

2017 Summary Report

Vars Well System

1.0 General overview

The City of Ottawa provides treatment, storage, and distribution of high quality drinking water to approximately 892,000 residents and industrial water users. The central water supply includes the Britannia and Lemieux Island Water Purification Plants which utilize the Ottawa River for their source water. Treated drinking water from both plants is distributed through a large network of water mains, pumping stations, reservoirs, and elevated tanks including a direct water supply to Russell Township. Outside of the central supply, the City operates (5) well systems that provide drinking water to rural communities located in Carp, Richmond (Kings Park subdivision), Munster, Greely (Shadow Ridge subdivision), and Vars.

This report deals specifically with the production and distribution of drinking water from the Vars Well System, which supplies water to the residents of Vars (population served: 1,194). The report must review regulatory requirements, standards and drinking water license requirements as a means of demonstrating compliance with drinking water regulations and the provision of safe drinking water during 2017.

The report has been prepared in fulfillment of Schedule 22 of O.Reg.170/03, which requires that a Summary Report be prepared for each water supply system and given to the members of municipal council by March 31st of the following year. The report covers the period from January 1st to December 31st, 2017.

2.0 Drinking water regulations

The Safe Drinking Water Act (2002) was created in response to the events in Walkerton, as a means of ensuring the provision of safe drinking water throughout the province. Under the authority of the Safe Drinking Water Act, several key regulations have been defined in the last number of years:

- O.Reg.170/03 – Drinking Water Systems Regulation
- O.Reg.169/03 – Ontario Drinking Water Quality Standards
- O.Reg.248/03 – Drinking Water Testing Services
- O.Reg.128/04 – Certification of Drinking Water Systems Operators
- O.Reg.188/07 – Licensing of Municipal Drinking Water systems
- O.Reg.170/03 (Appendix) – Procedure for Disinfection of Drinking Water in Ontario
- O.Reg.170/03 (Sch.15.1) – Community Lead Testing Program
- O.Reg.284/07 – Source Water Protection Regulation

These regulations cover all aspects of municipal water supply, including treatment requirements, quality standards, test frequency, operations and maintenance, operator qualifications, laboratory testing, inspections, reports, and public notification.

3.0 System approval and accreditation

In addition to the regulations noted above, the Ministry of Environment and Climate Change (MOECC) requires all owners of municipal drinking water systems to obtain a Municipal Drinking Water License (MDWL) for each drinking water system. These licenses are comprised of five elements, as listed below:

- **Permit To Take Water**
- **Drinking Water Works Permit**
- **Operational Plan**
- **Accredited Operating Authority**
- **Financial Plan**

Ottawa's municipal water systems operate under a comprehensive quality management system which is required in Ontario through the *Safe Drinking Water Act, 2002*. The Drinking Water Quality Management System (DWQMS) was established in 2007 to ensure proper oversight and management of the drinking water supply. It is composed of 21 Elements that cover all aspects of drinking water supply including: plant operations, infrastructure, maintenance, risk assessment, water quality testing, staff training, documentation, and continual improvement.

The City of Ottawa is the Operating Authority for the Vars Well System and was awarded its third party accreditation on October 3rd, 2011. Since that time, the City has maintained its accreditation through annual external audits of the Quality Management System and re-accreditation audits on a triennial basis. Re-accreditation was awarded by NSF International Strategic Registrations on October 4, 2014 and October 2, 2017. Collectively, these elements help to ensure the provision of safe drinking water to the public.

4.0 Annual inspection

The Ministry of Environment and Climate Change (MOECC) carried out its annual inspection of the Vars Well System on January 16th, 2018. The inspection focused on regulatory compliance, plant operations, data records, operator certification, record keeping, and management practices for the period January 1st to December 31st, 2017.

An inspection report was received on March 8th, 2018. There were (0) Provincial Orders, (0) Items of Non-Compliance, and (0) Best Practice Recommendations cited by the Inspector. A final inspection rating of 100% was given for the Vars Well System. The % rating is a risk-based score determined from 100 regulatory questions covering 15 inspection categories.

5.0 Compliance with drinking water regulations

During 2017, the Vars Well System was compliant with drinking water regulatory requirements, with any exceptions noted below in section 6.0. The table in Appendix I demonstrates the level of compliance by listing all key regulatory requirements for drinking water in comparison to the operational results achieved during 2017. The table illustrates both the comprehensive nature of provincial requirements and the diligence of drinking water staff in complying with drinking water regulations.

6.0 Items of non-compliance

There were (0) items of non-compliance observed during 2017.

7.0 Summary of annual water production

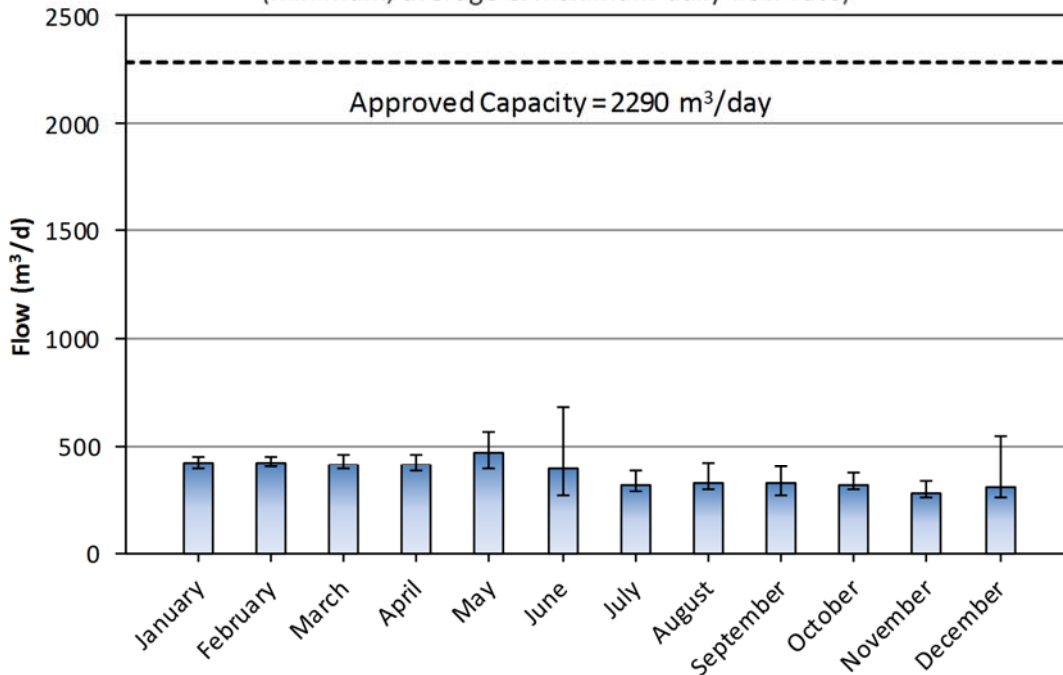
The Vars Well System treated and distributed an average of 366.9 (m³/day), which represents 16% of the approved plant capacity. The daily flow rates ranged from a minimum of 254.7 (m³/day) to a maximum of 685.7 (m³/day). The table and graph below summarize the 2017 water production by month. The 2017 maximum daily flow rate of 685.7 (m³/day) was within the approved capacity of the treatment system, which is 2,290 (m³/day).

Vars Well System daily water production flow rates by month during 2017

| | Average Daily Flow Rate | Minimum Daily Flow Rate | Maximum Daily Flow Rate |
|-----------------|--------------------------------|--------------------------------|--------------------------------|
| Month | (m³/d) | (m³/d) | (m³/d) |
| January | 422.7 | 396.6 | 455.1 |
| February | 420.5 | 400.4 | 451.9 |
| March | 412.4 | 394.8 | 457.3 |
| April | 415.8 | 379.1 | 455.4 |
| May | 466.2 | 389.5 | 567.2 |
| June | 389.6 | 270.2 | 685.7 |
| July | 314.5 | 284.6 | 384.7 |
| August | 329.3 | 296.5 | 417.0 |
| September | 329.2 | 266.5 | 405.8 |
| October | 318.7 | 294.3 | 371.8 |
| November | 280.5 | 254.7 | 338.3 |
| December | 306.8 | 260.8 | 546.2 |
| Year End | 366.9 | 254.7 | 685.7 |
| | (Average) | (Min. Day) | (Max. Day) |

2017 Vars Water Production by month

(minimum, average & maximum daily flow rate)



8.0 Water quality report

The Ontario Drinking Water System Regulation O.Reg.170/03 defines requirements for water quality sampling and testing based on categories of test parameters: microbiological, operational, inorganic, and organic. In order to fully characterize drinking water quality, the City of Ottawa conducts additional testing for other trace organic, inorganic, and radiological substances. The table attached in Appendix II summarizes the test results for Vars treated water, which represents water as it enters into the distribution system. It is important to note that in addition to treated water, water quality testing is performed for raw (untreated) well water, treatment plant samples, and several routine sample locations in the distribution system (Saint-Guillaume School, Peladeau Grocery, and Residence Saint-Marie).

For comparison against the water quality results, the Ontario Drinking Water Standards (O.Reg.169/03) are presented in the right column of the table to indicate the Maximum Acceptable Concentration (MAC) for various substances in drinking water. These standards are based on Health Canada's Guidelines for Canadian Drinking Water Quality. The MAC concentration limits are set at levels that are deemed to be protective of public health for daily water consumption over a lifetime.

During 2017, there were no test results that exceeded MAC levels for health-based parameters. The results demonstrate that drinking water supplied from the Vars Well System was of high

quality and met Ontario Drinking Water Standards (O.Reg.169/03) and the Health Canada Guidelines for Canadian Drinking Water Quality.

9.0 Summary

The operation of the Vars Well System complied with the requirements of Ontario drinking water regulations, permits, and licenses. The quality of treated and distributed drinking water remained high during 2017 and met all federal and provincial standards for safe drinking water.

Appendix I

Vars Well System

Regulatory requirements and compliance with Safe Drinking Water Act (2002)

Drinking water system: Vars Well System
 Source Water: Groundwater - Well#1 and Well#2
 Waterworks No.: 210002263
 Date of report: March 31, 2018

| No. | Description | Legislation | Regulatory Requirement | Results Achieved | Regulatory Compliance ? | Lead Person |
|------------------------|--------------------------|----------------------------------|---|--|-------------------------|-------------|
| Water Treatment | | | | | | |
| T1 | Raw (well) water taking | PTTW #5156-9HDRJ7 | Ground water taking for combined wells must be <2,300 m ³ /d | Avg. intake flow = 383.8 m ³ /d Max. daily flow = 771.9 m ³ /d | yes | Y. Zawada |
| T2 | Raw (well) water taking | PTTW #5156-9HDRJ7 | Daily raw water taking flow rates for previous year must be submitted to MOECC by March 31 | Daily water taking data submitted to MOECC Water Taking and Reporting System by March 31 | yes | Y. Zawada |
| T3 | Treated water production | MDWL #008-105 Sch.(C) 1.0 | Treated water flow must be <2,290 m ³ /d | Average daily flowrate = 366.8 m ³ /d Max. daily flowrate = 685.7 m ³ /d | yes | Y. Zawada |
| T4 | Well protection | O.Reg.170/03 Sch.1.2 | Wells must be constructed and maintained to prevent surface water and contaminants from entering the well | Wells inspected by MOECC during annual inspection; no issues noted during the inspection Ten-Year Inspection of Well #1 and Well #2 Vars Communal Well System (September, 2011) | yes | Y. Zawada |

| No. | Description | Legislation | Regulatory Requirement | Results Achieved | Regulatory Compliance ? | Lead Person |
|-----|---------------------------------------|---|---|---|-------------------------|-------------|
| T5 | Treatment barriers | O.Reg.170/03 Sch.1.2 | Treatment barriers must be operated: (i) whenever water is being supplied, (ii) in accordance with the <i>Procedure for Disinfection</i> , & (iii) to achieve the design capability | During 2017, all treatment barriers were fully operational whenever the treatment plant was in production | yes | Y. Zawada |
| T6 | Pathogen removal | MDWL #008-105 Sch.(E) 1.0; O.Reg.170/03 Sch.1.3 | Treatment must be designed and operated to achieve: >2-log (99%) reduction of Virus | Pathogen removal/inactivation targets were met at all times: Virus inactivation = 6.6-log (minimum log reduction during the year) | yes | Y. Zawada |
| T7 | Secondary disinfection | O.Reg.170/03 Sch.1.5 | Secondary disinfection equipment must be capable of providing 0.2 mg/L free chlorine throughout the distribution system | Secondary disinfection levels in treated water ranged from 0.74 mg/L – 1.84 mg/L | yes | P.Wilson |
| T8 | Continuous analyzers | O.Reg.170/03 Sch.6.5, Sch.7.2 | Must provide minimum testing frequency , alarm settings, operator response, data review within 72 hours, chlorine at CT outlet, calibration | (1) chlorine analyzer – met all requirements | yes | Y. Zawada |
| T9 | Chemicals and materials | MDWL #008-105 Section 14.0 | Chemicals and materials in contact with drinking water must meet standards NSF/60, NSF/61, & NSF 372 | NSF certification achieved for 6% sodium hypochlorite treatment chemical used for disinfection, and Potassium Permanganate used for oxidation of iron/magnesium | yes | Y. Zawada |
| T10 | Calibration of flow measuring devices | MDWL #008-105 Sch.(C) 2.0 | Annual calibration for raw (well) water and treated water flow meters | Raw and treated water flow meters were calibrated during 2017. | yes | Y. Zawada |

| No. | Description | Legislation | Regulatory Requirement | Results Achieved | Regulatory Compliance ? | Lead Person |
|----------------------|---|---|--|--|-------------------------|-------------|
| Water Quality | | | | | | |
| W1 | Microbiological sampling & testing | O.Reg.170/03 Sch.10.2, 10.3, & 10.4 | Raw water – weekly TC/EC (n=52x2) Treated water – weekly TC/EC (n=52) Treated water – weekly HPC (n=52) Distrib. – 9/month TC/EC (n=108) Distrib. – 2/month HPC (n=24) | Raw water – TC/EC (n=203) Treated water – TC/EC (n=103) Treated water – HPC (n=103) Distrib. – TC/EC (n=204) Distrib. – HPC (n=204) | yes | P.Wilson |
| W2 | Chemical sampling & testing | O.Reg.170/03 Sch.13.2, Sch.13.3 | Inorganics (9 metals): 1 every 3 years Organics (56 chemicals): 1 every 3 years | Inorganics – in 2017, 35 samples analyzed for trace metals Organics – In 2017, 1 sample analyzed for trace organics | yes | P.Wilson |
| W3 | Turbidity in source wells | O.Reg.170/03 Sch.7.3 | Monthly turbidity measurements in each source well (12 x 2 wells = 24 tests required per year) | Turbidity was measured twice per week in each source well. 203 tests completed during 2017 | yes | P.Wilson |
| W4 | Trihalomethanes, haloacetic acids, nitrate, nitrite, sodium, fluoride | O.Reg.170/03 Sch.13.6, 13.6.1, 13.7, 13.8, 13.9 | Trihalomethanes – 4/year (dist.) haloacetic acids – 4/year (dist.) nitrate/nitrite – 4/year sodium – 1 sample every 5 yrs fluoride – 1 sample every 5 yrs | Trihalomethanes – in 2016, 12 samples haloacetic acids – in 2017, 12 samples nitrate/nitrite – in 2017, 12 samples sodium – in 2017, 16 samples taken fluoride – In 2017, 12 samples taken | yes | P.Wilson |
| W5 | Chlorine residual testing in distribution system | O.Reg.170/03 Sch.7.2.3 | At least 7 samples per week, either daily or 4/3 at least 48 hours apart with multiple locations | 7 chlorine measurements taken per week as per regulation | yes | P.Wilson |
| W6 | Chlorine readings for bacteriological samples | O.Reg.170/03 Sch.6.3 | Chlorine residual must be measured and recorded for every required bacteriological sample | 307 bacteriological samples taken during the year; all samples had a chlorine residual measured and recorded | yes | P.Wilson |

| No. | Description | Legislation | Regulatory Requirement | Results Achieved | Regulatory Compliance ? | Lead Person |
|-----|---|---|---|---|-------------------------|-------------|
| W7 | Increased frequency of testing for chemicals | O.Reg.170/03 Sch.13.5 | Increase test frequency to quarterly if test result exceeds half the Ontario Drinking Water Quality Standard | Test frequency at least quarterly for parameters that exceeded half the MAC concentration: trihalomethanes (70.9 ppb), Haloacidic Acids (85.9 ppb) | yes | P.Wilson |
| W8 | Lead testing in consumer tap water | O.Reg.170/03 Sch.15.1 | Twice per year, conduct 30-minute stagnation sampling in 20 homes with lead service pipes, 1 building, and 2 distribution locations, unless exempt; 90 th percentile lead concentrations for Litre-1 and Litre-2 must be <10.0 ppb | Vars well system received exemption from lead testing in homes due to low lead concentrations observed during initial testing; pH and alkalinity measurements taken at 2 locations during 2017 as required by regulation. | yes | P.Wilson |
| W9 | Duty to report adverse water quality test results | O.Reg.170/03 Sch.16.3, 16.4, 16.6, 16.7, 16.8, 16.9 | Report immediately to MOH, MOECC, written report within 24 hours, take corrective actions, provide resolution notice within 7 days | During 2017 there was (1) adverse water quality reports for the Vars Well System. The adverse sample was reported, investigated and resolved according to O. Reg. 170/03 | yes | P.Wilson |
| W10 | Corrective actions for adverse water quality | O.Reg.170/03 Sch.17.2 – 17.13 | Specific corrective actions are required for each type of Adverse Water Quality event : improper disinfection, filter turbidity, chlorine residual, E.coli, total coliforms, <i>Aeromonas</i> , MAC, pesticide, sodium | For the (1) adverse water quality report, the required corrective actions were taken. | yes | P.Wilson |
| W11 | Retention of records | O.Reg.170/03 Section 13 | 2 years – operational checks & microbiological testing 6 years – chemical testing, lead testing, corrective actions, annual & summary reports 15 years – sodium, fluoride, Engineer Reports | All records retained as per the regulation: 2 years required– 5 years retained 6 years required– 8 years retained 15 years required– 15 years retained | yes | P.Wilson |

| No. | Description | Legislation | Regulatory Requirement | Results Achieved | Regulatory Compliance ? | Lead Person |
|-------------------------------|--|----------------------------------|---|---|-------------------------|----------------------|
| W12 | Notification of laboratory testing | O.Reg.170/03 Sch.6.9 | Must provide written notification to the MOECC for the identity of the Laboratory performing regulatory testing of water samples | Written notifications were provided to MOECC in 2008 with an update in 2016 & 2017 for regulatory testing at the ROPEC, Caduceon & SGS Lakefield (& subcontracted) Laboratories | yes | P.Wilson |
| W13 | Laboratory testing of drinking water samples | O.Reg.248/03 Section 1 | Analysis of parameters with a health-based drinking water quality standard must be performed by a licensed and accredited laboratory | ROPEC, Caduceon & SGS Lakefield (& subcontracted) Laboratories are all licensed and accredited labs | yes | P.Wilson |
| W14 | Research - laboratory testing of water samples | O.Reg.248/03 Section 5 | Provide written notification to MOECC for research samples being analyzed in non-licensed laboratories | (1) research notification form updated, signed, and on-site for inspection: radiological testing for tritium in treated water sample; | yes | I.Douglas |
| Water Distribution | | | | | | |
| D1 | Disinfection of watermains | DWWP #008-205; Sch.B 2.3 | All watermains or related fixtures that come in contact with drinking water must be disinfected as per the MOECC Watermain Disinfection Procedure and/or AWWA Standard C651 before being put into service | During 2017, all new water mains and repairs were disinfected as per requirements of AWWA Standard C651 and the MOECC Watermain Disinfection Procedure; | yes | C.Hall |
| Operator Certification | | | | | | |
| O1 | Overall Responsible Operator (ORO) | O.Reg.128/04 | Overall Responsible Operator must be certified to level of the system: Level-2 (Treatment) & Level-2 (Distribution); can be one level lower for up to 150 days per year | During 2017, Overall Responsible Operators held Class-3/4 license (treatment) and Class-2/3 license (distribution) as required by regulation O.Reg.128/04 | yes | Y. Zawada/ C.Hall |

| No. | Description | Legislation | Regulatory Requirement | Results Achieved | Regulatory Compliance ? | Lead Person |
|-------------------------------------|------------------------------------|--|---|--|-------------------------|--------------------|
| O2 | Treatment & distribution operators | O.Reg.170/03 Sch.1.2; O.Reg.128/04 Sch.22 | All adjustments to water treatment and distribution system must be carried out by certified operators | The treatment plant and distribution system was operated and/or supervised by certified operators at all times during the reporting period | yes | Y. Zawada / C.Hall |
| O3 | Water quality testing | O.Reg.170/03 Sch.7.5 | All drinking water tests must be performed by a Certified Operator or Water Quality Analyst | Field testing performed by Process Operators, Remote Facility Operators, & Water Distribution Operators (all certified by MOECC) | yes | P.Wilson |
| Reports & Record-keeping | | | | | | |
| R1 | Summary reports | O.Reg.170/03 Sch.22.2 | Prepare and transmit Summary Report for each water system to municipal council by March 31 st of the next calendar year | Summary Report was prepared and transmitted by March 31 st , 2018 | yes | T.Rose |
| R2 | Annual reports | O.Reg.170/03 Section 11 | Prepare Annual Report for each water system and make available to public by February 28 th of the next calendar year | Annual Report was prepared and posted on www.ottawa.ca website on February 14 th , 2018 | yes | T.Rose |
| R3 | Alterations to the system | DWWP #008-205 ; Sch.B 4.0 | Any alteration of the treatment system must be documented in Forms 2/3 – Record of Minor Modification, retained on-site for 10 years | During 2017, there were no minor modification project carried out for this facility. | yes | Y.Zawada |
| R4 | Alterations to the system | DWWP #008-205 ; Sch.B 4.0 | Any alteration of the water mains must be documented in Form 1 – Record of Water Mains Authorized as a Future Alteration, retained on-site for 10 years | All water main alterations carried out during 2017 were recorded in Form 1 documents, stored on City Intranet Site | yes | C.Hall |

Regulations, Licenses, & Permits:

MDWL – Municipal Drinking Water License

DWWP – Drinking Water Works Permit

PTTW – Permit To Take Water

O.Reg.170/03 – Drinking Water Systems Regulation

O.Reg.169/03 – Ontario Drinking Water Quality Standards

O.Reg.248/03 – Drinking Water Testing Services

O.Reg.128/04 – Certification of Drinking Water Systems Operators

O.Reg.188/07 – Licensing of Municipal Drinking Water systems

O.Reg.170/03 (Appendix) – Procedure for Disinfection of Drinking Water in Ontario

O.Reg.170/03 (Sch.15.1) – Community Lead Testing Program

AWWA – American Water Works Association

Glossary:

NOTE: water quality testing refers to treated water samples unless otherwise stated

ML/d = mega-Litres per day = million Litres per day

WPP = Water Purification Plant

TC = Total Coliform bacteria, units of (cfu/100mL)

EC = E.coli bacteria, units of (cfu/100mL)

HPC = Heterotrophic Plate Count bacteria, units of (cfu/mL)

MAC = maximum acceptable concentration for Ontario Drinking Water Standards

MOH – Medical Officer of Health

MOECC – Ministry of Environment and Climate Change



Vars Well System - 2017 Drinking Water Quality

physical, microbiological, chemical, & radiological test results

Physical

| Test Parameter | units | Treated water results | Drinking water standard* |
|------------------|-----------|-----------------------|--------------------------|
| Colour | TCU | 1.5 | 5 (A) |
| Turbidity | NTU | 0.60 | 5 (A) |
| Temperature | °C | 13.4 | <15 (A) |
| Conductivity | m-mhos/cm | 511 | |
| UV254 absorbance | abs/cm | 0.007 | |

Microbiological

| Test Parameter | units | Treated water results | Drinking water standard* |
|---------------------------------|-----------|-----------------------|--------------------------|
| Total Coliforms | cfu/100mL | 0 of 103 tests >0 | 0 |
| E.coli | cfu/100mL | 0 of 103 tests >0 | 0 |
| Heterotrophic Plate Count (HPC) | cfu/mL | range: <10 - 80 | 500 (O) |

Chemical - general

| Test Parameter | units | Treated water results | Drinking water standard* |
|--------------------------|------------------------|-----------------------|-----------------------------|
| pH | log ₁₀ | 7.70 | ² 7.0 - 10.5 (O) |
| Alkalinity | mg/L CaCO ₃ | 221 | 30 - 500 (O) |
| Bromate | mg/L | <0.003 | 0.01 |
| Bromide | mg/L | 0.005 | |
| Calcium | mg/L | 61.8 | |
| Chlorate | mg/L | 0.10 | 1.0 |
| Chloride | mg/L | 18.1 | 250 (A) |
| Chlorine (total) | mg/L | 1.25 | >0.05 ³ |
| Chlorite | mg/L | <0.01 | 1.0 |
| Cyanide | mg/L | <0.002 | 0.2 |
| Fluoride | mg/L | 0.18 | 1.5 |
| Iodide | mg/L | 0.009 | |
| Lithium | mg/L | 0.004 | |
| Magnesium | mg/L | 11.6 | |
| Potassium | mg/L | 3.8 | |
| Silicon | mg/L | 6.6 | |
| Sodium | mg/L | 31.5 | ⁵ 20, 200 (A) |
| Sulphate | mg/L | 23.5 | 500 (A) |
| Total Hardness** | mg/L CaCO ₃ | 201.9 | 80 - 100 (A) |
| Calcium Hardness** | mg/L CaCO ₃ | 154.3 | |
| Magnesium Hardness** | mg/L CaCO ₃ | 47.6 | |
| Ammonia | mg/L N | 0.01 | |
| Total Kjeldahl Nitrogen | mg/L N | 0.07 | |
| Organic Nitrogen** | mg/L N | 0.06 | ³ 0.15 (O) |
| Nitrate | mg/L N | <0.02 | 10 |
| Nitrite | mg/L N | <0.02 | 1 |
| Phosphates | mg/L as P | 0.023 | |
| Phosphorus (total) | mg/L | 0.026 | |
| Dissolved Organic Carbon | mg/L | 2.6 | 5 (A) |

Chemical - inorganic metals

| Test Parameter | units | Treated water results | Drinking water standard* |
|----------------|-------|-----------------------|---|
| Aluminum | mg/L | 0.0075 | 0.1 (O) |
| Antimony | mg/L | 0.0003 | 0.006 |
| Arsenic | mg/L | < | ² 0.010 / ³ 0.025 |
| Barium | mg/L | 0.3075 | 1 |
| Beryllium | mg/L | < | |
| Bismuth | mg/L | < | |
| Boron | mg/L | 0.0778 | 5 |
| Cadmium | mg/L | < | 0.005 |
| Chromium | mg/L | 0.0004 | 0.05 |
| Chromium VI | mg/L | 0.0001 | |
| Cobalt | mg/L | 0.0002 | |
| Copper | mg/L | 0.1992 | 1 (A) |
| Iron | mg/L | 0.0272 | 0.3 (A) |
| Lead | mg/L | 0.0023 | 0.01 |
| Manganese | mg/L | 0.0223 | 0.05 (A) |
| Mercury | mg/L | < | 0.001 |
| Molybdenum | mg/L | < | |
| Nickel | mg/L | 0.0015 | |
| Selenium | mg/L | < | 0.05 |
| Silver | mg/L | < | |
| Strontium | mg/L | 0.3785 | |
| Thallium | mg/L | < | |
| Tin | mg/L | 0.0002 | |
| Titanium | mg/L | 0.0003 | |
| Tungsten | mg/L | 0.0003 | |
| Uranium | mg/L | < | 0.02 |
| Vanadium | mg/L | 0.0002 | |
| Zinc | mg/L | 0.0129 | 5 (A) |
| Zirconium | mg/L | 0.0005 | |

Chemical - organics

| Test Parameter | units | Treated water results | Drinking water standard* |
|------------------------------------|-------|-----------------------|--------------------------|
| 1,1,1 -Trichloroethane | µg/L | < | |
| 1,1,1,2-Tetrachloroethane | µg/L | < | |
| 1,1,2 -Trichloroethane | µg/L | < | |
| 1,1,2,2-Tetrachloroethane | µg/L | < | |
| 1,1-Dichloroethane | µg/L | < | |
| 1,1-Dichloroethylene | µg/L | < | 14 |
| 1,1-Dichloropropene | µg/L | < | |
| 1,2,3-Trichlorobenzene | µg/L | < | |
| 1,2,3-Trichloropropane | µg/L | < | |
| 1,2,4-Trichlorobenzene | µg/L | < | |
| 1,2,4-Trimethylbenzene | µg/L | < | |
| 1,2-Dibromo-3-chloropropane / DBCP | µg/L | < | |
| 1,2-Dichlorobenzene | µg/L | < | 200, 3(A) |
| 1,2-Dichloroethane | µg/L | < | 5 |
| 1,2-Dichloroethylene - cis | µg/L | < | |
| 1,2-Dichloroethylene -trans | µg/L | < | |
| 1,2-Dichloropropane | µg/L | < | |
| 1,3-Dichlorobenzene | µg/L | < | |
| 1,3-Dichloropropene - cis | µg/L | < | |
| 1,3-Dichloropropene - trans | µg/L | < | |
| 1,3-Dichloropropane | µg/L | < | |
| 1,3,5-Trimethylbenzene | µg/L | < | |

Chemical - organics

| Test Parameter | units | Treated water results | Drinking water standard* |
|---|-------|-----------------------|-------------------------------------|
| 1,4-Dichlorobenzene | µg/L | < | 5, 1(A) |
| 2,2-Dichloropropane | µg/L | < | |
| 2,3,4,6-Tetrachlorophenol | µg/L | < | 100, 1(A) |
| 2,4,5-Trichlorophenoxyacetic acid / 2,4,5-T | µg/L | < | |
| 2,4,6-Trichlorophenol | µg/L | < | 5, 2(A) |
| 2,4-Dichlorophenol | µg/L | < | 900, 0.3(A) |
| 2,4-DDT | µg/L | < | |
| 2,4-Dichlorophenoxyacetic Acid (2,4-D) | µg/L | < | 100 |
| 2-Chlorotoluene | µg/L | < | |
| 2-Hexanone (MPK) | µg/L | < | |
| 4,4-DDD (pp-DDD) | µg/L | < | |
| 4,4-DDE (pp-DDE) | µg/L | < | |
| 4,4-DDT (pp-DDT) | µg/L | < | |
| 4-Chlorotoluene | µg/L | < | |
| Acetone | µg/L | < | |
| Alachlor | µg/L | < | 5 |
| Aldicarb | µg/L | < | |
| Aldrin | µg/L | < | |
| Aldrin + dieldrin | µg/L | < | |
| Atrazine | µg/L | < | |
| Atrazine + N-dealkylated metabolites | µg/L | < | 5 |
| Atrazine-desethyl (DEA) | µg/L | < | |
| Azinphos-methyl | µg/L | < | 20 |
| Bendiocarb | µg/L | < | |
| Benzene | µg/L | < | ² 5.0 / ³ 1.0 |
| Benzo(a)pyrene | µg/L | < | 0.01 |
| Bromobenzene | µg/L | < | |
| Bromoxynil | µg/L | < | 5 |
| Carbaryl | µg/L | < | 90 |
| Carbofuran | µg/L | < | 90 |
| Carbon Tetrachloride | µg/L | < | 2 |
| Chlorobenzene | µg/L | < | 80, 30(A) |
| Chloroethane | µg/L | < | |
| Chlorpyrifos | µg/L | < | 90 |
| Cyanazine | µg/L | < | |
| DDT + metabolites | µg/L | < | |
| Diazinon | µg/L | < | 20 |
| Dicamba | µg/L | < | 120 |
| Dichlorodifluoromethane / Freon 12 | µg/L | < | |
| Dichloromethane | µg/L | 0.51 | 50 |
| Diclofop - methyl | µg/L | < | 9 |
| Dieldrin | µg/L | < | |
| Dimethoate | µg/L | < | 20 |
| Dinoseb | µg/L | < | |
| Diquat | µg/L | < | 70 |
| Diuron | µg/L | < | 150 |
| Ethylbenzene | µg/L | < | 140, 1.6 (A) |
| Ethylene dibromide | µg/L | < | |
| Glyphosate | µg/L | < | 280 |
| Heptachlor | µg/L | < | |
| Heptachlor & heptachlor epoxide | µg/L | < | |
| Heptachlor epoxide | µg/L | < | |
| Hexane | µg/L | < | |
| Isopropylbenzene | µg/L | < | |
| Lindane | µg/L | < | |
| Malathion | µg/L | < | 190 |

Chemical - organics

| Test Parameter | units | Treated water results | Drinking water standard* |
|----------------|-------|-----------------------|--------------------------|
|----------------|-------|-----------------------|--------------------------|

| | | | |
|--|------|---|---|
| MCPA | µg/L | < | 100 |
| Methoxychlor | µg/L | < | |
| Methyl ethyl ketone (MEK) (2-Butanone) | µg/L | < | |
| Methyl isobutyl ketone (MIBK) | µg/L | < | |
| Methyl tert-butyl ether / MTBE | µg/L | < | 15 (A) |
| Metolachlor | µg/L | < | 50 |
| Metribuzin | µg/L | < | 80 |
| Microcystin-LR ⁶ | µg/L | < | 1.5 |
| Nitrioltriacetic Acid | µg/L | < | 400 |
| N - Nitrosodimethylamine (NDMA) | µg/L | < | ³ 0.009 / ² 0.040 |
| n-Butylbenzene | µg/L | < | |
| n-Propylbenzene | µg/L | < | |
| Paraquat | µg/L | < | 7 |
| Parathion | µg/L | < | |
| Pentachlorophenol | µg/L | < | 60, 30(A) |
| Phorate | µg/L | < | 2 |
| Picloram | µg/L | < | 190 |
| p-Isopropyltoluene | µg/L | < | |
| Polychlorinated Biphenyls (PCBs) | µg/L | < | 3 |
| Prometryne | µg/L | < | 1 |
| sec-Butylbenzene | µg/L | < | |
| Simazine | µg/L | < | 10 |
| Styrene | µg/L | < | |
| Temephos | µg/L | < | |
| Terbufos | µg/L | < | 1 |
| tert-Butylbenzene | µg/L | < | |
| Tetrachloroethylene | µg/L | < | 10 |
| Toluene | µg/L | < | 60, 24 (A) |
| Total Chlordane | µg/L | < | |
| Triallate | µg/L | < | ³ 230 |
| Trichloroethylene / TCE | µg/L | < | 5 |
| Trifluralin | µg/L | < | 45 |
| Vinyl Chloride | µg/L | < | ² 2.0 / ³ 1.0 |
| Xylene - meta & para | µg/L | < | |
| Xylene - ortho | µg/L | < | |
| Xylenes - total | µg/L | < | 90, 20(A) |
| 2,3,7,8,-Tetra-Dibenzo-p-Dioxin | µg/L | < | |
| 1,2,3,7,8,-Penta-Dibenzo-p-Dioxin | µg/L | < | |
| 1,2,3,4,7,8,-Hexa-Dibenzo-p-Dioxin | µg/L | < | |
| 1,2,3,6,7,8,-Hexa-Dibenzo-p-Dioxin | µg/L | < | |
| 1,2,3,7,8,9-Hexa-Dibenzo-p-Dioxin | µg/L | < | |
| 1,2,3,4,6,7,8,-Hepta-Dibenzo-p-Dioxin | µg/L | < | |
| 2,3,7,8-Tetra-Dibenzofuran | µg/L | < | |
| 1,2,3,7,8,-Penta-Dibenzofuran | µg/L | < | |
| 2,3,4,7,8,-Penta-Dibenzofuran | µg/L | < | |
| 1,2,3,4,7,8,-Hexa-Dibenzofuran | µg/L | < | |
| 1,2,3,6,7,8,-Hexa-Dibenzofuran | µg/L | < | |
| 2,3,4,6,7,8,-Hexa-Dibenzofuran | µg/L | < | |
| 1,2,3,7,8,9,-Hexa-Dibenzofuran | µg/L | < | |
| 1,2,3,4,6,7,8-Hepta-Dibenzofuran | µg/L | < | |
| 1,2,3,4,7,8,9,-Hepta-Dibenzofuran | µg/L | < | |
| Total Tetrachlorodibenzo-p-Dioxins | µg/L | < | |
| Total Pentachlorodibenzo-p-Dioxins | µg/L | < | |
| Total Hexachlorodibenzo-p-Dioxins | µg/L | < | |
| Total Heptachlorodibenzo-p-Dioxins | µg/L | < | |

Chemical - organics

| Test Parameter | units | Treated water results | Drinking water standard* |
|-----------------------------------|-------|-----------------------|--------------------------|
| Total Octachlorodibenzo-p-Dioxins | µg/L | < | |
| Total Tetrachlorodibenzofurans | µg/L | < | |
| Total Pentachlorodibenzofurans | µg/L | < | |

| | | | |
|-----------------------------------|------|---|-----------------------|
| Total Hexachlorodibenzofurans | µg/L | < | |
| Total Heptachlorodibenzofurans | µg/L | < | |
| Total Octachlorodibenzofuran | µg/L | < | |
| 2,3,7,8-TCDD Toxicity Equivalents | µg/L | < | ³ 0.000015 |

Chemical - disinfection by-products

| Test Parameter | units | Treated water results | Drinking water standard* |
|--|-------|-----------------------|--------------------------|
| Chloroform | µg/L | 41.9 | |
| Bromodichloromethane | µg/L | 7.5 | |
| Dibromochloromethane | µg/L | 1.4 | |
| Bromoform | µg/L | < | |
| Total Trihalomethanes (TTHMs) | µg/L | 50.9 | |
| Monochloroacetic Acid | µg/L | 1.7 | |
| Monobromoacetic Acid | µg/L | < | |
| Dichloroacetic Acid | µg/L | 17.4 | |
| Dibromoacetic Acid | µg/L | < | |
| Trichloroacetic Acid | µg/L | 28.8 | |
| Bromochloroacetic Acid | µg/L | 2.4 | |
| Bromodichloroacetic Acid | µg/L | 4.7 | |
| Chlorodibromoacetic Acid | µg/L | < | |
| Tribromoacetic Acid | µg/L | < | |
| Total Haloacetic Acids (HAA5) | µg/L | 47.8 | |
| Total Haloacetic Acids (HAA9) | µg/L | 54.8 | |
| Total Trihalomethanes (TTHMs) ¹ in distribution | µg/L | 55.8 | 100 |
| Total Haloacetic Acids (HAA5) ¹ in distribution | µg/L | 54.3 | 80 |

Radiological

| Test Parameter | units | Treated water results | Drinking water standard* |
|---------------------------|-------|-----------------------|--------------------------|
| Gross-Alpha Radioactivity | Bq/L | <0.1 | ⁴ 0.5 |
| Gross-Beta Radioactivity | Bq/L | 0.19 | ⁴ 1.0 |
| Radon | Bq/L | <10 | |
| Tritium | Bq/L | 4.2 | 7000 |

Glossary and notes:

reported values represent average concentrations measured in treated water

< indicates less than detection limit

mg/L = milligram per Litre = part per million (ppm)

µg/L = microgram per Litre = part per billion (ppb)

cfu = colony forming units

*Ontario Drinking Water Standards O.Reg.169/03 and/or Health Canada Guidelines for Canadian Drinking Water Quality

*Drinking water standards are health-based MAC (Maximum Acceptable Concentration) values, unless otherwise noted

(A) indicates aesthetic objective, not health related but may affect taste, odour, or appearance

(O) indicates an operational guideline, to ensure efficient treatment and distribution system operation

¹The reported THM and HAA result is an annual average concentration measured in the distribution system.

² Health Canada Drinking Water Guideline only

³ Ontario Drinking Water Quality Standard only

⁴Radioactivity screening values = 0.5 Bq/L for gross alpha and 1.0 Bq/L for gross beta

⁵Sodium health advisory level of 20 mg/L for people on sodium-restricted diets only

⁶Result from 2016

**calculated parameter based on individual analytes

***the lead values reported do not include the Ontario Ministry of Environment Community Lead Testing Program results