

Vars Well System

The following report summarizes the drinking water quality results, adverse water quality notifications, and other operating information related to the **Vars Well System** (waterworks# 210002263) for the period January 1 to December 31, 2022. It was prepared in accordance with Section 11 of O.Reg.170/03 under the Safe Drinking Water Act (SDWA, 2002).

The Annual Report for each municipal water system operated by the City of Ottawa is posted on the web site www.ottawa.ca. Copies of each Annual Report and Summary Report prepared in accordance with Schedule 22 of O.Reg.170/03, are available to the public at 951 Clyde Avenue (telephone 3-1-1), the Britannia Water Purification Plant (2731 Cassels Street), and the Lemieux Island Water Purification Plant (1 Onigam Street).

Description of Drinking Water System

The Vars water supply draws from two wells near the treatment facility. Both wellheads are about 0.5 meter above ground surface and there is minimal potential for contamination from surface water. The source water is high in organic carbon, colour, iron and manganese.

A series of treatment steps successively remove undesirable substances such as iron, manganese, organic carbon, and colour. The treatment process in Vars consists of the following steps:

- greensand filtration
- granular activated carbon filtration
- primary disinfection
- water storage
- high-lift pumping

This treatment process results in water that is clear and safe to drink.

Treated water is then pumped through the distribution network to reach water customers in Vars. All treatment, pumping, and storage systems are controlled by a dedicated computer control system and monitored by certified water treatment operators 24 hours

per day. On-line analyzers are used to measure chlorine residual concentration and turbidity (cloudiness) of the treated water. In addition, a water quality operator visits the well system twice per week to collect water samples and makes adjustments to the treatment process.

The water treatment chemicals used over this reporting period are listed below:

- Sodium hypochlorite (liquid – 6%)
- Potassium permanganate (dry powder)
- Granular Activated Carbon (GAC)

Monetary expenses incurred during this reporting period.

In order to maintain the safe and efficient operation of the waterworks, maintenance and capital projects are undertaken from time to time. All major repairs or upgrade projects that took place during the reporting period are described below.

Vars GAC Contact Tank A & B Side Entry Hatch Modification (\$130,000): To improve the safety of personnel entry into the GAC Tanks, existing hatches are being enlarged along with new GAC media. Tank A was completed in 2020. Tank B will be done in 2023, coincident with scheduled GAC media replacement.

Vars Greensand Filter Media Replacement (\$33,000): Routine replacement of the Greensand filter media in Filter Column 1 was completed in 2022. Greensand filters are used to remove iron and manganese, from the drinking water and the media requires periodic replacement with age.

Vars Well Pump Replacements (\$45,000): As part of necessary lifecycle replacement, submersible well pumps were replaced in both production wells in 2022.

Vars Well Inspections (\$108,000): As part of routine inspection work, well casing inspections and aquifer yield testing, for the two production wells at the Vars facility, were completed in 2022.

Water Quality test results

The Ontario Drinking Water System Regulation O.Reg.170/03 defines water quality sampling and testing requirements in several categories: microbiological, operational,

inorganic, and organic test parameters. The sections below describe the 2022 test results for samples required by O.Reg.170/03. In addition to the required regulatory testing, the City of Ottawa analyzes its drinking water for hundreds of other trace substances and test parameters in order to ensure the safety of the water supply. A complete table of water quality test results is posted on the City website www.ottawa.ca for each water system.

Microbiological

Total Coliform and E.coli bacteria tests are performed on the raw, treated and distributed drinking water. These types of bacteria are considered to be “indicator” organisms since they do not directly cause illness, but their presence indicates the potential for other pathogenic organisms to be present.

“Raw” water refers to untreated water that is drawn into the treatment plant from the two source wells. During 2022, there were no Total Coliform or E.coli bacteria detected in any of raw water samples from Well #1 and Well #2, based on 165 samples taken.

Treated weekly water is tested as it leaves the plant and enters the distribution system. Routine weekly bacteriological samples are also taken within the distribution system (Maklynne) to verify water quality throughout the supply network. During 2022, there were no samples of Vars treated that indicated the presence of Total Coliform bacteria or E.coli bacteria and one (1) sample of distributed water that indicated the presence of total coliform.

The treated and distribution water microbiological results for Total Coliform and E.coli bacteria are summarized in the table below.

Table 1a: Summary of microbiological test results for Vars treated and distributed water during 2022

Parameter	Number of treated water samples taken	Number of treated water samples that exceeded standard	Number of distribution samples taken	Number of distribution samples that exceeded standard
Total coliform bacteria (cfu/100mL)	86	0	144	1
E. coli bacteria (cfu/100mL)	86	0	144	0

cfu=colony forming units

HPC (heterotrophic plate count) bacteria represent a broad spectrum of environmental aerobic bacteria that indicate biological growth. They are not harmful to humans and are therefore not considered to represent adverse drinking water quality. However, they are useful as operational indicators for the presence of biological (ie. biofilm) growth on the inside surface of a pipe or watermain. An operational limit of 500 cfu/mL has been established as a target for drinking water systems in Ontario. During 2022, there were two (2) samples of treated or distributed water samples that were above the HPC operational target of 500 cfu/mL. The treated and distribution water microbiological results for HPC bacteria are summarized in the table below.

Table 1b: Summary of the heterotrophic plate count (HPC) bacteria test results for Vars treated and distribution samples taken during 2022

Parameter	Number of treated water samples taken	Range of treated water test results	Number of distribution samples taken	Range of distribution test results
HPC bacteria (cfu/mL)	85	0 – 3000	141	0 – 20

cfu=colony forming units

Operational: For the Vars Well System, continuous on-line analyzers are used to measure and record important process parameters such as chlorine concentration and turbidity. In addition, a water treatment operator visits the site twice per week to conduct routine operational tests and makes adjustments to the treatment process. During 2022, all operational tests of treated water complied with safe drinking water standards. The results are summarized in the table below.

Table 2: Summary of operational testing performed for Vars treated water during 2022

Parameter	Average range of results	Range of results (min - max)	Number of samples
Turbidity	0.24 NTU	0.09 – 0.72 NTU	102
Total Chlorine	1.25 mg/L	0.42– 1.73 mg/L	88

Inorganics: Inorganic substances include heavy metals and dissolved minerals that may be present in treated drinking water. Inorganic substances are tested monthly including the individual source wells. The table below summarizes the 2022 test results, expressed as annual average concentrations in mg/L. All inorganic test results during 2022 were safely within the Maximum Acceptable Concentration (MAC) as per Ontario Drinking Water Standards. The MAC concentrations for drinking water are listed in the right column for reference.

Table 3: Summary of inorganic test results for Vars treated water during 2022

Parameter	Unit of Measure	Result	Ontario Drinking Water Standard (MAC)
Antimony	mg/L	0	0.006
Arsenic	mg/L	0	0.010
Barium	mg/L	0.35	1
Boron	mg/L	0.08	5.0
Cadmium	mg/L	0	0.005
Chromium	mg/L	0	0.05
Lead	mg/L	0.002	0.01
Mercury	mg/L	0	0.001
Selenium	mg/L	0	0.05

Parameter	Unit of Measure	Result	Ontario Drinking Water Standard (MAC)
Uranium	mg/L	0	0.02
Sodium	mg/L	32.3	20*
Fluoride	mg/L	0.16	1.5
Nitrate	mg/L	0	10
Nitrite	mg/L	0	1

0 denotes that the chemical was not detected.

NOTE*: Sodium health advisory level of 20 mg/L for people on sodium-restricted diets only.

Sodium occurs naturally in groundwater and is present in the Vars treated water at a concentration of 32.3 mg/L, which is slightly above the health advisory level of 20 mg/L for people on sodium-restricted diets. Notification of the sodium level exceedance was made to the MECP and Ottawa Public Health Department on February 9, 2022, for this water system (notification is required every 5 years).

Organics: Trace organic substances include: volatile organic compounds, pesticides, herbicides, industrial solvents, and disinfection by-products. Trace organics are tested annually in the treated water and individual source wells. The table below shows the 2022 test results for treated water. None of the trace organic substances were detected with the exception of Trihalomethanes (THM) and Haloacetic Acids (HAA), which are tested monthly to monitor seasonal trends. THMs and HAAs are organic compounds that form during the treatment process when chlorine reacts with natural organic matter dissolved in the water. All trace organic test results during 2022 were safely within the Maximum

Acceptable Concentration (MAC) as per Ontario Drinking Water Standards. The MAC concentrations for drinking water are listed in the right column for reference.

Table 4: Summary of trace organic test results for Vars treated water during 2022

Parameter	Unit of Measure	Result	Ontario Drinking Water Standard (MAC)
Alachlor	mg/L	0	0.005
Atrazine + N-dealkylated metabolites	mg/L	0	0.005
Azinphos-methyl	mg/L	0	0.02
Benzene	mg/L	0	0.001
Benzo(a)pyrene	mg/L	0	0.00001
Bromoxynil	mg/L	0	0.005
Carbaryl	mg/L	0	0.09
Carbofuran	mg/L	0	0.09
Carbon Tetrachloride	mg/L	0	0.002
Chlorpyrifos	mg/L	0	0.09
Diazinon	mg/L	0	0.02

Parameter	Unit of Measure	Result	Ontario Drinking Water Standard (MAC)
Dicamba	mg/L	0	0.12
1,2-Dichlorobenzene	mg/L	0	0.2
1,4-Dichlorobenzene	mg/L	0	0.005
1,2-Dichloroethane	mg/L	0	0.005
1,1-Dichloroethylene	mg/L	0	0.014
Dichloromethane	mg/L	0	0.05
2,4-Dichlorophenol	mg/L	0	0.9
2,4-Dichlorophenoxy acetic acid (2,4D)	mg/L	0	0.1
Diclofop-methyl	mg/L	0	0.009
Dimethoate	mg/L	0	0.02
Diquat	mg/L	0	0.07
Diuron	mg/L	0	0.15
Glyphosate	mg/L	0	0.28

Parameter	Unit of Measure	Result	Ontario Drinking Water Standard (MAC)
Haloacetic Acids*	mg/L	0.060	0.080
Malathion	mg/L	0	0.19
2-Methyl-4-chlorophenoxyacetic Acid (MCPA)	mg/L	0	0.10
Metolachlor	mg/L	0	0.05
Metribuzin	mg/L	0	0.08
Monochlorobenzene	mg/L	0	0.08
Paraquat	mg/L	0	0.007
Pentachlorophenol	mg/L	0	0.06
Phorate	mg/L	0	0.002
Picloram	mg/L	0	0.19
Polychlorinated Biphenyls (PCB)	mg/L	0	0.003
Prometryne	mg/L	0	0.001

Parameter	Unit of Measure	Result	Ontario Drinking Water Standard (MAC)
Simazine	mg/L	0	0.01
Terbufos	mg/L	0	0.001
Tetrachloroethylene	mg/L	0	0.01
2,3,4,6-Tetrachlorophenol	mg/L	0	0.1
Triallate	mg/L	0	0.23
Trichloroethylene	mg/L	0	0.005
2,4,6-Trichlorophenol	mg/L	0	0.005
Trifluralin	mg/L	0	0.045
Trihalomethanes*	mg/L	0.062	0.1
Vinyl Chloride	mg/L	0	0.001

0 denotes the chemical was below the analytical detection limit.

NOTE*: The reported Trihalomethane (THM) and Haloacetic acid (HAA) results represent the average concentration measured in the distribution system.

Adverse Water Quality Incidents (AWQI) Requiring Notification

The drinking water regulations identify several “Indicators of Adverse Water Quality” for which the waterworks must immediately notify public health officials and the Ministry of the Environment, Conservation and Parks (MECP). These refer to any sampled or treated or distributed drinking water that does not meet a provincial water quality standard or a situation where disinfection of the water may be compromised. For each Adverse Water Quality Incident (AWQI), City of Ottawa staff immediately notify Ottawa Public Health Department and the Ministry of the Environment, Conservation and Parks (MECP) as required by regulations. Corrective actions, re-sampling, and reporting are required in each case.

During 2022, there were two (2) AWQI events for the Vars Well System.

Table 5 Adverse Water Quality incidents for the Vars Well System

Incident Date	Test Parameter and Location	Result	Unit of Measure	Corrective Action	Date of Resolution
9-Feb-22 AWQI# 157805	Sodium >20 mg/L Vars system Treated water	28.8	mg/L	5 year reporting	18-Feb-22
23-Nov-22 AWQI# 160766	Total Coliform bacteria >0 routine distribution sample on Maklynne	Positive	cfu/100 mL	Flush and resample	24-Nov-22

Community Lead Testing Program

The treated water produced by the Vars Well System is lead-free. However, trace amounts of lead can potentially be dissolved in the water as it comes in contact with household plumbing components such as lead solder and brass fittings. The current Ontario standard for lead in drinking water is 10 ppb (parts per billion), expressed as a Maximum Acceptable Concentration (MAC) measured at the customer’s tap. During 2019,



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Health Canada lowered the acceptable concentration to 5 ppb for lead in drinking water, due to increasing concerns for adverse health effects in children. To date, the Ontario standard for lead has not yet been revised to align with the new Health Canada guideline.

In July 2007, a new provincial regulation (amendment to O.Reg.170/03) was initiated in response to concerns about potential lead levels in provincial water supplies. The Community Lead Testing Program requires each water system to test tap water lead levels in representative homes during both winter and summer conditions. Ottawa's test results have consistently passed the Provincial lead testing criteria for drinking water. In order to meet compliance standards, 90% of the tap water samples must have a lead concentration below 10 ppb (parts per billion) following a 30-minute period of stagnation in the plumbing system.

Since the initial rounds of testing indicated the absence of lead in tap water taken from customer homes, the Vars Well System was granted relief from residential lead sampling. However, distribution system samples must be tested every winter and summer for alkalinity and pH, and lead is tested every three years. During 2022, distribution system samples were tested for alkalinity and pH during the winter and summer sampling period.

Summary

The results demonstrate that the quality of drinking water treated and distributed from the Vars Well System remained high during 2022 and met all Ontario Drinking Water Standards.

If you have any questions or concerns regarding the quality of your drinking water, please contact the City of Ottawa at 3-1-1 or email at info-water@ottawa.ca.

For more information on the City of Ottawa drinking water, please visit us at www.ottawa.ca.