

2019 Annual Report

Hudson Drinking Water System



Prepared by Northern Waterworks Inc. on behalf of the Municipality of Sioux Lookout

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1 INTRODUCTION

1.1 Annual Reporting Requirements

This consolidated Annual Report (the Report) has been prepared in accordance with both section 11 (Annual Reports) and Schedule 22 (Summary Reports for Municipalities) of Ontario Regulation 170/03 (Drinking Water Systems Regulation). This Report is intended to inform both the public and Municipal Council on the operation of the system over the previous calendar year (January 1 to December 31, 2019).

Section 11 of O. Reg. 170/03 requires the development and adequate distribution to the public of an annual report summarizing water quality monitoring results, adverse water quality incidents, system expenses and chemicals used in the water treatment process.

Schedule 22 of O. Reg. 170/03 requires the development and distribution to Council of an annual report summarizing incidents of regulatory non-compliance and associated corrective actions, in addition to providing flow monitoring results for the purpose of enabling the Owner to assess the capability of the system to meet existing and planned demand.

1.2 Report Availability

In accordance with section 11 of O. Reg. 170/03 this Report must be given, without charge, to every person who requests a copy. Effective steps must also be taken to advise users of water from the system that copies of the report are available, without charge, and of how a copy may be obtained. This Annual Report shall be made available for inspection by the public at the Municipal Office in Sioux Lookout, at the Lost Lake Seniors Drop-In Centre in Hudson, on the Municipality's website and on NWI's website.

In accordance with Schedule 22 of O. Reg. 170/03 this Annual Report must be given to the members of Municipal Council. Section 19 (Standard of care, municipal drinking-water system) of Ontario's *Safe Drinking Water Act* also places certain responsibilities upon those municipal officials who oversee an accredited operating authority or exercise decision-making authority over a system. The examination of this Report is one of the methods by which municipal officials may fulfil the obligations required by section 19 of O. Reg. 170/03.

System users and members of Council are strongly encouraged to contact a representative of NWI for assistance in interpreting this Report. Questions and comments may be directed to the local NWI Operations Manager or by email to compliance@nwi.ca.

2 SYSTEM OVERVIEW

2.1 System Description

The Hudson Drinking Water System (DWS No. 220005385) must meet extensive treatment and testing requirements in order to ensure that human health is protected. The operation and maintenance of the system is governed by Ontario's *Safe Drinking Water Act* and the regulations therein, in addition to requirements within system-specific approvals.

The Hudson Drinking Water System is classified as a large municipal residential system and is composed of a raw water pumping station, the Hudson Water Treatment Plant (WTP) and the Hudson water distribution system. The system is owned by the Corporation of the Municipality of Sioux Lookout and is operated, maintained and managed by Northern Waterworks Inc. Potential pathogenic organisms are removed and inactivated by chemical coagulation, flocculation, clarification, rapid sand filtration and ultraviolet disinfection processes.

Raw water flows by gravity from the intake structure located in Lost Lake to an underground wet well located at the raw water pumping station. Pumps then transfer water from the wet well directly to the treatment units at the WTP through a transmission line. At the Hudson WTP polyaluminum chloride (coagulant) is injected and rapidly mixed into the raw water immediately upstream from the package treatment units. Coagulated water enters two treatment units each including a three-chambered flocculation basin, a clarifier and filter.

Water is gently mixed as it passes through the flocculation basins in order to promote floc formation, and the optional application of polymer (flocculant) at this stage of treatment is intended to form larger floc aggregates. Process water then enters the clarifier, where its velocity is reduced to allow for the separation and settling of floc. Supernatant overflows into the clarifier effluent launders and is directed to the filter unit; settled floc (sludge) is automatically removed from the bottom of the clarifier.

Impurities that were not captured and settled as floc in the clarifier are removed by passing water through a dual media filter (composed of anthracite and silica sand on a layer of support gravel). The filters are periodically cleaned by using an air scour to agitate the entire media bed and reversing the flow of water through the filter using dedicated pumps. Sodium metabisulfite may be used as required to dechlorinate the treated water that is used clean the filters.

Filtered water then passes through one of two available UV reactors for disinfection as it is directed to the treated water storage reservoir. Prior to entering the reservoir, a super-chlorinated solution (secondary disinfection – gas chlorine) and sodium hydroxide (pH/alkalinity adjustment) are applied to the filtrate. Disinfected water is stored in the reservoir and is transferred to the Hudson water distribution system using pumps located at the WTP.

The Hudson water distribution system was installed exclusively in 1990 and includes approximately 6 km of water mains, 46 valves and 7 hydrants. Watermain materials consist of HDPE and PVC ranging in size from 50 to 150 mm in diameter. Secondary disinfection requirements in the distribution system are achieved by maintaining a free chlorine residual at all locations.

2.2 Water Treatment Chemicals

In accordance with section 11 of O. Reg. 170/03, this Report must include a list of all water treatment chemicals used by the system during the period covered by the report (**Table 1**). All chemicals used in the treatment process are NSF/ANSI 60 certified for use in potable water, as required by system approvals.

Table 1: Water treatment chemicals used in 2019

Treatment Chemical	Application
polyaluminum chloride	coagulant
sodium hydroxide	pH/alkalinity adjustment
chlorine gas	secondary disinfectant

2.3 System Expenses

In accordance with section 11 of O. Reg. 170/03, this Report must describe any major expenses incurred during the reporting period to install, repair or replace required equipment. This Report also includes those expenses related to strengthening equipment inventories and to maintenance activities undertaken by subcontracted service providers. Major expenses incurred in 2019 are summarized in **Table 2**.

Table 2: Major expenses incurred in 2019

Category	Description	Expense
Inventory	Gas chlorinator components ¹	\$12,379
Replace	Filtrate turbidity analyzers (2)	\$11,687
Repair	Programmable logic controller software upgrade and installation	\$2,166
Maintenance	Emergency generator service and load testing	\$1,513
Maintenance	Flow meter calibration verifications	\$1,364
Maintenance	Backflow prevention device testing	\$1,286
Maintenance	Thermal imaging of electrical systems	\$1,147

1. Gas chlorinator components included the purchase of a chlorine injector assembly, vacuum regulator assembly and water supply solenoid valves.

3 WATER QUALITY

3.1 Overview

In accordance with section 11 of O.Reg. 170/03, this Report must summarize the results of water quality tests required by regulations, approvals, and orders. The following sections use technical water quality terms, some of which the reader may not be familiar with. It is recommended that the reader refer to the *Technical Support Document for Ontario Drinking Water Standards, Objectives, and Guidelines* available at the following website:

<http://www.ontla.on.ca/library/repository/mon/14000/263450.pdf>. Within this document the reader will find information on provincial water quality standards, objectives and guidelines, rationale for monitoring, and a brief description of water quality parameters.

3.2 Microbiological Parameters

Microbiological tests are performed on source, treated and distribution water. 260 routine water samples were collected for microbiological analysis by an accredited laboratory in 2019, as required by Schedule 10 (Microbiological sampling and testing) of O. Reg. 170/03. These samples were collected on a weekly basis and included tests for E. coli (EC), total coliforms (TC) and heterotrophic plate counts (HPC). Results from microbiological analyses are summarized in **Table 3**. All results were below the Ontario Drinking Water Quality Standards.

Table 3: Results summary for microbiological parameters

Sample Type	# of Samples	EC Results Range ¹ (MPN/100mL)	TC Results Range ¹ (MPN/100mL)	# of HPC Samples	HPC Results Range (CFU/mL)
Raw Water	52	0 to 2	0 to 225	---	---
Treated Water	52	absent	absent	52	0 to 96
Distribution	156	absent	absent	104	0 to 5

1. The Ontario Drinking Water Quality Standard for E. Coli and Total Coliforms in a treated or distribution sample is 'not detectable'. The presence of either parameter in a treated or distribution sample is considered an exceedance.

3.3 Operational Parameters

In accordance with Schedule 7 (Operational checks) of O. Reg. 170/03, regulated operational parameters that must be monitored include raw water turbidity, filtrate turbidity and the free chlorine residuals associated with secondary disinfection. A comprehensive monitoring program is employed that extends beyond these regulated operational parameters to include additional tests conducted on source, process and treated water samples. **Table 4** summarizes water quality results for regulated and selected unregulated operational parameters. In accordance with Schedule 6 (Operational checks, sampling and testing – general) of O. Reg. 170/03, certain operational parameters are continuously monitored. No Adverse Water Quality Incidents (AWQIs) pertaining to operational parameters occurred during the reporting period.

Table 4: Results summary for operational parameters

Parameter (Sample Type)	Sample Method (Minimum Frequency)	Units	Minimum Result	Maximum Result	Annual Average	Adverse Result
Turbidity (Raw Water)	Grab (3x weekly)	NTU	0.22	2.06	0.93	n/a
Turbidity (Filter 1)	Continuous	NTU	0.03	0.35	0.05	>1.0
Turbidity (Filter 2)	Continuous	NTU	0.02	0.34	0.05	>1.0
Turbidity (Treated)	Grab (Daily)	NTU	0.076	0.267	0.150	n/a
pH (Treated)	Grab (5x weekly)	---	7.4	9.0	7.8	n/a
FCR ¹ (Treated)	Continuous	mg/L	0.21	1.82	1.13	n/a
FCR ¹ (Distribution) ²	Grab (Daily)	mg/L	0.44	1.48	n/a	<0.05

1. FCR = free chlorine residual.

2. Grab samples are collected and tested for free chlorine residual at various locations throughout the water distribution system. The free chlorine residual varies with water age and distribution system location, and for this reason an annual average cannot be provided. The values in the table pertain to the minimum and maximum results collected across all locations in the calendar year.

3.4 Filtration & UV Disinfection Performance

In accordance with the system's *Municipal Drinking Water Licence*, conventional filtration facilities must meet certain performance criteria in order to claim log removal and inactivation credits for *Cryptosporidium* oocysts, *Giardia* cysts and viruses. In addition to continuously monitoring filtrate turbidity and other requirements, filtrate turbidity must be less than or equal to 0.3 NTU in at least 95% of the measurements each month. **Table 5** summarizes filtrate turbidity compliance against the <0.3

NTU/95% performance criterion. Minimum and maximum values in the table correspond to the proportion of time that filtered water turbidity was less than or equal to 0.3 NTU in a calendar month in 2019. No AWQIs pertaining to filtration performance occurred during the reporting period.

Table 5: Filtration performance summary

Filter	Filter 1	Filter 2
Minimum Result	100%	99.76%
Maximum Result	100%	100%
Adverse Result	<95%	<95%

To ensure primary disinfection, the UV reactors at the Hudson WTP must operate within their validated operating conditions to achieve a minimum continuous pass-through UV dose of 40 mJ/cm². The dose is a function of the flow through the reactors, the applied UV intensity and the UV transmittance (purity) of the filtrate. The reactors are considered to be operating “off-specification” any time when conditions are below a minimum UV intensity, below a minimum UV transmittance or above a maximum flow rate. **Table 6** summarizes UV equipment performance against the validated operating conditions. An off-specification event is classified as an Adverse Water Quality Incident (AWQI) if UV equipment operates outside of the validated range for a continuous period of 10 minutes. No AWQIs pertaining to UV disinfection performance occurred during the reporting period.

Table 6: UV disinfection performance summary

Parameter	Sample Method (Min. Frequency)	Units	Min. Result	Max. Result	Annual Average	Adverse Result
Flow (Combined Filtrate)	Continuous	L/s	n/a	6.21	5.20	>9.3
UV Intensity (Reactor 1)	Continuous	W/m ²	0.0	n/a	85.8	<50.6
UV Intensity (Reactor 2)	Continuous	W/m ²	0.0	n/a	84.4	<50.6
UV Transmittance (Filter 1)	Grab (Weekly)	%/1cm	90.6	94.0	91.8	<85.1
UV Transmittance (Filter 2)	Grab (Weekly)	%/1cm	90.4	94.2	91.9	<85.1

3.5 Nitrate & Nitrite

Treated water is tested for nitrate and nitrite concentrations on a quarterly basis in accordance with Schedule 13 (Chemical sampling and testing) of O. Reg. 170/03. Nitrate and nitrite results are provided in **Table 7**. All results were below the Ontario Drinking Water Quality Standards.

Table 7: Nitrate and nitrite results

Sample Date	Nitrate Result (mg/L)	Nitrite Result (mg/L)
12-Feb-2019	<0.020	<0.010
14-May-2019	<0.020	<0.010
13-Aug-2019	0.023	<0.010
12-Nov-2019	0.025	<0.010
ODWQS	10	1

3.6 Trihalomethanes & Haloacetic Acids

Trihalomethanes (THMs) and haloacetic acids (HAAs) are required to be sampled on a quarterly basis from a distribution system location that is likely to have an elevated potential for their formation, in accordance with Schedule 13 (Chemical sampling and testing) of O. Reg. 170/03. Total THM and HAA results are provided in **Table 8** and **Table 9**, respectively.

Table 8: Total THM results

Sample Date	Result (µg/L)
12-Feb-2019	57.3
14-May-2019	70.4
13-Aug-2019	102
12-Nov-2019	66.8
Regulatory Average	74.1
ODWQS (RAA)	100

Table 9: Total HAA results

Sample Date	Result (µg/L)
12-Feb-2019	53.6
14-May-2019	52.7
13-Aug-2019	58.1
12-Nov-2019	56.8
Regulatory Average	55.3
ODWQS (RAA)	80

Compliance with the provincial standard for trihalomethane concentrations is determined by calculating a running annual average (with a Maximum Acceptable Concentration of 0.100 mg/L or 100 µg/L). A new provincial standard for haloacetic acids, also expressed as a running annual average with a Maximum Acceptable Concentration of 0.080 mg/L or 80 µg/L, came into effect on January 1, 2020. The 2019 running annual averages for THMs and HAAs were below the respective Ontario Drinking Water Quality Standards.

3.7 Environmental Discharge Sampling

The *Municipal Drinking Water Licence* for the Hudson DWS requires additional sampling associated with environmental discharges. Specifically, samples must be collected on a quarterly basis from settling tank effluent and analyzed for the parameter total suspended solids (TSS). This effluent is discharged to a disbursement field which has been designed for the management of residues produced during the normal operation of the WTP.

Environmental discharge sampling results are provided in **Table 10**.

Table 10: Environmental discharge sampling results

Sample Date	12-Feb-2019	17-May-2019	13-Aug-2019	13-Nov-2019
TSS Result (mg/L)	803	3.9	<2.0	1020

3.8 Lead Sampling

In accordance with Schedule 15.1 (Lead) of O. Reg. 170/03, the Hudson DWS was required to develop a *Corrosion Control Plan* in 2011 following unfavourable results associated with the community lead sampling program. The selected corrosion control measure involves maintaining treated water pH at a value of 7.8 +/- 0.2 units using a sodium hydroxide chemical feed system. Corrosion control has been effective and has resulted in a 70% reduction in average lead levels calculated across all plumbing samples. The ODWQS exceedance rate has also been reduced from 16.4% to 3.8% (i.e. 16.4% of plumbing samples collected prior to corrosion control exceeded the standard for lead in drinking-water).

The system now adheres to the lead monitoring program outlined in its *Municipal Drinking Water Licence*, which requires the collection of distribution and plumbing samples on an annual basis. **Table 11** summarizes the results of community lead sampling conducted in 2019. All samples were collected on October 7, 2019.

Table 11: Lead sampling results summary

Sample Type	Treated	Distribution	Plumbing
Total No. of Sample Points ¹	1	2	5
Total No. of Samples	3	4	10
Minimum Result (µg/L)	<1.0	<1.0	<1.0
Maximum Result (µg/L)	<1.0	1.9	16.9
No. of Sample Points greater than ODWQS (>10 µg/L)	n/a	n/a	1
Sample Point ODWQS Exceedance Rate	n/a	n/a	20%
No. of Samples greater than ODWQS (>10 µg/L)	0	0	1
No. of Samples between LDL ² and ODWQS (1 - 10 µg/L)	0	1	4
No. of Samples below LDL ² (<1.0 µg/L)	3	2	5

1. In accordance with the sampling protocol outlined in Schedule 15.1 of O. Reg. 170/03, two samples are collected and analyzed for lead at each sample point for plumbing samples.
2. LDL = lower detectable limit (i.e. <1.0 µg/L); lead concentrations below the LDL are not detected by the analytical method.

3.9 Inorganic Parameters

Most inorganic parameters are sampled on an annual basis in treated water in accordance with Schedules 13 (Chemical sampling and testing) and 23 (Inorganic parameters) of O. Reg. 170/03. The inorganic parameters sodium and fluoride are sampled every five (5) years in treated water in accordance with Schedules 13 and 23 of O. Reg. 170/03.

The most recent inorganic parameter sampling results are provided in **Table 12**. In order to shift the annual sample collection date from February to August in a given calendar year, two sets of treated water samples were collected and tested for most regulated inorganic parameters in 2019. Results in the table are identical for both sample collection dates unless otherwise indicated. All results were below the associated Ontario Drinking Water Quality Standards.

Table 12: Inorganic parameter sampling results

Parameter	Sample Date(s)	Units	Result(s)	ODWQS
Antimony	12-Feb-2019, 13-Aug-2019	µg/L	<0.60	6
Arsenic	12-Feb-2019, 13-Aug-2019	µg/L	<1.0	10
Barium	12-Feb-2019, 13-Aug-2019	µg/L	<10	1000
Boron	12-Feb-2019, 13-Aug-2019	µg/L	<50	5000
Cadmium	12-Feb-2019, 13-Aug-2019	µg/L	<0.10	5
Chromium	12-Feb-2019, 13-Aug-2019	µg/L	<1.0	50
Fluoride	17-Feb-2015	mg/L	<0.020	1.5
Mercury	12-Feb-2019, 13-Aug-2019	µg/L	<0.10	1
Selenium	12-Feb-2019	µg/L	<1.0	50
	13-Aug-2019		<5.0	
Sodium	17-Feb-2015	mg/L	6.87	20
Uranium	12-Feb-2019	µg/L	<2.0	20
	13-Aug-2019		<5.0	

3.10 Organic Parameters

Organic parameters are sampled on an annual basis in treated water in accordance with Schedules 13 (Chemical sampling and testing) and 24 (Organic parameters) of O. Reg. 170/03. These parameters include various organic acids, pesticides, herbicides, PCBs and other organic chemicals.

Organic parameter sampling results are provided in **Table 13**. In order to shift the annual sample collection date from February to August in a given calendar year, two sets of treated water samples were collected and tested for all regulated organic parameters in 2019. One set of samples was collected on February 19, while the second set of samples was collected on August 13. With the exception of the parameter Benzo(a)pyrene, results in the table are identical for both sample collection dates. All results were below the associated Ontario Drinking Water Quality Standards.

Table 13: Organic parameter sampling results

Parameter	Result (µg/L)	ODWQS (µg/L)	Parameter	Result (µg/L)	ODWQS (µg/L)
Alachlor	<0.10	5	Diuron	<1.0	150
Atrazine & Metabolites	<0.20	5	Glyphosate	<5.0	280
Azinphos-methyl	<0.10	20	Malathion	<0.10	190
Benzene	<0.50	1	MCPA	<0.20	100
Benzo(a)pyrene ¹	<0.010; <0.0050	0.01	Metolachlor	<0.10	50
Bromoxynil	<0.20	5	Metribuzin	<0.10	80
Carbaryl	<0.20	90	Monochlorobenzene	<0.50	80
Carbofuran	<0.20	90	Paraquat	<1.0	10
Carbon Tetrachloride	<0.20	2	Pentachlorophenol	<0.50	60
Chlorpyrifos	<0.10	90	Phorate	<0.10	2
Diazinon	<0.10	20	Picloram	<0.20	190
Dicamba	<0.20	120	Total PCBs	<0.035	3
1,2-Dichlorobenzene	<0.50	200	Prometryne	<0.10	1
1,4-Dichlorobenzene	<0.50	5	Simazine	<0.10	10
1,2-Dichloroethane	<0.50	5	Terbufos	<0.20	1
1,1-Dichloroethylene	<0.50	14	Tetrachloroethylene	<0.50	10
Dichloromethane	<5.0	50	2,3,4,6-Tetrachlorophenol	<0.50	100
2,4 -Dichlorophenol	<0.30	900	Triallate	<0.10	230
2,4-D	<0.20	100	Trichloroethylene	<0.50	5
Diclofop-methyl	<0.20	9	2,4,6-Trichlorophenol	<0.50	5
Dimethoate	<0.10	20	Trifluralin	<0.10	45
Diquat	<1.0	70	Vinyl Chloride	<0.20	1

1. The treated water sample collected on February 19 and tested for Benzo(a)pyrene yielded a result of < 0.010 µg/L. The treated water sample collected on August 13 and tested for Benzo(a)pyrene yielded a result of < 0.005 µg/L. All results were less than the lower analytical detection limit.

4 FLOW MONITORING

4.1 Overview

In accordance with Schedule 22 (Summary Reports for Municipalities) of O. Reg. 170/03, this Annual Report must include certain information for the purpose of enabling the Owner to assess the capability of the system to meet existing and planned uses. Specifically, this Report must include a summary of the quantities and flow rates of the water supplied during the reporting period, including monthly average and maximum daily flows. The Report must also include a comparison of flow monitoring results to the rated capacity and flow rates approved in the system's *Municipal Drinking Water Licence*.

4.2 2019 Flow Monitoring Results

Throughout the reporting period, the Hudson DWS operated within its rated capacity and supplied a total of 24,668 m³ of treated water. On an average day in 2019 67.6 m³ of treated water was supplied to the community, which represents 9% of the rated capacity of the Hudson WTP (726 m³/day). The maximum daily flow in 2019 was 183.2 m³/day, which represents 25% of the rated capacity of the facility. Flow monitoring results are summarized in Figure 1 and Table 14.

Figure 1: 2019 average and maximum daily treated water flows

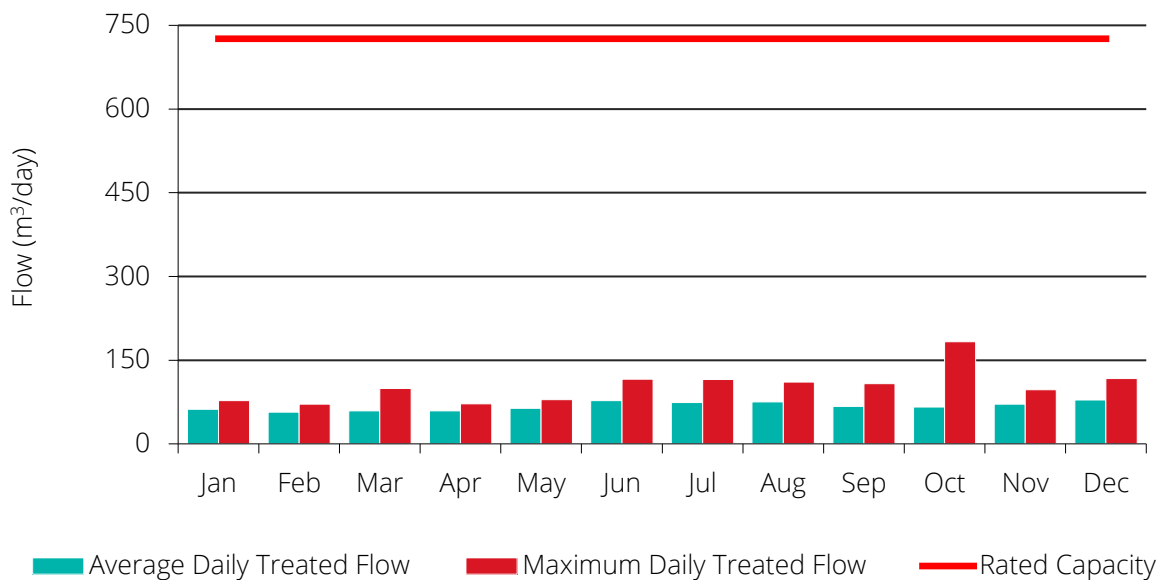


Table 14: 2019 flow monitoring results summary

Month	Total Volumes (m ³)		Daily Flows (m ³ /day)		Capacity Assessments ¹	
	Raw Water	Treated Water	Average - Treated Water	Maximum - Treated Water	Average - Treated Water	Maximum - Treated Water
Jan	2,131	1,918	61.9	77.5	9%	11%
Feb	1,721	1,596	57.0	70.9	8%	10%
Mar	1,916	1,825	58.9	99.5	8%	14%
Apr	1,934	1,777	59.2	71.9	8%	10%
May	2,171	1,970	63.6	79.0	9%	11%
Jun	2,468	2,327	77.6	116.0	11%	16%
Jul	2,448	2,300	74.2	115.3	10%	16%
Aug	2,527	2,326	75.0	110.5	10%	15%
Sep	2,189	2,009	67.0	107.8	9%	15%
Oct	2,261	2,053	66.2	183.2	9%	25%
Nov	2,191	2,130	71.0	97.1	10%	13%
Dec	2,601	2,437	78.6	117.3	11%	16%
Total	26,557	24,668	---	---	---	---
Average	2,213	2,056	67.6	---	9%	---

1. Capacity assessments compare average and maximum daily treated water flows to the rated capacity of the treatment facility, as provided within the *Municipal Drinking Water Licence*.

4.3 Recent Historical Flows

Table 15 summarizes recent historical flow monitoring results for the Hudson DWS. There were no significant changes in the amounts of source water withdrawn and treated water supplied in 2019 when compared to 2018. As a small system, average daily flows and annual total volumes in Hudson may be disproportionately affected by events such as a significant watermain break or a heavy user. Total annual volumes of treated water supplied in the near future may be expected to be between 15,000 m³ and 40,000 m³, which represents approximately 6% to 15% of the rated capacity of the Hudson WTP.

Table 15: Recent historical flow monitoring results

Year	Total Volumes (m ³)		Daily Flows (m ³ /day)		Annual % Change	
	Raw Water	Treated Water	Average – Treated Water	Maximum – Treated Water	Raw Water	Treated Water
2011	52,922	45,980	126.0	238.1	+23.2%	+22.7%
2012	33,668	25,760	70.4	236.0	-36.4%	-44.0%
2013	28,380	20,642	56.6	135.9	-15.7%	-19.9%
2014	32,466	24,077	66.0	201.8	+14.4%	+16.6%
2015	29,321	22,501	61.6	157.0	-9.7%	-6.5%
2016	27,326	21,186	57.9	118.9	-6.8%	-5.8%
2017	37,731	32,219	88.3	208.3	+38.1%	+52.1%
2018	28,237	26,006	71.2	195.8	-25.2%	-19.3%
2019	26,557	24,668	67.6	183.2	-6.0%	-5.1%
Average	32,957	27,004	73.9	---	---	---

5 COMPLIANCE

5.1 Overview

Northern Waterworks Inc. and the Municipality of Sioux Lookout employ an operational strategy that is committed to achieving the following goals:

- 1) Providing a safe and reliable supply of drinking water to the community of Hudson;
- 2) Meeting or exceeding all applicable legislative and regulatory requirements; and,
- 3) Maintaining and continually improving the operation and maintenance of the system.

The following sections will summarize incidents of adverse water quality and regulatory noncompliance that occurred during the reporting period. NWI is committed to employing timely and effective corrective actions to prevent recurrence of all identified incidents of noncompliance and adverse water quality.

5.2 Adverse Water Quality Incidents

In accordance with section 11 (Annual Reports) of O. Reg. 170/03, this Report must summarize any reports made to the Ministry under subsection 18(1) (Duty to report adverse test results) of *the Act* or section 16-4 (Duty to report other observations) of Schedule 16 of O. Reg. 170/03. Additionally, this Report must describe any corrective actions taken under Schedule 17 of O. Reg. 170/03 during the period covered by the report.

There were no adverse water quality incidents during the reporting period for the Hudson Drinking Water System.

5.3 Regulatory Compliance

In accordance with Schedule 22 (Summary Reports for Municipalities) of O. Reg. 170/03, this Report must list any requirements of the *Act*, the regulations, the system's approval, drinking water works permit, municipal drinking water licence, and any orders applicable to the system that were not met at any time during the period covered by the report (i.e. an incident of regulatory noncompliance). Additionally, this Report must specify the duration of the failure and the measures that were taken to correct the failure.

One (1) incident of regulatory noncompliance was identified during the most recent inspection initiated on April 29, 2019 by Ontario's Ministry of the Environment, Conservation and Parks. Information concerning the duration of failures and the measures taken to address those failures is provided below. The details of the noncompliance item and the actions required may utilize some or all of the original wording contained within the inspection report. Updates concerning the status of actions required are provided where appropriate.

- **Where an activity has occurred that could introduce contamination, all parts of the drinking water system were not disinfected in accordance with Schedule B, Condition 2.3 of the *Drinking Water Works Permit*.**

On October 4, 2018, one of the distribution high lift pumps failed and was taken out of service until repairs were completed. During this time the wet well for the pump was isolated, cleaned and disinfected using sodium hypochlorite as required.

AWWA Standard C653-13, section 5.1 requires that two or more samples shall be taken from the unit or facility not less than 30 minutes apart and be tested for the presence of total coliform bacteria. One bacteriological sample was collected on November 27, 2018 and tested absent for E. coli and total coliform parameters before the distribution pump came back into service on November 29, 2018.

Action(s) Required: Effective immediately, the Owner is required to follow AWWA Standard C653-13, including section 5.1, that after parts of the drinking water system that have been taken out of service for inspection or repair and the disinfection has been completed, and before the treatment unit or facility is placed in service, two or more samples shall be taken from the unit or facility not less than 30 minutes apart and shall be tested for the presence of total coliforms. No further actions are required.