liner and two (one duty, one stand-by) positive displacement metering pumps. Each pump has a rated capacity of 7 L/hr at a discharge pressure of 140 kPa, and injects sodium hydroxide solution into the chlorine contact chamber discharge header for final pH adjustment and corrosion control.

The hydrofluosilicic acid storage and feed system consists of one 2160 L Polyethylene(PE) storage tank and one duty positive displacement metering pump, having a rated capacity of 4 L/hr at a discharge pressure of 140 kPa, to inject hydrofluosilicic acid solution into the chlorine contact chamber discharge header.

Two positive displacement metering pumps, each pump having a rated capacity of 20 L/hr at a discharge pressure of 140 kPa, are provided as shelf spare chemical feed pumps.

All of the chemical pumps and feed lines are equipped with backflow prevention.

The chemical pumps are flow rated. Some are triggered by raw water flows while others operate in response to

filtered water flows. Chemical feed line flows are monitored and an alarm will sound upon flow failure.

**Site (Name):** BACKWASH PROCESS RESIDUALS - TREATMENT & RECIRCULATION SYSTEM  
**Type:** Treated Water POE **Sub Type:** Other

**Comments:**

**Backwash Process Residuals – Treatment and Re-Circulation System**

Two 140 m<sup>3</sup> backwash water holding/settling tanks store filter backwash water and settle out suspended solids from the backwash water. A centrifugal pump (the sludge transfer pump) with a rated capacity of 8.6 L/s at a TDH of 7 m transfers the settled sludge to the equalization tanks. Although currently valved off, discharge and suction pipes are connected to a second pump, the thickened sludge pump, also used for the removal of sludge or waters to the equalization tanks. A third, spare pump is in place for the removal of sludge or waste water. This pump can be valved to direct wastes to the equalization tanks, sanitary sewers or to a truck if required. Emergency overflows empty to the PDC.

Recycled supernatant water from these two tanks is withdrawn by floating decanters and a supernatant recycling pump with a rated capacity of 11.6 L/s at a TDH of 13 m. The pump discharges recycled water through a flow control valve, past an autosampler which is triggered by system operation, past an on-line turbidity analyser and through a magnetic flow meter before it is discharged at a controlled rate into the common raw water header at a point after the raw water flow meter and before chemical addition.

Two 130 m<sup>3</sup> equalization tanks (previously referred to as sludge thickener tanks) with bottom hoppers, store wastewater and sludge. A centrifugal pump with a rated capacity of 3 L/s at a TDH of 30 m discharges sludge from these tanks to the sanitary forcemain or to trucks for haulage if required. Each tank is equipped with a sludge raking mechanism, feed well, and overflow launder. These tanks receive waste water from the PDC and the diesel cooling system. Sludge and excess supernatant water is received from the backwash water settling/ holding tanks. A sanitary pumping station located in the base of the WTP discharges all plant waste materials into the sanitary force main and on to the wastewater treatment plant. It is equipped with two positive displacement pumps, each with a rated capacity of 2 L/s at a TDH of 33 m. This system is equipped with backflow prevention and a magnetic flow meter at the point of discharge.

Supernatant and emergency overflows from the backwash water holding/settling tanks, the HLPW and the CCC are discharged to the PDC and then to the equalization tanks. Flows into the PDC trigger an alarm which requires the manual operation of pumps and valves to direct the water to the equalization tanks. When the recycling system is not available, all of the contents of the backwash water holding/settling tanks are pumped to the sanitary forcemain via the equalization tanks. It is also possible to revalve the system to pump the backwash water holding/settling tanks directly to the sanitary sewer or to the emergency swale at the rear of the plant via the PDC.

**Site (Name):** DISTRIBUTION WATER  
**Type:** Other **Sub Type:** Other

**Comments:**

The first recorded installation of watermain in the Town of Bracebridge dates back to 1900. There is currently an estimated 102123 m of watermain within the distribution system. The watermains are composed of various sizes ranging from 100 mm to 750 mm in diameter and compositions including cast iron (CI), ductile iron (DI), polyvinyl chloride (PVC), asbestos cement (AC), polyethylene (PE), high density polyethylene (HDPE), stainless steel and copper. The most recent large scale expansion of the water distribution system occurred in 1995.

There are approximately 629 fire hydrants, 980 main valves (62 considered critical valves), 24 air release valves, two check valves, and four boundary zone/ pressure sustaining valves. Each of these zone valves is located in a below grade, concrete walled chamber with access ladder and locking plate metal doors. The boundary valves along with the check valves divide the distribution system into four pressure zones.

The water system currently serves a population of approximately 9000 people. The system includes 4053 total connections with approximately 3593 residential services, 374 commercial services, 68 institutional services and 18 industrial services.

There are three notable structures located within the distribution system:

- 1) The Hamblin Storage and Rechlorination Facility

- 2) The Ecclestone Reservoir and Booster Station
- 3) The Pine Street Booster and Rechlorination Station

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**Site (Name):** DISTRIBUTION (2) - ECCLESTONE RESERVOIR AND BOOSTER STATION

**Type:** Other

**Sub Type:** Reservoir

**Comments:**

The Ecclestone Reservoir, located at 336 Ecclestone Drive, consists of an underground pipe and valve gallery, a booster station and a single celled, concrete storage facility with a capacity of 4,086 m<sup>3</sup>. This reservoir is the first in line and fills directly from the WTP. The HLP's at the WTP start in response to level sensors at the reservoir.

The reservoir itself has two, screened, "J" shaped air vents which stand approximately 1.5 m above grade and one access hatch with a double locked plate steel lid with down turned edges and metal lip. The hatch rises approximately 20 cm above grade.

The pumps, piping, valves, recorders, analysers and control equipment are located in a two storey room in front of the reservoir tank. The room is accessed by a locking steel door. A water supply tap is provided outside this door for public access on a year round basis.

The facility is equipped with an alarmed, on-line free chlorine residual analyser (0-2 mg/L range with pH), an entry alarm, flow meter, level transducer and control panel. A 175 kW standby diesel power unit is located on site along with a contained fuel storage tank with an approximate volume of 1,100 L. This generator provides sufficient power to run the booster station. The outdoor fill and vent lines are capped and locked.

There are three pumps rated at 6,000 m<sup>3</sup>/day on site. The pumps at the reservoir start in response to level sensors at the Hamblin Reservoir. One of the pumps had been removed and been sent for service/maintenance at the time of inspection.

Flows, free chlorine residual and reservoir fill level are continuously monitored and recorded by SCADA.

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**Site (Name):** DISTRIBUTION (3)- HAMBLIN STORAGE AND RECHLORINATION FACILITY

**Type:** Other

**Sub Type:** Reservoir

**Comments:**

The Hamblin storage and rechlorination facility is located at 926 Manitoba Street. The tower is an above-ground, cylindrical, single cell storage facility with a capacity of 2,634 m<sup>3</sup>. The tower is composed of steel and is epoxy lined. It is located at the top of a hill with road access, separate from the rechlorination facility. The tower has a top water level at an elevation of 311.1 metres and a minimum water level at an elevation of 303.7 m. It has two access doors at its base and a locked access hatch at its top which is accessible by way of a shielded and fenced ladder. There is one screened vent at the top of the structure. A screened overflow line from the top of the structure empties to a roadside ditch. There are separate fill and drain lines into this structure from the rechlorination facility. The Hamblin Reservoir provides water by gravity to the distribution system Zone 2.

The rechlorination facility is located at the base of the tower hill in a brick and block building with locking steel doors and locked fence. It is equipped with entry alarms. The building contains a control panel, a day tank with containment and alarmed weigh scale for sodium hypochlorite and two (one duty, one stand-by) metering pumps, each pump having a rated capacity of 3.6 L/hr at a discharge pressure of 1000 kPa which inject sodium hypochlorite into the inlet piping of the reservoir when required. An alarmed on-line analyser, with a 0-2 mg/L range with pH, continuously monitors the free chlorine residual entering and exiting the reservoir. If the residual falls below a programmed concentration on the in-flowing water, rechlorination will be initiated. A flow meter on the inlet line to the reservoir and a pressure transducer indicate to the control system when the tower is filling or emptying. Reservoir levels, flows and chlorine concentrations are recorded continuously by the SCADA system.

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**Site (Name):** DISTRIBUTION (4) - PINE STREET BOOSTER STATION AND RECHLORINATION FACILITY

**Type:** Other

**Sub Type:** Booster Station

**Comments:**

The Pine Street booster station and rechlorination facility is located at 104 Pine Street. It is a brick and block structure with two locking steel access doors. The facility houses pumps, generator, generator fuel and control equipment on the main floor and a pipe gallery below ground. It is equipped with electronic entry alarms. It contains

four vertical turbine pumps, one pump having a rated capacity of 2 L/s at 50 m TDH, one pump having a rated capacity of 16 L/s at 50 m TDH, and two pumps having a rated capacity of 45 L/s at 50 m TDH. Each pump is equipped with a VFD, pressure gauge, backflow prevention, valves on suction and discharge lines, and an air relief valve. These pumps draw from the inlet main and discharge to the pump return line both of which are in the basement.

At the point of entry to the building, supply lines from the inlet main feed an inlet system pressure gauge, an electronic inlet system pressure monitor and the inlet free chlorine residual analyser. The inlet main passes a bypass/ return line from the pump discharge line with a normally closed valve, a pressure relief valve tie in to the pump discharge line, four pump draw points and a valved return line with a flow control valve from the pump discharge line. Water returned from the pumps passes through a flow control valve, past the chlorine injection point, a valve, a continuously monitored magnetic flow meter, a valve, and the continuous free chlorine residual analyser for discharged water.

At this point the main splits. Water is directed to Zone 3 of the distribution and back to the North section of the distribution system. Both discharge mains are equipped with valves, pressure gauges and electronic pressure monitors. The North discharge has an air relief valve.

The discharge main is also tied into the pump return line by way of a normally closed valve. The rechlorination equipment consists of two sodium hypochlorite metering pumps (one duty, one stand-by), each pump having a rated capacity of 3.5 L/hr at a discharge pressure of 1,000 kPa, complete with contained day tank, backflow prevention, tank scale and manually operated drum pump. Two on-line, continuously monitored free chlorine residual analysers (0-2 mg/L range) are located within the building. The analyser on the inlet line will initiate rechlorination if the residual falls below a programmed concentration. The analyser on the pressure pump discharge monitors free chlorine residual in the discharged water. Both are alarmed for low and high concentration. System pressures, flows and chlorine concentrations are recorded continuously by the SCADA system.

A 450 kW diesel generator unit, complete with transfer switch and fuel supply system, provides emergency power necessary to operate the entire facility during a power outage and the District Head Office at 70 Pine Street which is used as the emergency response center. Two approximately 1000 L diesel fuel tanks are located in containment inside the building. The tanks are equipped with electronic fuel level monitors and capped and locked fill lines from the outside.

## INSPECTION SUMMARY:

### Introduction

- The primary focus of this inspection is to confirm compliance with Ministry of the Environment and Climate Change (MOECC) legislation as well as evaluating conformance with ministry drinking water related policies and guidelines during the inspection period. The ministry utilizes a comprehensive, multi-barrier approach in the inspection of water systems that focuses on the source, treatment and distribution components as well as management practices.

This drinking water system is subject to the legislative requirements of the Safe Drinking Water Act, 2002 (SDWA) and regulations made therein, including Ontario Regulation 170/03, "Drinking Water Systems" (O.Reg. 170/03). This inspection has been conducted pursuant to Section 81 of the SDWA.

This report is based on a "focused" inspection of the system. Although the inspection involved fewer activities than those normally undertaken in a detailed inspection, it contained critical elements required to assess key compliance issues. This system was chosen for a focused inspection because the system's performance met the ministry's criteria, most importantly that there were no deficiencies as identified in O.Reg. 172/03 over the past 3 years. The undertaking of a focused inspection at this drinking water system does not ensure that a similar type of inspection will be conducted at any point in the future.

This inspection report does not suggest that all applicable legislation and regulations were evaluated. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

The Bracebridge (Kirby's Beach) drinking water system serves the Town of Bracebridge, geographically located centrally in Muskoka, just west of Provincial Highway 11. The drinking water system services an estimated population of 9000 persons. There are approximately 4053 total service connections, of which approximately 3593 are residential services; 374 are commercial services; 68 are institutional services, and approximately 18 are industrial services.

The Bracebridge (Kirby's Beach) drinking water system is owned and operated by the Corporation of the District Municipality of Muskoka. The Corporation of the District Municipality of Muskoka is referred to as the Owner, Operator and/or Municipality for the purposes of this inspection report.

Drinking water for the Bracebridge community is obtained from Lake Muskoka. The Bracebridge (Kirby's Beach) drinking water treatment plant (WTP) commenced operation in 1995. The drinking water treatment process consists of chemically assisted coagulation-flocculation, sedimentation and filtration, using multi-media filters with a combination of sand and anthracite coal. Disinfection is achieved by chlorination, through the use of sodium hypochlorite solution. Pre-treatment Alkalinity and pH adjustment is provided to enhance on the coagulant (Aluminum Sulphate) process, through the addition of hydrated lime and carbon dioxide. A Powdered Activated Carbon (PAC) pre-treatment system also exists, and may be used in response to any taste and odour related issues, however operation of this system has not been necessary for several years. Sodium hydroxide is added to aid in pH and corrosion control within the distribution system, and fluoridation occurs through the addition of Hydrofluosilicic Acid, prior to the treated water being conveyed to the distribution system.

The Bracebridge (Kirby's Beach) drinking water system is categorized as a Large Municipal Residential drinking water system as defined and regulated by the Safe Drinking Water Act, 2002 (SDWA) and regulations made therein, including Ontario Regulation (O.Reg.)170/03.

Operation of the Bracebridge (Kirby's Beach) drinking water system is authorized under Municipal Drinking Water Licence #143-106 (Licence) and Drinking Water Works Permit 143-206 (Permit) which were originally issued to the District of Muskoka, respectively as Licence Issue#1 on October 14, 2010, and Permit Issue#1 on October 13, 2010.

On February 3, 2015, an application was submitted, by the Municipality, to renew the Licence with the Ministry of

## Introduction

the Environment and Climate Change (Ministry), and the Ministry renewed the Licence and re-issued Licence Issue #2 and Permit Issue #2 on October 6, 2015.

Water takings from Lake Muskoka are permitted in accordance with Permit to Take Water (PTTW)# 8183-7EMQZL, issued May 16, 2008. The PTTW allows the Municipality to take a maximum of 10000000 Litres per day (L/d) from Lake Muskoka, at a rate not exceeding 6944 Litres per minute (L/min). The PTTW expires on May 31, 2018. Compliance with the PTTW was not assessed during the course of this inspection; however, the Municipality is aware that water takings must be done in accordance with the conditions of a valid PTTW.

The Bracebridge (Kirby's Beach) drinking water system was last inspected by the Ministry on January 29, 2016. Findings associated with that 2015 inspection were detailed in Inspection Report # 1-BYLBN, issued to the Municipality on February 9, 2016.

The December 23, 2016 inspection, to which this inspection report pertains, encompasses an inspection review period between January 29, 2014 and December 23, 2016. The 2016 inspection included a physical inspection of the water treatment equipment and facilities; interviews with operational staff; and a review of relevant documents for the inspection review period. The inspector also measured the free available chlorine residual in the drinking water within the distribution system and found the free available chlorine residual to be adequate with a result of 1.29mg/L being rendered.

## Capacity Assessment

- **There was sufficient monitoring of flow as required by the Municipal Drinking Water Licence or Drinking Water Works Permit issued under Part V of the SDWA.**

Condition 2.1, Schedule C of the Licence requires the Municipality to ensure the continuous flow measurement and recording be undertaken for the flow rate and daily volume of water conveyed into the treatment system and the flow rate and daily volume of water conveyed from the treatment system into the distribution system.

To comply with this condition, the Municipality has installed a magnetic flow measuring device on the combined raw water header to measure raw water being taken from Lake Muskoka, and on the plant high lift pump discharge header to measure the treated water being pumped to the distribution system. In addition, magnetic flow measuring devices have also been installed on each of the two separate filter train effluent lines; the carbon dioxide feed system; the lime slurry mixing line; and, the potable water service line for the plant. Flow meters are also installed to measure the surface wash and backwash water flows directed to each filter, and to measure the filter backwash wastewater/sludge and sanitary wastewater being pumped from the water treatment plant to the sanitary sewers on Santa's Village Road, via a forcemain. A flow meter is also installed to measure the settled backwash wastewater supernatant that is recycled back into the raw water low lift pump discharge header for re-treatment. Flow measuring devices are also installed at the Hamblin Reservoir and Rechlorination Facility, the Pine Street Booster and Rechlorination Facility and the Ecclestone Reservoir and Booster Station. These flowmeters are used to measure the flow into and/or out of those facilities.

Instantaneous flow rates are measured by each flow measuring device and continuously trended and recorded on the Supervisory Control and Data Acquisition (SCADA) system associated with the drinking water system.

Totalized daily flows are calculated by SCADA, and transcribed to record keeping mechanisms for reporting purposes. Several of the flow meters are also used for process control purposes.

All of the flow measuring devices were most recently calibrated between October 31, 2016 and November 21, 2016. There were reportedly no concerns identified with the 2016 calibrations.

In 2015, the flow measuring devices were calibrated between October 28 and 29, 2015. There were reportedly no concerns identified with the 2015 calibrations.

During the 2014 calibrations, an issue was initially noted with the venturi differential tube flow measuring device installed to measure the discharge flow from the Ecclestone Reservoir and Booster Station. The issues were believed to be related to the controller. Further calibrations, including the October 31, 2016 calibrations, did not present the same issue.

- **The owner was in compliance with the conditions associated with maximum flow rate or the rated capacity conditions in the Municipal Drinking Water Licence issued under Part V of the SDWA.**

### Capacity Assessment

Condition 1.1, Schedule C of the Licence stipulates that the maximum daily volume of treated water that flows from the Bracebridge (Kirby's Beach) water treatment plant to the distribution system shall not exceed 10022 cubic metres per day (m<sup>3</sup>/d).

In 2015, the maximum day demand occurred on July 29, 2015, when a total daily flow of 5079.2m<sup>3</sup> or 51% of the rated capacity was noted to have occurred. The average day demand for 2015 was reported to be approximately 3599.2m<sup>3</sup>/d or 36% of the plant rated capacity.

Between January 1, 2016 and up to the date of this inspection, December 23, 2016, the maximum day demand occurred on August 9, 2016 when a total daily flow of 5166.8m<sup>3</sup> or 51.5% of the rated capacity was noted to have occurred. The average day demand for this same period is reported to be approximately 3592.2m<sup>3</sup>/d or 36% of the plant rated capacity.

A review of records made during this inspection review period, indicates that the Bracebridge (Kirby's Beach) drinking water system was not operated to exceed the plant rated capacity set out in the Licence.

Similarly, records indicate that the filters were not operated in excess of their designed production capacities, 5 megalitres per day (MLD), during the production of water.

During water production, the rate of flow into the treatment system is governed by an actuated valve on the common low lift pump discharge header. Filter production rates are controlled by actuated valving installed on each of the filter train influent and effluent lines. Low lift pump operation and valving control is done through SCADA, based on maintaining a sufficient water level in the filters and the reservoir. The filters are typically operated in unison. During the summer months, each filter is typically operated at master production rates between 2.0 and 2.5MLD. During the winter months, each filter is typically operated at master production rates between 1.4 and 1.6MLD. The master production rates are manually set in SCADA by operational staff to meet water demands, and to prolong filter run times. SCADA programming, does not allow operational staff to set the master production rates above the filters designed production capacities, 5 MLD.

Between January 1, 2016 and up to the date of this inspection, December 23, 2016, the maximum filter production volumes occurred on June 24, 2016, when Filter 1 produced 2626.6m<sup>3</sup> (2.6MLD) and Filter 2 produced 2510.05m<sup>3</sup> (2.5MLD).

### Treatment Processes

- **The owner had ensured that all equipment was installed in accordance with Schedule A and Schedule C of the Drinking Water Works Permit.**

A review of the equipment installed at the Bracebridge (Kirby's Beach) water treatment plant was referenced and found to compare favourably to the equipment listed in the Permit issued for the Bracebridge (Kirby's Beach) Drinking Water System.

As previously discussed, the Municipality submitted an application to renew the Licence with the Ministry on February 3, 2015, as the licence was set to expire in October 2015. The Ministry renewed the Licence and re-issued Licence Issue #2 and Permit Issue #2 on October 6, 2015.

During this inspection review period, there were reportedly no alterations to the drinking water system that required the completion of any Form 2 or Form 3 documents, nor were there any alterations that necessitated the need for an amendment to the description of the drinking water system components in the Permit.

As discussed in the previous Ministry inspections, a Form 2 – Record of Minor Modification document was prepared on July 31, 2013 to support replacements of the filter effluent turbidity analysers, filter control valves, and a potable water backflow preventer at the water treatment plant.

In 2015, a check valve was installed on the wastewater forcemain used to transmit backwash wastewater/sludge

### Treatment Processes

and sanitary wastewater from the water treatment plant to the gravity sanitary sewers on Santa's Village Road. The checkvalve was installed in conjunction with a neighboring trailer park tying into the forcemain on Beaumont Drive. As the installation of the checkvalve is not directly related to the drinking water system, there was no need for the installation to be documented in a Form 2 document.

A spare air compressor has been purchased for the hydrated lime system at the water treatment plant.

Compressed air is used to vibrate the lime silo and hopper. When or if the lead compressor fails and is replaced with the identical spare, it is not expected that the preparation of a Form 2 document will be necessary, unless additional modifications are made to the chemical feed system.

During the Ministry's previous inspections, it was noted that there was some cracking of the mortar in the block work for the Ecclestone Reservoir. In response, some cosmetic repairs were made in 2015, and although the issues do not appear to be structural in nature, the Municipality continues to monitor the structure and is developing a longer term plan for the works.

- **The owner/operating authority was in compliance with the requirement to prepare Form 1 documents as required by their Drinking Water Works Permit during the inspection period.**

A Form 1 – Record of Watermain Alterations authorization document was prepared for the drinking water system on May 28, 2014 to support the installation of a 150mm diameter PVC watermain and associated appurtenances on Valley Drive. These works were completed in 2016.

It is anticipated that a Form 1 document will be prepared, as required, for watermain replacement work being undertaken on Taylor Road.

- **Records indicated that the treatment equipment was operated in a manner that achieved the design capabilities required under Ontario Regulation 170/03 or a Drinking Water Works Permit and/or Municipal Drinking Water Licence issued under Part V of the SDWA at all times that water was being supplied to consumers.**

O.Reg.170/03 requires that treatment for a surface water source consist of chemically assisted filtration and disinfection capable of achieving, at a minimum, 2-log removal or inactivation of *Cryptosporidium* oocysts, 3-log removal or inactivation of *Giardia* cysts, and, 4-log removal or inactivation of viruses.

These requirements are reportedly met by conventional filtration followed by chlorination, with sodium hypochlorite, for both primary and secondary disinfection purposes.

According to the Ministry's Procedure for Disinfection and Schedule E of the Licence, the filtration process is credited with 2.5 log *Giardia* cyst removal, 2.0 log *Cryptosporidium* oocyst removal and 2.0 log virus removal credits, if the filtration process meets the following criteria:

- use a chemical coagulant at all times when the treatment plant is in operation;
- monitor and adjust chemical dosages in response to variations in raw water quality;
- maintain effective backwash procedures, including filter-to-waste or an equivalent procedure during filter ripening to ensure that the effluent turbidity requirements are met at all times;
- continuously monitor filtrate turbidity from each filter; and,
- meet the performance criterion for filtered water turbidity of less than or equal to 0.3 NTU in 95% of the measurements each month.

To ensure these criteria are met, the Owner has installed a chemical coagulation system comprised of two (one duty, one standby) flow paced chemical metering pumps which inject aluminum sulphate solution into the common raw water header upstream of the filter pre-treatment tanks. The chemical metering pumps are equipped with "Efector" heat sensitive flow sensors linked to SCADA for alarming purposes. In the event low coagulant dosage is detected or the chemical pumping system fails, the filter inlet and outlet valves close, such that water production ceases until such time the metering pump is returned to service.

Continuous turbidimeters installed on each filter train effluent line are configured to trigger an alarm and shut down the respective filter (inlet and outlet valves close), should filter effluent turbidity exceed 0.3NTU, or should the turbidimeter register a signal loss/malfunction.



### Treatment Processes

The multimedia filters are backwashed manually by operational staff two times each week, at a minimum, using SCADA controls and formalized filter backwashing and filter to waste procedures, available within the Operations and Maintenance Manual. Typically Filter 1 (4100) is backwashed Mondays and Thursdays, while Filter 2 (4200) is backwashed Tuesdays and Fridays. Filter backwash frequencies may be increased in response to abnormal conditions. Regularly, operational staff will observe the filter during the surface wash and backwash process to confirm that binding or breakthrough is not occurring.

Following a backwash cycle, water is filtered to waste, before the filter production resumes. The turbidimeters are supplied samples from the filter effluent discharge piping, such that turbidity is being continuously monitored during water production and filter to waste processes. Should the filter effluent turbidity remain above 0.3NTU following the programmed filter to waste process, the filter effluent valves will remain closed and an alarm initiated. By design, water is not directed to the chlorine contact chamber until filtrate turbidity is below 0.3NTU.

Records indicate that the filters met the performance criterion of less than 0.3 NTU in 95% of the tests conducted each month during this inspection review period. SCADA is programmed to alarm should the trending results at the end of each month be out of compliance with the performance criteria. Records also indicate that the coagulant system was in operation when water was being produced, and backwash procedures were followed during this inspection review period.

To achieve the remaining 0.5-log Giardia cysts and 2-log Virus removal or inactivation, a free available chlorine disinfection system is utilized and the CT disinfection concept is used to quantify the capability of the disinfection system for primary disinfection purposes. Free chlorine residual is achieved through the addition of a sodium hypochlorite solution to the filtered water being directed to the dedicated chlorine contact chamber, where the contact time required for CT is afforded. The chlorine contact chamber is baffled ( $bf = 0.7$ ), and provides a dedicated chlorine contact volume of 220m<sup>3</sup>. The system is operated to target a free chlorine residual between 1.6 and 1.9mg/L at the end of the chlorine contact chamber, prior to the addition of sodium hydroxide and hydrofluosilicic acid, before the water is conveyed to the reservoir/high-lift pump chamber. The chlorine analyzer used for primary disinfection monitoring, is provided samples from the end of the chlorine contact chamber and is configured, through SCADA, to trigger an alarm notification sequence should chlorine residuals fall below 1.6mg/L. Operational staff are alerted to the alarm condition, so they may intervene.

A chlorine residual analyzer is also installed on the high-lift pump discharge header. The plant is operated to target a free chlorine residual of 1.5 to 1.8 mg/L in the finished water being conveyed to the distribution system. The finished water chlorine analyzer is configured to initiate an alarm notification should the chlorine residual drop below 1.3mg/L.

The SCADA system is also configured to calculate CT continuously and will alarm if CT is not met. A CT calculation spreadsheet is also available for operators to verify CT under varying operating conditions. Supporting documentation related to CT is available in the operations and maintenance manual.

Records reviewed, indicate that the water treatment plant was operated to achieve the necessary CT requirements for primary disinfection purposes during this inspection review period.

- **Records confirmed that the water treatment equipment which provides chlorination or chloramination for secondary disinfection purposes was operated so that at all times and all locations in the distribution system the chlorine residual was never less than 0.05 mg/l free or 0.25 mg/l combined.**

To ensure that sufficient free available chlorine residual is maintained out and into the distribution system for secondary disinfection purposes, the plant is operated to target a free chlorine residual of 1.5 to 1.8mg/L in the finished water being conveyed to the distribution system. Following the completion of the intended chlorine contact time for primary disinfection purposes and the subsequent addition of sodium hydroxide and hydrofluorosilicic acid, trim chlorination may occur on the high lift pump discharge header, but is not normally practiced. A finished water chlorine analyzer is installed on the high-lift pump discharge header and is supplied with continuous samples of water from a location downstream of the trim chlorine injection point and associated flash mixer. The analyzer may be used to control the trim chlorine injection rate if needed, and is configured to trigger an alarm should the chlorine residual in the treated water being conveyed from the plant drop below 1.3mg/L.

Re-chlorination facilities also exist within the distribution system at both the Hamblin Reservoir and Re-chlorination

### Treatment Processes

facility and the Pine Street Booster and Re-chlorination facility. Typically, re-chlorination is only occurring at the Hamblin Reservoir and Re-chlorination facility, as chlorine residuals within the Pine Street Booster Station service area are normally sufficient.

The free chlorine residual concentrations within the distribution system are being measured by continuous analyzers installed at the Ecclestone Reservoir and Booster Station, the Hamblin Reservoir and Re-chlorination facility, and the Pine Street Booster and Re-chlorination facility. At each of these locations analyzers are installed to measure the chlorine residuals in the drinking water that is conveyed into and/or out of the respective facility. The analyzers are also used to control the re-chlorination systems.

The chlorine residual analyzer and re-chlorination system installed at the Hamblin Reservoir facility is designed to target a free chlorine residual of 0.9mg/L in the drinking water being directed into the reservoir, and the analyzer will trigger an alarm notification if the free chlorine residual in the water being conveyed into and/or out of the reservoir falls below 0.6mg/L.

The chlorine residual analyzer installed at the Ecclestone Reservoir will trigger an alarm notification if the free chlorine residual in the water being conveyed out of the reservoir falls below 0.5mg/L.

There are two free chlorine residual analyzers installed at the Pine Street Booster and Re-chlorination facility. The inlet (suction) analyzer is designed to trigger an alarm notification if the incoming drinking water has a free chlorine residual below 0.45mg/L. The outlet (discharge) analyzer is designed to control the re-chlorination system to target a free chlorine residual of 0.8mg/L, calling the re-chlorination system into operation if the inlet chlorine residual is less than 80% of the 0.8mg/L discharge target. The outlet analyzer will trigger an alarm notification if the chlorine residual remains below 0.45mg/L in the water being discharged.

In addition, chlorine residuals are measured during microbiological sampling and maintenance activities throughout the distribution system. System wide hydrant flushing is conducted each spring and dead-end hydrant flushing is conducted each fall or in response to any issues. Chlorine residuals are regularly measured during the dead-end flushing activities.

Records indicate that free chlorine residuals were maintained at or above the 0.2mg/L throughout the distribution system during this inspection review period; and, there were no records which indicated free chlorine residuals less than 0.05 mg/L at any time during the inspection review period. The recorded distribution system free chlorine residual concentrations ranged between 0.22mg/L and 2.01mg/L.

### Treatment Process Monitoring

- **Primary disinfection chlorine monitoring was conducted at a location approved by Municipal Drinking Water Licence and/or Drinking Water Works Permit issued under Part V of the SDWA, or at/near a location where the intended CT has just been achieved.**

The primary disinfection chlorine monitoring point is currently located at the end of the dedicated baffled chlorine contact chamber, prior to the sodium hydroxide and hydrofluosilicic acid injection points, and the water entering the reservoir and high-lift pump chamber. The chlorine analyser is linked to SCADA for continuous monitoring, trending and alarming purposes, and is used by SCADA and operational staff to calculate CT provisions.

- **Continuous monitoring of each filter effluent line was being performed for turbidity.**

In accordance with subsection 7-3(2)(b) of Schedule 7, O.Reg.170/03 the Owner has installed continuous turbidimeters on each filter train. The turbidimeters are supplied with continuous samples from the filter effluent discharge piping, such that the samples are indicative of filtered water during production as well as during the filter to waste process. For operational purposes, the Owner has also installed continuous turbidimeters for the purpose of measuring the turbidity of the raw water conveyed into the plant and the finished drinking water conveyed to the distribution system. All four of the turbidimeters are linked to the SCADA system for continuous trending, monitoring and alarm purposes.

The high turbidity alarm set points on the two filter trains is set at 0.30 NTU. SCADA is also configured to initiate an alarm should turbidity measure a low analog output (4mA), which might suggest a turbidimeter malfunction. Should either a high or low turbidity alarm condition occur, the filter inlet and outlet valves close, ceasing the production of

### Treatment Process Monitoring

water. The filter train alarms are present to help ensure compliance with the Procedure for Disinfection of Drinking Water in Ontario effluent turbidity requirements of being less than or equal to 0.30 NTU in 95% of the measurements recorded each month on each filter effluent line.

The turbidimeter installed to measure the treated water is configured to initiate an alarm should treated water turbidity exceed 1.0NTU, and the raw turbidimeter is configured to trigger an alarm if raw water turbidity exceeds 1.0NTU.

A turbidimeter has also been installed for the supernatant recycling system. Condition 7.1, Schedule B of the Permit, stipulates that supernatant from the backwash wastewater process may be recirculated back into the treatment process at a rate of less than 10 percent of the raw water intake flow, only if the recirculated supernatant turbidity is less than or equal to 10NTU. To comply with this requirement the turbidimeter installed on the supernatant recirculation line is linked to SCADA for trending and alarming purposes, and an alarm notification is triggered if supernatant turbidity exceeds 9.5NTU. Should the alarm condition be triggered, the supernatant recycling system will shut down, and all of the backwash wastewater, including supernatant, is then pumped to the wastewater holding tanks, from where it is ultimately pumped to the sanitary sewers.

- **The secondary disinfectant residual was measured as required for the distribution system.**

The free chlorine residual concentration within the distribution system is being measured by continuous analyzers installed at the Ecclestone Reservoir and Booster Station, the Hamblin Reservoir and Re-chlorination facility and the Pine Street Booster and Re-chlorination facility. The distribution chlorine residual analyzers are configured to trigger an alarm if chlorine residual drops below the setpoints, previously discussed, at either of the locations. In addition, chlorine residuals are measured during microbiological sampling and maintenance activities throughout the distribution system.

The recorded distribution system free chlorine residual concentrations ranged between 0.22mg/L and 2.01mg/L, during this inspection review period.

- **Operators were examining continuous monitoring test results and they were examining the results within 72 hours of the test.**

Operators evaluate the system processes at the water treatment plant daily, Monday through Friday. They verify the operating conditions through SCADA trending and record any departures from normal operating conditions. Weekends and holidays are considered. Operators are scheduled to conduct a data review so that the time between checks does not exceed the 72 hour regulatory requirement. Records of checks are documented in the log book in order to satisfy Schedule 6, O.Reg.170/03 requirements for examination of continuous monitoring data.

Checklists are used to verify operating conditions and also to verify the SCADA trending. The specific operating conditions are recorded on their checklists and also stored electronically in Excel spreadsheets. Records of the checks are written in the log book at the water treatment plant and within distribution system log books.

Operational staff also attend the Ecclestone Reservoir and Booster Station, the Hamblin Reservoir and Re-chlorination facility and the Pine Street Booster and Re-chlorination facility at least once each week, and make records of those checks in the record keeping mechanisms.

- **All continuous monitoring equipment utilized for sampling and testing required by O. Reg.170/03, or Municipal Drinking Water Licence or Drinking Water Works Permit or order, were equipped with alarms or shut-off mechanisms that satisfy the standards described in Schedule 6.**

Continuous monitors are used to assess primary disinfection chlorine residual concentrations, secondary disinfection chlorine residual concentrations, and turbidity on each filter effluent. At the time of inspection, the analyzer used for primary disinfection monitoring had a low chlorine alarm set point of 1.6mg/L and a high chlorine alarm set point of 2.5mg/L. By activating the low or high setpoints an alarm notification is triggered and an operator intervenes.

As previously discussed, secondary disinfection is monitored in the distribution system at the Ecclestone Reservoir

### Treatment Process Monitoring

and Booster Station, the Hamblin Reservoir and Re-chlorination facility, and the Pine Street Booster and Re-chlorination facility. The initial high chlorine concentration set points are 2.00mg/L at Ecclestone, 1.99mg/L at Hamblin, and 1.8mg/L at Pine Street. Pine Street also operates with a high/high free chlorine residual concentration alarm set point of 1.99mg/L. The low chlorine residual concentration set point is 0.60mg/L at Hamblin, 0.45mg/L at Pine Street, and 0.50mg/L at Ecclestone. By activating the low or high setpoints an alarm notification is triggered and an operator intervenes.

The filter effluent turbidity high set point alarms are set at 0.30(NTU), and SCADA is configured to alarm if the turbidimeter generates a low analog signal (4mA). Should either the low or high turbidity alarms be triggered, the filter inlet and outlet valves shut down, ceasing the production of water, until rectified. By design, water is not directed to the chlorine contact chamber until filtrate turbidity is below 0.3NTU.

- **Continuous monitoring equipment that was being utilized to fulfill O. Reg. 170/03 requirements was performing tests for the parameters with at least the minimum frequency specified in the Table in Schedule 6 of O. Reg. 170/03 and recording data with the prescribed format.**

Schedule 6 of O.Reg.170/03 outlines the recording frequency requirements for continuous on line analysers. It requires that the free chlorine residual for primary disinfection be tested and recorded with a frequency of every five minutes. Turbidity monitoring must be performed with a minimum frequency of 15 minutes. If secondary disinfection monitoring uses continuous analysers, as is the case for secondary disinfection monitoring conducted at the reservoirs and booster station within the distribution system, the free chlorine residual in a distribution sample must have a minimum recording frequency of 1 hour.

Complying with these requirements, continuous monitoring data is recorded and trended on the SCADA system at ten second intervals.

The chlorine residual is being recorded in milligrams per litre(mg/L) and the turbidity is being recorded in Nephelometric Turbidity Units(NTU) in order to comply with the requirements contained in Schedule 6.

- **All continuous analysers were calibrated, maintained, and operated, in accordance with the manufacturer's instructions or the regulation.**

The Bracebridge (Kirby's Beach) drinking water system is equipped with continuous analysers for pH, chlorine residual, turbidity and fluoride.

Analyzer verifications are completed a minimum of at least once per month, or as needed to exceed the manufacturer's recommendations, to ensure effective operation and accuracy. These verifications are performed using titrations and/or secondary standards. The information is noted in the electronic spreadsheets and in the log books.

A third party is retained to perform annual verifications and calibrations to primary standards. These annual verifications/calibrations were last completed on August 22, 2016.

Procedures are available in the operations and maintenance manual for the calibration of the continuous analyzers.

The continuous chlorine analysers are verified on a monthly basis at a minimum. Calibration of the chlorine analyzers occur when the unit reads 5% above or below hand held readings. Records of each verification/calibration are made in the daily log book and the maintenance log book at the plant. Handheld colorimeters are verified against secondary standards on a regular basis, and the hand held units are used to verify the calibration of the continuous analyzers, including the analyzers installed within the distribution system.

### Operations Manuals

- **The operations and maintenance manuals contained plans, drawings and process descriptions sufficient**

**Operations Manuals**

**for the safe and efficient operation of the system.**

An operations and maintenance manual has been created and is available on-site for the utility operator's use at the water treatment plant. The Municipality is currently reviewing sections of the operations and maintenance manual to ensure the manual is consistent with the requirements of the Permit and Licence, issued October 6, 2015; and, to ensure that the manual conforms to their Operational Plan. The Municipality is working to develop more standardized SOP driven Operations and Maintenance Manuals for each of their drinking water systems, with the intent that the manuals will be maintained and made available in an electronic format.

Plans and drawings are available at the water treatment plant. A Process Flow Diagram also exists in Schedule D of the Permit.

- **The operations and maintenance manuals met the requirements of the Drinking Water Works Permit and Municipal Drinking Water Licence issued under Part V of the SDWA.**

Condition 16, Schedule B of the Licence prescribes that the operations and maintenance manual include at a minimum:

- the requirements of the licence and associated procedures;
- the requirements of the drinking water works permit for the drinking water system;
- a description of the processes used to achieve primary and secondary disinfection within the drinking water system, including a copy of the CT calculations that were used as the basis for primary disinfection under worst case operating conditions.
- procedures for monitoring and recording the in-process parameters necessary for the control of any treatment subsystem and for assessing the performance of the drinking water system;
- procedures for the operation and maintenance of monitoring equipment;
- contingency plans and procedures for the provision of adequate equipment and material to deal with emergencies, upset conditions and equipment breakdown; and,
- procedures for the dealing with complaints related to the drinking water system, including the recording of the nature of the complaint and any investigation and corrective action taken in respect of the complaint.

Procedures necessary for the operation and maintenance of any alterations to the drinking water system must also be incorporated into the operations and maintenance manual prior to the alterations coming into operation.

The requirement for the operations manual to include a description of the processes used to achieve primary and secondary disinfection within the drinking water system, was a new condition, Condition 16.2.3, Schedule B), of the Licence that was issued on October 6, 2015 and the Municipality had until April 13, 2016 to comply with this condition. In review of the information provided for this inspection, all of the information would appear to be available to satisfy this condition. The SCADA system is also configured to calculate CT continuously to ensure adequate disinfection is provided and will alarm if CT is not met, and a CT calculating spreadsheet is also installed on the computer in the control room which allows operators to verify CT under various conditions.

The Municipality is currently reviewing sections of the operations and maintenance manual to ensure the manual is consistent with the requirements of their Permit and Licence and that the manual conforms to their Operational Plan. In their efforts of ensuring consistency across the Municipality, considerations are being made to developing a more standardized SOP driven Operations and Maintenance Manual, that can be maintained and made available in an electronic format, at each of the Municipality's drinking water systems. In these efforts to date, many of the record keeping mechanisms have already been standardized across the Municipality.

With the next issuance of the Permit, it is anticipated that the Municipality will be required to ensure that the Ministry's Watermain Disinfection Procedure is followed during any watermain repairs, alterations or installations. Historically, the Municipality was required to, and did, follow the watermain disinfection procedures set out in the AWWA Standard C651. The Municipality has already developed Standard Operating Procedure (SOP) WS-12, which provides operational staff directives regarding Watermain Distribution Repairs, and incorporates the

### Operations Manuals

procedures set out in the Ministry's Watermain Disinfection Procedure.

### Logbooks

- **Records or other record keeping mechanisms confirmed that operational testing not performed by continuous monitoring equipment was being done by a certified operator, water quality analyst, or person who suffices the requirements of O. Reg. 170/03 7-5.**

Records reviewed, indicate that only the certified utility operators are the individuals that are performing the operational tests throughout the system. Operator certification was verified with the Ontario Water Wastewater Certification Office and all operators were in possession of valid certificates.

### Security

- **The owner had provided security measures to protect components of the drinking water system.**

Security measures in place throughout the Bracebridge (Kirby's Beach) drinking water system include fencing, locked gates, secure entrance doors and security systems. The security systems utilized are connected to the SCADA system. The on call operator is alerted to an alarm condition, must acknowledge it, and determine the appropriate response to the situation.

The Municipality reported no concerns with security or vandalism over the inspection review period.

### Certification and Training

- **The overall responsible operator had been designated for each subsystem.**

In accordance with Ontario Regulation 128/04 (Certification of Drinking Water System Operators and Water Quality Analysts) made under the SDWA, the Bracebridge (Kirby's Beach) Water Treatment Plant is classified as a Class 4 Water Treatment Subsystem (#2582 issued September 6, 2005), while the Bracebridge Water Distribution System is classified as a Class 3 Water Distribution Subsystem (#952 issued May 25, 2005).

At the time of this inspection, individuals possessing Class 4 Water Treatment Subsystem and Class 3 Water Distribution certificates, at a minimum, have been designated to act in the capacity of Overall Responsible Operator (ORO). Other operators, who possess, at a minimum, Class 3 Water Treatment certification and/or Class 2 Water Distribution certification, are also available and may serve in the ORO capacity, if required.

Records identifying the name of the individual serving in the capacity of ORO are documented within facility logbooks on a daily basis. The ORO is rotated on a weekly basis. There were no records to indicate that individuals other than sufficiently certified operators were acting in the capacity of ORO during this inspection review period.

The water treatment plant and distribution system certificates are prominently displayed at the water treatment plant. Operator certificates are prominently displayed at a location from where the collective drinking water system works are managed.

- **Operators in charge had been designated for all subsystems which comprised the drinking-water system.**

The Owner has designated the operators who possess the appropriate level of certification to act as Operator-in-Charge (OIC) as required. Typically, the operator doing facility checks is considered the OIC of the facility on that particular day.

### Certification and Training

- **Only certified operators made adjustments to the treatment equipment.**

Records provided for review indicate that the District of Muskoka utility operators appear to be the only persons who are adjusting water treatment equipment and processes at the water treatment plant. Operator certification was verified with the Ontario Water Wastewater Certification Office and all operators were in possession of valid certificates.

### Water Quality Monitoring

- **All microbiological water quality monitoring requirements for distribution samples were being met.**

The owner of a large municipal residential drinking water system shall ensure that if the system serves a population of 100,000 or less, at least eight distribution samples plus one for every thousand people served by the system are taken every month. At least one of the samples must be taken each week. As Bracebridge's population is estimated to be 9000 residents, 17 samples must be collected monthly as a minimum requirement from the distribution system. These samples are required to be tested for E.Coli., total coliform; and at least 25 percent of the samples are required to be tested for general bacteria populations expressed as colony counts on a heterotrophic plate count.

Records reviewed in the course of this inspection, indicate that the Municipality complied with these requirements, collecting between four and six distribution samples each week (approximately 22 each month), in order to comply with, and exceed, the regulatory requirement. Each of those samples was tested for E.Coli., total coliform, and at least 25 percent of the samples collected were tested for general bacteria populations expressed as colony counts on a heterotrophic plate count.

- **All microbiological water quality monitoring requirements for treated samples were being met.**

Section 10-3 of Schedule 10, O.Reg.170/03 requires the Municipality to ensure samples are collected at least once every week from the system's treated water at the point of entry into the distribution system. The samples collected are required to be tested for E.Coli and total coliform, and general bacteria populations expressed as colony counts on a heterotrophic plate count.

Records indicate that the Municipality complied with these requirements during this inspection review period.

- **All inorganic water quality monitoring requirements prescribed by legislation were conducted within the required frequency.**

Section 13-2 of Schedule 13, O.Reg.170/03 requires the Owner and the operating authority to ensure that at least one water sample is taken every 12 months if the system obtains water from a raw water supply that is surface water, and have those samples tested for every inorganic parameter set out in Schedule 23, O.Reg.170/03.

Complying with these requirements, the Municipality last conducted this sampling on May 9, 2016. Prior to that, this sampling was conducted on May 4, 2015. There were no concerns identified with the results obtained.

- **All organic water quality monitoring requirements prescribed by legislation were conducted within the required frequency.**

Section 13-4 of Schedule 13, O.Reg.170/03 requires the Owner and the operating authority to ensure that at least one water sample is taken every 12 months if the system obtains water from a raw water supply that is surface water, and have those samples tested for every organic parameter set out in Schedule 24, O.Reg.170/03.

Complying with these requirements, the Municipality last conducted this sampling on May 9, 2016. Prior to that, this sampling was conducted on May 4, 2015. There were no concerns identified with the results obtained.

- **All trihalomethanes water quality monitoring requirements prescribed by legislation were conducted within the required frequency.**

Section 13-6 of Schedule 13, O.Reg.170/03 requires the Owner and the operating authority to ensure that at least

### Water Quality Monitoring

one distribution sample is taken every 3 months from a point in the drinking water system's distribution system, or in plumbing that is connected to the drinking water system, that is likely to have an elevated potential for the formation of Trihalomethanes (THMs), and tested for THMs. Section 6-1.1 of Schedule 6, O.Reg.170/03 requires that these samples be taken at least 60 days, and not more than 120 days, after a sample was taken for that purpose in the previous three month period.

Complying with these requirements, the Municipality conducted this quarterly sampling on November 2, 2015; February 1, 2016; May 9, 2016; August 2, 2016 and November 7, 2016.

THM results during this inspection review period ranged between 28 and 64 micrograms per Litre (ug/L). The running annual average of the samples collected is 50.5ug/L, below the Ontario Drinking Water Quality Standard of 100ug/L.

- **All nitrate/nitrite water quality monitoring requirements prescribed by legislation were conducted within the required frequency for the DWS.**

Section 13-7 of Schedule 13, O.Reg.170/03 requires the Owner and the operating authority to ensure that at least one water sample is taken every three months and tested for nitrates and nitrites. Section 6-1.1 of Schedule 6, O.Reg.170/03 requires that these samples be taken at least 60 days, and not more than 120 days, after a sample was taken for that purpose in the previous three month period.

Complying with these requirements, the Municipality conducted this sampling on November 2, 2015; February 1, 2016; May 9, 2016; August 2, 2016 and November 7, 2016. There were no concerns identified with the results obtained.

- **All sodium water quality monitoring requirements prescribed by legislation were conducted within the required frequency.**

Section 13-8 of Schedule 13, O.Reg.170/03 requires that the owner of a municipal residential drinking-water system ensure that a treated water sample is taken every 60 months and is tested for sodium.

Records indicate that the Municipality conducted sampling for sodium on May 9, 2016. Prior to that, sampling for sodium had been undertaken May 4, 2015. There were no concerns identified with the results obtained.

- **The required daily samples were being taken at the end of the fluoridation process.**

Fluoridation is achieved through the addition of Hydrofluosilicic Acid after the chlorine contact chamber, prior to the water entering the reservoir/highlift pumping chamber. As fluoridation is practiced, section 7-4 of Schedule 7, O.Reg.170/03 requires the owner to ensure that a water sample is taken at the end of the fluoridation process at least once every day and is tested for fluoride. Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5 - 0.8 mg/L, the optimum level for the control of tooth decay. A result indicating that the concentration of fluoride exceeds 1.5mg/L is considered an adverse drinking water test, and is required to be reported the Ministry and the Simcoe Muskoka District Health Unit.

Complying with the fluoride monitoring requirements, the Municipality has ensured fluoride concentrations are measured using a continuous analyser which is provided with samples of drinking water from the high-lift pump discharge header.

The continuous analyzer is linked to the SCADA system for continuous monitoring, trending and alarming purposes. To ensure fluoride levels remain within the optimal range, the analyzer, through SCADA is configured to initiate an alarm notification if fluoride levels rise above 0.81mg/L, or fall below 0.45mg/L. Should fluoride levels increase above 0.81mg/L, the fluoridation system is configured to shut down. Fluoride measurements are trended on SCADA every 10 seconds.

Records reviewed, indicate that fluoride concentrations were typically maintained between 0.5 and 0.7mg/L during



### Water Quality Monitoring

this inspection review period.

On January 20, 2014, The District Municipality of Muskoka Council passed By-law No. 2014-2, which permitted each individual municipal council within the District to review the practice of fluoridation and decide to continue or cease the practice. The municipal council serving the Town of Bracebridge has reviewed the practice and has decided to continue to apply fluoride to the Bracebridge municipal drinking water system.

- **All water quality monitoring requirements imposed by the Municipal Drinking Water Licence and Drinking Water Works Permit were being met.**

The Bracebridge (Kirby's Beach) water treatment plant is capable of recycling a portion of the supernatant from the backwash wastewater settling process back to the head of the plant for re-treatment. Operation of the supernatant recycling process is subject to conditions set out in Condition 7.1, Schedule B of the Permit and Conditions 1.6 and 1.7, Schedule C of the Licence. Specifically, Condition 7.1, Schedule B of the Permit requires the Municipality, if they choose to recycle the supernatant, to ensure that the rate at which the supernatant is recycled back into the treatment process does not exceed 10 percent of the raw water intake flow, and that the recycled supernatant turbidity is less than or equal to 10 NTU. To comply with this condition, the Municipality has installed a magnetic flow meter and a continuous turbidity analyzer on the supernatant recirculation system. Both the flow meter and turbidity analyzer are linked to SCADA for trending, control and alarming purposes. Through SCADA the supernatant recycling system is configured to trigger an alarm and shut down should the flow rate exceed 10% of the raw intake flow and/or supernatant turbidity exceed 9.5 NTU. Should these alarm conditions exist, all of the backwash wastewater, including the supernatant, is then pumped to the wastewater holding tanks, from where it is ultimately pumped to the sanitary sewer.

In addition to the monitoring and operational conditions required by the Permit, Conditions 1.6 and 1.7, Schedule C of the Licence requires that the backwash supernatant, subject to recycling, be sampled and analyzed for suspended solids, free chlorine residual, E.Coli., pH, and Aluminum on a weekly basis, and that manganese and trihalomethanes be analyzed on a quarterly basis. The weekly and quarterly samples are to consist of a composite sample made up of three grab samples, one collected at the start of the discharge, one at the discharge mid-point, and one immediately before the end of the discharge. The Municipality has installed a composite sampler to satisfy the sample collection requirements.

Records reviewed, indicate that the Municipality complied with the operational conditions and monitoring/sampling requirements associated with the supernatant recycling process during this inspection review period.

Supernatant is typically recycled back into the treatment process prior to the start of the automated filter backwash process. The supernatant recycling process is automated, and allows time for the backwash wastewater to settle for several hours before supernatant is drawn off. A rinse of the articulating floating supernatant arm also occurs prior to the supernatant valve opening, to remove any settled solids. The programming ensures that at least one of the backwash settling tanks is empty, prior to the start of a backwash.

In 2015, approximately 14931 m<sup>3</sup> of supernatant was recycled, with a maximum of 150m<sup>3</sup> being recycled on May 19, 2015, equating to approximately 5.1 percent of the raw water intake flow on the same day. On the days supernatant recycling occurred in 2015, it was done at an average rate equating to 2.11 percent of the same day raw water intake flow.

Between January 1, 2016 and December 19, 2016, the supernatant that was recycled back into the treatment process had a measured turbidity of less than 10NTU, with results ranging between 0.74NTU and 4.05NTU. There were a few occasions when the supernatant turbidity was above 9.5NTU, however in each of those instances the alarm sequence was triggered and the supernatant recycling process ceased and the issue investigated. The elevated turbidity results were related to turbidimeter fouling, and the results were not indicative of the supernatant quality.

During this inspection review period, the total suspended solids concentrations in the recycled supernatant ranged between 0.4 and 9.6mg/L, free chlorine residual was consistently 0mg/L, pH ranged between 6.67 and 7.7, aluminium concentrations ranged between 0.5 and 3.0mg/L, manganese concentrations ranged between 0.0024 and 0.0075 mg/L; and, trihalomethanes ranged between 12 and 16ug/L.

### Water Quality Monitoring

On an emergency basis, supernatant may also be directed to the plant drainage chamber where it may be pumped to a stoned lined swale and ditch adjacent to the plant. Should this emergency overflow be used, Condition 4.4, Schedule C of the Licence requires the Municipality to conduct sampling for suspended solids and free chlorine residual during each event, and Condition 1.5, Schedule C of the Licence only permits such discharges if the suspended solids concentration is less than 25mg/L and the free chlorine residual is 0mg/L. No emergency overflow discharges occurred during this inspection review period. Supernatant that is not recycled, is directed to the sanitary sewers along with the backwash wastewater/settled sludge.

- **Records confirmed that chlorine residual tests were being conducted at the same time and at the same location that microbiological samples were obtained.**

Subsection 6-3 (1) of Schedule 6 of O.Reg.170/03 prescribes that if a microbiological sample required by the regulation is taken, that another sample must be taken at the same time from the same location and tested immediately for free chlorine residual. Records reviewed during the course of this inspection indicate that the Municipality ensured that the free chlorine residual was tested at the time of all microbiological samples. Operational staff recorded the free available chlorine residual tests directly on the Laboratory Sample Submission / Chain of Custody Form at the same time that microbiological samples were obtained. The chlorine residuals associated with microbiological sample were then included by the laboratory on the analytical report associated with results of the microbiological test.

### Water Quality Assessment

- **Records showed that all water sample results taken during the inspection review period did not exceed the values of tables 1, 2 and 3 of the Ontario Drinking Water Quality Standards (O.Reg. 169/03).**

The standards for drinking water quality in Ontario are prescribed in O.Reg.169/03 "Ontario Drinking Water Quality Standards" (ODWQS). Background and supporting information for each of the standards can be found in the Ministry's "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines". Results of sampling conducted during this inspection review period met the microbiological and chemical requirements of the ODWQS, and there were no other Adverse Water Quality Incidents reported or identified.

### Reporting & Corrective Actions

- **Where required continuous monitoring equipment used for the monitoring of chlorine residual and/or turbidity triggered an alarm or an automatic shut-off, a qualified person responded in a timely manner and took appropriate actions.**

A review of the continuous monitoring data and the log books was performed for any alarm conditions and actions taken by operators in response to incidents at the water treatment plant. Any after hours alarm calls appear to have been responded to in a timely fashion by the utility operators and notes have been entered in the log book of their actions taken for each instance. Explanations appear to have been consistently provided for power interruptions, maintenance activities, process operation alarm calls, and any communication errors that triggered alarms.

### Other Inspection Findings

- **The following items are noted as being relevant to the Drinking Water System:**

During this inspection review period, the Municipality reported one spill event which occurred on Sunday, November 13, 2016, when a watermain break on Ecclestone Drive resulted in an estimated 400m<sup>3</sup> of chlorinated water overflowing and carrying sediment to the Muskoka River. The Municipality deployed a floating boom to contain the sediment and actively de-chlorinated the water, while repairs were made to the watermain. Watermain disinfection procedures were followed during the repair, and microbiological samples collected following the event showed no

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**Other Inspection Findings**

indication of adverse water quality as a result of the watermain break. All appropriate actions were taken in response to the event and all appropriate notifications were made to the Ministry in response to this event.

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**NON-COMPLIANCE WITH REGULATORY REQUIREMENTS AND ACTIONS REQUIRED**

This section provides a summary of all non-compliance with regulatory requirements identified during the inspection period, as well as actions required to address these issues. Further details pertaining to these items can be found in the body of the inspection report.

**Not Applicable**

**SUMMARY OF RECOMMENDATIONS AND BEST PRACTICE ISSUES**

This section provides a summary of all recommendations and best practice issues identified during the inspection period. Details pertaining to these items can be found in the body of the inspection report. In the interest of continuous improvement in the interim, it is recommended that owners and operators develop an awareness of the following issues and consider measures to address them.

Not Applicable


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**SIGNATURES**

Inspected By:

James Crumbie

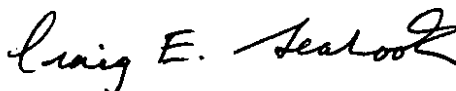
Signature: (Provincial Officer)



Reviewed &amp; Approved By:

Craig Seabrook

Signature: (Supervisor)



Review &amp; Approval Date:

2017 - 01 - 03

Note: This inspection does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they apply or may apply to this facility. It is, and remains, the responsibility of the owner and/or operating authority to ensure compliance with all applicable legislative and regulatory requirements.



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**Stakeholder Appendix**

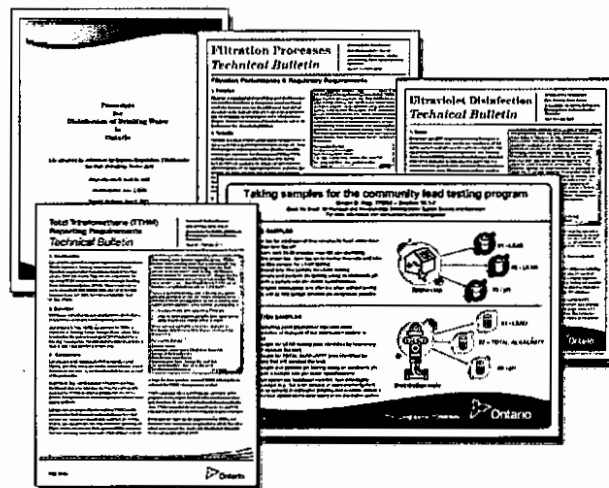
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# Key Reference and Guidance Material for Municipal Residential Drinking Water Systems

Many useful materials are available to help you operate your drinking water system. Below is a list of key materials owners and operators of municipal residential drinking water systems frequently use.

To access these materials online click on their titles in the table below or use your web browser to search for their titles. Contact the Public Information Centre if you need assistance or have questions at 1-800-565-4923/416-325-4000 or [picemail.moe@ontario.ca](mailto:picemail.moe@ontario.ca).

For more information on Ontario's drinking water visit [www.ontario.ca/drinkingwater](http://www.ontario.ca/drinkingwater) and email [drinking.water@ontario.ca](mailto:drinking.water@ontario.ca) to subscribe to drinking water news.



PUBLICATION TITLE	PUBLICATION NUMBER
Taking Care of Your Drinking Water: A Guide for Members of Municipal Councils	7889e01
FORMS: Drinking Water System Profile Information, Laboratory Services Notification, Adverse Test Result Notification Form	7419e, 5387e, 4444e
Procedure for Disinfection of Drinking Water in Ontario	4448e01
Strategies for Minimizing the Disinfection Products Trihalomethanes and Haloacetic Acids	7152e
Total Trihalomethane (TTHM) Reporting Requirements Technical Bulletin (February 2011)	8215e
Filtration Processes Technical Bulletin	7467
Ultraviolet Disinfection Technical Bulletin	7685
Guide for Applying for Drinking Water Works Permit Amendments, Licence Amendments, Licence Renewals and New System Applications	7014e01
Certification Guide for Operators and Water Quality Analysts	
Guide to Drinking Water Operator Training Requirements	9802e
Taking Samples for the Community Lead Testing Program	6560e01
Community Sampling and Testing for Lead: Standard and Reduced Sampling and Eligibility for Exemption	7423e
Guide: Requesting Regulatory Relief from Lead Sampling Requirements	6610
Drinking Water System Contact List	7128e
Technical Support Document for Ontario Drinking Water Quality Standards	4449e01

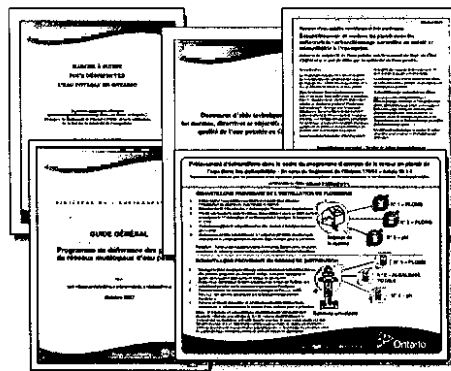
[ontario.ca/drinkingwater](http://ontario.ca/drinkingwater)



# Principaux guides et documents de référence sur les réseaux résidentiels municipaux d'eau potable

De nombreux documents utiles peuvent vous aider à exploiter votre réseau d'eau potable. Vous trouverez ci-après une liste de documents que les propriétaires et exploitants de réseaux résidentiels municipaux d'eau potable utilisent fréquemment.

Pour accéder à ces documents en ligne, cliquez sur leur titre dans le tableau ci-dessous ou faites une recherche à l'aide de votre navigateur Web. Communiquez avec le Centre d'information au public au 1 800 565-4923 ou au 416 325-4000, ou encore à [picemail.moe@ontario.ca](mailto:picemail.moe@ontario.ca) si vous avez des questions ou besoin d'aide.



Pour plus de renseignements sur l'eau potable en Ontario, consultez le site [www.ontario.ca/eaupotable](http://www.ontario.ca/eaupotable) ou envoyez un courriel à [drinking.water@ontario.ca](mailto:drinking.water@ontario.ca) pour suivre l'information sur l'eau potable.

TITRE DE LA PUBLICATION	NUMÉRO DE PUBLICATION
Prendre soin de votre eau potable – Un guide destiné aux membres des conseils municipaux	7889f01
Renseignements sur le profil du réseau d'eau potable, Avis de demande de services de laboratoire, Formulaire de communication de résultats d'analyse insatisfaisants et du règlement des problèmes	7419f, 5387f, 4444f
Marche à suivre pour désinfecter l'eau potable en Ontario	4448f01
Strategies for Minimizing the Disinfection Products Trihalomethanes and Haloacetic Acids (en anglais seulement)	7152e
Total Trihalomethane (TTHM) Reporting Requirements: Technical Bulletin (février 2011) (en anglais seulement)	8215e
Filtration, Processes Technical Bulletin (en anglais seulement)	7467
Ultraviolet Disinfection Technical Bulletin (en anglais seulement)	7685
Guide de présentation d'une demande de modification du permis d'aménagement de station de production d'eau potable, de modification du permis de réseau municipal d'eau potable, de renouvellement du permis de réseau municipal d'eau potable et de permis pour un nouveau réseau	7014f01
Guide sur l'accréditation des exploitants de réseaux d'eau potable et des analystes de la qualité de l'eau de réseaux d'eau potable	
Guide sur les exigences relatives à la formation des exploitants de réseaux d'eau potable	9802f
Prélèvement d'échantillons dans le cadre du programme d'analyse de la teneur en plomb de l'eau dans les collectivités	6560f01
Échantillonnage et analyse du plomb dans les collectivités : échantillonnage normalisé ou réduit et admissibilité à l'exemption	7423f
Guide: Requesting Regulatory Relief from Lead Sampling Requirements (en anglais seulement)	6610
Liste des personnes-ressources du réseau d'eau potable	7128f
Document d'aide technique pour les normes, directives et objectifs associés à la qualité de l'eau potable en Ontario	4449f01

[ontario.ca/eaupotable](http://ontario.ca/eaupotable)



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**MOE Audit Sample Results**

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Not Applicable



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**Provincial Officer's Report & Order**

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Not Applicable



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**Inspection Rating Record**

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**Ministry of the Environment - Inspection Summary Rating Record (Reporting Year - 2016-2017)**

**DWS Name:** BRACEBRIDGE (KIRBY'S BEACH) DRINKING WATER SYSTEM  
**DWS Number:** 220007276  
**DWS Owner:** Muskoka, The Corporation Of The District Municipality Of  
**Municipal Location:** Bracebridge

**Regulation:** O.REG 170/03

**Category:** Large Municipal Residential System

**Type Of Inspection:** Focused

**Inspection Date:** December 23, 2016

**Ministry Office:** Barrie District

**Maximum Question Rating: 430**

Inspection Module	Non-Compliance Rating
Capacity Assessment	0 / 30
Treatment Processes	0 / 60
Operations Manuals	0 / 28
Logbooks	0 / 14
Certification and Training	0 / 28
Water Quality Monitoring	0 / 116
Reporting & Corrective Actions	0 / 21
Treatment Process Monitoring	0 / 133
<b>TOTAL</b>	<b>0 / 430</b>

**Inspection Risk Rating | 0.00%**

**FINAL INSPECTION RATING: | 100.00%**

**Ministry of the Environment - Detailed Inspection Rating Record (Reporting Year - 2016-2017)**

**DWS Name:** BRACEBRIDGE (KIRBY'S BEACH) DRINKING WATER SYSTEM  
**DWS Number:** 220007276  
**DWS Owner:** Muskoka, The Corporation Of The District Municipality Of  
**Municipal Location:** Bracebridge

**Regulation:** O.REG 170/03  
**Category:** Large Municipal Residential System  
**Type Of Inspection:** Focused  
**Inspection Date:** December 23, 2016  
**Ministry Office:** Barrie District

**Maximum Question Rating:** 430

**Inspection Risk Rating** 0.00%

**FINAL INSPECTION RATING:** 100.00%