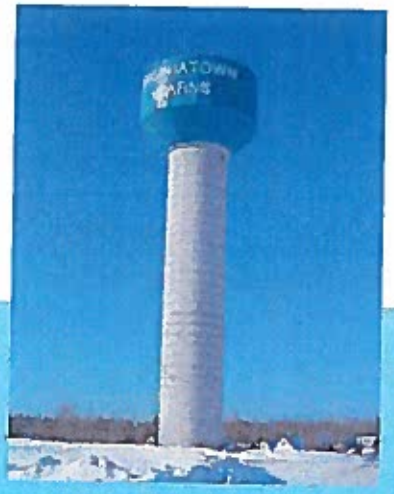
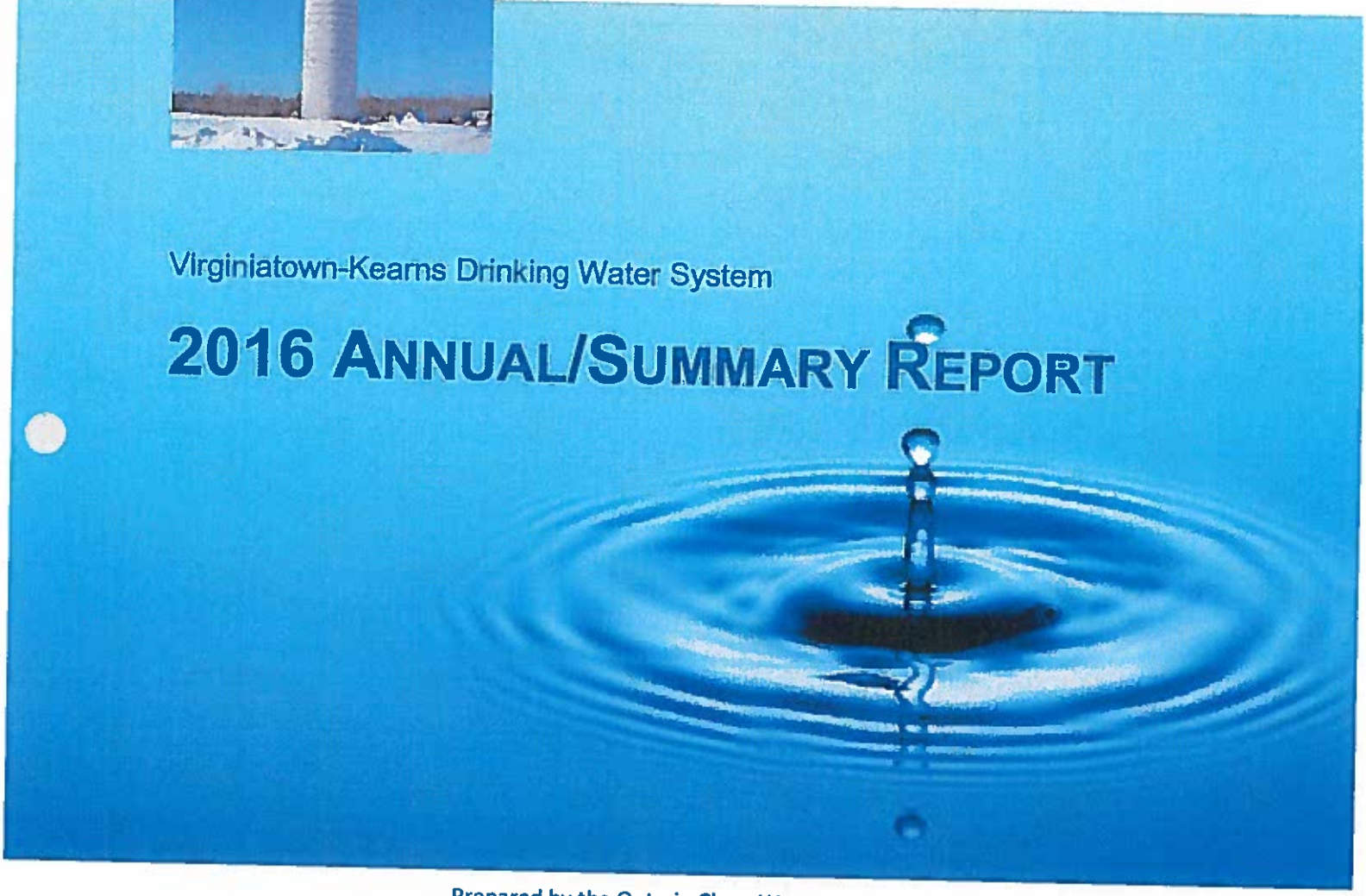


Ontario Clean Water Agency
Agence Ontarienne Des Eaux

Virginiatown-Kearns Drinking Water System

2016 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 Provincial Officer Order 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 2016 Annual/Summary Report.

Virginiatown-Kearns Drinking Water System

Section 11

2016 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, 2016 to December 31, 2016

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 www.mcgarry.ca/news.html

Location where 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 2016 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-Kearns 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 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 on 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 30 tower filling cycles.

Water Treatment

The groundwater is then chlorinated using a sodium hypochlorite disinfection system, complete with a chemical feed panel consisting of duplicate chemical metering pumps (duty and standby), and duplicate storage tanks with secondary spill containment. 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). There are 41 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.

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). OCWA implemented a new Workplace Management System (Maximo) in 2016 which better maintains and optimizes facility assets. All routine maintenance activities conducted at the water treatment plant were accomplished in 2016.

Significant expenses incurred in the drinking water system include:

- The Township of McGarry received OCIF funding for the distribution system rehabilitation and repairs project. Inspection work was completed in the Spring/Summer of 2016 and repairs are planned for the summer of 2017

5.0 Drinking Water System Highlights

- OCWA assumed complete operational responsibility of the distribution system in January 2016.
- The MOECC performed an annual inspection on June 8, 2016. The inspection included a physical assessment of the well house, the water tower, the wellheads and selected aspects of the distribution system as well as a document review for the period of May 12, 2015 to June 7, 2016. The system received a risk rating of 100% with no non-compliance issues identified in the report.
- SAI Global conducted a re-accreditation (verification) audit of the Virginiatown-Kearns Drinking Water System's Quality and Environmental Management System (QEMS). The system and processes associated with the QEMS were evaluated on March 30, 2016 to ensure implementation of the Operational Plan and procedures and conformance to the Drinking Water Quality Management Standard. Three (3) minor non-conformances and four (4) opportunities for improvement were identified during the audit and have been resolved. Re-accreditation was achieved on May 6, 2016.
- The Township of McGarry received OCIF funding for the collection system and distribution system rehabilitation and repairs project. OCWA's Engineering Department managed the project.
- Water distribution system leak testing was performed by OCWA's Distribution Group which identified a number of leaks.
- Communication issues between the tower and the well house from May 5th to May 12th caused Well No. 2 to intermittently start and stop. Trees in the area grew taller and blocked the radio signal. The antenna was extended and the issue was resolved.
- OCWA performed the annual water tower inspection. No damage identified for the rupture disk and vents.
- OCWA implemented a new computerized work order system (Maximo) which will better maintain the system's assets and optimize the facility. The system is used to schedule equipment maintenance activities and capture details of work performed. This information is valuable to assess equipment operation, locate equipment specifications and track any additional maintenance completed or required.

6.0 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, four (4) the adverse water quality incidents were reported to the MOE's Spills Action Centre.

1. **AWQI 129288 – Watermain Break/Loss of Pressure/Boil Water Advisory**
   April 26 @ 1630 hrs: Watermain break occurred on 29th Street affecting approximately 19 users. The break was isolated to conduct repairs. The Spills Action Center and the local

Health Unit were notified. A precautionary boil water advisory (BWA) was issued. The water main was repaired and the affected section was flushed and sampled as per AWWA Standard C651-14. Two sets of 3 bacteriological samples were collected. Sample results indicated no detectable total coliforms or *E.coli*. BWA was lifted on April 29th at approximately 2400 hours.

2. **AWQI 130446 – Watermain Break/Loss of Pressure/Boil Water Advisory**
July 26 @ 1130 hrs: Watermain break at Dorfman Street & Connell Avenue affecting about 10 users (category 2 break). MOE SAC and the local Health Unit were notified. A precautionary boil water advisory (BWA) was issued. The water main was repaired and the affected section was flushed and sampled. Sample results indicated no total coliforms or *E.coli*. BWA was lifted on July 28th at approximately 1600 hours.

3. **AWQI #130865 - Watermain Break/Loss of Pressure/Boil Water Advisory**
August 20th @ 0900 hrs: Watermain repair at corner of Connell and Cockeram Avenue affecting 18 users (category 2 break). A hydrant was hit by a car causing the break. MOE SAC and the local Health Unit were notified. A precautionary BWA was issued. The water main was isolated and repaired at 1245 hours. After the repair the area was flushed and sampled. Sample results indicated no total coliforms or *E.coli* and less than detectable HPC. BWA was lifted on August 22nd at approximately 1330 hours.

4. **AWQI #131565 – Total Coliforms (1 CFU/100mL)**
October 17 @ 1040 hrs: 1 Total Coliform was detected in a drinking water sample collected at the Virginiatown water tower (point of entry into the distribution system). Free chlorine residual = 1.20 mg/L. Re-samples were collected as required by O. Regulation 170/03; upstream, downstream at the site of the adverse result on October 18th. All results indicated zero total coliforms and zero *E. coli*. Issue resolved on October 25th.

7.0 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)	52	0 to 0	0 to 0	0	N/A
Raw (standby well)	52	0 to 0	0 to 7	0	N/A
Treated	53	0 to 0	0 to 1*	53	<10 to 340
Distribution (Location 1)	53	0 to 0	0 to 0	27	<10 to <10
Distribution (Location 2)	53	0 to 0	0 to 0	27	<10 to 20

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.

Notes: 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.

July 11th - 1 Total Coliforms were detected in a drinking water sample collected at the point of entry into the distribution system (water tower) (AWQI No.131565

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

8.0 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)	12	0.15 to 0.76	NTU
Turbidity (standby well)	12	0.32 to 5.06	

Note: Samples required once every month.

Continuous Monitoring in the Treatment Process

Parameter	# of Samples	Range of Results *(min to max)*	Unit of Measure	Standard
Free Chlorine	8760	0.416 to 1.72	mg/L	CT*

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

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
Combined Chlorine (Location 1)	104	0.31 to 1.59	mg/L	0.05
Combined Chlorine (Location 2)	104	0.25 to 1.47		
Combined Chlorine (Location 3)	104	0.24 to 1.73		
Combined Chlorine (Location 4)	52	0.52 to 1.43		

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 water treatment plant)*

Date of Sample	Nitrate Result Value	Nitrite Result Value	Unit of Measure	Exceedance
January 12	0.21	< 0.03	mg/L	No
April 11	< 0.1	< 0.05	mg/L	No
July 11	< 0.1	< 0.03	mg/L	No
October 3	< 0.1	< 0.03	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)*

Date of Sample	Result Value	Unit of Measure	Running Average	Exceedance
January 12	1.9	ug/L	2.9	No
April 11	2.2			
July 11	5.14			
October 3	2.3			

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

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 one 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 April 11th and October 5th of 2016. Results are summarized in the table below.

pH & Alkalinity 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)*
April 11	2	6.97 to 7.02	5.0 to 7.6	65.3 to 65.7
October 5	2	6.69 to 6.70	11.4 to 11.6	72.1 to 113

Note: Next lead sampling scheduled for April and October

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

Parameter	Result Value	Unit of Measure	Standard	Exceedance
Antimony	< 0.5	ug/L	6	No
Arsenic	< 1.0	ug/L	25	No
Barium	5.8	ug/L	1000	No
Boron	4.5	ug/L	5000	No
Cadmium	< 0.1	ug/L	5	No
Chromium	1.6	ug/L	50	No
Mercury	< 0.1	ug/L	1	No
Selenium	< 1.0	ug/L	10	No
Uranium	< 1.0	ug/L	20	No

Note: Sample required every 36 months (sample date = *October 16, 2014).* Next sampling scheduled for October 2017

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

Parameter	Result Value	Unit of Measure	Standard	Exceedance
Alachlor	< 0.5	ug/L	5	No
Aldicarb	< 0.7	ug/L	9	No
Aldrin + Dieldrin	< 0.004	ug/L	0.7	No
Atrazine + N-dealkylated metobolites	< 0.9	ug/L	5	No
Azinphos-methyl	< 0.4	ug/L	20	No
Bendiocarb	< 1.0	ug/L	40	No
Benzene	< 0.2	ug/L	5	No
Benzo(a)pyrene	< 0.009	ug/L	0.01	No
Bromoxynil	< 0.6	ug/L	5	No
Carbaryl	< 1.0	ug/L	90	No
Carbofuran	< 1.0	ug/L	90	No
Carbon Tetrachloride	< 0.2	ug/L	5	No
Chlordane (Total)	< 0.004	ug/L	7	No
Chlorpyrifos	< 0.4	ug/L	90	No
Cyanzine	< 0.4	ug/L	10	No
Diazinon	< 0.4	ug/L	20	No
Dicamba	< 0.2	ug/L	120	No
1,2-Dichlorobenzene	< 0.2	ug/L	200	No
1,4-Dichlorobenzene	< 0.2	ug/L	5	No
Dichlorodiphenyl trichloroethane (DDT) + metabolites	< 0.005	ug/L	30	No
1,2-Dichloroethane	< 0.2	ug/L	5	No
1,1-Dichloroethylene (vinylidene chloride)	< 0.2	ug/L	14	No
Dichloromethane	< 1.0	ug/L	50	No
2-4 Dichlorophenol	< 0.6	ug/L	900	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	< 0.2	ug/L	100	No

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

Parameter	Result Value	Unit of Measure	Standard	Exceedance
Diclofop-methyl	< 0.2	ug/L	9	No
Dimethoate	< 0.4	ug/L	20	No
Dinoseb	< 0.06	ug/L	10	No
Diquat	< 7.0	ug/L	70	No
Diuron	< 7.0	ug/L	150	No
Glyphosate	< 20.0	ug/L	280	No
Heptachlor + Heptachlor Epoxide	< 0.004	ug/L	3	No
Lindane (Total)	< 0.0004	ug/L	4	No
Malathion	< 0.4	ug/L	190	No
Methoxychlor	< 0.001	ug/L	900	No
Metolachlor	< 0.2	ug/L	50	No
Metribuzin	< 0.2	ug/L	80	No
Monochlorobenzene	< 0.2	ug/L	80	No
Paraquat	< 1.0	ug/L	10	No
Parathion	< 0.2	ug/L	50	No
Pentachlorophenol	< 0.04	ug/L	60	No
Phorate	< 0.6	ug/L	2	No
Picloram	< 0.4	ug/L	190	No
Polychlorinated Biphenyls (PCB)	< 0.06	ug/L	3	No
Prometryne	< 0.2	ug/L	1	No
Simazine	< 0.4	ug/L	10	No
Temephos	< 20.0	ug/L	280	No
Terbufos	< 0.2	ug/L	1	No
Tetrachloroethylene	< 0.2	ug/L	30	No
2,3,4,6-Tetrachlorophenol	< 0.6	ug/L	100	No
Triallate	< 0.2	ug/L	230	No
Trichloroethylene	< 0.2	ug/L	5	No
2,4,6-Trichlorophenol	< 0.6	ug/L	5	No
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	< 0.06	ug/L	280	No
Trifluralin	< 0.2	ug/L	45	No
Vinyl Chloride	< 0.2	ug/L	2	No

Note: Sample required every 36 months (sample date = *October 16, 2014*). Next sampling scheduled for October 2017

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

Summary of Additional Testing Performed in Accordance with a Legal Instrument.

No additional sampling and testing was required for the Virginiatown-Kearns Drinking Water System during the 2016 reporting period.

Virginiatown-Kearns Drinking Water System

Schedule 22

2016 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.:	279-201-3 (issued January 29, 2016)
Permit to Take Water (PTTW) No.:	1034-9UHP99 (issued March 12, 2015)
Period being reported:	January 1, 2016 to December 31, 2016

2.0 Requirements the System Failed to Meet

According to information kept on record by OCWA, the Virginiatown-Kearns Drinking Water System has complied with all the requirements set out in the system's MDWL, its DWWP, the Act and its Regulations.

However, it should be noted that, four (4) adverse water quality incidents were reported to the MOE's Spills Action Center. Refer to Section 6.0 – *Details on Notices of Adverse Test Results and Other Problems Reported to & Submitted to the Spills Actions Center* on page 6 of this report for details.

3.0 Summary of Quantities and Flow Rates

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, an E&H 8" Promag 50W 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 2016 reporting period, including total monthly volumes, average monthly volumes, maximum monthly volumes, and maximum flow rates.

Raw Water

2016 - Monthly Summary of Water Takings from the Source (Cheminis Well No. 1)
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)	32269	33871	38284	37751	33786	30261	26319	25363	25659	22640	21446	24860	352509
Average Volume (m^3/d)	1041	1168	1235	1258	1090	1009	849	818	855	730	715	802	964
Maximum Volume (m^3/d)	1223	1318	1498	1419	1431	1256	1016	986	1299	1122	815	952	1498
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)	1369	1359	1355	1369	1417	1381	1419	1384	1388	2050	1420	1420	2050
PTTW - Maximum Allowable Flow Rate (L/min)	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420

Note: High flows recorded on October 31st (2050 L/min) due to a break in the 6000 m feed line from the well house to the water tower

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)	1496	1120	1849	1298	1494	1155	1205	1258	1248	1625	977	1427	16152
Average Volume (m^3/d)	48	39	60	43	48	39	39	41	42	52	33	46	44
Maximum Volume (m^3/d)	535	392	662	482	429	325	196	236	304	679	259	367	679
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)	1128	1104	1059	1052	1090	1104	1104	1094	1095	1094	1105	1105	1128
PTTW - Maximum Allowable Flow Rate (L/min)	1105	1105	1105	1105	1105	1105	1105	1105	1105	1105	1105	1105	1105

Note: Well #2 was started manually to collect bacteriological sample (1128 L/min). A short spike occurred when the well pump was started (10 seconds). This is a false indication of the true peak flow.

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)	33765	34991	40133	39049	35280	31416	27524	26621	26907	24265	22423	26287	368661
Average Volume (m^3/d)	1089	1207	1295	1302	1138	1047	888	859	897	783	747	848	1008
Maximum Volume (m^3/d)	1223	1319	1498	1419	1431	1256	1020	986	1412	1202	874	997	1498
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):	2,044.8 m^3/day / 1,420 L/minute
Well T3/91 (Standby Well):	1,500 m^3/day / 1,105 L/minute
Total Combined Daily Volume:	2,044.8 m^3/day

A review of the raw water flow data indicates that the total daily volume of water taken from each well never exceeded the allowable limits. The maximum combined volume measured was 1,498 m^3 on March 3rd which occurred during service lines repairs.

Well No. 1 exceeded the allowable flow rate on October 31st (2050 L/minute) when the 6000 m transmission line from the well house to the water tower was punctured by a contractor. No homes were affected and there was sufficient storage in the tower to supply residents until the break was repaired.

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 120 days in 2016 and never ran more than 10 hours each day. The well did however exceed the allowable flow rate on January 18th when the pump was started manually to collect a bacteriological sample. The high flow rate lasted for about 10 seconds. This spike in flow is a false indication of the true peak rate.

Treated Water

2016 - Monthly Summary of Treated Water Supplied to the Distribution System
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)	32329	33660	38621	37116	32748	30068	26280	25218	24411	22063	21074	25208	348796
Average Volume (m^3/d)	1043	1161	1246	1237	1056	1002	848	813	814	712	702	813	954
Maximum Volume (m^3/d)	1138	1200	1419	1343	1141	1179	946	908	883	901	772	899	1419
MDWL - Rated Capacity (m^3/day)	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045

Schedule C, Section 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 a maximum flow rate of 2045 m^3 on any calendar day. The Virginiatown-Kearns DWS complied with this limit having a recorded maximum volume of 1419 m^3 on March 3rd which is 69.4% of the rated capacity.

Figure 1 compares the average and maximum flow rates into the distribution system to the rated capacity of the system identified in the MDWL. This information enables the Owner to assess the system's existing and future planned water usage needs.

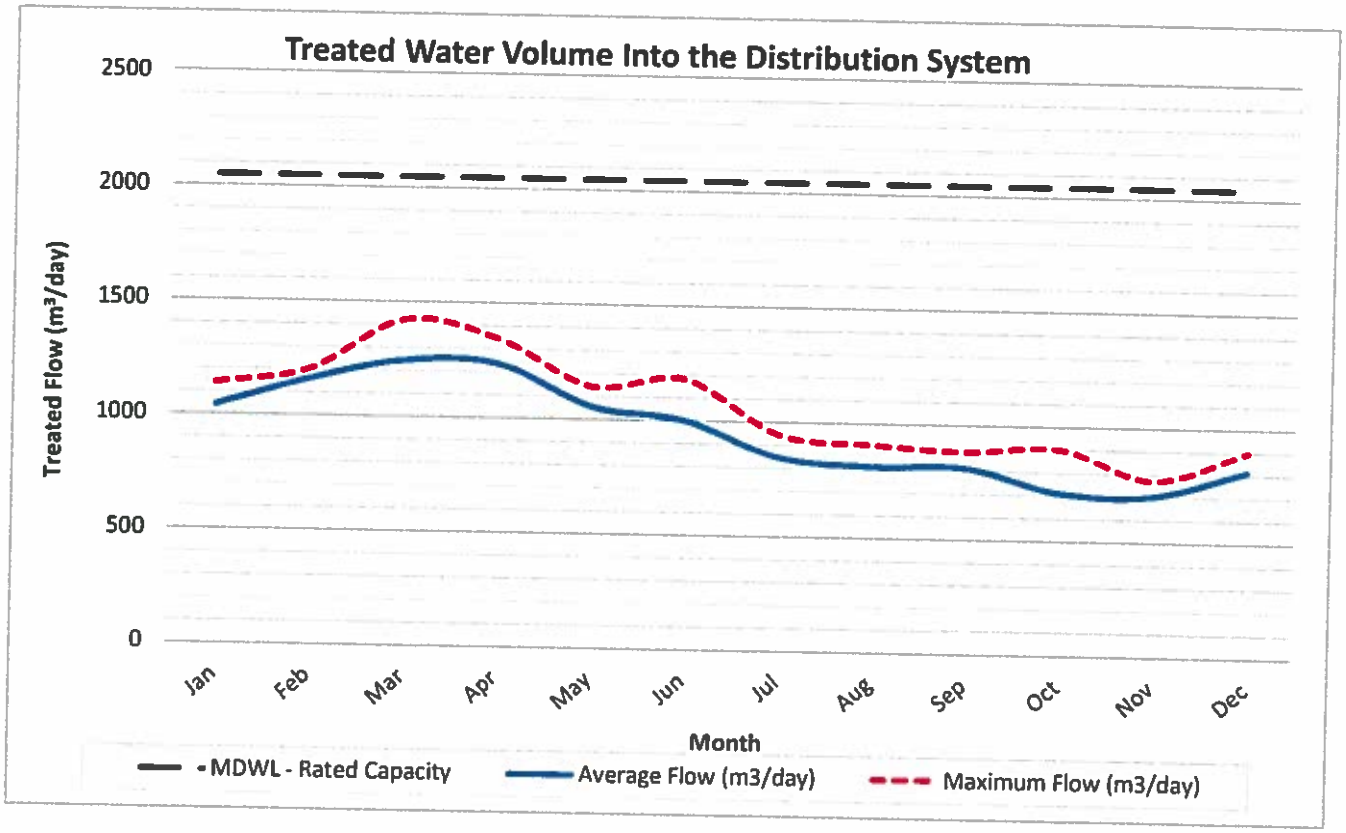
Comparison of the Flow Summary to the Rated Capacity & Flow Rates Allowed in the Systems Licence & Permit

Rated Capacity of the Plant (MDWL)	2,045 m^3/day	
Average Daily Flow for 2016	954 m^3/day	46.6 % of the rated capacity
Maximum Daily Flow for 2016	1,419 m^3/day	69.4 % of the rated capacity
Total Treated Water Produced in 2016	348,796 m^3	

The Virginiatown-Kearns water treatment plant is rated to produce 2,045 cubic meters of water per day as specified in the system's Municipal Drinking Water Licence. The average daily flow was 954 m^3 per day, which is 46.6% of the rated capacity. This information clearly shows that the plant is well within its rated capacity and is able to meet current demands of consumers.

Figure 1: 2016 - Daily Volume of Treated Water into the Distribution System

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Flow (m^3/day)	1043	1161	1246	1237	1056	1002	848	813	814	712	702	813
Maximum Flow (m^3/day)	1138	1200	1419	1343	1141	1179	946	908	883	901	772	899
MDWL - Rated Capacity	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045	2045
% Rated Capacity	56	59	69	66	56	58	46	44	43	44	38	44



CONCLUSION

In 2016, the Virginiatown-Kearns Drinking Water System (DWS) provided safe and reliable drinking water to the communities of Virginiatown, North Virginiatown and Kearns. The system complied with the regulatory requirements of the Safe Drinking Water Act and its Regulations and met the terms and conditions outlined in its site specific drinking water works permit and municipal drinking water licence having no incidents of non-compliance during the reporting period.

The system was able to operate within the rated capacity of the licence while meeting the community's demand for water use; however Well No. 1 exceeded the maximum allowable flow rate specified in its permit on October 31st during a major water main break.

APPENDIX A

Monthly Summary of Microbiological Test Results

VIRGINIATOWN-KEARNS DRINKING WATER SYSTEM
MONTHLYSUMMARY OF MICROBIOLOGICAL TEST RESULTS

Facility Org Number: 5085
Facility Works Number: 220000317
Facility Name: VIRGINIATOWN-KEARNS (MCGARRY) DRINKING WATER SYSTE
Facility Owner: Municipality: Township of McGarry
Facility Classification: None required
Service Population: 590.0
Total Design Capacity: 2045.0 m3/day
From: 01/01/2016 to 31/12/2016

	01/2016	02/2016	03/2016	04/2016	05/2016	06/2016	07/2016	08/2016	09/2016	10/2016	11/2016	12/2016	Total	Avg	Max	Min
RAW WATER																
Well 1 (Cheminis) / Total Coliform: TC - cfu/100mL																
Count Lab	4	5	4	4	5	4	4	5	4	5	4	4	52			
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	4	5	4	4	5	4	4	5	4	5	4	4	52			
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	4	5	4	4	5	4	4	5	4	5	4	4	52			
Max Lab	< 0	< 0	0	0	0	0	0	1	0	1	0	7			7	
Mean Lab	< 0	< 0	0	0	0	0	0	0.2	0	0.2	0	1.75		< 0.173		
Min Lab	< 0	< 0	0	0	0	0	0	0	0	0	0	0				0
Well 2 (Standby) / E. Coli: EC - cfu/100mL																
Count Lab	4	5	4	4	5	4	4	5	4	5	4	4	52			
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																
Treated Water (POE) / Total Coliform: TC - cfu/100mL																
Count Lab	4	5	4	4	5	4	4	5	4	6	4	4	53			
Max Lab	< 0	< 0	0	0	0	0	0	0	0	1	0	0			1	
Mean Lab	< 0	< 0	0	0	0	0	0	0	0	0.167	0	0		< 0.019		
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	4	5	4	4	5	4	4	5	4	6	4	4	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	4	5	4	4	5	4	4	5	4	6	4	4	53			
Max Lab	< 10	< 10	< 10	< 30	< 10	< 10	< 10	< 30	< 10	< 340	< 10	< 10			340	
Mean Lab	< 10	< 10	< 10	< 15	< 10	< 10	< 10	< 14	< 10	< 65	< 10	< 10		< 16.981		
Min Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10				< 10

October 17th - 1 Total Coliform was detected in a drinking water sample collected at the point of entry into the distribution system (water tower). AWQI No. 131565

DISTRIBUTION WATER		01/2016		02/2016		03/2016		04/2016		05/2016		06/2016		07/2016		08/2016		09/2016		10/2016		11/2016		12/2016	Total	Avg	Max	Min
VT-3 (Bacti) / E. Coli - cfu/100mL																												
Count Lab		4		5		4		4		5		4		4		5		4		6		4		4	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) / Total Coliform: TC - cfu/100mL																												
Count Lab		4		5		4		4		5		4		4		5		4		6		4		4	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		2		3		2		2		2		2		2		3		2		3		2		2	27			
Max Lab	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10			<	10
Mean Lab	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10		<	10	
Min Lab	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10				10
VT-4 (Bacti) / E. Coli - cfu/100mL																												
Count Lab		4		5		4		4		5		4		4		5		4		6		4		4	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) / Total Coliform: TC - cfu/100mL																												
Count Lab		4		5		4		4		5		4		4		5		4		6		4		4	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		2		3		2		2		2		2		4		2		2	27			
Max Lab	<	10	<	10	<	10	<	10	<	20	<	10		20	<	10	<	10	<	10	<	10	<	10			<	10
Mean Lab	<	10	<	10	<	10	<	10	<	13.333	<	10	<	15	<	10	<	10	<	10	<	10	<	10		<	10.741	
Min Lab	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10	<	10				10

APPENDIX B

Monthly Summary of Operational Data

VIRGINIATOWN-KEARNS DRINKING WATER SYSTEM
MONTHLYSUMMARY OF OPERATIONAL DATA

Facility Org Number: 5085
Facility Works Number: 220000317
Facility Name: VIRGINIATOWN-KEARNS (MCGARRY) DRINKING WATER SYSTE
Facility Owner: Municipality: Township of McGarry
Facility Classification: None required
Service Population: 590.0
Total Design Capacity: 2045.0 m3/day
From: 01/01/2016 to 31/12/2016

	01/2016	02/2016	03/2016	04/2016	05/2016	06/2016	07/2016	08/2016	09/2016	10/2016	11/2016	12/2016	Total	Avg	Max	Min
RAW WATER																
Well 1 (Cheminis) / Turbidity - NTU																
Count IH	1	1	1	1	1	1	1	1	1	1	1	1	12			
Max IH	0.46	0.42	0.29	0.15	0.4	0.27	0.32	0.76	0.27	0.33	0.45	0.69			0.76	
Mean IH	0.46	0.42	0.29	0.15	0.4	0.27	0.32	0.76	0.27	0.33	0.45	0.69		0.40		
Min IH	0.46	0.42	0.29	0.15	0.4	0.27	0.32	0.76	0.27	0.33	0.45	0.69				0.15
Well 2 (Standby) / Turbidity - NTU																
Count IH	1	1	1	1	1	1	1	1	1	1	1	1	12			
Max IH	0.43	0.58	0.72	0.96	0.58	2.42	1.89	1.6	0.32	5.06	0.93	1.35			5.06	
Mean IH	0.43	0.58	0.72	0.96	0.58	2.42	1.89	1.6	0.32	5.06	0.93	1.35		1.40		
Min IH	0.43	0.58	0.72	0.96	0.58	2.42	1.89	1.6	0.32	5.06	0.93	1.35				0.32
TREATED WATER																
Treated Water (POE) / Cl Residual: Free - mg/L																
Max OL	1.462	1.723	1.551	1.573	1.487	1.521	1.286	1.216	1.326	1.285	1.334	1.491			1.723	
Mean OL	1.327	1.405	1.446	1.38	1.359	1.36	1.103	1.048	1.115	1.223	1.204	1.342		1.276		
Min OL	1.139	0.668	1.297	0.472	0.416	1.169	1.027	0.659	0.991	1.09	1.038	1.037				0.416
DISTRIBUTION WATER																
Residual No. 1 / Cl Residual: Free - mg/L																
Count IH	8	9	9	8	9	9	8	10	8	9	9	8	104			
Max IH	1.23	1.59	1.43	1.4	1.31	1.34	1.21	1.05	1.15	1.25	1.31	1.34			1.59	
Mean IH	1.118	1.183	1.3	1.176	1.093	1.261	0.994	0.818	0.854	0.926	1.059	0.874		1.055		
Min IH	1.03	0.65	1.13	0.84	0.53	1.14	0.43	0.31	0.58	0.53	0.7	0.63				0.31
Residual No. 2 / Cl Residual: Free - mg/L																
Count IH	8	9	9	8	9	9	8	10	8	9	9	8	104			
Max IH	1.39	1.33	1.44	1.47	1.35	1.38	1.08	1.04	0.97	1.18	1.23	1.27			1.47	
Mean IH	1.129	1.167	1.319	1.179	1.187	1.267	0.873	0.677	0.679	0.836	0.989	0.992		1.024		
Min IH	0.93	0.69	1.16	0.87	0.67	1.12	0.25	0.39	0.31	0.35	0.69	0.54				0.25
Residual No. 3 / Cl Residual: Free - mg/L																
Count IH	8	9	9	8	9	9	8	10	8	9	9	8	104			
Max IH	1.31	1.73	1.5	1.38	1.36	1.3	1.16	0.98	1.14	1.12	1.11	1.41			1.73	
Mean IH	1.148	1.218	1.293	1.171	1.192	1.157	0.86	0.744	0.943	0.849	0.919	1.089		1.046		
Min IH	1	0.72	0.97	0.89	0.71	0.87	0.63	0.36	0.72	0.47	0.24	0.63				0.24
Residual No. 4 / Cl Residual: Free - mg/L																
Count IH	4	5	4	4	5	4	4	5	4	5	4	4	52			
Max IH	1.3	1.43	1.41	1.33	1.32	1.29	1.13	0.97	1.05	1.02	1.13	1.35			1.43	
Mean IH	1.138	1.346	1.343	1.183	1.21	1.25	1.023	0.822	0.9	0.836	0.945	1.13		1.091		
Min IH	0.9	1.27	1.27	1.03	1.01	1.19	0.87	0.52	0.55	0.6	0.74	0.94				0.52