

# UTILITIES KINGSTON

## 2010

### ANNUAL REPORT

January 1, 2010 – December 31, 2010

***Drinking Water System Number:*** 220001860

***Drinking Water System Name:*** King St. Water Treatment Plant (Formerly Kingston Central Water Treatment Plant)

***Drinking Water System Owner:*** City of Kingston

***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 any City of Kingston offices, at our waterplant 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 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 1km directly south of the treatment plant, 4m off the lake bottom, at a depth of approximately 18m. A great deal of testing was carried out in choosing the location for the intake. This has ensured that the treatment process begins by using the best and most consistent quality source water available, and reduces its susceptibility to contamination. Known sources of potential problems are few, and contingency plans are in place in the event of raw water contamination.

### *Zebra Mussel Control.*

When the water temperature rises above 10<sup>0</sup> 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 pipes 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. Particles in the water are attracted to the alum.

### *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 in the water will collide with the alum particles, and then join 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) and anthracite remove the particles that did not settle out in the settling tanks, as well as compounds that may cause tastes and odours. Water flows through the filters to a clean water reservoir called the clear well.

### *Backwash.*

Filters are washed daily to remove the particulates they have collected over the previous 24 hrs. Clean water from the clear well is pumped backwards through the filter, and the top layer of the filter is agitated to break up any large particles. Effluent water from the backwash process is directed to a process waste facility for further treatment.

### *Process Waste Facility.*

Effluent from the filter backwash process and sludge from the settling process are directed to the process waste facility for further treatment. Effluent is directed to two equalization tanks at the head of the process. Magnafloc 120L is added to the water as it is pumped from the equalization tanks through plate settlers at

which time the supernatant from the process is de-chlorinated using a 38% Sodium Bi-Sulphite solution, and then directed back to Lake Ontario. The sludge produced during the process is then pumped to the sanitary sewer system for further treatment at the Water Pollution Control Plant

### *Post Chlorination.*

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

### *Clear Well.*

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 clear well 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. Standby equipment is maintained for all critical processes.

### *Distribution System.*

The Kingston Drinking Water System, which receives water from both the King St. Water Treatment Plant and the Point Pleasant Water Treatment Plant, has a service population of approximately 124,000. The distribution system is divided into three distribution areas.

## **Distribution Area 1**

Distribution Area 1 is that area west of the Little Cataraqui Creek, south of Highway 401 and east of Coronation Boulevard, and north of Highway 401 along Sydenham Road northward to Mildred Street and eastward from Sydenham Road along Sunnyside Road for approximately 1.2 kilometres. Distribution Area 1 is comprised of approximately 220 km of water mains, 1 ground level reservoir/pumping station, 2 elevated storage tanks, 4 booster stations, over 2,500 main line valves, and over 1,300 fire hydrants and their associated isolation valves.

The Point Pleasant Water Treatment Plant provides water to Distribution Area 1. The OConnor Drive Elevated Storage Tank and the Progress Avenue Reservoir are located within this pressure zone.

## **Distribution Area 2**

Distribution Area 2 is that area which is east of the Little Cataraqui Creek, west of the Cataraqui River, and south of Highway 401. A small area on the east side of the Cataraqui River upstream of the pumps at the James Street Booster Station is part of the Area 2 pressure zone. In addition, Collins Bay Institution, which is west of the Little Cataraqui Creek on Bath Road, is supplied with water from this area and from Area 1.

Distribution Area 2 is comprised of over 250km of water mains, 1 ground level reservoir/pumping station, 1 elevated storage tank, over 2,000 main line valves, and over 1,200 fire hydrants and their associated isolation valves. The King Street Water Treatment Plant provides water to Distribution Area 2. The Tower Street Elevated Storage Tank and the Third Avenue Reservoir are located within this pressure zone.

### **Distribution Area 3**

Distribution Area 3 is that area which is east of the Cataraqui River. Distribution Area 3 is comprised of over 70km of water mains, 1 water booster station, 3 elevated storage facilities, over 250 main line valves, and over 300 fire hydrants and their associated isolation valves.

Water is supplied to Distribution Area 3 from Distribution Area 2 through the James Street Booster Station.

### **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.

Watermain replacement projects throughout the city were continued throughout 2010, with extensive leakage testing, hydrant maintenance and replacement, valve maintenance and operation programs were also conducted on the system.

Continued development of a 25 year master plan for the drinking water systems within the City of Kingston.

Construction and completion of the new O'Connor Dr. water storage reservoir.

Piloting projects and design work for the Point Pleasant Water Treatment Plant continue in 2010.

A Class Environmental assessment for water storage in Kingston East was completed in 2010.

### **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 details of any events requiring notifications are listed below.

On Feb. 18<sup>th</sup>, a notification for elevated lead in a sample collected from the distribution system was received from Caduceon Environmental Laboratories. Notifications were made to the Spills Action Center and to the Environmental Health Division of the local Ministry of Health. Previous samples collected at that location and re-samples indicated no elevated lead present.

On Apr. 13<sup>th</sup>, a notification for elevated lead in a sample collected from the treated water sample tap was received from Caduceon Environmental Laboratories. Notifications were made to the Spills Action Center and to the Environmental Health Division of the local Ministry of Health. Previous samples collected at that location and re-samples indicated no elevated lead present. Since lead has never been detected in the past and no lead is used within the treatment system, a sampling or lab error is suspected.

Notification of an indicator of adverse water quality was received from Caduceon Environmental Laboratories regarding a sample collected on Aug. 24<sup>th</sup> for total coliform bacteria. Free chlorine residual tested at the time the sample was collected was 1.53 mg/l. Notifications were made to the Spills Action Center and to the Environmental Health Division of the local Ministry of Health. The sample location was a new fire hydrant installation and re-sampling of the location, upstream and downstream were taken and sent to the lab for analysis. With the high free chlorine residual present in the original sample and the subsequent re-samples not indicating any adverse conditions, a contaminated sample bottle or sampling error is suspected.

Notification of an indicator of adverse water quality was received from Caduceon Environmental Laboratories regarding a sample collected on Aug. 30<sup>th</sup> for total coliform bacteria. Free chlorine residual tested at the time the sample was collected was 0.89 mg/l. Notifications were made to the Spills Action Center and to the Environmental Health Division of the local Ministry of Health. The sample location was a new fire hydrant installation and re-sampling of the location, upstream and downstream were taken and sent to the lab for analysis. With the high free chlorine residual present in the original sample and the subsequent re-samples not indicating any adverse conditions, a contaminated sample bottle or sampling error is suspected.

On Sept. 15<sup>th</sup> a notification was made under Schedule 16-3 of O. Reg. 170/03, a free chlorine test result indicated the concentration of free chlorine was less than 0.05 mg/l in the distribution system. Notifications were made to the Spills Action Center and to the Environmental Health Division of the local Ministry of Health. The underground department initiated flushing of the affected area and grab samples were collected. Within 25 minutes of the time the flushing was initiated, test results indicating free chlorine residuals of greater than 0.20 mg/l in the area. Bacteriological sampling was also initiated in the area with results indicating no adverse conditions present.

Notification of an indicator of adverse water quality was received from Caduceon Environmental Laboratories regarding a sample collected on Oct. 1<sup>st</sup> for total coliform bacteria. Free chlorine residual tested at the time the sample was collected was 1.16 mg/l. Notifications were made to the Spills Action Center and to the Environmental Health Division of the local Ministry of Health. The sample location was a new fire hydrant installation and re-sampling of the location, upstream and downstream were taken and sent to the lab for analysis. With the high free chlorine residual present in the original sample and the subsequent re-samples not indicating any adverse conditions, a contaminated sample bottle or sampling error is suspected.

Notification of an indicator of adverse water quality was received from Caduceon Environmental Laboratories regarding a sample collected on Dec. 23<sup>rd</sup> for total coliform bacteria. Free chlorine residual tested at the time the sample was collected was 1.71 mg/l. Notifications were made to the Spills Action Center and to the Environmental Health Division of the local Ministry of Health. The sample location was a new fire hydrant installation and re-sampling of the location, upstream and downstream were taken and sent to the lab for analysis. With the high free chlorine residual present in the original sample and the subsequent re-samples not indicating any adverse conditions, a contaminated sample bottle or sampling error is suspected.

## Definition & Terms

**° C** - degrees Celsius  
**kg** - kilogram  
**m** - meter  
**TCU** - True Colour Units  
**mg** - milligram  
**N/A** - Not Applicable

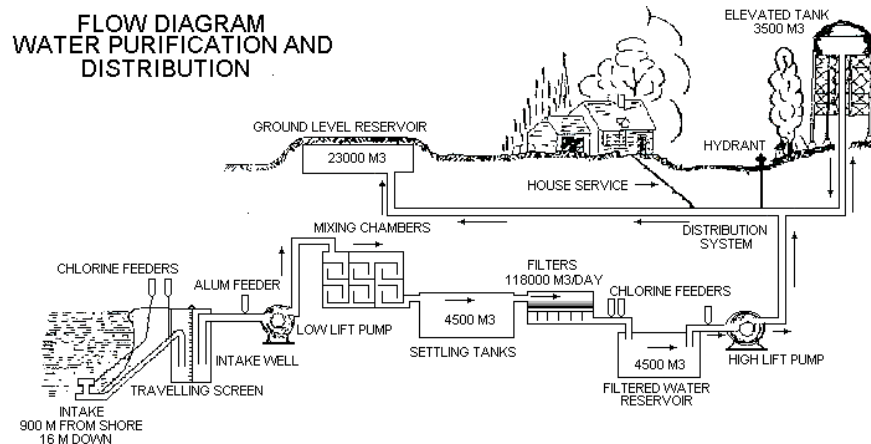
**° F** - degrees Fahrenheit  
**l** - litre  
**m<sup>3</sup>** - cubic meter=1000 litres.  
**CaCO<sub>3</sub>** -Calcium carbonate  
**psi** - pounds per square inch

- N/D** - Non -Detectable  
**NTU** - Nephelometric Turbidity Units - A measure of the amount of particles in water.  
**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, also called parts per billion.  
**ng/l** - 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.

## Flow Diagram



## 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	52	0 - 3	0 - 77		
Treated	53	0	0	53	0 - 60
Kingston Drinking Water System  (Receives water from both King St. WTP & Point Pleasant WTP)	1302	0	0 - 2	645	0 - <2000

## 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
Raw Water Turbidity	Continuous	0.06 - 1.5	NTU	Turbidity is a measure of particles in water.
Treated Water Turbidity	Continuous	0.04 - 0.20	NTU	Turbidity is a measure of particles in water.
Treated Chlorine Residual	Continuous	0.88 - 3.30	mg/l	Recommended level of at least 0.20 mg/l in distribution system to maintain microbiological quality. 0.05 mg/l minimum.
James St. Booster Stn. Chlorine Residual	Continuous	0.72 - 5.0	mg/l	Recommended level of at least 0.20 mg/l in distribution system to maintain microbiological quality. 0.05 mg/l minimum.
Distribution Chlorine Residual (Kingston Drinking Water System)  Receives water from both King St. WTP & Point Pleasant WTP	Continuous	0.03 - 3.12	mg/l	Recommended level of at least 0.20 mg/l in distribution system to maintain microbiological quality. 0.05 mg/l minimum.

Filter # 1 Effluent Turbidity	Continuous	0.02 – 0.16	NTU	Turbidity is a measure of particles in water.
Filter # 2 Effluent Turbidity	Continuous	0.03 – 0.19	NTU	Turbidity is a measure of particles in water.
Filter # 3 Effluent Turbidity	Continuous	0.01 – 0.23	NTU	Turbidity is a measure of particles in water.
Filter # 4 Effluent Turbidity	Continuous	0.02 – 0.16	NTU	Turbidity is a measure of particles in water.
Filter # 5 Effluent Turbidity	Continuous	0.03 – 0.67	NTU	Turbidity is a measure of particles in water.
Filter # 6 Effluent Turbidity	Continuous	0.02 – 0.30	NTU	Turbidity is a measure of particles in 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
Process Waste Facility Effluent	Total Suspended Solids	12	8	mg/l	A measure of the particulates collected in the filtration process.

### Summary Of Additional Testing And Sampling On The Process Wastewater Effluent

Sample Location	Parameter	Number of Samples	Results Average	Unit of Measure	Parameter Description
Process Waste Facility Effluent	BOD5	12	<2	mg/l	Biological Oxygen Demand
Process Waste Facility Effluent	Aluminum	3	0.56 – 1.45	mg/l	Residual from treatment process
Process Waste Facility Effluent	pH	12	7.85 – 8.04		An indicator of the acidity of water.

## 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> )	4	88 – 94	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Aluminum	2	<0.01 – 0.02	mg/l	No	May be naturally present.
Antimony	1	<0.0001	mg/l	No	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Ammonia N	2	<0.05	mg/l	No	Occurs naturally from organic nitrogen containing compounds.
Arsenic	2	0.0009 – 0.0011	mg/l	No	Naturally occurring in surface waters / mine drainage
Cadmium	1	<0.00002	mg/l	No	Industrial discharge
Calcium	2	35 – 35.3	mg/l	No	Naturally occurring.
Chloride	2	21 – 22	mg/l	No	A common naturally occurring non-toxic material that may produce a salty taste in water.
Colour	12	<2 – 5	TCU	No	Typically the result of organic matter in surface waters.
Conductivity	2	312 – 314	Us/cm	No	A measure of ability of water to carry an electric current due to the presence of ions.
Copper	2	<0.002	mg/l	No	Domestic plumbing (Aesthetic objective)
Dissolved Organic Carbon	4	1.9 – 2.2	mg/l	No	High DOC is an indicator of potential for chlorination by-product problems.
Fluoride	4	0.2	mg/l	No	Naturally occurring.

Geosmin	4	<3 - 10	Ng/l	No	An organic compound which causes an earthy flavor and aroma.
Hardness	4	121 – 124	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
Iron	2	<0.005	mg/l	No	Leaching from natural deposits and plumbing materials, industrial wastes. (Aesthetic objective)
Lead	2	<0.02	ug/l	No	Internal corrosion of household plumbing, erosion of natural deposits.
Manganese	2	<0.001	mg/l	No	Erosion of natural deposits.
Nitrate	4	0.3 – 0.4	mg/l	No	Runoff from fertilizer use, erosion of natural deposits
Nitrite	4	<0.1	mg/l	No	A natural component of water at this level.
Nitrilotriacetic acid -NTA	1	<0.03	mg/l	No	Used in laundry detergents.
Nitrosodimethylamine - NDMA	1	<0.0008	ug/l	No	Rarely used industrially but has been used as an antioxidant, and an additive for lubricants
pH	12	7.99 – 8.27		No	An indicator of the acidity of water.
Selenium	1	<0.001	mg/l	No	Discharge from refineries, mines, chemical manufacture
Sodium	4	12.6 – 13.1	mg/l	No	Occurs naturally in the earth's crust.
Sulphate	4	24 – 25	mg/l	No	An inorganic constituent that may cause tastes at high levels.
Total Kjeldahl Nitrogen	4	<0.05 – 0.2	mg/l	No	Indicator of organic contamination or the potential for taste and odour problems.
Total Phenols	4	<0.001	mg/l	No	A chemical compound found in nature and used in a wide variety of products.

Uranium	1	0.00023	mg/l	No	Erosion of natural deposits.
Zinc	2	<0.005	mg/l	No	An inorganic constituent that may cause tastes.

### 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	2	<0.0001 - 0.0001	mg/l	No	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Arsenic	2	0.0005 – 0.0008	mg/l	No	Naturally occurring in surface waters / mine drainage
Barium	2	0.018 – 0.023	mg/l	No	Erosion of natural deposits. Discharge from metal refineries, oil drilling wastes.
Boron	2	0.011 – 0.024	mg/l	No	Erosion of natural deposits, industrial waste effluents.
Cadmium	2	<0.00002	mg/l	No	Industrial discharge
Chromium	2	<0.002	mg/l	No	Industrial residues
Lead	4	<0.00002 – 0.0127	mg/l	Yes	Internal corrosion of household plumbing, erosion of natural deposits.
Mercury	2	<0.0002	mg/l	No	Erosion of natural deposits, industrial discharges.
Selenium	2	<0.0002	mg/l	No	Discharge from refineries, mines, chemical manufacture
Sodium	10	12.8 – 15.4	mg/l	No	Occurs naturally in the earth's crust.
Uranium	2	0.00014	mg/l	No	Erosion of natural deposits.

Fluoride	4	0.2	mg/l	No	Naturally occurring.
Nitrite	12	<0.1	mg/l	No	A natural component of water at this level.
Nitrate	12	0.3 – 0.4	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	2	<0.3	ug/l	No	Agricultural herbicide
Aldicarb	2	<3	ug/l	No	Agricultural insecticide
Aldrin + Dieldrin	2	<0.02	ug/l	No	Residue from banned insecticide
Atrazine + N-dealkylated metabolites	2	<0.5	ug/l	No	Agricultural herbicide
Azinphos-methyl	2	<1	ug/l	No	Insecticide
Bendiocarb	2	<3	ug/l	No	Insecticide
Benzene	2	<0.5	ug/l	No	Discharge from plastics manufacturing, leaking fuel tanks
Benzo(a)pyrene	2	<0.005	ug/l	No	Formed from the incomplete burning of organic matter.
Bromoxynil	2	<0.3	ug/l	No	Agricultural herbicide
Carbaryl	2	<3	ug/l	No	Agricultural/Forestry/ Household insecticide
Carbofuran	2	<1	ug/l	No	Agricultural insecticide
Carbon Tetrachloride	2	<0.2	ug/l	No	Discharge from chemical and industrial activities
Chlordane (Total)	2	<0.04	ug/l	No	Residue from banned insecticide

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

Glyphosate	2	<25	ug/l	No	Agricultural/Forestry/ Household herbicide
Heptachlor + Heptachlor Epoxide	2	<0.1	ug/l	No	Residue from banned insecticide
Lindane (Total)	2	<0.1	ug/l	No	Agricultural/ Pharmaceutical insecticide
Malathion	2	<5	ug/l	No	Fruit & Vegetable / pest control insecticide
Methoxychlor	2	<0.1	ug/l	No	Agricultural/ Livestock Operation/ Residential insecticide
Metolachlor	2	<3	ug/l	No	Agricultural herbicide
Metribuzin	2	<3	ug/l	No	Agricultural herbicide
Monochlorobenzene	2	<0.2	ug/l	No	Discharge from industrial and agricultural chemical factories and dry cleaning facilities
Paraquat	2	<1	ug/l	No	Agricultural/ Aquatic herbicide
Parathion	2	<3	ug/l	No	Agricultural insecticide
Pentachlorophenol	2	<0.1	ug/l	No	Pesticide/ wood preservative residue
Phorate	2	<0.3	ug/l	No	Agricultural insecticide
Picloram	2	<5	ug/l	No	Industrial herbicide
Polychlorinated Biphenyls(PCB)	2	<0.05	ug/l	No	Residue from various industrial uses
Prometryne	2	<0.1	ug/l	No	Agricultural herbicide
Simazine	2	<0.5	ug/l	No	Agricultural herbicide or its residue
Total Trihalomethanes  (NOTE: show latest annual average)	10	15.2	ug/l	No	By-product of chlorination. * The MAC for THMs of 100 ug/l is based on a running annual average.

Temephos	2	<10	ug/l	No	Insecticide for Mosquito/Black fly control
Terbufos	2	<0.3	ug/l	No	Agricultural insecticide
Tetrachloroethylene	2	<0.2	ug/l	No	Leaching from PVC pipes; discharge from factories, dry cleaners and auto shops (metal degreaser)
2,3,4,6-Tetrachlorophenol	2	<0.1	ug/l	No	Wood preservative
Triallate	2	<10	ug/l	No	Agricultural herbicide
Trichloroethylene	2	<0.1	ug/l	No	Discharge from metal degreasing sites and other factories
2,4,6-Trichlorophenol	2	<0.1	ug/l	No	Pesticide manufacturing
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	2	<10	ug/l	No	Industrial herbicide residue
Trifluralin	2	<0.5	ug/l	No	Agricultural herbicide
Vinyl Chloride	2	<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> )	4	82 - 92	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Aluminum	12	0.04 – 0.09	mg/l	No	May be naturally present or a residual from the coagulation process.

Ammonia N	4	<0.05	mg/l	No	Occurs naturally from organic nitrogen containing compounds.
Calcium	4	34.2 – 35.3	mg/l	No	Naturally occurring.
Chloride	4	23 – 25	mg/l	No	A common naturally occurring non-toxic material that may produce a salty taste in water.
Colour	12	<2 - 4	TCU	No	Typically the result of organic matter in surface waters.
Conductivity	3	322 – 330	Us/cm	No	A measure of ability of water to carry an electric current due to the presence of ions.
Dissolved Organic Carbon	4	1.5 – 1.8	mg/l	No	High DOC is an indicator of potential for chlorination by-product problems.
Gross Alpha	1	0.3	Bq/l	No	Decay of natural deposits.
Gross Beta	1	0.1	Bq/l	No	Decay of natural deposits.
Hardness	4	120 – 124	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
Iron	4	<0.005	mg/l	No	Leaching from natural deposits and plumbing materials, industrial wastes. (Aesthetic objective)
Magnesium	1	8.830	ug/l	No	Naturally occurring.
Manganese	4	<0.001	mg/l	No	Erosion of natural deposits.
Nitrilotriacetic acid -NTA	1	<0.03	mg/l	No	Used in laundry detergents.
Nitrosodimethylamine - NDMA	1	<0.000008	mg/l	No	Rarely used industrially but has been used as an antioxidant, and an additive for lubricants
pH	12	7.58 – 7.93		No	An indicator of the acidity of water.
Sulphate	4	28 – 32	mg/l	No	An inorganic constituent that may cause tastes at high levels.
Zinc	4	<0.005	mg/l	No	An inorganic constituent that may cause tastes.

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

Parameter	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Lead	18	<0.00002 – 0.052	mg/l	Yes	Internal corrosion of household plumbing, erosion of natural deposits.
Sodium	8	12.2 – 15.5	mg/l	No	Occurs naturally in the earth's crust.
Fluoride	2	0.2	mg/l	No	Naturally occurring.
Nitrite	2	<0.1	mg/l	No	A natural component of water at this level.
Nitrate	2	0.3 – 0.4	mg/l	No	Runoff from fertilizer use, erosion of natural deposits

## Summary Of The Kingston Drinking Water Distribution System 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)	12	38.1	ug/l	No	By-product of chlorination. * The MAC for THMs of 100 ug/l is based on a running annual average.

## Summary Of Additional Kingston Drinking Water 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> )	23	80 - 93	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Aluminum	8	0.04 – 0.14	mg/l	No	May be naturally present or a residual from the coagulation process.
Ammonia N	8	<0.05	mg/l	No	Occurs naturally from organic nitrogen containing compounds.
Arsenic	2	0.0007 – 0.0011	mg/l	No	Naturally occurring in surface waters / mine drainage
Benzo(a)pyrene	2	<0.005	ug/l	No	Formed from the incomplete burning of organic matter.
Calcium	8	34.4 – 35.7	mg/l	No	Naturally occurring.
Chloride	8	<1 - 25	mg/l	No	A common naturally occurring non-toxic material that may produce a salty taste in water.
Colour	2	<2	TCU	No	Typically the result of organic matter in surface waters.
Conductivity	6	311 - 332	Us/cm	No	A measure of ability of water to carry an electric current due to the presence of ions.
Copper	8	<0.002 – 0.018	mg/l	No	Domestic plumbing (Aesthetic objective)
Dissolved Organic Carbon	8	1.5 – 2.1	mg/l	No	High DOC is an indicator of potential for chlorination by-product problems.
Gross Alpha	2	<0.1	Bq/l	No	Decay of natural deposits.
Gross Beta	2	0.1 – 0.2	Bq/l	No	Decay of natural deposits.

Hardness	2	122 – 125	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
Iron	8	<0.005 – 0.032	mg/l	No	Leaching from natural deposits and plumbing materials, industrial wastes. (Aesthetic objective)
Manganese	8	<0.001 - 0.002	mg/l	No	Erosion of natural deposits.
Nitrilotriacetic acid -NTA	2	<0.03	mg/l	No	Used in laundry detergents.
Nitrosodimethylamine - NDMA	2	<0.0000008	mg/l	No	Rarely used industrially but has been used as an antioxidant, and an additive for lubricants
pH	8	7.55 – 8.10		No	An indicator of the acidity of water.
Sulphate	8	23 - 32	mg/l	No	An inorganic constituent that may cause tastes at high levels.
Tritium (Bq/l)	2	<15	Bq/l	No	Decay of natural & man made deposits.
Total Kjeldahl Nitrogen	8	<0.05 – 0.2	mg/l	No	Indicator of organic contamination or the potential for taste and odour problems.
Zinc	8	<0.005 – 0.008	mg/l	No	An inorganic constituent that may cause tastes.

### 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.15/09- Dec.31/10)	Number of Sample Locations Results Exceeding Standard (0.01 mg/l)	Lead Results Range (mg/l)	pH Results Range
Residential	76	*2	<0.00002 – 0.0125	6.43 – 7.88

Non-Residential	15	*2	<0.00002 – 0.0242	6.68 – 7.79
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\*Notification of lead exceedance results and advice by the medical officer of health were given to the occupants of the locations which exceeded the standard for lead in accordance to Schedule 15.1-9 of Regulation 170/03.

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

Parameter	Number of Samples	Average Results	Unit of Measure	Exceedance	Parameter Description
Alkalinity	49	93	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Hardness	49	130	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
pH	365	7.4		No	An indicator of the acidity of water.
Temperature	365	0.1 – 23	Degrees Celcius	No	

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

Parameter	Number of Samples	Average Results	Unit of Measure	Exceedance	Parameter Description
Alkalinity	49	95	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Aluminum	360	0 – 0.047	mg/l	No	May be naturally present or a residual from the coagulation process.

Hardness	49	128	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
pH	365	7.24		No	An indicator of the acidity of water.
Temperature	365	0.1 - 23	Degrees Celcius	No	