The Regional Municipality of Durham

Beaverton Drinking Water System 2018 Annual Report

Drinking Water System Number: 220004929

Municipal Drinking Water Licence 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 2018 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 at www.durham.ca. Further information regarding the Drinking Water Regulations can be found on the Ministry of the Environment, Conservation and Parks 's website at www.ontario.ca/ministry-environment-conservation-parks.

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 an approved capacity of 7,300 cubic metres per day (m^3/d). Beaverton Water Supply Plant feeds a Class One Distribution System and Class One Trunk Distribution System. 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 Simcoe. The water supply system includes the following processes:

- Zebra mussel control (chlorine),
- Screening,
- Low lift pumping,
- Coagulation (aluminum sulphate),
- Flocculation,
- Direct filtration,
- Disinfection (chlorine),
- Ultraviolet (UV) disinfection,
- High lift pumping,
- Water storage and distribution.

Raw Water Supply

Raw water is drawn from Lake Simcoe through a 500 millimetre (mm) diameter intake pipe extending 986 metres (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 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 filters are dual media containing granular activated carbon and sand. Each filter is equipped with two surface water agitators as well as a shared backwash pump.

Residual Management Facility

The filter backwash treatment includes isolation of the filter cell, reversal of flow through the media and surface water agitation. The backwash system consists of one celled backwash tank and one constant head tank that discharges the backwash water to the Lake Simcoe Water Pollution Control Plant.

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 and UV transmittance. The UV and chlorination systems will shut down the pumps if an alarm occurs. This process control ensures the water is properly 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 27 kilometres of watermains in a single pressure zone with a 1,717 cubic metre standpipe for storage and pressure equalization.

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:

Replacement of granular activated carbon in filter at water supply plant. - $25,900

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 2018 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 2018.

Incident Date	Parameter	Result	Corrective Action	Corrective Action Date
Not Applicable (N/A)	N/A	N/A	N/A	N/A

Beaverton 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	52	Non-Detect (ND) - 2	ND - 600
Treated	5	ND	ND
Distribution	14	ND	ND

Beaverton 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	52	Absence (A)	A
Distribution	206	A	A

Beaverton 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	57	Non-Detect (ND) - 27
Distribution	120	ND - 17

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
Turbidity - Filter Effluent	Continuous	0.02 - 0.29*	Nephelometric Turbidity Units (NTU)	Turbidity is a measure of particles in water.
Free Chlorine - Plant	Continuous	1.08 - 1.96*	Milligram per Litre (mg/L)	Must be sufficient to ensure disinfection has been achieved.
Free Chlorine - Distribution	Continuous	0.11 - 1.77*	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 Additional Testing and Sampling Carried Out in Accordance With the Requirement of an Approval, Order or Other Legal Instrument.

Type of Sample	Parameter	Number of Samples	Result	MAC	Unit of Measure
Raw Water	Gross Beta	1	Non-Detect (ND)	Not Applicable (N/A)	Becquerels per Litre (Bq/L)
Raw Water	Gross Alpha	1	ND	N/A	Bq/L
Raw Water	Tritium	1	ND	7,000	Bq/L
Raw Water	Microcystin (Total)	22	ND	1.5	Microgram per Litre (ug/L)
Treated Water**	Microcystin (Total)	12	ND	1.5	ug/L
Distribution**	Microcystin (Total)	10	ND	1.5	ug/L

**On August 10, the Region changed the total microcystin sampling location from the distribution to the point of entry to comply with the MECP Director's letter dated May 4, 2018. Prior to this date the Region collected samples from the THM sample locations in the distribution system as per previous direction from the MECP (2017) Director's letters.

Beaverton DWS Table 7

Summary of Treated Water Chemical 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	Non-Detect (ND) - 0.001	0.006	Milligram per Litre (mg/L)	No	Fire retardants, ceramics, electronics, solder.
Arsenic	14	ND	0.01	mg/L	No	Mining.
Barium	2	0.0272 - 0.0289	1.0	mg/L	No	Metal refineries, oil drilling.
Boron	2	0.0218 - 0.0333	5.0	mg/L	No	Industrial.
Cadmium	14	ND	0.005	mg/L	No	Industrial.
Chromium	14	ND	0.05	mg/L	No	Industrial.
Haloacetic acids - Distribution (annual average)	12	31.7	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 - 0.0016	0.05	mg/L	No	Refineries, mines, chemical manufacturing.
Sodium	12	28.2 - 33.0	Not Applicable[2]	mg/L	Yes (12)[3]	Storm water runoff including road salt.
Trihalomethane - Distribution (annual average)	12	65.9	100	ug/L	No	By-product of chlorination of drinking water.
Uranium	2	ND	0.02	mg/L	No	Power generation.
Fluoride	12	ND - 0.05	1.5	mg/L	No	Mining
Nitrite	12	ND	1.0	mg/L	No	Agriculture runoff, landfill leachate and animal waste.
Nitrate	12	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.

3 Number in parenthesis represents number of exceedance(s). For Sodium, regulations require reporting when results exceed 20 mg/L if it has not been reported in the preceding 57 months.

Beaverton DWS Table 8

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

No plumbing samples were required to be taken in 2018.

Location Type	Number of Samples	Range of Lead Results Milligram per Litre	MAC	Number of Exceedances	pH	Alkalinity Milligram per Litre
Plumbing	0	Not Applicable (N/A)	0.01	0	N/A	N/A
Distribution	6	Non-Detect (ND)	0.01	0	7.36 - 7.57	93.1 - 112

Beaverton 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 metobolites	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.

Beaverton 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.

Beaverton 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.

Beaverton DWS Table 9 continued

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources
Pentachlorophenol	2	Non-Detect (ND)	60	Microgram per Litre (ug/L)	No	Pesticide, wood preservative residue.
Phorate	2	ND	2	ug/L	No	Agricultural insecticide.
Picloram	2	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.
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.

Beaverton DWS Table 9 continued

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources
2,4,6-Trichlorophenol	2	Non-Detect (ND)	5	Microgram per Litre (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.

Beaverton 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 2018.

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