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Armow Drinking Water System

2024 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 2024

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:

Raw Water Expenses	$564.04
Treatment Equipment	$ 30,327.09
Distribution Repairs	$ 2,264.16
Water Meter Upgrades	$16,863.14

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 2024 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	53	0 – 7	0 – 0	0	
Treated	53	0 – 0	0 – 0	53	0 – 10
Distribution	53	0 – 0	0 – 0	53	0 – 40

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 15.3 ug/L before treatment in 2024. 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 15/24	<0.2	µg/L	No
	February 12/24	<0.2		
	March 11/24	<0.2		
	April 8/24	< 0.2		
	May 21/24	< 0.2		
	June 10/24	0.3		
	July 15/24	< 0.2		
	August 12/24	< 0.2		
	September 9/24	< 0.2		
	October 15/24	< 0.2		
	November 11/24	< 0.2		
	December 16/24	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 15/24	< 0.003	mg/L	No
	April 8/24	0.004		
	July 8/24	< 0.003		
	October 7/24	< 0.003		
Nitrate	January 15/24	0.007	mg/L	No
	April 8/24	0.007		
	July 8/24	0.009		
	October 7/24	0.007		

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	<0.00012	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. Below are the results of the 2024 THM sampling.

Date Sampled	THM Result Value (µg/L)	Running Annual Average (µg/L)	Exceedance
January 15/24	25	32	No
April 8/24	32	28	No
July 8/24	58	35	No
October 7/24	32	37	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 most recent Haloacetic acids testing results. HAA testing was not required in 2024.

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. Lead, PH and Alkalinity sampling was required to be sampled in 2024.

Date Sampled	Location Type	Number of Samples	Parameter	Results
March 25, 2024	Distribution	1	Lead (ug/L)	0.56
			pH	7.5
			Alkalinity (mg/L)	118
August 12, 2024	Distribution	1	Lead (ug/L)	0.35
			pH	7.5
			Alkalinity (mg/L)	125

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 – 837.1
UV Unit #2	0 – 574.7

UV Notes:

1. Zero (0) values were recorded during power flickers and monthly maintenance on the system.
2. January-Multiple issues with data blips below 40, not long enough to alarm out
3. February-Two issues with data blips below 40, not long enough to alarm out
4. Feb 2-UV#2 Sensor and sleeve cleaning caused min 17.4 reading
5. May 15-UV#1 Sensor changed out causing min reading of 6.3.
6. Nov 6-UV fault alarm caused min 0 reading.
7. Dec 21-Data blip below 40 for 1 data point, not long enough to alarm out
8. Dec 24-UV #1 maintenance caused min reading of 5.9

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	263	0.41 – 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	54	0.12 – 0.56

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	115	4	5%	6	7%
February	101	4	4%	5	7%
March	109	4	4%	5	7%
April	122	4	5%	9	10%
May	171	6	7%	14	17%
June	244	8	10%	30	37%
July	161	5	6%	10	12%
August	143	5	6%	10	13%
September	202	7	8%	18	22%
October	190	6	7%	8	10%
November	209	7	8%	11	14%
December	211	7	8%	10	12%
Annual	**1977**	**5.4**	**7%**	**30**	**37%**

Month	Average Daily Flow Rate (L/s)	Maximum Daily Flow Rate (L/s)
January	0.04	0.81
February	0.04	0.77
March	0.04	1.16
April	0.05	2.06
May	0.06	1.10
June	0.09	2.05
July	0.06	1.36
August	0.05	1.26
September	0.08	1.51
October	0.07	1.02
November	0.08	1.56
December	0.08	0.77
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 2024.

The annual Ministry of the Environment, Conservation and Parks Inspection took place on July 25, 2024 and covered the period from June 29, 2023 to July 25, 2024. 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 2024 reporting period.