

The Regional Municipality of Durham

Bowmanville Drinking Water System 2022 Annual Report

Drinking Water System Number: 220000852

Municipal Drinking Water Licence Number: 003-103

Drinking Water System Owner: The Regional Municipality of Durham

Drinking Water System Category: Large Municipal Residential

This Annual Report for the calendar year 2022 is designed to inform you about your drinking water system. This report has been prepared to satisfy Section 11 of Ontario Regulation (O. Reg.) 170/03. O. Reg. 170/03 sets requirements for drinking water systems with regard to sampling and testing, levels of treatment, certification of staff, and notification of authorities and the public about water quality. Hard copies of this report and the Schedule 22 Summary Report are available at the Regional Municipality of Durham Headquarters office that is located at 605 Rossland Road East, Whitby. The annual report is also available on the [Region of Durham's website](http://www.durham.ca) at www.durham.ca. Further information regarding the Drinking Water Regulations can be found on the [Ministry of the Environment, Conservation and Parks website](http://www.ontario.ca/ministry-environment-conservation-parks) at www.ontario.ca/ministry-environment-conservation-parks.

Drinking Water System Process Description

General

The Bowmanville Drinking Water System provides potable water to consumers in the Bowmanville urban area in the Municipality of Clarington. The water supply plant is a Class Two Water Treatment Plant with an approved capacity of 36,368 cubic metres per day (m³/d). The Bowmanville Water Supply Plant feeds a Class Two Distribution Subsystem and Class Two Trunk Distribution Subsystem. The treatment and distribution subsystems are owned and operated by the Regional Municipality of Durham.

The source water for the treatment process is drawn from Lake Ontario. The water supply system includes the following processes:

- Zebra mussel control (chlorine),
- Screening,
- Low lift pumping,
- Coagulation (polyaluminum chloride),
- Flocculation,
- Filtration,
- Residual Management,
- Disinfection (chlorine),
- High lift pumping, and
- Distribution system.

Raw Water Supply

Raw water is drawn from Lake Ontario through a 1,050 millimetre diameter intake pipe extending 1,260 metres (m) into the lake. The intake structure is located at a depth of approximately 12 m. The water is drawn into the raw water well by low lift pumps where screening takes place to remove large solids. Chlorine is added at the raw water intake for zebra mussel control. The free chlorine residual and raw turbidity are continuously monitored by analyzers as the raw water enters the treatment plant.

Coagulation/Flocculation

The water flows through traveling screens to remove large solids and continues towards the low lift pumps. Polyaluminum chloride is added into a mechanical mixer upstream of the flocculation tanks. After rapid mixing, the water enters the flocculation tanks where flocculated particles are developed by slow mixing action.

Filtration

Particulate matter that was present in the raw water is captured by the coagulation and flocculation process and deposited on top of the filters. The water supply plant has two dual-compartment multi-media gravity filters which discharge by gravity into a dedicated 690 cubic metre (m³) capacity clearwell, as well as a single compartment dual media gravity rapid filter which discharges into a dedicated 506 m³ capacity clearwell. Filter effluent turbidity and head loss are continuously monitored to indicate filter effectiveness. Treated water from the clearwells flows into the plant underground reservoir.

Residual Management

Filter backwash treatment includes, filter surface washing equipment, air scouring, two wastewater hopper settling tanks and a supernatant pumping well. The sludge and supernatant are discharged to the sanitary sewer system.

Disinfection and High Lift Pumping

The water then flows to a high lift pumping station equipped with six vertical turbine pumps which deliver the water to the distribution system. Disinfection is achieved by the addition of chlorine at multiple application points throughout the plant. The free chlorine residual and turbidity are monitored continuously by online analyzers.

Distribution System

The distribution system delivers the treated water through approximately 192 kilometres of watermains in two pressure zones and includes a 2,894 m³ reservoir, a 1,287 m³ elevated storage tank and a pumping station. Additional rechlorination can be applied at the reservoir facility.

Major Monetary expenses (above \$10,000)

Under Section 11 of O. Reg. 170/03, a description of any major expenses incurred during this reporting period to install, repair or replace required equipment must be included in the annual report.

Remaining project costs incurred in 2022 for new chlorine gas scrubber -
\$18,317.00

Watermain replacement on Regional road 57 - \$43,937.69

Raw water flowmeter replacement - \$20,750.00

Tables

For a description of terms and abbreviations in all tables, refer to the glossary at the end of the report.

Bowmanville Drinking Water System (DWS) Table 1

Summary of all Adverse Water Quality Incidents in 2022 Reported to Spills Action Centre in Accordance with Schedule 16-3 and 16-4 of O. Reg. 170/03.

| Incident Date | Parameter | Result | Corrective Action | Corrective Action Date |
|---------------|---------------------|-------------|---|------------------------|
| July 29 | Lead (distribution) | 0.0134 mg/L | Replaced hydrant components, flushed, resampled. Results met ODWQS. | August 9 |
| July 29 | Lead (distribution) | 0.109 mg/L | Replaced hydrant components, flushed, resampled. Results met ODWQS. | August 9 |

Bowmanville DWS Table 2

Microbiological Membrane Filtration (MF) Testing Under Schedule 10 of O. Reg. 170/03.

| Type of Sample | Number of Samples | Range of Escherichia Coli MF Colony Forming Units per 100 Millilitres | Range of Total Coliforms MF Colony Forming Units per 100 Millilitres |
|----------------|-------------------|---|--|
| Raw | 197 | Non-Detect (ND) - 4 | ND - 420 |
| Treated | 4 | ND | ND |
| Distribution | 16 | ND | ND |

*Number in parenthesis represents number of exceedance(s).

Bowmanville DWS Table 3

Microbiological Presence Absence (P/A) Testing Under Schedule 10 of O. Reg. 170/03.

| Type of Sample | Number of Samples | Escherichia Coli P/A per 100 Millilitres | Total Coliforms P/A per 100 Millilitres |
|----------------|-------------------|--|---|
| Treated | 197 | Absence (A) | A |
| Distribution | 832 | A | A |

*Number in parenthesis represents number of exceedance(s).

Bowmanville DWS Table 4

Microbiological Heterotrophic Plate Count (HPC) Testing Under Schedule 10 of O. Reg. 170/03.

| Type of Sample | Number of Samples | Range of HPC Samples Colony Forming Units per Millilitre |
|----------------|-------------------|--|
| Treated | 201 | Non-Detect (ND) - 27 |
| Distribution | 513 | ND-1300 |

Bowmanville DWS Table 5

Operational Testing Under Schedule 7 of O. Reg. 170/03.

| Test | Number of Samples | Range of Results | Unit of Measure | Parameter Description |
|------------------------------|-------------------|------------------|-------------------------------------|---|
| Turbidity - Filter Effluent | Continuous | 0.01 - 0.16* | Nephelometric Turbidity Units (NTU) | Turbidity is a measure of particles in water. |
| Free Chlorine - Plant | Continuous | 1.73 – 4.44* | Milligram per Litre (mg/L) | Must be sufficient to ensure disinfection has been achieved. |
| Free Chlorine - Distribution | Continuous | 0.36 – 3.40*, | mg/L | Recommended level of at least 0.20 mg/L in the distribution system to maintain secondary disinfection, 0.05 mg/L is the minimum required. |

*Results include all analyzers and grab samples.

Bowmanville DWS Table 6

Summary of Additional Testing and Sampling Carried Out in Accordance with the Requirement of an Approval, Order or Other Legal Instrument.

| Type of Sample | Parameter | Date Sampled | Result | MAC | Unit of Measure |
|----------------|---------------------|--------------------|-----------------|----------------------|-----------------------------|
| Raw Water | Gross Beta | January - December | 0.08 - 0.127 | Not Applicable (N/A) | Becquerels per Litre (Bq/L) |
| Raw Water | Tritium | January - December | 0.20 – 16.50 | 7,000* | Bq/L |
| Raw Water | Microcystin (Total) | June - October | Non-Detect (ND) | 1.5 | Microgram per Litre (ug/L) |
| Treated Water | Microcystin (Total) | June - October | ND | 1.5 | ug/L |

* Tritium does not have a Maximum Acceptable Concentration (MAC) for raw water. Treated water MAC of 7,000 Bq/L is provided as a guideline for interpretation of results only.

Bowmanville DWS Table 7

Summary of Treated Water Chemical Parameter Testing Under Schedules 13 and 23 of O. Reg. 170/03.

| Parameter | Number of Samples | Results Range | MAC | Unit of Measure | MAC Exceedance | Potential Sources* |
|--|-------------------|--------------------------|------------------|----------------------------|----------------|---|
| Antimony | 14 | Non-Detect (ND) – 0.0012 | 0.006 | Milligram per Litre (mg/L) | No | Fire retardants, ceramics, electronics, solder. |
| Arsenic | 14 | ND – 0.0007 | 0.01 | mg/L | No | Mining. |
| Barium | 2 | 0.0216 - 0.0246 | 1.0 | mg/L | No | Metal refineries, oil drilling. |
| Boron | 2 | 0.021 - 0.0256 | 5.0 | mg/L | No | Industrial. |
| Cadmium | 14 | 0.0206 – 0.026 | 0.005 | mg/L | No | Industrial. |
| Chromium | 14 | ND | 0.05 | mg/L | No | Industrial. |
| Total Haloacetic acids - Distribution (annual average) | 12 | 46 | 80 | Microgram per Litre (ug/L) | No | By-product of chlorination of drinking water. |
| Mercury | 2 | ND | 0.001 | mg/L | No | Industrial. |
| Selenium | 14 | ND | 0.05 | mg/L | No | Refineries, mines, chemical manufacturing. |
| Sodium | 12 | 13.7 – 17.7 | Not Applicable** | mg/L | No | Storm water runoff including road salt. |
| Total Trihalomethanes - Distribution (annual average) | 12 | 70.1 | 100 | ug/L | No | By-product of chlorination of drinking water. |
| Uranium | 2 | ND | 0.02 | mg/L | No | Power generation. |
| Fluoride | 12 | 0.08 - 0.1 | 1.5 | mg/L | No | Mining |
| | | | | | | |

Bowmanville DWS Table 7 continued

| Parameter | Number of Samples | Results Range | MAC | Unit of Measure | MAC Exceedance | Potential Sources* |
|----------------|-------------------|-----------------|------|----------------------------|----------------|---|
| Nitrite | 12 | Non-Detect (ND) | 1.0 | Milligram per Litre (mg/L) | No | Agriculture runoff, landfill leachate and animal waste. |
| Nitrate | 12 | ND | 10.0 | mg/L | No | Fertilizer. |

* Parameters may occur naturally in the environment.

** Sodium does not have a Maximum Acceptable Concentration (MAC); only an aesthetic objective of 200 mg/L. Sodium results exceeding 20 mg/L are to be reported to the Medical Officer of Health as per Schedule 16-3 (8) of O. Reg. 170/03 if it has not been reported in the preceding 57 months.

Bowmanville DWS Table 8

Summary of Lead Testing Under Schedule 15.1 of O. Reg. 170/03.

| Location Type | Number of Samples | Range of Lead Results Milligram per Litre | MAC | Number of Exceedances | pH | Alkalinity Milligram per Litre |
|---------------------|-------------------|---|------|-----------------------|-------------|--------------------------------|
| Plumbing | 111 | Non-Detect (ND) – 0.0024 | 0.01 | 0 | 7.40 – 8.00 | N/A |
| Distribution | 16 | ND – 0.109 | 0.01 | 2 | 7.60 – 8.00 | 88.5 - 91.7 |

*One residential plumbing sample on October 6, 2022, was analyzed for alkalinity.

Bowmanville DWS Table 9

Summary of Treated Water Organic Parameter Testing Under Schedule 24 of O. Reg. 170/03.

| Parameter | Number of Samples | Results Range | MAC | Unit of Measure | MAC Exceedance | Potential Sources |
|---|-------------------|-----------------|-----|----------------------------|----------------|-------------------------|
| Alachlor | 2 | Non-Detect (ND) | 5 | Microgram per Litre (ug/L) | No | Agricultural herbicide. |
| Atrazine + N-dealkylated metabolites | 2 | ND | 5 | ug/L | No | Agricultural herbicide. |

| Parameter | Number of Samples | Results Range | MAC | Unit of Measure | MAC Exceedance | Potential Sources |
|---|-------------------|---------------------|------|----------------------------|----------------|--|
| Azinphos-methyl | 2 | ND | 20 | ug/L | No | Insecticide. |
| Benzene | 2 | Non-Detect (ND) | 1 | Microgram per Litre (ug/L) | No | Plastics manufacturing, leaking fuel tanks. |
| Benzo(a)pyrene | 2 | ND | 0.01 | ug/L | No | Formed from the incomplete burning of organic matter. |
| Bromoxynil | 2 | ND | 5 | ug/L | No | Agricultural herbicide. |
| Carbaryl | 2 | ND – No Result (NR) | 90 | ug/L | No | Agricultural, forestry, household insecticide. |
| Carbofuran | 2 | ND - NR | 90 | ug/L | No | Agricultural insecticide. |
| Carbon Tetrachloride | 2 | ND | 2 | ug/L | No | Chemical and industrial activities. |
| Chlorpyrifos | 2 | ND | 90 | ug/L | No | Agricultural, household insecticide. |
| Diazinon | 2 | ND | 20 | ug/L | No | Agricultural, livestock, operation, residential insecticide. |
| Dicamba | 2 | ND | 120 | ug/L | No | Agricultural herbicide |
| 1,2-Dichlorobenzene | 2 | ND | 200 | ug/L | No | Chemical and industrial factories. |
| 1,4-Dichlorobenzene | 2 | ND | 5 | ug/L | No | Chemical and industrial factories. |
| 1,2-Dichloroethane | 2 | ND | 5 | ug/L | No | Industrial chemical factories. |
| 1,1-Dichloroethylene (vinylidene chloride) | 2 | ND | 14 | ug/L | No | Industrial chemical factories. |

Bowmanville DWS Table 9 continued

| Parameter | Number of Samples | Results Range | MAC | Unit of Measure | MAC Exceedance | Potential Sources |
|--|-------------------|---------------------|-----|----------------------------|----------------|--|
| Dichloromethane | 2 | Non-Detect (ND) | 50 | Microgram per Litre (ug/L) | No | Pharmaceutical and chemical factories. |
| 2,4-Dichlorophenol | 2 | ND | 900 | ug/L | No | Industrial contamination, reaction with chlorine. |
| 2,4-Dichlorophenoxy acetic acid (2,4-D) | 2 | ND | 100 | ug/L | No | Agricultural, residential herbicide. |
| Diclofop-methyl | 2 | Non-Detect (ND) | 9 | Microgram per Litre (ug/L) | No | Agricultural herbicide. |
| Dimethoate | 2 | ND | 20 | ug/L | No | Agricultural, livestock, operation, residential insecticide. |
| Diquat | 2 | ND | 70 | ug/L | No | Agricultural, aquatic herbicide. |
| Diuron | 2 | ND - No Result (NR) | 150 | ug/L | No | Agricultural, industrial herbicide. |
| Glyphosate | 2 | ND | 280 | ug/L | No | Agricultural, forestry, household herbicide. |
| Malathion | 2 | ND | 190 | ug/L | No | Pest control insecticide. |
| 2-Methyl-4-chlorophenoxyacetic acid (MCPA) | 2 | ND | 100 | ug/L | No | Agricultural herbicide. |
| Metolachlor | 2 | ND | 50 | ug/L | No | Agricultural herbicide. |
| Metribuzin | 2 | ND | 80 | ug/L | No | Agricultural herbicide. |

Bowmanville DWS Table 9 continued

| Parameter | Number of Samples | Results Range | MAC | Unit of Measure | MAC Exceedance | Potential Sources |
|--|-------------------|---------------------|-----|----------------------------|----------------|---|
| Monochlorobenzene | 2 | ND | 80 | ug/L | No | Industrial and agricultural chemical factories and dry cleaning facilities. |
| Paraquat | 2 | ND | 10 | ug/L | No | Agricultural, aquatic herbicide. |
| Pentachlorophenol | 2 | ND | 60 | ug/L | No | Pesticide, wood preservative residue. |
| Phorate | 2 | ND | 2 | ug/L | No | Agricultural insecticide. |
| Picloram | 2 | Non-Detect (ND) | 190 | Microgram per Litre (ug/L) | No | Industrial herbicide. |
| Polychlorinated Biphenyls(PCB) | 2 | ND | 3 | ug/L | No | Residue from various industrial uses. |
| Prometryne | 2 | ND | 1 | ug/L | No | Agricultural herbicide. |
| Simazine | 2 | ND | 10 | ug/L | No | Agricultural herbicide. |
| Terbufos | 2 | ND | 1 | ug/L | No | Agricultural insecticide. |
| Tetrachloroethylene (perchloroethylene) | 2 | ND | 10 | ug/L | No | Leaching from PVC pipes; discharge from factories; dry cleaners and auto shops (metal degreaser). |
| 2,3,4,6 - Tetrachlorophenol | 2 | ND | 100 | ug/L | No | Wood preservative. |
| Triallate | 2 | ND - No Result (NR) | 230 | ug/L | No | Agricultural herbicide. |
| Trichloroethylene | 2 | ND | 5 | ug/L | No | Metal degreasing sites and other factories. |

Bowmanville DWS Table 9 continued

| Parameter | Number of Samples | Results Range | MAC | Unit of Measure | MAC Exceedance | Potential Sources |
|-----------------------|-------------------|---------------|-----|-----------------|----------------|---|
| 2,4,6-Trichlorophenol | 2 | ND | 5 | ug/L | No | Pesticide manufacturing. |
| Trifluralin | 2 | ND | 45 | ug/L | No | Agricultural herbicide. |
| Vinyl Chloride | 2 | ND | 1 | ug/L | No | Leaching from PVC pipes; discharge from plastics factories. |

Bowmanville DWS Table 10

Inorganic or Organic Parameter(s) that Exceed Half the Standard Prescribed in Schedule 2 of the Ontario Drinking Water Quality Standards.

| Parameter | Result | MAC | Unit of Measure | Date of Sample |
|---|--------|------|-----------------------------|-----------------|
| Trihalomethane - Distribution (annual average) | 70.1 | 100 | Micrograms per Litre (ug/L) | Annual average. |
| Total Haloacetic acids -Distribution (annual average) | 46 | 80 | ug/L | Annual average. |
| Lead (distribution) | 0.0134 | 0.01 | Milligrams per Litre (mg/L) | August 9 |
| Lead (distribution) | 0.109 | 0.01 | Mg/L | August 9 |