



Kincardine 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:	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 2023

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 \$12,501.03
- Monitoring Equipment \$22,551.66
- Distribution Repairs and Replacements \$1,680,098.14

Other Major Expenses:

- KWTP Building Repairs \$70,008.93
- Engineering for future upgrades \$64,760.03

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 treated and six distribution samples every week and have them tested for E. coli, total coliform and HPC, with 1 raw sample taken each week tested for E. coli and 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) 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 Kincardine Water Source table. Samples taken in addition to our sampling program for things like watermain repairs or construction projects are not included here.

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	52	0 – 780	0 – 8	3	11 – 840
Treated	52	0 – 0	0 – 0	52	0 – 10
Distribution	312	0 – 0	0 – 0	312	0 – 29

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 tested for in 2023.

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 2023.

Inorganic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	October 10/23	<0.6	µg/L	No
Arsenic	October 10/23	0.2	µg/L	No
Barium	October 10/23	15.0	µg/L	No
Boron	October 10/23	17	µg/L	No
Cadmium	October 10/23	0.005	µg/L	No
Chromium	October 10/23	0.17	µg/L	No
Mercury	October 10/23	<0.01	µg/L	No
Selenium	October 10/23	0.10	µg/L	No
Sodium	October 10/23	5.09	mg/L	No
Uranium	October 10/23	0.029	µg/L	No
Fluoride	October 10/23	0.06	mg/L	No
Nitrite	January 9/23 April 11/23 July 10/23 October 10/23	<0.003 <0.003 <0.003 <0.003	mg/L	No
Nitrate	January 9/23 April 11/23 July 10/23 October 10/23	0.868 1.18 0.253 0.284	mg/L	No

Organic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	October 10/23	< 0.02	µg/L	No
Atrazine + N-dealkylated metabolites	October 10/23	0.02	µg/L	No
Azinphos-methyl	October 10/23	< 0.05	µg/L	No
Benzene	October 10/23	< 0.32	µg/L	No
Benzo(a)pyrene	October 10/23	< 0.004	µg/L	No
Bromoxynil	October 10/23	< 0.33	µg/L	No
Carbaryl	October 10/23	< 0.05	µg/L	No
Carbofuran	October 10/23	< 0.01	µg/L	No
Carbon Tetrachloride	October 10/23	< 0.17	µg/L	No
Chlorpyrifos	October 10/23	< 0.02	µg/L	No
Diazinon	October 10/23	< 0.02	µg/L	No
Dicamba	October 10/23	< 0.20	µg/L	No
1,2-Dichlorobenzene	October 10/23	< 0.41	µg/L	No
1,4-Dichlorobenzene	October 10/23	< 0.36	µg/L	No
1,2-Dichloroethane	October 10/23	< 0.35	µg/L	No
1,1-Dichloroethylene (vinylidene chloride)	October 10/23	< 0.33	µg/L	No
Dichloromethane	October 10/23	< 0.35	µg/L	No
2,4 Dichlorophenol	October 10/23	< 0.15	µg/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	October 10/23	< 0.19	µg/L	No
Diclofop-methyl	October 10/23	< 0.40	µg/L	No
Dimethoate	October 10/23	< 0.06	µg/L	No
Diquat	October 10/23	< 1	µg/L	No
Diuron	October 10/23	< 0.03	µg/L	No
Glyphosate	October 10/23	< 1	µg/L	No
Malathion	October 10/23	< 0.02	µg/L	No
2 methyl-4-chlorophenoxyacetic acid	October 10/23	<0.00012	µg/L	No
Metolachlor	October 10/23	<0.01	µg/L	No
Metribuzin	October 10/23	< 0.02	µg/L	No
Monochlorobenzene	October 10/23	< 0.3	µg/L	No
Paraquat	October 10/23	< 1	µg/L	No
Pentachlorophenol	October 10/23	< 0.15	µg/L	No
Phorate	October 10/23	< 0.01	µg/L	No
Picloram	October 10/23	< 1	µg/L	No
Polychlorinated Biphenyls (PCB)	October 10/23	< 0.04	µg/L	No
Prometryne	October 10/23	< 0.03	µg/L	No
Simazine	October 10/23	< 0.01	µg/L	No
Terbufos	October 10/23	< 0.01	µg/L	No
Tetrachloroethylene	October 10/23	< 0.35	µg/L	No
2,3,4,6-Tetrachlorophenol	October 10/23	< 0.20	µg/L	No
Triallate	October 10/23	< 0.01	µg/L	No
Trichloroethylene	October 10/23	< 0.44	µg/L	No
2,4,6-Trichlorophenol	October 10/23	< 0.25	µg/L	No
Trifluralin	October 10/23	< 0.02	µg/L	No
Vinyl Chloride	October 10/23	< 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 9/23	27	23	No
April 11/23	17	21.8	No
July 10/23	23	22.8	No
October 10/23	30	24.3	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 9/23	14.4	8.8	No
April 11/23	17.9	11.9	No
July 10/23	<5.3	10.9	No
October 10/23	<5.3	10.7	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 2023. Below are the results:

Date Sampled	Location Type	Number of Samples	Parameter	Range of Results
April 3, 2023	Distribution	4	pH	7.3 - 7.3
			Alkalinity (mg/L)	68 - 73
August 14, 2023	Distribution	4	pH	6.9 - 7.2
			Alkalinity (mg/L)	61 - 65

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 three 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 effluent 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.

Treated Water at the Point of Entry into the Distribution System	Number of Grab Samples	Range of Results (#-#)
Turbidity	Continuous monitoring	0.09 – 1.69
Chlorine	Continuous monitoring	0.00 – 2.00

Note: Minimum Chlorine residuals of 0 are recorded during power interruptions and equipment maintenance.

Distribution Water	Number of Grab Samples	Range of Results (#-#)
Free Chlorine Residual	365	0.82 – 1.58
Inverhuron Booster Station Free Chlorine Residual	Continuous Monitoring	0.00 – 2.00
Gary Street Booster Station Free Chlorine Residual	Continuous Monitoring	0.00 – 9.99
Kincardine Water Tower Free Chlorine Residual	Continuous Monitoring	0.04 – 0.68

Notes:

1. Minimum Chlorine residuals of 0 are recorded during power interruptions and equipment maintenance.
2. Inverhuron Booster-analyzer maintenance caused 0 cl2 in July.
3. Gary Booster-analyzer maintenance caused min 0 cl2 and max 9.99 cl2 values in February.
4. Kincardine Tower-analyzer maintenance caused min 0.04 cl2 value in December.

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. A significant weather event caused turbidity issues at the plant on April 5 and 6. An adverse water quality incident (AWQI) was reported for the April filter performance as it did not meet the criteria listed above for filter’s 2, 3 and 4. All water directed to users met the filter effluent criteria below 1NTU.

Month	Filter #1	Filter #2	Filter #3	Filter #4
January	99.74%	100.00%	99.33%	99.39%
February	0.00%	99.94%	99.53%	99.41%
March	0.00%	99.40%	98.87%	99.24%
April *	37.85%	91.08%	90.61%	89.78%
May	99.74%	99.89%	99.86%	99.80%
June	100.00%	100.00%	99.80%	99.97%
July	98.51%	99.99%	100.00%	100.00%
August	100.00%	100.00%	99.65%	100.00%
September	99.21%	100.00%	100.00%	99.99%
October	99.99%	100.00%	100.00%	100%
November	100%	100.00%	99.99%	100%
December	100%	99.85%	99.53%	99.87%

Notes:

Filter #1 was offline from January 11 to April 19. Filter #4 was offline October 2 to 11.

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.

Month	Total Treated Flow (m3)	Average Daily Flow (m ³ /day)	% Average Day Flow/ Rated Capacity	Maximum Daily Flow (m ³ /day)	% Maximum Day Flow/ Rated Capacity
January	79,314	2,559	22%	3,155	27%
February	71,117	2,540	22%	2,938	25%
March	79,430	2,562	22%	2,958	26%
April	81,634	2,721	24%	3,228	28%
May	103,373	3,335	29%	4,966	43%
June	134,913	4,497	39%	5,562	48%
July	129,863	4,189	36%	5,666	49%
August	116,535	3,759	33%	4,421	38%
September	107,608	3,587	31%	4,835	42%
October	93,837	3,027	26%	3,639	31%
November	82,727	2,758	24%	3,268	28%
December	83,302	2,687	23%	3,205	28%
Annual	1,163,653	3,185	28%	5,666	49%

Month	Average Daily Flow Rate (L/s)	Maximum Daily Flow Rate (L/s)
January	153.42	161.76
February	153.29	160.54
March	153.40	168.06
April	152.90	162.32
May	153.84	165.00
June	154.80	168.04
July	154.83	165.45
August	154.92	165.54
September	154.18	163.61
October	154.93	167.96
November	153.96	166.52
December	153.84	160.71
Annual	154.03	168.06

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.

Incident Date	Parameter	Result	Corrective Action	Corrective Action Date
May 1, 2023 AWQI # 161873	Filters did not meet the performance criterion for filtered water NTU of less than or equal to 0.3 NTU in 95% of the measurements for the month of April 2023.	Filter #1 37.85% Filter #2 91.08% Filter #3 90.61% Filter #4 89.78%	Cause was extreme turbidity event due to weather. Actiflo system was cleaned in May to remove excess sand	May 16, 2023

An annual Ministry of the Environment, Conservation and Parks Inspection was completed on September 20, 2023. One non-compliance was noted in the report as well as one best practice. See chart below for details.

Non-compliance Table

Incident Date	Requirements the System Failed to Meet	Result	Corrective Action	Corrective Action Date
May 1, 2023	Filters did not meet the performance criterion for filtered water NTU of less than or equal to 0.3 NTU in 95% of the measurements for the month of April 2023.	Filter #1 37.85% Filter #2 91.08% Filter #3 90.61% Filter #4 89.78%	Cause was extreme turbidity event due to weather. Actiflo system was cleaned in May to remove excess sand	May 16, 2023

Best Practice

Recommendation	Solution
It is strongly recommended that the Owner/Operating Authority forthwith assess their reservoir hatch covers and make appropriate modifications to the hatch covers to ensure that they are functioning appropriately and, in a manner, to mitigate the entry of groundwater into the reservoir.	Staff are looking at sealing the reservoir from the outside so the reservoir can stay online and there are minimal disruptions to the drinking water system. Work is tentatively scheduled for Spring 2024.

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 two issues identified in 2023.

Drinking Water Legislation	Requirements the System Failed to Meet	Duration	Corrective Actions
MDWL 088-102	Environmental Discharge Parameters of Total Chlorine residual must be taken when backwash water is directed to Lake Huron. During the discharge on April 5 a chlorine residual was not taken by staff	April 5, 2023	A training session was held with staff on May 24, 2023 on SOP026 KWTP Backwash water to Lake and reporting requirements.
MDWL 088-102 Section 10.1.2	An estimated amount of 5.41m ³ of chlorinated water was reported as a spill from the distribution system direct to Lake Huron for approximately 45 minutes. Cl ₂ residual was 1.45mg/L	45 mins on May 14, 2023	Broken fitting repaired.