The Regional Municipality of Durham

Newcastle Drinking Water System 2017 Annual Report

Drinking Water System Number: 220004787

Municipal Drinking Water Licence Number: 003-109

Drinking Water System Owner: The Regional Municipality of Durham

Drinking Water System Category: Large Municipal Residential

This Annual Report for the calendar year 2017 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 building 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 on the Drinking Water Regulations can be found on the Ministry of the Environment and Climate Change's website at www.ontario.ca/ministry-environment-and-climate-change.

Drinking Water System Process Description

General

Newcastle Drinking Water System provides potable water to consumers in the Communities of Newcastle and Newtonville in the Municipality of Clarington. Located in Newcastle, the water supply plant is a Class Two Water Treatment Plant with an approved capacity of 8,173 cubic metres per day (m^3/d). Newcastle Water Treatment Plant feeds a Class One Distribution System and has a Class Two 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 Ontario. The water supply system includes the following processes:

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

Raw Water Supply
Water is drawn from Lake Ontario through a 610 millimetre (mm) diameter intake pipe extending 1,070 metres (m) into the lake. The intake structure is located at a depth of approximately 10 m. The water is drawn into the raw water well where screening takes place to remove large solids. Chlorine is also added at the raw water intake for zebra mussel control. The pre-chlorine residual and turbidity are continuously measured as the raw water enters the water supply plant.

Coagulation/Flocculation
The water flows through a travelling screen to remove large solids and continues towards the low lift pumps. Polyaluminum chloride (PAC) is added into a mechanical mixer upstream of the flocculation tanks. After rapid mixing, the water discharges into two flocculation tanks where flocculated particles are developed by slow mixing action.

Filtration
Particulate matter present in the raw water is captured by the coagulation filtration process and deposited on the top of the filters. The water supply plant has two filters to remove flocculated particles. Both filters are sand/anthracite dual media filters. Filter effluent turbidity and head loss are continuously monitored to indicate filter effectiveness. Filtered water passes through the filter under-drain into a clear well.

The backwash system consists of an air scour system and a two celled backwash wastewater holding 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. The free chlorine residual and turbidity are monitored continuously by online analyzers.

Distribution System
The high lift pumps deliver treated water to the distribution system. The distribution system delivers the treated water through approximately 63 kilometres of watermains in two pressure zones, and includes a 1,817 cubic metre reservoir, a 900 cubic metre standpipe, and two booster stations. Additional chlorination is applied at the Newtonville Pumping Station.

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 polybutylene service connections - $1,602,605
Repair of low lift pump No. 1 at Newcastle Water Supply Plant - $22,653

Tables

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

Newcastle Drinking Water System (DWS) Table 1

Summary of all Adverse Water Quality Incidents (AWQI) in 2017 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 2017.

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

Newcastle 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) - 6	ND - 130
Treated	6	ND	ND
Distribution	8	ND	ND

Newcastle 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	309	A	A

Newcastle 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	203	Non-Detect (ND) - 4
Distribution	167	ND - 45

Newcastle 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 - 0.15*	Nephelometric Turbidity Units (NTU)	Turbidity is a measure of particles in water.
Free Chlorine - Plant	Continuous	1.65 - 5.00*	Milligram per Litre (mg/L)	Must be sufficient to ensure disinfection has been achieved.
Free Chlorine - Distribution	Continuous	0.70 - 4.0*	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.

Newcastle 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 - 0.13	Not Applicable (N/A)	Becquerels per Litre (Bq/L)
Raw Water	Tritium	January - December	2.8 - 24.0	N/A	Bq/L
Treated Water	Tritium	January - June*	ND - 11.0	7000	Bq/L

*Not all radionuclide results from the Ministry of Labour were available at the time of printing.

Newcastle 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) - 0.0009	0.006	Milligram per Litre (mg/L)	No	Fire retardants, ceramics, electronics, solder.
Arsenic	14	ND - 0.0007	0.025	mg/L	No	Mining.
Barium	2	0.0230 - 0.0231	1.0	mg/L	No	Metal refineries, oil drilling.
Boron	2	0.0261 - 0.0295	5.0	mg/L	No	Industrial.
Cadmium	14	ND	0.005	mg/L	No	Industrial.
Chromium	14	ND - 0.0036	0.05	mg/L	No	Industrial.
Haloacetic acids - Distribution (annual average)	12	32.8	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 - 0.0011	0.01	mg/L	No	Refineries, mines, chemical manufacturing.
Sodium[2]	12	13.8 - 19.8	20	mg/L	No	Runoff from road salt.
Trihalomethane - Distribution (annual average)	12	53.7	100	ug/L	No	By-product of chlorination of drinking water.
Uranium	2	ND	0.02	mg/L	No	Power generation.
Fluoride	12	0.089 - 0.1	1.5	mg/L	No	Mining.
Nitrite	12	ND	1.0	mg/L	No	Agriculture runoff, landfill leachate and animal waste.
Nitrate	12	ND - 0.451	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.

Newcastle DWS Table 8

Summary of Lead Testing Under Schedule 15.1 of O. Reg. 170/03. No lead samples from plumbing were required in 2017.

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	8	Non-Detect (ND) - 0.0005	0.01	0	7.64 - 7.90	89.1 - 93.6

Newcastle 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	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.

Newcastle 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	5	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.

Newcastle 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.

Newcastle 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	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.

Newcastle 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	2	ug/L	No	Leaching from PVC pipes; discharge from plastics factories.

Newcastle 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 2017.

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