



**Armow Drinking Water System**

**2017 Annual Water Summary Report**

## 1. INTRODUCTION AND BACKGROUND

The municipality owns and operates drinking water systems to provide residents with safe, potable water. These municipal drinking water systems are regulated under various legislation and legal documents including the Safe Drinking Water Act and Ontario Regulation 170/03 Drinking Water Systems. O. Reg. 170 requires that the municipality complete an annual water report (Section 11) and an annual summary report (Schedule 22). Previously two separate reports were completed, but for the 2017 reporting period, they have been combined into this one report.

The reports are available free of charge on the municipal website at [www.kincardine.net](http://www.kincardine.net) or by contacting the Water Services Department at [waterservice@kincardine.net](mailto:waterservice@kincardine.net).

### 1.1. System Description

<b>Drinking-Water System Number:</b>	220008792
<b>Drinking-Water System Name:</b>	Armow Drinking Water System
<b>Drinking-Water System Owner:</b>	Municipality of Kincardine
<b>Drinking-Water System Category:</b>	Small Municipal Residential
<b>Period being reported:</b>	Year 2017

The Armow Drinking Water System (DWS) consists of one non-GUDI well (which means that it is a secure well and not under the influence of surface water). Primary treatment is achieved through UV disinfection. The UV system consists of two (2) Trojan UV units, each capable of treating 0.63 L/s (10 gpm). Each UV unit is equipped with flow restrictors to ensure that the flow limit is not exceeded. If one UV unit is off-line, a sufficient volume of water can be treated by the second UV unit to meet the demands of the distribution system. If both UV units are unable to run, the well will be locked out. Upstream of each UV unit is a 50/5 micron cartridge filter. Sodium hypochlorite (NSF certified) is used for secondary treatment.

### 1.2. Major Expenses

The system required repairs and replacements as follows:

Data collection equipment replacement (\$4,776.00)

## 2. WATER QUALITY MONITORING

Each municipal drinking water system is required to do testing to ensure that the water supplied to consumers is safe for consumption. Some of these tests such as chlorine residuals are done on-site while others, like microbiological testing, must be performed by a licenced laboratory.

### 2.1. Microbiological Testing

O. Reg. 170 Schedule 11, requires the Armow DWS to take a minimum of one sample per month of raw water from the well, and one sample every two weeks of distribution water and have them tested for Escherichia coli (E. coli) and total coliforms. The distribution samples must also be tested for heterotrophic plate count (HPC). Our internal sampling schedule exceeds the minimum requirements by having operations staff collect one treated and one distribution sample every week and have them tested for E. coli, total coliform and HPC.

Any E. coli or total coliform results above 0 in treated or distribution water must be reported to the Ministry of Environment and Climate Change (MOECC) and Medical Officer of Health (MOH).

Heterotrophic plate count is a colony count of general bacteria population. There is no adverse limit for HPC samples. Results over 500 colonies per 1 mL may indicate a change in water quality but it is not considered an indicator of unsafe water.

The results from the 2017 sampling program are shown in the table below.

Water Source	Number TC/EC of Samples	Range of Total Coliform Results (#-#)	Range of E.coli Results (#-#)	Number of HPC Samples	Range of HPC Results (#-#)
Raw	13	0 – 0	0 – 0	13	0 – 18
Treated	52	0 – 13	0 – 5	52	0 – 29
Distribution	52	0 – 0	0 – 0	51	0 – 6

### 2.2. Chemical Testing

The Safe Drinking Water Act Reg 170 Schedule 13 requires periodic testing of the water for chemical parameters. The Armow DWS is required to test for nitrite/nitrate and Haloacetic Acid on a quarterly basis. Until recently, trihalomethanes were tested for quarterly but due to the low levels, they are now only required to be tested on a quarterly basis every third year. The tables below outline other inorganic and organic parameters that are required to be tested every five years and include the date and result of the most recent test. Any result displayed as less than (<) are below the method detection limit of the lab.

Sodium and fluoride levels exceed the Ontario Drinking Water Quality Standards, but they are naturally occurring in the groundwater and do not need to be tested more frequently than every five years.

If the concentration of a parameter is above half of the Maximum Acceptable Concentration (MAC) under the Ontario Drinking Water Quality Standards, an increased testing frequency of

once every three months is required by the Regulation. Arsenic is naturally occurring in the ground water in the Armow DWS and was required to be tested for quarterly in 2017.

Inorganic Parameters	Sample Date	Result Value	Unit of Measure	Exceedance
<b>Antimony</b>	Oct 19/15	< 0.02	ug/L	No
<b>Arsenic (Annual Average = 16.2 ug/L)</b>	Jan 9/17	16.7	ug/L	No
	Apr 10/17	15.8		
	June 12/17	15.8		
	July 17/17	17		
	Oct 16/17	15.5		
<b>Barium</b>	Oct 19/15	22.0	ug/L	No
<b>Boron</b>	Oct 19/15	286	ug/L	No
<b>Cadmium</b>	Oct 19/15	0.008	ug/L	No
<b>Chromium</b>	Oct 19/15	< 0.03	ug/L	No
<b>Mercury</b>	Oct 19/15	< 0.01	mg/L	No
<b>Selenium</b>	Oct 19/15	< 0.04	ug/L	No
<b>Sodium</b>	Oct 19/15	46.8	mg/L	Yes
	Oct 26/15	51.1		
<b>Uranium</b>	Oct 19/15	1.17	ug/L	No
<b>Fluoride</b>	Oct 19/15	2.16	mg/L	Yes
	Oct 26/15	2.11		
	Oct 26/15	2.05		
<b>Nitrite</b>	Jan 9/17	< 0.003	mg/L	No
	Apr 10/17	0.032		
	July 17/17	< 0.003		
	Oct 16/17	< 0.003		
<b>Nitrate</b>	Jan 9/17	0.011	mg/L	No
	Apr 10/17	< 0.006		
	July 17/17	0.006		
	Oct 16/17	0.011		

Organic Parameters	Sample Date	Result Value	Unit of Measure	Exceedance
<b>Alachlor</b>	Oct 19/15	< 0.02	ug/L	No
<b>Aldicarb</b>	Oct 19/15	< 0.01	ug/L	No
<b>Aldrin + Dieldrin</b>	Oct 19/15	< 0.01	ug/L	No
<b>Atrazine + N-dealkylated metabolites</b>	Oct 19/15	< 0.01	ug/L	No
<b>Azinphos-methyl</b>	Oct 19/15	< 0.05	ug/L	No
<b>Bendiocarb</b>	Oct 19/15	< 0.01	ug/L	No
<b>Benzene</b>	Oct 19/15	< 0.32	ug/L	No
<b>Benzo(a)pyrene</b>	Oct 19/15	< 0.004	ug/L	No
<b>Bromoxynil</b>	Oct 19/15	< 0.33	ug/L	No
<b>Carbaryl</b>	Oct 19/15	< 0.05	ug/L	No
<b>Carbofuran</b>	Oct 19/15	< 0.01	ug/L	No
<b>Carbon Tetrachloride</b>	Oct 19/15	< 0.16	ug/L	No
<b>Chlordane (Total)</b>	Oct 19/15	< 0.01	ug/L	No
<b>Chlorpyrifos</b>	Oct 19/15	< 0.02	ug/L	No
<b>Cyanazine</b>	Oct 19/15	< 0.03	ug/L	No

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Diazinon	Oct 19/15	< 0.02	ug/L	No
Dicamba	Oct 19/15	< 0.20	ug/L	No
1,2-Dichlorobenzene	Oct 19/15	< 0.41	ug/L	No
1,4-Dichlorobenzene	Oct 19/15	< 0.36	ug/L	No
Dichlorodiphenyltrichloroethane (DDT) + metabolites	Oct 19/15	< 0.01	ug/L	No
1,2-Dichloroethane	Oct 19/15	< 0.35	ug/L	No
1,1-Dichloroethylene (vinylidene chloride)	Oct 19/15	< 0.33	ug/L	No
Dichloromethane	Oct 19/15	< 0.35	ug/L	No
2-4 Dichlorophenol	Oct 19/15	< 0.15	ug/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	Oct 19/15	< 0.19	ug/L	No
Diclofop-methyl	Oct 19/15	< 0.40	ug/L	No
Dimethoate	Oct 19/15	< 0.03	ug/L	No
Dinoseb	Oct 19/15	< 0.36	ug/L	No
Diquat	Oct 19/15	< 1	ug/L	No
Diuron	Oct 19/15	< 0.03	ug/L	No
Glyphosate	Oct 19/15	< 1	ug/L	No
Heptachlor + Heptachlor Epoxide	Oct 19/15	< 0.01	ug/L	No
Lindane (Total)	Oct 19/15	< 0.01	ug/L	No
Malathion	Oct 19/15	< 0.02	ug/L	No
Methoxychlor	Oct 19/15	< 0.01	ug/L	No
Metolachlor	Oct 19/15	< 0.01	ug/L	No
Metribuzin	Oct 19/15	< 0.02	ug/L	No
Monochlorobenzene	Oct 19/15	< 0.3	ug/L	No
Paraquat	Oct 19/15	< 1	ug/L	No
Parathion	Oct 19/15	< 0.02	ug/L	No
Pentachlorophenol	Oct 19/15	< 0.15	ug/L	No
Phorate	Oct 19/15	< 0.01	ug/L	No
Picloram	Oct 19/15	< 1	ug/L	No
Polychlorinated Biphenyls (PCB)	Oct 19/15	< 0.04	ug/L	No
Prometryne	Oct 19/15	< 0.03	ug/L	No
Simazine	Oct 19/15	< 0.01	ug/L	No
THM (2015 annual average = 7.4 ug/L)	Jan 13/15 Apr 13/15 July 13/15 Oct 19/15	5.4 2.1 9.2 13	ug/L	No
Temephos	Oct 19/15	< 0.01	ug/L	No
Terbufos	Oct 19/15	< 0.01	ug/L	No
Tetrachloroethylene	Oct 19/15	< 0.35	ug/L	No
2,3,4,6-Tetrachlorophenol	Oct 19/15	< 0.20	ug/L	No
Triallate	Oct 19/15	< 0.01	ug/L	No
Trichloroethylene	Oct 19/15	< 0.44	ug/L	No
2,4,6-Trichlorophenol	Oct 19/15	< 0.25	ug/L	No
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	Oct 19/15	< 0.22	ug/L	No
Trifluralin	Oct 19/15	< 0.02	ug/L	No
Vinyl Chloride	Oct 19/15	< 0.17	ug/L	No

In 2016, the MOECC removed some parameters and added others to the lists of those required to be tested for. The new parameters have been added to the tables above and for now the old parameters have still been included as well.

Sampling and testing for Haloacetic Acid (HAA) in the distribution system is a new requirement in 2017. The limit as set in the Ontario Drinking Water Quality Standards is 80 ug/L and starting in 2020 must also be expressed as a running annual average. HAAs are a by-product of the disinfection process.

Date Sampled	HAA Result Value (ug/L)	Running Annual Average (ug/L)	Exceedance
January 9/17	5.3	5.3	No
April 10/17	<5.3	5.3	No
July 17/17	<5.3	5.3	No
October 16/17	7.9	6.0	No

The Armow DWS does not have significant levels of lead and so is currently under a reduced-sampling program. Under this sampling program, O. Reg 170 Schedule 15.1 requires sampling for lead every three years and lead-related parameters every year. Lead was last sampled in 2015 and was therefore not required to be sampled in 2017.

Parameter	Location Type	Number of Samples	Range of Results
Lead (ug/L)	Distribution	0	--
pH	Distribution	2	7.67 – 8.07
Alkalinity (mg/L)	Distribution	2	119 – 120

### 2.3. Operational Monitoring

Ultraviolet (UV) light is used for primary disinfection of the Armow raw water. A minimum UV dosage of 40 mJ/cm<sup>2</sup> must be maintained for adequate disinfection. The UV dosage is continuously monitored.

	UV dosage (mJ/cm <sup>2</sup> ) Range of Results (#-#)
UV Unit #1	41.4 – 297.2
UV Unit #2	40.5 – 338.1

Sodium hypochlorite is used for secondary disinfection. The free chlorine residual is monitored continuously on the treated water and a sample of distribution water is tested at least twice a week for free chlorine residual.

As a target, free chlorine residual within the distribution system should be above 0.20 mg/L. A distribution free chlorine level lower than 0.05 mg/L must be reported and corrective action taken.

Distribution Water	Number of Grab Samples	Range of Results (#-#)
Free Chlorine Residual	163	0.29 – 1.95

O. Reg 170 Schedule 7 requires that turbidity in the raw water is tested at least once every month. Consistent turbidity results greater than 1 NTU could indicate surface water influence on the well.

Raw Water Turbidity	Number of Grab Samples	Range of Results (#-#)
Armow Well	33	0.16 – 0.59

### 3. WATER QUANTITY

The following tables list the quantities and flow rates of the water supplied to the distribution system during the reporting period covered by this report, including monthly average and maximum daily flows and a comparison to the rated capacity specified in the system Municipal Drinking Water Licence. The rated capacity of the treatment system is 82 m<sup>3</sup>/day. There is no maximum flow rate specified for water supplied to the distribution system.

Month	Average Daily Flow (m <sup>3</sup> /day)	% Average Day/Rated Capacity (m <sup>3</sup> /day)	Maximum Daily Flow (m <sup>3</sup> /day)	% Maximum Day/Rated Capacity (m <sup>3</sup> /day)
January	3	4 %	7	8 %
February	3	4 %	5	6 %
March	2	2 %	4	5 %
April	3	4 %	9	11 %
May	3	4 %	4	5 %
June	4	5 %	14	17 %
July	3	4 %	4	5 %
August	3	4 %	4	5 %
September	3	4 %	6	7 %
October	3	4 %	7	8 %
November	4	5 %	17	21 %
December	3	4 %	10	12 %
<b>Annual</b>	<b>3.0</b>	<b>4 %</b>	<b>17</b>	<b>21 %</b>

<b>Month</b>	<b>Average Daily Flow Rate (L/s)</b>	<b>Maximum Daily Flow Rate (L/s)</b>
<b>January</b>	0.03	0.91
<b>February</b>	0.04	0.85
<b>March</b>	0.07	0.95
<b>April</b>	0.11	2.00
<b>May</b>	0.03	0.98
<b>June</b>	0.04	2.03
<b>July</b>	0.03	2.06
<b>August</b>	0.03	1.56
<b>September</b>	0.03	0.97
<b>October</b>	0.03	1.01
<b>November</b>	0.04	1.02
<b>December</b>	0.04	1.07
<b>Annual</b>	0.04	2.06

#### **4. ADVERSE WATER QUALITY INCIDENTS AND NON-COMPLIANCE FINDINGS**

Any adverse results from microbiological samples, chemical samples or observations of operational conditions that indicate adverse water quality are reported to the Spills Action Centre (SAC) of the MOECC and the Medical Officer of Health (MOH). All adverse conditions are responded to immediately and corrective actions taken. There were no adverse water quality incidents in 2017.

The annual MOECC Inspection took place on June 8, 2017. The inspection report did not identify any non-compliance issues and the system received a final inspection rating of 100%.

O. Reg 170 Schedule 22 requires the municipality to identify any requirements of the Act, Regulations, Drinking Water Works Permit, Municipal Drinking Water Licence and any Order that the system failed to meet during the reporting period. These are detailed in the following table including the duration and the measures taken to correct each failure.



<b>Drinking Water Legislation</b>	<b>Requirements the System Failed to Meet</b>	<b>Duration</b>	<b>Corrective Actions</b>
MDWL #088-105 Issue Number 2, dated November 12, 2015, Schedule E, Section 1.0	The UV duty sensors were not checked at least monthly against a reference UV sensor	July 2017	A work order is generated each month. The Lead Operator will assign the verification check work order at the start of the month and the Supervisor will sign off by the 15 <sup>th</sup> of the month to ensure the checks are completed each month. An in-house training session was held on November 23, 2017 to ensure operators understand the regulatory requirements and their responsibilities.
O. Reg. 170, Schedule 22, Section 22-2(1)	The Summary Report was not given to Council prior to March 31, 2017	Summary Reports were given to Council on April 5, 2017	A copy of the annual Schedule of Council Meetings has been obtained from the Clerks department to ensure the Summary Reports are submitted prior to the cut-off date to ensure they are on the Consent Agenda prior to March 31 each year.