SERPENT RIVER DRINKING WATER SYSTEM WATERWORKS # 260005919

ANNUAL & SUMMARY REPORTS 2019

Introduction

This Annual and Summary Report has been prepared in accordance with both Schedule 22 and Section 11 of Ontario Regulation 170/03. In this manner, the requirements by regulation for each report have been consolidated into a single document. This Report is intended to brief the ownership and consumers of the Serpent River Drinking Water System on the system's performance over the past calendar year January 1 to December 31, 2019.

This report encompasses all elements as required by O. Reg. 170/03. Each section explains what is required for the category Small Municipal Residential DWS (as it pertains to the Serpent River DWS) and how limits were met or if shortfalls were revealed. The last section contains a list of tables and definition of terms identified in this report.

System Description

The Serpent River water treatment plant is rated as a Class 1 Water Treatment subsystem, and categorized under O. Reg. 170/03 as a Small Municipal Residential system. The treatment plant draws water from the Serpent River. Historical records show that the plant was downstream from mining activity that is no longer in production. Previous treatment included ion exchange filters that have since been replaced with slow sand filters.

The plant uses a slow sand filtration process and chlorination to achieve the primary treatment requirements. Two slow sand filters operate at a combined rate of 243 cubic meters/day. Alkalinity is adjusted by flowing the filtered water through crushed dolomite limestone. Water is disinfected using sodium hypochlorite in the clear well. Chlorine residual is measured at the end of the treatment process, at the high lift discharge at the end of the clear well.

Water enters the distribution system from the 124 cubic meter clear well. Pressure is maintained by six (6) hydro pneumatic tanks, also located at the water treatment plant. The distribution system is a mix of materials, the new parts of the system use PVC piping. Blow-off valves are located throughout the distribution system for flushing purposes

Chemicals

Chemicals utilized at the Serpent River Treatment plant during 2019 include:

- Sodium Hypochlorite for primary and secondary disinfection

2019 Expenditures

During the year of 2019, expenses were incurred to maintain treatment and distribution functions:

- ESA Services
- High lift pump support repair
- 12-month surveillance and 3-year re-accreditation audits for DWQMS (SAI Global)

2019 Drinking Water System Changes

Form 1 – Record of Watermains Authorized as a Future Alteration

- n/a

Form 2 – Record of Minor Modification or Replacements

- n/a

Form 3 – Record of addition, modification or replacement of equipment discharging a contaminant of concern to the atmosphere

- n/a

Water Quality

Microbiological Sampling and Testing

Sampling is conducted weekly for the DWS at the frequencies and locations identified by Schedule 11 of O. Reg. 170/03 for Small Municipal Residential Systems.

Table 1: Microbiological sampling requirements

Location	Sample Analysis	# samples	Frequency
Raw	EC / TC	1 sample	monthly
Treated	N/A	0	-
Distribution	EC / TC/ HPC-25%	1 sample	bi-weekly

Serpent River's raw water samples are collected from the raw water header. Treated samples are collected from a sample tap from the treated discharge header prior to distribution. Distribution samples are collected from the furthest point in the distribution system at the Firehall. Other locations may be sampled as required.

Table 1a: Microbiological Sample Results

Type	# samples	EC (range)	TC (range)	# samples	HPC (range)
Raw	24	0 - 1000	0 - 3000	-	-
Distribution	48	0	0	48	0 – 20

Distribution samples are collected more frequent (weekly) than required by regulation.

Operational Checks and Testing

Operational testing is completed as per Schedules 6 & 7 of O. Reg. 170/03 for Small Municipal Residential Systems. These checks and testing are completed on site at the water treatment facility by licensed operators. Continuous monitoring analyzers (collecting 5 minute readings) are utilized for measurement of filter turbidity and chlorine residuals.

Table 2: Monthly Filter Turbidity Results

Month	Filter A		Filter B		
	Avg (NTU)	Range (NTU)	Avg (NTU)	Range (NTU)	Monthly Filter Efficiency
January	0.099	0.010 - 0.215	0.308	0.137 - 0.575	100.0
February	0.068	0.010 - 0.168	0.204	0.144 - 0.995	100.0
March	0.071	0.010 – 0.132	0.180	0.127 – 0.258	100.0
April	0.076	0.010 – 0.167	0.147	0.066 – 0.314	100.0
May	0.062	0.051 – 0.077	0.080	0.067 – 0.125	100.0
June	0.062	0.051 – 0.132	0.072	0.005- 0.127	100.0
July	0.050	0.039 – 0.103	0.061	0.005 – 0.27	100.0
August	0.052	0.041 – 0.132	0.049	0.041 – 0.133	100.0
September	0.067	0.055 – 0.242	0.047	0.016 – 0.800	100.0
October	0.084	0.043 – 0.136	0.060	0.005 – 0.197	100.0
November	0.067	0.019 – 0.952	0.056	0.005 – 0.352	100.0
December	0.107	0.005 – 1.432	0.102	0.005 – 1.934	99.91

Filter Efficiency is monitored by tracking the turbidity readings above and below 1.0 NTU during filter run time. Serpent River maintained filter compliance each month above 95%, the required limit for slow sand filtration to achieve necessary filtration credits for primary disinfection.

Table 3: Chlorine Residuals

Month	Average Chlorine Residual (mg/L)	Chlorine Residual Range (mg/L)
January	1.44	0.62 – 2.03
February	1.53	1.23 – 1.94
March	1.49	0.84 – 2.08
April	1.48	1.00 – 2.05
May	1.56	0.95 – 1.98
June	1.50	0.94 – 2.29
July	1.59	1.19 – 1.87
August	1.77	1.17 – 2.76
September	1.65	0.73 – 2.44
October	1.44	0.67 – 2.44
November	1.49	0.71 – 2.31
December	1.55	1.07 – 1.90

Chlorine residuals are continuously monitored, and data is recorded on 5-minute intervals.

Chemical Sampling and Testing

Schedule 13 of O. Reg. 170/03 outlines chemical sampling regiments for Small Municipal Residential systems. Schedules 23 (inorganics) and 24 (organics) are collected every 60 months as well as sodium and fluoride. This system requires quarterly sampling for Nitrites/Nitrates and THM's. Schedule 15.1 outlines the requirements for semi-annual lead testing (2 periods per year). Serpent River's lead sampling follows the reduced sampling requirements every third year.

Table 4: Schedule 23 - Inorganics

Parameter	Sample Date	Result Value (µg/L)	Units	ODWS
Antimony	07-Jun-19	<0.60	µg/L	6
Arsenic	07-Jun-19	<1.0	µg/L	10
Barium	07-Jun-19	23	µg/L	1000
Boron	07-Jun-19	<50	µg/L	5000
Cadmium	07-Jun-19	<0.10	µg/L	5
Chromium	07-Jun-19	<1.0	µg/L	50
Fluoride	16-Oct-19	0.026	mg/L	1.5
Mercury	07-Jun-19	<0.10	µg/L	1
Selenium	07-Jun-19	<1.0	µg/L	50
Sodium	16-Oct-19	8.55	mg/L	20
Uranium	07-Jun-19	<2.0	µg/L	20

All results for inorganic parameters are within the maximum acceptable concentrations (MAC) of the Ontario Drinking Water Quality Standards as defined in O. Reg. 169/03.

Table 5: Nitrite/ Nitrate Results

Date	ODWS	21-Feb-19	12-Jun-19	23-Sep-19	09-Dec-19
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Nitrite	1.0	<0.010	<0.010	<0.010	<0.050
Nitrate	10.0	0.222	0.138	0.162	<0.050

All quarterly results for Nitrites and Nitrates are well below ODWS.

Table 5a: THM/HAA Results

Date	ODWS	Q1	Q2	Q3	Q4	RAA
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
THM	100	77.8	74.2	53.7	82.5	72.1
HAA	80	154	160	71	94	119.8

ODWS established a MAC of 80 for HAAs effective January 1, 2020.

Table 6: Schedule 24 - Organics

Parameter	Date	Result	Unit	ODWS
Alachlor	07-Jun-19	<0.10	µg/L	5
Atrazine + N-dealkylated metobolites	07-Jun-19	<0.20	µg/L	5
Azinphos-methyl	07-Jun-19	<0.10	µg/L	20
Benzene	07-Jun-19	<0.50	µg/L	1
Benzo(a)pyrene	07-Jun-19	<0.010	µg/L	0.01
Bromoxynil	07-Jun-19	<0.20	µg/L	5
Carbaryl	07-Jun-19	<0.20	µg/L	90
Carbofuran	07-Jun-19	<0.20	µg/L	90
Carbon Tetrachloride	07-Jun-19	<0.20	µg/L	2
Chlorpyrifos	07-Jun-19	<0.10	µg/L	90
Diazinon	07-Jun-19	<0.10	µg/L	20
Dicamba	07-Jun-19	<0.20	µg/L	120
1,2-Dichlorobenzene	07-Jun-19	<0.50	µg/L	200
1,4-Dichlorobenzene	07-Jun-19	<0.50	µg/L	5
1,2-Dichloroethane	07-Jun-19	<0.50	µg/L	5
1,1-Dichloroethylene (vinylidene chloride)	07-Jun-19	<0.50	µg/L	14
Dichloromethane	07-Jun-19	<5.0	µg/L	50
2-4 Dichlorophenol	07-Jun-19	<0.30	µg/L	900
2,4-Dichlorophenoxy acetic acid	07-Jun-19	<0.20	µg/L	100
Diclofop-methyl	07-Jun-19	<0.20	µg/L	9
Dimethoate	07-Jun-19	<0.10	µg/L	20
Diquat	07-Jun-19	<1.0	µg/L	70
Diuron	07-Jun-19	<1.0	µg/L	150
Glyphosate	07-Jun-19	<5.0	µg/L	280
Malathion	07-Jun-19	<0.10	µg/L	190
2-Methyl-4-Chlorophenoxyacetic Acid (MCPA)	07-Jun-19	<0.20	µg/L	100
Metolachlor	07-Jun-19	<0.10	µg/L	50
Metribuzin	07-Jun-19	<0.10	µg/L	80
Monochlorobenzene	07-Jun-19	<0.50	µg/L	80
Paraquat	07-Jun-19	<1.0	µg/L	10
Pentachlorophenol	07-Jun-19	<0.50	µg/L	60
Phorate	07-Jun-19	<0.10	µg/L	2
Picloram	07-Jun-19	<0.20	µg/L	190
Polychlorinated Byphenols (PCB)	07-Jun-19	<0.035	µg/L	3
Prometryne	07-Jun-19	<0.10	µg/L	1
Simazine	07-Jun-19	<0.10	µg/L	10
Terbufos	07-Jun-19	<0.20	µg/L	1
Tetrachloroethylene	07-Jun-19	<0.50	µg/L	10
2,3,4,6-Tetrachlorophenol	07-Jun-19	<0.50	µg/L	100
Triallate	07-Jun-19	<0.10	µg/L	230
Trichloroethylene	07-Jun-19	<0.50	µg/L	5
2,4,6-Trichlorophenol	07-Jun-19	<0.50	µg/L	5
Trifluralin	07-Jun-19	<0.10	µg/L	45
Vinyl Chloride	07-Jun-19	<0.20	µg/L	1

All results for the required organic sampling of schedule 24 are below the MAC.

Table 6a: Organics - Sampling exceeding half MAC

Date of Sample	Parameter	Result Value
20-Mar-2019	THM	77.8
26-Mar-2019	HAA	154
7-Jun-2019	THM	74.2
7-Jun-2019	HAA	160
26-Sept-2019	THM	53.7
26-Sept-2019	HAA	71.0
9-Dec-2019	THM	82.5
9-Dec-2019	HAA	94.0

Lead Sampling: The maximum acceptable concentration for lead in drinking water is 10µg/L. This applies to water at the point of consumption since lead is only present as a result of corrosion of lead solder, lead containing brass fittings or lead pipes which are found close to or in domestic plumbing and the service connection to buildings.

Table 7: Community Lead Sampling Results

Location Type	Number of Samples	Range of Lead Results (min#) – (max #)	Number of Exceedances
Plumbing	13	0 - 305	1
Distribution	2	1.7 – 4.4	0

Lead samples are collected during the two prescribed periods each year (Dec 15 – Mar 15 and June 15 – Oct 15). Sample results revealed one exceedance during year 2019.

Compliance

Adverse Water Quality Incidents

During 2019, the Serpent River DWS reported zero incidents of adverse water quality.

Annual Drinking Water System Inspection

The annual DWS inspection took place on September 26, 2019 by MECP Drinking Water inspector Parise Drolet. Two non-conformances and additional four recommendations and best practice were identified. The DWS received a final inspection rating of 97.57%

The following table identifies any non-compliance with requirement of the Act, the regulations, the system's approval, drinking water works permit, municipal drinking water license and any orders applicable to the system that were not met at any time during the period covered by the report.

Table 8: Non-compliances identified during Annual DWS Inspection

Non-compliance	Sodium sampling not conducted within required frequency
Action	Sodium sample required for current 60-month period
Corrective Actions	Re-sample collected October 16, 2019
Non-compliance	Fluoride sampling not conducted within required frequency
Action	Fluoride sample required for current 60-month period
Corrective Actions	Re-sample collected October 16, 2019

Flows

The Permit to Take Water authorizes the municipality to draw water from the Serpent River at a rate not to exceed 243m^3/d.

Municipal Drinking Water Licence: 282-101 specifies a maximum intake capacity of 366 m^3/d. The max flow rate reported was 165m^3/d, 45 % of the rated capacity.

The Serpent River WTP treated and distributed a total of 9.8 ML (9,784m^3) during the year of 2019. The average day treated flow demand was 27m^3/d, and maximum day flow was 127 m^3/d on January 21, 2019.

Chart 1: Five-year Production History

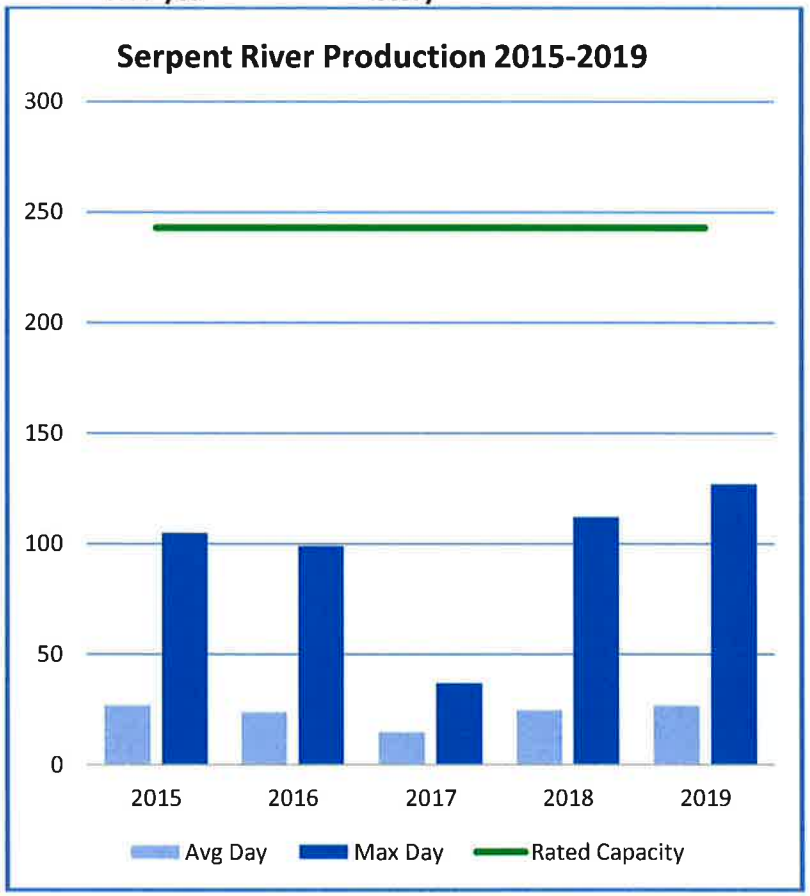
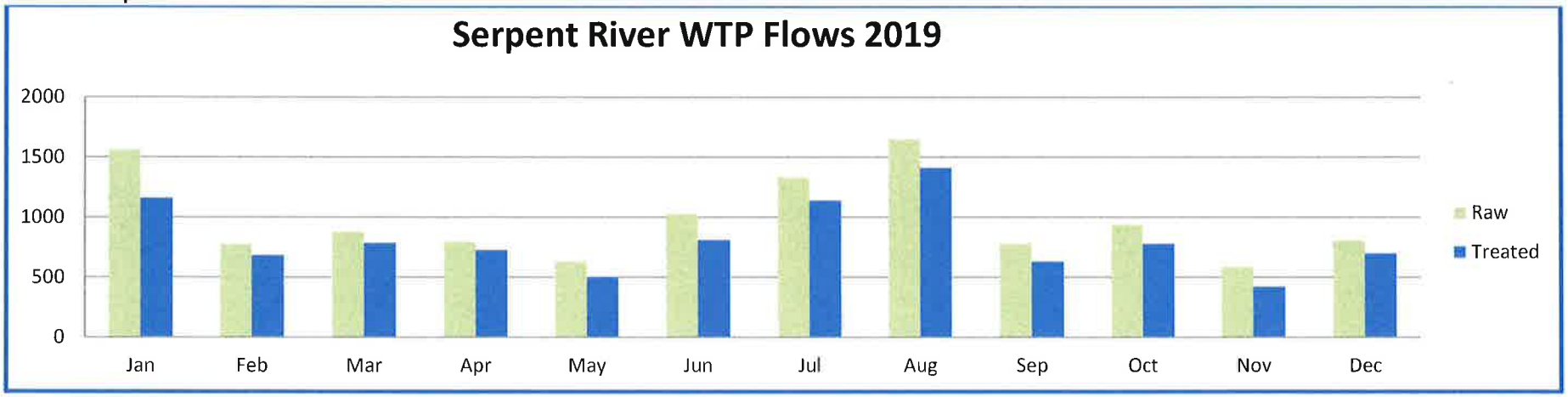


Table 9: Raw and Treated Water Production 2019

2019	Raw Water Production					Treated Water Production			
Month	Raw Water (m^3)	Minimum Day (m^3/d)	Maximum Day (m^3/d)	Average Day (m^3/d)	% Max. Flow Day of PTTW	Treated Water (m^3)	Minimum Day (m^3/d)	Maximum Day (m^3/d)	Average Day (m^3/d)
January	1,565.4	0	165.0	50.5	67.9	1,160.6	19.2	126.8	37.4
February	777.9	0	41.6	27.8	17.1	683.1	17.7	28.3	24.4
March	883.2	0	40.2	28.5	16.5	787.1	19.4	30.9	25.4
April	798.6	0	51.7	26.6	21.3	726.6	17.4	47.4	24.2
May	635.1	0	42.9	20.5	17.7	505.2	12.1	25.3	16.3
June	1,031.9	0	81.7	34.4	33.6	811.2	14.2	47.4	27.0
July	1,335.3	0	77.0	43.1	31.7	1,141.8	12.2	67.7	36.8
August	1,651.6	0	108.4	53.3	44.6	1,411.3	13.2	75.2	45.5
September	786.5	0	41.4	26.2	17.0	631.0	12.1	37.4	21.0
October	943.2	0	90.1	30.4	37.1	781.8	12.2	67.5	25.2
November	626.0	0	38.2	20.9	15.7	442.3	10.1	24.6	14.7
December	849.1	0	32.5	23.2	13.4	702.0	16.0	25.8	22.7

Chart 2: Serpent River WTP Flows 2019



Report Availability

Annual Report

Section 11 of O. Reg. 170/03 defines that this Annual Report must be given, without charge, to every person who requests a copy. Effective steps must also be taken to advise users of water from the system that copies of the report are available, without charge, and of how a copy may be obtained. This Annual Report shall be made available for inspection by the public at the Township Office.

Township of the North Shore
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Algoma Mills, ON
P0R 1A0

Summary Report

This Summary report for the Pronto East Drinking Water System for the period of January 1st to December 31st, 2019 has been prepared in accordance to Schedule 22 of O. Reg. 170/03. In accordance with Schedule 22 of O. Reg. 170/03, this Summary Report has been provided to council of the Township of the North Shore.

Tables, Definition of Terms

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Appendix B: Definition of Terms

Acronym	Definition
AWQI	Adverse water quality incident
DWS	Drinking water system
EC	E. Coli
HAA	Haloacetic acids
HPC	Heterotrophic plate count
MAC	Maximum Acceptable Concentration
m^3	Cubic metres
m^3/d	Cubic metres per day
mg/L	Milligram per litre (part per million)
ML	Megalitre (1000 m^3)
NTU	Nephelometric turbidity unit
ODWS	Ontario Drinking Water Standards
O. Reg. 170/03	Ontario Regulation 170/03
PTTW	Permit to take water
SCADA	Supervisory control and data acquisition
TC	Total coliforms
THM	Trihalomethane
µg/L	Microgram per litre (part per billion)
WD	Water distribution
WT	Water treatment
WTP	Water treatment plant