

2017 Annual Report

Hudson Drinking Water System

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Prepared by



for the Corporation of the
Municipality of Sioux Lookout

Introduction

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 the Municipal Council on the operation of the system over the previous calendar year (January 1 to December 31, 2017).

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 Municipal 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.

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 following locations:

- (1) Municipal Office, Customer Service Desk, Sioux Lookout
- (2) Lost Lake Seniors Drop-In Centre, Hudson
- (3) Municipal Website (www.sioxlookout.ca)
- (4) NWI Website (www.nwi.ca/publications)

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 Northern Waterworks Incorporated (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.

System Overview

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.

System Description

The Hudson DWS 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 distribution system. The system is owned by the Corporation of the Municipality of Sioux Lookout and is operated, maintained and administered by Northern Waterworks Incorporated. Potential pathogenic organisms are removed and inactivated by chemical coagulation, flocculation, clarification, rapid sand filtration and ultraviolet disinfection.

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. 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; settled floc (sludge) is automatically removed from the bottom of the clarifier.

Any suspended particles that did not settle 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.

As filtrate is directed to the treated water storage reservoir, it is passed through one of two available UV reactors for disinfection. A super-chlorinated solution (secondary disinfection – gas chlorine) and sodium hydroxide (pH adjustment) are also applied to the filtrate. Disinfected water is stored in the reservoir and is transferred to the Hudson distribution system using pumps located at the WTP.

The Hudson 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.

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 2017.

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

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 summarizes those expenses related to strengthening equipment inventories and to maintenance activities undertaken by subcontracted service providers. Major expenses incurred in 2017 are summarized in **Table 2**.

Table 2: Major expenses incurred in 2017.

Category	Description	Expense
Replace	Variable frequency drive motor controller (high lift pump no. 2)	\$11,536
Inventory	Chlorine residual analyzer sensor	\$4,078
Inventory	Chlorine gas regulator	\$2,950
Replace	Turbidity analyzer emitter and receiver	\$2,838
Replace	UV reactor bulbs (8)	\$2,630
Inventory	Distribution pressure transmitter	\$2,281
New Equipment	UV transmittance benchtop instrument	\$2,221
Maintenance	Backflow prevention device testing	\$1,728
Maintenance	Flow meter calibration verifications	\$1,500
Inventory	Chemical feed system pressure gauges (5)	\$1,382

Water Quality

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.

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 residual associated with secondary disinfection. The Hudson DWS employs a comprehensive monitoring program that extends beyond these regulated operational parameters to include additional tests conducted on source, process and treated water samples. **Table 3** 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.

Table 3: Results summary for operational parameters.

Parameter (Sample Type) ¹	Sample Method (Minimum Frequency)	Units	Minimum Result	Maximum Result	Annual Average	Adverse Result ²
Turbidity (Raw Water)	Grab (4x weekly)	NTU	0.59	1.81	1.03	n/a
Turbidity (Filter 1)	Continuous	NTU	0.04	0.77	0.06	>1.0
Turbidity (Filter 2)	Continuous	NTU	0.03	0.25	0.05	>1.0
Turbidity (Treated)	Continuous	NTU	0.12	1.75	0.23	n/a
pH (Treated)	Continuous	---	7.33	7.97	7.59	n/a
FRC (Treated)	Continuous	mg/L	0.13	1.74	1.10	n/a
FRC (Distribution)	Grab (Daily)	mg/L	0.39	1.63	0.92	<0.05

1. FRC = free residual chlorine.

2. Adverse results are prescribed within Schedule 16 of O. Reg. 170/03. There are additional factors not included in the table that are necessary to determine whether a result is adverse, such as the duration of the result and whether water is being directed to the next stage of the treatment process.

Conventional Filtration & UV Disinfection Performance

In accordance with the *Procedure for Disinfection of Drinking Water in Ontario*, 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 4** 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 2017.

Table 4: Conventional filtration performance.

Filter	Monthly Min.	Monthly Max.	Adverse Result
Filter 1	99.90%	100%	<95%
Filter 2	99.95%	100%	<95%

To ensure primary disinfection, the UV reactors at the Hudson Water Treatment Plant must operate within their validated operating conditions in order 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 operating conditions are below a minimum UV intensity, below a minimum UV transmittance, or above a maximum flow rate. Special recording and reporting requirements apply depending on the magnitude of an off-specification event. **Table 5** summarizes UV equipment performance against the validated operating conditions. An off-specification event is classified as an Adverse Water Quality Incident if UV equipment operates outside of the validated range for a continuous period of 10 minutes.

Table 5: UV disinfection performance.

Parameter	Sample Method (Min. Frequency)	Units	Min. Result	Max. Result	Annual Average	Adverse Result
Flow (Combined Filtrate)	Continuous	L/s	3.46	7.72	5.18	>9.3
UV Intensity (Reactor 1)	Continuous	W/m ²	62.1	111.3	82.7	<50.6
UV Intensity (Reactor 2)	Continuous	W/m ²	54.0	90.0	66.2	<50.6
UV Transmittance (Filter 1)	Grab (Weekly)	%/1cm	88.9	93.4	90.6	<85.1
UV Transmittance (Filter 2)	Grab (Weekly)	%/1cm	89.0	92.8	90.7	<85.1

Microbiological Parameters

Microbiological analyses are performed on source, treated, and distribution system water. 260 routine water samples were collected for microbiological analysis by an accredited laboratory in 2017, as required by Schedule 10 (Microbiological sampling and testing) of O. Reg. 170/03. These water 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 provided in **Table 6**. All results were below the associated Ontario Drinking Water Quality Standards.

Table 6: Microbiological sampling results.

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	<1 to 3	<1 to 980	---	---
Treated Water	52	absent	absent	51	0 to 143
Distribution	156	absent	absent	51	0 to 1
Distribution (Non-routine)	6	absent	absent	---	---

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.

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. Results of environmental discharge sampling are provided in **Table 7**.

Table 7: Environmental discharge results.

Sample Date	TSS Result (mg/L)
15-Feb-2017	94.8
16-May-2017	233
15-Aug-2017	174
15-Nov-2017	1800

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 summarized in **Table 8** and **Table 9**, respectively.

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). In 2017, the running annual average for THMs was 71.1 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, will come into effect on January 1, 2020.

Table 8: Total THM results.

Sample Date	Result (µg/L)
16-Feb-2017	60.6
16-May-2017	54.6
15-Aug-2017	105.0
14-Nov-2017	64.1
Average	71.1
ODWQS (RAA)	100

Table 9: Total HAA results.

Sample Date	Result (µg/L)
16-Feb-2017	47.4
16-May-2017	42.4
15-Aug-2017	71.5
14-Nov-2017	45.6
Average	51.7
Future ODWQS (RAA)	80

Nitrate and 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 10**. All results were below the Ontario Drinking Water Quality Standards.

Table 10: Nitrate and nitrite results.

Sample Date	Nitrate Result (mg/L)	Nitrite Result (mg/L)
16-Feb-2017	<0.020	<0.010
16-May-2017	<0.020	<0.010
15-Aug-2017	<0.020	<0.010
14-Nov-2017	<0.020	<0.010
ODWQS	10	1

Inorganic & Organic Parameters

Except for the parameters sodium and fluoride, 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 most recent inorganic parameter sampling results are provided in **Table 11**. All results were below the associated Ontario Drinking Water Quality Standards.

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 sample results are also summarized in **Table 11**.

Table 11: Inorganic sampling results.

Parameter	Sample Date	Units	Result	ODWQS
Antimony	16-Feb-2017	µg/L	<0.60	6
Arsenic	16-Feb-2017	µg/L	<1.0	10
Barium	16-Feb-2017	µg/L	<10	1000
Boron	16-Feb-2017	µg/L	<50	5000
Cadmium	16-Feb-2017	µg/L	<0.10	5
Chromium	16-Feb-2017	µg/L	<1.0	50
Fluoride	17-Feb-2015	mg/L	<0.020	1.5
Mercury	16-Feb-2017	µg/L	<0.10	1
Selenium	16-Feb-2017	µg/L	<1.0	50
Sodium	17-Feb-2015	mg/L	6.87	20
Uranium	16-Feb-2017	µg/L	<2.0	20

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 acids, pesticides, herbicides, PCBs, volatile organics, and other organic chemicals. Organic parameter sampling results are provided in **Table 12** on the following page. Sampling for all organic parameters was conducted on February 16, 2017. All results were below the associated Ontario Drinking Water Quality Standards.

Table 12: 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 + N-dealkylated metabolites	<0.20	5	Glyphosate	<5.0	280
Azinphos-methyl	<0.10	20	Malathion	<0.10	190
Benzene	<0.50	1	2-Methyl-4-Chlorophenoxy-acetic acid (MCPA)	<0.20	100
Benzo(a)pyrene	<0.010	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	<0.80	190
Dicamba	<0.20	120	Polychlorinated Biphenyls (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-Dichlorophenoxy acetic acid	<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

Lead Sampling

The Hudson DWS was required to develop a *Corrosion Control Plan* in 2011 following unfavourable results associated with the community lead sampling program. Following the implementation of corrosion control measures, the system now adheres to the lead monitoring program outlined in its *Municipal Drinking Water Licence*. **Table 13** summarizes the results of community lead sampling conducted in 2017.

Table 13: Lead sampling results.

Sample Type	Treated	Distribution	Plumbing
Total No. of Sample Points ¹	1	2	5
Total No. of Samples	3	2	10
Minimum Result (µg/L)	<1.0	2.8	<1.0
Maximum Result (µg/L)	4.0	6.3	1.7
No. of Sample Points greater than ODWQS (>10 µg/L)	0	0	0
No. of Samples greater than ODWQS (>10 µg/L)	0	0	0
No. of Samples between LDL ² and ODWQS (1 - 10 µg/L)	1	2	2
No. of Samples below LDL (<1.0 µg/L)	2	0	8

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.

Flow Monitoring

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.

Throughout the reporting period, the Hudson DWS operated within its rated capacity and supplied a total of 32,219 m³ of treated water. On an average day in 2017, 88.3 m³ of treated water was supplied to the community, which represents 12% of the rated capacity of the Hudson WTP (726 m³/day). The maximum daily flow in 2017 was 208.3 m³/day, which represents 29% of the rated capacity of the facility. 2017 flow monitoring results are summarized in **Table 14** and **Figure 1**.

Table 14: 2017 total volumes, daily flows, and capacity assessments.

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	2,162	1,583	51.1	64.7	7%	9%
Feb	2,007	1,479	52.8	71.4	7%	10%
Mar	2,186	1,652	53.3	85.9	7%	12%
Apr	2,365	1,826	60.9	77.9	8%	11%
May	2,838	2,335	75.3	95.9	10%	13%
Jun	3,294	2,858	95.3	130.2	13%	18%
Jul	4,181	3,741	120.7	170.6	17%	23%
Aug	3,805	3,272	105.5	152.7	15%	21%
Sep	3,055	2,498	83.3	188.5	11%	26%
Oct	3,115	2,914	94.0	118.4	13%	16%
Nov	3,510	3,216	107.2	123.7	15%	17%
Dec	5,215	4,844	156.2	208.3	22%	29%
Total	37,731	32,219	---	---	---	---
Avg.	3,144	2,685	88.3	---	12%	---

1. Capacity assessments compare average and maximum daily treated water flows to the rated capacity of the treatment facility (726 m³/day), as provided within the Municipal Drinking Water Licence for the Hudson DWS.

Figure 1: 2017 average and maximum daily treated water flows.

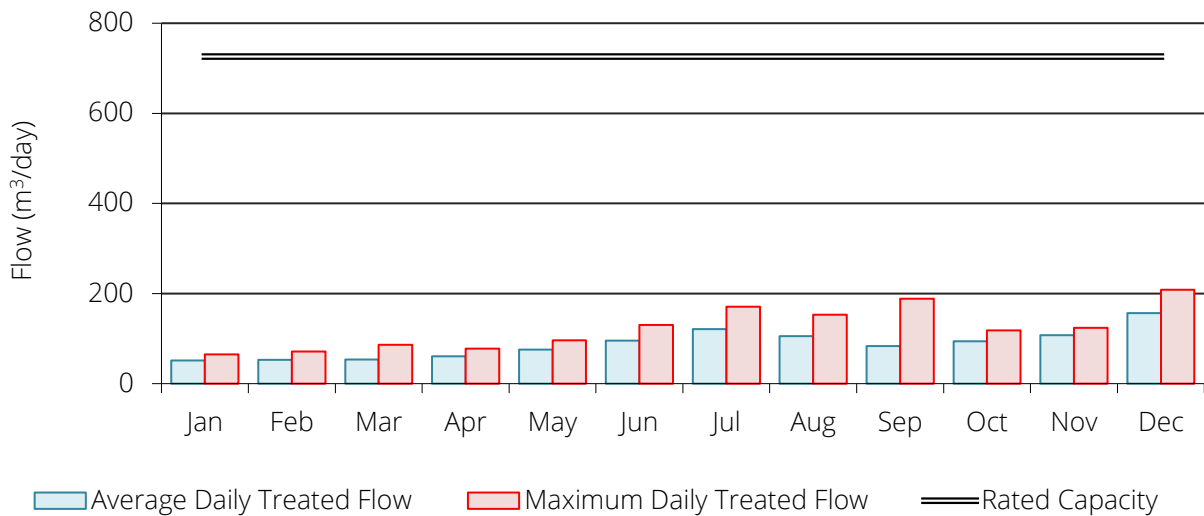


Table 15 summarizes annual flow monitoring results for the Hudson DWS. There were significant increases in the amounts of source water withdrawn and treated water supplied in 2017 when compared to 2016. Total annual volumes of treated water supplied in the near future are anticipated to be between 15,000 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%

Compliance

Northern Waterworks Incorporated 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;
- 3) Maintaining and continually improving the operation and maintenance of the system; and,
- 4) Maintaining and operating the Hudson Drinking Water System in a responsible manner in accordance with documented quality management system policies and procedures.

The following sections will summarize incidents of adverse water quality and 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.

Regulatory Noncompliance

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.

No incidents of regulatory noncompliance were identified during the most recent inspection by Ontario's Ministry of the Environment and Climate Change (MOECC) initiated on April 12, 2017.

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 was one (1) adverse water quality incident during the reporting period for the Hudson DWS:

- **AWQI No. 137104 (October 6, 2017)**

An operational indicator of adverse water quality occurred following a mechanical failure and a reduction in distribution system pressure originating at the Hudson Water Treatment Plant. The issue was reported to the MOECC Spills Action Centre and to the Northwestern Health Unit.

Corrective action was performed in accordance with Schedule 17 of O. Reg. 170/03, and included restoring distribution system pressure, correcting the mechanical failure, issuing a precautionary Boil Water Advisory, flushing watermains, and collecting microbiological samples throughout the community. The Notice of Issue Resolution was provided on October 13, 2017.