

# 2017 Annual Report

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## Sioux Lookout Urban 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](http://www.sioxlookout.ca))
- (4) NWI Website ([www.nwi.ca/publications](http://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](mailto:compliance@nwi.ca).

# System Overview

The Sioux Lookout Urban Drinking Water System (DWS No. 220001405) 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 Sioux Lookout Urban DWS is classified as a large municipal residential system and is composed of a raw water pumping station, the Sioux Lookout Water Treatment Plant (WTP), and the Sioux Lookout 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, membrane ultrafiltration, and disinfection using both free chlorine and ultraviolet (UV) irradiation.

Raw water flows by gravity from the intake structure located in Pelican Lake to an underground wet well located at the raw water pumping station. Pumps transfer water from the wet well and through a transmission line to the flocculation tanks at the WTP. At the Sioux Lookout WTP, aluminum sulphate (coagulant) and sodium hydroxide (pH adjustment) are injected and rapidly mixed into the raw water immediately upstream from the flocculation tanks. In the tanks water is gently mixed to promote floc formation, which will in turn facilitate membrane filtration.

Flocculated water is then directed to underground process reservoirs containing submerged membrane ultrafilters. Permeate (filtered water) is drawn through the membrane filters using a vacuum generated by pumps, effectively filtering impurities from the water. Permeate is passed through one of two available UV reactors for disinfection and is injected with sodium hypochlorite (disinfectant), fluorosilicic acid (fluoridation), and sodium hydroxide (pH adjustment) as it is directed to the chlorine contact chamber and reservoir. The chlorine contact chamber uses a baffling system to allow chlorine to mix adequately with the water. The disinfected water is then held in the reservoir for a sufficient amount of time to achieve free chlorine primary disinfection.

Treated water is delivered from the reservoir to the water distribution system using pumps located at the Sioux Lookout WTP. The Sioux Lookout distribution system consists of approximately 34 km of water mains, 250 water main gate valves, 172 hydrants, a community standpipe for regulating pressure and providing extra storage, and a booster station serving the northeast portion of the system. Secondary disinfection requirements in the distribution system are achieved by maintaining a free chlorine residual.

The Sioux Lookout WTP also includes an independent second stage membrane ultrafiltration unit designed to recover process wastewater. Wastewater generated from the primary filtration process is collected and delivered to the unit for treatment. Permeate may then be directed to one of multiple different locations, including introduction to the raw water stream.

## 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
aluminum sulphate	coagulant
sodium hydroxide	pH adjustment
fluorosilicic acid	fluoridation
sodium hypochlorite	disinfectant, filter cleaning agent
citric acid	filter cleaning agent

## 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.

Description	Expense
Wellington Street Upgrade Project, including the replacement of 417 m of watermain (150 mm, 200 mm and 300 mm diameter), the replacement of five (5) watermain valves (200 mm and 300 mm diameter), the installation of two (2) new 150 mm diameter watermain valves, the replacement of one (1) hydrant set, the replacement of six (6) water services, and the installation of two (2) new water services for future connection	\$256,240
Queen Street Upgrade Project, including the replacement of 155 m of 100 mm diameter watermain with 150 mm diameter watermain, the replacement of one (1) 150 mm diameter watermain valve, the installation of two (2) new 150 mm diameter watermain valves, the replacement of two (2) hydrant sets, the replacement of nine (9) water services, and the installation of three (3) new water services for future connection	\$152,313
Replacement of the standpipe recirculation system and installation of rechlorination chemical feed system	\$52,146

**Table 2 (Continued):** Major expenses incurred in 2017.

Description	Expense
Installation of variable frequency drive motor controllers for high lift pumps at WTP	\$34,578
Various distribution system maintenance and repair activities, including swabbing 900 m of watermain, repairing two (2) water service leaks and one (1) watermain break, installing three (3) new services for new developments, and replacing one (1) hydrant set	\$33,000
Booster pump replacement and upgrades at Curtis Street Booster Station	\$15,339
Reject wastewater submersible pump repairs	\$6,946
Replacement of membrane filter process tank level transmitter (1)	\$6,774
Replacement of filtrate flow meter (1)	\$6,264
Miscellaneous programming and automation services	\$6,001
Completion of the replacement of process tank lining	\$4,892
Repairs to low lift pump motor	\$3,647
Replacement of SCADA computer terminal	\$3,628
Purchase of spare free chlorine residual analyzer probe (1)	\$3,390
Purchase of spare air drying unit for pneumatic process valves	\$3,015
Purchase of spare permeate valve actuators (4)	\$2,601
Replacement of reject water flow meter (1)	\$2,454
Purchase of spare pressure transmitter (1) associated with membrane integrity testing	\$2,281
Flow meter calibration verifications	\$1,832
Backflow prevention device testing	\$1,728
Replacement of flocculation tank pH probes (2)	\$1,670
Purchase of spare pneumatic actuators for backpulse valves (2)	\$1,373
Purchase of spare filter-to-waste valve actuator (1)	\$1,094

# 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, treated water fluoride residual, and the free chlorine residuals associated with primary and secondary disinfection. The Sioux Lookout Urban 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) <sup>1</sup>	Sample Method (Minimum Frequency)	Units	Minimum Result	Maximum Result	Annual Average	Adverse Result <sup>2</sup>
Turbidity (Raw Water)	Grab (3x weekly)	NTU	0.34	1.16	0.57	n/a
Turbidity (Filter 1)	Continuous	NTU	0.030	0.682	0.036	>1.0
Turbidity (Filter 2)	Continuous	NTU	0.010	0.208	0.036	>1.0
Turbidity (Treated)	Continuous	NTU	0.02	0.74	0.08	n/a
pH (Treated)	Continuous	---	6.74	8.30	7.49	n/a
FR (Treated)	Continuous	mg/L	0.15	1.05	0.61	1.5
FRC (Treated)	Continuous	mg/L	1.35	2.82	2.31	n/a
FRC (Distribution)	Grab (Daily)	mg/L	<0.05 <sup>3</sup>	2.37	1.56	<0.05

1. FR = fluoride residual; 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.
3. This result is associated with two (2) Adverse Water Quality Incidents. Refer to the *Compliance* section of this report for more information.

## Membrane Filtration & UV Disinfection Performance

In accordance with the *Procedure for Disinfection of Drinking Water in Ontario*, membrane filtration facilities must meet certain performance criteria in order to claim log removal and inactivation credits for *Cryptosporidium* oocysts and *Giardia* cysts. In addition to continuously

monitoring filtrate turbidity and other requirements, filtrate turbidity must be less than or equal to 0.1 NTU in at least 99% of the measurements each month. **Table 4** summarizes filtrate turbidity compliance against the <0.1 NTU/99% 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 0.1 NTU in a calendar month in 2017.

**Table 4:** Membrane filtration performance.

Filter	Monthly Min.	Monthly Max.	Adverse Result
Filter 1	100%	100%	<99%
Filter 2	99.99%	100%	<99%

To ensure primary disinfection, the UV reactors at the Sioux Lookout Water Treatment Plant must operate within their validated operating conditions in order to achieve a minimum continuous pass-through UV dose of 20 mJ/cm<sup>2</sup> (based on a *Cryptosporidium* bracket reduction equivalent dose). 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 calculated dosage, 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. Features such as automatic switchover and/or automatic shutdown of the UV reactors generally limit the duration of off-specification events and help to prevent Adverse Water Quality Incidents.

**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	13.5	67.5	41.3	>65.0
UV Dosage (Reactor 1)	Continuous	mJ/cm <sup>2</sup>	0	77.5	34.8	<20
UV Dosage (Reactor 2)	Continuous	mJ/cm <sup>2</sup>	0	82.6	35.3	<20
UV Transmittance (Filter 1)	Grab (Daily)	%/1cm	86.1	92.2	90.0	<82.0
UV Transmittance (Filter 2)	Grab (Daily)	%/1cm	84.6	98.7	90.0	<82.0

## Microbiological Parameters

Microbiological analyses are performed on source, treated, and distribution system water. 312 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 <sup>1</sup> (MPN/100mL)	TC Results Range <sup>1</sup> (MPN/100mL)	# of HPC Samples	HPC Results Range (CFU/mL)
Raw Water	52	<1 to 3	<1 to 1550	---	---
Treated Water	52	absent	absent	50	0 to 1
Distribution	208	absent	absent	50	0 to 2
Distribution (Non-routine)	31	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.

## 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 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)
16-Feb-2017	0.073	<0.010
16-May-2017	0.059	<0.010
15-Aug-2017	<0.020	<0.010
14-Nov-2017	0.052	<0.010
ODWQS	10	1

## 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 86.7 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	77.0
16-May-2017	58.1
15-Aug-2017	129.0
14-Nov-2017	82.8
Average	86.7
ODWQS (RAA)	100

**Table 9:** Total HAA results.

Sample Date	Result (µg/L)
16-Feb-2017	72.5
16-May-2017	53.1
15-Aug-2017	95.3
14-Nov-2017	85.2
Average	76.5
Future ODWQS (RAA)	80

## Lead Sampling

The Sioux Lookout Urban DWS previously qualified for reduced lead sampling and ultimately became exempt from sampling at plumbing locations, in accordance with Schedule 15.1 (Lead) of O. Reg. 170/03. Six (6) distribution system samples must now be collected every year and analyzed for pH and alkalinity. Additionally, these distribution system samples must be analyzed for lead in every third 12-month period after the plumbing sample exemption was activated. **Table 10** summarizes the results of community lead sampling and related required tests.

**Table 10:** Distribution pH, alkalinity and lead sampling results.

Sample Date	Sample Location	pH	Alkalinity (mg/L as CaCO <sub>3</sub> )	Lead Result (µg/L)
29-Mar-2017	Hydrant, 1 <sup>st</sup> Ave. & Fuller St.	7.11	20	Lead analyses not required in 2017 <sup>1</sup>
30-Mar-2017	Hydrant, 7 <sup>th</sup> Ave. & King St.	7.16	20	
31-Mar-2017	Hydrant, Sturgeon River Rd. (East)	7.24	20	
10-Oct-2017	Hydrant, Sioux Mountain Public School	7.86	15	
10-Oct-2017	Hydrant, 1 <sup>st</sup> Ave. & Queen St.	7.63	15	
11-Oct-2017	Hydrant, 5 <sup>th</sup> Ave. & Ethel St.	7.21	20	

1. Lead will be tested in distribution samples during the period corresponding to December 15, 2017 to April 15, 2018, and again during the period corresponding to June 15, 2018 to October 15, 2018.

## 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 is sampled every five (5) years in treated water in accordance with Schedules 13 and 23 of O. Reg. 170/03. Although grab samples may be analyzed, regulatory testing for fluoride is achieved using continuous monitoring equipment, in accordance with Schedule 6 of O. Reg. 170/03. The most recent sodium and fluoride sample results are also summarized in **Table 11**. All results were below the associated Ontario Drinking Water Quality Standards.

**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	0.52	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	11.8	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	30
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

# 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.

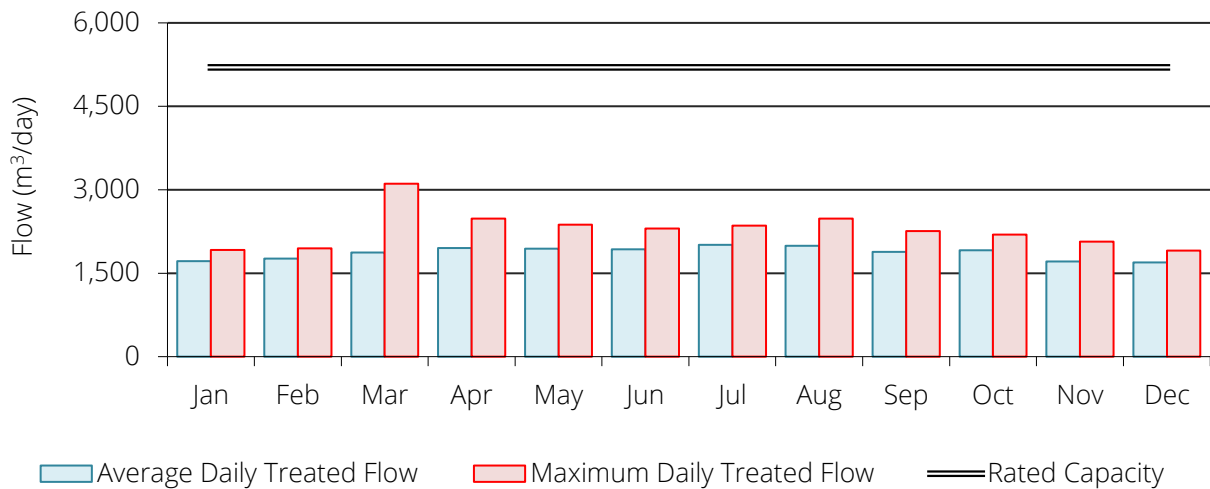
Throughout the reporting period, the Sioux Lookout Urban DWS operated within its rated capacity and supplied a total of 680,914 m<sup>3</sup> of treated water. On an average day in 2017, 1,866 m<sup>3</sup> of treated water was supplied to the community, which represents 36% of the rated capacity of the Sioux Lookout WTP (5,200 m<sup>3</sup>/day). The maximum daily flow in 2017 was 3,111 m<sup>3</sup>/day, which represents 60% of the rated capacity of the facility. Flow monitoring results are summarized in **Table 13** and **Figure 1**.

**Table 13:** 2017 total volumes, daily flows, and capacity assessments.

Month	Total Volumes (m <sup>3</sup> )		Daily Flows (m <sup>3</sup> /day)		Capacity Assessments <sup>1</sup>	
	Raw Water	Treated Water	Average - Treated Water	Maximum - Treated Water	Average - Treated Water	Maximum - Treated Water
Jan	62,442	53,179	1,715	1,920	33%	37%
Feb	57,493	49,387	1,764	1,947	34%	37%
Mar	68,799	58,082	1,874	3,111	36%	60%
Apr	67,405	58,526	1,951	2,480	38%	48%
May	69,389	60,213	1,942	2,373	37%	46%
Jun	65,437	57,825	1,928	2,301	37%	44%
Jul	70,484	62,257	2,008	2,355	39%	45%
Aug	69,406	61,846	1,995	2,479	38%	48%
Sep	63,323	56,441	1,881	2,257	36%	43%
Oct	66,652	59,286	1,912	2,194	37%	42%
Nov	60,410	51,397	1,713	2,069	33%	40%
Dec	60,961	52,475	1,693	1,904	33%	37%
Total	782,201	680,914	---	---	---	---
Avg.	65,183	56,743	1,866	---	36%	---

1. Capacity assessments compare average and maximum daily treated water flows to the rated capacity of the treatment facility (5,200 m<sup>3</sup>/day), as provided within the Municipal Drinking Water Licence for the Sioux Lookout Urban DWS.

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



**Table 14** summarizes annual flow monitoring results for the Sioux Lookout Urban DWS. There were no significant changes 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 may be expected to be between 600,000 m<sup>3</sup> and 725,000 m<sup>3</sup>, which represents approximately 32% to 38% of the rated capacity of the Sioux Lookout WTP.

**Table 14:** Recent historical flow monitoring results.

Year	Total Volumes (m <sup>3</sup> )		Daily Flows (m <sup>3</sup> /day)		Annual % Change	
	Raw Water	Treated Water	Average – Treated Water	Maximum – Treated Water	Raw Water	Treated Water
2011	888,430	729,341	1,998	3,008	-3.8%	+6.1%
2012	979,670	785,457	2,146	2,837	+10.3%	+7.7%
2013	846,566	697,954	1,912	3,411	-13.6%	-11.1%
2014	710,645	606,465	1,662	2,385	-16.1%	-13.1%
2015	819,063	663,813	1,819	2,495	+15.3%	+9.5%
2016	804,401	679,025	1,855	2,522	-1.8%	+2.3%
2017	782,201	680,914	1,866	3,111	-2.8%	+0.3%

# 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 Sioux Lookout;
- 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 Sioux Lookout Urban Drinking Water System in a responsible manner in accordance with documented quality management system policies and procedures.

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

## 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 two (2) adverse water quality incidents during the reporting period for the Sioux Lookout Urban DWS:

- **AWQI No. 132806 (April 5, 2017)**

An adverse result occurred such that the free chlorine residual in a distribution sample collected from a location on Second Avenue (North) was less than 0.05 mg/L. The issue was reported to the MOECC Spills Action Centre and the Northwestern Health Unit.

Corrective action was performed in accordance with Schedule 17 of O. Reg. 170/03 and included flushing adjacent water mains to restore secondary disinfection, issuing a localized Boil Water Advisory, collecting sets of microbiological samples, installing bleeders on nearby hydrants, and continuing to monitor secondary disinfection in the area. The Notice of Issue Resolution was provided on April 26, 2017.

- **AWQI No. 134038 (July 13, 2017)**

An adverse result occurred such that the free chlorine residual in a distribution sample collected from a hydrant located at the intersection of Queen Street and Second Avenue was less than 0.05 mg/L. The issue was reported to the MOECC Spills Action Centre and the Northwestern Health Unit.

Corrective action was performed in accordance with Schedule 17 of O. Reg. 170/03 and included flushing adjacent water mains to restore secondary disinfection, manipulating main valves to improve water quality, installing bleeders on nearby hydrants, and continuing to monitor secondary disinfection in the area. The Notice of Issue Resolution was provided on August 1, 2017.

## **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.

One (1) incident of regulatory noncompliance was identified during the most recent inspection initiated on October 3, 2017, by Ontario's Ministry of the Environment and Climate Change (MOECC). The details of the noncompliance items 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.

- **Records did not confirm that the water treatment equipment which provides chlorination or chloramination for secondary disinfection purposes was operated so that at all times and all locations in the distribution system the chlorine residual was never less than 0.05 mg/L free or 0.25 mg/L combined.**

Chlorination is provided for secondary disinfection purposes in the Sioux Lookout water distribution system. During the inspection review period there were four low chlorine residual events in the distribution system that resulted in the reporting of Adverse Water Quality Incidents. The areas affected were located where low water flows are persistent, such as dead ends. Two water bleeders were installed on hydrants and flushing of the distribution was conducted. A chlorine booster that has improved chlorine residuals was also installed at the Sioux Lookout Standpipe on June 27, 2017.

**Actions Required:** The owner and operator of the Sioux Lookout Urban Drinking Water System is to continue to monitor distribution chlorine residuals and to continue to address low chlorine residuals where and as they occur.

**Update:** Generally, low and adverse free chlorine residuals in the Sioux Lookout distribution system are caused by flow patterns that result in localized stagnant water zones and/or aging watermain infrastructure that exerts a greater chlorine demand than newer infrastructure. Interim solutions to address issues with secondary disinfection have included the installation and operation of bleeders, targeted flushing, watermain valve manipulations to alter flow patterns, the installation of a chlorine booster system at the community standpipe, and increased monitoring. Long term solutions to resolve incidents of inadequate secondary disinfection include watermain infrastructure renewal and rehabilitation.