

# UTILITIES KINGSTON

## 2009

### ANNUAL REPORT

January 1, 2009 – December 31, 2009

*Drinking Water System Number:* 220006053

*Drinking Water System Name:* Cana Water Treatment System

*Drinking Water System Owner:* City of Kingston

*Drinking Water System Category:* Small Municipal Residential

Utilities Kingston is proud to present this annual report on drinking water quality. This report has been prepared in accordance to Section 11 of Ontario Regulation 170/03. Regulation 170/03 sets requirements for public waterworks with regard to sampling and testing, levels of treatment, licensing of staff, and notification of authorities and the public about water quality. Free copies of this report and the Summary report prepared in accordance to Schedule 22 of Ontario Regulation 170/03, are available by public request at any City of Kingston offices, at our water plant locations and at [www.utilitieskingston.com](http://www.utilitieskingston.com). Notices of availability are generally made through the local newspapers and radio. Further information on the Drinking Water Regulations can be found on the Ministry of the Environment web site at [www.ene.gov.on.ca](http://www.ene.gov.on.ca).

For further information about this report please contact Philip Emon at [pemon@utilitieskingston.com](mailto:pemon@utilitieskingston.com), or call 613-389-0562.

## Plant Description & Treatment Process

The Cana Well system was established in the early 1950's by a co-operative formed by homeowners living on Marian Crescent, Rochdale Crescent, and Cana Blvd. The system was operated privately by the co-operative, then by the Ministry of the Environment (MOE), until operation was assumed by the former Township of Pittsburgh. When the township amalgamated with the city of Kingston and Kingston Township in 1998, operation of the system passed into the care of Utilities Kingston. Staff from the Utilities Kingston Treatment Group operate the treatment system. The distribution system is maintained by the Utilities' Underground Infrastructure Department.

### *Raw Water Source and Low Lift Pumping*

The raw water source is ground water pumped from a 150mm diameter by 18.6m deep well. A submersible pump, capable of pumping 75 L/min, discharges raw water, via a 75mm well pump header, through the pump house and into the chlorine contact tank. Well pump run cycles are controlled by the contact tank storage level transmitter. The raw water discharge line is equipped with a magnetic flow meter, conductivity / temperature sensor and a turbidimeter for capacity and quality measurement. A pressure transmitter

located at the base of the well provides for monitoring of groundwater aquifer level for determination of draw down and recharge rates.

### ***Primary Disinfection***

Sodium hypochlorite is dosed to the raw water flowing through the well pump discharge line upstream of a 45,000L in ground reservoir (contact tank). The sodium hypochlorite solution used is diluted down to a 2-3% Cl<sub>2</sub> solution with de-ionized water. Two peristaltic pumps are used for hypochlorite delivery. Chlorinated water flows through the baffled contact tank with high lift pump operation. The level transmitter located within the tank provides for the determination of actual storage volumes and control of the raw water well pump.

Contact tank inlet and outlet free Cl<sub>2</sub> residuals and pH levels are continuously monitored. Control of the chlorination system is accomplished through the monitoring of chlorine contact tank inlet Cl<sub>2</sub> residuals and raw water flow measurement through a PID (Process/ Integral/ Derivative) control loop to ensure in-plant chemical disinfection CT values (contact time) are equal to or greater than the required level determined by the 'Procedure for Disinfection of Water in Ontario'.

### ***High Lift Pumping and Distribution System Pressure Maintenance***

Two submersible pumps, capable of pumping 92 L/min each, discharge treated water from the outlet of the chlorine contact tank to the distribution system. The discharge of the two high lift pumps is routed back inside the pump house where it is filtered through two cartridge filters (one lead, one standby) that are 5 microns in pore size. Two 450L pressure tanks are located directly downstream of the cartridge filters and maintain system pressure while the high lift pumps are off. High lift pump operation is controlled in a duty/standby rotation through a pressure transmitter that regulates high lift discharge pressure between 40 and 60psi. The treated water discharge line is equipped with a magnetic flow meter, turbidimeter and two free chlorine/ pH analyzers (one designated as contact tank outlet Cl<sub>2</sub> and one as treated water Cl<sub>2</sub>).

### ***Secondary Disinfection (Trim Chlorination)***

Sodium hypochlorite is used as a secondary disinfectant. Two peristaltic pumps draw hypochlorite solution from an adjacent tank and deliver it to the treated water discharge line. This system only operates if the contact tank outlet Cl<sub>2</sub> residual is below an operator adjustable set point. Control of the trim chlorination system is accomplished through the monitoring of chlorine contact tank outlet Cl<sub>2</sub> residuals and treated water flow measurement through a PID (Process/ Integral/ Derivative) control loop to ensure adequate distribution system free chlorine residuals.

### ***Control System***

Supervisory Control and Data Acquisition (SCADA) is the method of control implemented at the Cana Well System. All analyzing, monitoring and control module equipment information is routed through the SCADA system for operator monitoring and control. Control of equipment can be accomplished locally at the SCADA panel in the pump house or remotely at the Kingston Central Water Treatment Plant. Alarm capability and set point adjustment along with trend monitoring are also available through SCADA system controls.

### ***Standby Equipment***

A 10,500 Watt portable generator is maintained on site to provide a backup electrical supply in case of power outages. This generator is capable of powering the well pump and one of the high lift pumps simultaneously, as well as all the instrumentation and control equipment required to automatically operate

the system. The operator can manually transfer to standby power once the generator is connected to the standby supply breaker switch, and after non-essential electrical loads are disabled.

### ***Distribution***

The distribution system was also originally installed by the co-operative, and was constructed from a variety of materials which were available to the co-operative at the time of construction. The entire distribution system was replaced in 2002, and 2003.

Treatment Plant staff attend the well on a regular basis to make system checks, take bacteriological samples, and to test chlorine residuals in both the treated water and in the distribution system. All operators are certified by the MOE.

## **Monetary expenses incurred during this reporting period**

Under Section 11 of Ontario 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 listed below.

Extensive work was done on the development of a new 25 year master plan for the drinking water systems within the City of Kingston.

Implementing the lead sampling program within the City of Kingston.

Development of the City of Kingston's Drinking-water Quality Management Standard.

## **Notifications submitted in accordance to the Safe Drinking Water Act**

Under Ontario Reg. 170/03, notifications were required for any instances where a sample result indicated that a parameter used to measure water quality exceeded a Maximum Acceptable Concentration (MAC). Once a notification is received from a laboratory or an observation of any other indicator of adverse water quality is made by operations personnel, corrective action as dictated by the regulations is initiated in an effort to confirm the initial result. If confirmed, further action may be recommended by the Medical Officer of Health. If not confirmed, sampling will typically return to the normal schedule, or depending on the parameter, Utilities Kingston may choose to increase the sampling frequency to more closely monitor the parameter for a period of time. The groundwater supply for the Cana Water Treatment System contains a sodium concentration greater than 20 mg\l which requires a notification to the Medical Officer of Health and to the Spills Action Center once every 60 months. This notification was last completed in November 2008.

There were no other incidents which required notification during this reporting period.

## Definition & Terms

<b>° C</b>	- degrees Celsius	<b>° F</b>	- degrees Fahrenheit
<b>kg</b>	- kilogram	<b>l</b>	- litre
<b>m</b>	- meter	<b>m<sup>3</sup></b>	- cubic meter=1000 litres.
<b>TCU</b>	- True Colour Units	<b>CaCO<sub>3</sub></b>	-Calcium carbonate
<b>mg</b>	- milligram	<b>psi</b>	- pounds per square inch
<b>N/A</b>	- Not Applicable		
<b>N/D</b>	- Non -Detectable		
<b>NTU</b>	- Nephelometric Turbidity Units - A measure of the amount of particles in water.		
<b>mg/l</b>	- Milligrams per litre. This is a measure of the concentration of a parameter in water, also called parts per million ( <b>ppm</b> ).		
<b>ug/l</b>	- Micrograms per litre, also called parts per billion.		
<b>ng/l</b>	- Nanograms per litre, parts per trillion.		

**Parameter**-A substance that we sample and analyze for in the water.

**AO** - Aesthetic objective. AOs are not health related, but may affect the taste, odour, colour or clarity of the water

**OG** - Operational guideline. Set to ensure efficient treatment and distribution of water.

**MAC** - Maximum Acceptable Concentration. This is a health-related drinking water standard established for contaminants having known or suspected adverse health effects when above a certain concentration. The length of time the MAC can be exceeded without injury to health will depend on the nature and concentration of the parameter.

## Microbiological Testing Done Under Schedule 10, 11 or 12 of Regulation 170/03, During This Reporting Period

	Number of Samples	Range of E. Coli or Fecal Results (min # - max #)	Range of Total Coliform Results (min # - max #)	Number of HPC Samples	Range of HPC Results ( min # - max #)
Cana Water Treatment Plant Raw	37	0	0 - 4	0	
Distribution System	51	0	0	50	0 – 1100

## Operational Testing Done Under Schedule 7, 8 or 9 of Regulation 170/03 During This Reporting Period

Parameter	Number of Samples	Range of Results ( min # - max #)	Unit of Measure	Parameter Description
Cana Water Treatment Plant Raw Turbidity	Continuous	0.05 – 0.63	NTU	Turbidity is a measure of particles in water.
Cana Water Treatment Plant Treated Chlorine	Continuous	0.94 – 3.15	mg/l	Recommended level of at least 0.20 mg/l in distribution system to maintain microbiological quality. 0.05 mg/l minimum.
Chlorine Residual (Distribution System)	Continuous	1.12 – 2.98	mg/l	Recommended level of at least 0.20 mg/l in distribution system to maintain microbiological quality. 0.05 mg/l minimum.

## Summary Of Treated Water Inorganic Parameters Tested During This Reporting Period

Parameter	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Antimony	1	<0.001	mg/l	No	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Arsenic	1	0.0010	mg/l	No	Naturally occurring in surface waters / mine drainage
Barium	1	0.191	mg/l	No	Erosion of natural deposits. Discharge from metal refineries, oil drilling wastes.
Boron	1	0.066	mg/l	No	Erosion of natural deposits, industrial waste effluents.
Cadmium	1	<0.0002	mg/l	No	Industrial discharge
Chromium	1	<0.002	mg/l	No	Industrial residues
Mercury	1	<0.00002	mg/l	No	Erosion of natural deposits, industrial discharges.

Selenium	1	0.0025	mg/l	No	Discharge from refineries, mines, chemical manufacture
Sodium	12	83 – 90.5	mg/l	Yes	Occurs naturally in the earth's crust.
Uranium	1	0.00169	mg/l	No	Erosion of natural deposits.
Fluoride	12	0.21 – 0.41	mg/l	No	Naturally occurring.
Nitrite	12	<0.1	mg/l	No	A natural component of water at this level.
Nitrate	12	0.1 – 0.2	mg/l	No	Runoff from fertilizer use, erosion of natural deposits

### Summary Of Treated Water Organic Parameters Tested During This Reporting Period

Parameter	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Alachlor	1	<0.3	ug/l	No	Agricultural herbicide
Aldicarb	1	<3	ug/l	No	Agricultural insecticide
Aldrin + Dieldrin	1	<0.02	ug/l	No	Residue from banned insecticide
Atrazine + N-dealkylated metabolites	1	<0.5	ug/l	No	Agricultural herbicide
Azinphos-methyl	1	<1	ug/l	No	Insecticide
Bendiocarb	1	<3	ug/l	No	Insecticide
Benzene	1	<0.5	ug/l	No	Discharge from plastics manufacturing, leaking fuel tanks
Benzo(a)pyrene	1	<0.005	ug/l	No	Formed from the incomplete burning of organic matter.
Bromoxynil	1	<0.3	ug/l	No	Agricultural herbicide
Carbaryl	1	<3	ug/l	No	Agricultural/Forestry/ Household insecticide

Carbofuran	1	<3	ug/l	No	Agricultural insecticide
Carbon Tetrachloride	1	<0.2	ug/l	No	Discharge from chemical and industrial activities
Chlordane (Total)	1	<0.04	ug/l	No	Residue from banned insecticide
Chlorpyrifos	1	<0.5	ug/l	No	Agricultural/ Household insecticide
Cyanazine	1	<0.5	ug/l	No	Agricultural/ Residential herbicide
Diazinon	1	<1	ug/l	No	Agricultural/ Livestock Operation/ Residential insecticide
Dicamba	1	<5	ug/l	No	Agricultural herbicide
1,2-Dichlorobenzene	1	<0.1	ug/l	No	Discharge from industrial chemical factories
1,4-Dichlorobenzene	1	<0.2	ug/l	No	Discharge from industrial chemical factories
Dichlorodiphenyltrichloroethane (DDT) + metabolites	1	<0.1	ug/l	No	Residue from banned insecticide
1,2-Dichloroethane	1	<0.1	ug/l	No	Discharge from industrial chemical factories
1,1-Dichloroethylene (vinylidene chloride)	1	<0.1	ug/l	No	Discharge from industrial chemical factories
Dichloromethane	1	<0.3	ug/l	No	Discharge from pharmaceutical and chemical factories
2,4 Dichlorophenol	1	<0.1	ug/l	No	Industrial contamination/ reaction with chlorine
2,4-Dichlorophenoxy acetic acid (2,4-D)	1	<5	ug/l	No	Agricultural/ Residential herbicide
Diclofop-methyl	1	<0.4	ug/l	No	Agricultural herbicide
Dimethoate	1	<1	ug/l	No	Agricultural/ Livestock Operation/ Forestry insecticide

Dinoseb	1	<0.5	ug/l	No	Herbicide residue
Diquat	1	<5	ug/l	No	Agricultural/ Aquatic herbicide
Diuron	1	<5	ug/l	No	Agricultural/ Industrial/ herbicide
Glyphosate	1	<25	ug/l	No	Agricultural/Forestry/ Household herbicide
Heptachlor + Heptachlor Epoxide	1	<0.1	ug/l	No	Residue from banned insecticide
Lindane (Total)	1	<0.1	ug/l	No	Agricultural/ Pharmaceutical insecticide
Malathion	1	<5	ug/l	No	Fruit & Vegetable / pest control insecticide
Methoxychlor	1	<0.1	ug/l	No	Agricultural/ Livestock Operation/ Residential insecticide
Metolachlor	1	<3	ug/l	No	Agricultural herbicide
Metribuzin	1	<3	ug/l	No	Agricultural herbicide
Monochlorobenzene	1	<0.2	ug/l	No	Discharge from industrial and agricultural chemical factories and dry cleaning facilities
Paraquat	1	<1	ug/l	No	Agricultural/ Aquatic herbicide
Parathion	1	<3	ug/l	No	Agricultural insecticide
Pentachlorophenol	1	<0.1	ug/l	No	Pesticide/ wood preservative residue
Phorate	1	<0.3	ug/l	No	Agricultural insecticide
Picloram	1	<5	ug/l	No	Industrial herbicide
Polychlorinated Biphenyls(PCB)	1	<0.05	ug/l	No	Residue from various industrial uses
Prometryne	1	<0.1	ug/l	No	Agricultural herbicide
Simazine	1	<0.5	ug/l	No	Agricultural herbicide or its residue

Total Trihalomethanes Distribution System (NOTE: show latest annual average)	4	22.5	ug/l	No	By-product of chlorination. * The MAC for THMs of 100 ug/l is based on a running annual average.
Temephos	1	<10	ug/l	No	Insecticide for Mosquito/Black fly control
Terbufos	1	<0.3	ug/l	No	Agricultural insecticide
Tetrachloroethylene	1	<0.2	ug/l	No	Leaching from PVC pipes; discharge from factories, dry cleaners and auto shops (metal degreaser)
2,3,4,6-Tetrachlorophenol	1	<0.1	ug/l	No	Wood preservative
Triallate	1	<10	ug/l	No	Agricultural herbicide
Trichloroethylene	1	<0.1	ug/l	No	Discharge from metal degreasing sites and other factories
2,4,6-Trichlorophenol	1	<0.1	ug/l	No	Pesticide manufacturing
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	1	<10	ug/l	No	Industrial herbicide residue
Trifluralin	1	<0.5	ug/l	No	Agricultural herbicide
Vinyl Chloride	1	<0.2	ug/l	No	Leaching from PVC pipes; discharge from plastics factories

## Summary Of Additional Treated Water Testing Analyzed By Accredited Laboratories During This Reporting Period

Parameter	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Alkalinity (as CaCO <sub>3</sub> )	1	352	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Aluminum	1	<0.01	mg/l	No	May be naturally present or a residual from the coagulation process.
Ammonia N	1	<0.05	mg/l	No	Occurs naturally from organic nitrogen containing compounds.
Benzo(a)pyrene	1	<0.005	ug/l	No	Formed from the incomplete burning of organic matter.
Calcium	1	105	mg/l	No	Naturally occurring.
Chloride	1	200	mg/l	No	A common naturally occurring non-toxic material that may produce a salty taste in water.
Colour	12	<2 - 2	TCU	No	Typically the result of organic matter in surface waters.
Conductivity	1	1370	Us/cm	No	A measure of ability of water to carry an electric current due to the presence of ions.
Hardness	12	465 – 553	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
Iron	12	<0.005 – 0.035	mg/l	No	Leaching from natural deposits and plumbing materials, industrial wastes. (Aesthetic objective)
Manganese	12	0.015 – 0.063	mg/l	No	Erosion of natural deposits.
Sulphate	1	57	mg/l	No	An inorganic constituent that may cause tastes at high levels.

Total Kjeldahl Nitrogen	1	<0.1	mg/l	No	Indicator of organic contamination or the potential for taste and odour problems.
Zinc	1	<0.005	mg/l	No	An inorganic constituent that may cause tastes.

### Summary Of Distribution System Water Inorganic Parameters Tested During This Reporting Period

Parameter	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Lead(Distribution)	3	0.00045–0.00099	mg/l	No	Internal corrosion of household plumbing, erosion of natural deposits.
Fluoride	2	0.4	mg/l	No	Naturally occurring.

### Summary Of Additional Distribution System Water Testing Analyzed By Accredited Laboratories During This Reporting Period

Parameter	Number of Samples	Result Value	Unit of Measure	Exceedance	Parameter Description
Alkalinity (as CaCO <sub>3</sub> )	2	352 - 360	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Benzo(a)pyrene	1	<0.005	ug/l	No	Formed from the incomplete burning of organic matter.
Cyanide	1	<0.005	mg/l	No	Industrial discharge
Gross Alpha	1	<0.1	Bq/l	No	Decay of natural deposits.
Gross Beta	1	0.1	Bq/l	No	Decay of natural deposits.
Nitrilotriacetic acid -NTA	1	0.07	mg/l	No	Used in laundry detergents.

Nitrosodimethylamine - NDMA	1	0.000004	ug/l	No	Rarely used industrially but has been used as an antioxidant, and an additive for lubricants
Tritium (Bq/l)	1	<1000	Bq/l	No	Decay of natural & man made deposits.

### Summary Of Residential & Non-Residential Plumbing Lead Testing Carried Out In Accordance With Schedule 15.1 of Regulation 170/03 During This Reporting Period

	Number of Sample locations (Dec.15/07- Dec.31/08)	Number of Sample Locations Results Exceeding Standard (0.01 mg/l)	Lead Results Range (mg/l)	pH Results Range
Residential	0	0		
Non-Residential	2	0	<0.00002 – 0.00046	7.27 – 7.36

### Summary Of Raw Water Testing Analyzed By In House Laboratory During This Reporting Period

Parameter	Number of Samples	Results Range	Unit of Measure	Exceedance	Parameter Description
Alkalinity	11	120 - 416	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Fluoride	10	0.29 – 0.51	mg/l	No	Naturally occurring.
Turbidity	44	0.05 – 0.63	NTU	No.	Turbidity is a measure of particles in water.
Hardness	10	410 – 653	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
pH	44	6.2 – 8.15		No	An indicator of the acidity of water.

## Summary Of Treated Water Testing Analyzed By In House Laboratory During This Reporting Period

Parameter	Number of Samples	Results Range	Unit of Measure	Exceedance	Parameter Description
Alkalinity	11	85 – 434	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Fluoride	10	0.21 – 0.41	mg/l	No	Naturally occurring.
Turbidity	44	0.4 – 1.1	NTU	No.	Turbidity is a measure of particles in water.
Hardness	10	400 – 680	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
pH	44	7.2 – 8.37		No	An indicator of the acidity of water.