2021 Summary Report

for the

Town of Minto

CLIFFORD DRINKING WATER SYSTEM

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Date: March 8, 2022

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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. This report covers the period from January 1, 2021 to December 31, 2021.

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 950 people and approximately 380 residential properties, 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 m^3 storage tank and a distribution network of watermains. The watermains range in diameter from 100 mm to 300 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 an alarm for high and/or low free chlorine 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 once adequate contact time has been achieved.

The Clifford Drinking Water System operates under MDWL 106-101 Issue 3, DWWP 106-201 Issue 3 and PTTW #0441-AQ4H8H.

2.0 SUMMARY OF UPGRADES

2.1 Upgrades Completed in 2021

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

Typically, maintaining the system includes repairs and/or replacement of individual components as necessary. In 2021 $1,530 was spent on arsenic testing, the water tower inspection was $16,165, watermain replacement on Allan Street was $89,980 and the installation of the SCADA panel in the water tower was $49,935.
The following purchases were also made on equipment that is shared between all of Minto's water systems. $29,725 on the water meters, $4,048 on equipment and $40,625 to replace a truck. $19,545 on engineering for our future servicing needs and $2,195 on our computer system upgrade plan.

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

2.2 Upgrades Scheduled to be Completed in 2022

In 2022, the Town of Minto is planning to spend $15,000.00 for infrastructure inspections and $5,000 for water treatment equipment.
The following will also be purchased to be shared within the water department. $5,000 for computer hardware and software, $110,000 on the SCADA monitoring system and $20,000 for water meters. $100,000.00 on watermain replacement (location to be determined), $15,000 on pumps and/or valves $10,000 on equipment and $15,000 for engineering of future water system needs.

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 2021, 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, 2021 – December 31, 2021

Month	Raw Water Flow (Max Daily Volume = 1,309 m³/day) (Max Flow Rate = 15.15 L/s			Chlorine	Monthly Averages				Distribution System Disinfectant
					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 (NTU)	No. of Treated Samples Collected	Monthly Average Residual (mg/L)	No. of Samples Collected
January	11.3	108	1,875	48	8	0.37	31	1.13	See Clifford Well #3 Data
February	11.1	95	1,275	44	8	0.30	25	1.15	
March	10.9	128	1,420	40	12	0.30	31	1.19	
April	10.8	82	1,306	23	8	0.27	31	1.23	
May	10.8	97	1,341	23	9	0.30	31	1.19	
June	10.8	141	1,893	88	6	0.26	30	1.18	
July	10.8	106	2,068	44	4	0.29	31	1.21	
August	10.8	101	1,616	22	7	0.28	32	1.15	
September	10.8	97	1,769	86	6	0.43	30	1.28	
October	10.9	94	1,733	45	6	0.31	29	1.24	
November	10.8	73	1,297	23	9	0.30	30	1.24	
December	10.8	108	1,645	59	8	0.25	32	1.14	
Total			19,238	545	91		363		
Average			1,603			0.30		1.19	
Maximum	11.3	141							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2021: **545 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, 2021 – December 31, 2021

Month	Raw Water Flow (Max Flow Rate = 7.6 L/s) (Max Daily Volume = 1,309 m³/d) This is the allowable combined limits for Well # 3 & Well # 4			Chlorine	Monthly Averages				Distribution System Disinfectant
					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 (NTU)	No. of Treated Samples Collected	Monthly Average Residual (mg/L)	No. of Samples Collected
January	4.5	172	2,919	59	8	0.32	31	1.25	45
February	4.5	170	3,406	69	9	0.22	28	1.27	48
March	4.5	248	4,205	44	12	0.28	31	1.27	50
April	4.5	284	3,855	90	8	0.23	30	1.29	48
May	4.5	220	4,150	46	10	0.20	31	1.22	47
June	4.5	213	3,953	90	7	0.22	30	1.31	45
July	4.5	210	2,702	68	4	0.26	31	1.17	47
August	4.5	216	3,963	66	7	0.15	32	1.30	48
September	4.5	196	2,878	76	6	0.21	30	1.25	45
October	4.5	248	2,999	45	7	0.28	31	1.18	47
November	4.6	237	3,776	60	10	0.23	30	1.22	48
December	4.7	218	3,593	90	9	0.35	31	1.33	49
Total			42,399	803	97		366		567
Average			3,533			0.25		1.26	
Maximum	4.7	284							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2021 for Wells #3 and #4 combined: **803 L** ***(Wells #3 and #4 share the same NaOCl 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, 2021 – December 31, 2021

Month	Raw Water Flow (Max Flow Rate = 15.15 L/s) (Max Daily Volume = 1,309 m³/d) This is the allowable combined limits for Well # 3 & Well # 4			Chlorine	Monthly Averages				Distribution System Disinfectant
					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 (NTU)	No. of Treated Samples Collected	Monthly Average Residual (mg/L)	No. of Samples Collected
January	9.9	53	952	See Clifford Well #3 Data	7	0.22	31	1.24	See Clifford Well #3 Data
February	9.9	49	849		8	0.32	28	1.26	
March	10.0	63	1,029		12	0.23	31	1.23	
April	10.0	45	938		6	0.33	31	1.24	
May	10.0	55	967		10	0.25	31	1.24	
June	9.9	50	1,042		7	0.31	30	1.25	
July	10.0	56	1,003		4	0.21	31	1.13	
August	10.0	36	1,077		6	0.24	32	1.30	
September	10.0	63	954		6	0.33	30	1.25	
October	9.9	56	981		6	0.26	31	1.10	
November	10.0	37	1,068		10	0.31	30	1.20	
December	9.8	35	946		9	0.28	32	1.20	
Total			11,806	803	91		368		
Average			984			0.27		1.22	
Maximum	10.0	63							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2021 for Wells #3 and #4 combined: **803 L** ***(Wells #3 and #4 share the same NaOCl 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, 2021 – December 31, 2021

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	4.5	9.9	172	3,871	59
February	4.5	9.9	170	4,255	69
March	4.5	10.0	248	5,234	44
April	4.5	10.0	284	4,793	90
May	4.5	10.0	220	5,117	46
June	4.5	9.9	213	4,995	90
July	4.5	10.0	210	3,705	68
August	4.5	10.0	216	5,040	66
September	4.5	10.0	196	3,832	76
October	4.5	9.9	248	3,980	45
November	4.6	10.0	237	4,844	60
December	4.7	9.8	218	4,539	90
Total				54,205	803
Average				4,517	
Maximum	4.7	10.0	284		

3.2 Comparison of Actual Rates and Maximum Allowable Rates

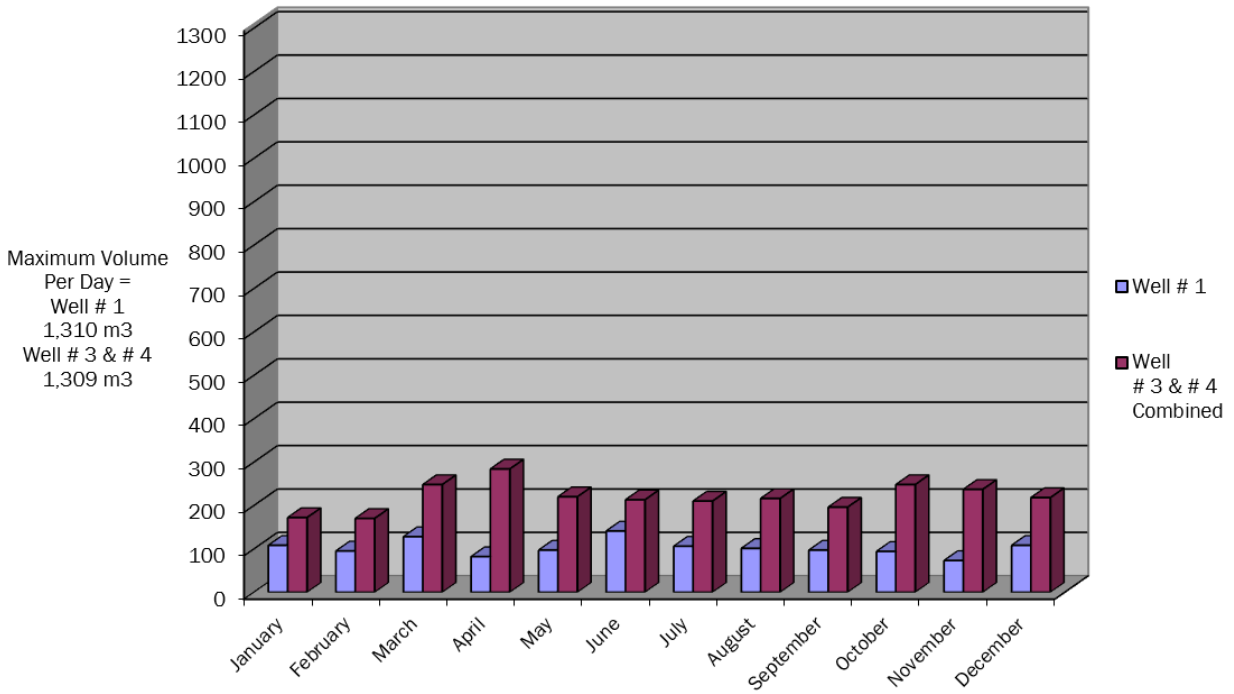
O. Reg. 170/03 stipulates that a summary of the quantities and flow rates of the water supplied from each of Clifford's wells be included in the Summary Report and compared against the rated capacity and flow rate for the system. As such, a comparison of the instantaneous peak flow to the PTTW's rated 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	11.3	74	1,310	141	11
Well #3	7.6	4.7	61	655	284	43
Well #4	15.1	10.0	66	1,310	63	5

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.
The time and duration of any flow exceedance is recorded for each event along with the reason for the occurrence. There were no extended exceedances or exceedances over the daily permitted rate 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 concentration) or IMAC (interim maximum acceptable concentration). Arsenic (As) levels for wells #1 and #4 continue to exceed half the MAC of 10 ug/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". The Clifford Drinking Water System does contain the naturally occurring chemical parameter Arsenic, therefore this will result in continuous quarterly sampling for the Clifford wells, see Table below.

Table 3.7
2021 Arsenic Sample Results
for Clifford Drinking Water System

	Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Well # 1	Arsenic	26/02/21	8.6	ug/L	10
	Arsenic	28/05/21	8.1	ug/L	10
	Arsenic	09/08/21	7.5	ug/L	10
	Arsenic	26/11/21	8.5	ug/L	10
Well # 4	Arsenic	26/02/21	8.0	ug/L	10
	Arsenic	28/05/21	8.1	ug/L	10
	Arsenic	09/08/21	7.8	ug/L	10
	Arsenic	26/11/21	8.3	ug/L	10

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 turbidity readings exceeding 1.0 NTU in 2021. The minimum, maximum, and average turbidity readings for raw water from each well are presented in Table 3.8.

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 in Table 3.8.

The free chlorine residual in the distribution system ranged between 0.53 mg/L and 1.35 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 3.8
2021 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	0.07	0.67
	Maximum	0.60	1.91
	Average	0.22	1.19
Well #3	Minimum	0.09	0.73
	Maximum	0.90	1.77
	Average	0.22	1.26
Well #4	Minimum	0.10	0.83
	Maximum	0.69	1.91
	Average	0.28	1.22

3.4 Summary of Treatment Chemicals Used

The disinfectant chemical used in the Clifford Drinking Water System is 12% sodium hypochlorite (NaOCl). Measurements of free residual are recorded on a continuous basis. Wells #3 and #4 share the same NaOCl storage container; 803 L of NaOCl is the combined usage for Wells #3 and #4. In 2021, a total of 1,348 L of NaOCl was used for all three wells. The annual average dosage rates for Well #1, and Wells #3 and #4 are presented in Table 3.9.

In 2021, 1,028 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 3.9.

Table 3.9
Clifford Drinking Water System
2021 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	545	65.4	19,238	3.40
	Well #3 & Well #4	803	96.4	54,205	1.78
	Total	1,348	161.8	73,443	2.20
Sodium Silicate (*NaSi*)	Well #1	192	266.9	19,238	13.87
	Well # 3 & Well #4	836	1162.0	54,205	21.44
	Total	1,028	1,429	73,443	19

Note:
- *Wells #3 and #4 share the same NaOCl storage container; 803 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); 836 L is the combined NaSi usage for both wells*
- *12% Sodium Hypochlorite = 120,000 mg/L = 120 kg/m^3*
- *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 MECP order that the system failed to meet from January 1, 2021 to December 31, 2021, and the corresponding corrective measure(s) taken. Compliance was assessed as follows:

- MECP Completed Inspection of the Clifford DWS was completed June 29, 2021, Final inspection rating 100%
- There were **no MECP Orders** issued to the Clifford Drinking Water System in 2021.
- 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 water 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
155025	Aug. 9/21	Total Coliform – 8	Resample August 11 & 12, 2021

- During regular weekly sampling, the sample collected from the End of Allan Street came back adverse for TC. Minto staff collected 2 sets of resamples 24 hours apart for the adverse sample location. Results of the resamples were received on August 11th & 12th 2021 with all resample results testing negative for TC

4.2 Summary of Compliance

The Town of Minto works diligently to maintain compliance, with all the requirements of the SDWA, O. Reg. 170/03, as well as the Clifford Water Work's MDLW 106-101 Issue 3, DWWP 106-201 Issue 3 and PTTW #0441-AQ4H8H.

Table 4.2 identifies any non-compliances related to the following: SDWA, O. Reg. 170/03, 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 Issue 3	*Clifford Drinking Water System is in compliance with all of the requirements of the MDWL*	
DWWP # 106-201 Issue 3	*Clifford Drinking Water System is in compliance with all of the requirements of the DWWP*	
O. Reg. 170/03	*Clifford Drinking Water System is in compliance with all of the requirements of O. Reg. 170/03*	

Compliance With	Description of Item the System Failed to Meet	Correction of This Situation How/When
SDWA	*Clifford Drinking Water System is in compliance with all of the requirements of the SDWA.*	
PTTW #0441-AQ4H8H	*Clifford Drinking Water System is in compliance with all of the requirements of the PTTW*	

Dated this 8th day of March 2022

Todd Rogers
Water Services Manager