



2017 ANNUAL REPORT ON DRINKING WATER QUALITY

JANUARY 1 TO DECEMBER.31 2017

CANA WATER TREATMENT PLANT

Drinking Water System Number: 220006053
Drinking Water System Owner: City of Kingston
Drinking Water System Category: Small Municipal Residential

Drinking Water Quality

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. 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. For further information about this report or any questions regarding accessibility contact James Patenaude at jpatenaude@utilitieskingston.com, or call 613-546-1181 Ext 2 5 2 5

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1. Plant Description & Treatment Processes

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 operates 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_2 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_2 residuals and pH levels are continuously monitored. Control of the chlorination system is accomplished through the monitoring of chlorine contact tank inlet Cl_2 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



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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 Cl₂ and one as treated water Cl₂).

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 Cl₂ residual is below an operator adjustable set point. Control of the trim chlorination system is accomplished through the monitoring of chlorine contact tank outlet Cl₂ 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 new diesel generator has been installed on the property of the newly built Cana Wastewater Treatment Plant to provide a backup electrical supply in case of power outages. This generator is directly connected to both the Cana Water and Cana Wastewater facilities and is capable of fully powering both systems in the event of a power outage.

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 MOECC.

2. 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 major expenses for this drinking water system are listed below.

- Operational & preventative maintenance was conducted at the well house during 2017.
- Both of the 450 L Pressure Tanks were replaced with new tanks.



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-Both housings for the cartridge filters were replaced with new housings.

-Both High Lift Pumps were replaced with new pumps.

-New rollers were installed on chlorine feed pumps as well as the associated chlorine feed lines.

3. 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 if a report under subsection 18 (1) of the Safe Drinking Water Act has not been made in respect of sodium in the preceding 57 months. This notification was last completed in April 2013.

There were NO incidents which required notification during this reporting period.

4. Definition & Terms

TCU - True Colour Units

mg - milligram

N/A - Not Applicable

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).

µg/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.

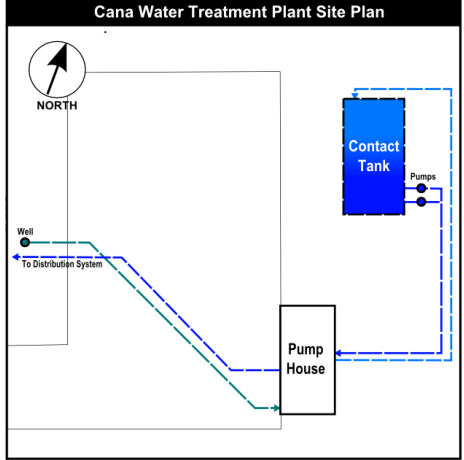
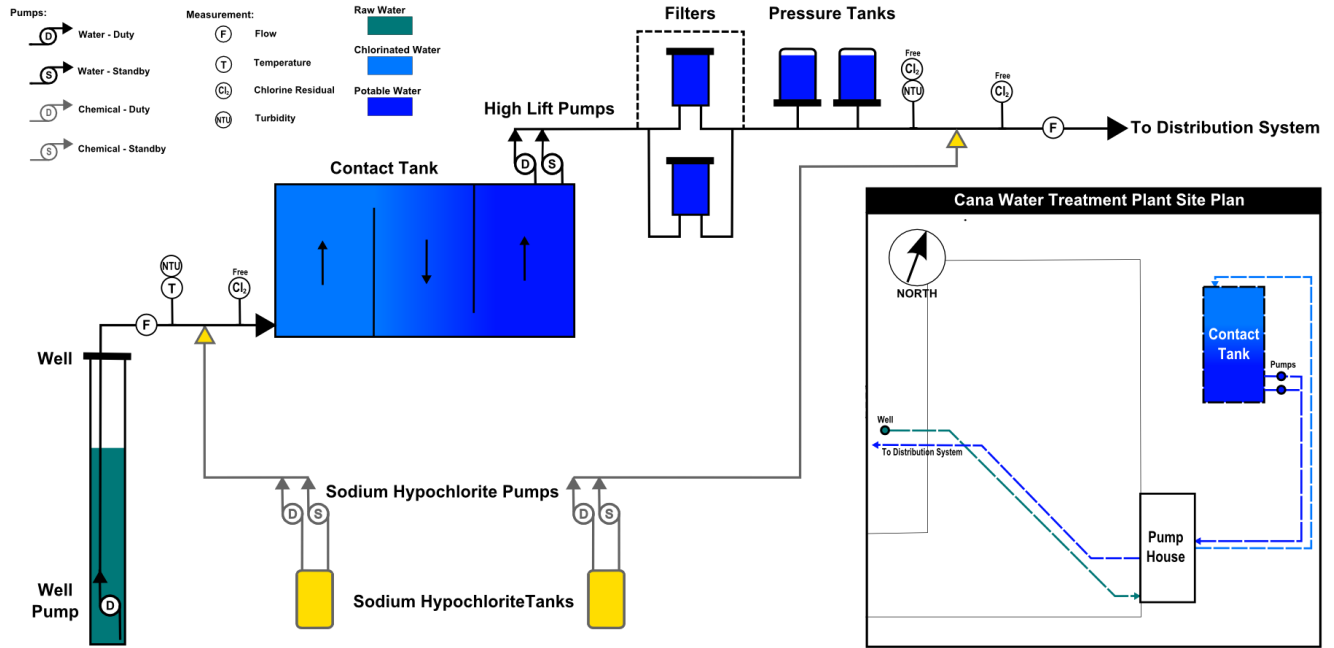
AO - Aesthetic objective. AOs are not health related, but may affect the taste, odour, colour or clarity of the water

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.

5. Flow Diagram

CANA WATER TREATMENT PLANT PROCESS FLOW



Version: April 28, 2009

6. Water Quality Test Results

Microbiological testing done under regulation 170 03 during this reporting period

	MAC (E. Coli & Total Coliforms)	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	N/A	53	0	0-5		
Distribution System	*	52	0	0	52	<10 – 50

**Indicator of adverse water quality if detected*

Operational testing done under schedule 7, 8 or 9 of regulation 170/03 during this reporting period

Parameter	MAC	Number of Samples	Range of Results (min # - max #)	Unit of Measure	Parameter Description
Cana Water Treatment Plant Raw Turbidity	N/A	50	0.08-2.50 *	NTU	Turbidity is a measure of particles in water.
Cana Water Treatment Plant Treated Chlorine	See parameter description	Continuous	0.35 – 2.55	mg/l	Recommended level of at least 0.20 mg/l in distribution system to maintain microbiological quality. 0.05 mg/l minimum required.
Chlorine Residual (Distribution System)	See parameter description	Continuous	0.40 – 2.27	mg/l	Recommended level of at least 0.20 mg/l in distribution system to maintain microbiological quality. 0.05 mg/l minimum required.
Cana Water Treatment Plant Treated Turbidity	N/A	Continuous	0.01-2.00	NTU	Turbidity is a measure of particles in water.



*The maximum value of 2.50 NTU is believed to be related to a contaminated sample bottle. On the day of the value in question, the online raw water turbidity analyzer recorded a maximum value of 0.130 NTU

Summary of treated water Schedule 23 inorganic parameters tested during this reporting period

Parameter	MAC	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Antimony	0.006	1	<0.0001	mg/l	No	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Arsenic	0.025	1	<0.0001	mg/l	No	Naturally occurring in surface waters / mine drainage
Barium	1.0	1	0.198	mg/l	No	Erosion of natural deposits. Discharge from metal refineries, oil drilling wastes.
Boron	5.0	1	0.080	mg/l	No	Erosion of natural deposits, industrial waste effluents.
Cadmium	0.005	1	<0.00002	mg/l	No	Industrial discharge
Chromium	0.05	1	<0.002	mg/l	No	Industrial residues
Mercury	0.001	1	<0.00002	mg/l	No	Erosion of natural deposits, industrial discharges.
Selenium	0.01	1	< 0.001	mg/l	No	Discharge from refineries, mines, chemical manufacture
Uranium	0.02	1	0.00190	mg/l	No	Erosion of natural deposits.

Summary of treated water Schedule 24 organic parameters tested during this reporting period

Parameter	MAC	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Alachlor	5	1	<0.3	µg/L	No	Agricultural herbicide

Parameter	MAC	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Atrazine + N-dealkylated metabolites	5	1	<0.5	µg/L	No	Agricultural herbicide
Azinphos-methyl	20	1	<1	µg/L	No	Insecticide
Benzene	5	1	<0.5	µg/L	No	Discharge from plastics manufacturing, leaking fuel tanks
Benzo(a)pyrene	0.01	1	<0.005	µg/L	No	Formed from the incomplete burning of organic matter.
Bromoxynil	5	1	<0.3	µg/L	No	Agricultural herbicide
Carbaryl	90	1	<3	µg/L	No	Agricultural/Forestry/ Household insecticide
Carbofuran	90	1	<3	µg/L	No	Agricultural insecticide
Carbon Tetrachloride	5	1	<0.2	µg/L	No	Discharge from chemical and industrial activities
Chlorpyrifos	90	1	<0.5	µg/L	No	Agricultural/ Household insecticide
Diazinon	20	1	<1	µg/L	No	Agricultural/ Livestock Operation/ Residential insecticide
Dicamba	120	1	<5	µg/L	No	Agricultural herbicide
1,2-Dichlorobenzene	200	1	<0.1	µg/L	No	Discharge from industrial chemical factories
1,4-Dichlorobenzene	5	1	<0.2	µg/L	No	Discharge from industrial chemical factories
1,2-Dichloroethane	5	1	<0.1	µg/L	No	Discharge from industrial chemical factories
1,1-Dichloroethylene (vinylidene chloride)	14	1	<0.1	µg/L	No	Discharge from industrial chemical factories

Parameter	MAC	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Dichloromethane	50	1	<0.3	µg/L	No	Discharge from pharmaceutical and chemical factories
2-4 Dichlorophenol	900	1	<0.1	µg/L	No	Industrial contamination/ reaction with chlorine
2,4-Dichlorophenoxy acetic acid (2,4-D)	100	1	<5	µg/L	No	Agricultural/ Residential herbicide
Diclofop-methyl	9	1	<0.5	µg/L	No	Agricultural herbicide
Dimethoate	20	1	<1	µg/L	No	Agricultural/ Livestock Operation/ Forestry insecticide
Diquat	70	1	<5	µg/L	No	Agricultural/ Aquatic herbicide
Diuron	150	1	<5	µg/L	No	Agricultural/ Industrial/ herbicide
Glyphosate	280	1	<25	µg/L	No	Agricultural/Forestry/ Household herbicide
Malathion	190	1	<5	µg/L	No	Fruit & Vegetable / pest control insecticide
2-methyl-4-chlorophenoxyacetic acid (MCPA)	0.1	1	< 0.00012	mg/L	No	Leaching and/or runoff from agricultural and other uses
Metolachlor	50	1	<3	µg/L	No	Agricultural herbicide
Metribuzin	80	1	<3	µg/L	No	Agricultural herbicide
Monochlorobenzene	80	1	<0.2	µg/L	No	Discharge from industrial and agricultural chemical factories and dry cleaning facilities
Paraquat	10	1	<1	µg/L	No	Agricultural/ Aquatic herbicide

Parameter	MAC	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Pentachlorophenol	60	1	<0.1	µg/L	No	Pesticide/ wood preservative residue
Phorate	2	1	<0.3	µg/L	No	Agricultural insecticide
Picloram	190	1	<5	µg/L	No	Industrial herbicide
Polychlorinated Biphenyls(PCB)	3	1	<0.05	µg/L	No	Residue from various industrial uses
Prometryne	1	1	<0.1	µg/L	No	Agricultural herbicide
Simazine	10	1	<0.5	µg/L	No	Agricultural herbicide or its residue
Terbufos	1	1	<0.3	µg/L	No	Agricultural insecticide
Tetrachloroethylene	30	1	<0.2	µg/L	No	Leaching from PVC pipes; discharge from factories, dry cleaners and auto shops (metal degreaser)
2,3,4,6-Tetrachlorophenol	100	1	<0.1	µg/L	No	Wood preservative
Triallate	230	1	<10	µg/L	No	Agricultural herbicide
Trichloroethylene	5	1	<0.1	µg/L	No	Discharge from metal degreasing sites and other factories
2,4,6-Trichlorophenol	5	1	<0.1	µg/L	No	Pesticide manufacturing
Trifluralin	45	1	<0.5	µg/L	No	Agricultural herbicide
Vinyl Chloride	2	1	<0.2	µg/L	No	Leaching from PVC pipes; discharge from plastics factories



Summary of other regulatory treated water parameters tested during this reporting period

Parameter	MAC	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Fluoride	1.5	2	0.2 – 0.3	mg/l	No	Naturally occurring.
Nitrite	1	11	<0.1 – 0.2	mg/l	No	A natural component of water at this level.
Nitrate	10	11	<0.1 – 0.3	mg/l	No	Runoff from fertilizer use, erosion of natural deposits
Sodium	20	11	76.8 – 90.7	mg/l	*Yes	Occurs naturally in the earth's crust. *Notification is required every 60 months if greater than 20 mg/l.

Additional treated water testing analyzed by accredited laboratories during this reporting period

Parameter	MAC	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Alkalinity (as CaCO ₃)	N/A	2	336 - 345	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Aluminum	0.1 OG	1	0.03	mg/l	No	May be naturally present or a residual from the coagulation process.
Ammonia N	N/A	1	<0.05	mg/l	No	Occurs naturally from organic nitrogen containing compounds.
Calcium	N/A	1	103	mg/l	No	Naturally occurring.
Chloride	250	1	167	mg/l	No	A common naturally occurring non-toxic material

Parameter	MAC	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
						that may produce a salty taste in water.
Colour	5	11	<2 - 2	TCU	No	Typically the result of organic matter in surface waters.
Conductivity	N/A	1	1,210	Us/cm	No	A measure of ability of water to carry an electric current due to the presence of ions.
Hardness	100 OG	11	449 – 523	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
Iron	0.3 AO	11	<0.005 – 0.007	mg/l	No	Leaching from natural deposits and plumbing materials, industrial wastes. (Aesthetic objective)
Lead	0.01	1	0.00002	mg/l	No	Internal corrosion of household plumbing, erosion of natural deposits.
Manganese	0.05 AO	11	0.010 – 0.024	mg/l	No	Erosion of natural deposits.
Sulphate	500 OG	1	53	mg/l	No	An inorganic constituent that may cause tastes at high levels.
Total Kjeldahl Nitrogen	N/A	1	<0.1	mg/l	No	Indicator of organic contamination or the potential for taste and odour problems.
Zinc	5	1	0.1	mg/l	No	An inorganic constituent that may cause tastes.



Summary of regulatory distribution drinking water parameters tested during this reporting period

Parameter	MAC	Number of Samples	Result Value	Unit of Measure	Exceedance	Parameter Description
Alkalinity (as CaCO ₃)	N/A	3	335 – 343	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Total Haloacetic acids	0.08 (Annual avg.)	4	< 5.3	mg/L	No	By-product of drinking water disinfection with chlorine. Based on a running annual average
Lead	0.01	2	0.00075 – 0.00189	mg/l	No	Internal corrosion of household plumbing, erosion of natural deposits.
pH	6.5–8.5 OG	2	7.58 – 7.74		No	An indicator of the acidity of water.
Total Trihalomethanes	100 (Annual avg.)	4	12.40	µg/L	No	By-product of chlorination. * The MAC for THMs of 100 µg/L is based on a running annual average.

Additional distribution water testing by accredited laboratories during this reporting period

Parameter	MAC	Number of Samples	Results Range	Unit of Measure	MAC Exceedance	Parameter Description
Fluoride	1.5	2	<0.1 - 0.3	mg/l	No	Naturally occurring.
Nitrite	1	1	<0.1 – 0.2	mg/l	No	A natural component of water at this level.
Nitrate	10	1	<0.1 – 0.3	mg/l	No	Runoff from fertilizer use, erosion of natural deposits

Summary of raw water testing analyzed by in house laboratory during this reporting period

Parameter	MAC	Number of Samples	Average Results	Unit of Measure	Exceedance	Parameter Description
Alkalinity	N/A	11	357	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Hardness	N/A	11	463	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
pH	N/A	50	7.14		No	An indicator of the acidity of water.

Summary of treated water testing analyzed by in house laboratory during this reporting period

Parameter	MAC	Number of Samples	Average Results	Unit of Measure	Exceedance	Parameter Description
Alkalinity	N/A	11	375	mg/l	No	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Turbidity	N/A	41	0.220	NTU	No	Turbidity is a measure of particles in water.
Hardness	100 OG	8	430	mg/l	No	Naturally occurring from dissolved calcium and magnesium.
pH	6.5–8.5 OG	40	7.22		No	An indicator of the acidity of water.

