



CITY OF ST. CATHARINES

WATER DISTRIBUTION SYSTEM 2006 SUMMARY REPORT

Waterworks # 260003279

Purpose

Under Ontario Regulation 170/03 made under the Safe Drinking Water Act, 2002, Schedule 22-2 (1), (2) and (3), Council members are required to be given a summary report on the drinking water system that falls under their municipal responsibility.

The report must list any time the City exceeded or was unable to meet the requirements of the Act, the regulation, the system's approval or any order issued by the Ministry of the Environment. Each failure must specify the duration and measures taken to correct the failure. The report must also list a summary of the quantities and flow rates of the water supplied.

Waterworks Description

The City of St. Catharines distribution system is classified by the Ministry of the Environment as a Class II system. The City's waterworks consists of approximately 530 kilometres of watermains serving the local street network. This watermain network is one of several municipal networks supplied by the Decew Water Treatment Plant operated by the Regional Municipality of Niagara. The source of water for this plant is surface water, from Lake Erie via an intake from the Welland Canal located approximately 6 km from the treatment plant near Allanburg. The water is diverted to Decew's own 5.4 km long open supply canal which flows by gravity directly to the treatment plant. The Decew Water Treatment plant is a full treatment plant providing screening, chemical-assisted flocculation/coagulation, filtration and disinfection with chlorine. Further information on the supply of water by the Decew Water Treatment Plant can be obtained from the Region's web site at www.regional.niagara.on.ca.

Actions Taken to Comply with the Safe Drinking Water Act & Regulation 170/03

- ▶ To meet the requirements, the City is required to take a minimum of 114 samples each month from a cross-section of its watermain network and to test these samples for microbiological indications of contamination. Testing for the chlorine residual content is also a requirement. The chlorine residual must be sampled at the same time and location as the microbiological sample.
- ▶ The City's drinking water is sampled every three months for Trihalomethanes (THM's) at a point that is likely to have an elevated potential for the formation of Trihalomethanes. Also, the City's drinking water is sampled every 12 months for Lead, from a point that is likely to have an elevated concentration.
- ▶ Anyone sampling the drinking water must hold an Ontario Environmental Training Consortium (OETC) Water Quality Analyst license or a Water

Distribution license. These licenses must be updated every three years and require continuing education for renewal.

- ▶ All laboratory analysis must be carried out by an accredited laboratory. The City of St. Catharines currently uses Niagara Analytical Laboratories located in Niagara Falls, Ontario for all microbiological analysis. Niagara Analytical is an accredited laboratory. The City uses EnviroTest Laboratories located in Waterloo, Ontario for Lead and Trihalomethanes (THM) analysis. EnviroTest Laboratories is also an accredited laboratory. Accreditation ensures the laboratory has acceptable laboratory protocols and test methods in place. It also requires the laboratory to provide evidence and assurances of the proficiency of the analysts performing the test methods. Laboratories are audited by the Canadian Association for Environmental Analytical Laboratories (CAEAL) and accredited by the Standards Council of Canada (SCC).
- ▶ All drinking water sample results are available to the public. Annual reports are available at City Hall, the Lake Street Service Centre and on the City's web site, www.stcatharines.ca. The daily sample records are also available at City Hall and the Lake Street Service Centre for the public to view.
- ▶ Notification is given to the Ministry of the Environment and the Regional Public Health Department of all incidents of regular sampling which exceed the bacteriological limits of zero colonies per 100 mL for *Escherichia coli* (E. coli) or Total Coliforms and free chlorine residual measurements of less than 0.05 mg/L or greater than 4.0 mg/L. Notification to the Ministry of the Environment and the Regional Public Health Department of THM's which exceed 0.10 mg/L or Lead analyses which exceed 0.01 mg/L.

Definitions, Abbreviations & Terms

MAC - Maximum Acceptable Concentration

This is a health-related standard established for parameters which when present above a certain concentration, have known or suspected adverse health effects. The length of time the MAC can be exceeded without injury to health will depend on the nature and concentration of the parameter. (Ontario Drinking Water Standards. Ministry of the Environment. Revised January 2001. PIBS #4065e. Page 2.)

mg/L - milligrams per litre (parts per million)

CFU/100 mL - Colony Forming Units per 100 millilitres of sample

< - Less than

> - Greater than

Microbiological parameters (ie. bacteria) - the source of bacteria may come from wastewater treatment plants, livestock operations, septic systems and wildlife. Microbiological analysis is the most important aspect of drinking water quality due to its association with dangerous water-borne diseases. (Paraphrased from Ontario Drinking Water Standards. Ministry of the Environment.)

Total Coliform - the group of bacteria most commonly used as an indicator of water quality. The presence of these bacteria in a water sample indicates inadequate filtration and/or disinfection. (Ontario Drinking Water Standards. Ministry of the Environment.)

***Escherichia coli* (E. coli)** - a sub-group of Coliform bacteria. It is most frequently associated with recent fecal pollution. The presence of E. coli or fecal coliforms in drinking water is an indication of sewage contamination. (Ontario Drinking Water Standards. Ministry of the Environment.)

Trihalomethanes (THM's) - disinfection by-products that are produced when chlorine reacts with naturally occurring organics in the water.

Lead - can occur as a result of recent erosion of natural deposits in surface water, usually only present as a result of corrosion in lead pipes or fittings in household plumbing.

Water Quality Test Results

In 2006, 2943 samples were taken throughout the City and analyzed for microbiological contamination, chlorine residual and organics as part of the drinking water surveillance program and followup watermain break sampling program. Of these, three samples were found to be adverse.

The following table summarizes each parameter tested. It gives the number of tests, the number of detectable results, the range of results and any exceedances.

Table 1: Summary of Water Quality Test Results, 2006

Parameter	MAC	Number of Samples	Number of Detectable Results	Results Range	Exceedances	Comments
Microbiological Analysis						
<i>Escherichia coli</i> (E. Coli) counts/100 mL	ND	1667	0	0	0	Indicates presence of fecal mater
Total Coliforms counts/100 mL	ND	1667	2	0 - 2	2	Indicates the possible presence of fecal contamination
Background Count counts/100 mL	N/A	1667	56	0 - >200	0	Natural occurring mircroorganism used to indicate treatment effectiveness
Heterotrophic Plate Count (HPC) counts/100 mL	N/A	357	132	0 - 31	0	Indication of water quality deterioration
Organics						
Lead mg/L	0.01	4	4	<0.001	0	Corrosion of plumbing systems; erosion of natural deposits
Trihalomethanes mg/L	0.1	7	7	0.032 Annual running average	0	By-product of disinfection; reaction of chlorine with organic matter
Disinfectant						
Chlorine Residual mg/L	>0.05 - <4.0	2936	2935	0.00 - 1.58	1	Level of disinfectant present

ND - None Detected

N/A - Not Applicable

Summary of Exceedences

After each adverse incident, a series of actions is required to ensure the safety of the water and compliance with provincial legislation. This involves flushing hydrants located in the area of the adverse incident, taking additional water samples from the original location and locations around the adverse incident. It also involves notifying the Ministry of the Environment, Spills Action Center (SAC) and the Public Health Department both verbally and in writing. The following table summarizes all adverse water incidents throughout the City of St. Catharines in 2006 and the corrective action taken.

An adverse water quality incident does not mean the drinking water supply is unsafe. An adverse incident simply indicates on that one occasion, a water quality objective was exceeded.

Table 2: Summary of Adverse Water Incidences, 2006

Incident Date	Location	Adverse Parameter	Result	Corrective Action	Corrective Action Date
January 11	Welland Canal Parkway	Chlorine Residual	0.00 mg/L	Flushed, resampled	January 12
February 21	Kent Street	Mainbreak (mistakenly identified by SAC as an adverse incident)	n/a	Flushed, sampled as per the City's watermain break procedure	February 21
February 22	Roehampton Drive	Mainbreak (mistakenly identified by SAC as an adverse incident)	n/a	Flushed, sampled as per the City's watermain break procedure	February 22
July 26	Lake Street	Total Coliform	2 CFU/100 mL	Flushed, resampled	July 27
August 23	Church Street	Total Coliform	1 CFU/100 mL	Flushed, resampled	August 24

Watermain Repairs

In 2006, there were 98 watermain breaks. The Region of Niagara with the cooperation of the local municipalities has developed standardized watermain break repair guidelines. Following a watermain break repair, the City samples from locations both upstream and downstream from where the break occurred. Samples are analyzed for microbiological contamination and chlorine residual.

When a new main is installed, the City is required to sample for microbiological contamination and chlorine residual. During this year, 245 samples were taken to test new watermains before being put into service. If any bacteria is present, the new watermains are flushed, rechlorinated and sampled again until no bacterial contamination is found before being put into service. All of the watermains were within the required chlorine residual range of 0.05 - 4.0 mg/L.

Maintenance Costs

The total budget for the 2006 Watermain Replacement Program amounted to \$7.85 Million. Almost 11 km of watermains were replaced and 1.33 km of new watermains were added for watermain looping purposes.

Water Flows

The following table lists the monthly flows from the Region of Niagara's Decew Water Treatment Plant (source: Regional Municipality of Niagara). More detailed flow data can be found in the Decew Water Treatment Plant's 2006 Summary Report.

Table 3: Summary of Monthly Flows (in MegaLitres), 2006

Month	Quantity (ML)
January	1480.66
February	1307.48
March	1380.14
April	1643.37
May	1742.56
June	2065.58
July	1903.02
August	2035.23
September	1652.08
October	1540.63
November	1432.89
December	1545.91
Monthly Average	1644.13
Daily Average	54.05

Percentages of Samples Meeting Ministry of Environment Standards

The table below shows a comparison of the drinking water samples that met the Ministry of Environment's Drinking Water System Regulation standards in the years 2004, 2005 and 2006.

Table 4: Percentages meeting Ministry standards

Parameter	2004	2005	2006
E. coli	100 %	99.95 %	100 %
Total Coliforms	100 %	99.08 %	99.88 %
Background Counts *	99.94 %	100 %	100 %
Chlorine Residual	99.69 %	99.67 %	99.97 %

* Background Colony Counts no longer considered adverse as of June 2006.