

## **The Regional Municipality of Durham**

### **Beaverton Drinking Water System 2014 Annual Report**

**Drinking Water System Number:** 220004929

**Municipal Drinking Water License Number:** 003-107

**Drinking Water System Owner:** The Regional Municipality of Durham

**Drinking Water System Category:** Large Municipal Residential

This Annual Report for the calendar year 2014 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](http://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](http://www.ontario.ca/ministry-environment-and-climate-change).

### **Drinking Water System Process Description**

#### **General**

The Beaverton Drinking Water System provides potable water to consumers in the Community of Beaverton in the Township of Brock. The water supply plant is a Class Three Water Treatment Plant with direct filtration and an approved capacity of 7,300 cubic metres per day (m<sup>3</sup>/d). Beaverton Water Supply Plant feeds a Class One Distribution System and Class One Trunk Distribution System. The treatment and distribution system is owned and operated by the Regional Municipality of Durham.

The source water for the treatment process is drawn from Lake Simcoe. The water supply plant includes the following 11 processes:

- Zebra mussel control (chlorine),
- Screening,
- Pre-chlorination,
- Low lift pumping,
- Coagulation (aluminum sulphate),
- Flocculation,
- Direct filtration,
- Post filtration chlorination,
- Ultraviolet (UV) disinfection,
- Distribution,
- Post-chlorination,
- Water storage and high lift pumping.

## **Raw Water Supply**

Raw water is drawn from Lake Simcoe through a 500 millimetre (mm) diameter intake pipe extending 986 metre (m.) into the lake. The intake structure is located at a depth of approximately 4.6 m. The intake pipe is equipped with two 31 mm diameter internal lines. One line is used for raw water sampling while the other line is dedicated to the delivery of chlorine solution to a chlorine diffuser that is used for disinfection and control of zebra mussels. The chlorine residual and turbidity are continuously monitored by online analyzers as the raw water enters the treatment plant.

## **Coagulation/Flocculation**

The water flows through a traveling screen to remove large solids and continues towards the low lift pumps. Raw water is pumped through the plant by the low lift pumps. Aluminum sulphate (alum) is added to the incoming water upstream from the flocculation tanks. Gentle mixing of the alum with the water occurs as the water passes through a static mixer to the three sets of hydraulic spiral up-flow flocculation tanks. Each tank contains two flocculation cells.

## **Filtration**

Particulate matter present in the raw water is captured by the flocculation process and deposited on the top of the filters. The water supply plant has two filters to remove flocculated particles. Both are dual media filters containing granular activated carbon (GAC) and sand. Each filter is equipped with two surface water agitators as well as a shared backwash pump.

The backwash system consists of one celled backwash tank and one constant head tank that discharges the backwash water to the sanitary sewer.

## **Disinfection**

Disinfection is achieved by the addition of chlorine at multiple application points throughout the plant. In addition to chlorination, ultraviolet disinfection is applied to the filter effluent. Consistent disinfection is ensured by continuous online monitoring of the free chlorine residual. The UV and chlorination systems will shut down the pumps if an alarm occurs. This ensures the water is disinfected.

## **Distribution System**

The water then flows to a high lift pumping station equipped with four constant speed pumps. The distribution system delivers the treated water through approximately 25.6 kilometres of watermains in a single pressure zone and includes a standpipe for storage and pressure equalization with a storage capacity of 1,717 cubic metres.

**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:

Chlorine analyzer - \$14,825.60

Granular Activated Carbon replacement - \$30,424.12

Supervisory Control And Data Acquisition (SCADA) upgrade - \$11,793.35

Valve actuators replacement - \$10,781.58

Chlorinator replacement - \$10,296.56

Raw water well cleaning - \$80,178.02

Raw water screen replacement - \$253,921.66

## Tables

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

### Beaverton Drinking Water System (DWS) Table 1

Summary of all Adverse Water Quality Incidents (AWQI) in 2014 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
Not Available (N/A)	N/A	N/A	N/A	N/A

### Beaverton 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	52	Non-Detect (ND) - 8	ND - 700
Treated	34	ND	ND
Distribution	6	ND	ND

### Beaverton 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	52	Absence (A)	A
Distribution	202	A	A

**Beaverton 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	85	Non-Detect (ND) - 8
Distribution	102	ND - 12

**Beaverton 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
<b>Turbidity - Filter Effluent</b>	Continuous	0.03 - 0.22	Nephelometric Turbidity Units (NTU)	Turbidity is a measure of particles in water.
<b>Free Chlorine - Plant</b>	Continuous	1.04 - 1.97*	Milligram per Litre (mg/L)	Must be sufficient to ensure disinfection has been achieved.
<b>Free Chlorine - Distribution</b>	Continuous	0.07 - 1.82*	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.

## Beaverton DWS Table 6

### 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 <sup>1</sup>
<b>Antimony</b>	14	0.0003 - 0.0007	0.006	Milligram per Litre (mg/L)	No	Fire retardants, ceramics, electronics, solder.
<b>Arsenic</b>	14	0.0002 - 0.0005	0.025	mg/L	No	Mining.
<b>Barium</b>	2	0.0262 - 0.0299	1.0	mg/L	No	Metal refineries, oil drilling.
<b>Boron</b>	2	0.016 - 0.017	5.0	mg/L	No	Industrial.
<b>Cadmium</b>	14	Non-Detect (ND)	0.005	mg/L	No	Industrial.
<b>Chromium</b>	14	ND - 0.0038	0.05	mg/L	No	Industrial.
<b>Mercury</b>	2	ND	0.001	mg/L	No	Industrial.
<b>Selenium</b>	14	ND - 0.0006	0.01	mg/L	No	Refineries, mines, chemical manufacturing.
<b>Sodium<sup>2</sup></b>	12	21.4 - 27.7	20.0	mg/L	Yes (12) <sup>3</sup>	Runoff from road salt.
<b>Uranium</b>	2	0.0002	0.02	mg/L	No	Power generation.
<b>Fluoride</b>	12	0.03 - 0.08	1.5	mg/L	No	Mining
<b>Nitrite</b>	12	ND	1.0	mg/L	No	Agriculture runoff, landfill leachate and animal waste.
<b>Nitrate</b>	12	ND - 0.161	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.

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

**Beaverton DWS Table 7**

**Summary of Lead Testing Under Schedule 15.1 of O. Reg. 170/03. No plumbing samples were required to be taken in 2014.**

Location Type	Number of Samples	Range of Lead Results milligram per litre	MAC	Number of Exceedences
Plumbing	0	Not Applicable (N/A)	0.01	N/A
Distribution	6	0.0001 - 0.003	0.01	0

**Beaverton DWS Table 8**

**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-methyl	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.

**Beaverton DWS Table 8 continued**

<b>Parameter</b>	<b>Number of Samples</b>	<b>Results Range</b>	<b>MAC</b>	<b>Unit of Measure</b>	<b>MAC Exceedance</b>	<b>Potential Sources</b>
<b>Carbaryl</b>	2	Non-Detect (ND)	90	microgram/litre (ug/L)	No	Agricultural, forestry, household insecticide.
<b>Carbofuran</b>	2	ND	90	ug/L	No	Agricultural insecticide.
<b>Carbon Tetrachloride</b>	2	ND	5	ug/L	No	Chemical and industrial activities.
<b>Chlordane (Total)</b>	2	ND	7	ug/L	No	Residue from banned insecticide.
<b>Chlorpyrifos</b>	2	ND	90	ug/L	No	Agricultural, household insecticide.
<b>Cyanazine</b>	2	ND	10	ug/L	No	Agricultural, residential herbicide.
<b>Diazinon</b>	2	ND	20	ug/L	No	Agricultural, livestock, operation, residential insecticide.
<b>Dicamba</b>	2	ND	120	ug/L	No	Agricultural herbicide.
<b>1,2-Dichlorobenzene</b>	2	ND	200	ug/L	No	Chemical and industrial factories.
<b>1,4-Dichlorobenzene</b>	2	ND	5	ug/L	No	Chemical and industrial factories.
<b>Dichlorodiphenyltrichloroethane (DDT) + metabolites</b>	2	ND	30	ug/L	No	Residue from banned insecticide.
<b>1,2-Dichloroethane</b>	2	ND	5	ug/L	No	Industrial chemical factories.
<b>1,1-Dichloroethylene (vinylidene chloride)</b>	2	ND	14	ug/L	No	Industrial chemical factories.
<b>Dichloromethane</b>	2	ND	50	ug/L	No	Pharmaceutical and chemical factories.



**Beaverton DWS Table 8 continued**

<b>Parameter</b>	<b>Number of Samples</b>	<b>Results Range</b>	<b>MAC</b>	<b>Unit of Measure</b>	<b>MAC Exceedance</b>	<b>Potential Sources</b>
<b>2,4-dichlorophenol</b>	2	Non-Detect (ND)	900	microgram/litre (ug/L)	No	Industrial contamination, reaction with chlorine.
<b>2,4-Dichlorophenoxy acetic acid (2,4-D)</b>	2	ND	100	ug/L	No	Agricultural, residential herbicide.
<b>Diclofop-methyl</b>	2	ND	9	ug/L	No	Agricultural herbicide.
<b>Dimethoate</b>	2	ND	20	ug/L	No	Agricultural, livestock, operation, residential insecticide.
<b>Dinoseb</b>	2	ND	10	ug/L	No	Herbicide residue.
<b>Diquat</b>	2	ND	70	ug/L	No	Agricultural, aquatic herbicide.
<b>Diuron</b>	2	ND	150	ug/L	No	Agricultural, industrial herbicide.
<b>Glyphosate</b>	2	ND	280	ug/L	No	Agricultural, forestry, household herbicide.
<b>Heptachlor + Heptachlor Epoxide</b>	2	ND	3	ug/L	No	Residue from banned insecticide.
<b>Lindane (Total)</b>	2	ND	4	ug/L	No	Agricultural, pharmaceutical insecticide.
<b>Malathion</b>	2	ND	190	ug/L	No	Pest control insecticide.
<b>Methoxychlor</b>	2	ND	900	ug/L	No	Agricultural, livestock, operation, residential insecticide.
<b>Metolachlor</b>	2	ND	50	ug/L	No	Agricultural herbicide.

**Beaverton DWS Table 8 continued**

<b>Parameter</b>	<b>Number of Samples</b>	<b>Results Range</b>	<b>MAC</b>	<b>Unit of Measure</b>	<b>MAC Exceedance</b>	<b>Potential Sources</b>
<b>Metribuzin</b>	2	Non-Detect (ND)	80	microgram/litre (ug/L)	No	Agricultural herbicide.
<b>Monochlorobenzene</b>	2	ND	80	ug/L	No	Industrial and agricultural chemical factories and dry cleaning facilities.
<b>Paraquat</b>	2	ND	10	ug/L	No	Agricultural, aquatic herbicide.
<b>Parathion</b>	2	ND	50	ug/L	No	Agricultural insecticide.
<b>Pentachlorophenol</b>	2	ND	60	ug/L	No	Pesticide, wood preservative residue.
<b>Phorate</b>	2	ND	2	ug/L	No	Agricultural insecticide.
<b>Picloram</b>	2	ND	190	ug/L	No	Industrial herbicide.
<b>Polychlorinated Biphenyls (PCB)</b>	2	ND	3	ug/L	No	Residue from various industrial uses.
<b>Prometryne</b>	2	ND	1	ug/L	No	Agricultural herbicide.
<b>Simazine</b>	2	ND	10	ug/L	No	Agricultural herbicide.
<b>Trihalomethane (THM) - Distribution (annual average)</b>	12	56.7	100	ug/L	No	By-product of chlorination of drinking water.
<b>Temephos</b>	2	ND	280	ug/L	No	Insecticide for mosquito, black fly control.
<b>Terbufos</b>	2	ND	1	ug/L	No	Agricultural insecticide.
<b>Tetrachloroethylene</b>	2	ND	30	ug/L	No	Leaching from PVC pipes; discharge from factories; dry cleaners and auto shops (metal degreaser).

**Beaverton DWS Table 8 continued**

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources
<b>2,3,4,6 - Tetrachlorophenol</b>	2	Non-Detect (ND)	100	microgram/litre (ug/L)	No	Wood preservative.
<b>Triallate</b>	2	ND	230	ug/L	No	Agricultural herbicide.
<b>Trichloroethylene</b>	2	ND	5	ug/L	No	Metal degreasing sites and other factories.
<b>2,4,6-Trichlorophenol</b>	2	ND	5	ug/L	No	Pesticide manufacturing.
<b>2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)</b>	2	ND	280	ug/L	No	Industrial herbicide residue.
<b>Trifluralin</b>	2	ND	45	ug/L	No	Agricultural herbicide.
<b>Vinyl Chloride</b>	2	ND	2	ug/L	No	Leaching from PVC pipes; discharge from plastics factories.

**Beaverton DWS Table 9**

**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 2014.

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