



CANA WATER TREATMENT PLANT
2022 ANNUAL REPORT

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

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1 EXECUTIVE SUMMARY

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 <http://www.utilitieskingston.com>. Notices of availability are generally made through the local newspapers and radio. More information on the Drinking Water Regulations can be found on the Ministry of the Environment web site at <http://www.ene.gov.on.ca>. For further information about this report or any questions regarding accessibility, contact Robert Cooney by email at rcooney@utilitieskingston.com, or call 613-546-1181 Ext 2291.

2 PLANT DESCRIPTION AND 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), now known as the Ministry of Environment, Conservation and Parks (MECP). Operation was then 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 Utilities Kingston Treatment Operations department operate the treatment system. The distribution system is maintained by the Utilities Kingston Systems Operations department.

2.1 RAW WATER SOURCE AND LOW LIFT PUMPING

The raw water source is ground water pumped from a 150 mm diameter by 18.6 m 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.

2.2 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.

2.3 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 60 psi. 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).

2.4 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.

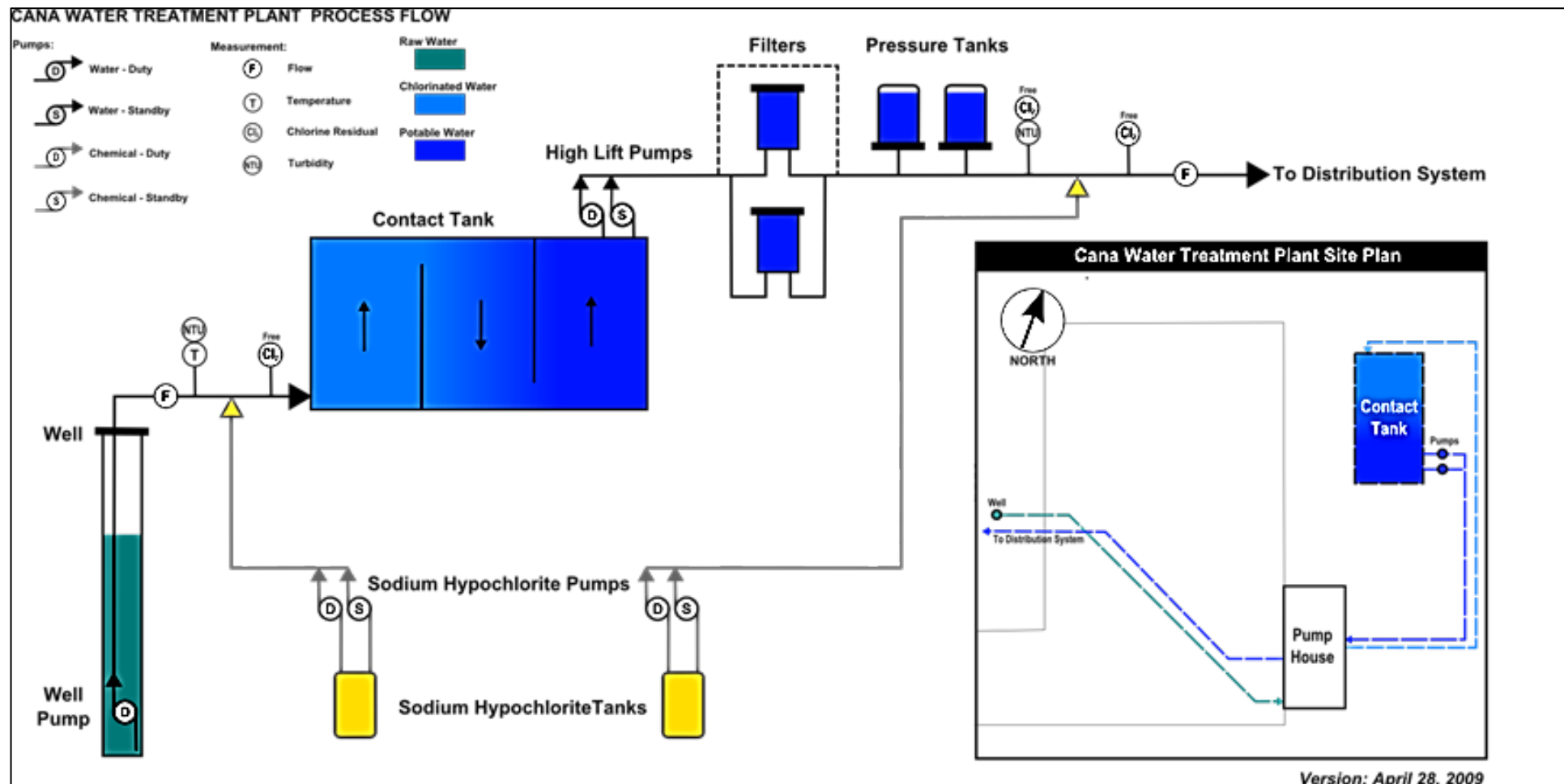
2.5 CONTROL SYSTEM

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 Street Water Treatment Plant. Alarm capability and set point adjustment along with trend monitoring are also available through SCADA system controls.

2.6 STANDBY EQUIPMENT

A diesel generator on the property of the Cana Wastewater Treatment Plant provides 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.

FIGURE 1 – CANA WATER TREATMENT PLANT PROCESS FLOW DIAGRAM



DOCUMENT:
Cana Water Treatment Plant Annual Report

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3 DISTRIBUTION SYSTEM

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 MECP.

4 MONETARY EXPENSES

Under Section 11 of Ontario Regulation 170/03, a description of any major expenses incurred during this reporting period must be included in the annual report.

4.1 MAJOR EXPENSES:

There were no major expenses incurred during this reporting period.

5 NOTIFICATIONS

Under Ontario Regulation 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 monitor the parameter more closely for a period of time.

5.1 EVENTS REQUIRING NOTIFICATIONS:

- 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 July of 2022.

6 GLOSSARY

TCU – True Colour Units

HPC - Heterotrophic plate count

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, also called 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

7 WATER QUALITY TEST RESULTS

Table 1 – Microbiological Testing

(Performed Under Regulation 170/03)

Type	MAC (E. Coli & Total Coliforms)	Number of Samples	Range of E. Coli Results (Min - Max)	Range of Total Coliform Results (Min - Max)	Number of HPC Samples	Range of HPC Results (Min - Max)
Raw	N/A	52	0	0 - 4	N/A	N/A
Distribution System	0	52	0	0	52	Under 1 - 10

Note: Total Coliforms are an indicator of adverse water quality if detected

Table 2 – Operational Testing

(Performed under Schedule 7, 8, or 9 of Regulation 170/03)

Parameter	MAC	Number of Samples	Range of Results (min - max)	Parameter Description
Raw Water Turbidity (NTU)	N/A	Continuous	0.04 - 0.50	Turbidity is a measure of particles in water.
Treated Water Turbidity (NTU)	N/A	Continuous	0.03 - 1.29	Recommended level of at least 0.20 mg/l in distribution system to maintain microbiological quality. 0.05 mg/l minimum required.
Treated Chlorine Residual (mg/L)	See Parameter Description	Continuous	0.89 - 2.32	Recommended level of at least 0.20 mg/l in distribution system to maintain microbiological quality. 0.05 mg/l minimum required.
Distribution System Chlorine Residual (mg/L)	See Parameter Description	Continuous	0.56 - 2.24	Turbidity is a measure of particles in water.

Note: Turbidity range determined through in house lab testing

Table 3 – Treated Water Schedule 23 Inorganic Parameters

Parameter	MAC	Number of Samples	Results Range (min - max)	MAC Exceedance (Yes or No)	Parameter Description
Antimony (mg/L)	0.006	1	Under 0.0001	No	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Arsenic (mg/L)	0.025	1	Under 0.0001	No	Naturally occurring in surface waters / mine drainage
Barium (mg/L)	1	1	0.201	No	Erosion of natural deposits. Discharge from metal refineries, oil drilling wastes.
Boron (mg/L)	5	1	0.068	No	Erosion of natural deposits, industrial waste effluents.
Cadmium (mg/L)	0.005	1	Under 0.000015	No	Industrial discharge
Chromium (mg/L)	0.05	1	Under 0.002	No	Industrial residues
Mercury (mg/L)	0.001	1	Under 0.00002	No	Erosion of natural deposits, industrial discharges.
Selenium (mg/L)	0.01	1	Under 0.001	No	Discharge from refineries, mines, chemical manufacture
Uranium (mg/L)	0.02	1	0.00154	No	Erosion of natural deposits.

Table 4 – Treated Water Schedule 24 Inorganic Parameters

Parameter	MAC	Number of Samples	Results Range (min - max)	MAC Exceedance (Yes or No)	Parameter Description
Alachlor (µg/L)	5	1	Under 0.3	No	Agricultural herbicide
Atrazine + N-Dealkylated Metabolites (µg/L)	5	1	Under 0.5	No	Agricultural herbicide
Azinphos-methyl (µg/L)	20	1	Under 1	No	Insecticide
Benzene (µg/L)	5	1	Under 0.5	No	Discharge from plastics manufacturing, leaking fuel tanks
Benzo(a)pyrene (µg/L)	0.01	1	Under 0.006	No	Formed from the incomplete burning of organic matter.
Bromoxynil (µg/L)	5	1	Under 0.5	No	Agricultural herbicide
Carbaryl (µg/L)	90	1	Under 3	No	Agricultural/Forestry/ Household insecticide
Carbofuran (µg/L)	90	1	Under 1	No	Agricultural insecticide
Carbon Tetrachloride (µg/L)	5	1	Under 0.2	No	Discharge from chemical and industrial activities
Chlorpyrifos (µg/L)	90	1	Under 0.5	No	Agricultural/ Household insecticide
Diazinon (µg/L)	20	1	Under 1	No	Agricultural/ Livestock Operation/ Residential insecticide
Dicamba (µg/L)	120	1	Under 10	No	Agricultural herbicide
1,2-Dichlorobenzene (µg/L)	200	1	Under 0.5	No	Discharge from industrial chemical factories
1,4-Dichlorobenzene (µg/L)	5	1	Under 0.5	No	Discharge from industrial chemical factories
1,2-Dichloroethane (µg/L)	5	1	Under 0.5	No	Discharge from industrial chemical factories
1,1-Dichloroethylene (µg/L)	14	1	Under 0.5	No	Discharge from industrial chemical factories
Dichloromethane (µg/L)	50	1	Under 5	No	Discharge from pharmaceutical and chemical factories
2,4-Dichlorophenol (µg/L)	900	1	Under 0.2	No	Industrial contamination/ reaction with chlorine
2,4-Dichlorophenoxy Acetic Acid (µg/L)	100	1	Under 1	No	Agricultural/ Residential herbicide
Diclofop-methyl (µg/L)	9	1	Under 0.9	No	Agricultural herbicide
Dimethoate (µg/L)	20	1	Under 1	No	Agricultural/ Livestock Operation/ Forestry insecticide

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DOCUMENT:
Canal Water Treatment Plant Annual Report

Parameter	MAC	Number of Samples	Results Range (min - max)	MAC Exceedance (Yes or No)	Parameter Description
Diquat (µg/L)	70	1	Under 5	No	Agricultural/ Aquatic herbicide
Diuron (µg/L)	150	1	Under 5	No	Agricultural/ Industrial/ herbicide
Glyphosate (µg/L)	280	1	Under 25	No	Agricultural/Forestry/ Household herbicide
Malathion (µg/L)	190	1	Under 5	No	Fruit & Vegetable / pest control insecticide
2-methyl-4-chlorophenoxyacetic Acid (µg/L)	100	1	Under 10	No	Leaching and/or runoff from agricultural and other uses
Metolachlor (µg/L)	50	1	Under 3	No	Agricultural herbicide
Metribuzin (µg/L)	80	1	Under 3	No	Agricultural herbicide
Monochlorobenzene (µg/L)	80	1	Under 0.5	No	Discharge from industrial and agricultural chemical factories and dry cleaning facilities
Paraquat (µg/L)	10	1	Under 1	No	Agricultural/ Aquatic herbicide
Pentachlorophenol (µg/L)	60	1	Under 0.2	No	Pesticide/ wood preservative residue
Phorate (µg/L)	2	1	Under 0.3	No	Agricultural insecticide
Picloram (µg/L)	190	1	Under 5	No	Industrial herbicide
Polychlorinated Biphenyls (µg/L)	3	1	Under 0.05	No	Residue from various industrial uses
Prometryne (µg/L)	1	1	Under 0.1	No	Agricultural herbicide
Simazine (µg/L)	10	1	Under 0.5	No	Agricultural herbicide or its residue
Terbufos (µg/L)	1	1	Under 0.5	No	Agricultural insecticide
Tetrachloroethylene (µg/L)	30	1	Under 0.5	No	Leaching from PVC pipes; discharge from factories, dry cleaners and auto shops (metal degreaser)
2,3,4,6-Tetrachlorophenol (µg/L)	100	1	Under 0.2	No	Wood preservative
Triallate (µg/L)	230	1	Under 10	No	Agricultural herbicide
Trichloroethylene (µg/L)	5	1	Under 0.5	No	Discharge from metal degreasing sites and other factories
2,4,6-Trichlorophenol (µg/L)	5	1	Under 0.2	No	Pesticide manufacturing
Trifluralin (µg/L)	45	1	Under 0.5	No	Agricultural herbicide
Vinyl Chloride (µg/L)	2	1	Under 0.2	No	Leaching from PVC pipes; discharge from plastics factories

Table 5 – Other Regulatory Treated Water Parameters

Parameter	MAC	Number of Samples	Results Range (min - max)	MAC Exceedance (Yes or No)	Parameter Description
Fluoride (mg/L)	1.5	2	Under 0.1	No	Naturally occurring.
Nitrite (mg/L)	1	12	Under 0.1	No	A natural component of water at this level.
Nitrate (mg/L)	10	12	Under 0.1	No	Runoff from fertilizer use, erosion of natural deposits
Sodium (mg/L)	20	13	75 - 94.2	Yes	Occurs naturally in the earth's crust. Notification is required every 60 months if greater than 20 mg/L

Table 6 – Treated Water Testing

(Analyzed by Accredited Laboratories)

Parameter	MAC	Number of Samples	Results Range (min - max)	MAC Exceedance (Yes or No)	Parameter Description
Alkalinity CaCO ₃ (mg/L)	N/A	1	362	No	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Aluminum (mg/L)	0.1 OG	2	0.02 - 0.03	No	Naturally occurring in surface waters / mine drainage
Ammonia Nitrogen (mg/L)	N/A	1	0.01	No	Erosion of natural deposits. Discharge from metal refineries, oil drilling wastes.
Benzo(a)pyrene (µg/L)	0.01	1	Under 0.006	No	Formed from the incomplete burning of organic matter
Calcium (mg/L)	N/A	1	105	No	Erosion of natural deposits, industrial waste effluents.
Chloride (mg/L)	250	1	182	No	Industrial discharge
Colour (TCU)	5	12	Under 2	No	Industrial residues
Conductivity (Us/cm)	N/A	1	1320	N/A	Erosion of natural deposits, industrial discharges.
Hardness (mg/L)	100 OG	12	413 - 525	N/A	Naturally occurring from dissolved calcium and magnesium.
Iron (mg/L)	0.3 AO	12	Under 0.005 - 0.023	N/A	Leaching from natural deposits and plumbing materials, industrial wastes. (Aesthetic objective)
Manganese (mg/L)	0.05 AO	12	0.01 - 0.015	N/A	Erosion of natural deposits.
Sulphate (mg/L)	500 OG	1	44	N/A	An inorganic constituent that may cause tastes at high levels.
Total Kjeldahl Nitrogen (mg/L)	N/A	1	0.1	N/A	Indicator of organic contamination or the potential for taste and odour problems
Zinc (mg/L)	5	1	Under 0.005	No	An inorganic constituent that may cause tastes.

Table 7 – Regulatory Distribution Water Testing

Parameter	MAC	Number of Samples	Results Range (min - max)	MAC Exceedance (Yes or No)	Parameter Description
Alkalinity CaCO ₃ (mg/L)	N/A	7	342 - 369	N/A	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Total Haloacetic Acids (mg/L)	0.08 (Annual avg.)	4	Under 0.0053 - 0.0069	No	By-product of drinking water disinfection with chlorine. Based on a running annual average
Lead (mg/L)	0.01	7	Under 0.00019 - 0.00162	No	Internal corrosion of household plumbing, erosion of natural deposits.
pH	6.5 - 8.5 OG	7	7.12 - 7.75	N/A	An indicator of the acidity of water.
Total Trihalomethanes (µg/L)	100 (Annual avg.)	4	15.0 - 17.0	No	By-product of chlorination. * The MAC for THMs of 100 µg/L is based on a running annual average.

Table 8 – Distribution Water Testing

(Analyzed by Accredited Laboratories)

Parameter	MAC	Number of Samples	Results Range (min - max)	MAC Exceedance (Yes or No)	Parameter Description
Benzo(a)pyrene (µg/L)	0.01	0	N/A	N/A	Formed during the combustion of organic matter
Copper (mg/L)	1 OG	0	N/A	N/A	Domestic plumbing (Aesthetic objective)
Cyanide (mg/L)	0.2	0	N/A	N/A	Compound used in a variety of industrial processes
Fluoride (mg/L)	1.5	1	Under 0.1	No	Naturally occurring.
Gross Alpha (bg/L)	0.5	0	N/A	N/A	Measure of radioactivity
Gross Beta (bg/L)	1	0	N/A	N/A	Measure of radioactivity
Nitritotriacetic Acid (mg/L)	0.4	0	N/A	N/A	A human made organic compound
Nitrosodimethylamine (µg/l)	0.0009	0	N/A	N/A	An organic chemical often found as an industrial biproduct
Tritium (bg/L)	7000	0	N/A	N/A	A form of hydrogen

Table 9 – Raw Water Testing

(Analyzed by In House Laboratory)

Parameter	MAC	Number of Samples	Average Results	MAC Exceedance (Yes or No)	Parameter Description
Alkalinity (mg/L)	N/A	13	306	N/A	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Hardness (mg/L)	N/A	14	520	N/A	Naturally occurring from dissolved calcium and magnesium.
pH	N/A	49	7.58	N/A	An indicator of the acidity of water

DOCUMENT:
Cana Water Treatment Plant Annual Report

Table 10 – Treated Water Testing
 (Analyzed by In House Laboratory)

Parameter	MAC	Number of Samples	Average Results	MAC Exceedance (Yes or No)	Parameter Description
Alkalinity (mg/L)	N/A	12	302	N/A	A measure of the resistance of the water to the effects of acids. Expressed as calcium carbonate.
Turbidity (NTU)	N/A	47	0.15	N/A	Turbidity is a measure of particles in water.
Hardness (mg/L)	100 OG	14	529	N/A	Naturally occurring from dissolved calcium and magnesium.
pH	6.5 - 8.5 OG	49	7.56	N/A	An indicator of the acidity of water.