



**City of Barrie
Water Operations Branch**

**Drinking Water System
2017 Annual Report
Section 11, O.Reg. 170/03**

For the Period of

JANUARY 1, 2017 TO DECEMBER 31, 2017

System Rating:

Water Treatment Subsystem Class IV
Water Distribution and Supply Subsystem Class IV
Water Distribution Subsystem Class II

Drinking Water System No.:

220001192

Municipal Drinking Water Licence No.:

014-101, Issue No. 5

Effective Date: 2018-02-26

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1 Introduction

The City of Barrie Water Operations Branch (the Branch) prepared this report to satisfy the requirements of Section 11 of Ontario Regulation (O.Reg.) 170/03. Section 11 (1) which requires that the owner of a drinking water system ensure that a report is prepared in accordance with subsection (3) and (6) for the preceding calendar year. The annual report must be prepared no later than February 28 of each year.

This report covers the period of January 1 to December 31, 2017 and the information provided complies with the reporting requirements outlined in Section 11 of O.Reg.170/03.

A summary of the City of Barrie’s Municipal Drinking Water System (the System) description is outlined below:

- Drinking-Water System Number: 220001192
- Drinking-Water System Name: City of Barrie Drinking Water System
- Drinking-Water System Owner: Corporation of the City of Barrie
- Drinking-Water System Category: Large Municipal Residential

2 Reporting Requirements under Section 11 - O.Reg.170/03

Section 11 requires that the report include the following information relating to the period covered by the report:

- Include a statement of where a report prepared under Schedule 22 will be available for inspection by any member of the public during normal business hours without charge.
- Contain a brief description of the drinking water system, including a list of water treatment chemicals used by the system;
- Describe any major expenses incurred to install, repair or replace required equipment;
- Summarize any reports made to the Ministry of Environment and Climate Change (MOECC) for Adverse Water Quality Incidents (AWQIs);
- Summarize the results of tests required under O.Reg. 170/03, or under an approval, municipal drinking water licence or order, including an Ontario Water Resources Act order, if tests required under this Regulation in respect of a parameter were not required during that period, summarize the most recent results of tests of that parameter; and
- Describe any corrective actions taken.

3 Evidence of Compliance

3.1 Availability of the Annual Report

In accordance with Section 11 of O.Reg. 170/03, a copy of the annual report is available to the public, free of charge from the City of Barrie website and from the Branch by request.

The public was advised of the report’s availability and how to obtain a copy, without charge, on the City of Barrie’s website and in a local newspaper on March 1, 2018

3.2 Description of the Municipal Drinking Water System

The System consists of a Surface Water Treatment Plant (SWTP) and associated low lift pumping station (LLPS), 12 groundwater wells, 3 in-ground storage facilities, 7 booster stations, and 3 elevated storage towers.

Treatment at the SWTP consists of primary screening, flocculation, membrane filtration, granular activated carbon contactors (for taste and odor control), and disinfection with chlorine gas. Primary disinfection is achieved through chlorine contact time (CT) in the four baffled wall chlorine contact chamber and reservoir. Secondary disinfection is achieved by boosting the chlorine residual of the treated water upon entry into the distribution system from the SWTP’s reservoir. Re-chlorination to maintain the chlorine residual in the distribution system is available at Harvie Road Booster Station/Reservoir and Mapleview Tower.

Treatment at each of the well stations consists of iron sequestration by addition of sodium silicate and disinfection with chlorine gas. Primary disinfection is achieved through CT prior to the first consumer, with the exception of Well 5 which achieves primary disinfection utilizing ultraviolet disinfection. Secondary disinfection is maintained throughout the distribution system with booster chlorination applied at 7 locations throughout the distribution system.

The distribution system consists of approximately 3,737 hydrants and approximately 628.7 kilometers of water main and transmission main ranging in sizes from 100mm to 1200mm and as of February 2017, delivering drinking water to a population of approximately 147,000 customers.

3.3 Water Treatment Chemicals

The following water treatment chemicals were utilized during the reporting period:

- Polyaluminum Chloride – Pre-filtration Coagulant – SWTP
- Chlorine – Primary and Secondary Disinfection – SWTP and Wells
- Sodium Silicate – Iron and Manganese Sequestration – Wells

3.4 Significant Expenses Incurred

A brief summary of the major expenses incurred during the reporting period to install, repair or replace required equipment, and value of each, is included in Table 1.

Table 1 – Summary of Expenses Incurred

Activity	Costs Incurred (2017)
Upgraded fuel systems at 13 Groundwater sites to comply with TSSA Fuels Safety Program	\$131,300
Watermain break repairs (37)	\$252,000
Hydro excavation contractors for water infrastructure repairs	\$91,200

3.5 Operational Checks, Sampling and Testing

O.Reg. 170/03 and the Municipal Drinking Water Licence (MDWL) specified the operational checks and sampling requirements for the System. O.Reg. 169/03 specified drinking water quality standards and maximum concentrations of analytical parameters which were acceptable.

In general, during the reporting period, operational checks were completed and drinking water samples were collected in accordance with O.Reg. 170/03 and the MDWL, with one exception of Well 3A which was not in service; therefore no operational checks or regulated samples were collected. In general, the laboratory results for analyzed samples met the requirements and did not exceed the applicable standards stipulated in O.Reg. 169/03.

The laboratory results for all analyzed samples regulated by O.Reg. 170/03 and the MDWL were compared to the standards presented in O.Reg. 169/03 and summarized in Table 3 through Table 11, included in Appendix A for reference.

Additional details of the sampling and testing conducted in 2017 are discussed below in Section 3.5.1 through 3.5.5, inclusive.

3.5.1 Schedule 7 – Operational Checks – O.Reg. 170/03

Operational checks including: treated and distribution free chlorine and raw and treated turbidity was conducted in accordance with Schedule 7 of O.Reg.170/03, with the exception of Well 3A which was not in service.

The operational checks conducted during this reporting period were summarized in Table 3, included in Appendix A for reference.

3.5.2 Schedule 10 – Microbiological Sampling and Testing – O.Reg. 170/03

Raw, treated and distribution water samples were analyzed for microbiological parameters specified in Schedule 10-2, 10-3 and 10-4 of O.Reg. 170/03. Laboratory results for all samples analyzed for microbiological parameters met the requirements and did not exceed the applicable standards stipulated in O.Reg. 169/03.

Pursuant to the Ontario Public Health Inspector’s Guide (OPHIG), dated 2013, and in addition to the sampling and analysis required by O.Reg. 170/03 and O.Reg. 169/03, respectively, raw, treated and distribution drinking water samples were analyzed for bacteriological health-related parameters including: Heterotrophic Plate Count (HPC), and Background bacteria (Background). The presence of HPC and Background is an unusual occurrence in properly disinfected drinking water; HPC and Background counts greater than 200 per 100 mL reflects deterioration of water quality and an increase risk of illness from non-coliform bacterial pathogens.

Laboratory results for all samples analyzed for E.coli, Total Coliforms and Background met the requirements and did not exceed the applicable standards stipulated in O.Reg. 169/03 and the OPHIG, with the exception of the raw water samples collected before treatment on the dates detailed below:

Table 2 – Summary of E.coli, Total Coliform and Background Presence

Date of Sample	E.coli	Total Coliform	Background>200
SWTP – Raw Water			
2017-01-03		X	
2017-01-23		X	
2017-01-30		X	
2017-02-06		X	
2017-02-21		X	
2017-02-27		X	X
2017-03-06		X	
2017-03-27		X	
2017-04-03		X	X
2017-04-10		X	
2017-04-18		X	
2017-05-01		X	
2017-05-08		X	
2017-05-15		X	X
2017-06-05		X	
2017-06-19			X
2017-06-26		X	
2017-07-04			X
2017-07-17		X	
2017-08-08	X	X	X
2017-08-14	X	X	X
2017-08-21	X	X	
2017-09-11	X	X	X
2017-09-18	X		X
2017-10-02	X	X	
2017-10-16	X	X	X
2017-10-23			X
2017-11-13			X
2017-11-20		X	
2017-11-27			X
2017-12-04	X	X	X
2017-12-18			X
2017-12-27		X	

The analytical results for the aforementioned samples from the SWTP were typical for surface waters. The samples analyzed for microbiological and bacteriological parameters during this reporting period were summarized in Table 4, included in Appendix A for reference.

3.5.3 Schedule 13 – Chemical Testing – O.Reg. 170/03

Treated water samples collected from the Water Distribution and Supply Subsystem were analyzed for organic and inorganic chemical parameters in accordance with O.Reg. 170/03, Schedule 13, Section 13.2 (Schedule 23), Section 13.4 (Schedule 24), Section 13.8, and Section 13.9. Analytical results for all samples analyzed for organic and inorganic chemical parameters met the requirements and did not exceed the applicable standards stipulated in O.Reg. 169/03.

If analysis required under O.Reg. 170/03 with respect to an analytical parameter was not required during the reporting period; the most recent analytical results for that parameter was included in this report, in accordance with O.Reg. 170/03, s.11 (6) (b).

Treated water samples collected from the distribution system were analyzed for Trihalomethanes (THMs) in accordance with O.Reg. 170/03, Schedule 13.6. Treated water samples collected from the well stations were analyzed for nitrates and nitrites in accordance with 13.7 of O.Reg.170/03. Laboratory results for all samples analyzed for THM, nitrate and nitrite parameters met the requirements and did not exceed the applicable standards stipulated in O.Reg. 169/03.

The samples analyzed for organic and inorganic chemical parameters during this reporting period were summarized in Table 5, included in Appendix A for reference.

The samples analyzed for THMs during this reporting period were summarized in Table 6, included in Appendix A for reference.

The samples analyzed for sodium, fluoride, nitrate and nitrite parameters during this reporting period were summarized in Table 7, included in Appendix A for reference.

3.5.4 Schedule 15.1 – Lead – O.Reg. 170/03

Lead samples were collected from the plumbing at industrial and commercial locations and several hydrants within the distribution system during the winter sampling period in accordance with Schedule 15.1. Amendments made under the MDWL requiring solely the collection of five (5) Industrial, Commercial & Institutional (ICI) samples and ten (10) Distribution samples to be collected during the reporting periods of December 15, 2016 to April 15, 2017 and June 15 to October 15, 2017.

Analytical results indicated lead concentrations below the established limit of 10 mg/L for all of the locations sampled with the exception of one sample collected from an ICI facility. As required, a second sample from the aforementioned location was collected to confirm the limit exceedance. As a result, the property owner, MOECC Spills Action Centre and the Simcoe Muskoka District Health Unit were notified. The reported exceedance is a result of private plumbing not the distribution system and therefore, did require further action from the Branch.

The samples analyzed for lead during this reporting period were summarized in Table 8, included in Appendix A for reference.

3.5.5 Municipal Drinking Water Licence

In addition to the sampling and monitoring required by O.Reg. 170/03, Schedule C: System Specific Conditions of the MDWL required additional sampling, testing and monitoring at select wells of analytical parameters including select Volatile Organic Compounds (VOC), and sodium, as well as, monitoring of the UV disinfection system installed at Well 5. Analytical results for all samples analyzed for select VOCs and sodium were below the applicable standards stipulated in O.Reg. 169/03.

The samples analyzed for select VOCs and sodium during the reporting period were summarized in Table 9 and Table 10, respectively, included in Appendix A for reference. UV monitoring documented during this reporting period was summarized in Table 11, included in Appendix A for reference.

3.6 Reporting and Corrective Actions

3.6.1 Schedule 16 – Reporting of Adverse Test Results and Other Problems

No Adverse Water Quality Incidents (AWQIs) were reported during the 2017 reporting period in accordance with Schedule 16 of O.Reg. 170/03.

3.6.2 Schedule 17 – Corrective Actions

No corrective action was necessary related to reporting AWQI, as a requirement of O.Reg. 170/03, Schedule 17.

4 Closure

It is the belief of the Branch that this report satisfies the requirements of Section 11 of O.Reg. 170/03. If you have any questions concerning the contents of this report, please contact the Supervisor of Compliance and Technical Support at the Branch.

Appendix A - Tables

Table 3 – Schedule 7 Operational Checks

Sample Location	Sample Count	Free Chlorine		Turbidity			
		(min)	(max)	(min)	(max)	(min)	(max)
		Treated Water		Raw Water		Treated Water	
Well 5	**8760	0.03	2.00	0.00	9.99	--	--
Well 7	**8760	0.29	1.78	0.06	10.00	--	--
Well 9	**8760	0.47	1.66	0.00	3.15	--	--
Well 11	**8760	0.40	1.80	0.01	9.99	--	--
Well 12	**8760	0.28	1.58	0.06	2.20	--	--
Well 13	**8760	0.05	1.66	0.00	10.00	--	--
Well 14	**8760	0.30	2.00	0.01	10.00	--	--
Well 15	**8760	0.34	1.22	0.02	10.00	--	--
Well 16	**8760	0.30	2.00	0.00	6.35	--	--
Well 17	**8760	0.20	2.00	0.01	10.00	--	--
Well 18	**8760	0.13	2.00	0.01	8.43	--	--
Surface Water Treatment Plant	**8760	0.00	5.00	0.00	98.35	0.00	11.12
Bayfield Tower	**8760	0.00	2.00	--	--	--	--
Ferndale Tower	**8760	0.00	2.00	--	--	--	--
Mapleview Tower	**8760	0.44	2.00	--	--	--	--
Anne Reservoir	**8760	0.17	2.00	--	--	--	--
Harvie Reservoir	**8760	0.00	1.75	--	--	--	--
Sunnidale Reservoir	**8760	0.00	2.00	--	--	--	--

Notes:

- ** 8760 - Represents continuous monitoring
- - Analysis not required
- NTU - Turbidity measured in Nephelometric Turbidity Units
- mg/L - Free Chlorine measured in milligrams per litre

Table 4 – Schedule 10 Microbiological Sampling and Testing

Sample Location	E.Coli		Total Coliform		Background		HPC		Sample Count
	(min)	(max)	(min)	(max)	(min)	(max)	(min)	(max)	
Distribution									
North Sampling Points	0	0	0	0	--	--	0	1,830	792
South Sampling Points	0	0	0	0	--	--	0	1,470	778
Other (i.e., main breaks, maintenance)	0	0	0	0	0	0	0	1	20
Sub-Total Distribution Samples									1590
Treated Water									
Well 5	0	0	0	0	0	0	0	240	54
Well 7	0	0	0	0	0	0	0	190	50
Well 9	0	0	0	0	0	0	0	20	52
Well 11	0	0	0	0	0	0	0	90	53
Well 12	0	0	0	0	0	2	0	370	53
Well 13	0	0	0	0	0	20	0	120	52
Well 14	0	0	0	0	0	0	0	210	55
Well 15	0	0	0	0	0	14	0	270	44
Well 16	0	0	0	0	0	0	0	260	46
Well 17	0	0	0	0	0	22	0	220	53
Well 18	0	0	0	0	0	0	0	40	53
Surface Water Treatment Plant	0	0	0	0	0	1	0	580	53
Sub-Total Treated Samples									618
Raw Water									
Well 5	0	0	0	0	0	5	--	--	52
Well 7	0	0	0	0	0	56	--	--	50
Well 9	0	0	0	0	0	6	--	--	51
Well 11	0	0	0	0	0	2	--	--	52
Well 12	0	0	0	0	0	0	--	--	52
Well 13	0	0	0	0	0	0	--	--	51
Well 14	0	0	0	0	0	0	--	--	53
Well 15	0	0	0	0	0	1	--	--	43
Well 16	0	0	0	0	0	136	--	--	46
Well 17	0	0	0	0	0	0	--	--	52
Well 18	0	0	0	0	0	3	--	--	52
Surface Water Treatment Plant	0	9	0	81	0	1300	--	--	52
Sub-Total Raw Samples									606

Notes:

- CFU/100mL - E. coli, Total Coliform and Background results are expressed as Colony Forming Units (CFU)/100mL
- CFU/1mL - Heterotrophic Plate Count (HPC) results are expressed as CFU/1mL
- - Analysis not required

Table 6 – Schedule 13 Chemical Sampling and Testing – Trihalomethanes

Parameter	Running Annual Average
	2017
Trihalomethanes	42.3

Notes:

ug/L - All units reported in micrograms per litre

Table 7 – Schedule 13 Chemical Sampling and Testing – Sodium, Fluoride, Nitrite and Nitrate

Parameter	MDL/RL	Date Sampled	Analytical Results												
			Sample Location	Well 5	Well 7	Well 9	Well 11	Well 12	Well 13	Well 14	Well 15	Well 16	Well 17	Well 18	SWTP
Sodium	0.01 MDL	2016-05-17	--	--	--	--	127	--	--	--	--	--	--	--	
		2016-05-30	--	--	--	--	131	--	--	--	--	--	--	--	
		2016-09-06	--	--	--	--	--	--	--	--	--	--	--	30.8	
Fluoride	0.06 MDL	2016-05-17	--	--	--	--	0.08	--	--	--	--	--	--	--	
		2016-09-06	--	--	--	--	--	--	--	--	--	--	--	0.08	
Nitrite	0.003 MDL 0.01 RL	2017-01-05	--	--	--	--	--	--	--	--	<MDL	--	--	--	
		2017-03-06	<MDL	<MDL	<MDL	<MDL	0.003	<MDL	<MDL	<MDL	<MDL	--	<MDL	--	<MDL
		2017-03-07	--	--	--	--	--	--	--	--	--	--	--	<MDL	--
		2017-06-05	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
		2017-09-05	<RL	<RL	<RL	<RL	<RL	<RL	<RL	<RL	--	--	<RL	<RL	--
		2017-09-06	--	--	--	--	--	--	--	--	--	--	--	--	<RL
		2017-09-29	--	--	--	--	--	--	--	--	<RL	<RL	--	--	--
		2017-10-05	--	--	--	--	--	--	--	--	--	--	--	--	--
		2017-11-27	--	--	--	--	--	--	--	--	--	--	--	--	<RL
Nitrate	0.006 MDL 0.01 RL	2017-01-05	--	--	--	--	--	--	--	--	<MDL	--	--	--	
		2017-03-06	<MDL	<MDL	3.55	0.529	<MDL	1.50	0.043	<MDL	--	<MDL	--	0.202	
		2017-03-07	--	--	--	--	--	--	--	--	--	--	<MDL	--	
		2017-06-05	<MDL	<MDL	3.7	0.038	<MDL	1.59	0.543	<MDL	1.10	<MDL	<MDL	<MDL	0.157
		2017-09-05	<RL	<RL	4	0.6	<RL	1.7	<RL	--	--	<RL	<RL	<RL	--
		2017-09-06	--	--	--	--	--	--	--	--	--	--	--	--	0.2
		2017-09-29	--	--	--	--	--	--	--	--	<RL	0.8	--	--	--
		2017-10-05	--	--	--	--	--	--	--	--	--	--	--	--	--
		2017-11-27	--	--	--	--	--	--	--	--	--	--	--	--	0.2
2017-12-04	<RL	<RL	3.7	0.5	<RL	1.6	<RL	1.6	<RL	<RL	1.1	<RL	<RL	--	

Notes:

- A change in contracted laboratory and testing methods in 2017. Results reported with both MDL and RL where applicable.

-- - Analysis not required

<MDL - Analytical result did not exceed the laboratory Method Detection Limit (MDL)

<RL - Analytical Result did not exceed the laboratory Reporting Limit (RL)

ug/L - All units reported in micrograms per litre

SWTP - Surface Water Treatment Plant

Table 8 – Schedule 15.1 – Lead

Parameter	Sample Count	Range of Results	
		(min)	(max)
Lead (Plumbing)	22	0.16	19.1
Lead (Distribution System)	22	<RL	2.18

Notes:

ug/L - All units reported in micrograms per litre

RL - Laboratory Reporting Limit

Table 9 – Municipal Drinking Water Licence – Raw Water Sampling and Testing – Volatile Organic Compound

Parameter	Analytical Results							
	(min)	(max)	(min)	(max)	(min)	(max)	(min)	(max)
Sample Location	Well 11		Well 12		Well 14		Well 15	
Benzene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Carbon Tetrachloride	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
1,2-Dichlorobenzene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
1,4-Dichlorobenzene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
1,1-Dichloroethylene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
1,2-Dichloroethane	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Dichloromethane	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Monochlorobenzene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Tetrachloroethylene	<RL	0.44	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Trichloroethylene	<MDL	<MDL	<MDL	<MDL	<RL	0.84	<MDL	<MDL
Vinyl Chloride	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Cis-1,2-Dichloroethylene	<RL	2.1	0.8	0.8	0.5	1.1	0.4	3.4

- Notes:
- A change in contracted laboratory testing methods in 2017. Results reported with both MDL and RL where applicable.
 - ug/L - All units reported in micrograms per litre unless otherwise noted
 - <MDL - Analytical result did not exceed the laboratory Method Detection Limit (MDL)
 - <RL - Analytical result did not exceed the laboratory Reporting Limit (RL)

Table 10 – Municipal Drinking Water Licence – Raw Water Sampling and Testing - Sodium

Sample Location	Sodium	
	(min)	(max)
*Well 3A	41.2	46.2
Well 9	37.6	41.7
Well 11	44.8	80
Well 12	121	134
Well 13	44.6	55.7
Well 14	46.3	71.9

- Notes:
- mg/L - All units reported in milligrams per litre
 - * - Although 3A was not in service, analytical results required as a condition of the MDWL

Table 11 – Municipal Drinking Water Licence – Ultra Violet Monitoring

Parameter	Minimum	Well 5	
		(min)	(max)
UV Dosage Monitored Continuously	40	0	98.4
UVT Monitored Weekly	NA	85	99.6

- Notes:
- NA - Not applicable
 - (mJ/cm²) - UV Dosage measured in millijoules per centimeter squared
 - % - UVT measured in percent