

CITY OF ST. CATHARINES

March 2008

WATER DISTRIBUTION SYSTEM 2007 SUMMARY REPORT

Waterworks #260003279

TABLE OF CONTENTS

TABLE OF CONTENTS	1
THE CITY OF ST. CATHARINES DRINKING WATER DISTRIBUTION SUMMARY REPORT	2
Introduction	2
Waterworks Description	2
Changes to Legislation	2
Actions Taken to Comply with the Safe Drinking Water Act	3
WATER QUALITY TEST RESULTS	4
Summary of Results	4
Table 1: Summary of Water Quality Test Results, 2007	4
Summary of Exceedances	5
Table 2: Summary of Adverse Water Incidences, 2007	5
Percentages of Samples Meeting Ministry of Environment Standards	6
Table 3: Percentages Meeting Ministry Standards	6
OPERATIONAL ACTIVITIES	6
Watermain Repairs	6
Maintenance Costs	6
Water Flows	7
Table 4: Summary of Monthly Water Flows (in MegaLitres), 2007	7
DEFINITIONS	8
APPENDIX A	9

THE CITY OF ST. CATHARINES DRINKING WATER DISTRIBUTION SUMMARY REPORT

Introduction

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 (MOE) as a Class II system. The City's waterworks consists of over 600 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 six kilometers from the treatment plant, near Allanburg. The water is diverted to Decew's own 5.4 kilometre long open supply channel which flows by gravity directly to the treatment plant. The Decew Water Treatment Plant is a conventional surface water treatment plant which incorporates zebra mussel control, screening, chemically assisted flocculation, coagulation, sedimentation, filtration and disinfection using sodium hypochlorite and ultraviolet light. Further information on the supply of water by the Decew Water Treatment Plant can be obtained from the Region's website at www.regional.niagara.on.ca.

Changes to Legislation

Changes were made to Regulation 170 in regards to lead sampling. The new legislation came into effect in December 2007. The newly amended regulation requires municipalities to undertake a Community Wide Lead Testing Program of their water distribution system. Twice per year, the City must collect 100 residential samples, 10 non-residential samples and 20 distribution samples (hydrants), testing for lead, pH and alkalinity. The samples must be taken from December 15 to April 15 and again from June 15 to October 15.

Actions Taken to Comply with the Safe Drinking Water Act

- To comply with the legislation, the City is required to take a minimum of 114 samples each month from a representative cross-section of its watermain network and to test these samples for microbiological indications of contamination. Testing for the free chlorine residual content is also a requirement. The chlorine residual must be sampled at the same time and location as the microbiological sample.
- At a point that is likely to have an elevated potential for the formation of trihalomethanes (THM's), the City's drinking water is sampled every three months for trihalomethanes.
- Each year, the City must sample for the total lead content in 260 samples. The volunteer based sampling program requires samples from 100 residential homes, 10 non-residential buildings and 20 samples taken from hydrants throughout the City twice each year.
- Anyone who conducts sampling from within the water distribution system must hold an Ontario Environmental Training Consortium (OETC) Water Quality Analyst license or a Water Distribution Operator's 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 for all microbiological analysis, ALS Laboratories for THM's analysis and Accutest Laboratories for lead analysis. All three laboratories are accredited. Accreditation ensures acceptable laboratory protocols and test methods are 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 website, www.stcatharines.ca. The daily sample records are also available at the Lake Street Service Centre for the public to view.
- Notification is given to the MOE, the Regional Public Health Department and Decew Water Treatment Plant 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. Notifications are also given for THM's which exceed 0.10 mg/L and lead analyses which exceed 0.010 mg/L.

WATER QUALITY TEST RESULTS

Summary of Results

In 2007, 3368 samples were taken throughout the City and analyzed for microbiological parameters, chlorine residual and organics as part of the drinking water surveillance program and follow-up watermain break sampling program. Of these, eleven were found to exceed the MOE's Drinking Water Quality Objectives. **Table 1** summarizes each parameter tested and it gives the number of samples analyzed, the number of detectable results, the range of results and any exceedances.

Table 1: Summary of Water Quality Test Results, 2007

Parameter	MAC	Number of Samples	Number of Detectable Results	Results Range	Exceedances	Comments
Microbiological Analysis						
<i>Escherichia coli</i> (E. coli) CFU/100 mL	ND	1809	0	0	0	Indicates presence of fecal matter
Total Coliforms CFU/100 mL	ND	1809	6	0 - 2	6	Indicates the possible presence of fecal contamination
Background Count CFU/100 mL	NA	1809	108	0 - 171	0	Indication of water quality deterioration
Heterotrophic Plate Count (HPC) CFU/1 mL	NA	725	257	0 - 290	0	Indication of overall water quality
Organics						
Lead mg/L	0.010	61	61	<0.001 - 0.023	5 (none in distribution system)	Corrosion of plumbing systems
Trihalomethanes mg/L	0.10	6	6	0.035 Annual running average	0	By-product of disinfection; reaction of chlorine with organic matter
Disinfectant						
Chlorine Residual mg/L	<0.05	3301	3301	0.05 - 1.40	0	Level of disinfectant present

ND - None Detected

NA - Not Applicable

CFU - Colony Forming Units

Summary of Exceedances

After each adverse incident, a series of actions are 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, the Spills Action Centre (SAC) and the Public Health Department both verbally and in writing. **Table 2** summarizes all adverse water incidents throughout the City of St. Catharines in 2007 and the corrective action taken.

Table 2: Summary of Adverse Water Incidences, 2007

Incident Date	Location	Adverse Parameter	Result	Corrective Action	Corrective Action Date
January 19	Queenston Street	Total Coliform	1 CFU/100 mL	Flushed, resampled	January 20
February 19	Main Street	Total Coliform	1 CFU/100 mL	Flushed, resampled	February 20
February 21	Rykert Street	Total Coliform	1 CFU/100 mL	Flushed, resampled	February 22
April 24	Baraniuk Street	Total Coliform	1 CFU/100 mL	Flushed, resampled	April 25
June 11	Church Street	Total Coliform	1 CFU/100 mL	Flushed, resampled	June 12
July 17	Walnut Street	Total Coliform	1 CFU/100 mL	Flushed, resampled	July 18

**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.**

Percentages of Samples Meeting Ministry of Environment Standards

Table 3 shows a comparison of the drinking water samples that met the Ministry of Environment's Drinking Water System Regulation standards in the last three years.

Table 3: Percentages Meeting Ministry Standards

Parameter	2005	2006	2007
E. coli	99.95%	100%	100%
Total Coliforms	99.08%	99.88%	99.67%
Background Count	100%	100%	100%
HPC	n/a	100%	100%
Chlorine Residual	99.67%	99.97%	100%

OPERATIONAL ACTIVITIES

Watermain Repairs

In 2007, there were 182 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 parameters and chlorine residual.

When a new main is installed, the City is required to sample for microbiological parameters and chlorine residual. During this year, 348 samples were taken to test the new watermains before being put into service. If any bacteria are 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 must also meet the required chlorine residual.

Maintenance Costs

The total budget for the 2007 Watermain Replacement Program amounted to \$7.28 million. Over 9 kilometres of watermains were replaced and 2.35 kilometres of new watermains were added.

Water Flows

Table 4 lists the monthly water flows from the Decew Water Treatment Plant to the City of St. Catharines (source: Regional Municipality of Niagara). More detailed flow data can be found in **Appendix A**, the Decew Water Treatment Plant's 2007 Summary Report.

Table 4: Summary of Monthly Water Flows (in MegaLitres), 2007

Month	Quantity (ML)
January	1460.8
February	1332.1
March	1485.5
April	1369.1
May	1706.1
June	2198.0
July	1971.7
August	2125.3
September	1861.0
October	1663.3
November	1439.1
December	1490.6
Total	20102.61
Monthly Average	1675.2
Daily Average	55.08

DEFINITIONS

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 June 2006. PIBS 4449e01. Page 02.)

Microbiological parameters (i.e. 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. (Ontario Drinking Water Standards. Ministry of the Environment.)

Total Coliforms – 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 a fecal Coliform. It is most frequently associated with recent fecal pollution. The presence of E. coli in drinking water is an indication of sewage contamination. (Ontario Drinking Water Standards. Ministry of the Environment.)

Background Count – the bacterial content in water which can be used to measure water quality deterioration in distribution systems. (Ministry of the Environment. Method MFMICRO-E3371.)

Heterotrophic Plate Count (HPC) – indicates the overall water quality in drinking water systems. Increases in HPC can indicate a problem with drinking water treatment. (Ontario Drinking Water Standards. Ministry of the Environment.)

Trihalomethanes (THM's) – disinfection by-products which are produced when chlorine reacts with naturally occurring organics left in the water after filtration. (Ontario Drinking Water Standards. Ministry of the Environment.)

Lead – present as a result of corrosion of lead solder, lead containing brass fittings or lead water service pipes. (Ontario Drinking Water Standards. Ministry of the Environment.)

APPENDIX A