Kincardine Drinking Water System

2021 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.

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 2021

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 m^3/d and the treatment plant rated capacity is 11,563 m^3/d. The chemicals used for treatment are Clar+ion A5, 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 m^3 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 ($30,928.00)

Monitoring Equipment ($34,166.00)

SCADA upgrades ($98,492.00)

Distribution Repairs and Replacements ($1,066,917.00)

Standpipe upgrades ($383,932.00)

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 2021 sampling program are shown in the table below. Samples taken in addition to our sampling program for things like watermain repairs or construction projects are not included here.

Water Source	Number of Samples	Range of Total Coliform Results (#-#)	Range of E. coli Results (#-#)	Number of HPC Samples	Range of HPC Results (#-#)
Raw	53	0 – 1760	0 – 23	53	0 – 1240
Treated	53	0 – 0	0 – 0	53	0 – 1
Distribution	265	0 – 0	0 – 0	265	0 – 36

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 18/21	<0.6	µg/L	No
Arsenic	October 18/21	0.2	µg/L	No
Barium	October 18/21	17.1	µg/L	No
Boron	October 18/21	18	µg/L	No
Cadmium	October 18/21	<0.003	µg/L	No
Chromium	October 18/21	0.19	µg/L	No
Mercury	October 18/21	<0.01	µg/L	No
Selenium	October 18/21	0.11	µg/L	No
Sodium	November 5/18	4.46	mg/L	No
Uranium	October 18/21	0.073	µg/L	No
Fluoride	October 15/18	< 0.06	mg/L	No
Nitrite	January 11/21 April 26/21 July 12/21 October 18/21	<0.003 <0.003 <0.003 <0.003	mg/L	No
Nitrate	January 11/21 April 26/21 July 12/21 October 18/21	0.494 0.389 0.316 0.987	mg/L	No

Organic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	October 18/21	< 0.02	µg/L	No
Atrazine + N-dealkylated metabolites	October 18/21	0.03	µg/L	No
Azinphos-methyl	October 18/21	< 0.05	µg/L	No
Benzene	October 18/21	< 0.32	µg/L	No
Benzo(a)pyrene	October 18/21	< 0.004	µg/L	No
Bromoxynil	October 18/21	< 0.33	µg/L	No
Carbaryl	October 18/21	< 0.05	µg/L	No
Carbofuran	October 18/21	< 0.01	µg/L	No
Carbon Tetrachloride	October 18/21	< 0.17	µg/L	No
Chlorpyrifos	October 18/21	< 0.02	µg/L	No
Diazinon	October 18/21	< 0.02	µg/L	No
Dicamba	October 18/21	< 0.20	µg/L	No
1,2-Dichlorobenzene	October 18/21	< 0.41	µg/L	No
1,4-Dichlorobenzene	October 18/21	< 0.36	µg/L	No
1,2-Dichloroethane	October 18/21	< 0.35	µg/L	No
1,1-Dichloroethylene	October 18/21	< 0.33	µg/L	No
Dichloromethane	October 18/21	< 0.35	µg/L	No
2-4 Dichlorophenol	October 18/21	< 0.15	µg/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	October 18/21	< 0.19	µg/L	No
Diclofop-methyl	October 18/21	< 0.40	µg/L	No
Dimethoate	October 18/21	< 0.06	µg/L	No
Diquat	October 18/21	< 1	µg/L	No
Diuron	October 18/21	< 0.03	µg/L	No
Glyphosate	October 18/21	< 1	µg/L	No
Malathion	October 18/21	< 0.02	µg/L	No
2 methyl-4-chlorophenoxyacetic acid	October 18/21	<0.00012	µg/L	No
Metolachlor	October 18/21	0.02	µg/L	No
Metribuzin	October 18/21	< 0.02	µg/L	No
Monochlorobenzene	October 18/21	< 0.3	µg/L	No
Paraquat	October 18/21	< 1	µg/L	No
Pentachlorophenol	October 18/21	< 0.15	µg/L	No
Phorate	October 18/21	< 0.01	µg/L	No
Picloram	October 18/21	< 1	µg/L	No
Polychlorinated Biphenyls (PCB)	October 18/21	< 0.04	µg/L	No
Prometryne	October 18/21	< 0.03	µg/L	No
Simazine	October 18/21	< 0.01	µg/L	No
Terbufos	October 18/21	< 0.01	µg/L	No
Tetrachloroethylene	October 18/21	< 0.35	µg/L	No
2,3,4,6-Tetrachlorophenol	October 18/21	< 0.20	µg/L	No
Triallate	October 18/21	< 0.01	µg/L	No
Trichloroethylene	October 18/21	< 0.44	µg/L	No
2,4,6-Trichlorophenol	October 18/21	< 0.25	µg/L	No
Trifluralin	October 18/21	< 0.02	µg/L	No
Vinyl Chloride	October 18/21	< 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 11/21	18	22.3	No
April 26/21	20	21.0	No
July 12/20	20	21.3	No
October 18/21	26	21.0	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 11/21	<5.3	6.0	No
April 26/21	11.4	7.5	No
July 12/21	7.3	7.3	No
October 18/21	14.6	9.7	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. Lead sampling was completed in 2021. Below are the results:

Date Sampled	Location Type	Number of Samples	Parameter	Range of Results
March 15, 2021	Distribution	4	pH	7.01 – 7.15
			Alkalinity (mg/L)	64 – 71
			Lead (ug/L)	0.13 – 1.66
August 23, 2021	Distribution	3	pH	6.36 – 7.25
			Alkalinity (mg/L)	67 – 73
			Lead (ug/L)	1.60 – 4.69
August 30, 2021	Distribution	1	pH	7.30
			Alkalinity (mg/L)	66
			Lead (ug/L)	0.10

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 greater than 15 minutes. There were no reportable turbidity events in 2021.

Treated Water at the Point of Entry into the Distribution System	**Number of Grab Samples**	**Range of Results (#-#)**
Turbidity	Continuous monitoring	0.0712 – 2.00
Chlorine	Continuous monitoring	0.37 – 2.00

Distribution Water	**Number of Grab Samples**	**Range of Results (#-#)**
Free Chlorine Residual	365	0.73 – 1.51
Inverhuron Booster Station Free Chlorine Residual	Continuous Monitoring	0.16 – 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	Out of service	99.99%	99.98%	100.00%
February	Out of Service	99.97%	99.97%	99.72%
March	Out of Service	99.97%	99.78%	99.94%
April	99.66%	100.00%	99.53%	99.86%
May	99.99%	99.99%	99.93%	99.63%
June	100.00%	99.94%	99.99%	99.58%
July	100.00%	99.97%	100.00%	99.37%
August	100.00%	100.00%	99.99%	99.80%
September	99.95%	99.97%	99.94%	99.60%
October	99.99%	100.00%	99.98%	99.99%
November	100.00%	100.00%	99.92%	99.99%
December	99.98%	99.97%	99.76%	100.00%

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

Month	Average Daily Flow (m^3/day)	% Average Day Flow/ Rated Capacity	Maximum Daily Flow (m^3/day)	% Maximum Day Flow/ Rated Capacity
January	2,603.21	23%	3,401.610	29%
February	2,581.99	22%	3,009.150	26%
March	2,729.81	24%	3,880.000	34%
April	3,034.65	26%	3,551.074	31%
May	4,182.92	36%	6,114.870	53%
June	5,742.92	50%	6,953.864	60%
July	5,076.34	44%	6,264.109	54%
August	5,504.92	48%	6,482.211	56%
September	4,358.20	38%	5,949.512	51%
October	3,764.15	33%	4,406.491	38%
November	3,426.70	30%	6,001.034	52%
December	3,269.36	28%	3,783.502	33%
Annual	3,856.26	33%	6,953.864	60%

Month	Average Daily Flow Rate (L/s)	Maximum Daily Flow Rate (L/s)
January	30.1399	142.0880
February	30.0458	141.8625
March	37.7939	157.0000
April	35.1355	156.8625
May	48.4291	160.8563
June	66.4921	163.0500
July	58.7751	160.2000
August	63.7365	157.5188
September	50.4678	157.5938
October	43.6600	168.0563
November	39.6875	158.0625
December	37.8600	159.5400
Annual	45.1853	168.0563

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
Aug 30, 2021, AWQI #155292	Lead	89.5 ug/L	Resampled	Sept 7, 2021
Sept 27, 2021, AWQI #155671	Filter #1 No NTU data recorded for 23 mins while in operation	Filter #1 placed out of service	Filter #1 NTU analyzer replaced and added loss of signal alarm	October 4, 2021

An annual Ministry of the Environment, Conservation and Parks Inspection was completed on November 10, 2021

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. See next page.

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. There was a loss of all trending data at KWTP	Approximately 14 hours March 24-25	SCADA contractor corrected the problem
O. Reg. 170, Section 13. (1)	Continuous monitoring data was not kept for at least two years. The POE flow meter stopped working. Loss of trending data	Approximately 15 hours March 26-27	Backwash flow meter installed temporarily until new meter installed on May 19
DWWP 088-202 Schedule A	The DWWP states that we have three chlorinators, two duty and one standby. At the time of the MECP inspection, there was only one duty and one standby chlorinator operational.	January 2019 to March 2021	Hired a contractor to complete repairs to cl2 system. A revision of wording was requested with the Director Notification submitted in June for the change to the chlorine feed rate.
O. Reg. 170, Schedule 1 section 1-6, (2) 1.	Alarm would not call out for a regulatory analyzer. The alarm dialer was malfunctioning and disarming itself.	Approximately 24 hours on April 12	Desiccant pack was placed in dialer to remove moisture. Dialer was replaced with Win911 system and backup sensaphone.
MDWL 088-102 issue #3 Schedule C Section 4.2	A monthly sample was not collected and tested for Total Suspended Solids when backwash water was directed to Lake Huron	April 4-13	In house training for staff on how to review trending to identify this issue.
O. Reg. 170, Section 13. (1)	Continuous monitoring data was not kept for at least two years. The Gary St Booster Station data logger did not record data	May 14-May 27	Two ethernet cords had been switched. Changed them back to rectify the issue.
MDWL 088-102 Issue #3 Schedule C Section 4.2	A monthly sample was not collected and tested for Total Suspended Solids when backwash water was directed to Lake Huron	Aug 19-25	Alarm put on pumps for overload or failure to start and dechlor pucks placed in chamber.
O. Reg. 170, Schedule 1 section 1-6, (2) 1.	Alarm would not call out for a regulatory analyzer. Phone and internet to plant was cut by contractor so alarms could not dial out	Sept 1	Bruce Telecom repaired phone line. Heartbeat put on SCADA so dialer at tower will call if connection is lost at plant.

O. Reg. 170, Schedule 6, Section 6-5, 10 (1.1) 1.	The continuous monitoring data was not kept for 2 years. Filter #2 was running but not recording on trending	Sept 11 for approximately 6 hours	Filter taken out of service until wiring repaired.
O. Reg. 170, Schedule 6, Section 6-5, 10 (1.1) 1.	The continuous monitoring data was not kept for 2 years. SCADA data lost Sept 23-24 due to Rockwell software signal loss	Sept 23-24 approximately 13 hours	SCADA tech added heartbeat so if signal is lost an alarm will notify on call operator
O. Reg. 170, Schedule 6, Section 6-5, 10 (1.1) 1.	The continuous monitoring data was not kept for 2 years. Filter #1 was running but not recording on trending	Sept 25-26 sporadic readings approximately	Filter taken out of service until analyzer replaced. Added loss of signal alarms on all 4 filters
O. Reg. 170, Schedule 1 section 1-6, (2) 1.	Alarm would not call out for a regulatory cl2 analyzer. The PLC card removed for pre cl2 analyzer and used for tower alarm.	Sept 14 to November	PLC card faulty for tower. Used card from pre cl2 analyzer until a replacement was obtained.
O. Reg. 170, Schedule 6, Section 6-5, 10 (1.1) 1.	The continuous monitoring data was not kept for 2 years. The UPS battery backup for SCADA failed. Trending data lost	Oct 1 approximately 4 hours	Plugged in direct to outlet until replacement UPS installed