Vermilion Bay Drinking Water System 2019 Annual Report

INTRODUCTION

The Vermilion Bay Drinking Water System (DWS# 210000997) is obligated to meet the requirements of Ontario's *Safe Drinking Water Act* and the regulations therein, in addition to requirements associated with system approvals.

This Annual Report has been prepared in accordance with both Schedule 22 and section 11 of Ontario Regulation 170/03. In this manner, the Summary Reports for Municipalities required by Schedule 22 and the Annual Reports required by section 11 have been consolidated into a single document. This Report is intended to brief the Municipal officials and the residents serviced by the Vermilion Bay Drinking Water System (VBDWS) on the system's performance over the past calendar year (January 1, 2019 to December 31, 2019).

A summary of this Drinking Water System (DWS) is produced with the use of technical terms, some of which the reader may not be familiar with. It is recommended that the reader refer to the *Technical Support Document for Ontario Drinking Water Standards, Objectives (ODWS), and Guidelines*. Within this document the reader will find information on provincial water quality standards, objectives and guidelines, rationale for monitoring, and a brief description of water quality parameters. The Ontario Drinking Water Standards (ODWS) document can be found at the following website address:

Ontario Drinking Water Standards Document

Users of this Drinking Water System are also encouraged to contact the Municipality of Machin through the ORO, if you have questions or if you require assistance in interpreting this Annual Report.

Report Availability

In accordance with section 11 of O. Reg. 170/03, this Annual Report must be made available for inspection by any member of the public serviced by the Drinking Water System, without charge, at the Municipal Office. Additionally, the Municipality of Machin is also encouraged to make available this Annual Report on the community's website.

In accordance with Schedule 22 of O. Reg. 170/03, this Annual Report must be distributed to the members of the municipal council. As of January 1, 2013, section 19 (Standard of care, municipal drinking water system) of Ontario's *Safe Drinking Water Act* places certain responsibilities upon those municipal officials who oversee or exercise decision-making authority over a Municipal Water System. Such municipal officials would be exercising diligence by becoming familiar with this Annual Report.

SYSTEM DESCRIPTION

Classified as a large municipal residential system, this drinking water system (DWS) provides a potable water supply to the community of Vermilion Bay. This DWS is composed of the Vermilion Bay Low Lift Pumping Station (VBLLPS), the Vermilion Bay Water Treatment Plant (VBWTP), and the Vermilion Bay distribution system. This DWS is owned and operated by the Corporation of the Municipality of Machin. Potential pathogenic organisms are removed from the source water by coagulation, flocculation, sedimentation, filtration, and primary disinfection processes.

The VBLLPS draws surface water from Eagle Lake, such that two low lift pumps are capable of transferring the raw water from the source to the treatment units located at the VBWTP. Lime solution (pH/alkalinity adjustment) and poly-aluminum chloride (primary coagulant) are injected into the raw water upstream from the treatment units. A cationic polymer (flocculation aid) is then injected during the flocculation stage in order to create a strong and dense floc, which will facilitate settling in the sedimentation stage. In the sedimentation tanks, water flows upward through a maintained floc blanket and tube settlers and enters the perforated clarifier effluent pipe which directs flow to the filters. Any suspended particles that did not settle in the sedimentation tanks will be removed by two dual-media filters (composed of anthracite and silica sand, on a layer of support gravel). Filter effluent is then directed to a non-chlorinated reservoir for subsequent transfer through the GAC (granular activated carbon) filter units. Sodium hypochlorite (disinfectant) is then added to the GAC filter effluent water.

The chlorinated water is held in the treated water storage reservoirs to allow for the necessary time required to achieve primary disinfection. Treated water is then transferred to the distribution system by the use of high lift pumps located at the VBWTP. Secondary disinfection requirements in the distribution system are achieved by the maintenance of a residual as free chlorine.

SYSTEM EXPENSES

System Expenses

It is within the scope of this Report to describe any major expenses incurred during the reporting period to install, repair or replace required equipment. Such major expenses for the Vermilion Bay DWS include:

Date	Description	Approximate Cost	Status*
April 24, 2019	Programmable Logic Controller (PLC) failed on Napier Reid panel (SELOG)	4580.00	A
June 24, 2019	Tablet for SCADA with EWON Programming (SELOG)	1575.00	A
August 19, 2019	Pump Packing and supplies (Wolseley)	949.95	A
October 11, 2019	Watermain Supplies (EMCO)	2101.60	A
November 11, 2019	Butterfly Valve (EMCO)	1091.50	A

*A = Approved R= Rejected N = Not Yet Determined

WATER QUALITY

The Vermilion Bay Drinking Water System continued to produce water of exceptional quality in 2019. The descriptions below provide brief summaries of the parameters tested in the VBDWS, and the reader is asked to consult **Appendix A** for a comprehensive summary of 2019 water quality.

In-House Analyses

The Vermilion Bay DWS employs an extensive in-house testing program which includes analyses of water quality indicators beyond that required by Ontario's *Safe Drinking Water Act*. Such analyses are conducted on source, treated, and process water, and include testing for turbidity, colour, pH, temperature, alkalinity, aluminum, and residual free chlorine. Approximately 5343 routine independent in-house water quality tests were conducted with respect to this system in 2019.

Microbiological Analyses

In 2019, as required by Schedule 10 of O. Reg. 170/03. These water samples were collected on a weekly basis, and included tests for E. coli, total coliforms, and heterotrophic plate counts. All routine treated samples tested were absent for E. coli and total coliform parameters.

Organic Parameters and Trihalomethanes

Organic parameters are sampled on an annual basis in treated water in accordance with Schedules 13 and 24 of O. Reg. 170/03. These parameters include various acids, pesticides, herbicides, PCBs, volatile organics, and other organic chemicals. With respect to the Vermilion Bay DWS, sampling for organic parameters was conducted on March 11, 2019. The results of all organic parameter testing were below the lower detectable limits.

Trihalomethanes (THMs) are sampled on a quarterly basis from one of the farthest points in the Vermilion Bay distribution system, in accordance with Schedule 13 of O. Reg. 170/03. Compliance with the provincial standard for Trihalomethanes concentrations is determined by calculating a running annual average (with a Maximum Acceptable Concentration of 0.100 mg/L or 100 ug/L). In 2019, the running annual average was 34.4 ug/L

Halo acetic acids (HAA's) are sampled on a quarterly basis from one of the nearest points in the Vermilion Bay distribution system, in accordance with Schedule 13 of O. Reg. 170/03. Compliance with the provincial standard for Halo acetic acid concentrations is determined by calculating a running annual average (with a Maximum Acceptable Concentration of 0.080 mg/L or 80 ug/L). In 2019, the running annual average was 34.3 ug/L

Microbiological analyses are conducted on source, treated, and distribution system water. A total of 220 routine water samples were collected for bacteriological analysis by an accredited laboratory

WATER QUALITY (CONTINUED)

Inorganic Parameters and Nitrate/Nitrite

Inorganic parameters are sampled on an annual basis in treated water in accordance with Schedules 13 and 23 of O. Reg. 170/03. Inorganic sampling includes various parameters such as Antimony, Arsenic, Cadmium, Mercury, and Uranium. With respect to the Vermilion Bay DWS, required annual sampling for inorganic parameters was conducted on March 11, 2019.

Treated water is also tested for nitrate and nitrite concentrations on a quarterly basis in accordance with Schedule 13 of O. Reg. 170/03. There was no exceedance for any inorganic parameter in 2019.

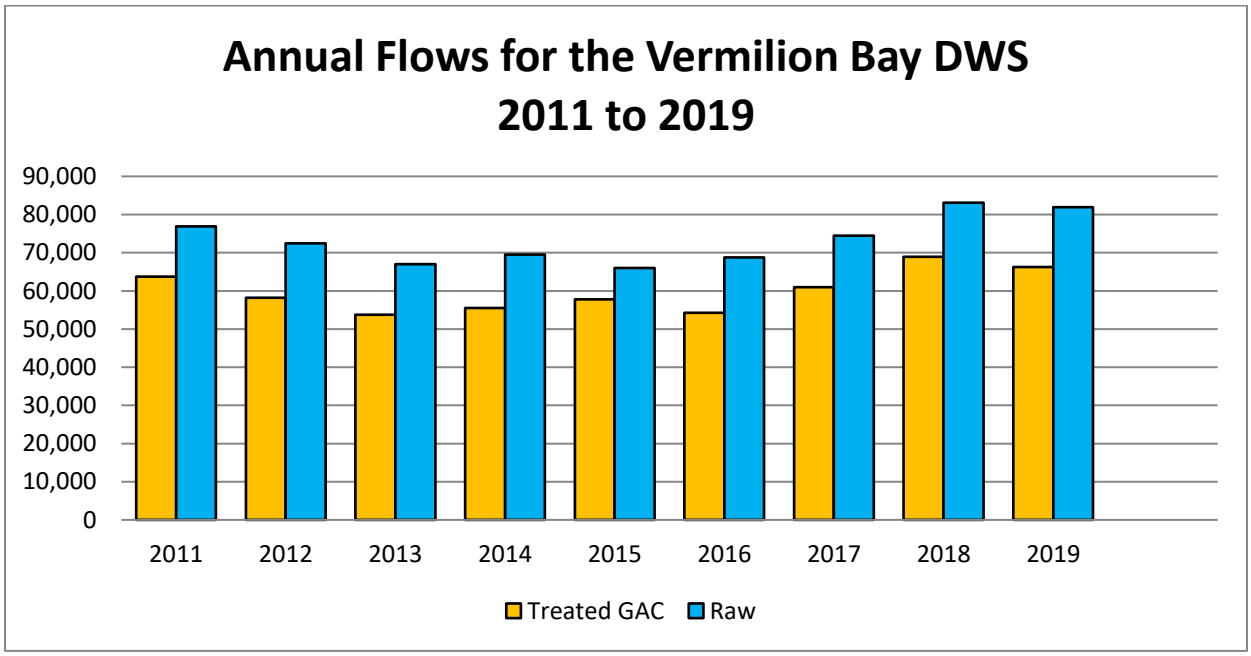
Community Lead Sampling

In 2019 in accordance with Schedule 15.1 of O. Reg. 170/03, based on results of the community lead sampling program, the MOECC instructed the Vermilion Bay DWS that we are not required to take lead samples for this year. We were only required to measure Ph and alkalinity in the distribution system from two Hydrants at the ends of the distribution system.

FLOWS

2019 Flows

Throughout the reporting period, the Vermilion Bay DWS supplied 70981 m^3 of treated water to consumers. On an average day in 2019, 194 m^3 of treated water was supplied to the community. This average daily flow rate in 2019 represented 14.3 % of the rated capacity of the Vermilion Bay WTP (1,360 m^3/day). The maximum daily flow rate in 2019 was 457 m^3/day, which represented 33.6 % of the rated capacity of the Vermilion Bay WTP. The maximum day flow was due to high usage on an extreme heat day in June 2019. The reader is asked to consult **Appendix B** for a complete summary of 2019 flow data.



There was a slight decrease in the amount of treated water supplied to its consumers in 2019 to the previous calendar year. In 2018, 68894 m^3 of treated water was supplied to users of the Vermilion Bay DWS, compared to 66234 m^3 in 2019. This represents a 3.9 % decrease in the amount of treated water supplied to the community. The reader is asked to consult **Appendix B** for a summary of historical flow data.

Note: The recirculation of treated water via pressure relief valves located downstream of the treated water (distribution) flowmeter had previously resulted in inaccurate estimates with respect to the amount of water being supplied to the community. For this reason, the values for total treated water flow and average treated water daily flow were derived from actual transfer flows through the GAC filter units. In this way, such flows were not derived from data collected from the treated water (distribution) flowmeter.

CHEMICALS

Chemical Consumptions

Usage of lime is associated with our corrosion control measures intended to reduce lead concentrations in premise plumbing. These measures have proven effective in controlling lead release.

The table below summarizes all the water treatment chemicals used during the reporting period and the previous 9 years with their consumption data. All chemicals used in the treatment process are NSF 60 certified for use in potable water, as required by system approvals.

Chemical Consumptions & Average Dosages

Year	Lime		Poly aluminum chloride		Polymer		Sodium hypochlorite	
	Quantity Used (kg)	Average Dosage (mg/L)	Quantity Used (L)	Average Dosage (mg/L)	Quantity Used (kg)	Average Dosage (mg/L)	Quantity Used (L)	Average Dosage[1] (mg/L)
2010	287	3.5	4394	21.7	13.4	0.16	2262	3.86
2011	462	6.0	4306	22.5	7.6	0.10	2256	4.25
2012	417	5.8	3418	18.9	7.0	0.10	2469	5.09
2013	464	6.9	3375	20.2	4.4	0.07	2548	7.75
2014	435	6.3	3948	22.6	5.0	0.07	2633	5.67
2015	276	4.2	3843	23.1	4.6	0.07	2309	5.17
2016	331	4.8	3924	22.8	4.7	0.07	2350	5.17
2017	444	6.0	4242	22.7	5.0	0.07	2812	5.46
2018	330	5.5	4966	23.5	6.0	0.07	3144	5.48
2019	340	4.2	5514	26.8	6.3	0.08	3011	5.46

1. GAC transfer volumes (as opposed to raw water volumes) are used in the average dosage calculations for sodium hypochlorite. Using such volumes provides a better indication of applied dosages. Discrepancies in the reported dosages between this and previous Annual Reports can be attributed to using raw water volumes in such calculations.

COMPLIANCE

Ensuring Compliance

The Municipality of Machin operates the Vermilion Bay Drinking Water System, and must comply with legislative and regulatory requirements in addition to the terms and conditions of a number of site-specific system License and approvals. Staffing is maintained at levels to ensure that adequate numbers of trained and licensed personnel are available for proper operations, during emergency or upset conditions, for vacation/sick relief, or to deal with equipment breakdown. Emergency response procedures and operations manuals are established and located in the appropriate facilities, and are available to all staff members. Operations manuals include information necessary for the day-to-day operation and maintenance of the treatment and distribution systems, as well as information that may be required to be accessed quickly for various purposes. Emergency response procedures include information that may be required for proper operation of the system during emergency or upset conditions, and contains items such as emergency plans and contact lists.

The operational strategy of the Municipality of Machin includes ensuring that permits and approvals are in place, ensuring efficient maintenance and operations, and ensuring that the quality of water supplied to its customers meets or exceeds the minimum requirements as set out in the *Safe Drinking Water Act*. It is also our responsibility to ensure that permissible flow rates are not exceeded. Flow measuring devices for measuring the amount of water taken and the amount of water supplied are calibrated annually. Accuracy in these measurements ensures that treatment chemicals are precisely applied and that flows do not exceed the capacity at which the system is designed to be effective. These flows are recorded to provide current and historical information for decision making purposes, in addition to being used by the Ministry of the Environment and Climate Change to review treatment operations.

Water quality analyzers are in place to continuously monitor water quality after critical treatment processes. Each filter is equipped with a filter effluent turbidity analyzer which monitors the number of suspended particles in the water leaving the filter. A chlorine residual analyzer continuously monitors the free chlorine residual at a point where primary disinfection is complete. Each piece of equipment is equipped with an alarm indicating adverse water quality, and is maintained in accordance with manufacturer's recommendations. Additionally, a water sampling program is conducted to exceed the minimum requirements of O. Reg. 170/03 under the *Safe Drinking Water Act*. Raw water sampling is conducted to give operational staff the information required to effectively operate the treatment process, and samples are collected throughout the process to determine the effectiveness of treatment at each stage. Treated and distribution system sampling provide information regarding the quality of water delivered to consumers. All of these samples are analyzed by licensed staff or by an accredited laboratory.

Compliance with System Approvals

The Municipal Drinking Water Licence for the Vermilion Bay DWS requires that effluent discharged into the natural environment has an annual average total suspended solids concentration below 15 mg/L. This effluent is returned to Eagle Lake, and originates from the water consumed for plant process purposes (such as filter backwashing, clarifier "desludging", and filter rinsing-to-waste). In 2019, the annual average concentration for decant effluent total suspended solids was 10.08 mg/L. The annual average concentration calculation assumes that sample results found to be below the lower detectable limit are equivalent to that lower detectable limit of 2 mg/l.

COMPLIANCE (CONTINUED)

Incidents of Non-Compliance

There was one incident of non-compliance in 2019. On January 23, 2019, The Vermilion Bay Water Treatment Plant experienced a power bump which caused the plant to switch over to generator power, however the generator did not engage. Operator on duty, Dennis LeBlanc was not on site at this time. An alarm was sent out and the operator was able to return the plant back to utility power. Unfortunately, the pressure in the distribution system fell below 140 kpa. Since regulation requires that pressure must be maintained above 140 kpa at all times, a boil water advisory was imposed by the NWHU. Two sets of bacteria samples were sent to an accredited laboratory which came back negative. The boil water advisory was lifted on January 28, 2019.

APPENDIX A: WATER QUALITY 2019

Parameter (Sample Type)	Units	Number of Samples	Minimum	Maximum
E. Coli (Raw)	MPN/100mL	52	0	5
E. Coli (Treated)	p/a/100mL	52	absent	Absent
E. Coli (Distribution)	p/a/100mL	104	absent	Absent
Total Coliforms (Raw)	MPN/100mL	52	0	<2420
Total Coliforms (Treated)	p/a/100mL	52	absent	Absent
Total Coliforms (Distribution)	p/a/100mL	104	absent	Absent
HPC (Treated)	CFU/mL	52	0	3
HPC (Distribution)	CFU/mL	104	0	1
Parameter	Units	Number of Samples	Minimum[1]	Maximum[1]
Turbidity (Filter #1/#2)	NTU	Continuous	0.050/0.051	0.103/0.119
Turbidity (Treated)	NTU	Continuous	0.078	0.222
Residual Free Chlorine	mg/L	Continuous	1.15	1.55
pH (Treated)	pH units	274	6.3	7.0
Total Alkalinity (Treated)	mg/L $CaCO_3$	274	11.7	16.2
Residual Aluminum (Treated)	mg/L	274	0.014	0.023

Inorganic Parameters 2019

Parameter (Treated Water)	Units	Result	ODWQS	Compliant ODWQS	Sample Date (2017)	Nitrate Result (mg/L)	Nitrite Result (mg/L)	Compliant ODWQS
Antimony	ug/L	<0.60	6	✓	March 11	0.020	<0.010	✓
Arsenic	ug/L	< 1.0	10	✓	May 21	0.024	<0.010	✓
Barium	ug/L	<10	1000	✓	August 26	0.021	<0.010	✓
Boron	ug/L	<50	5000	✓	Nov 18	0.022	. <0.050	✓
Cadmium	ug/L	<0.10	5	✓	ODWQS (mg/L)	10	1	
Chromium	ug/L	<1.0	50	✓				
Fluoride	mg/L	<0.030	1.5	✓				
Mercury	ug/L	<0.10	1	✓				
Selenium	ug/L	<1.0	50	✓				
Sodium	mg/L	6.73[1]	20[2]	✓				
Uranium	ug/L	<2.0	20	✓				

1. Treated water must be tested for sodium concentrations once every 5 years. This most recent result pertains to a sample collected on February 3, 2015.
2. This value for the parameter Sodium is not associated with a Standard as prescribed in O. Reg. 169/03, although an exceedance of this value is associated with reporting requirements and corrective actions.

APPENDIX A: WATER QUALITY (CONTINUED)

Organic Parameters 2019

Parameter (Treated Water)	Result (ug/L)	ODWQS (ug/L)	Compliant ODWQS	Parameter (Treated Water)	Result (ug/L)	ODWQS (ug/L)	Compliant ODWQS
Alachlor	<0.10	5	✓	Diquat	<1.0	70	✓
Atrazine + N-dealkylated metabolites	<0.20	5	✓	Diuron	<1.0	150	✓
Azinphos-methyl	<0.10	20	✓	Glyphosate	<5.0	280	✓
Benzene	<0.50	1	✓	2 methyl-4-chlorophenoxy acid (MCPA)	<0.20	100	✓
Benzo(a)pyrene	<0.010	0.01	✓	Malathion	<0.10	190	✓
Bromoxynil	<0.20	5	✓	Metolachlor	<0.10	50	✓
Carbaryl	<0.20	90	✓	Metribuzin	<0.10	80	✓
Carbofuran	<0.20	90	✓	Monochlorobenzene	<0.50	80	✓
Carbon Tetrachloride	<0.20	2	✓	Paraquat	<1.0	10	✓
Chlorpyrifos	<0.10	90	✓	Pentachlorophenol	<0.50	60	✓
Diazinon	<0.10	20	✓	Phorate	<0.10	2	✓
Dicamba	<0.20	120	✓	Picloram	<0.20	190	✓
1,2-Dichlorobenzene	<0.50	200	✓	Polychlorinated Biphenyls (PCBs)	<0.035	3	✓
1,4-Dichlorobenzene	<0.50	5	✓	Prometryne	<0.10	1	✓
1,2-Dichloroethane	<0.50	5	✓	Simazine	<0.10	10	✓
1,1-Dichloroethylene	<0.50	14	✓	Terbufos	<0.20	1	✓
Dichloromethane	<5.00	50	✓	Tetrachloroethylene	<0.50	10	✓
2,4 -Dichlorophenol	<0.30	900	✓	2,3,4,6-Tetrachlorophenol	<0.50	100	✓
2,4-Dichloropheny acetic acid	93.0	50-130	✓	Triallate	<0.10	230	✓
Diclofop-methyl	<0.20	9	✓	Trichloroethylene	<0.50	5	✓
Dimethoate	<0.10	20	✓	2,4,6-Trichlorophenol	<0.50	5	✓
				Trifluralin	<0.10	45	✓
				Vinyl Chloride	<0.20	1	✓

Trihalomethanes and Haloacetic Acids 2019

Sample Date (2019)	Total THMs Result (ug/L)	2018 Annual Average (ug/L)	2017 Annual Average (ug/L)	2016 Annual Average (ug/L)	2015 Annual Average (ug/L)	2014 Annual Average (ug/L)	ODWQS[1] (ug/L)	Compliant ODWQS
March 11	25.6	21.3	46.8	51.8	54.0	72.1	100	✓
May 21	26.6							
Aug 26	54.1							
Nov 18	31.4							
Average	34.4							

Sample Date (2019)	Total HAAs Result (ug/L)	2018 Annual Average (ug/L)	2017 Annual Average (ug/L)	2016 Annual Average (ug/L)	2015 Annual Average (ug/L)	2014 Annual Average (ug/L)	ODWQS[1] (ug/L)	Compliant ODWQS
March 11	25.5	25.0	47.3	N/A	N/A	N/A	100	✓
May 21	26.6							
Aug 26	47.3							
Nov 18	33.4							
Average	33.2							

1. ODWQS = Ontario Drinking Water Quality Standard; a value above this threshold is considered to be an exceedance.

APPENDIX B: FLOW STATISTICS

2019 Flow Statistics (values expressed as m^3)

Month	Total Raw Water Flow	Total GAC Treated Water Flow[1]	Average Treated Water Daily Flow[1]	Maximum Treated Water Daily Flow[2]	Plant Efficiency %	% Capacity Performance (Average Flows)	% Capacity Performance (Maximum Flows)
Jan.	6307	5182	167	248	82.2%	13.2%	18.2%
Feb.	5887	4754	170	213	80.8%	13.7%	15.7%
March	6626	5376	173	225	81.1%	13.8%	16.5%
April	5845	4728	158	220	80.9%	12.9%	16.2%
May	6745	5418	218	257	80.3%	13.9%	18.9%
June	9188	7754	258	457	84.4%	19.3%	33.6%
July	8720	7162	231	355	82.1%	18.3%	26.1%
Aug.	7718	6352	205	316	82.3%	15.5%	23.2%
Sept.	5977	4940	165	230	82.7%	12.7%	16.9%
Oct.	5716	4371	159	209	76.5%	11.7%	15.4%
Nov.	6493	5048	168	228	77.7%	13.5%	16.8%
Dec.	6704	5149	166	217	76.8%	13.1%	16.0%
Total	81926	66234					
Avg.	6827	5520	187	265	80.7%	14.3%	19.5%

1. The recirculation of treated water via pressure relief valves located downstream of the treated water (distribution) flowmeter had previously resulted in inaccurate estimates with respect to the amount of water being supplied to the community. For this reason, the values for total treated water flow and average treated water daily flow were derived from actual transfer flows through the GAC filter units. In this way, such flows were not derived from data collected from the treated water (distribution) flowmeter.
2. Values for maximum daily flows were derived from data collected from the treated water (distribution) flowmeter.

Flow Statistics by Year (values expressed as m^3)

Year	Total Raw Water Flow	Total Treated Water Flow[1]	Plant Efficiency	% Change in Total Raw Flow from Previous Year	% Change in Total Treated Flow from Previous Year
2011	76,863	63,729	82.9%	-5.4%	-9.5%
2012	72,418	58,217	80.4%	-5.8%	-8.6%
2013	67,038	53,790	79.8%	-8.0%	-8.2%
2014	69,506	55,476	79.8%	3.7%	3.1%
2015	66,008	57,817	80.1%	-5.0%	4.0%
2016	68,360	54,250	79.4%	+3.6%	-0.1%
2017	74,446	60,931	83.2%	+8.9%	+12.3%
2018	83,104	68,894	83.3%	+11.6 %	+13.1%
2019	81,926	66,234	80.7%	-1.0%	-1.0%

1. Estimates for total treated water annual flow were derived from actual transfer flows through the GAC filter units. Previous Annual Reports derived such estimates from the treated water (distribution) flowmeter, and as such there is discrepancy with the estimates provided above. The estimates provided in this Report are considered to be more accurate in depicting the actual amount of treated water supplied to the community.

APPENDIX C: ADVERSE WATER QUALITY INCIDENTS

Incidents of Adverse Water Quality

Under O. Reg 170/03, reporting procedures and corrective actions are required for any instance where a sample result shows that a parameter used to measure water quality exceeded a certain standard, or where other observations indicate that the safety of the water cannot be guaranteed. The reader is asked to consult **Appendix C** for a summary of adverse water quality incidents which occurred in 2019.

Summary of 2019 Adverse Water Quality Incidents

Incident Description	AWQI 144614
Explanation	Power bump, Generator did not engage, loss of pressure in the distribution system
Corrective Actions	The Northwestern Health Unit imposed a Boil Water Advisory because the distribution system dropped below 140 kpa. Two sets of bacteria samples were sent to an accredited lab which came back negative. The BWA was lifted on January 28. 2019

Ground Leachate- Eagle River Landfill

At the request of the Ministry of Environment, Conservation and Parks, (MECP) The Annual Report will now include ground leachate for the wells that are located at the Eagle River Landfill. We sample twice a year, spring and fall.

The Eagle River landfill site is located on Highway 594, approximately 4 km south of Hwy 17. The Waste Disposal site is situated on Ontario Ministry of Natural Recourses (MNR) property. Part of ½ of lot 23, Concession 5, Township of Aubrey, District of Kenora. Five shallow groundwater monitoring wells were installed in the vicinity of the waste disposal site to monitor water quality and the landfill leachate quality.

PARAMETER GROUND LEACHATE	WELL #1 SPRING /FALL		WELL #2 SPRING /FALL		WELL #3 **SPRING /FALL**		WELL #4 SPRING /FALL		WELL #5 SPRING /FALL		UNITS OF MEASURE
PHYSICAL TESTS	S	F	S	F	S	F	S	F	S	F	
CONDUCTIVITY (EC)	169	241	713	590	1540	1380	948	1000	957	821	uS/cm
PH	7.67	8.10	7.26	7.87	6.99	7.65	6.42	6.97	7.63	8.06	pH
TOTAL SUSPENDED SOLIDS	237	716	106	258	809	479	129	178	4020	2510	mg/L
TOTAL DISSOLVED SOLIDS	94	162	437	363	979	856	709	724	691	590	mg/L
ANIONS AND NUTRIENTS											
ALKALINITY TOTAL (AS CACO3)	81	124	377	313	677	575	167	234	307	286	mg/L
AMMONIA TOTAL (AS N)	0.56	0.068	0.198	0.042	3.39	4.63	0.23	0.114	0.487	0.027	mg/L
CHLORIDE (CL)	1.18	1.09	3.72	4.16	37.6	35.9	12.0	13.3	33.2	26.0	mg/L
NITRATE (AS N)	0.028	<0.02	<0.02	<0.02	<0.04	0.024	0.031	0.045	<0.020	<0.020	mg/L
SULFATE (SO4)	3.98	2.97	<0.3	.78	163	180	332	327	187	149	mg/L
ORGANIC/INORGANIC CARBON											
DISSOLVED ORGANIC CARBON	1.62	2.12	26.2	18.4	28.1	13.0	11.4	8.78	11.4	11.2	mg/L
DISSOLVED METALS											
BARIUM	.0095	.0150	.0372	.0406	0.133	0.101	0.040	.0478	.0493	.0470	mg/L
BORON	<0.01	<0.01	0.015	0.016	0.986	0.855	0.492	0.496	0.348	0.336	mg/L
CALCIUM	26.8	44.1	111	91.2	174	152	117	132	111	97.6	mg/L
IRON (FE)- DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.019	0.035	<0.01	0.038	<0.010	<0.010	mg/L
SODIUM (NA) - DISSOLVED	2.99	2.97	8.88	7.59	65.0	69.7	27.0	33.4	45.9	33.7	mg/L
MAGNESIUM (MG)-DISSOLVED	4.39	5.03	32.2	27.3	70.9	59.5	50.8	47.0	40.2	49.4	mg/L
AGGREGATE ORGANICS											
BIOCHEMICAL OXYGEN DEMAND	<2.0	<2.0	45	30	5.7	4.3	<2.0	<2.0	<2.0	<2.0	mg/L
CHEMICAL OXYGEN DEMAND	<20	45	86	91	134	125	32	57	103	70	mg/L