Annual Report
For the 2015 Operating Year

Ripley Drinking Water System
2015 Operation and Maintenance
Annual Report

PREPARED BY

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1.0 INTRODUCTION AND BACKGROUND

The purpose of the 2015 Annual Report is to document the operation and maintenance data for the Ripley Drinking Water System for review by the Ministry of the Environment in accordance with O. Reg. 170/03. This report covers January 1, 2015 to December 31, 2015. A copy of this report will be submitted to the owner to be displayed to the residents.

2.0 DESCRIPTION OF WATER SYSTEM

The Ripley Drinking Water System (DWS # **2200002636**) is comprised of two (2) wells located within the Municipality of Huron-Kinloss in the village of Ripley. The system serves an originally estimated population of approximately 680 people and 355 connections. Both wells are located at the Ripley Pumphouse, which is equipped with an on-line chlorine analyzer and is monitored through a SCADA system based out of the Ripley Municipal office. As a redundancy, the pumphouse is also equipped with an auto-dialer that is independent of the SCADA system, to call out alarms in the event of communications/SCADA failure.

The Ripley Drinking Water System is characterized as a "secure groundwater system" and categorized as a Class 2 Distribution and Supply Large Municipal Residential drinking water system as per O.Reg 170/03. The system has a daily maximum capacity to deliver 864 cubic metres of potable water to the village of Ripley.

The two (2) wells are described as follows:

Well #1 (RP-W1) is a 203 mm diameter, 84.4 m deep drilled groundwater well, located within the existing pumphouse at 74 Huron Street. A pitless adapter connects the well pump to an underground discharge line which empties into the water storage reservoir. The discharge line is equipped with a check valve and an isolation valve. Well # 1 was drilled in 1947, with the well pump and associated equipment replaced in 2007.

Well #2 (RP-W2) is a 203 mm diameter 85.3 m deep drilled groundwater well located approximately 60 m east of the existing pumphouse. Well # 2 is equipped with a submersible well pump. A pitless adapter connects the well pump to an underground discharge line which empties into the water storage reservoir. The discharge line is equipped with a check valve and an isolation valve. Well # 2 was drilled in 1994, with the well pump and associated equipment replaced in June 2013.

From the water storage reservoir, the water is pumped via two (2) high lift pumps, to the chlorine contact watermain (55 m x 582 mm ID = 14,632 L).

Both Ripley wells are secure deep bedrock wells, not under the influence of surface water. The wells penetrate limestone aquifers. Due to the depth and structure of the aquifers, the water temperature is relatively constant (<10°), turbidity is low, and the water is relatively hard. The raw water is also relatively high in sodium and fluoride, but the lead content of the raw water is well below the half-MAC (Maximum Allowable Concentration). Those who are supplied water from the Ripley Drinking Water System are made aware of the various concentrations in their drinking water by numerous means of communication with the Township of Huron-Kinloss.

The Ripley Drinking Water System is equipped with a Supervisory Control and Data Acquisition system (SCADA) allowing for remote control, monitoring and record keeping of the system. This provides the operator with the current operating status of the supply and treatment equipment throughout the system at any given time via remote access by computer or iPhone.

A 250 kW stand-by diesel generator and fuel storage tank are located in the Fire Hall adjacent to the pumphouse. The diesel generator provides emergency backup power for the water system in the event of a power failure. A stand-by propane generator is also located at the Ripley Municipal office for back-up power requirements for the office and SCADA systems.

The raw water is disinfected using sodium hypochlorite (12%) and serves primarily as a measure to prevent microbiological growth within the raw water pipeline, reservoir, and distribution system. The Ripley Drinking Water System achieves a minimum of 2-log removal or inactivation of viruses as outlined in the MOECC *Procedure for Disinfection of Drinking Water in Ontario* with a chlorine contact watermain.

3.0 SUMMARY OF WATER QUALITY MONITORING

3.1 Water Treatment Equipment Operation and Monitoring

3.1.1 Point of Entry Chlorine Residual

In 2015, a total of 363 samples were collected and analyzed for Free Chlorine Residual at the Point of Entry (POE) for treated water using a HACH pocket chlorine colorimeter. One sample was missed on January 7, 2015, and one sample was missed on January 9, 2015 due to closed roads from weather conditions.
Table 1 shows the monthly average of free chlorine residual values.

3.1.2 Distribution Chlorine Residual

In 2015, a Total of 363 samples were collected in the Ripley Distribution System. Two samples were missed due to closed roads from weather conditions (Jan. 7/15, and Jan. 9/15).

Table 1 – Treated and Distribution Chlorine Residuals for Ripley Drinking Water System [a]

Date	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	***Avg***	***Min***	***Max***	***# Samples***
Average Treated Chlorine Residual (mg/L)	1.48	1.56	1.45	1.46	1.49	1.38	1.42	1.58	1.43	1.54	1.58	1.57	**1.50**	**0.39**	**2.77**	**8,760**
Average Distribution Chlorine Residual (mg/L)	1.39	1.43	1.34	1.37	1.36	1.31	1.33	1.42	1.39	1.43	1.51	1.47	**1.40**	**0.36**	**1.90**	**363**

[a] – Results collected from January 1, 2015 – December 31, 2015

3.1.3 Turbidity

Drinking water turbidity was measured by a portable turbidity analyzer. The raw and treated water grab samples were collected monthly and analyzed for turbidity.

Table 2 provides a summary of raw and treated turbidity results. The maximum turbidity measured in the raw water was 2 NTU and the maximum turbidity measured in the treated water was 1.70 NTU.

Table 2 – Raw and Treated Water Turbidities for Ripley Drinking Water System [a]

Date	*Site*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Avg*	*Min*	*Max*	*# Samples*
Average Raw Turbidity (NTU)	W #1	0.210	0.270	0.200	0.305	0.230	0.265	0.220	0.360	0.217	0.220	0.240	0.200	0.243	0.170	0.400	20
	W #2	0.230	0.330	0.250	0.335	0.250	0.240	0.180	0.250	0.160	0.190	0.210	0.243	0.240	0.090	0.360	20
Average Treated Turbidity (NTU)	TW	0.350	0.365	0.375	0.340	0.280	0.285	0.310	0.260	0.293	0.180	0.275	0.300	0.309	0.180	0.490	21

[a] – Results collected from January 1, 2015 – December 31, 2015

3.2 Microbiological Sampling

3.2.1 Raw Water Samples

Raw water samples are taken every week. In 2015, a total of 104 samples were collected and analyzed for E.Coli and Total Coliform. All of the E.Coli results obtained were 0 cfu/100 mL. All of the Total Coliform results were 0 cfu/100 mL. T**able 3.** provides a summary of bacteriological results performed on the raw water.

Table 3 – Microbiological Results for Raw Water at Ripley Drinking Water System [a]

	E.Coli			***Total Coliform***		
Date	# Samples	# Samples 0	# Samples ≥1	# Samples	# Samples 0	# Samples ≥1
Jan	8	8	0	8	8	0
Feb	8	8	0	8	8	0
Mar	10	10	0	10	10	0
Apr	8	8	0	8	8	0
May	8	8	0	8	8	0
Jun	10	10	0	10	10	0
Jul	8	8	0	8	8	0
Aug	8	8	0	8	8	0
Sept	10	10	0	10	10	0
Oct	8	8	0	8	8	0
Nov	8	8	0	8	8	0
Dec	10	10	0	10	10	0
Total	104	104	0	104	104	0

[a] – Results collected from January 1, 2015 – December 31, 2015

3.2.2 Treated Water (Point of Entry) Samples

One (1) treated water sample is taken every week and analyzed for E.Coli, Total Coliform, and for Heterotrophic Plate Count (HPC). A total of 104 treated water samples were collected and analyzed for the above parameters. All samples were found to be safe. Each E.Coli and Total Coliform result from the treated water was 0 cfu/100 mL. The range of HPC results were 0 – 10 cfu/100 mL.

Table 4 provides a summary of all bacteriological results performed on treated water.

Table 4 – Microbiological Results for Treated Water (Point of Entry) at Ripley Drinking Water System [a]

Date	*E.Coli*			*Total Coliform*			*HPC*		
	# Samples	# Samples 0	# Samples ≥1	# Samples	# Samples 0	# Samples ≥1	# Samples	# Samples 0	# Samples 1 - 70
Jan	4	4	0	4	4	0	4	0	4
Feb	4	4	0	4	4	0	4	4	0
Mar	5	5	0	5	5	0	5	1	4
Apr	4	4	8	4	4	0	4	4	0
May	4	4	0	4	4	0	4	2	2
Jun	5	5	0	5	5	0	5	2	3
Jul	4	4	0	4	4	0	4	3	1
Aug	4	4	0	4	4	0	4	3	1
Sep	5	5	0	5	5	0	5	3	2
Oct	4	4	0	4	4	0	4	3	1
Nov	4	4	0	4	4	0	4	4	0
Dec	5	5	0	5	5	0	5	3	2
Total	52	52	0	52	52	0	52	32	20

[a] – Results collected from January 1, 2015 – December 31, 2015

3.2.3 Distribution System

Typically, two (2) distribution samples are collected every week and tested for E.Coli, Total Coliform, and for Heterotrophic Plate Count (HPC). In 2015, a total of 121 distribution samples were collected and analyzed for the above parameters and all sampled were found to be safe. Each E.Coli result from the distribution samples was 0 cfu/100 mL. There were a few Total Coliform samples in July, ranging from 1 - 4 cfu/100 mL. The range of HPC results were 0 – 70 cfu/100 mL.

Table 5 provides a summary of all bacteriological samples taken in the distribution system.

Table 5 – Microbiological Results for Ripley Drinking Water Distribution System [a]

	E.Coli			*Total Coliform*			*HPC*		
Date	# Samples	# Samples 0	# Samples ≥1	# Samples	# Samples 0	# Samples ≥1	# Samples	# Samples 0	# Samples 1 - 70
Jan	8	8	0	8	8	0	4	1	3
Feb	11	11	0	11	11	0	6	4	2
Mar	11	11	0	11	11	0	5	3	2
Apr	8	8	0	8	8	0	4	3	1
May	8	8	0	8	8	0	5	1	4
Jun	10	10	0	10	10	0	5	2	3
Jul	21	21	0	21	18	3[b]	14	1	13
Aug	8	8	0	8	8	0	4	2	2
Sep	10	10	0	10	10	0	5	1	4
Oct	8	8	0	8	8	0	4	3	1
Nov	8	8	0	8	8	0	4	0	4
Dec	10	10	0	10	10	0	5	3	2
Total	121	121	0	121	118	3	65	24	41

[a] – Results collected from January 1, 2015 – December 31, 2015.
[b] – July 7, 2015 – 1 distribution sample had 4 Total Coliforms; July 10, 2015 – 1 distribution sample had 3 Total Coliforms, and 1 distribution sample had 1 Total Coliform.

3.3 Chemical Sampling & Testing as per Schedule 13, O. Reg.170/03

3.3.1 Inorganics

Treated water samples are collected every 36 months and tested for inorganics. The most recent samples for the Ripley Drinking Water System were collected on June 5, 2015 and submitted to the laboratory for analysis of inorganics as listed in Schedule 23. All parameters were found to be within compliance. Inorganics will be sampled and analyzed again on or before June 10, 2018.

Results from the June 5, 2015 samples can be found in **Table 6.**

Table 6 – Schedule 23 Results for Ripley Drinking Water System [a]

Parameter	*Ripley Result (µg/L)*	*Maximum Allowable Concentration (µg/L)*
Antimony	0.10	6
Arsenic	4.4	25
Barium	66.9	1000
Boron	118	5000
Cadmium	0.021	5
Chromium	0.32	50
Mercury	0.01 <MDL	1
Selenium	1 <MDL	10
Uranium	5.28	20

[a] – Samples collected on June 5, 2015.

3.3.2 Lead

Schedule 15.1 of Ontario Regulation 170/03 requires that samples be taken during two seasons: once between December 15 and April 15 and once between June 15 and October 15. The Ripley Drinking Water System is currently under a reduced sampling program for lead where lead, pH and alkalinity are sampled in each season every 3 years. In the interim, pH and alkalinity are tested during each sampling season. In the two previous lead sampling seasons, two pH and alkalinity samples were taken on March 13, 2015 and two pH and alkalinity samples on October 7 & 8, 2015. These parameters are required to be sampled and analyzed again between the months of December 2015 and April 2016 and again between June and October 2016. Lead samples are required next in the 2017 sampling season. 2015 results can be found in Table 7.

Table 7 – Lead Sampling Program Results for Ripley Drinking Water System [a]

Sampling Season	*pH*	*Alkalinity (mg/L)*
Dec-Apr	7.59	204
	7.42	205
Jun-Oct	7.89	208
	7.91	209

[a] – Samples collected on March 18, 2015 and Oct. 7-8, 2015 respectively.

3.3.3 Organics

Treated water samples are collected every 36 months and tested for schedule 24 organic parameters. The most recent samples were collected on June 10, 2015. All parameters were found to be within compliance. Organics will be sampled and analyzed again on or before June 10, 2018. June 10, 2015 sample results can be found in **Table 8.**

Table 8 – Schedule 24 Results for Ripley Drinking Water System [a]

Parameter	*Result (µg/L)*	*Maximum Allowable Concentration (µg/L)*
Benzene	0.32 <MDL	5
Carbon Tetrachloride	0.16 <MDL	5
1,2-Dichlorobenzene	0.41 <MDL	200
1,4-Dichlorobenzene	0.36 <MDL	5
1,1-Dichloroethylene	0.33 <MDL	14
1,2-Dichloroethane	0.35 <MDL	5
Dichloromethane	0.35 <MDL	50
Monochlorobenzene	0.3 <MDL	80
Tetrachloroethylene	0.35 <MDL	30
Trichloroethylene	0.44 <MDL	50
Vinyl Chloride	0.17 <MDL	2
Diquat	1 <MDL	70
Paraquat	1 <MDL	10
Glyphosate	1 <MDL	280
Polychlorinated Biphenyls	0.04 <MDL	3
Benzo(a)pyrene	0.004 <MDL	0.01
2,4-dichlorophenol	0.15 <MDL	900
2,4,6-trichlorophenol	0.25 <MDL	5
2,3,4,5-tetrachlorophenol	0.20 <MDL	100
Pentachlorophenol	0.15 <MDL	60
Alachlor	0.02 <MDL	5
Aldicarb	0.01 <MDL	9
Aldrin+Dieldrin	0.01 <MDL	0.7
Aldrin	0.01 <MDL	-
Dieldrin	0.01 <MDL	-
Atrazine+N-dealkylated metabolites	0.01 <MDL	5
Atrazine	0.01 <MDL	-
De-ethylated atrazine	0.01 <MDL	-
Azinphos-methyl	0.05 <MDL	20
Bendiocarb	0.01 <MDL	40
Carbaryl	0.05 <MDL	90
Carbofuran	0.01 <MDL	90
Chlordane	0.01 <MDL	7
a-chlordane	0.01 <MDL	-
g-chlordane	0.01 <MDL	-
Oxychlordane	0.01 <MDL	-
Chlorpyrifos	0.02 <MDL	90

Parameter	*Result (µg/L)*	*Maximum Allowable Concentration (µg/L)*
Cyanazine	0.03 <MDL	10
Diazinon	0.02 <MDL	20
(DDT)+Metabolites	0.01 <MDL	30
op-DDT	0.01 <MDL	-
pp-DDD	0.01 <MDL	-
pp-DDE	0.01 <MDL	-
pp-DDT	0.01 <MDL	-
Dimethoate	0.03 <MDL	20
Diuron	0.03 <MDL	150
Heptachlor-Heptachlor Epoxide	0.01 <MDL	3
Heptachlor	0.01 <MDL	-
Heptachlor epoxide	0.01 <MDL	-
Lindane	0.01 <MDL	4
Malathion	0.02 <MDL	190
Methoxychlor	0.01 <MDL	900
Metolachlor	0.01 <MDL	50
Metribuzin	0.02 <MDL	80
Parathion	0.02 <MDL	50
Phorate	0.01 <MDL	2
Prometryne	0.03 <MDL	1
Simazine	0.01 <MDL	10
Temephos	0.01 <MDL	280
Terbufos	0.01 <MDL	1
Triallate	0.01 <MDL	230
Trifluralin	0.02 <MDL	45
2,4-dichlorophenoxyacetic acid	0.19 <MDL	100
2,4,5-trichlorophenoxyacetic acid	0.22 <MDL	280
Bromoxynil	0.33 <MDL	5
Dicamba	0.20 <MDL	120
Diclofop-methyl	0.40 <MDL	9
Dinoseb	0.36 <MDL	10
Picloram	1 <MDL	190

[a] – Samples collected on June 5, 2015.

3.3.4 Trihalomethanes

Distribution samples are taken every three months from representative points in the distribution system and tested for Trihalomethanes (THMs). In 2015, samples were collected during the months of February, May, August, and November. The Ontario Drinking Water Quality Standard (ODWQS) have set a Maximum Allowable Concentration (MAC) of 100 µg/L for this parameter and it is expressed as a running annual average. In 2015, the average THM was found to be 10.60 µg/L, which is within compliance.

Refer to **Table 9** for the summary of trihalomethane results. In 2016, samples will be collected in February, May, August, and November.

3.3.5 Nitrate & Nitrite

Four treated water samples are taken every three months and tested for nitrate and nitrite. In 2015, samples were collected during the months of February, May, August, and November. The Ontario Drinking Water Quality Standard (ODWQS) have set a Maximum Allowable Concentration (MAC) of 1 mg/L for nitrites and 10 mg/L for nitrates. The analytical results were found to be within compliance.

Refer to **Table 9.** In 2016, samples will be collected in February, May, August, and November.

Table 9 – Nitrate, Nitrite and THM Results at Ripley Drinking Water System [a]

	Nitrate		***Nitrite***		***THMs***	
Date	# Samples	Result (mg/L)	# Samples	Result (mg/L)	# Samples	Result (µg/L)
Feb	1	0.135	1	<0.003	1	3.7
May	1	0.114	1	<0.003	1	5.8
Aug	1	0.108	1	<0.003	1	5.1
Nov	1	0.091	1	<0.003	1	6.6
Total	4		4		4	
Average		0.112		<0.003		5.3
Maximum		0.135		<0.003		6.6

[a] – Results collected from January 1, 2015 – December 31, 2015.

3.3.6 Sodium

One water sample is collected from point of entry every 60 months and tested for Sodium. The Ontario Drinking Water Standards (ODWQS) have set a Maximum Acceptable concentration (MAC) of 200 mg/L for Sodium and requires the Medical Office of Health be notified if the concentration exceeds 20 mg/L. These samples were last collected on June 17, 2011. Refer to Table 10. The next water sample for Sodium will be collected and analyzed on or before June 17, 2016.

3.3.7 Fluoride

One water sample is collected from point of entry at least once in every 60 months and tested for Fluoride. The Ontario Drinking Water Quality Standards (ODWQS) have set a MAC of 1.5 mg/L. On May 12, 2015, a sample was collected for this analysis. The sample collected exceeded the Maximum Allowable Concentration (MAC). This is due to naturally occurring fluoride in the aquifer The next water samples for Fluoride will be collected and analyzed on or before May 12, 2016. Refer to Table 10.

Table 10 – Sodium and Fluoride Results at Ripley Drinking Water System

	Sodium	Fluoride
	Result (mg/L)	Result (mg/L)
Treated Water	**23.9**[a]	**2.03**[b]
MAC	20	1.50

[a] – Result collected on June 17, 2011.

[b] – Result collected on May 12, 2015.

4.0 WATER AND CHEMCIAL USAGE

4.1 Chemical Usage

Refer to **Table 11.** From January 1, 2015 to December 31, 2015, 263.99 kg of sodium hypochlorite (NaOCI) was used to treat the water that was provided to the distribution system with an average dosage of 2.72 mg/L.

Table 11 – Sodium Hypochlorite Usage at Ripley Drinking Water System [a]

	Ripley	
Date	***Usage (kg)***	***Average Dosage (mg/L)***
Jan	17.53	2.40
Feb	16.01	2.33
Mar	23.74	2.46
Apr	22.36	2.70
May	24.43	2.94
Jun	22.49	2.70
Jul	32.84	2.80
Aug	23.32	2.86
Sep	23.46	3.01
Oct	19.73	2.79
Nov	19.60	2.93
Dec	18.49	2.77
Total	**263.99**	
Average	**22.00**	**2.72**

[a] – Results collected from January 1, 2015 – December 31, 2015.

4.2 Annual Volumes

A summary of the water supplied to the distribution system in 2015 is provided in **Table 12.** This Table provides a breakdown of the monthly volume provided to the distribution system.

Flow meter was sent to Coulter Water Meter Service for calibration and was found to be acceptable. The water meter will be calibrated again in April 2016.

Table 12 – Treated Water Volumes for Ripley Drinking Water System [a]

Date	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	***Average***	***Maximum***	***Total***
Average Daily Volume (m^3)	234.00	237.81	302.64	279.21	267.28	270.05	388.27	258.28	252.14	228.10	216.22	213.34	**262.28**		
Maximum Daily Volume (m^3)	306.21	287.55	454.72	542.28	362.15	371.98	632.33	421.26	519.65	267.85	244.95	268.74		**632.33**	
Total Monthly Volume (m^3)	7254.12	6658.55	9381.92	8376.16	8285.83	8101.59	12036.41	8006.76	7564.21	7071.09	6486.59	6613.57			**95,620.90**

[a] – Results collected from January 1, 2015 – December 31, 2015

5.0 IMPROVEMENTS TO SYSTEM AND ROUTINE AND PREVENTATIVE MAINTENANCE

The following summarizes water system improvements and routine and preventative maintenance for the Ripley Drinking Water System Supply:

Replaced High Lift Pump # 1.
Replaced SCADA autodialer in the Municipal Office.

6.0 MINISTRY OF THE ENVIRONMENT INSPECTIONS AND REGULATORY ISSUES

Flow meter change-out was conducted on March 31, 2015.
DWQMS Audit was conducted on June 25, 2015.
The Ministry of the Environment and Climate Change conducted an inspection on Ripley Drinking Water System Supply between July 29 – September 14, 2015.