SYDENHAM WATER TREATMENT PLANT

2025 ANNUAL REPORT

Drinking Water System Number: 260069290
Drinking Water System Owner: Township of South Frontenac
Drinking Water System Category: Large 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 with Section 11 of Ontario Regulation 170/03. Regulation 170/03 sets requirements for public waterworks with regard to sampling and testing, levels of treatment, licensing of staff, and notification of authorities and the public about water quality. Free copies of this report and the Summary report prepared in accordance to Schedule 22 of Ontario Regulation 170/03, are available by public request at the South Frontenac Township Offices, at our water plant locations, and at http://www.utilitieskingston.com. Notices of availability are generally made through social media and the South Frontenac website. More information on the Drinking Water Regulations can be found on the Ministry of the Environment, Conservation and Parks (MECP) website. 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

2.1 RAW WATER SOURCE

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

2.2 ZEBRA MUSSEL CONTROL

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.

2.3 SCREENING

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

2.4 LOW LIFT PUMPS

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

2.5 CHEMICAL FEED SYSTEM

XL1900 Polyaluminum Chloride (PACl) is added to the water as it enters the process building just prior to passing through the in-line mixer. The particles in the water will collide with the PACl particles as the water flows in a spiral motion through the mixer, and then join together to form larger particles called floc.

2.6 FILTERS

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

2.7 BACKWASH

Filters are washed to remove the particulates they have collected over each filter run. Clean water from the clear well is pumped backwards through the filter, and the filter is agitated by air scouring the filter media to break up any large particles.

2.8 PROCESS WASTE MANAGEMENT

Effluent water from the backwash process is directed to a backwash storage tank for further settling. The supernatant (the clear water at the top of the tank after settling) is directed back to Sydenham Lake and the settled sludge is mechanically removed and sent for further treatment.

2.9 GRANULAR ACTIVATED CARBON CONTACTORS

During periods of high dissolved organic content in the source water, filter effluent water is directed to two pressure filtration tanks containing granular activated carbon (GAC). The GAC contactors assist in the removal of dissolved organics which react with chlorine to produce chlorination by-products. The GAC contactors are periodically backwashed to remove the particulates they have collected.

2.10 PRIMARY DISINFECTION

Primary disinfection of the filtered water is achieved via UV light and free chlorine residual. Two UV reactors (duty/standby) each using 12 low pressure high output lamps provide the UV light disinfection. Free chlorine disinfection follows the UV process with the use of two chemical metering pumps(duty/standby) which provide sodium hypochlorite to an application point downstream of the UV reactors at the entrance to the detention piping.

2.11 SECONDARY DISINFECTION

Secondary disinfection is the maintenance of a disinfectant residual throughout the distribution system which is achieved with chloramines. Following the free chlorine disinfection process, ammonium sulphate is added with the use of two chemical metering pumps (duty/standby), at an approximate rate of 3.5:1 ratio (chlorine/ammonia), to react with the free chlorine residual to form chloramines. The application dosages of sodium hypochlorite and ammonium sulphate is adjusted to produce a sufficient in plant combined chlorine residual to ensure that minimum residuals are maintained in the distribution system.

2.12 CLEAR WELLS

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

2.13 HIGH LIFT PUMPS

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

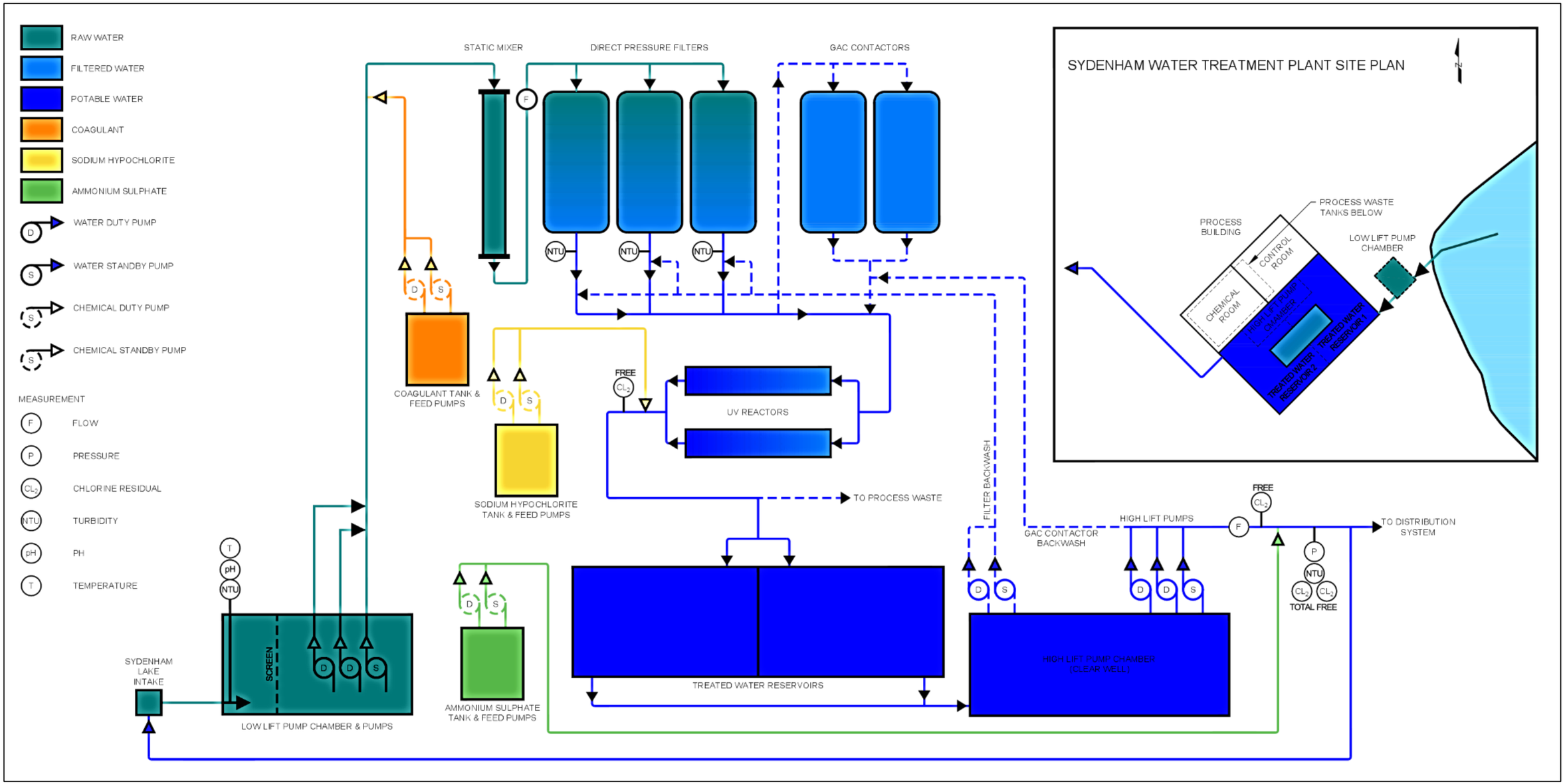
2.14 STANDBY EQUIPMENT

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

2.15 ELEVATED TANK

The elevated tank has a storage capacity of 1019 m^3 and provides pressure to the distribution system.

Figure 1 – Sydenham Water Treatment Plant Process Flow Diagram



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3 DISTRIBUTION SYSTEM

There are approximately 7154 meters of water mains, and 43 fire hydrants in the system. Once all connections to the distribution system have been completed, the drinking water system will supply water to 288 services.

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:

- The UV system was serviced, including the purchase and replacement of reactor parts and bulbs.
- A cleaning and inspection of the raw water intake was completed.
- New chemical delivery system flow meters and totalizers were purchased and installed.
- Safety eyewash chemicals (Diphoterine) were purchased for all facilities.
- Annual third-party analyzer and flow meter calibrations, and pump vibration analysis completed at all facilities.

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:

- Notification of an indicator of adverse water quality was received from Caduceon Environmental Laboratories regarding a sample collected on **February 12th**, **2025,** for Total Coliform (TC) with a count of **86 cfu/100mL**. Combined chlorine residual at the time of sampling was **1.56 mg/L**. Notifications were made to the Spills Action Centre and to the Environmental Health Division of the local Ministry of Health. Resamples were collected from the same location, upstream and downstream, and sent to the lab for analysis. With the combined 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.

6 GLOSSARY

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, 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 - 9	0 - 130	N/A	N/A
Treated	0	52	0	0	52	Under 10 - 120
Distribution System	0	114	0	0 - 86	62	Under 10 - 550

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	0.12 - 2.59	Turbidity is a measure of particles in water
Treated Water Turbidity (NTU)	N/A	Continuous	0.07 - 0.203	Turbidity is a measure of particles in water
Treated Combined Chlorine Residual (mg/L)	See Parameter Description	Continuous	1.54 - 2.30	Recommended level of at least 1.00 mg/L in distribution system to maintain microbiological quality. 0.25 mg/L minimum.
Distribution System Chloramines Residual (mg/L)	See Parameter Description	Continuous	1.02 - 2.79	Recommended level of at least 1.00 mg/L combined chlorine in distribution system to maintain microbiological quality. 0.25 mg/L combined chlorine minimum.

Note: Turbidity range determined through in house lab testing

Table 3 - Filter Operational Testing

Parameter	MAC	Number of Samples	Range of Results (min - max)	Results Average
Filter #1 Effluent Turbidity (NTU)	1.0 for over 15 minutes	Continuous	0.07 - 1.49	0.12
Filter #2 Effluent Turbidity (NTU)	1.0 for over 15 minutes	Continuous	0.06 - 1.38	0.12
Filter #3 Effluent Turbidity (NTU)	1.0 for over 15 minutes	Continuous	0.07 - 1.0	0.12

Table 4 – Backwash Wastewater Effluent Testing and Sampling

Parameter	MAC	Number of Samples	Results Average	Parameter Description
Total Suspended Solids (mg/L)	15	12	7	A measure of the particulates collected in the filtration process.

Note: Testing and sampling in accordance with the requirements of the Municipal Drinking Water License

Table 5 - Raw Water Testing
(Analyzed by Accredited Laboratories)

Parameter	MAC	Number of Samples	Results Range (min - max)	MAC Exceedance (Yes or No)	Parameter Description
Microcystin (µg/L)	1.5	24	Under 0.10 - 0.66	No	Naturally occurring (released from blooms of blue-green algae)

Table 6 - 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	0.0001	No	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Arsenic (mg/L)	0.025	1	0.0002	No	Naturally occurring in surface waters / mine drainage
Barium (mg/L)	1	1	0.048	No	Erosion of natural deposits. Discharge from metal refineries, oil drilling wastes.
Boron (mg/L)	5	1	0.023	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 0.001	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	Under 0.00005	No	Erosion of natural deposits.

Table 7 - 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 Metobolites (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

Parameter	MAC	Number of Samples	Results Range (min - max)	MAC Exceedance (Yes or No)	Parameter Description
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 1	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
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-chlorophenoxy-acetic 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
Monochloro-benzene (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

Parameter	MAC	Number of Samples	Results Range (min - max)	MAC Exceedance (Yes or No)	Parameter Description
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
Tetrachloro-ethylene (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 8 - 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	1	Under 0.1	No	Naturally occurring.
Nitrite (mg/L)	1	4	Under 0.05 - 0.14	No	A natural component of water at this level.
Nitrate (mg/L)	10	4	0.07 - 0.19	No	Runoff from fertilizer use, erosion of natural deposits
Sodium (mg/L)	20	1	12.8	No	Occurs naturally in the earth's crust. Notification is required every 60 months if greater than 20 mg/L

Table 9 - Treated Water Testing

(Analyzed by Accredited Laboratories)

Parameter	MAC	Number of Samples	Results Range (min - max)	MAC Exceedance (Yes or No)	Parameter Description
Microcystin (µg/L)	1.5	6	Under 0.15	No	Naturally occurring (released from blooms of blue-green algae)

Table 10 - Regulatory Distribution Water Testing

(Analyzed by Accredited Laboratories)

Parameter	MAC	Number of Samples	Results Range (min - max)	MAC Exceedance (Yes or No)	Parameter Description
Alkalinity CaCO3 (mg/L)	N/A	9	111 - 123	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	0.005 - 0.0334	No	By-product of drinking water disinfection with chlorine. Based on a running annual average
pH	6.5–8.5 OG	9	7.14 - 7.67	N/A	An indicator of the acidity of water.
Total Trihalomethanes (µg/L)	100 (Annual avg.)	4	32 - 47	No	By-product of chlorination. * The MAC for THMs of 100 µg/L is based on a running annual average.
Lead (mg/L)	0.01	8	0.00004 - 0.00032	No	Internal corrosion of household plumbing, erosion of natural deposits.

Table 11 - Raw Water Testing

(Analyzed by In House Laboratory)

Parameter	MAC	Number of Samples	Average Results	MAC Exceedance (Yes or No)	Parameter Description
UV Transmittance (%)	N/A	128	78.7	N/A	A measure of the percentage of transmittance of UV light

Table 12 - Treated Water Testing

(Analyzed by In House Laboratory)

Parameter	MAC	Number of Samples	Average Results	MAC Exceedance (Yes or No)	Parameter Description
Aluminum (mg/L)	0.1 OG	131	0.03	N/A	May be naturally present or a residual from the coagulation process. There is no MAC for this parameter. It is an Operational Guideline (OG).
Free Ammonia (mg/L)	N/A	116	0.27	N/A	Residual from the addition of Ammonium Sulphate for the secondary disinfection process

Parameter	MAC	Number of Samples	Average Results	MAC Exceedance (Yes or No)	Parameter Description
Monochloramines (mg/L)	3	118	1.83	No	Chloramines are produced when ammonia is added to chlorinated water during the disinfection process.
UV Transmittance (%)	N/A	128	86.1	N/A	UV transmittance is a measure of the percentage of transmittance of UV light