

The Regional Municipality of Durham

Bowmanville Drinking Water System 2015 Annual Report

Drinking Water System Number: 220000852

Municipal Drinking Water License 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 2015 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 are available at the Regional Municipality of Durham Headquarters building located at 605 Rossland Road East, Whitby or on the [Region of Durham's website](http://www.durham.ca) at www.durham.ca. Further information on the Drinking Water Regulations can be found on the [Ministry of the Environment and Climate Change's website](http://www.ontario.ca/ministry-environment-and-climate-change) at www.ontario.ca/ministry-environment-and-climate-change.

Drinking Water System Process Description

General

The Bowmanville Drinking Water System provides potable water to consumers in the Town of Bowmanville in the Township 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 System and Class Two Trunk Distribution System. The treatment and distribution system 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 10 processes:

- Zebra mussel control (chlorine),
- Screening,
- Pre-chlorination,
- Low lift pumping,
- Coagulation (polyaluminum chloride),
- Flocculation,
- Filtration,
- Post Chlorination,
- Distribution,
- Water storage and high lift pumping.

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

and to provide initial disinfection. The chlorine residuals 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 (PACl) 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.

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

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 water then flows to a high lift pumping station equipped with six vertical turbine pumps. The distribution system delivers the treated water through approximately 171.4 kilometres of watermains in two pressure zones and includes a 2,894 cubic metre reservoir, an 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. The details of major expenses for this drinking water system are as follows:

- Supervisory Control And Data Acquisition (SCADA) upgrades - \$149,368
- Replacement of polybutylene service connections - \$475,514

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 (AWQI) in 2015 Reported to Spills Action Centre in Accordance with Schedule 16-3 and 16-4 of O. Reg. 170/03. No adverse water quality incidents occurred in 2015.

Incident Date	Parameter	Result	Corrective Action	Corrective Action Date
None Available (N/A)	N/A	N/A	N/A	N/A

Bowmanville DWS Table 2

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) - 15	ND - 240
Treated	12	ND	ND
Distribution	39	ND	ND

Bowmanville DWS Table 3

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	660	A	A

Bowmanville DWS Table 4

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	209	Non-Detect (ND) - 380
Distribution	351	ND - 44

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	1.47 - 2.92*	mg/L	Must be sufficient to ensure disinfection has been achieved.
Free Chlorine - Distribution	Continuous	0.21 - 2.60*	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	0.09 - 0.13	N/A	Becquerels per Litre (Bq/L)
Raw Water	Tritium	January - December	1.5 - 8.2	N/A	Bq/L
Treated Water	Tritium	January - December	5.0 - 9.0	7000	Bq/L

Bowmanville DWS Table 7

Summary of Treated Water Inorganic Parameters Tested Under Schedule 13 and 23 of O. Reg. 170/03.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources ¹
Antimony	14	0.0004 - 0.0009	0.006	Milligram per Litre (mg/L)	No	Fire retardants, ceramics, electronics, solder.
Arsenic	14	Non-Detect (ND) - 0.0007	0.025	mg/L	No	Mining.
Barium	2	0.0224 - 0.0245	1.0	mg/L	No	Metal refineries, oil drilling.
Boron	2	0.022 - 0.024	5.0	mg/L	No	Industrial.
Cadmium	14	ND	0.005	mg/L	No	Industrial.
Chromium	14	ND - 0.001	0.05	mg/L	No	Industrial.
Mercury	2	ND - 0.00003	0.001	mg/L	No	Industrial.
Selenium	14	ND - 0.001	0.01	mg/L	No	Refineries, mines, chemical manufacturing.
Sodium²	12	13.7 - 17.2	20	mg/L	No	Runoff from road salt.
Uranium	2	Non-Detect (ND) - 0.0002	0.02	mg/L	No	Power generation.
Fluoride	12	0.08 - 0.12	1.5	mg/L	No	Mining
Nitrite	12	ND	1.0	mg/L	No	Agriculture runoff, landfill leachate and animal waste.
Nitrate	12	0.16 - 0.45	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 as per the Medical Officer of Health Schedule 16-3 (8) of O. Reg. 170/03.

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 2015.

Location Type	Number of Samples	Range of Lead Results milligram per litre	MAC	Number of Exceedences	pH	Alkalinity milligrams per litre
Plumbing	0	N/A	0.01	0	N/A	N/A
Distribution	8	ND - 0.0059	0.01	0	7.79 - 7.98	86.8 - 88.4

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/litre (ug/L)	No	Agricultural herbicide.
Aldicarb	2	ND	9	ug/L	No	Agricultural insecticide.
Aldrin + Dieldrin	2	ND	0.7	ug/L	No	Residue from banned insecticide.
Atrazine + N-dealkylated metabolites	2	ND	5	ug/L	No	Agricultural herbicide.
Azinphos-methy1	2	ND	20	ug/L	No	Insecticide.
Bendiocarb	2	ND	40	ug/L	No	Insecticide.
Benzene	2	ND	5	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.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources
Carbofuran	2	Non-Detect (ND)	90	ug/L	No	Agricultural insecticide.
Carbon Tetrachloride	2	ND	5	ug/L	No	Chemical and industrial activities.
Chlordane (Total)	2	ND	7	ug/L	No	Residue from banned insecticide.
Chlorpyrifos	2	ND	90	ug/L	No	Agricultural, household insecticide.
Cyanazine	2	ND	10	ug/L	No	Agricultural, residential herbicide.
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.
Dichlorodiphenyltrichloroethane (DDT) + metabolites	2	ND	30	ug/L	No	Residue from banned insecticide.
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.
Diclofop-methyl	2	ND	9	ug/L	No	Agricultural herbicide.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources
Dimethoate	2	Non-Detect (ND)	20	ug/L	No	Agricultural, livestock, operation, residential insecticide.
Dinoseb	2	ND	10	ug/L	No	Herbicide residue.
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.
Heptachlor + Heptachlor Epoxide	2	ND	3	ug/L	No	Residue from banned insecticide.
Lindane (Total)	2	ND	4	ug/L	No	Agricultural, pharmaceutical insecticide.
Malathion	2	ND	190	ug/L	No	Pest control insecticide.
Methoxychlor	2	ND	900	ug/L	No	Agricultural, livestock, operation, residential insecticide.
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.
Parathion	2	ND	50	ug/L	No	Agricultural insecticide.
Pentachlorophenol	2	ND	60	ug/L	No	Pesticide, wood preservative residue.
Phorate	2	ND	2	ug/L	No	Agricultural insecticide.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources
Picloram	2	Non-Detect (ND)	190	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.
Trihalomethane (THM) - Distribution (annual average)	12	64.4	100	ug/L	No	By-product of chlorination of drinking water.
Temephos	2	ND	280	ug/L	No	Insecticide for mosquito, black fly control.
Terbufos	2	ND	1	ug/L	No	Agricultural insecticide.
Tetrachloroethylene	2	ND	30	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.
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	2	ND	280	ug/L	No	Industrial herbicide residue.
Trifluralin	2	ND	45	ug/L	No	Agricultural herbicide.
Vinyl Chloride	2	ND	2	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. No inorganic or organic parameters exceeded half the maximum allowable concentration in 2015.

Parameter	Result	Unit of Measure	Date of Sample
Not Applicable (N/A)	N/A	N/A	N/A