Ontario Clean Water Agency
Agence Ontarienne Des Eaux

Virginiatown-Kearns Drinking Water System

2019 Annual/Summary Report

Prepared by the Ontario Clean Water Agency
on behalf of the Township of McGarry

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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 requirement 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 2019 Annual/Summary Report.

Virginiatown-Kearns Drinking Water System

Section 11

2019 Annual Report

Section 11 - ANNUAL REPORT

1.0 INTRODUCTION

Drinking-Water System Name:	**Virginiatown-Kearns Drinking Water System**
Drinking-Water System No.:	220000317
Drinking-Water System Owner:	The Corporation of the Township of McGarry
Drinking-Water System Category:	Large Municipal, Residential System
Period being reported:	January 1, 2019 to December 31, 2019

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 https://www.mcgarry.ca/

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

McGarry Township Office
27 Webster Street,
Virginiatown Ontario P0K 1X0

Drinking Water Systems that receive drinking water from the Virginiatown-Kearns Drinking Water System

The Virginiatown-Kearns Drinking Water System provides all drinking water to the communities of Virginiatown, North Virginatown and Kearns.

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

The Ontario Clean Water Agency prepared the 2019 Annual/Summary Report for the Virginiatown-Kearns Drinking Water System and provided a copy to the system owner; the Township of McGarry. The Virginiatown-Kearns Drinking Water System is a stand-alone system that does not receive water from or send water to any other system.

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

- A notice on the Town's website
- A notice posted at the municipal office

2.0 VIRGINIATOWN DRINKING WATER SYSTEM (DWS No. 220000317)

The Virginiatown-Kearns Drinking Water System is owned by the Corporation of the Township of McGarry and operated by the Ontario Clean Water Agency (OCWA). The system consists of a Class 2 water distribution and supply subsystem. The Ontario Clean Water Agency (OCWA) is the accredited operating authority and is designated as the Overall Responsible Operator for both the water supply and water distribution facilities.

Raw Water Supply

The main building for the water treatment plant/pumphouse is located approximately 6 km northeast of the Virginiatown Community Centre and approximately 500 metres east of Cheminis Road. Groundwater is supplied to the plant from production Well No. 1 (Cheminis Well) which is situated within the plant and Well No. 2 (T3/91); a standby well which is located 10 metres east of the well house.

Well No.1 (Cheminis Well) was drilled in October 1994 to a depth of 26.2 metres. The well consists of a 300 mm diameter steel casing and is equipped with a vertical turbine pump assembly and fixed-rate control system to pump at a maximum rate of 1,420 L/minute. A magnetic flow meter is mounted on the 150 mm diameter discharge line from the well into the treatment process.

Well No. 2 (T3/91) was originally drilled in February 1991 and maintained as a test well. It was modified in December 2014 to service as a standby well. It is located approximately 10 m east of the well house and Well No. 1. It is drilled to a depth of 28.65 metres and equipped with a submersible deep well pump rated at 1,105 L/minute. The discharge pipe connects to the Well No. 1 discharge header at a point just before the flow meter located inside the well house.

The standby well is intended for use when production Well No.1 has been taken out of service for repair and maintenance, or in an emergency situation. The well can also be used periodically as required to ensure water quality; it is currently configured to operate once in every 60 tower filling cycles.

Water Treatment

The wells feed the water treatment system that has a maximum rated capacity of 2045 cubic meters per day (m^3/d).

The groundwater is chlorinated using a sodium hypochlorite disinfection system, complete with a chemical feed panel consisting of duplicate chemical metering pumps (duty and standby), and a single 400 L storage tank with secondary spill containment and an outside fill line. Also integrated into the treatment process are off-site chlorine contact facilities. The first is a 6 km long by 200 mm diameter ductile iron forcemain (pipe) with no service connections that extends from the treatment plant to the elevated reservoir/tower.

Water Storage and Pumping Capabilities

The tower is located approximately 150 m to the west of the Virginiatown Community Centre at the intersection of Twenty-Seventh Avenue and Twenty-Seventh Street within the community of North Virginiatown. The tower has 1,300 cubic metres of usable volume for water storage. A free chlorine residual analyzer and a pressure transmitter both using a circular chart recorder are on-site and utilize the alarm communication device. An 8" Promag 50W magnetic flow meter was installed on the tower discharge line in June 2015 to continuously monitor the flow rate and daily volume of treated water directed to the distribution system. Piping for filling, discharging, draining, sampling and bypassing purposes are also housed within the elevated water storage.

Emergency Power

A 56 kW diesel engine generator set and its associated fuel storage and secondary spill containment is available at the pump house for standby power.

A 15 KW diesel generator is also available outside the water tower to provide emergency power in case of a power failure.

Distribution System

The distribution system serves an estimated population of approximately 590 people spread throughout the residential areas of Virginiatown, North Virginiatown and Kearns. The distribution system itself consists primarily of ten (10), eight (8), and six (6) inch ductile iron constructed water mains. The service life of the distribution system ranges from 60 years (for the North Virginiatown sector) to 80 years (for the Virginiatown sector). More recent watermain installations and repair sections are comprised of polyvinyl chlorite (PVC) piping. There are 48 fire hydrants connected to the distribution system to aid in fire protection. Based on the number of service connections, the system is classified as a Large Municipal Residential Drinking Water System.

3.0 LIST OF WATER TREATMENT CHEMICALS USED OVER THE REPORTING PERIOD

Sodium Hypochlorite, used as a disinfectant, was the only chemical used at the Water Treatment Plant.

This chemical meets 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 sustains a program of scheduled inspection and maintenance activities using a computerized Work Management System (WMS).

Significant expenses incurred in the drinking water system include:

- Purchased spare 6" silent check valve for wells.
- Replaced starter (soft start) on Well No. 1.

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, two (2) adverse water quality incidents were reported to the Ministry's Spills Action Centre in 2019.

1. **AWQI 145341** - May 7th@ 1900 hrs.: Loss of pressure due to a watermain break/repair (Category 2) on 28 Street in Virginiatown. Main was isolated order to conduct repair. Approximately 20 houses were affected. Pedersen Construction was called to perform the repair and OCWA oversaw the repair. The area was flushed and samples collected. The local Health Unit was notified and a precautionary boil water advisory (BWA) was issued for the affected area. The repair was completed and the pressure was restored on May 8, 2019 at 0850 hours. The Ministry's Spills Action Center (SAC) and the local MECP inspector were also notified.

   The area was flushed and 2 sets of 3 bacti samples were collected (upstream, downstream and at site). Sample results indicated no total coliforms or *E.coli*. The BWA was lifted on May 10th at 1225 hours.

2. **AWQI 148364** - October 2nd: Seven (7) total coliforms were detected in a drinking water sample collected from a hydrant after work was done to relocate a hydrant and replace part of the main in Virginiatown. The sample was collected on October 2nd at 3110 hours (FCR = 0.83 mg/L).

   SAC, the local MOH and Owner were notified. The line was flushed and resamples were collected upstream, downstream and at the site of the adverse result on October 3rd. Resample results were acceptable having zero total coliforms and *E. coli.* The incident was resolved on October 7th.

6.0 MICROBIOLOGICAL TESTING PERFORMED DURING THE REPORTING PERIOD

Summary of Microbiological Data

Sample Type	# of Samples	Range of *E. coli* Results *(min to max)*	Range of Total Coliform Results *(min to max)*	# of HPC Samples	Range of HPC Results *(min to max)*
Raw (production well)	53	0 to 0	0 to 0	0	N/A
Raw (standby well)	44 Note 2	0 to 0	0 to 1	0	N/A
Treated	53	0 to 0	0 to 0	53	< 10 to 2000
Distribution	106	0 to 0	0 to 0	53	< 10 to 980

Maximum Allowable Concentration (MAC) for *E. coli* = 0 Counts/100 mL
MAC for Total Coliforms = 0 Counts/100 mL
INT - Interferences are evident on plate and therefore bacterial colonies cannot be properly counted (interferences can be anything that inhibit the proper growth and formation of target colonies)
"<" denotes less than the laboratory's method detection limit.

Notes:

1. One microbiological sample is collected and tested each week from the raw (each well) and treated water supply. A total of two microbiological samples are collected and tested each week from the Virginiatown-Kearns distribution system. At least 25% of the distribution samples are tested for HPC bacteria.

2. The standby well (Well 2) was taken off-line on August 15th when a contactor switch in the electrical panel faulted. Issue resolved and well back on-line October 23rd.

Refer to *Appendix A* for a monthly summary of microbiological test results.

7.0 OPERATIONAL TESTING PERFORMED DURING THE REPORTING PERIOD

Summary of Raw Water Turbidity Data

Parameter	# of Samples	Range of Results *(min to max)*	Unit of Measure
Turbidity (production well)	23	0.06 to 0.30	NTU
Turbidity (standby well)	17 Note 2	0.22 to 1.22	NTU

Notes:

1. Turbidity samples are required once every month.

2. The standby well (Well 2) was taken off-line on August 15th when a contactor switch in the electrical panel faulted. Issue resolved and well back on-line October 23rd.

Continuous Monitoring in the Treatment Process

Parameter	# of Samples	Range of Results *(min to max)*	Unit of Measure	Standard
Free Chlorine Residual	8760	0.302 to 1.93	mg/L	CT*

Notes:

1. For continuous monitors 8760 is used as the number of samples.

2. 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 for the Virginiatown-Kearns drinking water system if the free chlorine residual level drops below 0.05 mg/L 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	368	0.09 to 1.87	mg/L	≥ 0.05

Note: A total of seven operational checks for chlorine residual in the distribution system are collected each week. Four (4) samples are 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.

Refer to *Appendix B* for a monthly summary of the above operational data.

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 8	0.11	< 0.008	mg/L	No
April 4	< 0.05	< 0.05	mg/L	No
July 11	< 0.05	< 0.05	mg/L	No
October 9	< 0.05	< 0.05	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 8	1.8	ug/L	1.63	No
April 4	1.7	ug/L		
July 11	1.4	ug/L		
October 9	1.6	ug/L		

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

Haloacetic Acid (HAAs) Sampling and Testing Required under Schedule 13-6.1

New sampling requirements for Haloacetic Acids (HAAs) came into effect on January 1st, 2017. At least one distribution sample must be taken in each calendar quarter, from a point in the drinking water system's distribution system, or plumbing that is likely to have an elevated potential for the formation of HAAs. Over the past three years, samples were collected near the plant, in the middle of the distribution system and at the end of the distribution system as per guidance provided in a Ministry's letter "HAA Concerns" dated May 9, 2018. The sample locations with the highest concentrations of HAAs are Chez Lucie (42 Connell Ave.) in the middle of the system and the River Valley Restaurant (147 Government Road) at the end of the system.

The maximum allowable concentration (MAC) of 80 ug/L is effective January 1st, 2020 and is based on a running annual average of quarterly results (similar to THMs). Results that exceed the MAC must be reported as an adverse water quality incident (AWQI) starting January 1st, 2020. HAA results for 2019 are summarized below.

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 8	10	ug/L	< 8.5	N/A
April 4	< 8	ug/L		
July 11	< 8	ug/L		
October 9	< 8	ug/L		

Summary of Most Recent Lead Data under Schedule 15.1

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

The Virginiatown-Kearns 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 two 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 29th and September 23rd of 2019. 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 29	2	7.06 to 7.24	7.1 to 8.3	70 to 72	N/A
September 23	2	7.02 to 7.03	9.1 to 10.9	73 to 74	N/A

Note: Next lead sampling scheduled for 2020

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

Parameter	Result Value	Unit of Measure	MAC	MAC Exceedance	½ MAC Exceedance
Antimony	< 0.5	ug/L	6	No	No
Arsenic	< 1	ug/L	10	No	No
Barium	6	ug/L	1000	No	No
Boron	3.4	ug/L	5000	No	No
Cadmium	< 0.1	ug/L	5	No	No
Chromium	1.4	ug/L	50	No	No
Mercury	< 0.1	ug/L	1	No	No
Selenium	< 1	ug/L	50	No	No

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

Parameter	Result Value	Unit of Measure	MAC	MAC Exceedance	½ MAC Exceedance
Uranium	< 1	ug/L	20	No	No

Note: Sample required every 36 months (sample date = *October 2, 2017).* Next sampling scheduled for October 2020

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

Parameter	Result Value	Unit of Measure	MAC	MAC Exceedance	½ MAC Exceedance
Alachlor	< 0.2	ug/L	5	No	No
Atrazine + N-dealkylated metobolites	< 0.5	ug/L	5	No	No
Azinphos-methyl	< 0.2	ug/L	20	No	No
Benzene	< 0.1	ug/L	1	No	No
Benzo(a)pyrene	< 0.005	ug/L	0.01	No	No
Bromoxynil	< 0.09	ug/L	5	No	No
Carbaryl	< 1	ug/L	90	No	No
Carbofuran	< 1	ug/L	90	No	No
Carbon Tetrachloride	< 0.2	ug/L	2	No	No
Chlorpyrifos	< 0.2	ug/L	90	No	No
Diazinon	< 0.2	ug/L	20	No	No
Dicamba	< 0.08	ug/L	120	No	No
1,2-Dichlorobenzene	< 0.2	ug/L	200	No	No
1,4-Dichlorobenzene	< 0.3	ug/L	5	No	No
1,2-Dichloroethane	< 0.2	ug/L	5	No	No
1,1-Dichloroethylene (vinylidene chloride)	< 0.3	ug/L	14	No	No
Dichloromethane	< 1	ug/L	50	No	No
2-4 Dichlorophenol	< 0.2	ug/L	900	No	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	< 0.08	ug/L	100	No	No
Diclofop-methyl	< 0.08	ug/L	9	No	No
Dimethoate	< 0.2	ug/L	20	No	No
Diquat	< 0.7	ug/L	70	No	No
Diuron	< 6	ug/L	150	No	No
Glyphosate	< 20	ug/L	280	No	No
MCPA	< 10	ug/L	100	No	No
Malathion	< 0.2	ug/L	190	No	No
Metolachlor	< 0.1	ug/L	50	No	No
Metribuzin	< 0.1	ug/L	80	No	No
Monochlorobenzene	< 0.5	ug/L	80	No	No
Paraquat	< 0.3	ug/L	10	No	No
Pentachlorophenol	< 0.3	ug/L	60	No	No
Phorate	< 0.1	ug/L	2	No	No
Picloram	< 0.08	ug/L	190	No	No
Polychlorinated Biphenyls (PCBs)	< 0.06	ug/L	3	No	No

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

Parameter	Result Value	Unit of Measure	MAC	MAC Exceedance	½ MAC Exceedance
Prometryne	< 0.06	ug/L	1	No	No
Simazine	< 0.2	ug/L	10	No	No
Terbufos	< 0.1	ug/L	1	No	No
Tetrachloroethylene	< 0.3	ug/L	10	No	No
2,3,4,6-Tetrachlorophenol	< 0.3	ug/L	100	No	No
Triallate	< 0.1	ug/L	230	No	No
Trichloroethylene	< 0.2	ug/L	5	No	No
2,4,6-Trichlorophenol	< 0.2	ug/L	5	No	No
Trifluralin	< 0.1	ug/L	45	No	No
Vinyl Chloride	< 0.1	ug/L	1	No	No

Note: Sample required every 36 months (sample date = *October 2, 2017).* Next sampling scheduled for October 2020

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	# of Samples	Result Value	Unit of Measure	Standard	Exceedance
October 5, 2015	1	15.1	mg/L	20	No

Note: Sample required every 60 months. Next sampling scheduled for October 2020

Most Recent Fluoride Data Sampled at the Water Treatment Plant

Date of Sample	# of Samples	Result Value	Unit of Measure	Standard	Exceedance
October 5, 2015	1	< 0.1	mg/L	1.5	No

Note: Sample required every 60 months. Next sampling scheduled for October 2020

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

No additional sampling and testing was required for the Virginiatown-Kearns Drinking Water System during the 2019 reporting period.

Virginiatown-Kearns Drinking Water System

Schedule 22

2019 SUMMARY REPORT

FOR MUNICIPALITIES

Schedule 22 - SUMMARY REPORTS FOR MUNICIPALITIES

1.0 INTRODUCTION

Drinking-Water System Name:	**Virginiatown-Kearns Drinking Water System**
Municipal Drinking Water Licence (MDWL) No.:	280-101-4 (issued January 29, 2016)
Drinking Water Work Permit (DWWP) No.:	279-201-4 (issued July 31, 2018)
Permit to Take Water (PTTW) No.:	1034-9UHP99 (issued March 12, 2015)
Period being reported:	January 1, 2019 to December 31, 2019

2.0 REQUIREMENTS THE SYSTEM FAILED TO MEET

According to information kept on record by OCWA, the Virginiatown-Kearns Drinking Water System failed to meet the following requirements during the 2019 reporting period:

Drinking Water Legislation	Requirement(s) the System Failed to Meet	Duration	Corrective Action(s)	Status
Section 3 (3.2) of PTTW #1034-9UHP99	Well No. 2 failed to meet the maximum allowable flow rate of 1105 L/min on January 9th. Flushing and sampling was performed after a new silent check valve was installed on the well pipe. This resulted in the exceedance.	January 9th from 12:40 to 12:50 pm	Operators will closely monitor flows during maintenance activities.	Complete
Section 3 (3.2) of PTTW #1034-9UHP99	Well No. 2 failed to meet the maximum allowable flow rate of 1105 L/min on February 4th and 7th when filling the tower and collecting bacteriological samples. It was discovered that the flow control valve had to be adjusted in order to prevent further flow exceedances.	February 4th from 2:22pm to 2:28pm & 5:27pm to 6:37pm February 7th from 10:53am to 11:02am	Flow control valve was adjusted.	Complete
Section 3 (3.2) of PTTW #1034-9UHP99	Well No. 2 failed to meet the maximum allowable flow rate of 1105 L/min on October 15th and 16th during distribution flushing.	October 15th from 11:47am to 12:02pm October 16th from 12:58pm to 1:14pm	Operators will closely monitor flows during maintenance activities.	Complete
Section 3 (3.2) of PTTW #1034-9UHP99	Well No. 1 failed to operate within its allowable flow rate (1420 L/min) on December 11th & 12th. It was discovered that the flow control valve required adjusting.	December 11th from 11:04pm to December 12th 1:51pm for 6 well runs.	Flow control valve was adjusted.	Complete

It should be mentioned that, two (2) adverse water quality incidents were reported to the Ministry's Spills Action Center. Refer to Section 5.0 – *Details on Notices of Adverse Test*

Results and Other Problems Reported to & Submitted to the Spills Actions Center on page 5 of this report for details.

3.0 SUMMARY OF FLOWS AND COMPARISON TO REGULATORY LIMITS

Flow Monitoring

MDWL No. 280-101 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, and
- the flow rate and daily volume of water that flows into the treatment subsystem.

The Virginiatown-Kearns drinking water system has a flow meter installed on the raw water header which was considered sufficient to satisfy the requirement of the licence since there was no water loss from processes between the raw source and the point of discharge of treated water at the water tower. Although this flow meter satisfied the flow monitoring requirements, a magnetic flow meter was installed on the discharge header of the North Virginiatown Elevated Storage Tank to continuously monitor the treated water entering the distribution system. 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 2019 reporting period, including total monthly volumes, average monthly volumes, maximum monthly volumes, and maximum flow rates.

Raw Water

2019 - Monthly Summary of Water Takings from the Source (Cheminis Well No. 1 & Standby Well No. 2 (T3/91)

Regulated by Permit to Take Water (PTTW) #PTTW #1034-9UHP99, issued March 12, 2015

Cheminis Well No. 1

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m^3)	21940	23214	23653	20560	19710	18693	16976	16004	17120	15890	15180	18788	227728
Average Volume (m^3/d)	708	829	763	685	636	623	548	516	571	513	506	606	625
Maximum Volume (m^3/d)	843	988	963	750	769	947	837	635	734	591	593	739	988
PTTW - Maximum Allowable Volume (m^3/day)	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045
Maximum Flow Rate (L/min)	1392	1382	1384	1411	1349	1368	1415	1414	1376	1361	1413	1857	1857
PTTW - Maximum Allowable Flow Rate (L/min)	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420

Note: Well No. 1 failed to operate within its allowable flow rate on December 11th and 12th. The flow control valve had to be adjusted to ensure flows were maintained below the allowable limit.

Standby Well T3/91 Well No. 2

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m^3)	34	878	930	768	765	382	1177	68	0	183	304	307	5796
Average Volume (m^3/d)	1	31	30	26	25	13	38	2	0	6	10	10	16
Maximum Volume (m^3/d)	15	110	126	88	80	84	539	64	0	62	80	81	539
PTTW - Maximum Allowable Volume (m^3/day)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Maximum Flow Rate (L/min)	1742	1162	1101	1099	1100	1100	1093	1086	0	1556	1097	1105	1742
PTTW - Maximum Allowable Flow Rate (L/min)	1105	1105	1105	1105	1105	1105	1105	1105	1105	1105	1105	1105	1105

Notes:
1. The standby well (Well 2) exceeded it's allowable flow rate on January 9th from 1240 pm to 1250 pm. Flushing and sampling was performed after a new silent check valve was installed on the well pipe. This resulted in the exceedance.

2. Well 2 exceeded its allowable flow rate on February 4th and 7th when filling the tower and collecting bacteriological samples. It was discovered that the flow control valve had to be adjusted in order to prevent further flow exceedances.

3. Well 2 exceeded its allowable flow rate on October 15th and 16th during distribution flushing.

4. The standby well (Well 2) was taken off-line on August 15th when a contactor switch in the electrical panel faulted. Issue resolved and well back on-line October 23rd.

Combined Water Taking (Well No. 1 and Well No. 2)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m^3)	21974	24092	24583	21328	20475	19075	18153	16072	17120	16073	15484	19095	233524
Average Volume (m^3/d)	709	860	793	711	660	636	586	518	571	518	516	616	641
Maximum Volume (m^3/d)	843	988	982	750	769	947	837	635	734	591	593	739	988
PTTW - Maximum Allowable Volume (m^3/day)	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045

The system's Permit to Take Water #1034-9UHP99, allows the Township to withdraw water at the following rates:

Well No. 1 (Cheminis Well):	2044.8 m^3/day	1,420 L/minute
Well T3/91 No. 2 (Standby Well):	1500 m^3/day	1,105 L/minute
Total Combined Daily Volume:	2044.8 m^3/day	

A review of the raw water flow data indicates that the total daily volume of water taken from Well No. 1 and Well No. 2 did not exceed their allowable limits.

Well No. 1 failed to operate within its allowable flow rate on December 11th and 12th. The flow control valve had to be adjusted to ensure flows were maintained below the allowable limit.

Well No. 2 failed to operate within its allowable flow rate several times during the reporting period.

1. The standby well (Well 2) exceeded it's allowable flow rate on January 9th from 1240 pm to 1250 pm. Flushing and sampling was performed after a new silent check valve was installed on the well pipe. This resulted in the exceedance.

2. Well 2 exceeded its allowable flow rate on February 4th and 7th when filling the tower and collecting bacteriological samples. It was discovered that the flow control valve had to be adjusted in order to prevent further flow exceedances.

3. Well 2 exceeded its allowable flow rate on October 15th and 16th during distribution flushing.

4. The standby well (Well 2) was taken off-line on August 15th when a contactor switch in the electrical panel faulted. Issue resolved and well back on-line October 23rd.

Note: The standby well (Well No. 2) is allowed to run for a maximum of 10 hours per day and 140 days per year. The well operated for a total of 105 days in 2019 and never ran more than 10 hours each day.

Treated Water

2019 - Monthly Summary of Treated Water from the Well House to the Water Tower

Regulated by Municipal Drinking Water Licence (MDWL) #280-101 - Issue 4, dated January 29, 2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m^3)	21974	24092	24583	21328	20475	19075	18153	16072	17120	16073	15484	19095	233524
Average Volume (m^3/d)	709	860	793	711	660	636	586	518	571	518	516	616	641
Maximum Volume (m^3/d)	843	988	982	750	769	947	837	635	734	591	593	739	988
MDWL - Rated Capacity (m^3/day)	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045

Note: for this system, compliance with the maximum daily rated capacity being directed to the distribution system is based on total raw water flow and volumes provided by the raw water flow meter which measures flow from the well house to the elevated water tower.

Schedule C, Section 1.0 (1.1) of MDWL No. 280-101 states that the maximum daily volume of treated water that flows from the treatment subsystem to the distribution system shall not exceed 2045 m^3/day. The Virginiatown-Kearns DWS complied with this limit having a recorded maximum volume of 988 m^3 in February which represents 48.3% of the rated capacity.

A monthly summary of flows from the water tower into the distribution system are presented below.

2019 - Monthly Summary of Treated Water from the Water Tower into the Distribution System

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m^3)	21742	23958	24334	21122	20165	18729	17838	15902	16960	15786	15285	18897	230717
Average Volume (m^3/d)	701	856	785	704	650	624	575	513	565	509	509	610	634
Maximum Volume (m^3/d)	816	991	954	725	755	943	801	622	763	582	584	737	991
MDWL - Rated Capacity (m^3/day)	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045

The following tables and graphs (Figures 1 and 2) compare the average and maximum flow rates from the well house to the water tower and from the tower into the distribution system to the rated capacity of the system identified in the MDWL.

Figure 1: 2019 - Monthly Volume of Treated Water from the Well House to the Tower

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Flow (m^3/day)	709	860	793	711	660	636	586	518	571	518	516	616
Maximum Flow (m^3/day)	843	988	982	750	769	947	837	635	734	591	593	739
MDWL - Rated Capacity	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045
% Rated Capacity	41	48	48	37	38	46	41	31	36	29	29	36

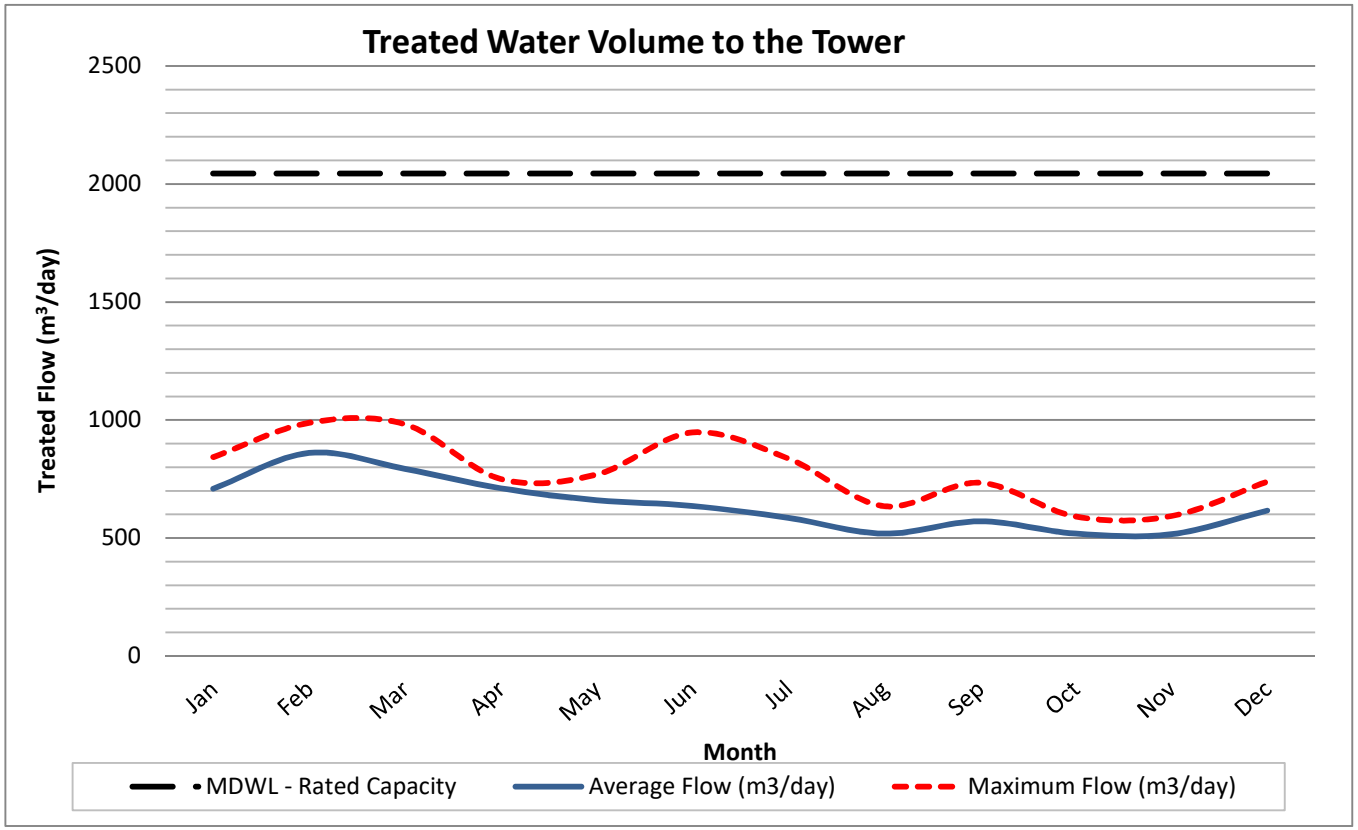
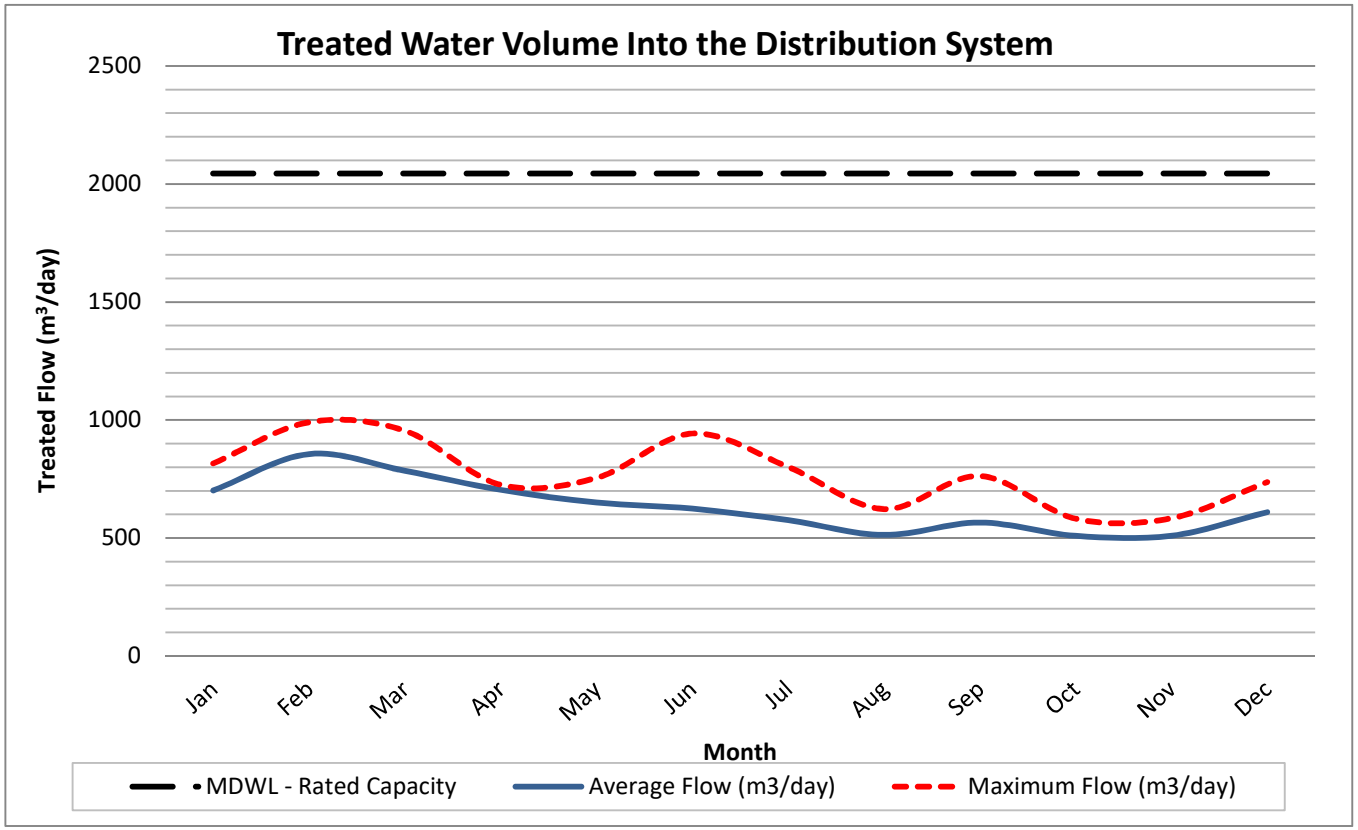


Figure 2: 2019 - Monthly Volume of Treated Water from the Tower into the Distribution System

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Flow (m^3/day)	701	856	785	704	650	624	575	513	565	509	509	610
Maximum Flow (m^3/day)	816	991	954	725	755	943	801	622	763	582	584	737
MDWL - Rated Capacity	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045
% Rated Capacity	40	48	47	35	37	46	39	30	37	28	29	36



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)	2045 m^3/day	
Average Daily Flow for 2019	634 m^3/day	31.0 % of the rated capacity
Maximum Daily Flow for 2019	988 m^3/day	48.3 % of the rated capacity
Total Treated Water Produced in 2019	233,524 m^3	

CONCLUSION

The Virginiatown-Kearns Drinking Water System operated well in 2019 complying with the regulatory requirements outlined its site specific drinking water works permit and municipal drinking water licence having no incidents of non-compliance during the reporting period.

The system failed to operate within the rated capacity of the Permit to Take Water when the standby well (Well No. 2) exceeded it allowable flow rate of 1105 L/minute four days during the reporting period. Three exceedances were caused during maintenance of the system and two due to issues with the flow control valve.

Well No. 1 exceeded the maximum allowable flow rate specified in its permit on December 11th and 12th due to issues with the flow control valve.

Two adverse water quality incidents (AWQIs) were reported in 2019 during distribution repairs.

APPENDIX A

Monthly Summary of Microbiological Test Results

VIRGINIATOWN-KEARNS DRINKING WATER SYSTEM
SUMMARY OF MICROBIOLOGICAL TEST RESULTS

Facility Works Number: 220000317

Facility Owner: Municipality: Township of McGarry

Facility Classification: Water Distribution and Supply

RAW WATER	01/2019	02/2019	03/2019	04/2019	05/2019	06/2019	07/2019	08/2019	09/2019	10/2019	11/2019	12/2019	Total	Avg	Max	Min
Well 1 (Cheminis) / Total Coliform: TC - cfu/100mL																
Count Lab	5	4	4	5	4	4	5	4	5	4	4	5	53			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
Well 1 (Cheminis) / E. Coli: EC - cfu/100mL																
Count Lab	5	4	4	5	4	4	5	4	5	4	4	5	53			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
Well 2 (Standby) / Total Coliform: TC - cfu/100mL																
Count Lab	2	4	4	5	4	4	5	3	0	4	4	5	44			
Max Lab	0	0	1	0	0	0	0	0	Well	0	0	0			1	
Mean Lab	0	0	0.25	0	0	0	0	0	Off-line	0	0	0		0.023		
Min Lab	0	0	0	0	0	0	0	0		0	0	0				0
Well 2 (Standby) / E. Coli: EC - cfu/100mL																
Count Lab	2	4	4	5	4	4	5	3	0	4	4	5	44			
Max Lab	0	0	0	0	0	0	0	0	Well	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	Off-line	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0		0	0	0				0

TREATED WATER	01/2019	02/2019	03/2019	04/2019	05/2019	06/2019	07/2019	08/2019	09/2019	10/2019	11/2019	12/2019	Total	Avg	Max	Min
Treated Water (POE) / Total Coliform: TC - cfu/100mL																
Count Lab	5	4	4	5	4	4	5	4	5	4	4	5	53			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
Treated Water (POE) / E. Coli: EC - cfu/100mL																
Count Lab	5	4	4	5	4	4	5	4	5	4	4	5	53			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
Treated Water (POE) / HPC - cfu/mL																
Count Lab	5	4	4	5	4	4	5	4	5	4	4	5	53			
Max Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	> 2000	< 10	< 10	< 30			2000	
Mean Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	> 408	< 10	< 10	< 14		? 47.925		
Min Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	> 10	< 10	< 10	< 10				< 10

DISTRIBUTION WATER	01/2019	02/2019	03/2019	04/2019	05/2019	06/2019	07/2019	08/2019	09/2019	10/2019	11/2019	12/2019	Total	Avg	Max	Min
VT-3 (Bacti) / Total Coliform: TC - cfu/100mL																
Count Lab	5	4	4	5	4	4	5	4	5	4	4	5	53			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
VT-3 (Bacti) / E. Coli - cfu/100mL																
Count Lab	5	4	4	5	4	4	5	4	5	4	4	5	53			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
VT-3 (Bacti) / HPC - cfu/mL																
Count Lab	3	2	2	2	2	2	3	2	2	2	2	3	27			
Max Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	30			30	
Mean Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 16.667		< 10.741		
Min Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10				< 10
VT-4 (Bacti) / Total Coliform: TC - cfu/100mL																
Count Lab	5	4	4	5	4	4	5	4	5	4	4	5	53			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
VT-4 (Bacti) / E. Coli - cfu/100mL																
Count Lab	5	4	4	5	4	4	5	4	5	4	4	5	53			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
VT-4 (Bacti) / HPC - cfu/mL																
Count Lab	2	2	2	3	2	2	2	2	3	2	2	2	26			
Max Lab	< 30	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	980	< 10			980	
Mean Lab	< 20	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	495	< 10		< 48.077		
Min Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10				< 10

NOTES:

1. August 15 - The standby well (Well 2) was taken off-line when a contactor switch in the electrical panel faulted. Issue resolved and well back on-line October 23rd.

APPENDIX B

Monthly Summary of Operational Data

VIRGINIATOWN-KEARNS DRINKING WATER SYSTEM
2019 SUMMARY OF OPERATIONAL RESULTS

Facility Works Number: 220000317

Facility Owner: Municipality: Township of McGarry

Facility Classification: Water Distribution and Supply

RAW WATER	01/2019	02/2019	03/2019	04/2019	05/2019	06/2019	07/2019	08/2019	09/2019	10/2019	11/2019	12/2019	Total	Avg	Max	Min
Well 1 (Cheminis) / Turbidity - NTU																
Count IH	2	2	2	1	2	2	2	2	2	2	2	2	23			
Total IH	0.24	0.16	0.35	0.255	0.326	0.329	0.576	0.2	0.32	0.23	0.15	0.381	3.517			
Max IH	0.14	0.09	0.27	0.255	0.21	0.212	0.301	0.12	0.19	0.17	0.09	0.276			0.301	
Mean IH	0.12	0.08	0.175	0.255	0.163	0.165	0.288	0.1	0.16	0.115	0.075	0.191		0.153		
Min IH	0.1	0.07	0.08	0.255	0.116	0.117	0.275	0.08	0.13	0.06	0.06	0.105				0.06
Well 2 (Standby) / Turbidity - NTU																
Count IH	1	2	2	1	2	2	2	0	0	1	2	2	17			
Total IH	1.15	0.99	0.69	0.507	1.232	0.79	0.542	Well Off-line		0.302	0.81	1.746	8.759			
Max IH	1.15	0.77	0.36	0.507	0.679	0.435	0.287			0.302	0.48	1.22			1.22	
Mean IH	1.15	0.495	0.345	0.507	0.616	0.395	0.271			0.302	0.405	0.873		0.515		
Min IH	1.15	0.22	0.33	0.507	0.553	0.355	0.255			0.302	0.33	0.526				0.22

TREATED WATER	01/2019	02/2019	03/2019	04/2019	05/2019	06/2019	07/2019	08/2019	09/2019	10/2019	11/2019	12/2019	Total	Avg	Max	Min
Treated Water (POE) / Cl Residual: Free (0.10 mg/L) - mg/L																
Max OL	1.771	1.788	1.552	1.348	1.171	1.401	1.656	1.8	1.476	1.808	1.535	1.928			1.928	
Mean OL	1.458	1.194	1.232	1.082	0.996	1.157	1.168	1.33	1.258	1.282	1.409	1.474		1.253		
Min OL	1.119	0.679	0.501	0.682	0.726	0.8	0.337	0.708	0.511	0.302	1.269	1.201				0.302

DISTRIBUTION WATER	01/2019	02/2019	03/2019	04/2019	05/2019	06/2019	07/2019	08/2019	09/2019	10/2019	11/2019	12/2019	Total	Avg	Max	Min
Residual No. 1 / Cl Residual: Free - mg/L																
Count IH	10	8	8	9	9	8	9	9	9	9	8	9	105			
Total IH	12.33	7.64	7.17	7.62	6.19	6.4	6.48	7.9	7.02	8.13	8.07	9.66	94.61			
Max IH	1.49	1.68	1.21	1.06	0.86	1.08	1.06	1.32	0.96	1.14	1.4	1.18			1.68	
Mean IH	1.233	0.955	0.896	0.847	0.688	0.8	0.72	0.878	0.78	0.903	1.009	1.073		0.901		
Min IH	1.04	0.39	0.52	0.71	0.56	0.56	0.47	0.48	0.6	0.48	0.71	0.95				0.39
Residual No. 2 / Cl Residual: Free - mg/L																
Count IH	10	8	8	9	9	8	9	9	9	9	8	9	105			
Total IH	12.82	8.2	8.75	8.52	7.88	8.33	8.77	10.01	9.51	10.95	9.39	12.07	115.2			
Max IH	1.52	1.63	1.34	1.19	0.99	1.31	1.45	1.5	1.29	1.42	1.37	1.47			1.63	
Mean IH	1.282	1.025	1.094	0.947	0.876	1.041	0.974	1.112	1.057	1.217	1.174	1.341		1.097		
Min IH	1.08	0.71	0.56	0.66	0.67	0.74	0.47	0.73	0.43	0.97	0.55	1.24				0.43
Residual No. 3 / Cl Residual: Free - mg/L																
Count IH	10	8	8	9	9	8	9	9	9	9	8	9	105			
Total IH	12.73	7.65	8.44	8.8	7.25	6.45	9.1	9.57	8.72	9.38	9.25	11.32	108.66			
Max IH	1.49	1.5	1.37	1.19	0.99	1.11	1.42	1.38	1.3	1.36	1.3	1.44			1.5	
Mean IH	1.273	0.956	1.055	0.978	0.806	0.806	1.011	1.063	0.969	1.042	1.156	1.258		1.035		
Min IH	1.04	0.69	0.41	0.75	0.52	0.51	0.67	0.76	0.09	0.55	0.71	1.01				0.09
Residual No. 4 / Cl Residual: Free - mg/L																
Count IH	5	4	4	5	4	4	5	4	5	4	4	5	53			
Total IH	6.14	3.85	4.46	4.87	3.48	4.37	2.34	3.84	4.51	4.73	4.81	6.78	54.18			
Max IH	1.48	1.4	1.19	1.16	0.98	1.24	0.8	1.17	1.21	1.36	1.32	1.87			1.87	
Mean IH	1.228	0.963	1.115	0.974	0.87	1.093	0.468	0.96	0.902	1.183	1.203	1.356		1.022		
Min IH	0.95	0.52	1.04	0.84	0.67	0.81	0.19	0.69	0.15	1.02	1.13	0.96				0.15

NOTES:

1. August 15 - The standby well (Well 2) was taken off-line when a contactor switch in the electrical panel faulted. Issue resolved and well back on-line October 23rd.