



2017 Summary Report

for the

Town of Minto

CLIFFORD DRINKING WATER SYSTEM

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	Background.....	1
1.2	Objective	2
1.3	Description of Drinking Water System	2
2.0	SUMMARY OF UPGRADES.....	3
2.1	Upgrades Completed in 2017	3
2.2	Upgrades Scheduled to be Completed in 2018.....	3
3.0	OPERATION OF THE DRINKING WATER SYSTEM	3
3.1	Summary of the Quantities and Flow Rates of Water Supplied	3
3.2	Comparison of Actual Rates and Maximum Allowable Rates	7
3.3	Raw Water Qualities and Required Treatment.....	9
3.4	Summary of Treatment Chemicals Used	10
4.0	COMPLIANCE	11
4.1	Assessment of Compliance	11
4.2	Summary of Compliance.....	12

LIST OF TABLES

Table 3.1	Clifford Drinking Water System – Well #1.....	4
Table 3.2	Clifford Drinking Water System – Well #3.....	5
Table 3.3	Clifford Drinking Water System – Well #4.....	6
Table 3.4	Clifford Drinking Water System – Well # 3 & 4 Combined.....	7
Table 3.5	Comparison of Flow Rates and Flow Capacities	8
Table 3.6	2017 Maximum Water Usage Per Day by Month	8
Table 3.7	2017 Annual Summary of Raw Water Turbidity.....	10
Table 3.8	2017 Annual Summary of Treatment Chemicals Used.....	11
Table 4.1	Adverse Water Quality Incidents	12
Table 4.2	Requirements the System Failed to Meet.....	13

2017 Summary Report for the Town of Minto CLIFFORD DRINKING WATER SYSTEM

1.0 INTRODUCTION

1.1 Background

In December 2002, the Safe Drinking Water Act (SDWA) was enacted. Subsequently, on June 1, 2003, under the SDWA, a new '*Drinking-Water Systems Regulation*', Ontario Regulation 170/03 (O. Reg. 170/03), was enacted. In addition, several supporting regulations and procedures were also enacted to assist with the administration of O. Reg. 170/03. The list of relevant drinking-water legislation is presented in Appendix A.

The SDWA identifies the responsibilities of owners and operating authorities of municipal drinking water systems (SDWA, Sections 11 and 19). Their duties include ensuring that:

- All water provided by the drinking-water system meets prescribed drinking-water quality standards;
- The drinking-water system is operated in accordance with the Act and regulations and is kept in a good state of repair;
- All facilities are appropriately staffed and supervised;
- All sampling, testing and monitoring requirements are complied with;
- All reporting requirements are complied with; and
- Only persons holding valid operator's certificates operate the drinking-water-system.

O. Reg. 170/03 establishes the standard for protection of drinking water. It includes sets of schedules, specific to municipal residential systems that define requirements for:

- Minimum treatment levels;
- Operational checks;
- Chemical and microbiological sampling and testing;
- Adverse results reporting;
- Corrective procedures; and
- Report documentation and retention.

The system's Municipal Drinking Water Licence (MDWL), Drinking Water Works Permit (DWWP) and Permit To Take Water (PTTW) imposes system specific rules and conditions applicable to the standards set out in O. Reg. 170/03.

1.2 Objective

This Summary Report for the Clifford Drinking Water System is being prepared in fulfillment of Schedule 22 of O. Reg. 170/03, and will be given to Members of the Municipal Council. It covers the period from January 1, 2017 to December 31, 2017.

This Summary Report lists any requirements of the Act, the regulations, the PTTW, the MDWL, the DWWP and any order that the system failed to meet during the period of this report. For any such failure, the measures that were taken to correct the failure are detailed. The report also includes relevant information that will assist the Town of Minto to assess the water work's capability to meet existing and future planned uses of the system.

1.3 Description of Drinking Water System

Clifford is a community with a population of approximately 804 persons, located within the Town of Minto at the northwest corner of Wellington County, along the route of Provincial Hwy. No. 9.

Clifford is serviced by a municipal Drinking Water System that is comprised of: three drilled well supplies, two pumphouses, an elevated 1,275 m³ storage tank and a distribution network of watermains. The watermains range in diameter from 100 mm to 250 mm. The municipal water system is also used for fire protection and has approximately 46 fire hydrants throughout the distribution system. In the event of a prolonged power outage, a portable generator can be moved to Wells #1, #3 & #4 to supply back-up power.

Well #3 is a deep overburden well, and serves as the primary production well for the system. Wells #1 and #4 are bedrock wells and provide peak flows and redundancy to the system. Wells #3 and #4 are a *combined supply*, and are not allowed to operate together. All three operating wells are equipped with submersible pumps; the pump in Well #3 is a variable speed pump.

The pumphouse on Allan Street serves Well #1. The second pumphouse is in the base of the elevated storage tank on Nelson Street and serves Wells #3 and #4. The treatment employed in both pumphouses includes the use of sodium silicate for the sequestering of iron and sodium hypochlorite for disinfection of the raw water. A continuous online analyser measures the levels of free chlorine residual at point of entry (POE). When the alarm for chlorination system failure is activated, there is a corresponding lockout of well pumps. Subsequent to treatment, supply from Well #1 is discharged from the chlorine contact pipe into the distribution system, while supply from Wells #3 and #4 is discharged from the chlorine contact pipe directly into the elevated storage tank from the Cl₂ contact pipe.

The Clifford Drinking Water System operates under MDWL 106-101, DWWP 106-201 and PTTW #1704-9XBH9S until August 13th and PTTW #0441-AQ4H8H starting August 14th (all wells).

2.0 SUMMARY OF UPGRADES

2.1 Upgrades Completed in 2017

The disinfection treatment system in the Clifford Drinking Water System meets all of the standards imposed by O. Reg. 170/03 and the MOECC's *"Procedures for Disinfection of Drinking Water in Ontario"*.

Typically, maintaining the system includes repairs and/or replacement of individual components as necessary. In 2017 \$8,500 was spent on a pump replacement in well #4, \$145,900 was spent installing watermain on Ann Street to replace the backyard watermain and \$800 was spent on watermain replacement design for Elora Street.

The following purchases were also made on equipment that is shared between all of Minto's water systems. \$11,500 on equipment, \$3,300 on SCADA equipment upgrades to improve data reporting and \$8,600 on the electronic data management system, \$19,600 on the water meter installation program.

Preventative maintenance measures are being followed to ensure proper operation of the Drinking Water System.

2.2 Upgrades Scheduled to be Completed in 2018

In 2018, the Town of Minto is planning to spend \$25,000.00 on the Brown and William St. Development, \$140,000 replacing watermain on Ann St. N. from Queen St. to Nelson St. and \$110,000 on the extension of watermains on Elora St. N.

In 2018 the following will be purchased to be shared within the water department. \$20,000 for water meters and \$90,000.00 on vehicle replacements.

3.0 OPERATION OF THE DRINKING WATER SYSTEM

3.1 Summary of the Quantities and Flow Rates of Water Supplied

O. Reg. 170/03 stipulates that a summary of the quantities and flow rates of the water supplied from each of Clifford's wells be included in the Summary Report. Tables 3.1, 3.2 and 3.3 provide a summary of quantities and flow rates supplied during 2017, for Wells #1, #3 and #4 respectively, on a monthly basis. Well #1 supplies the Allan Street Wellhouse. Wells #3 and #4 supply the Nelson Street Wellhouse; they are a *combined* supply and are not allowed to operate together.

Table 3.1
Clifford Drinking Water System – Well #1
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2017 – December 31, 2017

Month	Raw Water Flow (Max Daily Volume = 1,309 m³/day) (Max Flow Rate = 15.15 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant
	Operator Observed Peak Flow (L/s)	Maximum Day Flow (m³/day)	Monthly Total (m³)	Monthly Total (L)	Treated Water Turbidity		Treated Water Disinfectant Point of Entry		No. of Samples Collected
					No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	
January	13.1	165	3,902	108	6	0.53	31	1.20	See Clifford Well #3 Data
February	13.2	193	3,233	88	7	0.44	28	1.35	
March	13.2	161	3,601	68	8	0.41	31	1.29	
April	13.2	138	2,880	66	7	0.46	29	1.23	
May	13.2	140	3,421	86	9	0.42	31	1.21	
June	13.2	141	3,305	66	8	0.44	30	1.32	
July	13.2	150	3,337	88	8	0.42	31	1.20	
August	13.2	154	3,409	133	6	0.42	31	1.37	
September	13.2	196	3,055	87	8	0.27	31	1.32	
October	13.1	174	3,962	110	7	0.33	31	1.34	
November	13.1	189	3,580	110	6	0.37	29	1.28	
December	13.1	165	3,937	114	6	0.34	31	1.29	
Total			41,622	1,124	86		364		
Average			3,469			0.40		1.28	
Maximum	13.2	196							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2017: **1,124 L**
Distribution System Minimum Target Residual: **0.2 mg/L**

Table 3.2
Clifford Drinking Water System – Well #3
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2017 – December 31, 2017

Month	Raw Water Flow (Max Flow Rate = 7.6 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant
	(Max Daily Volume = 1,309 m³/d) This is the allowable combined limits for Well # 3 & Well # 4				Treated Water Turbidity		Treated Water Disinfectant Point of Entry		No. of Samples Collected
	Operator Observed Peak Flow	Maximum Day Flow	Monthly Total	Monthly Total	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual	
	(L/s)	(m³/day)	(m³)	(L)				(mg/L)	
January	4.6	106	2,000	89	5	0.29	31	1.25	47
February	4.6	108	1,960	23	8	0.30	28	1.33	44
March	4.6	126	1,815	66	8	0.25	31	1.26	50
April	4.6	85	1,279	22	8	0.29	29	1.28	44
May	4.6	152	2,168	66	8	0.35	31	1.26	50
June	4.6	120	1,653	46	8	0.38	30	1.23	49
July	4.5	93	1,738	22	7	0.47	31	1.24	48
August	4.5	103	1,827	66	8	0.26	31	1.36	49
September	4.5	150	1,614	22	7	0.36	31	1.23	49
October	4.7	204	2,247	88	6	0.35	31	1.16	49
November	4.5	187	1,986	37	7	0.33	30	1.25	46
December	4.5	91	1,884	65	6	0.32	31	1.3	49
Total			22,171	612	86		365		574
Average			1,848			0.33		1.26	
Maximum	4.7	204							

Disinfectant Compound Used: **12% Sodium Hypochlorite**

Form of Residual Displayed: **Free**

Quantity of Disinfectant Used During 2017 for Wells #3 and #4 combined: **612 L** **(Wells #3 and #4 share the same Cl₂ storage container)*

Distribution System Minimum Target Residual: **0.2 mg/L**

Table 3.3
Clifford Drinking Water System – Well #4
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2017 – December 31, 2017

Month	Raw Water Flow (Max Flow Rate = 15.15 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant
	(Max Daily Volume = 1,309 m³/d) This is the allowable combined limits for Well # 3 & Well # 4				Treated Water Turbidity		Treated Water Disinfectant Point of Entry		
	Operator Observed Peak Flow (L/s)	Maximum Day Flow (m³/day)	Monthly Total (m³)	Monthly Total (L)	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Samples Collected
January	11.3	70	1,347	See Clifford Well #3 Data	5	0.39	31	1.31	See Clifford Well #3 Data
February	11.2	78	1,017		5	0.51	22	1.21	
March	11.3	53	1,352		8	0.39	31	1.30	
April	11.5	66	1,161		7	0.43	29	1.21	
May	11.5	78	1,377		9	0.42	31	1.15	
June	11.5	55	1,168		7	0.46	30	1.17	
July	11.5	48	1,207		6	0.45	31	1.15	
August	11.5	65	1,162		5	0.46	31	1.39	
September	11.4	50	1,069		8	0.49	30	1.39	
October	11.1	49	1,186		6	0.27	31	1.36	
November	10.2	50	994		7	0.37	30	1.29	
December	10.3	42	1,047		6	0.42	31	1.24	
Total			14,087	612	79		358		
Average			1,174			0.42		1.26	
Maximum	11.5	78							

Disinfectant Compound Used: **12% Sodium Hypochlorite**

Form of Residual Displayed: **Free**

Quantity of Disinfectant Used During 2017 for Wells #3 and #4 combined: **612 L** *(Wells #3 and #4 share the same Cl₂ storage container)

Distribution System Minimum Target Residual: **0.2 mg/L**

Table 3.4
Clifford Drinking Water System – Well #3 & #4 Combined
Treated Water Flow
January 1, 2017 – December 31, 2017

Month	Treated Water Flow (Well #3 Max Flow Rate = 7.6 L/s) (Well #4 Max Flow Rate = 15.1 L/s) (Max Daily Volume = 1309 m³/d)				Chlorine
	Operator Observed Peak flow Well #3 (L/s)	Operator Observed Peak Flow Well #4 (L/s)	Maximum Day Flow (m³/day)	Monthly Total (m³)	Monthly Total (l)
January	4.6	11.3	106	3,347	89
February	4.6	11.2	108	2,977	23
March	4.6	11.3	126	3,167	66
April	4.6	11.5	85	2,440	22
May	4.6	11.5	152	3,545	66
June	4.6	11.5	120	2,821	46
July	4.5	11.5	93	2,945	22
August	4.5	11.5	103	2,989	66
September	4.5	11.4	150	2,683	22
October	4.7	11.1	204	3,433	88
November	4.5	10.2	187	2,980	37
December	4.5	10.3	91	2,931	65
Total				36,258	612
Average				3,022	
Maximum	4.7	11.5	204		

3.2 Comparison of Actual Rates and Maximum Allowable Rates

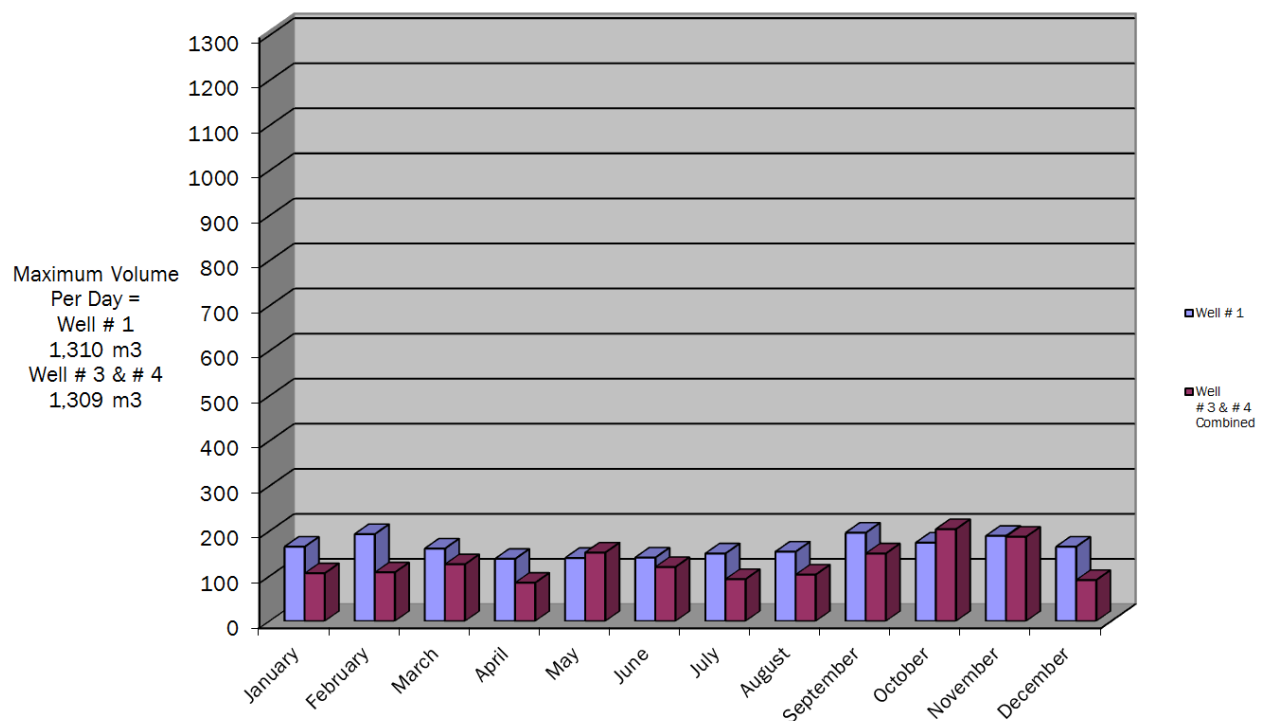
O. Reg. 170/03 stipulates that a summary of the quantities and flow rates of the water supplied from each of Clifford's wells be included in the Summary Report and compared against the rated capacity and flow rate for the system. As such, a comparison of the instantaneous peak flow to the PTTW's rated capacity is included and a comparison of the maximum daily flow to the MDWL's rated capacity is included in Table 3.5.

Table 3.5
Comparison of Flow Rates and Flow Capacities
To
Rated Flow Rate (PTTW) and Rated Capacity (MDWL)

Well Supply	PTTW Max. Flow Rate	Operator Observed Peak Flow	Percent of Maximum Allowable	MDWL Schedule Maximum Daily Quantity	Maximum Daily Flow	Percent of Maximum Allowable
	L/s	L/s	%	m ³ /day	m ³ /day	%
Well #1	15.1	13.2	87	1,310	196	15
Well #3	7.6	4.7	61	655	204	31
Well #4	15.1	11.5	76	1,309	78	6

The MDWL stipulates, “*The maximum daily volume of treated water that flows from the treatment subsystem to the distribution system shall not exceed the value identified as the rated capacity in Schedule C Table 1.*”

Table 3.6
Maximum Water Usage Per Day by Month



Short-term peaks, in excess of permitted values, may occur at pump start up, while doing specific maintenance procedures or during emergency demand situations. An occurrence of this nature is not considered an exceedance.

The time and duration of any flow exceedance is recorded for each event along with the reason for the occurrence. There were **no exceedances** of the allowable flow rates in the Clifford Drinking Water System.

3.3 Raw Water Qualities and Required Treatment

The Clifford Drinking Water System has no naturally occurring chemical parameters that exceed MAC (maximum acceptable limit) or IMAC (interim maximum acceptable limit). Starting Jan 1/2018 the MAC for Arsenic (As) will be lowered from .025mg/L to .010mg/L. Reg. 170/03 Section 13.5 states If a test result obtained under section 13-2 or 13-4 for a parameter exceeds half of the standard prescribed for the parameter in Schedule 2 to the Ontario Drinking Water Quality Standards, the frequency of sampling and testing for that parameter under that section shall be increased so that at least one water sample is taken and tested every three months. This will result in extra sampling for the Clifford system in 2018. The most recent test results taken May 17/16 are as follows: Well #1 - .0065 mg/L Well #3 - <.001 mg/L, Well#4 - .0081 mg/L.

The Allan Street Wellhouse (Well #1) and the Nelson Street Wellhouse (Wells #3 and #4) are equipped with continuous monitoring analyzers for measuring free chlorine residuals. The chlorine analyzer is equipped with an alarm to a monitoring centre who will call the on-call water operator to notify of a critical alarm. The average monthly turbidity and free chlorine residual measurements for treated water are presented in Tables 3.1, 3.2 and 3.3.

There were no high turbidity readings (>1.0 NTU) experienced in 2017. The minimum, maximum, and average turbidity readings for raw water from each well are presented in Table 3.7.

Sodium Hypochlorite is the disinfectant used for Wells #1, #3 and #4. Free chlorine residual is monitored continuously at the “Point of Entry” (POE) into the distribution system. Additional “grab samples” are taken daily (*excluding weekends and holidays*) within the distribution system and tested for the free chlorine residual. The minimum, maximum and average values of free chlorine residual at the POE are presented Table 3.7. Also included in Table 3.7 is the range of free chlorine residual within the distribution system.

The free chlorine residual in the distribution system ranged between 0.51 mg/L and 1.93 mg/L. O. Reg. 170/03, Schedule 1-2 stipulates that the free chlorine residual can never be less than 0.05 mg/L. In addition, O. Reg. 170-03, Schedule 1-4 stipulates that the water treatment equipment must be “...capable of achieving, at all locations within the

distribution system, a free chlorine residual of 0.2 mg/L ...". The Clifford Drinking Water System meets both of these requirements.

Table 3.7
2017 Annual Summary of
Raw Water Turbidity and Free Chlorine Residual
for Clifford Drinking Water System

Location	Range	Raw Water Turbidity	Free Chlorine Residual at POE
		NTU	mg/L
Well #1	Minimum	0.10	0.84
	Maximum	0.89	1.72
	Average	0.33	1.28
Well #3	Minimum	0.07	0.70
	Maximum	0.88	1.75
	Average	0.28	1.26
Well #4	Minimum	0.11	0.82
	Maximum	0.78	1.89
	Average	0.41	1.26

3.4 Summary of Treatment Chemicals Used

The disinfectant chemical used in the Clifford Drinking Water System is 12% sodium hypochlorite (CL₂). Measurements of free residual are recorded on a continuous basis. Wells #3 and #4 share the same CL₂ storage container; 612 L of CL₂ is the combined usage for Wells #3 and #4. In 2017, a total of 1,736 L of CL₂ was used for all three wells. The annual average dosage rates for Well #1, and Wells #3 and #4 are presented in Table 3.8.

In 2017, 898 L of sodium silicate was used for the sequestering of iron. The annual average dosage rates for Well #1, Well #3 and Well #4 are presented in Table 3.8.

Table 3.8
Clifford Drinking Water System
2017 Annual Summary of
Treatment Chemicals Used

Treatment Chemical	Well	Volume Used	Mass Used	Annual Flow	Dosage Rate
		L	kg	m ³	mg/L
12 % Sodium Hypochlorite (NaOCl)	Well #1	1,124	134.9	41,622	3.24
	Well #3 & Well #4	612	73.4	36,258	2.03
	Total	1,736	208.3	77,880	2.67
Sodium Silicate (NaSi)	Well #1	295	410.1	41,622	9.85
	Well # 3 & Well #4	603	838.2	36,258	23.12
	Total	898	1,248	77,880	16

- Note:**
- Wells #3 and #4 share the same NaOCl storage container; 612 L is the combined NaOCl usage for both wells.
 - Wells #3 and #4 share the same storage container for the sequestering agent, sodium silicate (NaSi); 603 L is the combined NaSi usage for both wells
 - 12% Sodium Hypochlorite = 120,000 mg/L = 120 kg/m³
 - Sodium Silicate has a specific gravity = 1.39

4.0 COMPLIANCE

4.1 Assessment of Compliance

The objective of the Summary Report is to list any requirements of the Act, the regulations, the PTTW, the MDWL, the DWWP and any MOECC order that the system failed to meet from January 1, 2017 to December 31, 2017, and the corresponding corrective measure(s) taken. Compliance was assessed as follows:

- MOECC Completed Inspection of the Clifford system completed May 3/17, Final inspection rating 100%
- There were **no MOECC Orders** issued to the Clifford Drinking Water System in 2017.
- The MDWL imposes the specific rules and conditions governing the standards set out in O. Reg. 170/03. It is an important instrument in defining the requirements of compliance of a Drinking Water System.
- O. Reg. 170/03 establishes the standard for protection of drinking water; specifically, through 12 schedules that municipal residential drinking systems must follow to meet the requirements of the regulation.

- The SDWA clearly identifies the responsibilities of owners and operating authorities of municipal drinking water systems. It places a recommended statutory standard of care on those who have oversight of municipal drinking-water systems. In essence, the standard of care has two themes: be informed and exercise diligent oversight.
- Adverse Test Results reported under the Safe Drinking Water Act, 18(1) or O Reg.170/03, Schedule 16-4
 - a) Adverse Water Quality Incidents (AWQI) refer to any unusual test results that do not meet provincial water quality standard or situation where the disinfection of the drinking water may be compromised.

Table 4.1
Adverse Water Quality Incidents

AWQI #	Date	Issue	Corrective Action
134558	July 24/17	Distribution sample 1 total coliform	Chlorine residual at sample site good resampled at site, upstream and downstream and flushed main. Resample result 0
136626	Sept 11/17	Distribution sample 2 total coliform	Chlorine residual at sample site good resampled at site, upstream and downstream and flushed main. Resample result 0

4.2 Summary of Compliance

To the best of our knowledge and ability we are in, or diligently working towards, compliance, with all of the requirements of the SDWA, O. Reg. 170/03, as well as the Clifford Water Work's MDLW 106-101, DWWP 106-201 and PTTW #1704-9XBH9S. Every attempt has been made to ensure this document is an accurate representation of how the Drinking Water System is operated

To the best of our knowledge, Table 4.2 identifies all of the requirements of the SDWA, the regulations, the MDWL, the DWWP. and the PTTW.

Table 4.2
Clifford Drinking Water System
Requirements the System Failed to Meet

Compliance With	Description of Item the System Failed to Meet	Correction of This Situation How/When
MDWL # 106-101	<i>Clifford Drinking Water System is in compliance with all of the requirements of the MDWL</i>	
DWWP # 106-201	<i>Clifford Drinking Water System is in compliance with all of the requirements of the DWWP</i>	
O. Reg. 170/03	<i>Clifford Drinking Water System is in compliance with all of the requirements of O. Reg. 170/03</i>	
SDWA	<i>Clifford Drinking Water System is in compliance with all of the requirements of the SDWA.</i>	

Dated this 2nd day of March 2018.

Wayne Metzger
Water Foreman