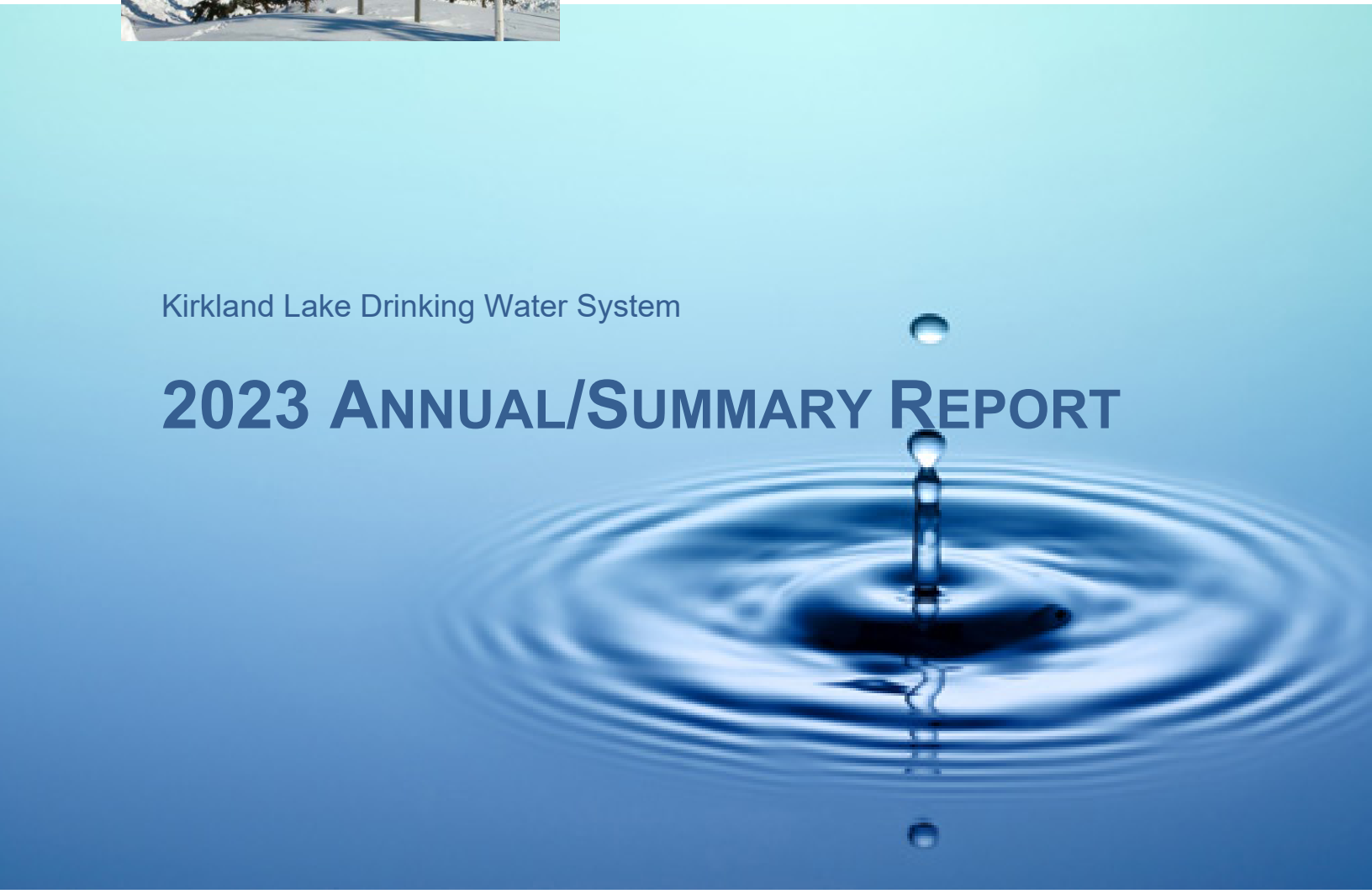
Ontario Clean Water Agency
Agence Ontarienne Des Eaux

Kirkland Lake Drinking Water System

2023 Annual/Summary Report



Prepared by the Ontario Clean Water Agency
on behalf of the Town of Kirkland Lake

Kirkland Lake Drinking Water System

Section 11

2023 Annual Report

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INTRODUCTION

Municipalities throughout Ontario have been required to comply with Ontario Regulation 170/03 made under the *Safe Drinking Water Act* (SDWA) since June 2003. The Act was enacted following recommendations made by Commissioner O'Conner after the Walkerton Inquiry. The Act's purpose is to protect human health through the control and regulation of drinking water systems. O. Reg. 170/03 regulates drinking water testing, use of licensed laboratories, treatment requirements and reporting requirements.

Section 11 of Regulation 170/03 requires the owner to produce an Annual Report. This report must include the following:

1. Description of system & chemical(s) used
2. Summary of any adverse water quality reports and corrective actions
3. Summary of all required testing
4. Description of any major expenses incurred to install, repair or replace equipment

This annual report must be completed by February 28th of each year.

Schedule 22 of the regulation also requires a Summary Report which must be presented & accepted by Council by March 31st of each year for the preceding calendar year.

The report must list the requirements of the Act, its regulations, the system's Drinking Water Works Permit (DWWP), Municipal Drinking Water Licence (MDWL), Certificate of Approval (if applicable), and any regulatory requirements the system failed to meet during the reporting period. The report must also specify the duration of the failure, and for each failure referred to, describe the measures that were taken to correct the failure.

The *Safe Drinking Water Act* (2002) and the drinking water regulations can be viewed at the following website: http://www.e-laws.gov.on.ca.

To enable the Owner to assess the rated capacity of their system to meet existing and future planned water uses, the following information is also required in the report.

1. A summary of the quantities and flow rates of water supplied during the reporting period, including the monthly average and the maximum daily flows,

2. A comparison of the summary to the rated capacity and flow rates approved in the systems approval, drinking water works permit or municipal drinking water licence or a written agreement if the system is receiving all its water from another system under an agreement.

The reports have been prepared by the Ontario Clean Water Agency (OCWA) on behalf of the Owner and presented to council as the 2023 Annual/Summary Report.

Section 11 - ANNUAL REPORT

1.0 INTRODUCTION

Drinking-Water System Name:	**Kirkland Lake Drinking Water System**
Drinking-Water System No.:	220000308
Drinking-Water System Owner:	The Corporation of Town of Kirkland Lake
Drinking-Water System Category:	Large Municipal, Residential System
Period being reported:	January 1 to December 31, 2023

Does your Drinking Water System serve more than 10,000 people? No

Is your annual report available to the public at no charge on a web site on the Internet? Yes at http://www.kirklandlake.ca/

Location where the report required under O. Reg. 170/03 Schedule 22 will be available for inspection.

Town of Kirkland Lake, Department of Physical Services
1 Dunfield Road,
Kirkland Lake ON P2N 3P4

Drinking Water Systems that receive drinking water from the Kirkland Lake Drinking Water System

The Kirkland Lake Drinking Water System provides all drinking water to the communities of Kirkland Lake, Chaput Hughes and Swastika.

The Annual Report was not provided to any other Drinking Water System Owners.

The Ontario Clean Water Agency prepared the 2023 Annual/Summary Report on behalf of the Town of Kirkland Lake and provided a copy to the system owner. The Kirkland Lake Drinking Water System is a stand-alone system that does not receive water from or send water to another system.

Notification to system users that the Annual Report is available for viewing is accomplished through:

- Notice on the Town's website
- Notice on the Town's Facebook page
- Notice at the Town of Kirkland Lake Municipal Office

2.0 DESCRIPTION OF THE DRINKING WATER SYSTEM (DWS# 220000308)

The Kirkland Lake Drinking Water System is owned by the Corporation of the Town of Kirkland Lake and consists of a Class 3 conventional design water treatment plant (Lionel Sherratt water treatment plant) and a Class 2 water distribution system. The Ontario Clean Water Agency (OCWA) is the accredited operating authority and is designated as the Overall Responsible Operator for both the water treatment and water distribution facilities.

The Kirkland Lake Drinking Water System has an approved rated capacity of 22,500 m^3/day and provides a potable water supply to the Town of Kirkland Lake which includes the communities of Chaput Hughes and Swastika.

Raw Water Supply

The Lionel Sherratt water plant draws raw water from Gull Lake through a 146 m long, 710 mm diameter intake pipe. The pipe terminates in an intake chamber located approximately 10 m from the lake shoreline. A 750 mm diameter, 17 m long pipe connects the intake chamber and the water plant.

A traveling water screen is installed immediately inside the plant. The screen removes large floating debris from the water prior to treatment. The provision for a manual screen immediately downstream from the traveling screen offers back up screening in the event the traveling screen is out of service. The back-up screen consists of guide channels embedded in the walls of the wet well and several sections of screen frames. Following the screening, the raw water can be disinfected (pre-chlorination) prior to entering the wet well of the Low Lift Pumping Station. The raw water is also injected with soda ash, usually during the winter months to stabilize the water and aid in the coagulation and flocculation process which reduces the amount of iron and manganese passing through the system and into the distribution system. Soda ash is injected prior to the mechanical bar screen and operates pace-to-flow.

A chlorine dioxide pilot trial began at the water treatment plant in January 2018 to help reduce the amount of iron and manganese in the finished water leaving the plant. The process was permanently implemented in January 2019. Chlorine dioxide is injected into the bottom of the raw water wet well following the mechanical screens. It is flow paced to the raw water flow meter which is located on the common raw water header. Chlorine dioxide is generated and stored on site using a vendor supplied package generator system. The generator uses chlorine gas, which already exists on-site and 25% sodium chlorite solution which is stored in two (2) 1500 US gallon bulk tanks as feed chemicals which are drawn under partial vacuum into the generator. The generator is called to start on a low level signal in the day tank. The generator also uses a finished water supply line and a finished water booster pump to boost water pressure to a minimum of 60 psi. Upon fault condition, the generator will shut down.

Water Treatment

1. Coagulation / Flocculation / Sedimentation

The Low Lift Pumping Station (LLPS), equipped with five pumps, transfers water from the wet well (where water level corresponds to the water level in the lake) to the treatment processes. The raw water is continuously monitored by a 12" magnetic flow meter and flows by gravity through the treatment processes.

The first step of water treatment is coagulation; a process of destabilization and initial aggregation of colloidal and finely divided suspended matter by the addition of a floc-forming chemical. Raw water enters the treatment stage through an inlet chamber. Just prior to entering the chamber, a chemical coagulant, aluminum sulfate (alum), is injected into raw water and is rapidly agitated with a flash mixer.

The mixture then overflows into three (3) contact compartments – one per pre-treatment unit. In the compartments, the mixing weirs gently turn the mixture in order to promote coagulation. Just prior to leaving the mixing chambers, a flocculant, FloPam – an inorganic polymer, is added.

Flocculation in water treatment is an agglomeration of colloidal and finely divided suspended matter after coagulation by gentle agitation by either mechanical or hydraulic means, sometimes with an aid of chemical flocculant.

The mixture enters the bottom distribution piping of each Degremont Ultra-Pulsator clarifier via vacuum chambers. The vacuum in the chambers is created by the vacuum pumps, one per chamber. The purpose of the vacuum chambers is to create gentle movement of the sludge blanket in the clarifier for both flocculation and sludge removal.

Sedimentation is the process of subsidence and deposition of suspended matter, carried by water or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid to below the point at which it can transport the suspended material or floc.

The flow is distributed equally over the full area of the clarifiers through the distribution pipes in the bottom of the unit. The flow percolates through the sludge blanket. Upon exiting the sludge blanket, the water flows through a plate settler and then the tube settler. Clarified water is gathered by the collection pipes at the top of the units and transferred to channels that lead to the filters.

2. Filtration

Filtration is the process of passing a liquid through a filtering medium (consisting of granular material, sand and anthracite) for the removal of suspended or colloidal matter. There are four (4) dual media filters at the plant. Each filter is approximately 6.4 m x 4.3 m x 3m deep and rated to operate at a maximum rise rate of 9.0 m/hr or a maximum flow rate of 65.0 L/sec. The filter media consists of 450 mm of anthracite underlain by a 300 mm layer of silica sand. A

concrete underdrain slab outfitted with strainer nozzles supports the filter media. During normal operation, the water flows into the filter from the filter channel via an inlet sluice gate and travels through the media in a downward pattern. The filtered water is collected in the underdrain area and transported by pipes to the clearwell, located under the ground slab of the plant. The flow through each filter is measured by individual flow meters and is controlled by dedicated filter control valves. A headloss indicator monitors the filter media condition. The filtrate quality is continuously monitored by individual turbidimeters, and a particle analyzer.

3. Disinfection (Chlorination)

Filtered water is disinfected following filtration. Chlorine solution is diffused into the water stream in the clearwell of the treatment building. The diffuser and a series of baffles promote complete mixing of chlorine with water. The chlorine solution is prepared on-site by mixing chlorine gas with water. A chlorinator controls the chlorine gas feed rate. There are two (2) chlorinators installed at the plant; one serves as a duty pre-chlorinator while the second is a duty post-chlorinator. Chlorine gas is mixed with water in the ejectors and is sent to diffusers as a chlorine solution. SCADA monitors the chlorinators which will generate alarms upon high and low vacuum levels or abnormal chlorine levels. Each chlorinator is rated to supply 67.0 kg per day of chlorine gas which, based on the plant rated capacity, equals to the maximum chlorine feed rate of up to 3.0 mg/L (3.0 ppm or parts per million) at each location. The gas is withdrawn at any given time from only one of the two one tonne cylinders that are located on the monitored weigh scale. The chlorine feed system will switch automatically to another cylinder when pressure in the duty cylinder drops below the pre-set value. If both cylinders approach low levels, SCADA will alarm the operator.

4. pH Adjustment

The pH adjustment process uses 40% sodium hydroxide (NaOH) to restore treated water to a neutral pH. Two metering pumps (1 duty and 1 standby) feed the NaOH to the clearwell of the treatment building at the point of exit to the pumping building. At this point, the treated water is continuously monitored for pH, free chlorine residual, flow and pressure before being pumped by four high lift pumps to the distribution system.

Process Waste Residuals Management

Filter backwash water and withdrawn sludge from the sedimentation tanks are directed to two wastewater tanks. The capacity of each tank is approximately 900 m^3. Wastewater is discharged to the sanitary sewer system.

Control System

Control System Supervisory Control and Data Acquisition (SCADA) is the method of control implemented for the Kirkland Lake Water Treatment 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 using the SCADA computer located at the Lionel Sherratt water treatment plant or remotely using operator

computers and cell phones. Alarm capability and set point adjustment along with trend monitoring are also available through SCADA system controls.

Emergency Power

A 500 kW standby diesel generator equipped with an automatic transfer switch supplies power for essential plant operations during a power outage. Diesel fuel is stored in an underground fuel storage tank with an approximate volume of 4000 imperial gallons and in-plant fuel day tank with an approximate volume of 44.5 imperial gallons.

Distribution System and Elevated Storage Tank

The Kirkland Lake Drinking Water System is classified as a Large Municipal Residential Drinking Water System and provides water to approximately 9000 residents through 2740 residential service connections. Distribution piping typically ranges in size from 150 mm to 250 mm, and may consist of cast iron, ductile iron, or PVC, depending on the location and date of installation. Typical system pressure ranges from 55 P.S.I. to 70 P.S.I. The standpipe provides for storage for approximately 7,115 m^3 of water, helps stabilize water pressure in the distribution system and provides extra water in the case of an emergency. To ensure optimum chlorine residual in the distribution system there are two (2) chlorine booster stations, one at the Chaput Hughes Water Control Building/Standpipe and the other at the Swastika Water Control Building.

3.0 LIST OF WATER CHEMICALS USED OVER THE REPORTING PERIOD

The following chemicals were used in the treatment process at the Kirkland Lake Water Treatment Plant.

- Aluminum Sulphate (Alum) - Coagulation/Flocculation
- Sodium Carbonate (Soda Ash) - pH Adjustment/oxidation of iron and manganese
- Coagulant aid
- Sodium Hydroxide – pH adjustment
- Chlorine Gas – Primary disinfection
- Chlorine Dioxide (Sodium Chlorite and Chlorine Gas) – Oxidation of iron and manganese
- Sodium Hypochlorite – Booster chlorination at the Chaput Hughes standpipe and Swastika booster station.

All treatment chemicals meet AWWA and NSF/ANSI standards.

4.0 SIGNIFICANT EXPENSES INCURRED IN THE DRINKING WATER SYSTEM

OCWA is committed to maintaining the assets of the drinking water system and maintains a program of scheduled inspection and maintenance activities using a computerized Work Management System (WMS).

Significant expenses incurred in the drinking water system include:

- air conditioner repair server room
- Altitude valve failure
- backwash return pipe replacement
- chlorinator maintenance
- chlorine dioxide system service
- chlorine discharge line repair
- CL-17 analyzer
- clarifier #3 collection tubes
- fan motor in AC unit
- filter 3 prep and cleaning
- filter 3 underdrain
- filter 3 rebuild
- food grade grease
- gas chlorinator repair
- genset maintenance
- high range pH analyzer
- indoor lighting throughout the plant
- license for SCADA
- lifting device inspection
- parts for CL-17 chlorine analyzer
- peristaltic tubing
- pH meter and flow sensor
- PLC card at Swas booster station
- repair breaker #3
- rotork actuator replacement
- rotork valve refurbish
- SCADA server panel
- waste pump repairs
- water tower chlorine analyzer electrode

5.0 DETAILS ON NOTICES OF ADVERSE TEST RESULTS AND OTHER PROBLEMS REPORTED TO & SUBMITTED TO THE SPILLS ACTION CENTER

Based on information kept on record by OCWA, the following adverse water quality incidents were reported to the Ministry's Spills Action Centre in 2023.

Date	*AWQI No.*	*Details*
June 16	162219	09:08 - Town started to flush hydrant in front of 83 Wishman St, 09:45 - water started to clear up and town started taking residuals, which were less than 0.05 mg/L 10:05 - OCWA was dispatched on site 10:18 - residual was 0.06 mg/L, continued to flush and reroute water by opening valves 10:53 - residual was 0.34 mg/L Achieving residuals in the normal range resolved the incident
Sept 17	163488	Northern Telephone is having issues with their equipment - landlines are down. This means that an alarm condition would not result in a call an operator. Northern Telephone was contacted and said that they are aware of the issue but did not have an estimated resolution time. Plants could still be monitored remotely via SCADA/Wonderware and were monitored periodically until the landline issue was resolved. Northern Telephone had restored service to landlines by approximately 23:30 thus resolving the incident

6.0 MICROBIOLOGICAL TESTING PERFORMED DURING THE REPORTING PERIOD

Summary of Microbiological Data

Sample Type	# of Samples	Range of Total Coliform Results *(min to max)*	Range of *E.coli* Results *(min to max)*	# of HPC Samples	Range of HPC Results *(min to max)*
Raw (Gull Lake)	52	< 2 to 455	< 2 to 15	N/A	N/A

Summary of Microbiological Data

Sample Type	# of Samples	Range of Total Coliform Results *(min to max)*	Range of *E.coli* Results *(min to max)*	# of HPC Samples	Range of HPC Results *(min to max)*
Treated (POE)	52	0 to 0	0 to 0	52	< 10 to 30
Distribution	208	0 to 0	0 to 0	82	< 10 to 90

Maximum Allowable Concentration (MAC) for *E. coli* = 0 Counts/100 mL
MAC for Total Coliforms = 0 Counts/100 mL
"<" denotes less than the laboratory's method detection limit
">" denotes greater than the laboratory's method detection limit

Notes:

1. One microbiological sample is collected and tested each week from the raw and treated water supply. A total of five microbiological samples are collected and tested each week from the Kirkland Lake distribution system which includes one sample from the community of Swastika. At least 25% of the distribution samples must be tested for HPC bacteria.

7.0 OPERATIONAL TESTING PERFORMED DURING THE REPORTING PERIOD

Continuous Monitoring in the Treatment Process

Parameter	# of Samples	Range of Results *(min to max)*	Unit of Measure	Standard
Turbidity (Filter 1)	8760	0.00 to 0.87*	NTU	≤ 1.0
Turbidity (Filter 2)	8760	0.00 to 1.99*	NTU	
Turbidity (Filter 3)	8760	0.00 to 0.66*	NTU	
Turbidity (Filter 4)	8760	0.00 to 0.94*	NTU	
Free Chlorine (POE)	8760	0.91 to 3.16**	mg/L	CT**

Notes:

1. For continuous monitors, 8760 is used as the number of samples.
2. * Effective backwash procedures and automatic pump shut down features are in place to ensure that the effluent turbidity requirements as described in the Filter Performance Criteria are met all times.
3. ** CT is the concentration of chlorine in the water times the time of contact that the chlorine has with the water. It is used to demonstrate the level of disinfection treatment in the water. CT calculations are performed by the plant's SCADA system and are monitored daily to ensure primary disinfection is achieved.

Summary of Chlorine Residual Data in the Distribution System

Parameter	# of Samples	Range of Results *(min to max)*	Unit of Measure	Standard
Free Chlorine Residual	418	0.00* to 2.16	mg/L	0.05
Free Chlorine (Chaput Hughes Standpipe)	8760	0.11 to 5.00	mg/L	0.05
Free Chlorine (Swastika Booster Station)	8760	0.25 to 5.00	mg/L	0.05

Notes:

1. A total of eight operational checks for chlorine residual in the distribution system were collected each week. Five (5) samples were tested one day and three (3) on a second day. The sample sets are collected at least 48-hours apart and samples collected on the same day are from different locations.

2. * Free Chlorine Residuals - zero values during flushing on June 16 (AWQI 162219).

Summary of Nitrate & Nitrite Data *(sampled at the plant's point of entry into the distribution every quarter)*

Date of Sample	Nitrate Result Value	Nitrite Result Value	Unit of Measure	Exceedance
January 9	0.2	<0.01	mg/L	No
April 11	0.1	<0.01	mg/L	No
July 10	<0.1	<0.01	mg/L	No
October 10	<0.1	0.02	mg/L	No

Maximum Allowable Concentration (MAC) for Nitrate = 10 mg/L
MAC for Nitrite = 1 mg/L

Summary of Total Trihalomethane Data *(sampled in the distribution system every quarter)*

Date of Sample	Result Value	Unit of Measure	Running Average	Exceedance
January 9	55.8	ug/L	71.9	No
April 11	43.7	ug/L		
July 10	82.0	ug/L		
October 10	106	ug/L		

Maximum Allowable Concentration (MAC) for Total Trihalomethanes = 100 ug/L (Four Quarter Running Average)

Summary of Total Haloacetic Acid Data *(sampled in the distribution system every quarter)*

Date of Sample	Result Value	Unit of Measure	Running Average	Exceedance
January 9	63	ug/L	70.5	No
April 11	56	ug/L		
July 10	97	ug/L		
October 10	66	ug/L		

Maximum Allowable Concentration (MAC) for Total Haloacetic Acids = 80 ug/L (Four Quarter Running Average)

Summary of Most Recent Lead Data

(applicable to the following drinking water systems; large municipal residential systems, small, municipal residential systems, and non-municipal year-round residential systems)

The Kirkland Lake Drinking Water System was eligible to follow the "Exemption from Plumbing Sampling" as described in section 15.1-5(9) and 15.1-5(10) of Schedule 15.1 of Ontario Regulation 170/03. The exemption applies to a drinking water system if, in two consecutive periods at reduced sampling, not more than 10% of all samples from plumbing exceed the

maximum allowable concentration (MAC) of 10 ug/L for lead. As such, the system was required to test for total alkalinity and pH in three distribution sample collected during the periods of December 15 to April 15 (winter period) and June 15 to October 15 (summer period). This testing is required in every 12-month period with lead testing in every third 12-month period.

Two rounds of alkalinity and pH testing were carried out on March 13th and October 11th of 2023. Results are summarized in the table below.

Summary of Lead Data *(sampled in the distribution system)*

Date of Sample	# of Samples	Field pH *(min to max)*	Field Temperature (°C) *(min to max)*	Alkalinity (mg/L) *(min to max)*	Lead (ug/L) *(min to max)*
March 13	3	6.93 to 7.34	4.4 to 5.4	7 to 44	<0.1
October 11	3	7.90 to 8.11	11.5 to 13.5	34 to 35	0.3

Note: Next lead sampling scheduled for 2023

Most Recent Schedule 23 Inorganic Data Tested at the Water Treatment Plant

Parameter	Result Value	Unit of Measure	Standard	MAC Exceedance	½ MAC Exceedance
Antimony	<0.5	ug/L	6	No	No
Arsenic	1.0	ug/L	10	No	No
Barium	38.0	ug/L	1000	No	No
Boron	<2.0	ug/L	5000	No	No
Cadmium	<0.1	ug/L	5	No	No
Chromium	<1.0	ug/L	50	No	No
Mercury	<0.1	ug/L	1	No	No
Selenium	<0.2	ug/L	50	No	No
Uranium	<1.0	ug/L	20	No	No

Note: Sample required every 12 months (sample date = *October 10, 2023)*

Most Recent Schedule 24 Organic Data Tested at the Water Treatment Plant

Parameter	Result Value (ug/L)	Standard	MAC Exceedance	½ MAC Exceedance
Alachlor	< 0.281	5	No	No
Atrazine + N-dealkylated metobolites	< 0.5	5	No	No
Azinphos-methyl	< 0.211	20	No	No
Benzene	0.1	1	No	No
Benzo(a)pyrene	< 0.01	0.01	No	No
Bromoxynil	< 0.099	5	No	No
Carbaryl	< 3.0	90	No	No
Carbofuran	< 4.0	90	No	No
Carbon Tetrachloride	< 0.2	2	No	No
Chlorpyrifos	< 0.211	90	No	No
Diazinon	< 0.211	20	No	No
Dicamba	< 0.087	120	No	No

Parameter	Result Value (ug/L)	Standard	MAC Exceedance	½ MAC Exceedance
1,2-Dichlorobenzene	< 0.2	200	No	No
1,4-Dichlorobenzene	< 0.3	5	No	No
1,2-Dichloroethane	< 0.2	5	No	No
1,1-Dichloroethylene (vinylidene chloride)	< 0.3	14	No	No
Dichloromethane	< 1.0	50	No	No
2-4 Dichlorophenol	< 0.2	900	No	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	0.5	100	No	No
Diclofop-methyl	< 0.124	9	No	No
Dimethoate	< 0.211	20	No	No
Diquat	< 0.2	70	No	No
Diuron	< 10.0	150	No	No
Glyphosate	< 20.0	280	No	No
Malathion	< 0.211	190	No	No
Metolachlor	< 0.14	50	No	No
Metribuzin	< 0.14	80	No	No
Monochlorobenzene	< 0.5	80	No	No
Paraquat	< 0.2	10	No	No
Polychlorinated Biphenyls (PCB)	< 0.06	3	No	No
Pentachlorophenol	< 0.3	60	No	No
Phorate	< 0.14	2	No	No
Picloram	< 0.087	190	No	No
Prometryne	< 0.07	1	No	No
Simazine	< 0.211	10	No	No
Terbufos	< 0.14	1	No	No
Tetrachloroethylene	< 0.3	10	No	No
2,3,4,6-Tetrachlorophenol	< 0.3	100	No	No
Triallate	< 0.14	230	No	No
Trichloroethylene	< 0.2	5	No	No
2,4,6-Trichlorophenol	< 0.2	5	No	No
2-methyl-4-chlorophenoxyacetic acid (MCPA)	< 6.21	100	No	No
Trifluralin	< 0.14	45	No	No
Vinyl Chloride	< 0.1	1	No	No

Note: Sample required every 12 months (sample date = *October 10, 2023)*

Inorganic or Organic Test Results that Exceeded Half the Standard Prescribed in Schedule 2 of the Ontario Drinking Water Quality Standards.

No inorganic or organic parameter(s) listed in Schedule 23 and 24 of Ontario Regulation 170/03 exceeded half the standard found in Schedule 2 of the Ontario Drinking Water Standard (O. Reg. 169/03) during the reporting period.

Most Recent Sodium Data Sampled at the Water Treatment Plant

Date of Sample	No. of Samples	Result Value	Unit of Measure	Standard	Exceedance
October 6, 2020	1	20.2	mg/L	20	Yes
October 9, 2020 (resample)	1	22.8	mg/L	20	Yes

Note: Sample required every 60 months. Next sampling scheduled for October 2025

The aesthetic objective for sodium in drinking water is 200 mg/L at which it can be detected by a salty taste. It is required that the local Medical Officer of Health be notified when the concentration exceeds 20 mg/L so that persons on sodium restricted diets can be notified by their physicians. Sodium exceedances are only reported every five years. The adverse sodium result was reported to SAC and the Timiskaming Health Unit on October 9, 2020 as required under Schedule 16 of O. Reg. 170/03 (AWQI# 15214).

Most Recent Fluoride Data Sampled at the Water Treatment Plant

Date of Sample	No. of Samples	Result Value	Unit of Measure	Standard	Exceedance
October 6, 2020	1	< 0.05	mg/L	1.5	No

Note: Sample required every 60 months. Next sampling scheduled for October 2025

Additional Testing Performed in Accordance with an Approval, Order or Legal Instrument

Chlorate and Chlorite

Condition 5 (5.1) of Schedule C to Municipal Drinking Water Licence (MDWL) #214-101 issued on March 9, 2021 requires sampling, testing and monitoring of chlorate and chlorite. The samples are to be collected each quarter from the final treated water and not exceed the maximum allowable concentrations (MAC) of 1.0 mg/L.

Summary of Chlorate & Chlorite Data *(sampled from the final treated water every quarter)*

Date of Sample	Chlorate Result Value	Chlorite Result Value	Unit of Measure	Exceedance
January 9	0.18	0.60	mg/L	No
April 11	0.16	0.66	mg/L	No
July 10	0.13	0.31	mg/L	No
October 10	<0.01	<0.01	mg/L	No

Maximum Allowable Concentration (MAC) for Chlorate = 1 mg/L
MAC for Chlorite = 1 mg/L

Microcystins

Condition 6.0 (6.1) of Schedule C to Municipal Drinking Water Licence (MDWL) #214-101 issued on March 9, 2021 requires the development of a Harmful Algae Bloom (HAB) monitoring,

reporting and sampling plan by September 9, 2021. The plan must be implemented during the harmful algae bloom season, during but not limited to the warm seasonal period between June 1st and October 31st of each year, or as otherwise directed by the Medical Officer of Health. A Plan was developed for the Kirkland Lake Drinking Water System in May 2021 and is implemented during the summer seasons. The Plan includes: visual monitoring of the HAB monitoring area at least once per week, weekly sampling and testing of the raw and treated water for microcystins if a bloom is suspected or confirmed, reporting to the Health Unit and the Ministry's Spills Actions Center if microcystins are detected in either the raw or treated samples or if a suspected bloom is observed.

No incidents of suspected and/or confirmed blue green algae blooms occurred in the source water; Gull Lake, during the monitoring period.

Kirkland Lake Drinking Water System

Schedule 22

2023 SUMMARY REPORT

FOR MUNICIPALITIES

Schedule 22 - SUMMARY REPORTS FOR MUNICIPALITIES

1.0 INTRODUCTION

Drinking-Water System Name:	**Kirkland Lake Drinking Water System**
Municipal Drinking Water Licence (MDWL) No.:	214-101-5 (issued March 9, 2021)
Drinking Water Work Permit (DWWP) No.:	214-201-5 (issued March 9, 2021)
Permit to Take Water (PTTW) No.:	5882-APGJY8 (issued July 25, 2017)
Period being reported:	January 1 to December 31, 2023

2.0 REQUIREMENTS THE SYSTEM FAILED TO MEET

According to information kept on record by OCWA, the Kirkland Lake Drinking Water System failed to meet the following requirements during the 2023 reporting period:

Drinking Water Legislation	Requirement(s) the System Failed to Meet	Corrective Action(s)
O. Reg. 170/03 6-5, (1)1-4; (1)5-10; (1.1);	Where required continuous monitoring equipment, used for the monitoring of chlorine residual and/or turbidity triggered an alarm or an automatic shut-off, a qualified person did not respond in a timely manner and/or did not take appropriate actions	On September 17, 2023, the landlines were discovered to be down at 12:30pm, which prevented the alarms to call-out. The operators remotely monitored the system until the lines were restored on September 17, 2023 at 11:30pm. Reported as AWQI 163488
O. Reg. 170/03, 1-2, (2);	Records did not confirm that the water treatment equipment which provides chlorination or chloramination for secondary disinfection purposes was operated so that at all times and all locations in the distribution system the chlorine residual was never less than 0.05 mg/l free.	On June 16, 2023, while performing maintenance flushing of hydrants within the distribution, the free chlorine residual dropped below 0.05 mg/L. As advised by the Health Unit, operators continued flushing until an acceptable of free chlorine residual was achieved (0.34 mg/L). Reported as AWQI# 162219

Refer to Section 5.0 – *Details on Notices of Adverse Test Results and Other Problems Reported to & Submitted to the Spills Actions Center* of this report for details.

3.0 SUMMARY OF FLOWS AND COMPARISON TO REGULATORY LIMITS

Flow Monitoring

MDWL No. 214-101 requires the owner to install a sufficient number of flow measuring devices to permit the continuous measurement and recording of:

- the flow rate and daily volume of treated water that flows from the treatment subsystem
  the distribution system (treated water flow from the high lift pump facilities), and
- the flow rate and daily volume of water that flows into the treatment subsystem (raw water flow from the low lift pump facilities).

The flow monitoring equipment identified in the MDWL is present and operating as required. These flow meters are calibrated on an annual basis as specified in the manufacturers' instructions.

Water Usage

The following water usage tables summarize the quantities and flow rates of water taken and produced during the 2023 reporting period, including total monthly volumes, average monthly volumes, maximum monthly volumes, and maximum flow rates.

Raw Water

Table A **- Raw Water Usage**

2023 - Monthly Summary of Water Takings from the Source (Gull Lake)

Regulated by by Permit to Take Water (PTTW) #5882-APGJY8 (issued July 25, 2017)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m^3)	272,818	257,661	273,850	262,472	259,992	291,443	298,606	284,218	270,295	273,737	267,560	252,145	3,264,796
Average Volume (m^3/d)	8,801	9,202	8,834	8,749	8,387	9,715	9,632	9,168	9,010	8,830	8,919	8,134	8,945
Maximum Volume (m^3/d)	9,508	9,866	9,556	9,468	9,571	11,050	11,100	9,982	9,876	9,252	10,081	8,591	11,100
PTTW - Maximum Allowable Volume (m^3/day)	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500
Maximum Flow Rate (L/min)	9,187	9,172	12,740	9,247	9,188	12,817	9,231	9,049	9,040	9,087	9,099	9,100	12,817
PTTW - Maximum Allowable Flow Rate (L/min)	15,625	15,625	15,625	15,625	15,625	15,625	15,625	15,625	15,625	15,625	15,625	15,625	15,625

The system's Permit to Take Water allows the Municipality to withdraw a maximum volume of 22,500 cubic meters from Gull Lake each day. A review of the raw water flow data indicates that the system did not exceed the maximum allowable volume or maximum flow rate during the reporting period.

Treated Water

Table B **- Treated Water Usage**

2023 - Monthly Summary of Treated Water Supplied to the Distribution System

Regulated Municipal Drinking Water Licence (MDWL) #214-101 - Issue 4, dated February 5, 2020

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m^3)	249,953	240,872	255,132	244,942	242,682	274,186	279,189	266,617	252,067	259,333	252,795	236,059	3,053,828
Average Volume (m^3/d)	8,063	8,603	8,230	8,165	7,828	9,140	9,006	8,601	8,402	8,366	8,427	7,615	8,370
Maximum Volume (m^3/d)	8,681	9,122	8,887	8,828	9,066	10,417	10,224	9,465	9,305	8,736	9,515	8,098	10,417
MDWL/C of A - Rated Capacity (m^3/day)	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500

Schedule C, Section 1.0 (1.1) of MDWL No. 214-101 states that the maximum daily volume of treated water that flows from the treatment subsystem to the distribution system shall not exceed 22,500 m^3/day. The Kirkland Lake DWS complied with this limit having a recorded maximum volume of 10,417 m^3/day, which represents 46% of the rated capacity.

Table C: 2023 - Comparison of Treated Water Flows to the Rated Capacity

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Flow (m^3/day)	8,063	8,603	8,230	8,165	7,828	9,140	9,006	8,601	8,402	8,366	8,427	7,615
Maximum Flow (m^3/day)	8,681	9,122	8,887	8,828	9,066	10,417	10,224	9,465	9,305	8,736	9,515	8,098
MDWL - Rated Capacity	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500
% Rated Capacity	39	41	39	39	40	46	45	42	41	39	42	36

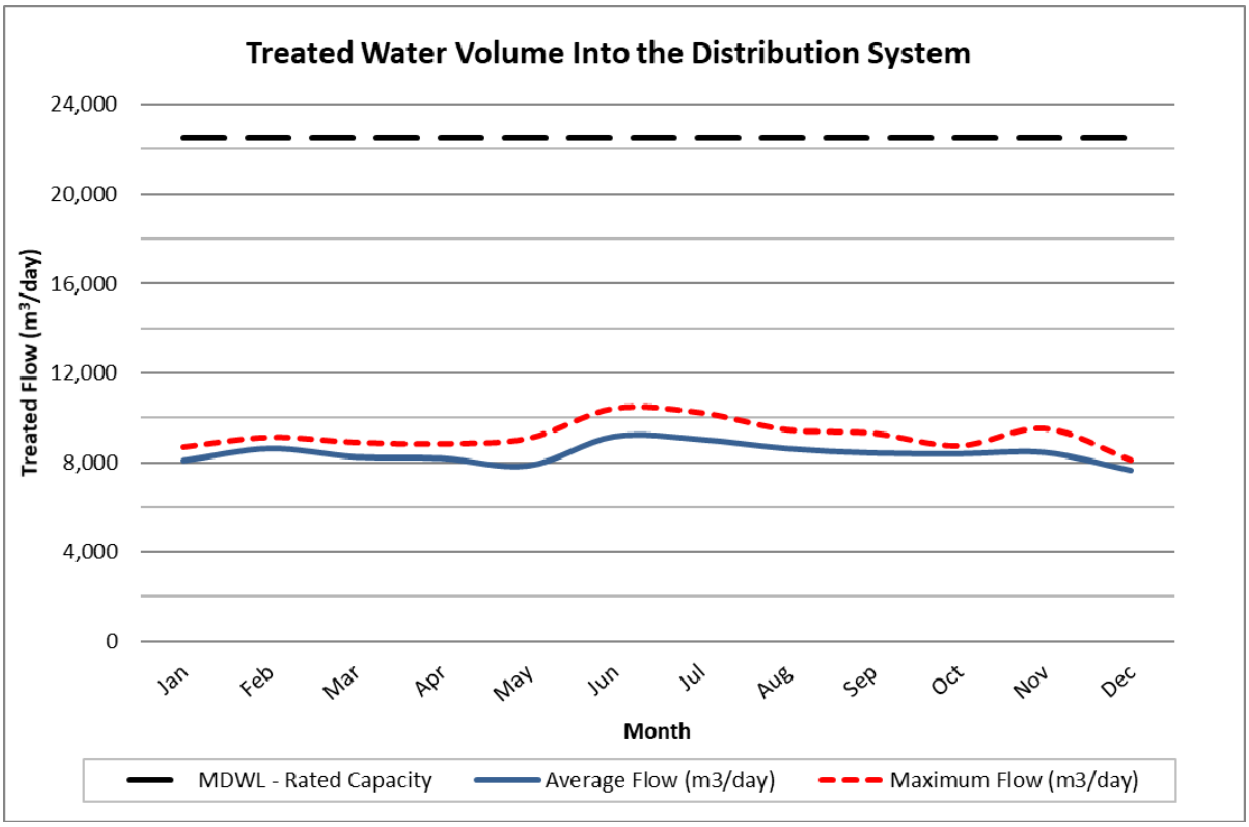

Figure 1: 2023 - Comparison of Treated Water Flows to the Rated Capacity

Table C and Figure 1 compare the average and maximum flow rates into the distribution system to the rated capacity of the system identified in the MDWL.

Summary of System Performance

The following information is provided to enable the Owner to assess the capability of the system to meet existing and future water usage needs.

Rated Capacity of the Plant (MDWL)	22,500 m^3/day	
Average Daily Flow for 2023	8,370 m^3/day	37.2 % of the rated capacity
Maximum Daily Flow for 2023	10,417 m^3/day	46.3 % of the rated capacity
Total Treated Water Produced in 2023	3,053,828 m^3	

Historical Flows

Kirkland Lake (Lionel Sherratt) Water Treatment Plant – Historical Flow Comparison

Year	Maximum Treated Flow (m^3/d)	Average Daily Treated Flow (m^3/d)	Average Day % of Rated Capacity (22,500 m^3/d)
2023	**10,417**	**8,370**	**37.2%**
2022	13,755	8,985	39.9%
2021	12,008	8,734	38.8%
2020	13,092	9,256	41.1%
2019	15,485	10,916	48.5%

Table D and Figure 2 compare the average treated water flows from 2019 to 2023.

Table D: Kirkland Lake (Lionel Sherratt) Water Treatment System - Average Treated Water Flows from 2019 to 2023

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2019 Average Flow (m^3/day)	11,042	11,550	12,653	11,799	10,081	10,544	12,244	11,059	9,535	10,113	10,147	10,225
2020 Average Flow (m^3/day)	10,195	9,923	9,798	9,687	8,723	9,018	8,971	9,001	8,544	9,016	9,131	9,063
2021 Average Flow (m^3/day)	7,990	8,011	8,276	8,334	8,565	9,563	9,431	10,062	9,245	8,612	8,183	8,480
2022 Average Flow (m^3/day)	8,830	10,277	10,956	9,240	8,745	8,485	9,017	8,606	8,236	8,391	8,569	8,551
2023 Average Flow (m^3/day)	8,063	8,603	8,230	8,165	7,828	9,140	9,006	8,601	8,402	8,366	8,427	7,615
MDWL - Rated Capacity (m^3/day)	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500

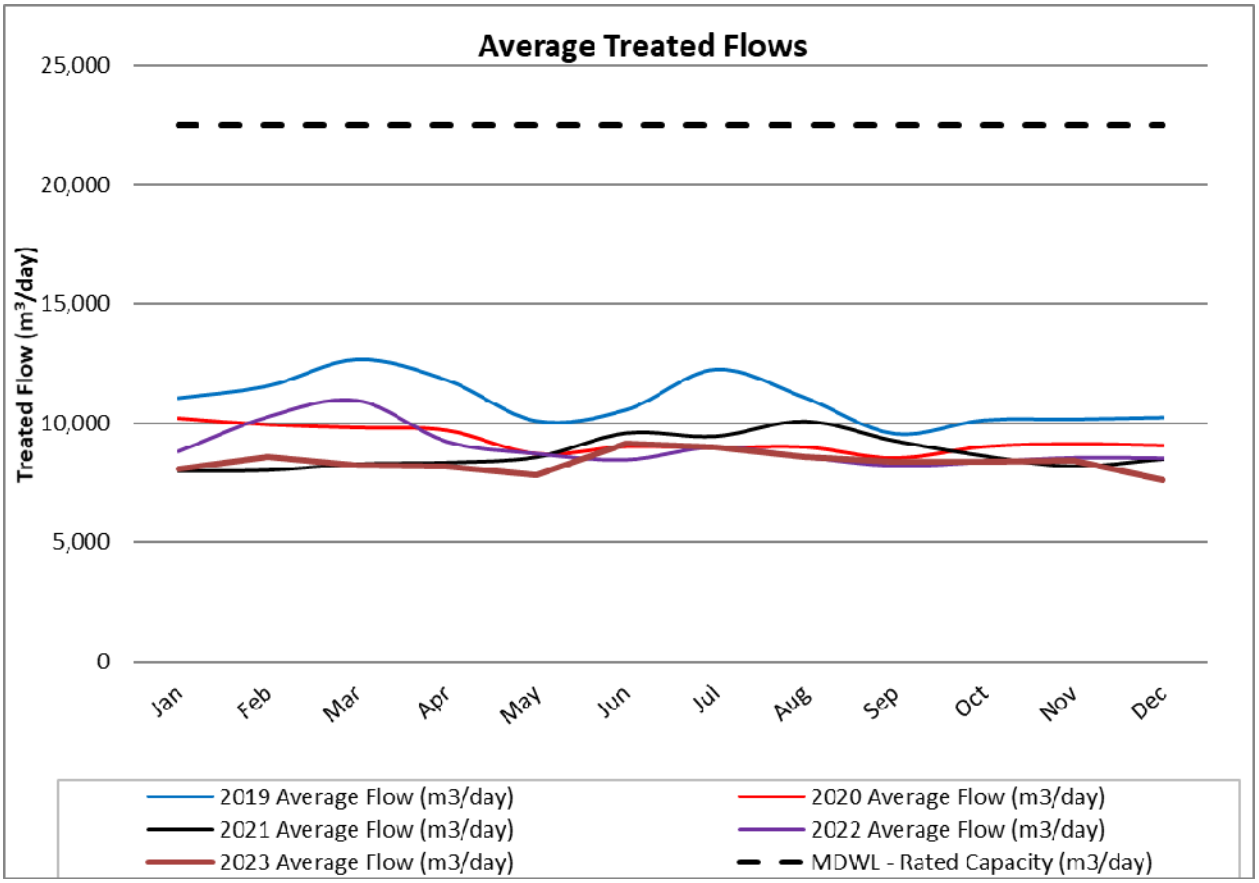

Figure 2: Kirkland Lake (Lionel Sherratt) Water Treatment System - Average Treated Water Flows from 2019 to 2023

CONCLUSION

The water quality data collected in 2023 demonstrates that the Kirkland Lake drinking water system provided high quality drinking water to its users.

The system was able to operate in accordance with the terms and conditions of the Permit to Take Water and in accordance with the rated capacity of the licence while meeting the community's demand for water use.

All Adverse Water Quality Incidents were reported to the Ministry's Spills Action Center and the corrective actions were completed as required and any non-compliances that were identified were resolved as soon as possible.