

The Regional Municipality of Durham

Bowmanville Drinking Water System 2020 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 2020 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 systems 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. 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 capacity clearwell, as well as a single compartment dual media gravity rapid filter which discharges into a dedicated 506 cubic metre 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 cubic metre (m³) reservoir, a 1,287 m³ elevated storage tank and a pumping station. Additional chlorination 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.

Watermain replacement costs (multiple locations) - \$946,092.63

Supervisory Control and Data Acquisition (SCADA) upgrades - \$45,918.04

Project costs incurred in 2020 for new chlorine gas scrubber at the water supply plant- \$586,406.19

Replacement and installation of flowmeters at water supply plant - \$39,596.00

Purchase of ultraviolet visible spectrophotometer with radio-frequency identification technology for water supply plant - \$14,579.50

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 2020 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 10	Total Coliforms (distribution)	Presence	Flushed, resampled.	July 10
July 11	Total Coliforms (distribution)	1 Colony Forming Units (CFU) per 100 Millilitres (mL)	Flushed, resampled. Results met ODWQS.	July 11 and July 13
August 12	Total Coliforms (distribution)	Presence	Flushed, resampled. Results met ODWQS.	August 12

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	183	Non-Detect (ND) - 9	ND - 300
Treated	4	ND	ND
Distribution	36	ND	ND – 1 (1)*

*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	183	Absence (A)	A
Distribution	627	A	A - Presence (2)*

*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	187	Non-Detect (ND) - 230
Distribution	456	ND

Bowmanville DWS Table 5

Operational Testing Done 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 - 0.15*	Nephelometric Turbidity Units (NTU)	Turbidity is a measure of particles in water.
Free Chlorine - Plant	Continuous	1.45 – 4.84*	Milligram per Litre (mg/L)	Must be sufficient to ensure disinfection has been achieved.
Free Chlorine - Distribution	Continuous	0.56 - 3.20*	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	0.095 - 0.144	Not Applicable (N/A)	Becquerels per Litre (Bq/L)
Raw Water	Tritium	January - December	1.10 – 11.50	7,000*	Bq/L
Raw Water	Microcystin (Total)	June - October	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 Parameters Tested Under Schedules 13 and 23 of O. Reg. 170/03.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources¹
Antimony	11	Non-Detect (ND) - 0.0006	0.006	Milligram per Litre (mg/L)	No	Fire retardants, ceramics, electronics, solder.
Arsenic	11	ND - 0.0005	0.01	mg/L	No	Mining.
Barium	2	0.0226 - 0.0236	1.0	mg/L	No	Metal refineries, oil drilling.
Boron	2	0.025 - 0.0252	5.0	mg/L	No	Industrial.
Cadmium	11	ND	0.005	mg/L	No	Industrial.
Chromium	11	ND	0.05	mg/L	No	Industrial.
Total Haloacetic acids - Distribution (annual average)	9	15.0	80	Microgram per Litre (ug/L)	No	By-product of chlorination of drinking water.
Mercury	2	ND	0.001	mg/L	No	Industrial.
Selenium	11	ND	0.05	mg/L	No	Refineries, mines, chemical manufacturing.
Sodium	10	14.2 - 18.4	Not Applicable ²	mg/L	No	Storm water runoff including road salt.
Total Trihalomethanes - Distribution (annual average)	10	72.5	100	ug/L	No	By-product of chlorination of drinking water.
Uranium	2	ND	0.02	mg/L	No	Power generation.
Fluoride	10	0.05 - 0.1	1.5	mg/L	No	Mining
Nitrite	10	ND	1.0	mg/L	No	Agriculture runoff, landfill leachate and animal waste.
Nitrate	10	ND	10.0	mg/L	No	Fertilizer.

¹ Parameters may occur naturally in the environment.

2 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.

No lead samples from plumbing were required in 2020.

Location Type	Number of Samples	Range of Lead Results Milligram per Litre	MAC	Number of Exceedances	pH	Alkalinity Milligram per Litre
Plumbing	N/R	Not Applicable (N/A)	0.01	N/A	N/A	N/A
Distribution	8	Non-Detect	0.01	0	7.70 - 7.80	86.1 - 92.6

Bowmanville DWS Table 9

Summary of Treated Water Organic Parameters Tested 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.
Azinphos-methyl	2	ND	20	ug/L	No	Insecticide.
Benzene	2	ND	1	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	90	ug/L	No	Agricultural, forestry, household insecticide.

Bowmanville DWS Table 9 continued

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources
Carbofuran	2	Non-Detect (ND)	90	Microgram per Litre (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.
Dichloromethane	2	ND	50	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.

Bowmanville DWS Table 9 continued

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources
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	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.
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.

Bowmanville DWS Table 9 continued

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources
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	230	ug/L	No	Agricultural herbicide.
Trichloroethylene	2	ND	5	ug/L	No	Metal degreasing sites and other factories.
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)	72.5	100	Microgram per Litre (ug/L)	Annual average.