

2015 Annual Report

Atikokan Drinking Water System

	Introduction p. 2
	System Overview pp. 3 - 4
	Water Quality pp. 5 - 9
	Flow Monitoring pp. 10 - 11
	Compliance pp. 12 - 21

Prepared by:





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, 2015).

Section 11 of O. Reg. 170/03 requires the development and adequate dissemination 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 dissemination 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) Atikokan Public Library
- (2) Town of Atikokan Website (www.atikokan.ca)
- (3) 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 municipal 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 Supervisor or by email to compliance@nwi.ca.

SYSTEM OVERVIEW

The Atikokan Drinking Water System (DWS No. 220000950) must meet extensive treatment and testing requirements 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 Atikokan Drinking Water System (DWS) is classified as a large municipal residential system, and it is composed of the Low Lift Pumping Station (LLPS), the Atikokan Water Treatment Plant (WTP), and the Atikokan distribution system. The system is owned by the Corporation of the Town of Atikokan and the treatment subsystem is operated and maintained by Northern Waterworks Incorporated. Potential pathogenic organisms are removed and inactivated by chemical coagulation, sand-ballasted flocculation, clarification, rapid sand filtration, and free chlorine disinfection.

Pumps located at the LLPS transfer raw water from the Atikokan River and through a transmission line to the two proprietary Actiflo treatment units at the WTP, each of which includes a coagulation basin, injection basin, maturation basin and settling zone. Polyaluminum chloride (coagulant) is injected into the raw water immediately upstream from the coagulation basin. Water and coagulant are rapidly mixed in the coagulation basin and flow is directed to the injection basin, where microsand and polyacrylamide (polymer – a flocculant) are added to enhance the formation of robust flocs. Floc formation continues in the maturation basin before water is directed to the settling zone, where its velocity is reduced to allow for the separation and settling of floc. Supernatant then overflows into a launder and is directed to the filter units.

Any suspended particles that did not settle in the clarifier are removed by passing water through four dual media filters (each composed of anthracite and silica sand on a layer of support gravel). The filters are periodically cleaned by reversing the flow of water through the filter using pumps. Chlorine gas (disinfectant), sodium carbonate solution (pH adjustment), and hydrofluorosilicic acid (fluoridation) are added to the filtrate as it is directed from the filters to the treated water storage reservoir.

The reservoir at the Atikokan WTP uses a baffling system to allow the disinfectant to mix adequately with the water, and disinfected water is held in the reservoir for a sufficient amount of time to achieve primary disinfection. Treated water is then delivered from the reservoir to the distribution system by the use of pumps located at the WTP. Secondary disinfection requirements in the distribution system are achieved by the maintenance of 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. The standby sodium hypochlorite chemical feed system was not utilized in 2015.

Table 1: Water treatment chemicals used in 2015.

Treatment Chemical	Application
polyaluminum chlorine (SternPAC)	coagulant
silica dioxide (Actisand)	flocculant
polymer (Superfloc C-492)	flocculant
sodium carbonate (soda ash)	pH adjustment
hydrofluorosilicic acid	fluoridation
chlorine gas	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 2015 include:

- installation of a digital chart recorder at the WTP;
- installation of a filtrate free chlorine residual monitoring system;
- installation of Aqua-Flo units at two households as a pilot project;
- replacement of distribution (treated water) flow meter;
- replacement of air compressors;
- replacement of overhead hoist in high lift pumping room;
- replacement of a low lift pump at LLPS;
- replacement and purchase of spare surface wash nozzles for filter backwash system;
- replacement of local disconnects for high lift, backwash and fire pumps;
- replacement of level sensor for a filter unit;
- replacement and purchase of spare chemical metering pumps;
- replacement and purchase of spare air compressor starters;
- replacement of fluorescent light high output ballasts;
- repairs and upgrades to automation systems;
- repairs to soda ash exhaust fan motor;
- purchase of spare components for polymer chemical feed system;
- purchase of a spare chlorine gas detector probe;
- purchase of rebuild kits and pilot assembly for distribution header pressure reducing valve;
- purchase of a spare probe and refurbishment kit for pH analyzers;
- inspection, service and testing of emergency generators;
- electrical networks thermal imaging inspection and report; and,
- calibration verification of flow measuring devices.

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*. 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. This document can be found at the following website address: <https://www.ontario.ca/document/technical-support-document-ontario-drinking-water-standards-objectives-and-guidelines>

Operational Parameters

In accordance with Schedule 7 (Operational checks) of O. Reg. 170/03, regulated operational parameters which 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 Atikokan 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 2** 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 2: Results summary for operational parameters.

Parameter (Sample Type) ¹	Sample Method (Minimum Frequency) ²	Units	Minimum Monthly Average	Maximum Monthly Average	Annual Average
Turbidity (Raw Water)	Grab (Twice-weekly)	NTU	0.72	1.49	1.08
Turbidity (Filter 1)	Continuous	NTU	0.060	0.122	0.088
Turbidity (Filter 2)	Continuous	NTU	0.070	0.143	0.104
Turbidity (Filter 3)	Continuous	NTU	0.041	0.098	0.062
Turbidity (Filter 4)	Continuous	NTU	0.042	0.100	0.065
Turbidity (Treated)	Continuous	NTU	0.08	0.15	0.11
pH (Treated)	Grab (Twice-weekly)	---	7.11	7.69	7.34
Alkalinity (Treated)	Grab (Twice-weekly)	mg/L ³	19.3	31.2	24.8
Fluoride Residual (Treated)	Continuous	mg/L	0.48	0.71	0.62
FRC (Treated)	Continuous	mg/L	2.37	2.71	2.51
FRC (Distribution)	Grab (Daily)	mg/L	0.77	1.82	1.34

1. FRC = free residual chlorine.

2. For continuously monitored parameters, all results are derived from daily instantaneous readings of continuous monitoring equipment. Grab samples are also collected and tested in order to verify the accuracy of monitoring equipment for all continuously monitored parameters.

3. Expressed as mg/L CaCO₃.

Conventional Filtration 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 removal credits for *Cryptosporidium* oocysts. 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 3** 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 2015.

Table 3: Filtration performance.

Filter	Monthly Min.	Monthly Max.
Filter 1	98.0% (Nov.)	100%
Filter 2	97.3% (Nov.)	100%
Filter 3	98.9% (Nov.)	100%
Filter 4	97.0% (Nov.)	100%

Microbiological Parameters

Microbiological analyses are performed on source, treated, and distribution system water. A total of 265 routine water samples were collected for microbiological analysis by an accredited laboratory in 2015, 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 4**.

Table 4: Microbiological sampling results.

Sample Type	# of EC/TC 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 42	24 to >2420	---	---
Treated Water	52	absent	absent	52	0 to 2
Distribution	161	absent	absent	57	0 to 8
Raw Water (Non-Routine)	2	3	108 to 185	---	---
Treated Water (Non-Routine)	4	absent	absent	4	0
Distribution (Non-Routine)	34	absent	absent	8	0 to 480

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.

Trihalomethanes

Trihalomethanes (THMs) are required to be sampled on a quarterly basis from a distribution system location that is likely to have an elevated potential for THM formation, in accordance with Schedule 13 (Chemical sampling and testing) of O. Reg. 170/03. 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 2015, the running annual average was 65.0 µg/L. Total THM results are summarized in **Table 5**.

Table 5: Total trihalomethane sampling results.

2015 Total THM Results (µg/L)				Annual Average Total THM Results (µg/L)					
Feb. 9	May 11	Aug. 17	Nov. 24	2015	2014	2013	2012	2011	2010
42.5	73.0	92.0	52.6	65.0	83.9	98.3	87.2	82.7	68.2

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 6**. All results were below the associated Ontario Drinking Water Quality Standards.

Table 6: Nitrate and nitrite results.

Sample Date (2015)	Nitrate Result (mg/L)	Nitrite Result (mg/L)	Nitrate + Nitrite (mg/L)
Feb. 9	0.044	<0.010	0.044
May 11	<0.020	<0.010	<0.040
Aug. 17	<0.020	<0.010	<0.040
Nov. 16	0.030	<0.010	<0.040
ODWQS	10	1	10

Lead Sampling

The Atikokan DWS has followed the standard lead sampling schedule for the previous four sampling periods, in accordance with Schedule 15.1 (Lead) of O.Reg. 170/03. **Table 7** summarizes the results of community lead sampling conducted on March 31, April 7, and October 13. Based on the favourable results of community lead sampling conducted over the previous four sample periods, the Atikokan DWS has re-qualified for reduced sampling. Reduced sampling for lead will resume in the Winter 2017 sample period (i.e. December 15, 2017 to April 15, 2018).

Table 7: Lead sampling results.

Sample Type	Distribution	Plumbing ¹
Total Number of Samples	9	90
Minimum Result (µg/L)	<1.0	<1.0
Maximum Result (µg/L)	<1.0	92.9
Number of Samples greater than ODWQS (>10 µg/L)	0	3
Number of Samples between LDL ² and ODWQS (1 - 10 µg/L)	0	44
Number of Samples below LDL (<1.0 µg/L)	9	43

1. Two plumbing samples are collected at each sample location (i.e. 90 samples correspond to 45 sample locations). Only the highest result of the two samples is used for determining regulatory compliance.
2. LDL = lower detectable limit (i.e. <1.0 µg/L); lead concentrations below the LDL are not detected by the employed analytical method.

Inorganic Parameters

With the exception of 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. 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 through the use of continuous monitoring equipment, in accordance with Schedule 6 of O. Reg. 170/03. The most recent inorganic parameter sampling results are provided in **Table 8**. All results were below the associated Standards.

Table 8: Inorganic sampling results.

Parameter	Sample Date	Units	Result	ODWQS
Antimony	November 16, 2015	µg/L	<0.60	6
Arsenic	November 16, 2015	µg/L	<1.0	25
Barium	November 16, 2015	µg/L	<10	1000
Boron	November 16, 2015	µg/L	<50	5000
Cadmium	November 16, 2015	µg/L	<0.10	5
Chromium	November 16, 2015	µg/L	<1.0	50
Fluoride	November 15, 2012	mg/L	0.663 ¹	1.5
Mercury	November 16, 2015	µg/L	<0.10	1
Selenium	November 16, 2015	µg/L	<1.0	10
Sodium	November 15, 2012	mg/L	10.2	20 ²
Uranium	November 16, 2015	µg/L	<2.0	20

1. This result pertains to a grab sample.
2. This value for the parameter sodium is not a water quality standard as prescribed in O. Reg. 169/03, although an exceedance of this value is associated with reporting requirements and corrective actions.

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 acids, pesticides, herbicides, PCBs, volatile organics, and other organic chemicals. Organic parameter sampling results are provided in **Table 9** on the following page. Sampling for the majority of organic parameters was conducted on November 11, 2015; sampling for Bromoxynil, 2,4-Dichlorophenoxy acetic acid, 2,4,5-Trichlorophenoxy acetic acid, Dicamba, Dinoseb, Picloram was conducted on January 25, 2016. All results were below the associated Standards.

Environmental Discharge Sampling

The Municipal Drinking Water Licence for the Atikokan DWS requires additional sampling associated with environmental discharges. During normal operation, process wastewater is transferred directly to the wastewater collection system. In the event that conditioned process wastewater is discharged to the natural environment, composite samples must be collected and analyzed for total suspended solids (TSS). The results of environmental discharge sampling conducted in 2015 are provided in **Table 10**.

Table 10: Environmental discharge sampling results.

Sample Date (2015)	TSS Result (mg/L)
Mar. 1	33.6
Apr. 17	13.2
May 15	13.4
Jun. 15	11.4
Oct. 26	6.0
Nov. 1	14.5

Table 9: Organic parameter sampling results.

Parameter	Result (µg/L)	ODWQS (µg/L)	Parameter	Result (µg/L)	ODWQS (µg/L)
Alachlor	<0.10	5	Diquat	<1.0	70
Aldicarb	<1.0	9	Diuron	<1.0	150
Aldrin + Dieldrin	<0.040	0.7	Glyphosate	<5.0	280
Atrazine + N-dealkylated metabolites	<0.20	5	Heptachlor + Heptachlor Epoxide	<0.20	3
Azinphos-methyl	<0.10	20	Lindane	<0.10	4
Bendiocarb	<0.20	40	Malathion	<0.10	190
Benzene	<0.50	5	Methoxychlor	<0.10	900
Benzo(a)pyrene	<0.010	0.01	Metolachlor	<0.10	50
Bromoxynil ¹	<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	<0.50	5	Parathion	<0.10	50
Chlordane (Total)	<0.30	7	Pentachlorophenol	<0.50	60
Chlorpyrifos	<0.10	90	Phorate	<0.10	2
Cyanazine	<0.10	10	Picloram ¹	<0.20	190
Diazinon	<0.10	20	Polychlorinated Biphenyls (PCBs)	<0.035	3
Dicamba ¹	<0.20	120	Prometryne	<0.10	1
1,2-Dichlorobenzene	<0.50	200	Simazine	<0.10	10
1,4-Dichlorobenzene	<0.50	5	Temephos	<0.10	280
DDT + metabolites	<0.40	30	Terbufos	<0.20	1
1,2-Dichloroethane	<0.50	5	Tetrachloroethylene	<0.50	30
1,1-Dichloroethylene	<0.50	14	2,3,4,6-Tetrachlorophenol	<0.50	100
Dichloromethane	<5.0	50	Triallate	<0.10	230
2,4 -Dichlorophenol	<0.30	900	Trichloroethylene	<0.50	5
2,4-Dichlorophenoxy acetic acid ¹	<0.20	100	2,4,6-Trichlorophenol	<0.50	5
Diclofop-methyl	<0.20	9	2,4,5-Trichlorophenoxy acetic acid ¹	<0.20	280
Dimethoate	<0.10	20	Trifluralin	<0.10	45
Dinoseb ¹	<0.20	10	Vinyl Chloride	<0.20	2

1. Sampling for these organic parameters was conducted on January 25, 2016.

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 report 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.

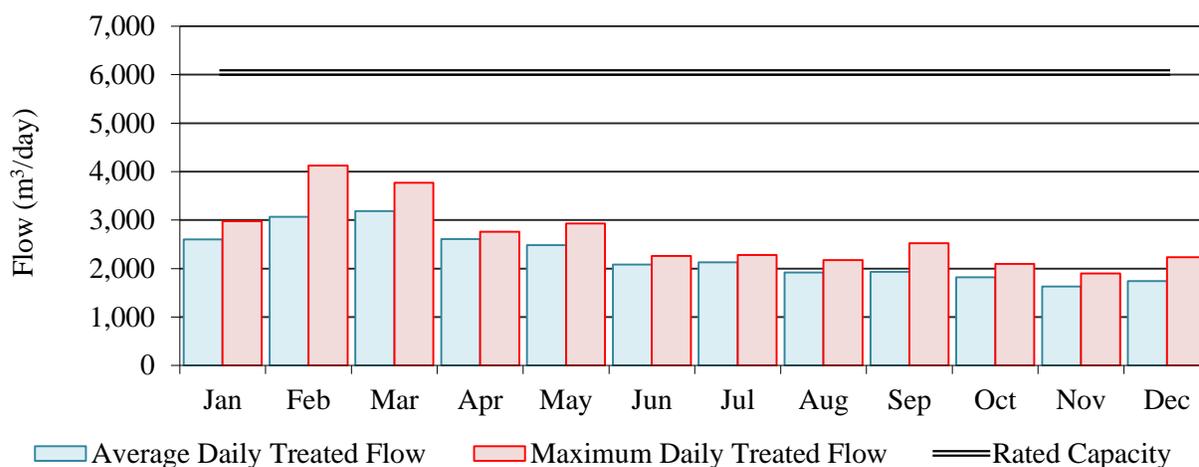
Throughout the reporting period, the Atikokan DWS operated within its rated capacity and supplied a total 825,522 m³ of treated water. On an average day in 2015, 2,262 m³ (2,262,000 L) of treated water was supplied to the community. The average daily flow in 2015 represents 37.4 % of the rated capacity of the Atikokan WTP (6,048 m³/day). The maximum daily flow in 2015 was 4,124 m³/day, which represents 68.2 % of the rated capacity. 2015 flow monitoring results are summarized in **Table 11** and **Figure 1**.

Table 11: 2015 total volumes, daily flows, and capacity assessments.¹

Month	Total Volumes (m ³)		Daily Flows (m ³ /day)		Capacity Assessments ²	
	Raw Water	Treated Water	Average - Treated Water	Maximum - Treated Water	Average - Treated Water	Maximum - Treated Water
Jan	97,010	80,730	2,604	2,976	43.1%	49.2%
Feb	100,670	85,859	3,066	4,124	50.7%	68.2%
Mar	116,740	98,832	3,188	3,769	52.7%	62.3%
Apr	94,860	78,139	2,605	2,760	43.1%	45.6%
May	100,260	77,010	2,484	2,930	41.1%	48.4%
Jun	88,110	62,414	2,080	2,258	34.4%	37.3%
Jul	78,750	65,935	2,127	2,280	35.2%	37.7%
Aug	73,560	59,492	1,919	2,173	31.7%	35.9%
Sep	78,160	57,939	1,931	2,525	31.9%	41.7%
Oct	77,340	56,468	1,822	2,093	30.1%	34.6%
Nov	64,000	48,820	1,627	1,901	26.9%	31.4%
Dec	59,570	53,883	1,738	2,236	28.7%	37.0%
Total	1,029,030	825,522	---	---	---	---
Avg.	85,753	68,793	2,266	---	37.4%	---

1. The treated water flow meter failed in November 2015 and was not replaced until 2016. Flow data obtained from the filtrate flow meter have been used to approximate treated water flows for the months of November and December.
2. Capacity assessments compare average and maximum daily treated water flows to the combined rated capacity of the system (6,048 m³/day), as provided within the Municipal Drinking Water Licence for the Atikokan DWS.

Figure 1: 2015 average and maximum daily treated water flows.



The Atikokan DWS continues to experience excessive distribution flows for a community its size (population 2,787, 2011 Census), relative both to neighbouring communities and to statistics reported for Canada as a whole. The 2015 flows encountered by the Atikokan DWS would be more expected for a community serving 10,000 persons (using per capita consumption statistics reported for Ontario in the 2014 Minister’s Annual Report on Drinking Water). Excessive and increasing flows may be attributed to distribution system leaks, unmetered consumption, and the use of seasonal bleeders to prevent water lines from freezing. Excessive flows will continue to increase electrical and chemical costs while also reducing the longevity of treatment infrastructure.

Table 12 summarizes recent historical flow monitoring results for the Atikokan DWS. There were increases in the amounts of source water withdrawn and treated water supplied in 2015 when compared to 2014. Total annual volumes of treated water supplied in the near future may be expected to be between 650,000 m³ and 850,000 m³, which represents approximately 29% to 39% of the rated capacity of the Atikokan WTP.

Table 12: 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
2010	797,588	619,846	1,698	---	---	---
2011	762,600	615,934	1,687	3,889	-4.4%	-0.6%
2012	747,243	642,622	1,756	3,082	-2.0%	+4.3%
2013	798,360	639,019	1,751	5,530	+6.8%	-0.6%
2014	943,794	789,592	2,163	3,770	+18.2%	+23.6%
2015	1,029,030	825,522	2,262	4,124	+9.0%	+4.6%

COMPLIANCE

Northern Waterworks Incorporated and the Town of Atikokan 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 Atikokan;
- 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 Atikokan Drinking Water System in a responsible manner in accordance with documented quality management system policies and procedures.

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

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.

Eight (8) incidents of regulatory noncompliance were identified during the most recent inspection by Ontario's Ministry of the Environment and Climate Change (MOECC) initiated on February 18, 2015. Information concerning the duration of failures and the measures taken to address those failures is provided for each item of non-compliance. The details of the noncompliance items and the actions required utilize some or all of the original wording contained within the inspection report. Updates concerning the status of actions required have been provided where appropriate.

- **The owner had not ensured that all equipment was installed in accordance with Schedule A and Schedule C of the Drinking Water Works Permit.**

Following the inspection on January 29, 2014, the operating authority was requested to provide an update, which was provided on May 30, 2014. The inspection on February 18, 2015, found this information to be the current status of the equipment.

THIRD CHLORINATOR - The third chlorinator was rebuilt on May 6 and 7, 2014, and is operational in manual. However, there remains a problem with the automatic controller. The operating authority reports that this issue could potentially be resolved by performing a milliamp input calibration or by replacing the automatic controller.

CHLORINATOR AUTOMATIC SWITCHOVER - The Drinking Water Works Permit requires automatic switchover between the duty and standby chlorinator dedicated to primary disinfection. The operating authority reports that the switchover panel is operational, however SCADA shuts down the plant after switching to the standby chlorinator. The PLC has switchover capabilities (when the duty chlorinator fails due to low vacuum, it engages the standby chlorinator). However, the PLC automatically reverts back to the duty chlorinator if the condition that caused the alarm deactivates.

FLUORIDE FEED SYSTEM - A previous inspection report and Order had discussed that Schedule A of the Drinking Water Works Permit describes the fluoride feed system as "flow paced". However, the amount of fluoride was being manually adjusted at the pump by an operator. On October 31, 2013, the operating authority provided a report which stated that the fluoride feeders are now dosing on a "flow proportional" system. However, the fluoride feeders were not dosing on a "flow proportional" system. In the past year the fluoride pumps have been replaced and it is reported that the system is now dosing in proportion to the flow of the water.

Action(s) Required:

FLUORIDE FEED SYSTEM - No further action required.

CHLORINATORS - Information provided by the Northern Waterworks Inc. indicates that the chlorinators have automatic switchover capability but problems with the controls/programming prevent them from operating properly or as described in the license. An "Action Required" for non-compliance item 3 relates to the chlorinators and may negate the need for further work on the automatic switchover feature of the chlorinators for primary disinfection.

- **The owner/OA was not in compliance with the requirement to prepare Form 1 documents as required by their Drinking Water Works Permit during the inspection period.**

During the summer of 2014 watermains were replaced on Willow Road and a section of watermain was installed to loop the system and eliminate a dead end. A Form 1 was not completed for this work but was provided on March 20, 2015, during this inspection. Schedule B of the Drinking Water Works Permit allows for the drinking water system to be altered by adding, modifying, replacing or extending a watermain within the distribution system subject to the conditions specified in Schedule B, Condition 3.0. Condition 3.3 states that the verifications required in conditions 3.1.7 (engineer confirming the work meets specific requirements) and 3.1.8 (owner confirming the work meets specific requirements) shall be recorded on "Form 1 – Record of Watermains Authorized as a Future Alteration" as published by the Ministry of the Environment; and retained for a period of ten (10) years by the owner.

Action(s) Required: These forms are "Authorized as a Future Alteration" and are to be completed along with the attachments prior to beginning the work. The Town of Atikokan is reminded that these forms must be retained for a period of ten years by the owner.

- **Records did not indicate that the treatment equipment was operated in a manner that achieved the design capabilities required under Ontario Regulation 170/03 or a Permit, Licence or Approval issued under Part V of the SDWA at all times that water was being supplied to consumers.**

Since the previous inspection in February 2014 there have been incidents that resulted in the treatment process not meeting the requirements of Schedule 1 of O. Reg. 170/03. On January 18, 2015, gas chlorine was not added to the partially treated water as it entered the Clearwell. No alarms were associated with the failure of the chlorination system. The problem was detected when low residuals were measured by the analyzer monitoring the chlorine residual in the water leaving the Clearwell and entering the distribution system. The operator reported that CT may not have been met. During the inspection a review of the operating parameters at the time of the incident also indicated that CT may not have been achieved. The incident was reported as an AWQI.

One of the most important requirements for the Atikokan Drinking Water System is to ensure that water entering the Clearwell is treated with chlorine for the purpose of primary and secondary disinfection. The Clearwell is large and is the only storage for water in the drinking water system. It is critical that a failure associated with the chlorination system is detected prior to the water entering the Clearwell as opposed to after the treatment process has operated for hours and a low chlorine residual finally detected when the water is leaving the Clearwell and entering the distribution system. Over the past years, incidents of loss of chlorination have resulted from both equipment and human-related causes. Previous discussions in this report have reviewed the status of the gas chlorination equipment and the automatic switchover capabilities.

On April 14, 2014, Actiflo #2 operated without the addition of sand which resulted in a process upset. Effluent from the Actiflo was directed through the next stage of the treatment process. Filters #3 and #4 produced water with turbidities that exceeded 1 NTU. This occurred between April 14, 2014, at 22:00 and April 15, 2014, and was reported as an AWQI.

Action(s) Required:

CHLORINATION - Discussions between the Town of Atikokan, Northern Waterworks Inc. and the Ministry of Environment and Climate Change suggests that it is time to review the options of ensuring that water entering the Clearwell has been treated by gas chlorination. In the interest of continuing these discussions and moving forward with actions that meet the requirements of the Drinking Water Systems Regulation and better serve the residents of Atikokan, a report with proposed actions is requested by June 1, 2015.

FILTRATION - In light of the April 14/15, 2014 incident, Northern Waterworks Inc. should complete a review of the Actiflo component of the filtration process so as to ensure continued optimization of the system. It is the expectation that the continuous feed of sand is occurring as required. The report should be provided to the undersigned inspector by April 30, 2015.

Update: A review of the chlorination system concluded that the best method to ensure primary and secondary disinfection for all possible scenarios was to install a filtrate chlorine residual analyzer. The analyzer was subsequently installed, and it functions to continuously monitor the free chlorine residual in filtered water immediately after chlorine application. The system is configured to transmit an alarm if there is an interruption in chlorine application. The required report was delivered to the inspector.

A review of the Actiflo component of the treatment process concluded that the best method to protect against the loss of sand is to optimize coagulant and polymer dosages. The review considered additional methods, including the installation of mass flow meters on the sand recirculation lines. The required report was delivered to the inspector.

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

Due to the condition of the distribution system, low chlorine residuals in sections of the distribution system are recognized as a chronic problem. Despite the actions that have been taken to date, free chlorine residuals less than 0.05 mg/L have been detected in the distribution system during weekly distribution sampling, in samples collected as part of an additional monitoring program in different "zones" of the distribution system and in response to a customer complaint of coloured water.

Action(s) Required: The Town of Atikokan and Northern Waterworks Inc. have been working to address low chlorine residuals with both short term and long term solutions. Although some progress has been made with addressing low chlorine residuals, some of the actions that have been discussed, such as the installation of the bleeder in Don Park, require follow through.

Readings of low chlorine residuals that are not reportable as AWQIs may require proactive flushing to prevent adverse water quality incidents. It is important that the Town of Atikokan staff respond quickly to requests for flushing in areas of town where certified operators identify low chlorine residuals.

Reports of coloured or dirty water must continue to be investigated in a timely manner. In order for operators to investigate the complaints, communication between the Town of Atikokan staff and Northern Waterworks Inc. is important. It is advised that complaints concerning coloured or dirty water from elderly or sick people are taken over the phone and that a visit to the town office to file a complaint not be required.

The Town of Atikokan recognizes the need to replace sections of watermains. This would help to resolve low chlorine residuals in the distribution system. It is hoped that funds become available for this work.

- **The facility and equipment did not appear to be maintained or in a fit state of repair.**

DISTRIBUTION SYSTEM - All parts of the drinking water system must be maintained in a fit state of repair. This includes the components of the distribution system. The Town of Atikokan reactively repairs breaks in the distribution system.

Some repairs or replacement of valves and hydrants has taken place. Information indicates that there is more of this work that needs to be done. Operators have started a record of valves that require maintenance or replacement.

Replacement of the watermains and looping of the distribution system has been included with the collection system upgrades in the Willow Road area. The Town of Atikokan had previously committed to installing a bleeder line in the Don Park area of town to address the low chlorine residuals. This work was not completed in 2014. The Town has now committed to installing the bleeder line in 2015.

Spruce Road has been an area of chronic watermain breaks. Operators report that this section of road has so many patches that sections of the road have "patches on patches". Although the Town of Atikokan is already committing funds to water and wastewater upgrades, plans need to progress for the replacement of watermains in the Spruce Road section of town. The Town of Atikokan is reminded that should funds become available for watermain replacements, engineering work and a Form 1 must be completed prior to initiating the work.

Action(s) Required: By June 1, 2015, the Town of Atikokan is requested to provide the undersigned inspector with a report that discusses the measures and options the Town of Atikokan is currently undertaking and reviewing to address the maintenance needs of the distribution system.

Update: A report was provided to the inspector on May 29, 2015, indicating the steps that the Town of Atikokan was undertaking to address the maintenance needs of the distribution system. The report referenced the ongoing replacement of 600 meters of watermain and 57 water services, the possibility of leak detection, the status of the distribution monitoring plan, and the development of new maintenance procedures. The Town also completed work on the Don Park bleeder in 2015.

- **The operator-in-charge did not ensure that records were maintained of all adjustments made to the processes within his or her responsibility.**

Inadequate information is being recorded when sections of the distribution system are being maintained or repaired. When work is being conducted, changes to valve positions are not being recorded. This has resulted in valves being left in the wrong position once the work has been completed. Operators at the water treatment plant are reminded to ensure that changes to alarm settings are recorded.

Action(s) Required: By April 17, 2015, the Town of Atikokan shall prepare a procedure directing operators on recording requirements to ensure that valve changes are recorded and measures are implemented to ensure that valve positions are returned to the normal operating position after work is completed.

Update: The Town of Atikokan subsequently developed a standard operating procedure for valve operations and established a record pertaining to valve manipulations. NWI developed and implemented a new method of recording alarm settings.

- **The owner did not indicate that the required records are kept and will be kept for the required time period.**

During the three previous inspections there has been non-compliance with the requirement to keep records due to the loss of SCADA data. In the past year the operating authority has reported the loss of data on June 25, November 10, November 18, November 19, and November 20 in 2014. As part of the inspection on February 19, 2015, the alarm records were reviewed. The records were reviewed at 16:35 and records were only available as far back as 04:10 that day. Records were not available for days previous to February 19, 2015. The "Alarm Summary" in SCADA was also reviewed and there were no records available.

Action(s) Required: The Town of Atikokan and Northern Waterworks Inc. have initiated the process of installing an independent, redundant monitoring system consisting of a data logger. This data logger would monitor 12 key process compliance related parameters (filter effluent turbidity, chlorine residual, flow rates) with the intent of providing compliance data even if the SCADA malfunctions. The installation of the equipment is scheduled to be completed in mid-April.

A meeting is scheduled with Automation Now on April 15, 2015, to discuss the SCADA related issues. Within five business days after the meeting, the Town of Atikokan is requested to provide a report to the undersigned inspector providing a narrative of the meeting including the proposed corrective action(s). In addition, the Town of Atikokan is requested to provide an update on progress within a month of the meeting date.

Update: The digital chart recorder was installed subsequent to the inspection, and it will protect against SCADA-related losses of continuously monitored data. Planning has also begun for short-term and long-term solutions respecting automation systems, including planning for the replacement of the SCADA computer terminals in the near future.

- **All required notifications of adverse water quality incidents were not immediately provided as per O. Reg. 170/03 16-6.**

A review of AWQI's finds that a verbal report was not provided immediately for a turbidity exceedance. Turbidity greater than 1 NTU (AWQI 116961) was reported to the MOE on April 15, 2014 at 13:05. The incident had occurred on April 14, 2014, from 22:00 to 02:00 on April 15, 2014. Other AWQI's that were reviewed as part of the inspection process appeared to meet the requirement for immediate reporting.

Action(s) Required: By April 17, 2015, the operating authority is requested to review the requirement for immediate reporting with operators and provide an email confirming completion of this action to the undersigned inspector.

Update: A review of the requirement for immediate reporting was conducted with operators subsequent to the inspection, and an email confirming the completion of this action was provided to the inspector by the indicated date.

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.

The twenty-four (24) incidents of adverse water quality in 2015 are summarized in **Table 13**.

Table 13: Summary of 2015 Adverse Water Quality Incidents.

AWQI No.	Details	Corrective Action(s)
122084	January 15 - Localized loss of pressure due to planned watermain replacement affecting 103 to 147 Willow Road	January 22 - Planned work completed, pressure and secondary disinfection restored
122321	January 18 - Observation of improper primary disinfection (low chlorine residual caused by chlorinator component failure)	January 18 - Restored disinfection, flushed clear well, increased chlorine dosage, monitored secondary disinfection and collected microbiological samples in the distribution system January 19 - Continued to monitor secondary disinfection in the distribution system and conducted chlorinator repairs
122472	February 8 - Localized loss of pressure due to unplanned distribution system repairs affecting 43 to 81 Spruce Road	February 17 - Repairs completed, pressure and secondary disinfection restored
122564	February 18 - Localized loss of pressure due to unplanned distribution system repairs affecting 5 to 15 Mercury Ave. E.	March 3 - Repairs completed, pressure and secondary disinfection restored
122879	March 19 - Localized loss of pressure due to unplanned distribution system repairs affecting 1104 to 1127 O'Brien Street	March 27 - Repairs completed, pressure and secondary disinfection restored
122918	March 24 - Localized loss of pressure due to planned hydrant valve replacement affecting 148 to 174 Cedar Crescent and 215 Alder Street.	March 30 - Planned work completed, pressure and secondary disinfection restored
123292	April 20 - Observation of improper primary disinfection (loss of coagulant addition caused by equipment failure)	April 20 - Equipment failure corrected, coagulant addition and treatment processes restored
123625	May 15 - Observation of improper primary disinfection (loss of free chlorine residual monitoring caused by analyzer malfunction)	May 15 - Analyzer malfunction corrected in order to ensure the accurate and continuous measurement of the free chlorine residual used to determine primary disinfection

Table 13 (Continued): Summary of 2015 Adverse Water Quality Incidents.

AWQI No.	Details	Corrective Action(s)
123672	May 21 - Localized loss of pressure due to planned watermain replacement affecting 149 to 155 Willow Road	May 29 - Planned work completed, pressure and secondary disinfection restored
123900	June 4 - Localized loss of pressure due to planned watermain replacement affecting 104 to 127 Elm Crescent	June 10 - Planned work completed, pressure and secondary disinfection restored
123901	June 4 - Localized loss of pressure due to unplanned distribution system repairs affecting Kaskie Street.	June 10 - Repairs completed, pressure and secondary disinfection restored
124263	June 18 - Localized loss of pressure due to unplanned distribution system repairs affecting 104 to 146 Elm Crescent.	June 25 - Repairs completed, pressure and secondary disinfection restored
124873	July 10 - Localized loss of pressure due to unplanned distribution system repairs affecting 38 to 64 Poplar Avenue and 138 Maple Crescent.	July 17 - Repairs completed, pressure and secondary disinfection restored
124909	July 13 - Localized loss of pressure due to unplanned distribution system repairs affecting 103 to 149 Willow Road	July 17 - Repairs completed, pressure and secondary disinfection restored
125071	July 17 - Localized loss of pressure due to unplanned distribution system repairs affecting 103 to 149 Willow Road	July 23 - Repairs completed, pressure and secondary disinfection restored
125195	July 23 - Localized loss of pressure due to unplanned distribution system repairs affecting 38 to 64 Poplar Avenue and 138 Maple Crescent.	July 30 - Repairs completed, pressure and secondary disinfection restored
125327	July 29 - Localized loss of pressure due to unplanned distribution system repairs affecting 100 to 113 Pine Crescent.	August 7 - Repairs completed, pressure and secondary disinfection restored

Table 13 (Continued): Summary of 2015 Adverse Water Quality Incidents.

AWQI No.	Details	Corrective Action(s)
125500	August 5 - Localized loss of pressure due to unplanned distribution system repairs affecting the Lone Pine area.	August 10 - Repairs completed, pressure and secondary disinfection restored
125750	August 17 - Observation of improper secondary disinfection (distribution residual less than 0.05 mg/L at a location on Grenville Avenue)	Corrective actions and issue resolution are ongoing; immediate corrective action included flushing mains, restoring disinfection, collecting microbiological samples, and continuing to monitor secondary disinfection
125853	August 21 - Localized loss of pressure due to unplanned distribution system repairs affecting 103 to 149 Willow Road	August 27 - Repairs completed, pressure and secondary disinfection restored
126339	September 15 - Localized loss of pressure due to unplanned distribution system repairs affecting 1127 to 1235 O'Brien Street.	September 21 - Repairs completed, pressure and secondary disinfection restored
127467	November 21 - Observation of improper primary disinfection (system-wide loss of distribution pressure caused by major leak at distribution flow meter)	November 21 - Leak repaired, pressure and disinfection restored, community-wide Boil Water Advisory issued, sets of microbiological samples were collected; issue was resolved on November 27
127707	December 15 - Observation of improper primary disinfection (system-wide loss of distribution pressure caused by automation failure)	December 15 - Pressure and disinfection restored, community-wide Boil Water Advisory issued, distribution system flushing conducted, secondary disinfection monitored, and sets of microbiological samples collected; issue was resolved on December 18
127759	December 18 - Observation of improper primary disinfection (system-wide loss of distribution pressure caused by automation failure)	December 18 - Pressure and disinfection restored, community-wide Boil Water Advisory issued, distribution system flushing conducted, secondary disinfection monitored, and sets of microbiological samples collected; issue was resolved on December 22