

# UTILITIES KINGSTON

## 2007

### ANNUAL REPORT

July 4, 2007 – December 31, 2007

***Drinking Water System Number:*** 260069290

***Drinking Water System Name:*** Sydenham Water Treatment Plant

***Drinking Water System Owner:*** Township of South Frontenac

***Drinking Water System Category:*** Large 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 the Township of South Frontenac offices, at our water plant location 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 Processes

### ***Raw Water Source.***

The source of water treated by this plant is Sydenham Lake. The intake is located 128m east of the treatment plant, at approximately 6m of water depth.

### ***Screening.***

Two stationary screens located in the low lift pumping well remove any large debris such as weeds, fish, etc.

These pumps lift the water from lake level to the main treatment building. There are three submersible pumps each with a capacity of 7.8 l/sec which pump the water into the main building for treatment.

### ***Chemical Feed System***

Clarion A7 (acidified aluminum sulphate) is added to the water as it enters the process building just prior to passing through the in-line mixer. The particles in the water will collide with the alum particles as the water flows in a spiral motion through the mixer, and then join together to form larger particles called floc.

### ***Filters.***

Three pressure filtration tanks containing a ceramic filtration media remove the floc formed from the addition of alum and the particles present in the water. Water flows through the filters into two baffled clean water reservoirs called clear wells.

### ***Backwash.***

Filters are washed to remove the particulates they have collected over the previous 48 hrs. Clean water from the clear well is pumped backwards through the filter, and the filter is agitated by air scouring the filter media to break up any large particles. Effluent water from the backwash process is directed to a backwash storage tank for further settling. The supernatant (the clear water after settling) is directed back to Sydenham Lake and the settled sludge is mechanically removed and sent for further treatment.

### ***Chlorination Control System***

Sodium Hypochlorite is added to the water to provide disinfection and to ensure the safety of the water to the customer's tap. Three sodium hypochlorite feed systems, each consisting of one duty pump and one standby pump, provide pre-chlorination (before filtration), post-chlorination (after filtration) and trim-chlorination (before entering the distribution system).

### ***Clear Wells.***

Two baffled clear wells, each with a volume of 115 m<sup>3</sup>, provide storage of filtered water and allow for a sufficient amount of chlorine contact time with the water to ensure proper disinfection.

### ***High Lift Pumps.***

Three high lift pumps move treated water from the clear wells into the distribution system.

### ***Standby Equipment.***

A 130 kW standby diesel generator provides electricity to the water plant during power interruptions. The generator and standby equipment is tested regularly to ensure proper operation when required.

### ***Elevated Tank.***

The elevated tank has a storage capacity of 1019 m<sup>3</sup> and provides pressure to the distribution system.

### ***Distribution System.***

There are approximately 6363 meters of water mains, and 47 fire hydrants in the system. Once all connections to the distribution system have been completed, the drinking water system will supply water to 274 customer connections.

## **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.

Upgrades to the chemical feed system were made to incorporate true auto switchover capabilities on the Sodium Hypochlorite systems and the Poly-Aluminum Chloride (PACl) system. Modifications were also made to the SCADA control programming to include an on-line calculation of chlorine Contact Time (CT), as well as improved chlorine feed control.

Modifications to the coagulant feed system pumps were required to meet the dosage requirements for the new coagulant.

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

Under Ontario Reg. 170/03, notifications are required for any instances where a sample result indicates that a parameter used to measure water quality exceeds 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.

There were three events requiring notifications during this reporting period.

On April 5/07, July 30/07 and October 12/07 notifications were made under schedule 16-3 of O.Reg170/03, specifically, the annual running average for total trihalomethanes exceeded the MAC, which is calculated in each quarter resulting in a separate notification for each quarter.

In December 2007, Utilities Kingston changed coagulants from Clarion A7, to PACl Hyperion 1090 after testing indicated the potential for increased removal of organics, which are precursors to the formation of trihalomethanes (THMs). Test results in December, following the coagulant change, indicated a significant reduction in THMs within the system. In January 2008, modifications on the chemical feed systems were completed to improve chemical dosage control. Operational adjustments are still continuing to optimize the chemical dosages and to achieve the optimum plant performance.

## 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 #)
Raw	53	0 - 82	0 - 118	0	
Treated	52	0	0	52	0 - 330
Distribution System	114	0	0	54	0 - 1470

## 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

Turbidity Raw Water	Continuous	0.37 – 19.97	NTU	Turbidity is a measure of particles in water.
Turbidity Treated Water	Continuous	0.07 – 0.29	NTU	Turbidity is a measure of particles in water.
Chlorine (Treated)	Continuous	0.45 – 3.65	mg/l	Recommended level of at least 0.20 mg/l in distribution system to maintain microbiological quality. 0.05 mg/l minimum.
Turbidity Filter#1	Continuous	0.1 – 0.97	NTU	Turbidity is a measure of particles in water.
Turbidity Filter#2	Continuous	0.09 – 0.90	NTU	Turbidity is a measure of particles in water.
Turbidity Filter#3	Continuous	0.07 – 0.97	NTU	Turbidity is a measure of particles in water.
Chlorine Residual (Distribution System)	Continuous	0.08 – 2.44	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 Raw 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> )	2	112 – 120	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Colour	4	<2 – 7	TCU	No	Typically the result of organic matter in surface waters.
Hardness	2	127 – 143	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
pH	1	7.34		No	An indicator of the acidity of water.

## Summary Of Additional Testing And Sampling Carried Out In Accordance With The Requirement Of The Certificate Of Approval

Sample Location	Parameter	Number of Samples	Results Average	Unit of Measure	Parameter Description
Backwash Wastewater Effluent	Total Suspended Solids	12	9	mg/l	A measure of the particulates collected in the filtration process.

## 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	<0.0001	mg/l	No	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Arsenic	1	0.0001	mg/l	No	Naturally occurring in surface waters / mine drainage
Barium	1	0.049	mg/l	No	Erosion of natural deposits. Discharge from metal refineries, oil drilling wastes.
Boron	1	0.026	mg/l	No	Erosion of natural deposits, industrial waste effluents.
Cadmium	1	<0.00002	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	0.0009	mg/l	No	Discharge from refineries, mines, chemical manufacture
Sodium	1	14.5	mg/l	No	Occurs naturally in the earth's crust.
Uranium	1	<0.00005	mg/l	No	Erosion of natural deposits.
Fluoride	1	0.2	mg/l	No	Naturally occurring.
Nitrite	4	<0.1	mg/l	No	A natural component of water at this level.
Nitrate	4	<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
Aalachlor	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	<1	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
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
Total Trihalomethanes (Treated)  (NOTE: shows latest annual average)	6	87.2	ug/l	*No	By-product of chlorination. * The MAC for THMs, at 100 ug/l, is based on a running annual average only using highest test results from each quarter.
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> )	2	108 - 114	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Aluminum	2	0.04 – 0.15	mg/l	No	May be naturally present or a residual from the coagulation process.
Colour	3	3 - 6	TCU	No	Typically the result of organic matter in surface waters.
Hardness	4	126 – 142	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
pH	4	7.19		No	An indicator of the acidity of water.

## 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)	5	<0.00002 – 0.0001	mg/l	No	Internal corrosion of household plumbing, erosion of natural deposits.

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

Parameter	Number of Samples	Result Value	Unit of Measure	MAC Exceedance	Parameter Description
Total Trihalomethanes  (NOTE: shows latest annual average)	22	134	ug/l	Yes	By-product of chlorination. * The MAC for THMs, at 100 ug/l, is based on a running annual average only using highest test results from each quarter.

## 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
Aluminum	44	0.015 – 0.121	mg/l	No	May be naturally present or a residual from the coagulation process.
pH	Continuous	7.17 – 8.22		No	An indicator of the acidity of water.