



**CITY OF ST. CATHARINES
WATER DISTRIBUTION SYSTEM
2004 ANNUAL REPORT
Waterworks # 260003279**

The City of St. Catharines presents its 2004 annual report on drinking water quality. This report has been prepared in response to the Safe Drinking Water Act (SDWA) which came into effect June 01, 2003. The Safe Drinking Water Act and its associated Regulations set requirements for public waterworks with regard to sampling and testing, levels of treatment, accredited laboratories, licensing of staff, and notification of authorities and the public about water quality.

Further information on the Safe Drinking Water Act and associated Regulations can be found on the Ministry of the Environment's web site at

www.ene.gov.on.ca.

For questions or for further information regarding the City of St. Catharines water system, please contact Ron Tripp, Assistant Director of Transportation and Environmental Services at (905) 688-5601 ext. 1664.

For questions, comments or public feedback regarding this report, please contact Stephanie Wybrew, Senior Water Quality Technician at (905) 688-5601 ext. 2197, swybrew@stcatharines.ca.

Free copies of this report are available at City Hall - TES Department, 50 Church Street or at the Lake Street Service Center, 383 Lake Street. Copies may also be found on the City's website at www.stcatharines.ca.

All daily sample laboratory report forms are available for viewing Monday - Friday, 8:30 am - 4:30 pm, City Hall - TES Department or at the Lake Street Service Center.

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 520 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

- ▶ To meet the requirements of Regulation 170/03, 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 bacteriological indications of contamination. It is also required to perform tests for chlorine residual content at the same location and time of sampling.
- ▶ City drinking water is sampled annually for Lead and sampled every quarter for Trihalomethanes (THM's) in the distribution system at a point reflecting the maximum residence time.
- ▶ The water distribution sampler 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. E3 Laboratories Inc. located in Niagara-on-the-Lake, Ontario is used as the City's secondary and emergency laboratory. Both Niagara Analytical and E3 are accredited laboratories. The City also 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, Background bacteria counts greater than 200 colonies per 100 mL 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.

OPERATIONAL PRACTICES

When conducting regular water distribution sampling, if the water is found to be in non-compliance (chlorine residual of < 0.05 mg/L), a sample is immediately taken from the nearest hydrant, upstream hydrant and downstream hydrant to determine the chlorine residual in the watermain. If the watermains are confirmed to have the minimum chlorine residual of 0.20 mg/L or greater, the owner(s) of the location sampled are advised of the low residual and advised to flush their service to get fresher water with adequate chlorine residual from the watermain which has adequate residual. If the hydrant sample is found to be less than 0.20 mg/L chlorine residual, the watermain is flushed until the required residual is achieved and the original sample location is then flushed and rechecked for chlorine residual. A follow up retest on the chlorine residual at the original sample location is done the next working day to confirm the problem has been resolved.

When a laboratory report of a sample analysis shows that there are indicators of adverse water quality, action is taken immediately to have the adjacent watermain and the sample location flushed until a chlorine residual of 0.20 mg/L is reached. In addition, the Regional Public Health Department, the Ministry of the Environment, including both the Niagara District and the Spills Action Centre are immediately notified by telephone. "Notice of Adverse Test Results" forms are filled out and faxed to the Ministry of the Environment and the Public Health Department. A bacteriological resample must be taken from the adverse incident location. If possible, initial resamples should also be taken from a location that is a significant distance upstream and a significant distance downstream from the adverse incident location. A second resample must be taken no earlier than 24 hours after initial resample and no later than 48 hours from the adverse incident location. All samples must have accompanying chlorine residuals taken at the same time as the bacteriological sample is taken. If an adverse water sample is reported on weekends or after hours, response

procedures are in place with all after hours staff and foremen. All after hours staff are trained in adverse water protocol (ie. notifications, flushing of watermains) and Water Quality Analyst or licensed Water Distribution System Operators are called in to resample.

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.

VULNERABLE POPULATIONS

Some people in our community may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons; such as people with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly and infants can be particularly at risk from infections. These people should seek advice from their health care professionals regarding drinking water.

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.)

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

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 - JANUARY 01 - DECEMBER 31, 2004

During the past year, 1604 samples were taken throughout the City and analyzed for bacteriological contamination and chlorine residual as part of the drinking water surveillance program and the follow up watermain break sampling. Of these, six 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 exceedences.

Table 1: Summary of Water Quality Test Results, 2004

Parameter	MAC	Number of Samples	Number of Detectable Results	Results Range	Exceedences	Sources of Contaminants
Total Coliforms counts/100mL	*	1604	0	0	0	Indicates possible presence of fecal matter
<i>Escherichia coli</i> (E. coli) counts/100mL	*	1604	0	0	0	Definite indicator of fecal contamination
Background Count counts/100mL	200 colonies/100 mL	1604	91	0 - >200	1	Natural occurring microorganisms used to indicate treatment effectiveness
Chlorine Residual mg/L	0.05 - 4.0 mg/L	1604	1603	0.00 - 2.20	5	Used as a disinfectant
Trihalomethanes mg/L	0.10 mg/L	4	4	annual running avg. 0.029	0	By-product of disinfection; reaction of chlorine with organic matter
Lead mg/L	0.01 mg/L	1	1	<0.001	0	Corrosion of plumbing systems; erosion of natural deposits

Note - * Indicator of adverse water quality if detected

The following table summarizes all adverse water incidents throughout the City of St. Catharines in 2004 and the corrective action taken.

Table 2: Adverse Water Summary and Corrective Action, 2004

Location Address	Sample Date	E. coli Count	Total Coliform Count	Back-ground Count	Chlorine Residual mg/L	Corrective Action Taken
117 Bradley Street	Feb. 03, 2004	0	0	0	0	Flushed hydrants - up/downstream until 0.20 mg/L, flushed within home
117 Bradley Street	Feb. 04, 2004	0	0	0	0.11	Resample
23.5 Moffat Street	May 26, 2004	0	0	0	0.01	Flushed hydrants - upstream & downstream until 0.20 mg/L reached
21 Moffat Street - hydrant	May 27, 2004	0	0	0	0.24	Resample
Linhaven Seniors Home 403 Ontario Street	July 21, 2004	0	0	>200	0.66	Upstream, downstream & private hydrants flushed
Linhaven Seniors Home 403 Ontario Street	July 22, 2004	0	0	0	0.58	Resample #1
Linhaven Seniors Home 403 Ontario Street	July 23, 2004	0	0	0	0.50	Resample #2
Dunlop Seniors Community Center 80 Dunlop Drive	Sept. 08, 2004	0	0	0	0.04	Flushed hydrants - on property, upstream & downstream until 0.20 mg/L reached

Location Address	Sample Date	E. coli Count	Total Coliform Count	Back-ground Count	Chlorine Residual mg/L	Corrective Action Taken
Dunlop Seniors Community Center 80 Dunlop Drive	Sept. 08, 2004	n/a	n/a	n/a	0.11	Inside of building
Dunlop Seniors Community Center 80 Dunlop Drive	Sept. 09, 2004	0	0	0	0.07	Resample
Dunlop Seniors Community Center 80 Dunlop Drive	Sept. 10, 2004	0	0	0	0.06	Resample
Dunlop Seniors Community Center 80 Dunlop Drive	Sept. 10, 2004	0	0	0	0.10	Resample
St. Alfred School 280 Vine Street	Oct. 07, 2004	0	0	0	0.03	Flushed hydrants - on property, upstream & downstream until 0.20 mg/L reached
St. Alfred School 280 Vine Street	Oct. 07, 2004	0	0	0	0.14	Resample
St. Alfred School 280 Vine Street	Oct. 07, 2004	n/a	n/a	n/a	0.26	Resample
St. Alfred School 280 Vine Street	Oct. 08, 2004	0	0	0	0.06	Resample

Location Address	Sample Date	E. coli Count	Total Coliform Count	Back-ground Count	Chlorine Residual mg/L	Corrective Action Taken
Dunlop Seniors Community Center 80 Dunlop Drive	Nov. 03, 2004	0	0	0	0.02	Flushed hydrants, on property, upstream and downstream until 0.20 mg/L reached
Dunlop Seniors Community Center 80 Dunlop Drive	Nov. 04, 2004	0	0	0	0.16	Resample
Dunlop Seniors Community Center 80 Dunlop Drive	Nov. 05, 2004	0	0	0	0.20	Resample

PUBLIC WORKS

In addition to the daily sampling that takes place cyclically throughout the city, Public Works crews who respond to water complaints or conduct the City's flushing program also measure for chlorine residual. Anytime a Works crew repairs or flushes the distribution system, they are required to measure the chlorine residual. From January 01 to December 31, there were 461 chlorine residual tests conducted within the distribution system. Of these, nine locations were found to have inadequate chlorine residual. The locations were flushed until a chlorine residual of 0.20 mg/L or greater was found.

The following table summarizes the locations where inadequate chlorine residuals were found.

Table 3: Summary of Hydrants with inadequate chlorine residuals, 2004

Location of hydrant	Date & Chlorine Residual (mg/L)
Queenston Street & Emmett Road	January 23 - 0.03 January 23 - 0.27

Niagara Street	March 29 - 0.03 March 30 - 0.25
Vine Street South	June 07 - 0.00 June 07 - 0.44
York Street & Elizabeth Street	July 27 - 0.02 July 27 - 0.26
Spruce Street	August 09 - 0.03 August 10 - 0.45
Spruce Street	August 11 - 0.03 August 11 - 0.23
Michael Street	August 13 - 0.00 August 14 - 0.54
Spruce Street	August 12 - 0.01 August 14 - 0.32
Dunlop Drive	August 25 - 0.01 August 27 - 0.23

When an inadequate chlorine residual is found, the same procedures must be followed as with the daily sampling. The Ministry of the Environment and the Regional Public Health Department must be notified and the watermain flushed until an adequate chlorine residual is achieved.

The Region of Niagara with the cooperation of the local municipalities have 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 bacteriological contamination and chlorine residual.

When a new main is installed, the City is required to sample for bacterial contamination and chlorine residual. During this year, 184 samples were taken to test new watermains before being put into service. Elevated levels of background colony counts were present in three of these samples. Total coliform bacterial counts were found in three of these samples. The new water mains were flushed, rechlorinated and sampled again until no bacterial contamination was found before being put into service. All of the watermains were within the required chlorine residual range of 0.05 - 4.0 mg/L.

REGIONAL PUBLIC HEALTH DEPARTMENT

When the Regional Public Health Department receives a complaint regarding the drinking water, an inspector is sent out to respond. The inspector samples the

drinking water for bacteria and chlorine residual. If any exceedences are found, the City is responsible for the notifications and corrective action. The City follows the same guidelines for adverse water as with the daily sample routine.

MAINTENANCE COSTS

There were 158 watermain breaks in 2004. The total budget for the 2004 Watermain Replacement Program amounted to \$4.3 Million. Approximately 10 km of watermain were replaced or abandoned as part of the 2004 Watermain Replacement Program. This represents about 2.0 % of the total system. The average provincial replacement/rehabilitation rate is 2.0 %.

QUESTIONS AND CONCERNS

Why is my water sometimes brown?

If rusty or coloured water is noticeable in your cold water, it may be coming from the watermain. Various maintenance procedures in our distribution system (for example: fire hydrant and valve maintenance or repair of watermain breaks) require flushing of the watermains. Rust can form on the inside walls of cast iron watermains over time. Higher than normal flow conditions which can occur during flushing operations, may cause small particles to break off adding colour to the water. This is usually a temporary problem. Running your taps long enough for the colour to disappear should be sufficient to flush out the service line from the main to your house and should take care of the situation. Please note that there is no health risk associated with this physical characteristic. If this problem is noticeable in your hot water, your water heater may be rusting and should be serviced.

My water tastes and smells like chlorine bleach, what can I do about it?

Chlorine quickly disappears from water on its own. You can easily remove the taste and smell of chlorine residual in drinking water in several ways. Many people find that storing tap water in the refrigerator in a glass container will remove the taste of chlorine. Another alternative is to install a carbon filter on your tap to remove chlorine. However this filter must be properly maintained on a regular basis.

Why is my water cloudy when I first turn the tap on?

Cloudy water is usually caused by tiny air bubbles in the water. After a while, the bubbles rise to the top and disappear. This type of cloudiness occurs more often in the winter, when the drinking water is cold. Another cause of cloudiness in cold water comes from calcium. Calcium is naturally occurring in our drinking water and usually settles to the bottom. Although the water may look unappealing, it is perfectly safe to drink.