APPENDIX "B"

# City of Barrie
# Water Operations Branch

# Drinking Water System
# 2016 Annual Report
# Section 11, O.Reg. 170/03

For the Period of

**JANUARY 1 TO DECEMBER 31, 2016**

| | |
|---|---|
| **System Rating:** | Water Treatment Subsystem Class IV<br>Water Distribution and Supply Subsystem Class IV<br>Water Distribution Subsystem Class II |
| **Drinking Water System No.:** | 220001192 |
| **Municipal Drinking Water Licence No.:** | 014-101, Issue No. 3 |

Effective Date: 2016-02-28

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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, 2016 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 2, 2017.

### 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 3,731 hydrants and approximately 625 kilometers of water main and transmission main ranging in sizes from 100mm to 1200mm and delivers 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 (2016) |
|---|---|
| Performed an Inspection and structural assessment the Centennial Well 12 surge tank to determine if repair or replacement was required | $24,000 |
| Initiated upgrades to plumbing at all well stations to comply with Backflow Prevention and Cross Connection Control By-law | $26,000 |
| Main break repairs (37) | $245,000 |
| Hydro excavation contractors for water infrastructure repairs | $91,000 |

### 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 were below 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 12, included in Appendix A for reference.

Additional details of the sampling and testing conducted in 2016 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: raw and treated water turbidity; and treated and distribution free chlorine 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 were below 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 and Total Coliforms were below the applicable standards stipulated in O.Reg. 169/03 and the OPHIG, with the exception of the samples collected on the dates detailed below:

Table 2 - E.Coli and Total Coliform Exceedances

| E.Coli | | Total Coliform | |
|---|---|---|---|
| **Distribution Maintenance** | | | |
| N/A | | 2016-Aug-25 | 2016-Aug-27 |
| | | 2016-Aug-26 | |
| **SWTP – Raw Water Samples** | | | |
| 2016-Jan-05 | 2016-Nov-14 | 2016-Jan-05 | 2016-Aug-15 |
| 2016-Jan-18 | 2016-Nov-21 | 2016-Jan-18 | 2016-Aug-22 |
| 2016-Feb-01 | 2016-Dec-05 | 2016-Feb-01 | 2016-Aug-29 |
| 2016-Feb-08 | 2016-Dec-19 | 2016-Feb-08 | 2016-Sep-19 |
| 2016-Aug-02 | 2016-Dec-28 | 2016-Feb-16 | 2016-Sep-26 |
| 2016-Aug-15 | | 2016-Feb-24 | 2016-Oct-03 |
| 2016-Aug-22 | | 2016-Feb-29 | 2016-Oct-11 |
| 2016-Aug-29 | | 2016-Mar-14 | 2016-Oct-17 |
| 2016-Sep-19 | | 2016-Mar-21 | 2016-Oct-24 |
| 2016-Sep-26 | | 2016-Mar-29 | 2016-Nov-07 |
| 2016-Oct-03 | | 2016-Apr-04 | 2016-Nov-14 |
| 2016-Oct-11 | | 2016-Apr-18 | 2016-Nov-21 |
| 2016-Oct-17 | | 2016-May-02 | 2016-Dec-05 |
| 2016-Oct-24 | | 2016-Jul-25 | 2016-Dec-19 |
| 2016-Nov-07 | | 2016-Aug-02 | 2016-Dec-28 |
| **Well 16 – Raw Water Samples** | | | |
| 2016-Aug-18 | | N/A | |

The analytical results for the Distribution Maintenance sample noted above are discussed further in Sections 3.6.1 and 3.6.2. The analytical results for the aforementioned samples from the SWTP were typical for surface waters. The analytical results for the sample collected from Well 16 were an anomaly; subsequent analytical results did not identify a trend.

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 analysed 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. Although not mandatory, treated water samples collected from the Water Distribution and Supply Subsystem were analyzed for sodium and fluoride parameters. Analytical results for all samples analyzed for organic and inorganic chemical parameters were below 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 were 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 were below 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 several residential, 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 samples and ten (10) Distribution samples to be collected during the reporting periods of December 15, 2015 to April 15, 2016 and June 15 to October 15, 2016. Analytical results for all samples analyzed for lead were below the applicable standards stipulated in O.Reg. 169/03.

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 10 and Table 11, respectively, included in Appendix A for reference. UV monitoring documented during this reporting period was summarized in Table 12, 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

Fourteen (14) Adverse Water Quality Incidents (AWQIs) were reported in accordance with Schedule 16 of O.Reg. 170/03.

The following AWQIs reported in 2016 were of note:

- AWQI No. 130948, 130960 and 130966 were issued by the MOECC on August 25, 26 and 27, 2016, respectively, as a result of reported laboratory results that exceeded the applicable standards stipulated in O.Reg. 169/03. The samples were collected for final tie-ins as part of watermain commissioning, in accordance with the MOECC Watermain Disinfection Procedure.
- AWQI No 131564 was issued by the MOECC on October 16, 2016, following the break of both a watermain and sanitary line within the same trench, with suspected cross-contamination. Subsequently, the Simcoe Muskoka District Health Unity (SMDHU) issued a Boil Water Order (the Order) on October 18, 2016. The Branch responded to the incident immediately and resolved the incident in consultation with the SMDHU and the local MOECC Inspector. Impacted services were provided an alternate water supply until the infrastructure was repaired and the situation was remediated, including receipt of adequate analytical laboratory results confirming the potable water infrastructure was acceptable for use. The Order was rescinded on November 24, 2016.

The AWQIs that were reported during this reporting period were summarized in Table 9, included in Appendix A for reference.

### 3.6.2 Schedule 17 – Corrective Actions

Corrective actions related to each of the reported AWQI, as discussed above, were completed in accordance with O.Reg. 170/03, Schedule 17.

The Branch resolved the AWQIs noted in Section 3.6.1 in consultation with the SMDHU and the MOECC in a timely manner.

The AWQIs and associated corrective actions that occurred during this reporting period were summarized in Table 9, included in Appendix A for reference.

## 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 | Turbidity | | | | Free Chlorine | |
|---|---|---|---|---|---|---|---|
| | | (min) | (max) | (min) | (max) | (min) | (max) |
| | | Raw Water | | Treated Water | | Treated Water | |
| Well 5 | **8760 | 0.02 | 10.00 | -- | -- | 0.03 | 2.00 |
| Well 7 | **8760 | 0.06 | 10.00 | -- | -- | 0.23 | 2.00 |
| Well 9 | **8760 | 0.00 | 10.00 | -- | -- | 0.13 | 1.82 |
| Well 11 | **8760 | 0.10 | 9.99 | -- | -- | 0.00 | 1.81 |
| Well 12 | **8760 | 0.00 | 10.00 | -- | -- | 0.20 | 2.00 |
| Well 13 | **8760 | 0.00 | 10.00 | -- | -- | 0.10 | 1.98 |
| Well 14 | **8760 | 0.00 | 10.00 | -- | -- | 0.10 | 1.75 |
| Well 15 | **8760 | 0.03 | 10.00 | -- | -- | 0.19 | 1.49 |
| Well 16 | **8760 | 0.16 | 9.99 | -- | -- | 0.28 | 1.63 |
| Well 17 | **8760 | 0.04 | 10.00 | -- | -- | 0.17 | 2.00 |
| Well 18 | **8760 | 0.04 | 2.72 | -- | -- | 0.26 | 2.00 |
| Surface Water Treatment Plant | **8760 | 0.00 | 101.00 | 0.00 | 7.19 | 0.00 | 5.00 |
| Mapleview Tower | **8760 | -- | -- | -- | -- | 0.00 | 1.99 |
| Ferndale Tower | **8760 | -- | -- | -- | -- | 0.00 | 2.00 |
| Bayfield Tower | **8760 | -- | -- | -- | -- | 0.18 | 2.00 |
| Anne Reservoir | **8760 | -- | -- | -- | -- | 0.70 | 2.00 |
| Harvie Reservoir | **8760 | -- | -- | -- | -- | 0.38 | 2.00 |
| Sunnidale Reservoir | **8760 | -- | -- | -- | -- | 0.00 | 2.00 |

Notes:

** 8760 - Represents continuous monitoring
-- - Analysis not required
NTU - Turbidity measured in NTU
mg/L - Free Chlorine measured in miligrams 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 | 520 | 781 |
| South Sampling Points | 0 | 0 | 0 | 0 | -- | -- | 0 | 820 | 771 |
| Other (i.e., main breaks, maintenance) | 0 | 0 | 0 | 25 | 0 | 122 | 0 | 1 | 79 |
| | | | | | | | | Sub-Total Distribution Samples | 1631 |
| **Treated Water** | | | | | | | | | |
| Well 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 53 |
| Well 7 | 0 | 0 | 0 | 0 | 0 | 73 | 0 | 16 | 52 |
| Well 9 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 109 | 51 |
| Well 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 49 |
| Well 12 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 8 | 38 |
| Well 13 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 680 | 52 |
| Well 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 720 | 51 |
| Well 15 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 420 | 24 |
| Well 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 151 | 34 |
| Well 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 52 |
| Well 18 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 6 | 50 |
| Surface Water Treatment Plant | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 2 | 53 |
| | | | | | | | | Sub-Total Treated Samples | 559 |
| **Raw Water** | | | | | | | | | |
| Well 5 | 0 | 0 | 0 | 0 | 0 | 2 | -- | -- | 53 |
| Well 7 | 0 | 0 | 0 | 0 | 0 | 0 | -- | -- | 52 |
| Well 9 | 0 | 0 | 0 | 0 | 0 | 1 | -- | -- | 51 |
| Well 11 | 0 | 0 | 0 | 0 | 0 | 0 | -- | -- | 49 |
| Well 12 | 0 | 0 | 0 | 0 | 0 | 4 | -- | -- | 36 |
| Well 13 | 0 | 0 | 0 | 0 | 0 | >2000 | -- | -- | 53 |
| Well 14 | 0 | 0 | 0 | 0 | 0 | 14 | -- | -- | 51 |
| Well 15 | 0 | 0 | 0 | 0 | 0 | 0 | -- | -- | 25 |
| Well 16 | 0 | 0 | 0 | 1 | 0 | 7 | -- | -- | 34 |
| Well 17 | 0 | 0 | 0 | 0 | 0 | 1040 | -- | -- | 52 |
| Well 18 | 0 | 0 | 0 | 0 | 0 | 36 | -- | -- | 50 |
| Surface Water Treatment Plant | 0 | 7 | 0 | 34 | 0 | >2000 | -- | -- | 52 |
| | | | | | | | | Sub-Total Raw Samples | 558 |

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 5 – Schedule 13 Chemical Sampling and Testing – Inorganics and Organics

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date Sampled | 2015-04-21 | 2015-04-21 | 2015-04-14 | 2015-04-14 | 2015-11-09 | 2015-04-14 | 2015-05-06 | 2015-04-21 | 2015-04-14 | 2015-04-14 | 2015-04-14 | 2016-09-06 |
| | MDL | Analytical Result | | | | | | | | | | | |
| **Treated Water - Inorganic Parameters** | | | | | | | | | | | | | |
| Antimony | 0.02 | 0.17 | 0.04 | 0.22 | 0.18 | <MDL | 0.17 | <MDL | 0.03 | 0.18 | 0.39 | 0.28 | 0.07 |
| Arsenic | 0.2 | 0.4 | 0.3 | <MDL | <MDL | 0.4 | 0.2 | <MDL | 0.4 | 0.3 | 0.4 | 0.6 | 0.5 |
| Barium | 0.01 | 175 | 234 | 97.3 | 262 | 281 | 85.2 | 171 | 247 | 95.9 | 261 | 232 | 27.8 |
| Boron | (0.2) 2 | 24.3 | 17.2 | 9.8 | 18.3 | 29 | 18 | 17.7 | 15.3 | 14.8 | 12.5 | 18.8 | 26 |
| Cadmium | 0.003 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Chromium | 0.03 | <MDL | <MDL | 0.39 | <MDL | <MDL | 0.22 | <MDL | <MDL | 0.13 | <MDL | <MDL | 0.06 |
| Mercury | 0.01 | <MDL | <MDL | 0.02 | <MDL | 0.02 | 0.01 | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL |
| Selenium | 1 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | 0.08 |
| Uranium | 0.002 | 0.425 | 0.291 | 1 | 1.03 | 0.552 | 0.845 | 0.358 | 0.148 | 1.13 | 0.248 | 0.214 | 0.184 |
| **Treated Water - Organic Parameters** | | | | | | | | | | | | | |
| Alachlor | 0.02 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Aldicarb | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| Aldrin+Dieldrin | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| Atrazine | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Atrazine+N-dealkylated metabolites | 0.01 | <MDL | <MDL | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Azinphos-methyl | 0.02 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Bendiocarb | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| Benzene | 0.32 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Benzo(a)pyrene | 0.004 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Bromoxynil | 0.33 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Carbaryl | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Carbofuran | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Carbon Tetrachloride | 0.16 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Chlordane (Total) | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| Chlorpyrifos | 0.02 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Cyanazine | 0.03 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| Desethyl atrazine | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Diazinon | 0.02 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Dicamba | 0.20 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| 1,2-Dichlorobenzene | 0.41 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| 1,4-Dichlorobenzene | 0.36 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Dichlorodiphenyltrichloroethane (DDT) + metabolites | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| 1,2-dichloroethane | 0.35 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| 1,1-Dichloroethylene (vinylidene chloride) | 0.33 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Dichloromethane | 0.35 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| 2,4-Dichlorophenol | 0.015 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| 2,4-Dichlorophenoxy acetic acid (2,4-D) | 0.19 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Diclofop-methyl | 0.40 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Dimethoate | 0.03 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Dinoseb | 0.36 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| Diquat | 1 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Diuron | 0.03 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Glyphosate | 1 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Heptachlor + Heptachlor Epoxide | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| Lindane (Total) | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| Malathion | 0.02 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| MCPA | 0.00012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | <MDL |
| Methoxychlor | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| Metolachlor | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Metribuzin | 0.02 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Monochlorobenzene | 0.3 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Paraquat | 1 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Parathion | 0.02 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| Pentachlorophenol | 0.15 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Phorate | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Picloram | 1 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Polychlorinated Biphenyls (PCB) | 0.04 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Prometryne | 0.03 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Simazine | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Temephos | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| Terbufos | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Tetrachloroethylene (perchloroethylene) | 0.35 | <MDL | <MDL | <MDL | 0.5 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| 2,3,4,6-Tetrachlorophenol | 0.20 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Triallate | 0.01 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Trichloroethylene | 0.44 | <MDL | <MDL | <MDL | 0.49 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| 2,4,6-Trichlorophenol | 0.25 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| 2,4,5-Trichlorophenoxy acetic acid (2,4,5-T) | 0.22 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- |
| Trifluralin | 0.02 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Vinyl Chloride | 0.17 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |

Notes:

ug/L - All units presented in micrograms per litre unless noted otherwise
-- - Analysis not required
<MDL - Analytical result did not exceed the laboratory Method Detection Limit (MDL)
(#) # - MDL for analysis completed in 2015 indicated in brackets "()". MDL for analysis completed in 2016 indicated without brackets.
SWTP - Surface Water Treatment Plant

Table 6 – Schedule 13 Chemical Sampling and Testing – Trihalomethanes

| Parameter | Running Annual Average |
|---|---|
| | 2016 |
| Trihalomethanes | 32.0 |

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 | 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 | 2016-05-17 | -- | -- | -- | -- | 127 | -- | -- | -- | -- | -- | -- | -- |
| | | 2016-05-30 | -- | -- | -- | -- | 131 | -- | -- | -- | -- | -- | -- | -- |
| | | 2016-09-06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30.8 |
| Fluoride | 0.06 | 2016-05-17 | -- | -- | -- | -- | 0.08 | -- | -- | -- | -- | -- | -- | -- |
| | | 2016-09-06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.08 |
| Nitrite | 0.003 | 2016-01-25 | -- | -- | -- | -- | -- | -- | -- | <MDL | -- | -- | -- | -- |
| | | 2016-03-07 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- | -- | <MDL | <MDL | <MDL |
| | | 2016-05-05 | -- | -- | -- | -- | -- | -- | -- | -- | <MDL | -- | -- | -- |
| | | 2016-05-17 | -- | -- | -- | -- | <MDL | -- | -- | <MDL | -- | -- | -- | -- |
| | | 2016-06-06 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| | | 2016-06-20 | -- | -- | -- | -- | <MDL | -- | -- | -- | -- | -- | -- | -- |
| | | 2016-09-06 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| | | 2016-12-05 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | <MDL |
| | | 2016-12-07 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | -- | <MDL | <MDL | <MDL | -- |
| Nitrate | 0.006 | 2016-01-25 | -- | -- | -- | -- | -- | -- | -- | <MDL | -- | -- | -- | -- |
| | | 2016-03-07 | <MDL | <MDL | 3.47 | 0.556 | -- | 1.48 | 0.068 | -- | -- | <MDL | <MDL | 0.144 |
| | | 2016-05-05 | -- | -- | -- | -- | -- | -- | -- | -- | 1.140 | -- | -- | -- |
| | | 2016-05-17 | -- | -- | -- | -- | <MDL | -- | -- | <MDL | -- | -- | -- | -- |
| | | 2016-06-06 | <MDL | <MDL | 3.15 | 0.73 | -- | 1.39 | 0.146 | <MDL | 1.1 | <MDL | <MDL | 0.115 |
| | | 2016-06-20 | -- | -- | -- | -- | <MDL | -- | -- | -- | -- | -- | -- | -- |
| | | 2016-09-06 | <MDL | <MDL | 3.56 | 0.66 | <MDL | 1.73 | 0.089 | <MDL | 1.17 | <MDL | <MDL | 0.132 |
| | | 2016-12-05 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.104 |
| | | 2016-12-07 | <MDL | <MDL | 3.57 | 0.603 | <MDL | 1.54 | 0.053 | -- | 1.030 | <MDL | <MDL | -- |

Notes:

-- - Analysis not required

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

ug/L - All units reported in micrograms per litre unless otherwise noted

SWTP - Surface Water Treatment Plant

Table 8 – Schedule 15.1 – Lead

| Parameter | MDL | Sample Count | Range of Results | |
|---|---|---|---|---|
| | | | (min) | (max) |
| Lead (Plumbing) | 0.01 | 20 | 0.26 | 7.46 |
| Lead (Distribution System) | 0.01 | 20 | 0.01 | 0.13 |

Notes:

ug/L - All units reported in micrograms per litre unless otherwise noted
MDL - Laboratory Method Detection Limit

Table 9 – Schedule 16 and 17 – Adverse Water Quality Incidents (AWQIs) and Corrective Actions

| AWQI # | Incident Date | Location | Parameter | Result | Unit of Measure | Corrective Action Taken | Corrective Action Date |
|---|---|---|---|---|---|---|---|
| 127958 | 2016-01-08 | WPS13 | Chlorine | 0.38 | mg/L | pump down clear well to waste, refill, collect bacteriological sample, collect raw and treated sample, receive all clear results | 2016-01-08 |
| 128293 | 2016-02-16 | V6880 | Chlorine | 0.44 | mg/L | concern having found valve in closed position, bacteriological sample taken, all clear results | 2016-02-18 |
| 129289 | 2016-04-27 | WPS5 | Chlorine | 0.04 | mg/L | backflush, restore residual | 2016-04-27 |
| 129309 | 2016-04-28 | WPS5 | Chlorine | 0 | mg/L | backflush, restore residual | 2016-04-27 |
| 129523 | 2016-05-24 | WPS12 | Sodium | 127 | mg/L | made report and resampled as per 60 month requirement of O.Reg. 170/03 | 2016-05-27 |
| 129919 | 2016-06-25 | WPS11 | Chlorine | 0 | mg/L | respond to station, take grab sample, adjust analyzer, backflush station | 2016-06-25 |
| 129930 | 2016-06-26 | WPS11 | Chlorine | 0 | mg/L | attend station, collect grab sample, verify chlorine system is operational, investigate analyzer | 2016-06-26 |
| 129931 | 2016-06-26 | WPS5 | Chlorine | 0.03 | mg/L | attend station, collect grab sample, adjust analyzer, backflush station | 2016-06-26 |
| 129951 | 2016-06-28 | WPS5 | Chlorine | 0.04 | mg/L | attend station, backflush station, check analyzer | 2016-06-28 |
| 130147 | 2016-07-08 | WPS15 | Communications | NA | NA | loss of communications during storm event, operator attended station, restored communications | 2016-07-08 |
| 130948 | 2016-08-26 | H892 | Total Coliform | 2 | count/100mL | resample upstream and downstream of hydrant | 2016-08-30 |
| 130960 | 2016-08-27 | H892 & H1070 | Total Coliform | 2 & 12 | count/100mL | resample upstream and downstream of hydrant | 2016-08-30 |
| 130966 | 2016-08-27 | H892 & H1070 & H1072 & H3779 | Total Coliform | 25 | count/100mL | resample upstream and downstream of hydrants, receive clear results for all hydrants | 2016-08-30 |
| 131564 | 2016-10-16 | 36, 40, 42, 44 & 46 Brennan Ave | potential sewage contamination | NA | NA | isolated main, back-flushed and sampled for bacteriological contaminants the 6 homes affected, installed temporary water supply with backflow, contacted SMDHU, boil water order initiated, affected main replaced, bacteriological sampling, boil water order rescinded | 2016-11-24 |

Notes:

NA - Not applicable

Table 10 – Municipal Drinking Water Licence – Raw Water Sampling and Testing – Volatile Organic Compound

| Parameter | MDL | Analytical Results | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | (min) | (max) | (min) | (max) | (min) | (max) | (min) | (max) |
| | Sample Location | Well 11 | | Well 12 | | Well 14 | | Well 15 | |
| Benzene | 0.32 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Carbon Tetrachloride | 0.16 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| 1,2-Dichlorobenzene | 0.41 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| 1,4-Dichlorobenzene | 0.36 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| 1,1-Dichloroethylene | 0.33 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| 1,2-Dichloroethane | 0.35 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Dichloromethane | 0.35 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Monochlorobenzene | 0.3 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Tetrachloroethylene | 0.35 | 0.35 | 0.46 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Trichloroethylene | 0.44 | <MDL | <MDL | <MDL | <MDL | 0.48 | 0.85 | <MDL | <MDL |
| Vinyl Chloride | 0.17 | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL | <MDL |
| Cis-1,2-Dichloroethylene | 0.30 | <MDL | 0.6 | <MDL | <MDL | 0.6 | 1.1 | 3.6 | 6.4 |

Notes:

ug/L - All units reported in micrograms per litre unless otherwise noted

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

Table 11 – Municipal Drinking Water Licence – Raw Water Sampling and Testing - Sodium

| Sample Location | MDL | Sodium | |
|---|---|---|---|
| | | (min) | (max) |
| *Well 3A | 0.01 | 38.2 | 46.9 |
| Well 9 | | 33.6 | 44.4 |
| Well 11 | | 66.9 | 89.8 |
| Well 12 | | 118 | 144 |
| Well 13 | | 42.2 | 50.4 |
| Well 14 | | 45.7 | 58.6 |

Notes:

mg/L - All units reported in milligrams per litre unless otherwise noted

* - Although Well 3A was not in service, analytical results required as a condition of the MDWL

MDL - Laboratory Method Detection Limit

Table 12 – Municipal Drinking Water Licence – Ultra Violet Monitoring

| Parameter | Minimum | Well 5 | |
|---|---|---|---|
| | | (min) | (max) |
| UV Dosage *Monitored Continuously* | 40 | 0 | 104.9 |
| UVT *Monitored Weekly* | NA | 85 | 98 |

Notes:

NA - Not applicable

($mJ/cm^2$) - UV Dosage measured in milijules per centimeter squared

% - UV Transmittance measured in percent