



Underwood Drinking Water System

2022 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: | 220007052 |
| Drinking-Water System Name: | Underwood Drinking Water System |
| Drinking-Water System Owner: | Municipality of Kincardine |
| Drinking-Water System Category: | Small Municipal Residential |
| Period being reported: | Year 2022 |

The Underwood Drinking Water System (DWS) is a non-GUDI system (which means that it is a secure well and not under the influence of surface water) consisting of a single well located in the hamlet of Underwood. The well is a drilled type with a 203 mm (8 in.) casing and is 122 m (400 ft) deep. It was drilled in August 1972 and is equipped with a submersible pump. Raw and treated water are each metered by mag meters. Sodium hypochlorite (NSF certified) is used for disinfection. There is on-line monitoring of chlorine. There are hydropneumatic tanks located in the control building that provide continuous pressure in the distribution system and allow for intermittent operation of the well pump. A chlorine contact chamber consisting of an 8.3 m length of 600 mm diameter pipe provides the required contact time. This system has a standby generator.

1.2. Major Expenses

The system did not incur any expenses necessary to install, repair or replace required equipment.

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 Underwood 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 addition, the raw water sampling was increased to weekly to monitor for the presence of microorganisms in the raw water. The water was disinfected adequately such that there were no E. coli or total coliform present in the treated or distribution water.

Any E. coli or total coliform results above zero in treated or distribution water must be reported to the Ministry of Environment, Conservation and Parks (MECP) 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 2022 sampling program are shown in the table below.

| Water Source | Number of TC/EC Samples | Range of Total Coliform Results (#-#) | Range of E. coli Results (#-#) | Number of HPC Samples | Range of HPC Results (#-#) |
|---------------------|--------------------------------|--|---------------------------------------|------------------------------|-----------------------------------|
| Raw | 52 | 0 – 30 | 0 – 0 | 52 | 0 – 840 |
| Treated | 52 | 0 – 0 | 0 – 0 | 52 | 0 – 3 |
| Distribution | 52 | 0 – 0 | 0 – 0 | 52 | 0 – 12 |

2.2. Chemical Testing

The Safe Drinking Water Act Reg 170 Schedule 13 requires periodic testing of the water for chemical parameters. The Underwood DWS is required to test for nitrite/nitrate, trihalomethanes and haloacetic acids on a quarterly basis. 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. Arsenic is naturally occurring in the raw water and is tested for quarterly. The maximum acceptable concentration of arsenic in drinking water is 10 µg/L.

| Inorganic Parameter | Sample Date | Result Value | Unit of Measure | Exceedance |
|----------------------------|--------------------|---------------------|------------------------|-------------------|
| Antimony | July 16/18 | 0.04 | µg/L | No |
| Arsenic | January 10/22 | 5.4 | µg/L | No |
| | April 11/22 | 5.8 | | |
| | July 11/22 | 4.8 | | |
| | October 12/22 | 6.5 | | |
| Barium | July 16/18 | 18.5 | µg/L | No |
| Boron | July 16/18 | 267 | µg/L | No |
| Cadmium | July 16/18 | 0.014 | µg/L | No |
| Chromium | July 16/18 | 0.10 | µg/L | No |
| Mercury | July 16/18 | < 0.01 | µg/L | No |
| Selenium | July 16/18 | < 0.04 | µg/L | No |
| Sodium | October 12/22 | 69.6 | mg/L | Yes |
| | October 18/22 | 57.3 | | |
| Uranium | July 16/18 | 0.443 | µg/L | No |
| Fluoride | April 9/18 | 1.69 | mg/L | Yes |
| | April 17/18 | 1.72 | | |
| Nitrite | January 10/22 | < 0.003 | mg/L | No |
| | April 11/22 | < 0.003 | | |
| | July 11/22 | < 0.003 | | |
| | October 12/22 | < 0.003 | | |
| Nitrate | January 10/22 | 0.007 | mg/L | No |
| | April 11/22 | 0.009 | | |
| | July 11/22 | 0.008 | | |
| | October 12/22 | 0.011 | | |

| Organic Parameter | Sample Date | Result Value | Unit of Measure | Exceedance |
|--|-------------|--------------|-----------------|------------|
| Alachlor | July 16/18 | < 0.02 | µg/L | No |
| Atrazine + N-dealkylated metabolites | July 16/18 | < 0.01 | µg/L | No |
| Azinphos-methyl | July 16/18 | < 0.05 | µg/L | No |
| Benzene | July 16/18 | < 0.32 | µg/L | No |
| Benzo(a)pyrene | July 16/18 | < 0.004 | µg/L | No |
| Bromoxynil | July 16/18 | < 0.33 | µg/L | No |
| Carbaryl | July 16/18 | < 0.05 | µg/L | No |
| Carbofuran | July 16/18 | < 0.01 | µg/L | No |
| Carbon Tetrachloride | July 16/18 | < 0.16 | µg/L | No |
| Chlorpyrifos | July 16/18 | < 0.02 | µg/L | No |
| Diazinon | July 16/18 | < 0.02 | µg/L | No |
| Dicamba | July 16/18 | < 0.20 | µg/L | No |
| 1,4-Dichlorobenzene | July 16/18 | < 0.36 | µg/L | No |
| 1,2-Dichlorobenzene | July 16/18 | < 0.41 | µg/L | No |
| 1,2-Dichloroethane | July 16/18 | < 0.35 | µg/L | No |
| 1,1-Dichloroethylene (vinylidene chloride) | July 16/18 | < 0.33 | µg/L | No |
| Dichloromethane | July 16/18 | < 0.35 | µg/L | No |
| 2,4 Dichlorophenol | July 16/18 | < 0.15 | µg/L | No |
| 2,4-Dichlorophenoxy acetic acid (2,4-D) | July 16/18 | < 0.19 | µg/L | No |
| Diclofop-methyl | July 16/18 | < 0.40 | µg/L | No |
| Dimethoate | July 16/18 | < 0.03 | µg/L | No |
| Diquat | July 16/18 | < 1 | µg/L | No |
| Diuron | July 16/18 | < 0.03 | µg/L | No |
| Glyphosate | July 16/18 | < 1 | µg/L | No |
| Malathion | July 16/18 | < 0.02 | µg/L | No |
| 2 methyl-4-chlorophenoxyacetic acid (MCPA) | July 16/18 | <0.00012 | µg/L | No |
| Metolachlor | July 16/18 | < 0.01 | µg/L | No |
| Metribuzin | July 16/18 | < 0.02 | µg/L | No |
| Monochlorobenzene | July 16/18 | < 0.3 | µg/L | No |
| Paraquat | July 16/18 | < 1 | µg/L | No |
| Pentachlorophenol | July 16/18 | < 0.15 | µg/L | No |
| Phorate | July 16/18 | < 0.01 | µg/L | No |
| Picloram | July 16/18 | < 1 | µg/L | No |
| Polychlorinated Biphenyls (PCB) | July 16/18 | <0.04 | µg/L | No |
| Prometryne | July 16/18 | < 0.03 | µg/L | No |
| Simazine | July 16/18 | < 0.01 | µg/L | No |
| Terbufos | July 16/18 | < 0.01 | µg/L | No |
| Tetrachloroethylene | July 16/18 | < 0.35 | µg/L | No |
| 2,3,4,6-Tetrachlorophenol | July 16/18 | < 0.20 | µg/L | No |
| Triallate | July 16/18 | < 0.01 | µg/L | No |
| Trichloroethylene | July 16/18 | < 0.44 | µg/L | No |
| 2,4,6-Trichlorophenol | July 16/18 | < 0.25 | µg/L | No |
| Trifluralin | July 16/18 | < 0.02 | µg/L | No |
| Vinyl Chloride | July 16/18 | < 0.17 | µg/L | No |

Trihalomethane (THM) distribution sampling is required quarterly 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.

| Date Sampled | THM Result Value (µg/L) | Running Annual Average (µg/L) | Exceedance |
|---------------------|--------------------------------|--------------------------------------|-------------------|
| January 10/22 | 50 | 55.5 | No |
| April 11/22 | 39 | 53.0 | No |
| July 11/22 | 50 | 52.8 | No |
| October 12/22 | 117 | 64.0 | No |

Sampling and testing for haloacetic acids (HAA) in the distribution system is a new requirement as of 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. Haloacetic acids are a by-product of the disinfection process. Haloacetic acids testing was not required in 2022.

| Date Sampled | HAA Result Value (µg/L) | Running Annual Average (µg/L) | Exceedance |
|---------------------|--------------------------------|--------------------------------------|-------------------|
| January 13/20 | < 5.3 | 6.0 | No |
| April 20/20 | < 5.3 | 6.0 | No |
| July 13/20 | 8.0 | 5.3 | No |
| October 13/20 | < 5.3 | 6.0 | No |

The Underwood 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 performed in 2022, below are the results.

| Date Sampled | Location Type | Number of Samples | Parameter | Results |
|---------------------|----------------------|--------------------------|-------------------|----------------|
| March 14, 2022 | Distribution | 1 | pH | 8.2 |
| | | | Alkalinity (mg/L) | 112 |
| August 15, 2022 | Distribution | 1 | pH | 7.2 |
| | | | Alkalinity (mg/L) | 100 |

2.3. Operational Monitoring

Sodium hypochlorite is used for primary and secondary disinfection. The free chlorine residual is monitored continuously on the treated water and must be checked a minimum of twice per week in the distribution system.

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

Our internal sampling schedule exceeds the minimum requirements by having operations staff collect one distribution free chlorine residual every day. Distribution residuals were not obtained on February 19 and December 24 due to inclement weather and road closures.

| Free Chlorine Residual | Number of Grab Samples | Range of Results (#-#) |
|-------------------------------|-------------------------------|-------------------------------|
| Treated Water | Continuous monitoring | 0.30 – 5.55 |
| Distribution Water | 363 | 0.26 – 1.57 |

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 | Number of Grab Samples | Range of Results (#-#) |
|------------------|-------------------------------|-------------------------------|
| Turbidity | 52 | 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 90.8 m³/day. There is no maximum flow rate specified for water supplied to the distribution system.

| Month | Average Daily Flow (m³/day) | % Average Day/Rated Capacity (m³/day) | Maximum Daily Flow (m³/day) | % Maximum Day/Rated Capacity (m³/day) |
|------------------|---|---|---|---|
| January | 11 | 14% | 17 | 22% |
| February | 11 | 15% | 17 | 22% |
| March | 11 | 15% | 13 | 17% |
| April | 12 | 16% | 19 | 24% |
| May | 16 | 20% | 23 | 30% |
| June | 13 | 17% | 18 | 23% |
| July | 14 | 18% | 23 | 30% |
| August | 10 | 13% | 14 | 18% |
| September | 11 | 15% | 19 | 24% |
| October | 10 | 13% | 13 | 17% |
| November | 11 | 14% | 19 | 24% |
| December | 10 | 13% | 23 | 29% |
| Annual | 12 | 15% | 23 | 30% |

| Month | Average Daily Flow Rate (L/s) | Maximum Daily Flow Rate (L/s) |
|------------------|--------------------------------------|--------------------------------------|
| January | 0.13 | 1.21 |
| February | 0.13 | 2.14 |
| March | 0.13 | 1.32 |
| April | 0.14 | 3.09 |
| May | 0.18 | 3.09 |
| June | 0.15 | 2.85 |
| July | 0.16 | 3.09 |
| August | 0.12 | 2.94 |
| September | 0.13 | 3.09 |
| October | 0.12 | 3.02 |
| November | 0.13 | 3.07 |
| December | 0.12 | 3.08 |
| Annual | 0.14 | 3.09 |

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 and the Medical Officer of Health (MOH). All adverse conditions are responded to immediately and corrective actions taken. There was one reportable incident in 2022 for Sodium.

| Incident Date | Parameter | Result | Corrective Action | Corrective Action Date |
|----------------------------------|----------------------------------|---------------|---|-------------------------------|
| October 20, 2022 AWQI# 160375 | Sodium above MAC limit of 20mg/L | 69.6 mg/L | Resampled and annual notification given to system users | October 20, 2022 |

The annual MECP Inspection took place on April 20, 2022 for the period of May 11, 2021 to April 20, 2022. The inspection report did not identify non-compliance issues.

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 in 2022.