The Regional Municipality of Durham
2011 Annual Report

Drinking Water System Number: 220000772

Municipal Drinking Water License Number: 003-111

Drinking Water System Name: Oshawa Drinking Water System

Drinking Water System Owner: The Regional Municipality of Durham

Drinking Water System Category: Large Municipal Residential

This Annual Drinking Water Quality Report for calendar year 2011 is designed to inform you about your drinking water quality. 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. Copies of this report can be found in hard copy at the Regional Municipality of Durham Headquarters building located at 605 Rossland Road East, Whitby or on our website at *www.durham.ca*. Further information on the Drinking Water Regulations can be found on the Ministry of the Environment website at *www.ene.gov.on.ca*.

Drinking Water System Process Description
Oshawa Drinking Water System

General

The Oshawa Water Supply System provides potable water to residents, businesses and industries in the City of Oshawa, Town of Courtice, Town of Whitby and Community of Brooklin. The water supply plant is a Class III, conventional design water treatment plant with an approved capacity of 134,000m^3/day. The Oshawa Water Supply Plant feeds a Class II distribution system and Class III trunk system. The water supply system is divided into two plants; both plants are located on the same property and supply water to one watermain leaving the plant. The supply and distribution system is 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:

- Zebra mussel control (chlorine)
- Screening
- Pre-chlorination
- Low lift pumping
- Coagulation (aluminum sulphate)
- Flocculation
- Sedimentation
- Filtration
- Water storage and high lift pumping
- Post-chlorination
- Fluoridation (hydrofluosilicic acid)
- Distribution

Raw Water Supply

Raw water is drawn from Lake Ontario through two (2) intake pipes. The first is a 750mm diameter intake pipe extending 831m into the lake at a depth of 7.6m, and the second is a 900mm intake pipe extending 924m into the lake at a depth of 10.7m. Chlorine is added at the raw intake for zebra mussel control and to provide initial disinfection. There is also a line for raw water sampling at one of the intake cribs. The pre-chlorine residual and turbidity are continuously measured as the raw water enters the water supply plant.

Coagulation/Flocculation/Sedimentation

The water flows through traveling screens to remove large solids and continues towards the low lift pumps. Aluminum sulphate (alum) is added into a mechanical mixer upstream of the flocculation tanks. Gentle mixing of the alum with the water occurs as the water passes through the flocculation tanks. Plant 1 has three (3) sets of three (3) stage, four (4)-cell hydraulic spiral upflow flocculation tanks with three (3) trains of horizontal cross flow settling tanks. Plant 2 has three (3) sets of two (2) stage, three (3) cell hydraulic spiral upflow flocculation tanks with three (3) trains of horizontal cross flow settling tanks.

Filtration

Most of the particulate matter that was present in the raw water is deposited in the sedimentation tanks. The water supply plant has a total of ten (10) filters to remove flocculated particles. All ten (10) filters are dual media filters, composed of anthracite coal and sand. Filter effluent turbidity and head loss are continually monitored to indicate filter effectiveness. The filter backwash treatment includes isolation of the filter cell, reversal of flow through the media, air scouring or surface water agitation and discharge of the backwash water to Lake Ontario.

Disinfection and Fluoridation

Filtered water passes through the filter under-drain into the treated water clearwell and reservoir, and eventually to the high lift pump suction well. The high lift pumps deliver treated water to the distribution system. Disinfection is controlled by the addition of chlorine at multiple application points throughout the

plant. Consistent disinfection is ensured by continuous online monitoring of the chlorine residual throughout the water supply plant. Fluoride (hydrofluosilicic acid) is added to the treated water for the prevention of tooth decay.

Distribution System

The Oshawa distribution system is interconnected with the distribution systems of Whitby and Ajax. The Oshawa/Whitby/Ajax distribution system delivers treated water through 1,829km of watermains in multiple pressure zones and includes nine (9) reservoirs and twelve (12) booster stations and one (1) elevated tank.

Monetary expenses incurred during this reporting period

Under Section 11 of O. Reg. 170/03, a description of any major expenses incurred during this reporting period must be included in the annual report. The details of major expenses for this drinking water system are as follows:

Grandview Pumping Station pumps rebuild - $26,659
CCTV inspection equipment - $18,776
Cement mortar lining of watermains - $660,000
Reservoir rehabilitation - $83,304

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

Summary of all adverse water quality incidents (AWQI) reported to Spills Action Centre in accordance with Section 16-3 and 16-4 of O. Reg. 170/03.

Distribution sample results are from the Oshawa/Whitby/Ajax distribution system.

Incident Date	Parameter	Result	Corrective Action	Corrective Action Date
January 20	Low pressure (Ajax distribution)	0	Pressure restored, residual increased, system flushed, samples collected.	January 20
February 24	Low pressure (Ajax distribution)	170 kPa	Pressure restored, system flushed, samples collected.	February 24
*March 24	Lead (Oshawa distribution)	0.0175 mg/L	Replaced hydrant components, flushed, resampled.	March 24
*March 28	Lead (Oshawa distribution)	0.0101 mg/L	Flushed, resampled.	March 28
*March 31	Lead (Oshawa distribution)	.208 mg/L	Hydrant and valve replaced, flushed, resampled.	April 1
*April 6	Lead (Oshawa distribution)	.0604 mg/L	Section of watermain replaced, flushed, resampled.	April 7
*April 11	Lead (Oshawa distribution)	.0281 mg/L	Flushed, resampled.	April 13
April 21	Total coliforms (distribution)	17 CFU/100 mL	Flushed, resampled.	April 21
April 29	Total coliforms (Ajax distribution)	Presence	Flushed, resampled.	April 29
May 3	Total coliforms (Whitby distribution)	Presence	Flushed, resampled.	May 3
May 3	Total coliforms (Whitby distribution)	Presence	Flushed, resampled.	May 3
May 4	Total coliforms (Oshawa distribution)	1 CFU/100 mL	Flushed, resampled.	May 4
May 5	Total coliforms (Ajax distribution)	Presence	Flushed, resampled.	May 5
May 25	Total coliforms (Oshawa distribution)	9 CFU/100 mL	Flushed, resampled.	May 25
July 10	Total coliforms (Oshawa distribution)	1 CFU/100 mL	Flushed, resampled.	July 10
July 23	Total coliforms (Oshawa distribution)	1 CFU/100 mL	Flushed, resampled.	July 23
July 25	Low pressure (Ajax distribution)	0	Flushed, resampled.	July 25
August 6	Total coliforms (Whitby distribution)	3 CFU/100 mL	Flushed, resampled.	August 6
August 6	Total coliforms (Whitby distribution)	3 CFU/100 mL	Flushed, resampled.	August 6
August 6	Total coliforms (Whitby distribution)	10 CFU/100 mL 2 CFU/100 mL 7 CFU/100 mL	Flushed, resampled.	August 6
August 7	Total coliforms (Whitby distribution)	18 CFU/100 mL 16 CFU/100 mL	Flushed, resampled.	August 7
August 11	Total coliforms (Oshawa distribution)	1 CFU/100 mL	Flushed, resampled.	August 11
August 11	Total coliforms (Oshawa distribution)	3 CFU/100 mL	Flushed, resampled.	August 11
August 17	Total coliforms (Oshawa distribution)	8 CFU/100 mL	Flushed, resampled.	August 17
August 18	Total coliforms (Oshawa distribution)	7 CFU/100 mL	Flushed, resampled.	August 18
September 10	Total coliforms (Ajax distribution)	3 CFU/100 mL	Flushed, resampled.	September 10
December 14	Low pressure (Ajax distribution)	0	Flushed, resampled.	December 14

*AWQIs from March 24 - April 11 are all related to one sample required under Schedule 15.1

Microbiological testing done under Schedule 10 of O. Reg. 170/03, during the period covered by this Annual Report.

Distribution sample results are from the Oshawa/Whitby/Ajax distribution system.

	Number of Samples	Range of E.Coli MF	Range of Total Coliform MF
Raw	203	ND - 2	ND - 500
Treated	-	-	-
Distribution	719	ND	ND - 18
	Number of Samples	**E. Coli P/A**	**Total Coliform P/A**
Raw	-	-	-
Treated	204	A	A
Distribution	2,643	A	A - P(3)*
	Number of HPC Samples	**Range of HPC Samples**	
Raw	-	-	
Treated	204	ND - 11	
Distribution	1,967	ND - 360	

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

Operational testing done under Schedule 7 of O. Reg. 170/03 during the period covered by this Annual Report.

Distribution sample results are from the Oshawa/Whitby/Ajax distribution system.

	Number of Samples	Range of Results	Unit of Measure	Parameter Description
Turbidity - Filter Effluent	Continuous	0.01 - 0.55	NTU	Turbidity is a measure of particles in water.
Fluoride - Plant	Continuous	0.09 - 1.32	mg/L	Fluoride is added to water to prevent tooth decay.
Free Chlorine - Plant	Continuous	0.21 - 5.15	mg/L	Must be sufficient to ensure disinfection has been achieved.
Free Chlorine - Distribution	Continuous	0.09 - 4.21	mg/L	Recommended level of at least 0.20 mg/L in distribution system to maintain microbiological quality, 0.05 mg/L is the minimum.

Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.

Date of legal instrument issued	Parameter	Date Sampled	Result	Unit of Measure
May 25, 2006	Raw Water			
	Gross Beta	Jan - Dec	0.09 - 0.13	Bq/L
	Tritium	Jan - Dec	2.0 - 14.1	Bq/L
	Treated Water			
	Gross Alpha	Jan - Dec		Bq/L
	Gross Beta	Jan - Dec		Bq/L
	Tritium	Jan - Dec		Bq/L
	Cesium-134	Jan - Dec		Bq/L
	Cesium-137	Jan - Dec		Bq/L
	Cobalt-60	Jan - Dec		Bq/L
	Iodine-131	Jan - Dec		Bq/L
	Residue Management			
	Aluminum	Jan - Dec		
	Chlorine	Jan - Dec		mg/L
	Suspended Solids	Jan - Dec		mg/L

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

Summary of treated water inorganic parameters tested under Schedule 13 and 23 of O. Reg. 170/03 during the period covered by this Annual Report.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources[1]
Antimony	14	0.0005 - 0.0011	0.006	mg/L	No	Fire retardants, ceramics, electronics, solder.
Arsenic	14	0.0003 - 0.0007	0.025	mg/L	No	Mining.
Barium	2	0.018 - 0.025	1.0	mg/L	No	Metal refineries, oil drilling.
Boron	2	ND - 0.016	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	1	ug/L	No	Industrial.
Selenium	14	ND - 0.0003	0.01	mg/L	No	Refineries, mines, chemical manufacturing.
Sodium[2]	12	13.0 - 16.2	20	mg/L	No	Runoff from road salt.
Uranium	2	0.0002 - 0.0003	0.02	mg/L	No	Power generation.
Nitrite	12	ND	1.0	mg/L	No	Agriculture runoff, landfill leachate and animal waste.
Nitrate	12	0.182 - 0.501	10.0	mg/L	No	Fertilizer.

[1] Parameters may occur naturally in the environment.

[2] Sodium does not have a MAC; only an aesthetic objective of 200 mg/L. Sodium results exceeding 20 mg/L are to be reported as per Section 16-3 (8) of O. Reg. 170/03.

Summary of lead testing under Schedule 15.1 of O. Reg. 170/03 during the period covered by this Annual Report. Samples taken

Sample results are from the Oshawa/Whitby/Ajax distribution system.

Location Type	Number of Samples	Range of Lead Results	Unit of measure	MAC	Number of Exceedances
Plumbing	220	ND - 0.0029	mg/L	0.01	0
Distribution	20	ND - 0.0175	mg/L	0.01	1

Summary of treated water organic parameters tested under Schedule 24 of O. Reg. 170/03 during the period covered by this Annual Report.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Parameter description
Alachlor	2	ND	5	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 metobolites	2	ND	5	ug/L	No	Agricultural herbicide.
Azinphos-methy1	1	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	1	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.
Carbofuran	2	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	1	ND	90	ug/L	No	Agricultural, household insecticide.
Cyanazine	2	ND	10	ug/L	No	Agricultural, residential herbicide.
Diazinon	1	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.
Dimethoate	1	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.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Parameter description
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	1	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	1	ND	50	ug/L	No	Agricultural insecticide.
Pentachlorophenol	2	ND	60	ug/L	No	Pesticide, wood preservative rseidue.
Phorate	1	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.
THM - Distribution (annual average)	12	40	100	ug/L	No	By-product of chlorination of drinking water.
Temephos	1	ND	280	ug/L	No	Insecticide for mosquito, black fly control.
Terbufos	1	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.

Inorganic or organic parameter(s) that exceed half the standard prescribed in Schedule 2 of the Ontario Drinking Water Quality Standards.

Parameter	Result	Unit of Measure	Date of Sample
Not Applicable	-	-	-

The Regional Municipality of Durham
2011 Annual Report

Drinking Water System Number: 220000754

Municipal Drinking Water License Number: 003-111

Drinking Water System Name: Whitby Drinking Water System

Drinking Water System Owner: The Regional Municipality of Durham

Drinking Water System Category: Large Municipal Residential

This Annual Drinking Water Quality Report for calendar year 2011 is designed to inform you about your drinking water quality. 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. Copies of this report can be found in hard copy at the Regional Municipality of Durham Headquarters building located at 605 Rossland Road East, Whitby or on our website at *www.durham.ca*. Further information on the Drinking Water Regulations can be found on the Ministry of the Environment website at *www.ene.gov.on.ca*.

Drinking Water System Process Description
Whitby Drinking Water System

General

The Whitby Drinking Water System provides potable water to residents, businesses and industries in the Town of Whitby, Community of Brooklin, City of Oshawa and Town of Courtice. The plant also has the capability to supply water to the Town of Ajax. The water supply plant is a Class III, direct filtration water treatment plant with an approved capacity of 118,000 m^3/day. The Whitby Water Supply Plant feeds a Class II distribution system and Class III trunk system. The supply and distribution system is 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:

- Zebra mussel control (chlorine)

- Screening
- Pre-chlorination
- Low lift pumping
- Coagulation (aluminum sulphate)
- Flocculation
- Filtration
- Post-chlorination/dechlorination (sodium bisulphite)
- Fluoridation (hydrofluorosilicic acid)
- Water storage and high lift pumping
- Distribution

Raw Water Supply

Raw water is drawn from Lake Ontario through a 1,350mm diameter intake pipe extending 1,710m into the lake. The intake structure is located at a depth of 16m. Chlorine is added at the raw intake for zebra mussel control and to provide initial disinfection. There is also a line for raw water sampling at the intake crib. The pre-chlorine residual and turbidity are continuously measured as the raw water enters the water supply plant.

Coagulation/Flocculation

The water flows through traveling screens to remove large solids and continues towards the low lift pumps. Aluminum sulphate (alum) is added to the incoming water upstream of the flocculation tanks. Gentle mixing of the alum with the water occurs as the water passes through the flocculation tanks. There are six (6) sets of hydraulic spiral upflow flocculation tanks, each with three (3) cells arranged for parallel flow.

Filtration

Particulate matter that is present in the raw water is captured by the process and deposited on the top of the filters. The water supply plant has four (4) filters to remove flocculated particles. All filters are dual media filters, composed of anthracite and sand. Filter effluent turbidity and head loss are continuously monitored to indicate filter effectiveness. The filters are cleaned using a backwash treatment. The backwash water is discharged to a two (2)-cell sedimentation tank to allow for settling of the suspended solids. The settled solids are pumped to the sanitary sewer. The supernatant is discharged back to Lake Ontario.

Disinfection and Fluoridation

Filtered water passes through the filter under-drain into the treated water clearwell. Treated water passing through the filters enters a clearwell which feeds the high lift suction well. The high lift pumps deliver treated water to the distribution system. Disinfection is controlled by the addition of chlorine at multiple application points throughout the plant. Sodium bisulfite, a dechlorination chemical, is used to manage chlorine residuals. Consistent disinfection is

ensured by continuous online monitoring of the chlorine residual throughout the water supply plant. Fluoride (hydrofluosilicic acid) is added to the treated water for the prevention of tooth decay.

Distribution System

The Whitby distribution system is interconnected with the distribution systems of Oshawa and Ajax. The Oshawa/Whitby/Ajax distribution system delivers treated water through 1,829km of watermains in multiple pressure zones and includes nine (9) reservoirs and twelve (12) booster stations and one (1) elevated tank.

Monetary expenses incurred during this reporting period

Under Section 11 of O. Reg. 170/03, a description of any major expenses incurred during this reporting period must be included in the annual report. The details of major expenses for this drinking water system are as follows:

Traveling water screen - $219,906

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

Summary of all adverse water quality incidents reported to Spills Action Centre in accordance with Section 16-3 and 16-4 of O. Reg. 170/03.

Incident Date	Parameter	Result	Corrective Action	Corrective Action Date
March 25	Fluoride	1.53 mg/L	Feed stopped.	March 25

Microbiological testing done under Schedule 10 of O. Reg. 170/03, during the period covered by this Annual Report.

	Number of Samples	Range of E.Coli MF	Range of Total Coliform MF
Raw	202	ND - 4	ND - 400
Treated	3	ND	ND
	Number of Samples	**E. Coli P/A**	**Total Coliform P/A**
Raw	-	-	-
Treated	202	A	A
	Number of HPC Samples	**Range of HPC Samples**	
Raw	-	-	
Treated	205	ND - 69	

Operational testing done under Schedule 7 of O. Reg. 170/03 during the period covered by this Annual Report.

	Number of Samples	Range of Results	Unit of Measure	Parameter Description
Turbidity - Filter Effluent	Continuous	0.02 - 0.449	NTU	Turbidity is a measure of particles in water.
Fluoride - Plant	Continuous	0.2 - 1.53	mg/L	Fluoride is added to water to prevent tooth decay.
Free Chlorine - Plant	Continuous	1.33 - 4.62	mg/L	Must be sufficient to ensure disinfection has been achieved.

Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.

Date of legal instrument issued	Parameter	Date Sampled	Result	Unit of Measure
May 25, 2006	Raw Water			
	Gross Beta	Jan - Dec	0.08 - 0.12	Bq/L
	Tritium	Jan - Dec	2.2 - 11.3	Bq/L
	Treated Water			
	Gross Alpha			Bq/L
	Gross Beta			Bq/L
	Tritium			Bq/L
	Cesium-134			Bq/L
	Cesium-137			Bq/L
	Cobalt-60			Bq/L
	Iodine-131			Bq/L
	Residue Management			
	Suspended Solids			mg/L

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

Summary of treated water inorganic parameters tested under Schedule 13 and 23 of O. Reg. 170/03 during the period covered by this Annual Report.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources[1]
Antimony	14	0.0005 - 0.0009	0.006	mg/L	No	Fire retardants, ceramics, electronics, solder.
Arsenic	14	0.0003 - 0.0007	0.025	mg/L	No	Mining.
Barium	2	0.019 - 0.025	1.0	mg/L	No	Metal refineries, oil drilling.
Boron	2	ND - 0.018	5.0	mg/L	No	Industrial.
Cadmium	14	ND	0.005	mg/L	No	Industrial.
Chromium	14	ND - 0.0012	0.05	mg/L	No	Industrial.
Mercury	2	ND	1	ug/L	No	Industrial.
Selenium	14	ND - 0.0003	0.01	mg/L	No	Refineries, mines, chemical manufacturing.
Sodium[2]	12	13.3 - 15.6	20	mg/L	No	Runoff from road salt.
Uranium	2	0.0002	0.02	mg/L	No	Power generation.
Nitrite	12	ND - 0.022	1.0	mg/L	No	Agriculture runoff, landfill leachate and animal waste.
Nitrate	12	0.197 - 0.429	10.0	mg/L	No	Fertilizer.

[1] Parameters may occur naturally in the environment.

[2] Sodium does not have a MAC; only an aesthetic objective of 200 mg/L. Sodium results exceeding 20 mg/L are to be reported as per Section 16-3 (8) of O. Reg. 170/03.

Summary of treated water organic parameters tested under Schedule 24 of O. Reg. 170/03 during the period covered by this Annual Report.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Parameter description
Alachlor	2	ND	5	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 metobolites	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.
Carbofuran	2	ND	90	ug/L	No	Agricultural insecticide.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources
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-methy1	2	ND	9	ug/L	No	Agricultural herbicide.
Dimethoate	2	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.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources
Pentachlorophenol	2	ND	60	ug/L	No	Pesticide, wood preservative rseidue.
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.
THM - Distribution (annual average)	12	39.3	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.

Inorganic or organic parameter(s) that exceed half the standard prescribed in Schedule 2 of the Ontario Drinking Water Quality Standards.

Parameter	Result	Unit of Measure	Date of Sample
Not Applicable	-	-	-

The Regional Municipality of Durham
2011 Annual Report

Drinking Water System Number: 220008890

Municipal Drinking Water License Number: 003-111

Drinking Water System Name: Ajax Drinking Water System

Drinking Water System Owner: The Regional Municipality of Durham

Drinking Water System Category: Large Municipal Residential

This Annual Drinking Water Quality Report for calendar year 2011 is designed to inform you about your drinking water quality. 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. Copies of this report can be found in hard copy at the Regional Municipality of Durham Headquarters building located at 605 Rossland Road East, Whitby or on our website at *www.durham.ca*. Further information on the Drinking Water Regulations can be found on the Ministry of the Environment website at *www.ene.gov.on.ca*.

Drinking Water System Process Description
Ajax Drinking Water System

General

Ajax Drinking Water System provides potable water to residents, businesses and industries in the Town of Ajax and City of Pickering. The plant also has the capability to supply water to the Town of Whitby. The water supply plant is a Class IV, direct filtration design water treatment plant with a rated capacity of 163,500m^3/day. Ajax Water Supply Plant supplies a Class II distribution system, and a Class III trunk distribution system. The supply and distribution system is 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:

- Zebra mussel control (sodium hypochlorite)
- Screening

- Pre-chlorination
- Low lift pumping
- pH adjustment (sulphuric acid)
- Coagulation (aluminum sulphate)
- Flocculation
- Filtration
- Post chlorination/dechlorination (sodium bisulphite)
- Fluoridation (hydrofluosilicic acid)
- Water storage and high lift pumping
- Distribution

Raw Water Supply

Raw water is drawn from Lake Ontario through a 2,100mm diameter intake pipe extending 2,506m into the lake. The intake structure is located at a depth of 18m. Five (5) 100mm diameter lines are located outside the intake pipe. Three (3) lines are used for raw water sampling and two lines are dedicated to the delivery of chlorine solution to a zebra mussel chlorine diffuser that is used for initial disinfection and control of zebra mussels. The chlorine residual and turbidity are continuously measured as the raw water enters the water supply plant. Sulphuric acid can be added for pH adjustment to enhance disinfection, coagulation and flocculation.

Coagulation/Flocculation

The water flows through traveling screens to remove large solids and continues towards the low lift pumps. Aluminum sulphate (alum) is added to a mechanical mixer upstream of the flocculation tanks. Gentle mixing of the alum with the water occurs as the water passes through the six (6) sets of hydraulic spiral up-flow flocculation tanks. Each tank contains three (3) flocculation cells.

Filtration

Particulate matter that is present in the raw water is captured by the process and deposited on the top of the filters. The water supply plant has six (6) dual media filters to remove flocculated particles. Four (4) of the filters use granulated activated carbon (GAC) and two (2) use anthracite. GAC is used to assist taste and odour control. Three vertical centrifugal pumps are available for backwashing the filters. The backwashed water is discharged to two tanks and two sedimentation tanks to allow for settling of the suspended solids. The settled solids are pumped to the sanitary sewer. The dechlorinated clear supernatant is discharged back to Lake Ontario.

Disinfection and Fluoridation

Filtered water passes through the filter under-drain into the reservoir. The water in the reservoir then enters the clear well and eventually the high lift pump suction well. The high lift pumps deliver treated water to the distribution system. Disinfection is controlled by the addition of chlorine at multiple application points throughout the plant. Sodium bisulphate, a dechlorination chemical, is used to

manage chlorine residuals. Consistent disinfection is ensured by continuous online monitoring of the chlorine residual throughout the water supply plant. Fluoride (hydrofluosilicic acid) is added to the treated water for the prevention of tooth decay.

Distribution System

The Ajax distribution system is interconnected with the distribution systems of Oshawa and Whitby. The Oshawa/Whitby/Ajax distribution system delivers treated water through 1,829km of watermains in multiple pressure zones and includes nine (9) reservoirs and twelve (12) booster stations and one (1) elevated tank.

Monetary expenses incurred during this reporting period

Under Section 11 of O. Reg. 170/03, a description of any major expenses incurred during this reporting period must be included in the annual report. The details of major expenses for this drinking water system are as follows:

Granular activated carbon replacement - $106,526
Circle chart recorders for filter effluent turbidity monitoring - $14,700
Alum mixer - $25,010
Process compressors and dryers - $23,654
Sulfuric acid suction piping replacement - $84,700
Re-roofing Cherrywood Reservoir - $23,350
Supervisory Control and Data Acquisition (SCADA) system upgrades - $39,772
High lift and backwash pump rebuild kits - $39,067
Parking lot improvements - $32,980
Floor tiles - $17,702
Substation maintenance - $17,750

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

Summary of all adverse water quality incidents reported to Spills Action Centre in accordance with Section 16-3 and 16-4 of O. Reg. 170/03.

Incident Date	Parameter	Result	Corrective Action	Corrective Action Date
February 11	Over Dechlorination (plant)	0.20 mg/L	Flushed, verified residuals.	February 11
February 22	Over Dechlorination (plant)	0.00 mg/L	Flushed, verified residuals, samples collected.	February 22
March 16	Chlorination (plant)	0.02 mg/L	Residual restored, flushed, samples collected.	March 16
October 17	Fluoride (plant)	1.725 mg/L	Analyzer inspected, residual reduced.	October 17
December 21	Total Coliforms (plant)	Presence	Resampled	December 21

Microbiological testing done under Schedule 10 of O. Reg. 170/03, during the period covered by this Annual Report.

	Number of Samples	Range of E.Coli MF	Range of Total Coliform MF
Raw	204	ND - 4	ND - 700
Treated	-	-	-
	Number of Samples	**E. Coli P/A**	**Total Coliform P/A**
Raw	-	-	-
Treated	204	A	A - P (1)*
	Number of HPC Samples	**Range of HPC Samples**	
Raw	-	-	
Treated	204	ND - 5	

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

Operational testing done under Schedule 7 of O. Reg. 170/03 during the period covered by this Annual Report.

	Number of Samples	Range of Results	Unit of Measure	Parameter Description
Turbidity - Filter Effluent	Continuous	0.016 - 0.219	NTU	Turbidity is a measure of particles in water.
Fluoride - Plant	Continuous	0.02 - 1.725	mg/L	Fluoride is added to water to prevent tooth decay.
Free Chlorine - Plant	Continuous	0.00 - 2.02	mg/L	Must be sufficient to ensure disinfection has been achieved.

Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.

Date of legal instrument issued	Parameter	Date Sampled	Result	Unit of Measure
May 25, 2006	Raw Water			
	Gross Beta	Jan - Dec	0.08 - 0.12	Bq/L
	Tritium	Jan - Dec	2.3 - 10.3	Bq/L
	Treated Water			
	Gross Alpha	Jan - Dec		Bq/L
	Gross Beta	Jan - Dec		Bq/L
	Tritium	Jan - Dec		Bq/L
	Cesium-134	Jan - Dec		Bq/L
	Cesium-137	Jan - Dec		Bq/L
	Cobalt-60	Jan - Dec		Bq/L
	Iodine-131	Jan - Dec		Bq/L
	Residue Management			
	Chlorine	Jan - Dec		mg/L
	Suspended Solids	Jan - Dec		mg/L

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

Summary of treated water inorganic parameters tested under Schedule 13 and 23 of O. Reg. 170/03 during the period covered by this Annual Report.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources[1]
Antimony	14	0.0005 - 0.0008	0.006	mg/L	No	Fire retardants, ceramics, electronics, solder.
Arsenic	14	0.0004 - 0.0007	0.025	mg/L	No	Mining.
Barium	2	0.0216 - 0.0219	1.0	mg/L	No	Metal refineries, oil drilling.
Boron	2	0.018 - 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	1	ug/L	No	Industrial.
Selenium	14	ND - 0.0003	0.01	mg/L	No	Refineries, mines, chemical manufacturing.
Sodium[2]	12	15.8 - 17.5	20	mg/L	No	Runoff from road salt.
Uranium	2	0.0002 - 0.0004	0.02	mg/L	No	Power generation.
Nitrite	12	ND	1.0	mg/L	No	Agriculture runoff, landfill leachate and animal waste.
Nitrate	12	0.191 - 0.426	10.0	mg/L	No	Fertilizer.

[1] Parameters may occur naturally in the environment.

[2] Sodium does not have a MAC; only an aesthetic objective of 200 mg/L. Sodium results exceeding 20 mg/L are to be reported as per Section 16-3 (8) of O. Reg. 170/03.

Summary of treated water organic parameters tested under Schedule 24 of O. Reg. 170/03 during the period covered by this Annual Report.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Parameter description
Alachlor	2	ND	5	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 metobolites	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.
Carbofuran	2	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.

Parameter	Number of Samples	Results Range	MAC	Unit of Measure	MAC Exceedance	Potential Sources
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-methy1	2	ND	9	ug/L	No	Agricultural herbicide.
Dimethoate	2	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 rseidue.
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	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.
THM - Distribution (annual average)	12	29.7	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.

Inorganic or organic parameter(s) that exceed half the standard prescribed in Schedule 2 of the Ontario Drinking Water Quality Standards.

Parameter	Result	Unit of Measure	Date of Sample
Not Applicable	-	-	-