Verner Drinking Water System

Section 11

2020 Annual Report

Section 11 - ANNUAL REPORT

1.0 Introduction

Drinking-Water System Name:	**VERNER DRINKING WATER SYSTEM**
Drinking-Water System No.:	210000951
Drinking-Water System Owner:	The Corporation of the Municipality of West Nipissing
Drinking-Water System Category:	Large Municipal, Residential System
Period being reported:	January 1, 2020 to December 31, 2020

Does your Drinking Water System serve more than 10,000 people? No

Is your annual report available to the public at no charge on a web site on the Internet? Yes

Location where Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.

Municipality of West Nipissing
Sturgeon Falls Water Treatment Plant
11 Nipissing Street
Sturgeon Falls, Ontario P2B 1J4

Drinking Water Systems that receive drinking water from the Verner Drinking Water System

The Verner Drinking Water System provides all drinking water to the community of Verner.

The Annual Report was not provided to any other Drinking Water System Owners.

The Ontario Clean Water Agency prepared the 2020 Annual/Summary Report for the Verner Drinking Water System and provided a copy to the system owner; the Municipality of West Nipissing. The Verner Drinking Water System is a stand-alone system that does not receive water from or send water to another system.

Notification to system users that the Annual Report is available for viewing is accomplished through:

- A notice is posted on the web at http:www.westnipissingouest.ca/pop/dep-utilities.html, and the annual report is available for viewing, at the above website.
- Discussions during public council meetings.

2.0 Description of the Drinking Water System (DWS No. 210000951)

The Verner Drinking Water System (DWS) is owned by the Corporation of the Municipality of West Nipissing and consists of a Class 3 water treatment subsystem and a Class 1 water distribution subsystem. The Ontario Clean Water Agency is designated as the Overall Responsible Operator (ORO) for the water treatment plant (WTP). The Municipality of West Nipissing provides the ORO for the Verner Water Distribution System.

The Verner DWS has an approved rated capacity of 1054 m^3/day and provided a potable water supply to Verner.

Raw Water Supply

The Verner Municipal Water System is a surface water system that draws water from the Veuve River. The Veuve River is part of the Lake Nipissing watershed. The intake structure is located 12 kilometers (km) upstream of Lake Nipissing and 48 km downstream of the source. The Veuve River, upstream from the intake, has a catchment area of approximately 92,000 hectares (ha). This area is well developed and includes: Highway (Hwy) 17 corridor; Canadian Pacific Railway (CPR) railway tracks; housing and cottage development. The water treatment plant's intake facility consists of an intake structure located 5 meters (m) below the low river level, connected to a raw water wet well by a 42.7 m long, 250 millimeter (mm) ductile iron pipe. The intake structure is approximately 20 m from the riverbank. In accordance with the Permit To Take Water (PTTW), the allowable rate of water taking is 12.25 litres per second (L/s) with a maximum daily volume of 1059 cubic meters per day (m^3/d).

Water Treatment

The Verner WTP was originally commissioned in 1975 and underwent major regulatory upgrades in 2005 which included replacement of all chemical feed system equipment and tanks; replacement of the plant instrumentation and controls; installation of a Ultra-Violet Irradiation (UV) system for primary disinfection; installation of piping and valves to provide treatment-to-waste functionality; new raw water and treated water magnetic flow meters; and the installation of a 125 kilowatt (kW) standby diesel generator. Also, radio telemetry equipment was installed at the elevated storage tank to permit treatment plant-elevated tank communication and control. The Verner WTP is a conventional treatment facility, with a designed capacity of 1059 m^3/d. Conventional treatment is comprised of coagulation, flocculation, sedimentation & dual media rapid sand filtration, primary disinfection & secondary disinfection. Furthermore, disinfection is achieved through the use of UV (primary disinfection) and chlorine gas (secondary disinfection). Chemically assisted filtration is through the use of an "Ecodyne Graver Monoplant" package treatment plant. The Ecodyne Graver Monoplant package treatment plant consists of a mixing zone; flocculation zone; settling compartment and flock barriers; blowdown valve and rapid flow by gravity sand and GAC filters. Chemical treatment includes the addition of polymer, aluminum sulphate (Alum), pre and post soda ash, chlorine gas for disinfection and chlorine dioxide for iron and manganese removal to control taste and odour. An occupancy alarm was installed at the WTP in 2017 and set to dial out after 64 hours. Recently plant is undergoing a polyaluminum chloride (PACl) trial and using PACl as coagulant. Also, potassium permanganate trial is now successful and currently in use full time to rid the system of chlorine dioxide and the various disinfection by products it causes, such as chlorite and chlorate.

Water Storage and Pumping Capabilities

There are four (4) below grade clear wells connected in series having a total area, total capacity and useable capacity of 134 square meters (m^2), 269 cubic meters (m^3) and 234 m^3 respectively. The high lift pumping station has a firm capacity of 1,090 m^3/d with three (3) identical vertical turbine high lift pumps each having a capacity of 545 m^3/d at a total dynamic head (TDH) of 53.3 m.

Waste Management

A backwash handling system includes a 4.56 m by 3.05 m deep waste equalization tank which collects waste sludge, backwash water, all in-plant drainage and sanitary waste; one (1) submersible pump that pumps 272.2 m^3/d at a TDH of 7.0 m discharging to the municipal sanitary sewage system.

Emergency Power

Standby emergency power is supplied at this plant by a 125 kW standby diesel generator with automatic switchover controls installed as part of the 2005 plant upgrades.

Distribution System

The Verner Water Supply System is classified as a Large Municipal Residential Drinking Water System which serves a population of approximately 1100 consumers. The Verner Water Distribution System consists of approximately 8 km of water main. The system includes an offsite water storage facility located on the west side of Dubeau Street (192 m north of the intersection of Dubeau Street and Vercheres Avenue). The facility is a steel and concrete elevated storage tank, having a total storage capacity of 568 m^3 and about 40 m above ground equipped with low level alarm and an overflow. The system has approximately 50 hydrants. The distribution system undergoes routine flushing twice a year, in the spring and in the fall.

3.0 List of Water Treatment Chemicals Used Over the Reporting Period

The following chemicals were used in the treatment process at the Verner Water Treatment Plant.

- Aluminum Sulphate (Alum) - Coagulation/Flocculation
- Polyaluminum Chloride (PACl) – Coagulation/Flocculation
- Chlorine dioxide is produced on site by combining Chlorine solution and Sodium Chlorite – Iron and Manganese Control
- Potassium Permanganate ($KMnO_4$) – Iron and Manganese Control
- Chlorine Gas – Secondary Disinfection
- Magnafloc LT 20 Poly Acrylamide Polymer – Coagulant Aid
- Sodium Carbonate (Soda Ash) –Alkalinity and pH Adjustment
- Sodium Chlorite – Iron and Manganese Control

4.0 Significant Expenses Incurred in the Drinking Water System

OCWA is committed to maintaining the assets of the drinking water system and maintains a program of scheduled inspection and maintenance activities using a computerized Work Management System (WMS). OCWA implemented a new Workplace Management System (Maximo) in 2015 which better maintains and optimizes facility assets. All routine maintenance activities conducted at the water treatment plant were accomplished in 2020.

Significant expenses incurred in the drinking water system include:

- New frames, stands and ABS pipes installed with low lift pumps. All pumps are back in service.
- Programming was completed to lock out low lift pumps on high flows to prevent raw water flow exceedances and to prevent exceedances of flows through UV units.
- Critical spare low lift pump ordered.
- June 9, 2020, potassium permanganate trial started. Potassium permanganate trial proving to be a success. It is so effective that chlorine dioxide could likely be eliminated. This would eliminate chlorate and chlorite formation in the drinking water. It would also do away with the H&S issues surrounding the generation of chlorine dioxide onsite with old equipment.
- Point of entry (POE) turbidity analyzer issues. Replacement ordered.
- Programmable logic controller (PLC) and dialer uninterruptible power supply (UPS) failed and was replaced.
- Intake dive inspection completed.
- Preparations under way to switch coagulant from alum to PACl.
- PACl trial started on October 10, 2020.
- Failed POE turbidity analyzer replaced with new turbidity analyzer.

5.0 Drinking Water System Highlights

- The first Ministry of the Environment, Conservation and Parks (MECP) inspection took place on January 21, 2020. The inspection included a physical assessment of the Verner water treatment plant and a document review. The system received a risk rating of 7.10%, with a final inspection rating of 92.90%. There were four non-compliance issues identified during the inspection. See info on page 13. The second MECP inspection took place on November 18, 2020. The system received a risk rating of 0.0% with a final inspection rating of 100%. There were zero non-compliance issues and one best management practice identified.

- SAI Global conducted an off-site external 12 Month Surveillance audit of the Verner Drinking Water Systems' Quality and Environmental Management System (QEMS). The system and processes associated with the QEMS were evaluated on February 18, 2020 to ensure implementation of the Operational Plan and procedures and conformance to the Drinking Water Quality Management Standard version 2.0. There were no findings. Re-accreditation was achieved on December 18, 2018.

- Schedule C Amendment approved to allow for Potassium Permanganate trail. Six month trial began June 9, 2020 to help solve the ongoing chlorite issue. Trial was so successful that the chlorine dioxide system is no longer in use. Director's Notification submitted December 9, 2020.

- Polyaluminum chloride trial started October 10, 2020 to help improve plant performance.

6.0 Details on Notices of Adverse Test Results and Other Problems Reported to & Submitted to the Spills Action Center

Based on information kept on record by OCWA, zero (0) adverse water quality incidents (AWQI) was reported to the Ministry of the Environment's Spills Action Centre (MOE SAC) in 2020.

7.0 Microbiological Testing Performed During the Reporting Period

Summary of Microbiological Data

Sample Type	No. of Samples	Range of *E. coli* Results *(min to max)*	Range of Total Coliform Results *(min to max)*	# of HPC Samples	Range of HPC Results *(min to max)*
Raw (River)	53	0 to 1200	0 to 28000	0	N/A
Treated	53	0 to 0	0 to 0	53	0 to 12
Distribution	156	0 to 0	0 to 0	52	0 to 3

Maximum Allowable Concentration (MAC) for *E. coli* = 0 Counts/100 mL
MAC for Total Coliforms = 0 Counts/100 mL
"<" denotes less than the laboratory's method detection limit.
NDOGT = No Data, Overgrown with Target
NDOGHPC = No Data, Overgrown with HPC

Notes: One microbiological sample is collected and tested each week from the raw and treated water supply. A total of three microbiological samples are collected and tested each week from the Verner distribution system.

Refer to *Appendix A* for a monthly summary of microbiological test results.

8.0 Operational Testing Performed During the Reporting Period

Continuous Monitoring in the Treatment Process

Parameter	No. of Samples	Range of Results *(min to max)*	Unit of Measure
Filter #1 and #2 Combined Turbidity	8760	0.0 to 1.0	NTU
Free Chlorine	8760	0.54 to 5.00	mg/L

Notes: For continuous monitoring 8760 is used as the number of samples.

Effective backwash procedures, including filter to waste are in place to ensure that the effluent turbidity requirements are met all times. The plant is configured to shut down and creates a callout whenever turbidity reaches 1.0 NTU for 0 seconds. At 0.35 NTU after 800 seconds automatic backwashes are triggered.

Summary of Chlorine Residual Data in the Distribution System

Parameter	No. of Samples	Range of Results *(min to max)*	Unit of Measure	Standard
Free Chlorine	367	0.37 to 1.99	mg/L	0.05

Note: A total of seven operational checks for chlorine residual in the distribution system are collected each week. Four (4) samples are tested one day and three (3) on a second day. The sample sets are collected at least 48-hours apart and samples collected on the same day are from different locations.

Refer to *Appendix B* for a monthly summary of the above operational data.

Summary of Nitrate & Nitrite Data *(sampled at the water treatment plant)*

Date of Sample	Nitrate Result Value	Nitrite Result Value	Unit of Measure	Exceedance
January 15	0.129	< 0.003	mg/L	No
April 15	0.073	< 0.003	mg/L	No
July 15	<0.006	< 0.003	mg/L	No
October 15	0.064	< 0.003	mg/L	No

Maximum Allowable Concentration (MAC) for Nitrate = 10 mg/L
MAC for Nitrite = 1 mg/L

Summary of Chlorate and Chlorite Data *(sampled at the water treatment plant)*

Date of Sample	Chlorite Result Value	Chlorate Result Value	Unit of Measure	Exceedance
January 15	0.36	0.13	mg/L	No
April 15	0.27	0.18		
July 15	<0.01	<0.01		
October 15	<0.01	<0.01		

Maximum Allowable Concentration (MAC) for Chlorate = 1 mg/L
MAC for Chlorite = 1 mg/L

Summary of Total Trihalomethane Data *(sampled in the distribution system)*

Date of Sample	Result Value	Unit of Measure	Running Average	Exceedance
January 15	46.0	ug/L	70.0	No
April 15	45.0			
July 15	93.0			
October 15	96.0			

Maximum Allowable Concentration (MAC) for Total Trihalomethanes (THMs) = 100 ug/L (Four Quarter Running Average)

Summary of Total Haloacetic Acids Data *(sampled in the distribution system)*

Date of Sample	Result Value	Unit of Measure	Running Average	Exceedance
January 15	53.5	ug/L	79.875	No
April 15	50.5			
July 15	117.0			
October 15	98.5			

Maximum Allowable Concentration (MAC) for Total Haloacetic Acids (HAAs) = 80 ug/L (Four Quarter Running Average)

Summary of Most Recent Lead Data

(Applicable to the following drinking water systems; large municipal residential systems, small, municipal residential systems, and non-municipal year-round residential systems)

The Verner Drinking Water System was eligible to follow the "Exemption from Plumbing Sampling" as described in section 15.1-5(9) and 15.1-5(10) of Schedule 15.1 of Ontario Regulation 170/03. The exemption applies to a drinking water system if, in two consecutive periods at reduced sampling, not more than 10% of all samples from plumbing exceed the maximum allowable concentration (MAC) of 10 ug/L for lead. As such, the system was required to test for total alkalinity, lead and pH in two distribution sample collected during the periods of December 15 to April 15 (winter period) and June 15 to October 15 (summer period). This testing is required in every 12-month period with lead testing in every third 12-month period.
Two rounds of alkalinity and pH testing were carried out on February 12th and two rounds of lead, alkalinity and pH testing were carried out on September 14th of 2020. Results are summarized in the table below.

Summary of Lead, pH & Alkalinity Data

Date of Sample	No. of Samples	Sample Location/ID	Field pH	**Lead** (mg/L)	**Alkalinity** (mg/L)
Feb. 12	1	B/O Telesphore	7.09	N/A	56.0
Feb. 12	1	B/O Hwy 64	7.05	N/A	59.1
Sept. 14	1	B/O Telesphore	6.85	<0.001	23.5
Sept. 14	1	B/O Hwy 64	6.82	<0.001	24.7

Most Recent Schedule 23 Inorganic Data Tested at the Water Treatment Plant

Parameter	Result Value	Unit of Measure	Standard	Exceedance
Antimony	<MDL 0.09	ug/L	6	No
Arsenic	0.3	ug/L	10	No
Barium	13.1	ug/L	1000	No
Boron	9.0	ug/L	5000	No
Cadmium	0.017	ug/L	5	No
Chromium	0.25	ug/L	50	No
Mercury	<MDL 0.01	ug/L	1	No
Selenium	0.06	ug/L	50	No
Uranium	0.003	ug/L	20	No

Note: Sample required every 12 months (sample date = *January 15, 2020)*

Most Recent Schedule 24 Organic Data Tested at Water Treatment Plant

TREATED WATER	Sample Date (yyyy/mm/dd)	Sample Result	MAC	Number of Exceedances	
				MAC	1/2 MAC
Alachlor (ug/L) - TW	2020/01/15	<MDL 0.02	5.0	No	No
Atrazine + N-dealkylated metabolites (ug/L) - T	2020/01/15	<MDL 0.01	5.0	No	No
Azinphos-methyl (ug/L) - TW	2020/01/15	<MDL 0.05	20.0	No	No
Benzene (ug/L) - TW	2020/01/15	<MDL 0.32	1.0	No	No
Benzo(a)pyrene (ug/L) - TW	2020/01/15	<MDL 0.004	0.01	No	No
Bromoxynil (ug/L) - TW	2020/01/15	<MDL 0.33	5.0	No	No
Carbaryl (ug/L) - TW	2020/01/15	<MDL 0.05	90.0	No	No
Carbofuran (ug/L) - TW	2020/01/15	<MDL 0.01	90.0	No	No
Carbon Tetrachloride (ug/L) - TW	2020/01/15	<MDL 0.17	2.0	No	No
Chlorpyrifos (ug/L) - TW	2020/01/15	<MDL 0.02	90.0	No	No
Diazinon (ug/L) - TW	2020/01/15	<MDL 0.02	20.0	No	No
Dicamba (ug/L) - TW	2020/01/15	<MDL 0.2	120.0	No	No
1,2-Dichlorobenzene (ug/L) - TW	2020/01/15	<MDL 0.41	200.0	No	No
1,4-Dichlorobenzene (ug/L) - TW	2020/01/15	<MDL 0.36	5.0	No	No
1,2-Dichloroethane (ug/L) - TW	2020/01/15	<MDL 0.35	5.0	No	No
1,1-Dichloroethylene (ug/L) - TW	2020/01/15	<MDL 0.33	14.0	No	No
Dichloromethane (Methylene Chloride) (ug/L) -	2020/01/15	<MDL 0.35	50.0	No	No
2,4-Dichlorophenol (ug/L) - TW	2020/01/15	<MDL 0.15	900.0	No	No
2,4-Dichlorophenoxy acetic acid (2,4-D) (ug/L) -	2020/01/15	<MDL 0.19	100.0	No	No
Diclofop-methyl (ug/L) - TW	2020/01/15	<MDL 0.4	9.0	No	No
Dimethoate (ug/L) - TW	2020/01/15	<MDL 0.06	20.0	No	No
Diquat (ug/L) - TW	2020/01/15	<MDL 1.0	70.0	No	No
Diuron (ug/L) - TW	2020/01/15	<MDL 0.03	150.0	No	No
Glyphosate (ug/L) - TW	2020/01/15	<MDL 1.0	280.0	No	No
Malathion (ug/L) - TW	2020/01/15	<MDL 0.02	190.0	No	No
Metolachlor (ug/L) - TW	2020/01/15	<MDL 0.01	50.0	No	No
Metribuzin (ug/L) - TW	2020/01/15	<MDL 0.02	80.0	No	No
Monochlorobenzene (Chlorobenzene) (ug/L) - T	2020/01/15	<MDL 0.3	80.0	No	No
Paraquat (ug/L) - TW	2020/01/15	<MDL 1.0	10.0	No	No
PCB (ug/L) - TW	2020/01/15	<MDL 0.04	3.0	No	No
Pentachlorophenol (ug/L) - TW	2020/01/15	<MDL 0.15	60.0	No	No
Phorate (ug/L) - TW	2020/01/15	<MDL 0.01	2.0	No	No
Picloram (ug/L) - TW	2020/01/15	<MDL 1.0	190.0	No	No
Prometryne (ug/L) - TW	2020/01/15	<MDL 0.03	1.0	No	No
Simazine (ug/L) - TW	2020/01/15	<MDL 0.01	10.0	No	No
Terbufos (ug/L) - TW	2020/01/15	<MDL 0.01	1.0	No	No
Tetrachloroethylene (ug/L) - TW	2020/01/15	<MDL 0.35	10.0	No	No
2,3,4,6-Tetrachlorophenol (ug/L) - TW	2020/01/15	<MDL 0.2	100.0	No	No
Triallate (ug/L) - TW	2020/01/15	<MDL 0.01	230.0	No	No
Trichloroethylene (ug/L) - TW	2020/01/15	<MDL 0.44	5.0	No	No
2,4,6-Trichlorophenol (ug/L) - TW	2020/01/15	<MDL 0.25	5.0	No	No
2-methyl-4-chlorophenoxyacetic acid (MCPA) (	2020/01/15	<MDL 0.12	100.0	No	No
Trifluralin (ug/L) - TW	2020/01/15	<MDL 0.02	45.0	No	No
Vinyl Chloride (ug/L) - TW	2020/01/15	<MDL 0.17	1.0	No	No

Note: Sample required every 12 months (sample date = *January 15, 2020)*

Inorganic or Organic Test Results that Exceeded Half the Standard Prescribed in Schedule 2 of the Ontario Drinking Water Quality Standards.

No inorganic or organic parameter(s) listed in Schedule 23 and 24 of Ontario Regulation 170/03 exceeded half the standard found in Schedule 2 of the Ontario Drinking Water Standard (O. Reg. 169/03) during the reporting period.

Most Recent Sodium Data Sampled at the Water Treatment Plant

Date of Sample	No. of Samples	Result Value	Unit of Measure	Standard	Exceedance
February 22, 2016	1	39.8	mg/L	20	Yes
February 29, 2016 (resample)	1	27.3			
January 17, 2019	1	44.2			
January 15, 2020	1	44.0			

Note: Sample required every 60 months. Next sampling scheduled for January 2021. AWQI reported in 2016.

It is required that the local Medical Officer of Health be notified when the concentration exceeds 20 mg/L so that persons on sodium restricted diets can be notified by their physicians. The adverse sodium result was reported to MOE SAC and the North Bay Parry Sound District Health Unit on Feb. 25, 2016 as required under Schedule 16 of O. Reg. 170/03 (AWQI# 128400).

Most Recent Fluoride Data Sampled at the Water Treatment Plant

Date of Sample	No. of Samples	Result Value	Unit of Measure	Standard	Exceedance
January 17, 2019	1	<MDL 0.06	mg/L	1.5	No
January 15, 2020	1	<MDL 0.06			

Note: Sample required every 60 months. Next sampling scheduled for January 2025.

Summary of Additional Testing Performed in Accordance with a Legal Instrument.

1. Schedule C, Section 1.6 of Municipal Drinking Water Licence #202-101 requires the UV disinfection system to maintain a continuous pass-through UV dose of at least 40 millijoules per square centimeter (mJ/cm^2) which is equal to 12.7 watts per square meter (W/m^2) throughout the life span of the UV lamps. Refer to Appendix B.

   A primary disinfection system consisting of two (2) Trojan UV swift SC model B08 low pressure UV irradiation units, each rated at 1,320 m^3/d at 85% Ultra-Violet Light Transmittance (UVT) with design dose of 40 mJ/cm^2 complete with electrically actuated control valves to allow switchover between units, automatic on-line cleaning systems, and treatment-to-waste functionality. The standby reactor will be brought into service in the event that the duty reactor faults or fails to provide the required UV dosage of 40 mJ/square cm. If the duty reactor fails the following would occur:

   - the low lift and high lift pumps would shut off
   - the (failed) duty UV reactor's water inlet valve would close
   - an alarm would be generated and sent through the emergency call-out system to alert operators of the failure of the duty reactor
   - an operator would respond and manually get standby reactor online

   Table 4 of the licence also requires the following parameters related to the UV disinfection system to be continuously monitored and recorded every four (4) hours:

UV Intensity Measured continuously by the UV system. UV intensity is monitored by each individual unit's control module and should the light intensity of the unit fall outside the specified range, the unit will automatically shut down and a standby unit will be activated by the on call operator. Such an event will be recorded by the UV control system.

Flow Rate The maximum flow rate though each of the units is 12.2 to 12.8 L/s (see table 4 in Section 1.6 of Schedule C in the municipal drinking water licence #202-101) which is continuously measured by the raw water flow meter. Each UV unit is equipped with a flow control valve and an electronically activated water shut-off valve which will automatically close in the event of a UV equipment malfunction, loss of power or ceases to provide an appropriate level of disinfection.

UV Transmittance Under Section 7.0 of Schedule B in the Drinking Water Works Permit #202-201, it states that UVT shall be monitored monthly.

Lamp Status Monitored by each unit's control module. Should the lamp status fail, the unit will automatically shut down and a standby unit will be activated by an on call operator. Such an event will be recorded by the UV control system.