2011 SUMMARY REPORT

for the

TOWN OF MINTO
CLIFFORD DRINKING WATER SYSTEM

TABLE OF CONTENTS

LIST OF TABLES

Date: March 20, 2012

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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 Certificate of Approval (C. of A.) imposes system specific rules and conditions applicable to the standards set out in O. Reg. 170/03.
July 31, 2011, the C. of A. was revoked and adherence to the Municipal Drinking Water Licence (MDWL) and Drinking Water Works Permit (DWWP) is required.

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, 2011 to December 31, 2011.

This Summary Report lists any requirements of the Act, the regulations, the C. of A., 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 wellhouses, an elevated 1,275 m^3 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 is available in Wellhouse #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 wellhouse on Allan Street serves Well #1. The second wellhouse is in the base of the elevated storage tank on Nelson Street and serves Wells #3 and #4. The treatment employed in both wellhouses includes the use of sodium silicate for the sequestering of iron and sodium hypochlorite for disinfection of the raw water. Continuous online analyzers measure the levels of free chlorine residual, and the level of turbidity in the treated water. 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 Cl_2 contact pipe.

The Clifford Drinking Water System operates under C. of A. #5953-6JLJSK until July 31, 2011 at which time operations are regulated by MDWL 106-101 and DWWP 106-201, PTTW #6117-62MQDH (*Well #1*) and PTTW #8554-6DDJZH (*Wells #3 and #4*).

2.0 SUMMARY OF UPGRADES

2.1 Upgrades Completed in 2011

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

Typically, maintaining the system includes repairs and/or replacement of individual components as necessary. In 2011, $1,400.00 was spent on a portable generator, $850.00 on a metal detector and $6,500.00 on computer equipment and upgrades between all 4 water systems.
In Clifford, approximately $132,400.00 was spent installing watermain.

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

2.2 Upgrades Scheduled to be Completed in 2012

In 2012, the Town of Minto is planning to replace watermain on Clark St. from John to Allan St. at an estimated cost of $30,000.00 and replace watermain on Allan St. at an estimated cost of $200,000.00. As well as, complete upgrades and maintenance to the water tower at an estimated cost of $30,000.

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 2011, 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, 2011 – December 31, 2011

Month	Treated Water Flow (Max Daily Volume = 1309 m³/day) (Max Flow Rate = 15.15 L/s			Chlorine	Monthly Averages				Distribution System Disinfectant	
					Treated Water Turbidity		Treated Water Disinfectant			
	Instantaneous Peak flows (L/s)	Maximum Day Flow (m³/day)	Monthly Total (m³)	Monthly Total (L)	No. of Samples Collected	Daily Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Dis. Samples Collected	No. of Samples with Detectable Residual
January	14.2	300	4946	101	7	0.40	31	1.32	See Clifford Well #3 Data	
February	14.3	556	5356	80	8	0.44	29	1.36		
March	14.2	309	5910	135	11	0.53	31	1.25		
April	14.2	220	3549	80	6	0.35	30	1.11		
May	14.2	331	4266	80	3	0.40	32	1.09		
June	14.2	204	4129	100	2	0.13	30	1.02		
July	14.1	393	6609	120	4	0.37	33	1.02		
August	14.1	393	8554	180	6	0.40	31	1.03		
September	14.2	367	7113	160	6	0.50	30	1.11		
October	14.2	433	10647	220	3	0.63	31	1.18		
November	14.1	481	9918	200	6	0.40	30	1.25		
December	14.1	321	5586	140	2	0.29	23	1.16		
Total			76,583	1,596	64		361			
Average			6,382			0.40		1.16		
Maximum	14.3	556								

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2011: **1,596 L**
Distribution System Target Residual: **0.2 mg/L**

Table 3.2
Clifford Drinking Water System – Well #3
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2011 – December 31, 2011

Month	Treated Water Flow (Max Daily Volume = 1309 m³/d) (Max Flow Rate = 15.2 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant	
					Treated Water Turbidity		Treated Water Disinfectant			
	Instantaneous Peak Flow (L/s)	Maximum Day Flow (m³/day)	Monthly Total (m³)	Monthly Total (L)	No. of Samples Collected	Daily Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Dis. Samples Collected	No. of Samples with Detectable Residual
January	4.5	298	4578	60	8	0.27	31	1.31	49	49
February	4.5	274	4823	80	8	0.54	29	1.34	43	43
March	4.5	431	5969	80	14	0.54	31	1.29	47	47
April	4.5	133	2284	40	7	0.42	30	1.24	47	47
May	4.5	262	3207	80	3	0.36	32	1.18	48	48
June	4.5	244	3049	40	0		30	1.12	50	50
July	4.5	240	5200	121	1	0.34	33	1.17	43	43
August	4.5	256	4975	80	3	0.42	31	1.21	48	48
September	4.5	302	5368	100	6	0.50	30	1.23	48	48
October	4.5	295	5803	80	3	0.50	31	1.25	48	48
November	4.5	222	5387	100	5	0.33	30	1.27	48	48
December	4.6	767	5923	164	5	0.35	31	1.4	51	51
Total			56,566	1,025	63		369		570	570
Average			4,714			0.42		1.25		
Maximum	4.6	767								

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2011 for Wells #3 and #4 combined: **1,025 L** **(Wells #3 and #4 share the same Cl_2 storage container)*
Distribution System Target Residual: **0.2 mg/L**

Table 3.3
Clifford Drinking Water System – Well #4
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2011 – December 31, 2011

Month	Treated Water Flow (Max Daily Volume = 1309 m^3/d) (Max Flow Rate = 15.2 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant	
					Treated Water Turbidity		Treated Water Disinfectant			
	Instantaneous Peak flow (L/s)	Maximum Day Flow (m^3/day)	Monthly Total (m^3)	Monthly Total (L)	No. of Samples Collected	Daily Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Dis. Samples Collected	No. of Samples with Detectable Residual
January	10.8	93	739	See Clifford Well #3 Data	7	0.51	22	1.43	See Clifford Well #3 Data	
February	10.4	129	871		17	0.55	27	1.43		
March	10.6	64	980		15	0.60	30	1.43		
April	11.9	60	1054		11	0.48	29	1.40		
May	12.0	62	1310		6	0.59	32	1.38		
June	11.9	57	988		2	0.28	30	1.21		
July	11.9	80	1176		6	0.49	30	1.24		
August	11.6	72	1318		6	0.42	31	1.26		
September	11.6	64	1024		7	0.64	30	1.30		
October	11.6	166	1402		5	0.52	31	1.30		
November	11.3	158	1251		5	0.47	29	1.31		
December	10.6	301	2734		6	0.54	30	1.45		
Total			14,848	1,025	93		351			
Average			1,237			0.51		1.35		
Maximum	12.0	301								

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2011 for Wells #3 and #4 combined: **1,025 L** **(Wells #3 and #4 share the same Cl_2 storage container)*
Distribution System Target Residual: **0.2 mg/L**

Table 3.4
Clifford Drinking Water System – Well #3 & #4 Combined
Treated Water Flow
January 1, 2011 – December 31, 2011

Month	Treated Water Flow (Max Daily Volume = 1309 m^3/d) (Max Flow Rate = 15.2 L/s)			Chlorine
	Instantaneous Peak flow (L/s)	Maximum Day Flow (m^3/day)	Monthly Total (m^3)	Monthly Total (l)
January	15.3	298	5317	60
February	14.9	274	5694	80
March	15.1	431	6949	80
April	16.4	133	3338	40
May	16.5	262	4517	80
June	16.4	244	4037	40
July	16.4	240	6376	121
August	16.1	256	6293	80
September	16.1	302	6392	100
October	16.1	295	7205	80
November	15.8	222	6638	100
December	15.2	767	8657	164
Total			71,414	1,025
Average			5,951	
Maximum	16.5	767		

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 C. of A's rated capacity is included and a comparison of the maximum daily flow to the PTTW's rated capacity is included in Table 3.5. Table 3.4 reflects the comparisons between the MDWL and PTTW as of July 31, 2011. However, this table includes data from January 1st to December 31st, 2011.

Table 3.5
Comparison of Flow Rates and Flow Capacities
To
Rated Flow Rate (C. of A.) and Rated Capacity (PTTW)

Well Supply	C. of A. Max. Flow Rate	Maximum Instantaneous Peak Flow	Percent of Maximum Allowable	PTTW Maximum Daily Quantity	Maximum Daily Flow	Percent of Maximum Allowable
	L/s	L/s	%	m^3/day	m^3/day	%
Well #1	15.1	14.3	94	1,310	556	42
Well #3	7.6	4.6	60	655	767	117
Well #4	15.1	12.0	79	1,309	301	23

The C. of A. stipulates, "*The drinking-water system shall not be operated to exceed the rated capacity for the maximum flow rates into the treatment system*". The wells have fixed speed pumps that typically discharge at constant rate equal to the average rate identified in the PTTW.

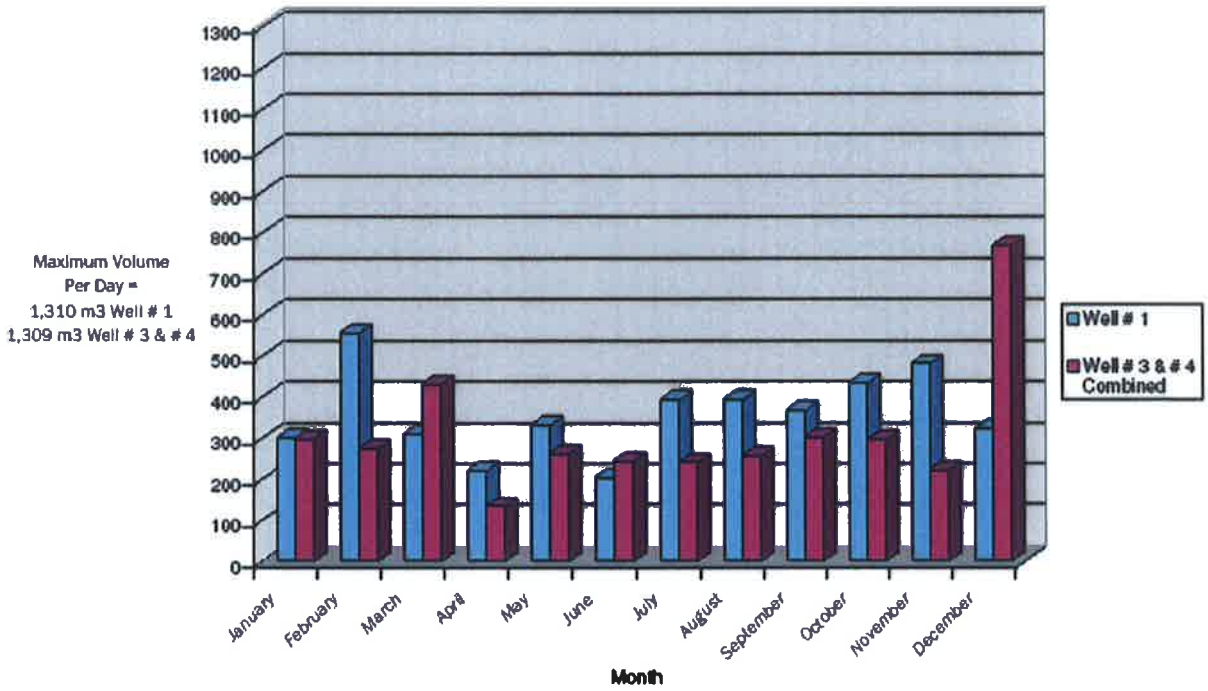
Table 3.6
Comparison of Flow Rates To Rated Flow Rate (PTTW)

Well Supply	PTTW Max. Flow Rate	Maximum Instantaneous Peak Flow	Percent of Maximum Allowable
	L/s	L/s	%
Well #1	15.1	14.3	94
Well #3	7.6	4.6	60
Well #4	15.1	12.0	79

Table 3.7
Comparison of Flow Capacities To Rated Capacity (MDWL)

Well Supply	PTTW Maximum	Maximum Daily Flow	Percent of Maximum Allowable
	m^3/day	m^3/day	%
Well #1	1,310	556	42
Well #3 & # 4	1,309	767	59

Table 3.8
Maximum Water Usage Per Day by Month



The C of A is valid until July 31, 2011. As of August 1, 2011 the Municipal Drinking Water Licence does not list a flow rate, therefore the flow rate is based on the PTTW.

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 or IMAC limits.

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 2011. The minimum, maximum, and average turbidity readings for raw water from each well are presented in

Table 3.9.

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 3.9. Also included in Table 3.9 is the range of free chlorine residual within the distribution system.

The free chlorine residual in the distribution system ranged between 0.26 mg/L and 1.88 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 3.9
2011 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	0.01	0.72
	Maximum	0.89	1.77
	Average	0.41	1.16
Well #3	Minimum	0.01	0.94
	Maximum	0.82	1.66
	Average	0.41	1.25
Well #4	Minimum	0.05	0.75
	Maximum	0.92	1.76
	Average	0.59	1.35

3.4 Summary of Treatment Chemicals Used

The disinfectant chemical used in the Clifford Drinking Water System is 12% sodium hypochlorite. Measurements of free residual are recorded on a continuous basis. Wells #3 and #4 share the same Cl_2 storage container; 1,025 L of Cl_2 is the combined usage for Wells #3 and #4. In 2011, a total of 2,621 L of 12% sodium hypochlorite was used for all three wells. The annual average dosage rates for Well #1, and Wells #3 and #4 are presented in Table 3.10.

In 2011, 1,428 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 3.10.

Table 3.10
Clifford Drinking Water System
2011 Annual Summary of
Treatment Chemicals Used

Treatment Chemical	Well	Volume Used	Mass Used	Annual Flow	Dosage Rate
		L	kg	m^3	mg/L
12 % Cl_2	Well #1	1,596	191.5	76,583	2.50
	Well #3 & Well #4	1,025	123.0	71,414	1.72
	Total	2,621	314.5	147,997	2.13
Sodium Silicate	Well #1	1,026	1,426.1	76,583	18.62
	Well # 3 & Well #4	402	558.8	71,414	7.82
	Total	1,428	1,984.9	147,997	13.41

Note:
- *Wells #3 and #4 share the same Cl_2 storage container; 931 L is the combined Cl_2 usage for both wells.*
- *Wells #3 and #4 share the same storage container for the sequestering agent, sodium silicate (NaSi); 402 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 C. of A., the MDWL, the DWWP and any MOE order that the system failed to meet from January 1, 2011 to December 31, 2011, and the corresponding corrective measure(s) taken. Compliance was assessed as follows:

- There were **no MOE Orders** issued to the Clifford Drinking Water System in 2011.
- The C. of A. 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. A detailed 'checklist' was developed, based on the terms and conditions of C. of A. #5953-6JLJSK and after July 29, 2011 the MDWL and DWWP for the Clifford Drinking Water System. From these checklists, the terms and conditions of the C. of A., MDWL and DWWP were summarized as either in compliance or not in compliance. A copy of both the summary and the checklist are included in Appendix B.

- 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. A detailed 'checklist' was developed for each of the relevant schedules for municipal residential systems. This checklist was then summarized into requirements that have been met, and those that have not been met, for each of the schedules. A copy of both the summary and the checklist are included in Appendix C.

- 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.

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 C. of A. #5953-6JLJSK, Well #1 PTTW #6117-62MQDH, and Well #3 & #4 PTTW #5364-7ZWRQJ. Every attempt has been made to ensure this document is an accurate representation of how the Drinking Water System is operated. On July 31, 2011 the C of A was replaced with the Municipal Drinking Water Licence 106-101 and Drinking Water Works Permit 106-201.

To the best of our knowledge, Table 4.1 identifies all of the requirements of the SDWA, the regulations, the C. of A. and the PTTW, in which the Clifford Drinking Water System failed to meet from January 1, 2011 to July 29, 2011 and after July 29, 2011, the MDWL and DWWP.

Table 4.1
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
C. of A. #5953-6JLJSK	*Clifford Drinking Water System is in compliance with all of the requirements of the Certificate of Approval.*	
MDWL # 106-101 As of July 29, 2011	*Clifford Drinking Water System is in compliance with all of the requirements of the MDWL*	
DWWP # 106-201 As of July 29, 2011	*Clifford Drinking Water System is in compliance with all of the requirements of the DWWP*	

Compliance With	Description of Item the System Failed to Meet	Correction of This Situation How/When
O. Reg. 170/03	On January 6, 2011, the Allan Street Pumphouse (Well #1) lost communication with their SCADA system and 17 minutes of data was lost. The Town of Minto's SCADA consultant was contacted immediately when the problem was noticed. The system's UPS (uninterrupted power supply) had to be rebooted a few times that day to try and fix the communication problem. This caused the SCADA system to only record data at 7 or 9 minute intervals during the reboot instead of the 5 minutes intervals that is required by O.Reg,170/03. However, when the UPS is rebooted the well automatically locks out and no water is sent to the distribution during this time. During the communication problem, their SCADA consultant confirmed their analyzers were still working and that the wells would still automatically shutdown at their programmed alarm set points in the event of a low chlorine.	No further action is required. The Town of Minto has developed a procedure to ensure that when a communication loss is discovered the well is either shutdown immediately or an operator is sent to the site to conduct manual testing until communication can be restored with the SCADA system. This procedure also included steps to ensure that when maintenance is being conducted on the system that the chlorine residual is recorded manually by an operator to ensure the testing requirements of Schedule 6 of O.Reg.170 are met at all times when water is being directed to the distribution system.
	On December 23, 2011, Well #1 brokedown, causing a higher use of Well # 3. Due to Well # 1 being inoperable, we failed to meet guidelines of the PTTW for Well #3. The flow rate for the MDWL was not exceeded. Proper disinfection was achieved at all times.	Scheduled repair to Well #1 which occured
SDWA	***Clifford Drinking Water System is in compliance with all of the requirements of the SDWA.***	

Dated this 20th day of March 2012.

Brian Hansen
Public Works Director