QUARTERLY REPORT ON DRINKING WATER QUALITY

JULY - SEPT. 2000. KINGSTON CENTRAL WATER PLANT - SERVING AREAS EAST OF LITTLE CATARAQUI CREEK.

Drinking Water Quality

Ontario Drinking Water Protection Regulations.

Utilities Kingston is proud to present its first quarterly report on drinking water quality. This report has been prepared in response to Operation Clean Water, an initiative of Ontario's Ministry of the Environment to ensure high quality drinking water for the residents of Ontario. The new regulations put into law what was formerly the Ontario Drinking Water Objectives (ODWO), and 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.

Further information on the Drinking Water Regulations can be found on the Ministry of the Environment web site at www.ene.gov.on.ca.

For further information about this report please contact Utilities Kingston at wpp@city.kingston.on.ca or, Lynn McLeod or Randy Whan at 546-1181 ext. 2296. Free copies of this report are available at 211 Counter St. or City Hall.

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INSIDE THIS REPORT

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Plant Description & Treatment Processes

Raw Water Source.

The source of water treated by this plant is Lake Ontario at the mouth of the St. Lawrence River. Our intake is located directly south of the treatment plant, 4m off the lake bottom, at a depth of approximately 18m.

Zebra Mussel Control.

When the water temperature rises above 10^0 C (above this temperature zebra mussels are active), pre-chlorination takes place at the mouth of the intake. This protects the intake from becoming encrusted with zebra mussels, which would restrict the flow of water through the intake.

Pre Chlorination.

The purpose of chlorination is to provide disinfection. 12% Sodium Hypochlorite is applied to the raw water in solution form.

Screening.

A revolving screen in the suction well of the low lift building removes any large debris such as weeds, fish, etc.

Low Lift Pumps.

These pumps lift the water from lake level to the main plant. There are two headers from the low lift building directing the water to the mixing chambers.

Coagulation / Flocculation.

Aluminum Sulphate (alum) is added to the water as it leaves the low lift building at a rate of 10 mg/l. Particles in the water are attracted to the alum.

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Mixing tanks.

Water flows rapidly in these tanks in a spiral motion, allowing proper mixing of the chlorine and alum with the water. The particles of dirt and alum will collide and come together to form larger particles called floc.

Settling tanks.

These are large tanks designed to reduce the velocity of water allowing the heavier floc particles to settle out. They also provide detention time, allowing the chlorine time to achieve disinfection.

Filters.

Six 'rapid sand' filters, with Granular Activated Carbon (GAC), remove the particles that did not settle out in the settling tanks, as well as compounds that cause tastes and odours. Water flows through the filters to a clean water reservoir called the clearwell.

Backwash.

Filters are washed daily to remove the particulates they have collected over the previous 24 hrs. Clean water from the clearwell is pumped backwards through the filter, and the top layer of the filter is agitated to break up any large particles.

Post Chlorination.

Sodium hypochlorite is added to the water as it enters the clearwell to provide a 'chlorine residual' which remains throughout the distribution system. This ensures protection to the point of the customers' tap.

Clearwell.

Filtered water is stored here before being pumped to the distribution system or used for filter washing.

High Lift Pumps.

Five high lift pumps move treated water from the clearwell into the distribution system.

Standby Equipment.

Diesel driven pumps are maintained to provide a continuous supply of water during power failures. These provide enough capacity to meet fire-fighting requirements as well as normal flows during power outages. A diesel generator provides electricity to run metering equipment and lighting in the water plant.

Reservoir and Pumping Station.

This reservoir has a capacity of 22,700 m^3. It also contains two electric pumps, and one diesel pump. Water is pumped into this reservoir during the night and out of it during the day.

James St. Booster Station.

This station is supplied by a water main running from the city central, under the Cataraqui River, to James St. in Barriefield village. Three electric pumps are available to pump water into the distribution system east of the Cataraqui River, including Canadian Forces Base (CFB) Kingston. Fluoride is added at the James St. station for CFB Kingston, as a requirement of the Department of National Defense, to help prevent tooth decay. As well, sodium hypochlorite is added to ensure adequate chlorine residuals in this part of the system. The city east system has three elevated tanks for storage, and two control valves to regulate flows to and from the towers.

Central Elevated Tank.

Built in 1955 this steel tank is used for storage, to provide system pressure, and to act as a buffer to pressure fluctuations.

Distribution System.

Approximately 80,000 people are supplied with water from the Kingston Central Water Treatment Plant. There are approximately 250 km of water mains, and over 1200 fire hydrants in the system. Average daily flows are approximately 50,000 m^3/day, with summer time peaks of 72,000 m^3/day.

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Quality Control

This plant provides multiple barriers against bacteriological contamination. Four different chlorine application points are available, and the coagulation/flocculation process along with filtration provide additional barriers. Bacteriological

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DEFINITIONS & TERMS

°C - *degrees Celsius*

°F - *degrees Fahrenheit*

kg - *kilogram*

l - *litre*

m - *meter*

m³ - *cubic meter, 1 m³ =1000 litres.*

TCU - *True Colour Units*

$CaCO_3$-*Calcium carbonate*

mg - *milligram*

psi - *pounds per square inch*

mg/l - *Milligrams per litre. This is a measure of the concentration of a parameter in water, also called parts per million. (PPM)*

ug/l - *Micrograms per litre. This is a measure of the concentration of a parameter in water, also called parts per billion.*

ng/l - *Nanograms per litre. This is a measure of the concentration of a parameter in water, also called parts per trillion.*

NTU - *Nephelometric Turbidity Units - A measure of the amount of particles in 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.*

IMAC- *Interim Maximum Acceptable Concentration. This is a health related drinking water standard established for contaminants when there is insufficient toxicological data to establish a MAC with reasonable certainty, or when it is not practical to establish a MAC at the desired level.*

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

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testing is carried out on raw water, mid process, treated water and distribution samples on a daily basis. On-line analyzers for chlorine residuals and turbidity ensure safe, clear water leaving the plant. Chlorine levels in the distribution system are checked daily. More specialized testing occurs monthly and quarterly, and includes parameters such as pesticides, heavy metals, disinfection by-products, volatiles and organics.

Required Testing

The Ontario Drinking Water Regulations and our Certificates of Approval (COA) set sampling requirements for this plant. The COAs for the Central Water Treatment Plant specify only that Trihalomethanes (THMs) be sampled on a monthly basis during the time the zebra mussel control system is in use. All other sampling conforms to the Drinking Water Protection Regulation schedule for sampling and analysis.

What is in your water?

Some parameters may be present in source water before it is treated. Here is a description of the various groups of parameters.

Microbiological parameters such as bacteria may come from wastewater treatment plants, livestock operations, septic systems and wildlife. Microbiological quality is the most important aspect of drinking water quality because of its association with dangerous water-borne diseases which can strike quickly.

Inorganic parameters such as salts and metals can be naturally occurring or as a result of urban storm runoff, industrial or domestic wastewater discharges, mining or agriculture. Some may be the result of the treatment and distribution of water (for example, lead from solder in plumbing).

Organic parameters can be naturally occurring, but most organics of concern are synthetic. They originate from industrial discharges, urban storm runoff and other sources. Included in this group are pesticides that originate from both rural and urban areas. Some may originate from treatment of drinking water (for example, chlorination byproducts such as trihalomethanes). *Volatile organics* such as solvents and certain industrial chemicals are often the result of vehicle emissions or industrial discharges.

The Table below summarizes the detectable results from

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CHARACTERISTICS OF

KINGSTON WATER

(Average values)
Turbidity - 0.08 NTU
Colour - 2.1 TCU
Alkalinity- 95 mg/l as $CaCO_3$
pH - 7.5 - 7.7
Hardness - 120 mg/l $CaCO_3$ or 7.3 grains per gal.
Fluoride - 0.15 mg/l of naturally occurring fluoride. Fluoride is added to Kingston East water as a requirement of CFB Kingston.

CHARACTERISTICS OF WATER.
Specific Gravity: 1.00 Water reaches its highest density at 4 degrees Celsius. It becomes less dense at higher and lower temperatures.

Water weighs: 1 kg/l, 1000 kg /m^3,
10 lb/imperial gallon,
62.4 lb/ft^3 at 4 ° C.
Pressure: 1 psi = 2.31 ft of water,
1 ft of water = 0.433 psi,
1 m of water = 1.42 psi
1 psi = 6.895 KiloPascals
Water boils at: 100 ° C / 212 ° F,
freezes at : 0 ° C. / 32 ° F

monitoring we were required to do for this quarter. The presence of these substances in drinking water does not necessarily mean that the water poses a health risk.

The frequency for monitoring for different parameters varies, so some of the data in this table may be several months old. However, the sampling requirements have been set to ensure a representative picture of water quality. Although more than 75 different parameters were tested for, only those found in detectable levels are listed below, with the exception of those parameters required by our COA, and those related to microbiological quality.

Did We Exceed the Standards?

We did not exceed any health-related Ontario Drinking Water Standards for this reporting period.

Water Quality Test Results for this Quarter are listed in the table below

Microbiological Parameters	MAC or IMAC	Number of Samples	Number of Detectable Results	Sampling Dates	Range	Exceedance?	Typical Source of Contaminant
Total Coliform (counts/100ml)	*	386	0	07/03 - 09/29	N/A	No	Indicates possible presence of fecal matter.
Escherichia coliform (counts/100ml)	*	386	0	07/03 - 09/29	N/A	No	Definite indicator of fecal contamination.

** Indicator of adverse water quality if detected*

Parameters Related to Microbiological Quality	MAC or IMAC	Number of Samples	Number of Detectable Results	Sampling Dates	Range	Exceedance?	Typical Source of Contaminant
Turbidity (NTU)	1	Continuous	Continuous	07/01 - 09/30	0.04 - 0.11	No	Turbidity is a measure of particles in water.
Free chlorine - Plant effluent (mg/l)	-	Continuous	Continuous	07/01 - 09/30	0.35 - 0.65	N/A	Added for disinfection
Free chlorine - Distribution (mg/l)	-	224	217	07/03 - 09/29	0.00 - 0.81	N/A	Recommended level of at least 0.20 mg/l in distribution system to maintain microbiological quality.

N/A - Not Applicable

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Inorganic Parameters	MAC or IMAC	Number of Samples	Number of Detectable Results	Sampling Dates	Range	Exceedance?	Typical Source of Contaminant
Fluoride (mg/l)	1.5	48	48	07/05 - 09/14	0.08 - 0.84	No	* Added to prevent tooth decay.
Lead - Distribution (ug/l)	10	1	1	04/03	0.27 +/- 0.14 ug/l	No	Leached from lead solder or brass plumbing fixtures.
Nitrate (mg/l)	10	3	3	07/06 - 09/06	0.62 - 0.80	No	A natural component of water at this level.
Barium (ug/l)	1000	1	1	07/06 - 07/06	10.00	No	A common constituent of sedimentary rock.

** Fluoride is added to city east water only. City central water contains approximately 0.15 mg/l of naturally occuring fluoride.*

Volatile Organics	MAC or IMAC	Number of Samples	Number of Detectable Results	Sampling Dates	Range *	Exceedance?	Typical Source of Contaminant
Trihalomethanes-Plant effluent (ug/l)	100	12	12	10/5/99 - 9/6/00	15.2	No	By-product of chlorination
Trihalomethanes-Distribution (ug/l)	100	2	2	10/12/99 - 4/3/00	16.5	No	By-product of chlorination

** The MAC for THMs is based on a running annual average. The numbers listed are average results for data from the last 4 quarters.*

Pesticides & PCB	MAC or IMAC	Number of Samples	Number of Detectable Results	Sampling Dates	Range *	Exceedance?	Typical Source of Contaminant
None							

Questions and Answers

Q: I live in what used to be called Kingston/Pittsburgh Township. Where does my water come from?

A: The part of the city now referred to as Kingston West is serviced by the water treatment plant located on Sunny Acres Rd. The treatment plant is operated by the Ontario Clean Water Agency (OCWA) who also produce a quarterly report on water quality.

The part of the city now referred to as Kingston East is serviced by the central water treatment plant, located on King St. West, through a pipe running under the Cataraqui River.

Q: What is an Accredited Laboratory?

A: Accredited labs must have undergone an on-site assessment and performance review of their methods by the Canadian Association of Environmental and Anaytical Laboratories (CAEAL). The Standards Council of Canada (SCC) grants accreditation to the lab based on the recommendation of the CAEAL. The accreditation requirements are repeated every two years.

Q: Why are some of the values in the above table outside the recommended ranges or listed as not available/applicable?

A: The requirements for sampling, sample locations, as well as the recommended levels for chlorine residuals changed when the Ontario Drinking Water Regulations came into effect at the end of August 2000. This report, however, covers a period of time that extends back to before those changes came into effect. That does not mean that the water was not safe to drink before the new regulations. For example, our bacteriological sampling program in the past was very extensive, with nearly twice the number of samples being collected as were required, and chlorine residual testing which confirmed adequate disinfection. However, some of the residuals detected then would not meet the levels recommended under the new regulations.

Q: What had to be done to meet the new regulations?

A. The Kingston Water Treatment Plant was following the ODWO before they became law, so little change was required to meet the new regulations. Our chlorine residual in the water leaving the plant was raised slightly to achieve the (0.20 mg/l free chlorine) recommended level in the distribution system, and some changes were required in the way results are reported. This report to the public is also the result of the new regulations.

QUESTIONS AND ANSWERS
… Continued

Q: What parameters did you test for?

A. A complete list can be found in the Ontario Drinking Water Standards (ODWS) or at the MOE website listed on page 1 of this report. Microbiological parameters are tested daily. ODWS tables B, C and D, which include Volatile Organics, Inorganics and Pesticides & PCBs, are tested for on a quarterly basis. A description of what these are and where they come from can be found on page 2 of this report. Only those parameters found in detectable levels are listed.

Q. Sometimes my water looks rusty or coloured. Why is that, and what should I do about it?

A. This is quite often caused when the tanks in older water heaters start to decay. If the colour is seen only in your hot water this may be the problem. If the colour is also noticed in your cold water it could be coming from the water main. Various maintenance procedures in our distribution system -such as fire hydrant and valve maintenance, or main break repairs- require flushing of the water mains. Since most of the water mains in Kingston are cast or ductile iron, a type of rust forms on the inside of the mains. Normal flows are not high enough to disturb this, but high flows during flushing can cause small particles to break off adding colour to the water. Please note that there is no health risk associated with this problem. This is usually only temporary, and opening your taps for a while to flush out your service line (the pipe from the water main to your house) should take care of the problem. Just let the water run until the colour disappears.

Q. Why does the water sometimes have a strange taste or smell.

A. Tastes and odours in drinking water are usually the result of chemicals produced by algae in source water. Granular Activated Carbon (GAC) was added to our filters in 1998 to remove these chemicals. GAC should remove up to 90% of the taste and odour causing compounds, although some people may still be able to detect the small amounts of these compounds which remain after treatment. Certain medications may also enhance your ability to detect tastes and odours. There is no health risk associated with these taste and odour causing compounds, and our bacteriological sampling program ensures that your drinking water is safe.