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Armow Drinking Water System

2023 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). The information required for each of these reports has been combined into this one report. This annual water summary report will be made available for inspection as per O. Reg. 170 subsection 12 (4).

The reports are available free of charge on the municipal website at www.kincardine.ca or by contacting the Environmental Services Department at waterservice@kincardine.ca. Requests will also be received in person or by telephone at the Municipal Administration Centre (1475 Concession 5, 519-396-3468) or the Environmental Services Office (155 Durham Street, Kincardine, 519-396-4660).

1.1. System Description

Drinking-Water System Number:	220008792
Drinking-Water System Name:	Armow Drinking Water System
Drinking-Water System Owner:	Municipality of Kincardine
Drinking-Water System Category:	Small Municipal Residential
Period being reported:	Year 2023

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 but can also provide primary disinfection if the UV disinfection is unavailable.

In 2018, an arsenic-removal system was installed on-site to remove the naturally occurring arsenic.

An emergency back-up generator is capable of providing sufficient power to the entire Armow treatment system.

1.2. Major Expenses

The system incurred expenses necessary to install, repair or replace required equipment as follows:

Treatment Equipment $ 8,593.20
Distribution Repairs $ 788.64

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 (TC). 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. In October 2023 the raw water sampling was increased to weekly to monitor Total Coliforms.

Any E. coli or total coliform results above zero (0) in treated or distribution water must be reported to the Ministry of Environment, Conservation and Parks (MECP) Spills Action Centre (SAC) and the 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 2023 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	21	0 – 27	0 – 0	3	0 – 0
Treated	52	0 – 0	0 – 0	52	0 – <10
Distribution	52	0 – 0	0 – 0	52	0 – 60

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 on a quarterly basis. Until recently, trihalomethanes and haloacetic acids 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 O. Regulation 170. Due to the naturally

occurring arsenic in the ground water, the Armow DWS is equipped with an arsenic-removal system and is required to test the arsenic levels in the raw and treated water on a monthly basis. Arsenic in the raw water averaged 15.6 ug/L before treatment in 2023. Treated results are below.

Inorganic Parameters	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	October 13/20	< 0.09	µg/L	No
Arsenic	January 16/23	<0.2	µg/L	No
	February 13/23	<0.2		
	March 13/23	<0.2		
	April 17/23	< 0.2		
	May 8/23	< 0.2		
	June 13/23	< 0.2		
	July 17/23	< 0.2		
	August 14/23	< 0.2		
	September 15/23	< 0.2		
	October 17/23	< 0.2		
	November 13/23	< 0.2		
	December 11/23	< 0.2		
Barium	October 13/20	22.6	µg/L	No
Boron	October 13/20	216	µg/L	No
Cadmium	October 13/20	0.010	µg/L	No
Chromium	October 13/20	0.11	µg/L	No
Mercury	October 19/20	< 0.01	µg/L	No
Selenium	October 13/20	< 0.04	µg/L	No
Sodium	October 13/20	46.9	mg/L	Yes
	October 21/20	51.5		
Uranium	October 13/20	0.971	µg/L	No
Fluoride	October 13/20	2.04	mg/L	Yes
	October 19/20	1.99		
Nitrite	January 9/23	< 0.003	mg/L	No
	April 11/23	< 0.003		
	July 10/23	< 0.003		
	October 10/23	< 0.003		
Nitrate	January 9/23	< 0.006	mg/L	No
	April 11/23	0.009		
	July 10/23	0.011		
	October 10/23	0.010		

Organic Parameters	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	October 13/20	< 0.02	µg/L	No
Atrazine + N-dealkylated metabolites	October 13/20	< 0.01	µg/L	No
Azinphos-methyl	October 13/20	< 0.05	µg/L	No
Benzene	October 13/20	< 0.32	µg/L	No
Benzo(a)pyrene	October 13/20	< 0.004	µg/L	No
Bromoxynil	October 13/20	< 0.33	µg/L	No
Carbaryl	October 13/20	< 0.05	µg/L	No
Carbofuran	October 13/20	< 0.01	µg/L	No
Carbon Tetrachloride	October 13/20	< 0.17	µg/L	No
Chlorpyrifos	October 13/20	< 0.02	µg/L	No
Diazinon	October 13/20	< 0.02	µg/L	No
Dicamba	October 13/20	< 0.20	µg/L	No
1,2-Dichlorobenzene	October 13/20	< 0.41	µg/L	No
1,4-Dichlorobenzene	October 13/20	< 0.36	µg/L	No
1,2-Dichloroethane	October 13/20	< 0.35	µg/L	No
1,1-Dichloroethylene (vinylidene chloride)	October 13/20	< 0.33	µg/L	No
Dichloromethane	October 13/20	< 0.35	µg/L	No
2-4 Dichlorophenol	October 13/20	< 0.15	µg/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	October 13/20	< 0.19	µg/L	No
Diclofop-methyl	October 13/20	< 0.40	µg/L	No
Dimethoate	October 13/20	< 0.06	µg/L	No
Diquat	October 13/20	< 1	µg/L	No
Diuron	October 13/20	< 0.03	µg/L	No
Glyphosate	October 13/20	< 1	µg/L	No
Malathion	October 13/20	< 0.02	µg/L	No
2 methyl-4-chlorophenoxyacetic acid (MCPA)	October 13/20	<0.0001 2	µg/L	
Metolachlor	October 13/20	< 0.01	µg/L	No
Metribuzin	October 13/20	< 0.02	µg/L	No
Monochlorobenzene	October 13/20	< 0.3	µg/L	No
Paraquat	October 13/20	< 1	µg/L	No
Pentachlorophenol	October 13/20	< 0.15	µg/L	No
Phorate	October 13/20	< 0.01	µg/L	No
Picloram	October 13/20	< 1	µg/L	No
Polychlorinated Biphenyls (PCB)	October 13/20	< 0.04	µg/L	No
Prometryne	October 13/20	< 0.03	µg/L	No
Simazine	October 13/20	< 0.01	µg/L	No
Terbufos	October 13/20	< 0.01	µg/L	No
Tetrachloroethylene	October 13/20	< 0.35	µg/L	No
2,3,4,6-Tetrachlorophenol	October 13/20	< 0.20	µg/L	No
Triallate	October 13/20	< 0.01	µg/L	No
Trichloroethylene	October 13/20	< 0.44	µg/L	No
2,4,6-Trichlorophenol	October 13/20	< 0.25	µg/L	No
Trifluralin	October 13/20	< 0.02	µg/L	No
Vinyl Chloride	October 13/20	< 0.17	µg/L	No

Trihalomethane (THM) distribution sampling is required quarterly every third year and must also be expressed as a running annual average. The limit as set in the Ontario Drinking Water Quality Standards is 100 ug/L. Trihalomethanes are a by-product of the disinfection process. THM sampling was not required in 2023.

Date Sampled	THM Result Value (µg/L)	Running Annual Average (µg/L)	Exceedance
January 11/21	17	17	No
April 26/21	47	32	No
July 12/21	30	31	No
October 18/21	25	30	No

Sampling and testing for haloacetic acids (HAA) in the distribution system was a new requirement as of 2017. They are also required quarterly every third year as long as the results are below the limit. 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. Haloacetic acids are a by-product of the disinfection process. Below are the Haloacetic acids testing results for 2023.

Date Sampled	HAA Result Value (µg/L)	Running Annual Average (µg/L)	Exceedance
January 9/23	< 5.3	6.7	No
April 11/23	< 5.3	5.7	No
July 10/23	6.5	6.0	No
October 10/23	< 5.3	5.6	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 (pH and alkalinity) every year. PH and Alkalinity sampling was required to be sampled in 2023.

Date Sampled	Location Type	Number of Samples	Parameter	Results
April 3, 2023	Distribution	1	pH	8.1
			Alkalinity (mg/L)	120
August 14, 2023	Distribution	1	pH	8.0
			Alkalinity (mg/L)	108

2.3. Operational Monitoring

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

Sample Location	**UV dosage (mJ/cm^2) Range of Results (#-#)**
UV Unit #1	0 – 429.9
UV Unit #2	0 – 837.1

UV Notes:

1. Zero (0) values were recorded during power flickers and monthly maintenance on the system.
2. UV#1 was out of service from March 10 to April 13, 2023.
3. In January, March, April, May, and December UV#2 had multiple min data points below 40 recorded for 1 data point each time, these faults were not long enough to call out on alarm system.

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	265	0.46 – 2.20

O. Reg 170 Schedule 7 requires that turbidity in the raw water is tested at least once every month. Consistent turbidity results greater than 5 NTU could indicate surface water influence on the well.

Raw Water Turbidity	**Number of Grab Samples**	**Range of Results (#-#)**
Armow Well	51	0.17 – 0.80

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^3/day. There is no maximum flow rate specified for water supplied to the distribution system.

Month	Total Flow (m3)	Average Daily Flow (m^3/day)	% Average Day/Rated Capacity (m^3/day)	Maximum Daily Flow (m^3/day)	% Maximum Day/Rated Capacity (m^3/day)
January	347	11	14%	21	26%
February	107	4	5%	6	7%
March	111	4	4%	6	7%
April	138	5	6%	11	13%
May	203	7	8%	15	18%
June	191	6	8%	13	16%
July	205	7	8%	24	29%
August	139	4	5%	7	9%
September	152	5	6%	9	11%
October	130	4	5%	6	7%
November	119	4	5%	5	6%
December	122	4	5%	5	6%
Annual	1965	5.4	7%	24	29%

Month	Average Daily Flow Rate (L/s)	Maximum Daily Flow Rate (L/s)
January	0.13	2.06
February	0.04	0.76
March	0.04	0.74
April	0.05	1.57
May	0.08	1.25
June	0.07	2.00
July	0.08	0.96
August	0.05	1.06
September	0.06	0.87
October	0.05	1.01
November	0.05	0.80
December	0.05	0.79
Annual	0.06	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 Ministry of the Environment, Conservation and Parks (MECP) and the Medical Officer of Health (MOH). All adverse conditions are responded to immediately and corrective actions taken. There were no reportable incidents in 2023.

The annual Ministry of the Environment, Conservation and Parks Inspection took place on June 29, 2023 and covered the period from June 14, 2022 to June 29, 2023. There were no non-compliances identified in the report.

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. There were no issues identified during the 2023 reporting period.