2018 Summary Report

for the

Town of Minto

PALMERSTON DRINKING WATER SYSTEM

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Date: March 8, 2019

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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 Palmerston 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, 2018 to December 31, 2018.

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

Palmerston is located in the Town of Minto within the northwest corner of Wellington County, along the route of Provincial Hwy. No. 23.

The Palmerston Drinking Water System services a permanent population of approximately 2,920, comprised of approximately 1120 residential premises, as well as Industrial, Commercial, Institutional premises. The municipal water system is also used for fire protection.

Palmerston is currently serviced by a waterworks that consists of: four drilled bedrock wells, two wellhouses, an elevated 2500 m^3 steel storage tank and a distribution network of watermains, ranging in diameter from 100 mm to 350 mm. There are approximately 102 fire hydrants in the Town of Palmerston. In the event of a prolonged power outage, a portable generator is available to either wellhouse to supply back-up power.

The bedrock wells are equipped with submersible pumps that discharge directly into the William Street Wellhouse (Wells #1 and #2) or the Whites Road Wellhouse (Well #3 and #4). In the wellhouse, the raw water supply is injected with 12% sodium hypochlorite for disinfection and the chemical PW1680 for iron sequestering.

The wells are controlled (*start/stop*) automatically based on elevated storage tank liquid levels and pressures in the distribution system. Each wellhouse is equipped with alarms for chlorination system failure (*and corresponding lockout of well pumps*), low water level and intrusion. Each wellhouse has continuous monitoring analyzers for chlorine.

The treated water leaves the wellhouse and enters an underground contact pipe and is discharged into the distribution system after adequate contact time is achieved.

The Palmerston Drinking Water System operates under MDWL 106-103, DWWP 106-203 and PTTW #8374-8HSPD5.

2.0 SUMMARY OF UPGRADES

2.1 Upgrades Completed in 2018

The disinfection treatment system in the Palmerston 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 2018 $9,800 on design for installing the watermain loop from William Street to Queen Street and $11,300 on a Pump Motor for Well #2.
The following purchases were also made on equipment that is shared between all of Minto's water systems. $18,500 on the water meter installation program and $86,000 on 2 new trucks.

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

2.2 Upgrades Scheduled to be Completed in 2019

In 2019, the Town of Minto is planning to spend $10,000.00 on water system modeling, $28,000 for a video log and inspection for wells #3 and #4, $10,000 for flow control valves for Well #2 and #3, $155,000 to install a watermain loop through the Lion's park and $125,000 for Industrial park servicing.
The following will also be purchased to be shared within the water department. $53,500 for SCADA, computer hardware and software, $20,000 for water meters, $50,000.00 on vehicle replacement and $10,000 on chemical pumps.

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 Palmerston's wells be included in the Summary Report. Tables 3.1, 3.2, 3.3 and 3.4 provide a summary of quantities and flow rates supplied during 2018 for Wells #1, #2, #3 and #4 respectively, on a monthly basis. Wells #1 and #2 supply the William Street Wellhouse and the two wells alternate duties as primary supply. As such, Wells #1 and #2 are permitted as one and provide standby duty to each other. Well #3 and # 4 supply the White's Road Wellhouse and the two wells alternate duties as primary supply.

Table 3.1
Palmerston Drinking Water System – Well #1
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2018 – December 31, 2018

	Raw Water Flow (Max Flow Rate = 22.8 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant
					Treated Water Turbidity		Treated Water Disinfectant Point of Entry		
Month	Operator Observed Peak Flow (L/s)	Maximum Day Flow (m^3/day)	Monthly Total (m^3)	Monthly Total (L)	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Samples Collected
January	15.1	114	2,102	44	16	0.81	31	1.23	See Palmerston Well #2 Data
February	15.1	95	1,953	53	15	0.89	28	1.25	
March	15.2	97	2,186	46	16	0.92	31	1.28	
April	15.3	100	2,038	44	13	0.70	30	1.29	
May	15.5	90	2,112	50	17	0.69	31	1.39	
June	15.4	102	1,919	44	14	0.64	30	1.27	
July	15.5	303	5,480	134	8	0.61	31	1.26	
August	15.5	121	2,281	23	16	0.55	31	1.24	
September	15.5	134	2,040	66	15	0.64	30	1.39	
October	15.5	99	2,321	44	16	0.53	31	1.36	
November	15.5	122	2,074	44	15	0.53	30	1.25	
December	15.6	106	2,157	68	12	0.43	31	1.33	
Total			28,663	660	173		365		
Average			2,389			0.66		1.30	
Maximum	15.6	303							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2018: **660 L**
Distribution System Minimum Target Residual: **0.2 mg/L**

Table 3.2
Palmerston Drinking Water System – Well #2
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2018 – December 31, 2018

	Raw Water Flow (Max Flow Rate = 22.8 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant
					Treated Water Turbidity		Treated Water Disinfectant Point of Entry		
Month	Operator Observed Peak Flow (L/s)	Maximum Day Flow (m^3/day)	Monthly Total (m^3)	Monthly Total (L)	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Samples Collected
January	19.4	365	9,565	198	16	0.89	31	1.21	49
February	19.5	407	8,534	167	15	0.91	29	1.25	44
March	19.6	377	9,187	193	16	0.92	31	1.27	49
April	19.4	351	9,028	159	13	0.79	30	1.22	47
May	19.5	737	9,955	197	18	0.74	31	1.26	47
June	19.4	348	8,463	176	14	0.70	29	1.22	48
July	19.9	421	4,807	88	1	0.63	15	1.41	49
August	19.7	302	8,417	196	15	0.65	31	1.22	50
September	19.8	601	8,755	177	15	0.66	30	1.25	44
October	19.6	376	9,323	176	16	0.63	31	1.35	50
November	19.5	325	7,949	176	16	0.60	30	1.35	50
December	19.7	444	8,995	175	12	0.53	31	1.26	47
Total			102,978	2,078	167		349		574
Average	19.6		8,582			0.72		1.27	
Maximum		737							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2018: **2,078 L**
Distribution System Minimum Target Residual: **0.2 mg/L**

Table 3.3
Palmerston Drinking Water System – Well #3
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2018 – December 31, 2018

	Raw Water Flow (Max Flow Rate = 26.7 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant
					Treated Water Turbidity		Treated Water Disinfectant Point of Entry		
Month	Operator Observed Peak Flow (L/s)	Maximum Day Flow (m^3/day)	Monthly Total (m^3)	Monthly Total (L)	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Samples Collected
January	23.0	432	12,370	260	16	0.77	31	1.28	See Palmerston Well #2 Data
February	22.9	716	11,793	238	15	0.87	28	1.23	
March	23.1	884	12,577	284	16	0.92	31	1.21	
April	22.9	448	12,074	240	13	0.65	30	1.19	
May	22.8	594	12,369	306	16	0.70	31	1.34	
June	22.8	510	11,001	263	14	0.67	30	1.29	
July	22.8	798	13,274	283	9	0.65	31	1.21	
August	22.7	386	10,292	282	16	0.61	31	1.29	
September	22.7	593	9,983	263	15	0.63	30	1.36	
October	22.8	436	11,337	283	16	0.70	31	1.30	
November	22.9	409	9,614	238	15	0.64	30	1.30	
December	22.8	362	9,263	196	13	0.5	31	1.37	
Total			135,947	3,136	174		365		
Average	22.9		11,329			0.69		1.28	
Maximum		884							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2018: **3,136 L**
Distribution System Minimum Target Residual: **0.2 mg/L**

Table 3.4
Palmerston Drinking Water System – Well #4
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2018 – December 31, 2018

	Raw Water Flow (Max Flow Rate = 26.7 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant
					Treated Water Turbidity		Treated Water Disinfectant Point of Entry		
Month	Operator Observed Peak Flow (L/s)	Maximum Day Flow (m^3/day)	Monthly Total (m^3)	Monthly Total (L)	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Samples Collected
January	23.7	129	3,143	See Palmerston Well #3 Data	16	0.74	31	1.34	Palmerston Well #2 Data
February	23.7	140	2,848		15	0.86	28	1.25	
March	23.0	142	3,165		16	0.88	31	1.29	
April	23.0	147	2,869		14	0.65	30	1.35	
May	23.1	123	2,912		17	0.62	31	1.28	
June	23.1	137	2,758		14	0.60	30	1.18	
July	23.0	147	3,172		9	0.54	31	1.17	
August	23.0	116	2,991		16	0.54	31	1.25	
September	23.0	157	2,796		15	0.54	30	1.30	
October	23.0	132	3,158		16	0.51	31	1.33	
November	23.0	151	2,838		15	0.46	30	1.34	
December	23.0	153	2,900		12	0.38	31	1.41	
Total			35,550	3,136	175		365		
Average			2,963			0.61		1.29	
Maximum	23.7	157							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2018 for Wells #3 and #4 combined: **3,136 L** ***(Wells #3 and #4 share the same Cl_2 storage container)***
Distribution System Minimum Target Residual: **0.2 mg/L**

3.2 Comparison of Actual Flow 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 Palmerston'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 3.6. Table 3.5 and Table 3.6 reflect the comparisons between the PTTW and MDWL.

Table 3.5
Palmerston Drinking Water System
Well #1 & 2 Combined
Treated Water Flow
January 1, 2018 – December 31, 2018

Month	Treated Water Flow Max Daily Volume - 1964 m3/day Max Flow Rate = 22.83 L/s Well # 1 22.83 L/s Well # 2				Chlorine
	Operator Observed Peak Flow Well #1 (L/s)	Operator Observed Peak Flow Well #2 (L/s)	Maximum Day Flow (m^3/day)	Monthly Total (m^3)	Monthly Total (l)
January	15.1	19.4	365	11,667	242
February	15.1	19.5	407	10,487	220
March	15.2	19.6	377	11,373	239
April	15.3	19.4	351	11,066	203
May	15.5	19.5	737	12,067	247
June	15.4	19.4	348	10,382	220
July	15.5	19.9	421	10,287	222
August	15.5	19.7	302	10,698	219
September	15.5	19.8	601	10,795	243
October	15.5	19.6	376	11,644	220
November	15.5	19.5	325	10,023	220
December	15.6	19.7	444	11,152	243
Total				131,641	2,738
Average				10,970	
Maximum	15.6	19.9	737		

Table 3.6
Palmerston Drinking Water System
Well #3 & 4 Combined
Treated Water Flow
January 1, 2018 – December 31, 2018

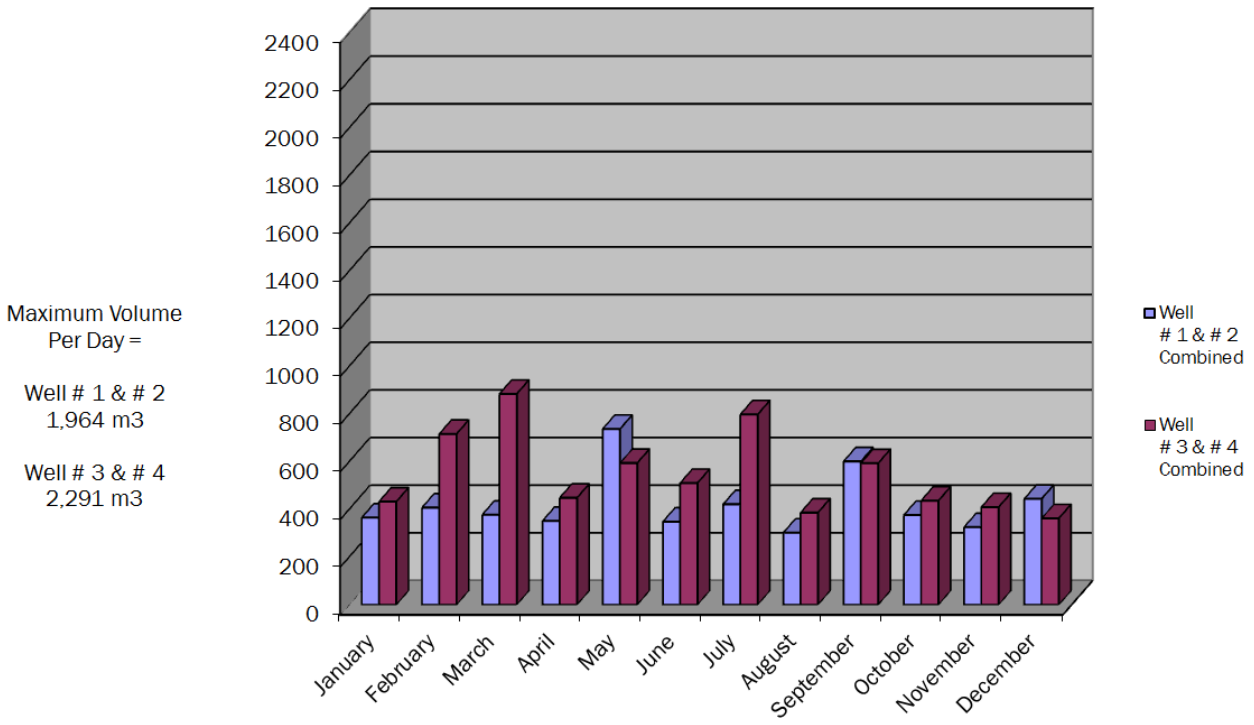
Month	Treated Water Flow Max Daily Volume - 2291 m3/day Max Flow Rate = 26.7 L/s Well # 3 26.7 L/s Well # 4				Chlorine
	Operator Observed Peak Flow Well #3 (L/s)	Operator Observed Peak Flow Well #4 (L/s)	Maximum Day Flow (m^3/day)	Monthly Total (m^3)	Monthly Total (l)
January	23.0	23.7	432	15,513	260
February	22.9	23.7	716	14,641	238
March	23.1	23.0	884	15,742	284
April	22.9	23.0	448	14,943	240
May	22.8	23.1	594	15,281	306
June	22.8	23.1	510	13,759	263
July	22.8	23.0	798	16,446	283
August	22.7	23.0	386	13,283	282
September	22.7	23.0	593	12,779	263
October	22.8	23.0	436	14,495	283
November	22.9	23.0	409	12,452	238
December	22.8	23.0	362	12,163	196
Total				171,497	3,136
Average				14,291	
Maximum	23.1	23.7	884		

Table 3.7
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 C Maximum Daily Quantity	Maximum Daily Flow	Percent of Maximum Allowable
	L/s	L/s	%	m^3/day	m^3/day	%
Well #1	22.8	15.6	69	1,964	303	15
Well #2	22.8	19.9	74	1,964	737	38
Well #3	26.7	23.1	86.4	2,291	884	39
Well #4	26.7	23.7	89	2,291	157	7

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 3.8
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 Palmerston Drinking Water System.

3.3 Raw Water Quality and Required Treatment

The Palmerston Drinking Water System has no naturally occurring chemical parameters that exceed MAC (maximum acceptable limit) or IMAC (interim maximum acceptable limit). The Palmerston Drinking Water System uses PW1680 to improve the disinfection process by controlling corrosion in water that is considered very hard and or contains high levels of iron.

The William Street Wellhouse (*Well #1 and #2*) and the Whites Road Wellhouse (*Well #3 and #4*) are equipped with continuous monitoring analyzers for measuring free chlorine residual. The chlorine analyzers are equipped with alarms. In the event of an adverse chlorine residual reading, a signal is sent to the SCADA system, which in turn, shuts down the respective well pump. The average monthly turbidity and free chlorine residual measurements for treated water are presented in Tables 3.1, 3.2, 3.3 and 3.4 for Well #1, Well #2, Well # 3 and Well # 4, respectively.

There were no high turbidity readings (*>1.0 NTU*) experienced in 2018. The minimum, maximum and average turbidity readings for raw water from each well are presented in Table 3.9.

12% Sodium Hypochlorite is the disinfectant used. 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 0.58 mg/L and 1.32 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 with the distribution system, a free chlorine residual of 0.2 mg/L …*". The Palmerston Drinking Water System meets both of these requirements.

Table 3.9
Palmerston Drinking Water System
2018 Annual Summary of
Raw Water Turbidity and Free Chlorine Residual

Location	Range	Raw Water Turbidity	Free Chlorine Residual at POE
		NTU	mg/L
Well #1	Minimum	0.29	0.93
	Maximum	0.97	1.61
	Average	0.65	1.30
Well #2	Minimum	0.30	0.82
	Maximum	0.97	1.61
	Average	0.67	1.27
Well #3	Minimum	0.27	0.81
	Maximum	0.98	1.68
	Average	0.62	1.28
Well #4	Minimum	0.28	0.96
	Maximum	0.95	1.61
	Average	0.60	1.29

3.4 Summary of Treatment Chemicals Used

The disinfectant chemical used in the Palmerston Drinking Water System is 12% Sodium Hypochlorite. Measurements of free chlorine residual are recorded on a continuous basis. In 2018, 5,874 L of 12% Sodium Hypochlorite was used. The average dosage rates are presented in Table 3.10.
In 2018, 2,462 L of PW1680 was used for the sequestering of iron. Wells #1 and #2 share a common tank of PW1680. The average dosage rates are presented in Table 3.10.

Table 3.10
Palmerston Drinking Water System
2018 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	660	79.2	28,663	2.76
	Well #2	2,078	249.4	102,978	2.42
	Well #3 & 4	3,136	376.3	171,497	2.19
	Total	**5,874**	**704.9**	**303,138**	**2.33**
PW1680	Well #1 & Well #2	912	1,276.8	131,641	9.70
	Well #3 & Well #4	1,550	2,170.0	171,497	12.65
	Total	**2,462**	**3,446.8**	**303,138**	**11.37**

Note:
- *Wells #1 and #2 share the same PW1680 storage container; 2,365 L is the combined PW1680 usage for both wells*
  Wells #3 and #4 share the same PW1680 storage container; 2,285 L is the combined PW1680 usage for both wells
- *12% Sodium Hypochlorite = 120,000 mg/L = 120 kg/m^3*
- *PW1680 has a specific gravity = 1.4*

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, 2018 to December 31, 2018, and the corresponding corrective measure(s) taken. Compliance was assessed as follows:

- MOECC Completed Inspection of the Palmerston system completed November 13, 2018, Final inspection rating 95.97%
- There were **no MOECC Orders** issued to the Palmerston Drinking Water System in 2018.
- 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 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
		No Adverse Issues	

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 Palmerston Water Work's MDWL 106-103, DWWP 106-203 and PTTW #8374-8HSPD5. 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
Palmerston 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 # 106-103	*Palmerston Drinking Water System is in compliance with all of the requirements of the MDWL*	
DWWP # 106-203	*Palmerston 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	*Palmerston Drinking Water System is in compliance with all of the requirements of O. Reg. 170/03.*	
SDWA	*Palmerston Drinking Water System is in compliance with all of the requirements of the SDWA.*	

Dated this 8th day or March 2019.

Wayne Metzger
Water Foreman