



Kincardine 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:	220002716
Drinking-Water System Name:	Kincardine Drinking Water System
Drinking-Water System Owner:	Municipality of Kincardine
Drinking-Water System Category:	Large Municipal Residential
Period being reported:	Year 2022

The Kincardine Drinking Water System (DWS) takes water from Lake Huron and treats it using a surface water treatment plant. The water treatment plant provides conventional filtration and consists of two Actiflo clarifiers, four filters, a chlorination system and an underground reservoir. The intake capacity is 18,750 m³/d and the treatment plant rated capacity is 11,563 m³/d. The chemicals used for treatment are Clar+ion A5, Norfloc 127H (formerly Magnafloc LT27AG), Actisand and chlorine gas. The distribution system serves the town of Kincardine and residents north of the town via a pipeline, plus the Huronville Subdivision Distribution System owned by the Township of Huron-Kinloss, with a total of over 4000 connections. There is a 3,360 m³ standpipe to provide water storage, pressure and fire protection for the distribution system. A Booster Chlorination Facility is located at the north end of the distribution system for the Inverhuron Provincial Park. In 2018, a Booster Station was commissioned for monitoring and increasing pressure and chlorination for lands to the north of Gary Street.

1.2. Major Expenses

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

- Treatment Equipment \$82,467.01
- Monitoring Equipment \$29,501.16
- SCADA upgrades \$18,330.61
- Reservoir Repairs \$154,233.42
- Distribution Repairs and Replacements \$851,785.77

Other Major Expenses:

KWTP Building Repairs \$425,717.66

Tower Inspection \$6,187.01

Engineering for future upgrades \$91,024.38

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 10, requires the Kincardine DWS to take a minimum of one sample per week of raw, treated and distribution water with a minimum of eighteen distribution samples required every month. All raw, treated and distribution samples must be tested for Escherichia coli (E. coli) and total coliforms (TC). All the treated samples and twenty five percent of 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 raw, one treated and five distribution sample every week and have them tested for E. coli, total coliform and HPC.

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) 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 2022 sampling program are shown in the Kincardine Water Source table. Samples taken in addition to our sampling program for things like watermain repairs or construction projects are not included here.

The treatment plant was placed offline twice in 2022 for reservoir work, from April 29 to May 16 for a reservoir inspection and again from October 17 to November 19 for reservoir repairs. During the times the plant was offline the distribution system was fed from the Huronville Well on the Lakeshore Drinking Water System owned by the Township of Huron Kinloss and operated by Veolia. The Lakeshore DWS Water Source chart has a summary of raw and treated samples taken from the Huronville Well and the distribution samples were taken within the Kincardine distribution system while the system was being fed from the Lakeshore DWS. Raw and Treated sample results from the Huronville Well were provided by Veolia.

Kincardine Water Source	Number of Samples	Range of Total Coliform Results (#-#)	Range of E. coli Results (#-#)	Number of HPC Samples	Range of HPC Results (#-#)
Raw	45	0 – 1280	0 – 20	45	0 – 660
Treated	45	0 – 0	0 – 0	45	0 – 4
Distribution	231	0 – 0	0 – 0	231	0 – 112

Lakeshore DWS Water Source	Number of Samples	Range of Total Coliform Results (#-#)	Range of E. coli Results (#-#)	Number of HPC Samples	Range of HPC Results (#-#)
Raw	8	0 – 0	0 - 0	8	--
Treated	8	0 – 0	0 – 0	8	0 – 10
Distribution	40	0 - 0	0 – 0	40	0 - 16

2.2. Chemical Testing

The Safe Drinking Water Act Reg 170 Schedule 13 requires periodic testing of the water for chemical parameters. The Kincardine DWS is required to test for nitrite/nitrate, trihalomethanes and haloacetic acids on a quarterly basis. The tables below outline these as well as other inorganic and organic parameters that are required to be tested for annually 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 licenced lab.

Sodium and fluoride are not found in significant levels in the treated water and fluoride is not added to the drinking water. Sodium and fluoride are only required to be tested for every five years and were last tested for in 2018.

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. There were no parameters above the half MAC that were required to be tested for quarterly in 2021.

Inorganic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	October 12/22	<0.6	µg/L	No
Arsenic	October 12/22	0.2	µg/L	No
Barium	October 12/22	14.6	µg/L	No
Boron	October 12/22	14	µg/L	No
Cadmium	October 12/22	<0.003	µg/L	No
Chromium	October 12/22	0.32	µg/L	No
Mercury	October 12/22	<0.01	µg/L	No
Selenium	October 12/22	0.08	µg/L	No
Sodium	November 5/18	4.46	mg/L	No
Uranium	October 12/22	0.028	µg/L	No
Fluoride	October 15/18	< 0.06	mg/L	No
Nitrite	January 10/22 April 11/22 July 11/22 October 12/22	<0.003 <0.003 <0.003 <0.003	mg/L	No
Nitrate	January 10/22 April 11/22 July 11/22 October 12/22	0.476 0.500 0.277 0.273	mg/L	No

Organic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	October 12/22	< 0.02	µg/L	No
Atrazine + N-dealkylated metabolites	October 12/22	0.03	µg/L	No
Azinphos-methyl	October 12/22	< 0.05	µg/L	No
Benzene	October 12/22	< 0.32	µg/L	No
Benzo(a)pyrene	October 12/22	< 0.004	µg/L	No
Bromoxynil	October 12/22	< 0.33	µg/L	No
Carbaryl	October 12/22	< 0.05	µg/L	No
Carbofuran	October 12/22	< 0.01	µg/L	No
Carbon Tetrachloride	October 12/22	< 0.17	µg/L	No
Chlorpyrifos	October 12/22	< 0.02	µg/L	No
Diazinon	October 12/22	< 0.02	µg/L	No
Dicamba	October 12/22	< 0.20	µg/L	No
1,2-Dichlorobenzene	October 12/22	< 0.41	µg/L	No
1,4-Dichlorobenzene	October 12/22	< 0.36	µg/L	No
1,2-Dichloroethane	October 12/22	< 0.35	µg/L	No
1,1-Dichloroethylene	October 12/22	< 0.33	µg/L	No
Dichloromethane	October 12/22	< 0.35	µg/L	No
2,4 Dichlorophenol	October 12/22	< 0.15	µg/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	October 12/22	< 0.19	µg/L	No
Diclofop-methyl	October 12/22	< 0.40	µg/L	No
Dimethoate	October 12/22	< 0.06	µg/L	No
Diquat	October 12/22	< 1	µg/L	No
Diuron	October 12/22	< 0.03	µg/L	No
Glyphosate	October 12/22	< 1	µg/L	No
Malathion	October 12/22	< 0.02	µg/L	No
2 methyl-4-chlorophenoxyacetic acid	October 12/22	<0.00012	µg/L	No
Metolachlor	October 12/22	<0.01	µg/L	No
Metribuzin	October 12/22	< 0.02	µg/L	No
Monochlorobenzene	October 12/22	< 0.3	µg/L	No
Paraquat	October 12/22	< 1	µg/L	No
Pentachlorophenol	October 12/22	< 0.15	µg/L	No
Phorate	October 12/22	< 0.01	µg/L	No
Picloram	October 12/22	< 1	µg/L	No
Polychlorinated Biphenyls (PCB)	October 12/22	< 0.04	µg/L	No
Prometryne	October 12/22	< 0.03	µg/L	No
Simazine	October 12/22	< 0.01	µg/L	No
Terbufos	October 12/22	< 0.01	µg/L	No
Tetrachloroethylene	October 12/22	< 0.35	µg/L	No
2,3,4,6-Tetrachlorophenol	October 12/22	< 0.20	µg/L	No
Triallate	October 12/22	< 0.01	µg/L	No
Trichloroethylene	October 12/22	< 0.44	µg/L	No
2,4,6-Trichlorophenol	October 12/22	< 0.25	µg/L	No
Trifluralin	October 12/22	< 0.02	µg/L	No
Vinyl Chloride	October 12/22	< 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	16	20.5	No
April 11/22	22	21.0	No
July 11/22	19	20.8	No
October 12/22	24	20.3	No

Sampling and testing for haloacetic acids (HAA) in the distribution system was 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.

Date Sampled	HAA Result Value (µg/L)	Running Annual Average (µg/L)	Exceedance
January 10/22	5.4	9.7	No
April 11/22	<5.3	8.2	No
July 11/22	9.2	8.6	No
October 12/22	6.1	6.5	No

The Kincardine 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 completed in 2022. Below are the results:

Date Sampled	Location Type	Number of Samples	Parameter	Range of Results
March 14, 2022	Distribution	4	pH	7.3 - 7.4
			Alkalinity (mg/L)	72 – 76
August 15, 2022	Distribution	4	pH	6.70 – 6.90
			Alkalinity (mg/L)	62 – 69

2.3. Operational Monitoring

The free chlorine residual must be monitored continuously on the treated water at the point of entry into the distribution system. A minimum of seven distribution grab samples are taken weekly and tested for free chlorine residual. In addition, free chlorine levels are monitored continuously within the treatment process and at two locations in the distribution system.

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

At the Kincardine Water Treatment Plant, turbidity is monitored continuously on the raw water, after each Actiflo unit, after each filter and at the point of entry into the distribution system. Turbidity is measured in nephelometric turbidity units (NTU).

Filter and point of entry turbidity is reported to the ministry’s Spills Action Centre if it is greater than 1 NTU for a period of 15 minutes or more, or if there are two spikes above 1 NTU within a 15-minute period. One turbidity event was reported on December 8, 2022. Details are included in section 4 Adverse Water Quality Incidents and Non-Compliance Findings.

The treatment plant was offline from April 29 to May 19 and from October 17 to November 19 for reservoir repairs. The ‘Treated water at the Point of Entry into the Distribution System’ table below indicates results while the plant was online.

From April 29 to May 19 and October 17 to November 19, five (5) extra chlorine residuals were taken daily, while the system was fed from the Lakeshore DWS. The ‘Distribution Water’ table below includes these monitoring residuals.

Treated Water at the Point of Entry into the Distribution System	Number of Grab Samples	Range of Results (#-#)
Turbidity	Continuous monitoring	0.0600 – 2.00
Chlorine	Continuous monitoring	0.78 – 2.00

Distribution Water	Number of Grab Samples	Range of Results (#-#)
Free Chlorine Residual	365	0.61 – 2.06
Free Chlorine Residual Lakeshore DWS source extra sampling	303	0.06 – 2.06
Inverhuron Booster Station Free Chlorine Residual	Continuous Monitoring	0.13 – 2.00
Gary Street Booster Station Free Chlorine Residual	Continuous Monitoring	0.01 – 2.45
Kincardine Water Tower Free Chlorine Residual	Continuous Monitoring	0.14 – 2.00

The Ministry of the Environment, Conservation and Parks *Procedure for Disinfection of Drinking Water in Ontario* requires that the turbidity on each filter effluent line is less than or equal to 0.3 NTU at least 95% of the time each month.

Month	Filter #1	Filter #2	Filter #3	Filter #4
January	100.00%	99.85%	99.61%	99.95%
February	100.00%	99.93%	99.58%	99.88%
March	100.00%	99.93%	99.52%	99.59%
April	100.00%	99.96%	99.22%	99.44%
May	99.96%	99.88%	99.83%	99.63%
June	100.00%	98.13%	99.25%	99.88%
July	100.00%	100.00%	100.00%	100.00%
August	100.00%	99.95%	97.81%	99.93%
September	99.97%	100.00%	96.36%	99.45%
October	100.00%	99.98%	100.00%	100.00%
November	99.61%	100.00%	99.55%	98.90%
December	99.94%	99.07%	98.94%	99.36%

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 is 11,563 m³/day. There is no maximum flow rate specified for water supplied to the distribution system.

The treatment plant was placed offline twice in 2022 for reservoir work. The reservoir was taken offline from April 29 to May 16 for a reservoir inspection and again from October 17 to November 19 for reservoir repairs. During the times the plant was offline the distribution system was fed from the Huron Kinloss Lakeshore Drinking Water System. Huron Kinloss flows are not included in the charts below.

Month	Average Daily Flow (m³/day)	% Average Day Flow/ Rated Capacity	Maximum Daily Flow (m³/day)	% Maximum Day Flow/ Rated Capacity
January	3249.39	28%	3970.963	34%
February	3188.71	28%	3618.140	31%
March	3107.44	27%	3588.718	31%
April	2621.38	23%	3073.375	27%
May	2949.25	26%	4498.410	39%
June	4540.58	39%	6024.900	52%
July	5093.86	44%	5971.500	52%
August	4573.44	40%	5322.800	46%
September	4074.15	35%	5156.900	45%
October	1762.06	15%	3574.600	31%
November	2537.26	22%	4327.400	37%
December	2732.63	24%	3365.400	29%
Annual	3368.18	29%	6024.900	52%

Month	Average Daily Flow Rate (L/s)	Maximum Daily Flow Rate (L/s)
January	37.63	157.10
February	36.93	157.31
March	35.99	156.16
April	30.36	157.33
May	136.03	163.76
June	153.20	387.12
July	154.41	167.93
August	155.44	162.88
September	154.58	163.22
October	151.34	162.15
November	135.71	169.16
December	153.63	161.48
Annual	111.27	387.12

Note: average daily flow rates for January to April included 0's during the pump downtime. SCADA upgrades in May now has average flow rate only recorded when pump in running.

The table below is a summary of distribution water supplied to the Kincardine Distribution system from the Lakeshore DWS while the treatment plant was offline for reservoir repairs.

Month	Estimated Total Flow per Month (m3)	Average Daily Flow (m³/day)	Maximum Daily Flow (m³/day)	Number of days
April	1,951	975.5	1502	2
May	49,313	2595	3501	19
October	36,237	2588	3383	14
November	46,819	2601	3232	18
Total	134,320	2190	3501	53

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.

Incident Date	Parameter	Result	Corrective Action	Corrective Action Date
October 20, 2022, AWQI #160377	Low Distribution Chlorine at Gary St Booster Station	0.01mg/L	Flushed until residual above 0.05mg/L obtained	October 20, 2022
October 24, 2022, AWQI #160430	Low Distribution Chlorine on Highland Drive	0mg/L	Flushed until residual above 0.05mg/L obtained	October 24, 2022
October 31, 2022, AWQI #160495	Low Distribution Chlorine on Highland Drive	0.03mg/L	Flushed until residual above 0.05mg/L obtained	October 31, 2022
November 7, 2022, AWQI #160582	Low Distribution Chlorine on McLeod Ave	0.03mg/L	Flushed until residual above 0.05mg/L obtained	November 7, 2022
November 15, 2022, AWQI #160667	Low Distribution Chlorine on McLeod Ave	0.02mg/L	Flushed until residual above 0.05mg/L obtained	November 15, 2022
December 8, 2022, AWQI# 160931	Filter Effluent Turbidity >1 NTU for 15 minutes	>1 NTU	Changes made to SCADA programming	December 9, 2022

An annual Ministry of the Environment, Conservation and Parks Inspection was completed on September 7, 2022. One non-compliance was noted in the report. See chart below for details.

Incident Date	Requirements the System Failed to Meet	Result	Corrective Action	Corrective Action Date
July 27, 2022	The process wastewater discharge monitoring program and discharge quality did not comply with requirements established in the MDWL for backwash water directed to Lake Huron	TSS sample 32mg/L	Ability to run the pump on auto from SCADA removed. Locked out manual controls.	July 27, 2022

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 three issues identified in 2022.

Drinking Water Legislation	Requirements the System Failed to Meet	Duration	Corrective Actions
O. Reg. 170, Section 13. (1)	Continuous monitoring data was not kept for at least two years. Filter #4 was running but not trending.	Approximately 2 hours on Aug 16	NTU analyzer for Filter #4 replaced. Analog signal delay removed.
O. Reg. 170, Schedule 1, section 1-2. (2) 1.	Reservoir discharge pump that feed water to reservoir chlorine analyzer stopped feeding water multiple times causing data to show low cl2 readings	Multiple times from August 6 to 17, 2022	Pump repaired on August 17.
O. Reg. 170, Schedule 1, section 1-2. (2) 1.	Reservoir discharge pump that feeds water to reservoir chlorine analyzer stopped feeding water causing data to show low cl2 readings	December 8-9	Pump Repaired on December 9. Alarm added to SCADA on December 19 for Reservoir Cl2 low chlorine