Enteric Viruses in Water

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Overview

A virus is a parasitic infectious microbe which can cause disease(s) in humans and animals. Viruses that can multiply in the gastrointestinal tract of humans or animals are known as “enteric viruses.” The most significant characteristic of enteric viruses is the ease by which they can be transferred from person to person. There are more than 200 recognized enteric viruses of which approximately 140 variations are currently known to infect humans.

Health Canada recently completed its review of the health risks associated with these viruses and published Enteric Viruses in Drinking Water. This document indicates viruses are present to some degree in all sources of Canadian drinking water and the human illnesses associated with enteric viruses are diverse. As a result, they have introduced new guidelines which recommend 4-log (which is equivalent to 99.99%) inactivation or removal of these viruses from drinking water.

Document Highlights

- “The absence of indicator bacteria (i.e., E. coli, total coliforms) does not necessarily indicate the absence of enteric viruses.”[1]
- “Enteric viruses have been detected in surface water and groundwater sources.”[2]
- “The main source of human enteric viruses in water is human faecal matter.”[3]
- “Source waters can become contaminated by human faeces through a variety of routes, including effluents from wastewater treatment plants, leaking sanitary sewers, discharges from sewage lagoons, and septic systems.”[2]

Water in Canada

Water supplies in Canada come from both surface and groundwater sources. Water in cities and towns are provided through local utilities, which may rely on both types of sources. In rural areas, supply comes from individual wells, surface water sources (lakes, rivers or dug wells) or small communal systems, where a number of homes, businesses or institutions are connected to a single well.

Broadly, the federal government oversees the provinces and territories through 20 departments[5] who are responsible to govern water quality in each region. This is further broken down by local municipal agencies, such as public utilities commissions and municipal works departments, who retain primary responsibility for the operation of water works and delivery of safe and reliable supplies of drinking water to their residents.

Water in the Country

Evidence to date indicates that fractured bedrock aquifers are more susceptible to viral water contamination. Approximately 70% of Canadian regional aquifers that provide drinking water are fractured bedrock and susceptible to surface water runoff and septic effluent leaching. To this point, studies have reported that 35% to 78% of private wells with septic systems nearby have shown viral detection in water sources.[4] Despite these staggering percentages a virus test is not currently part of a standard Health Unit bacterial water analysis and would therefore go undetected in the average person's sampling procedure. Currently, throughout Canada, removing viruses from water is a private owner's requirement as there is no legislation in any province or territory for privately owned water supplies.

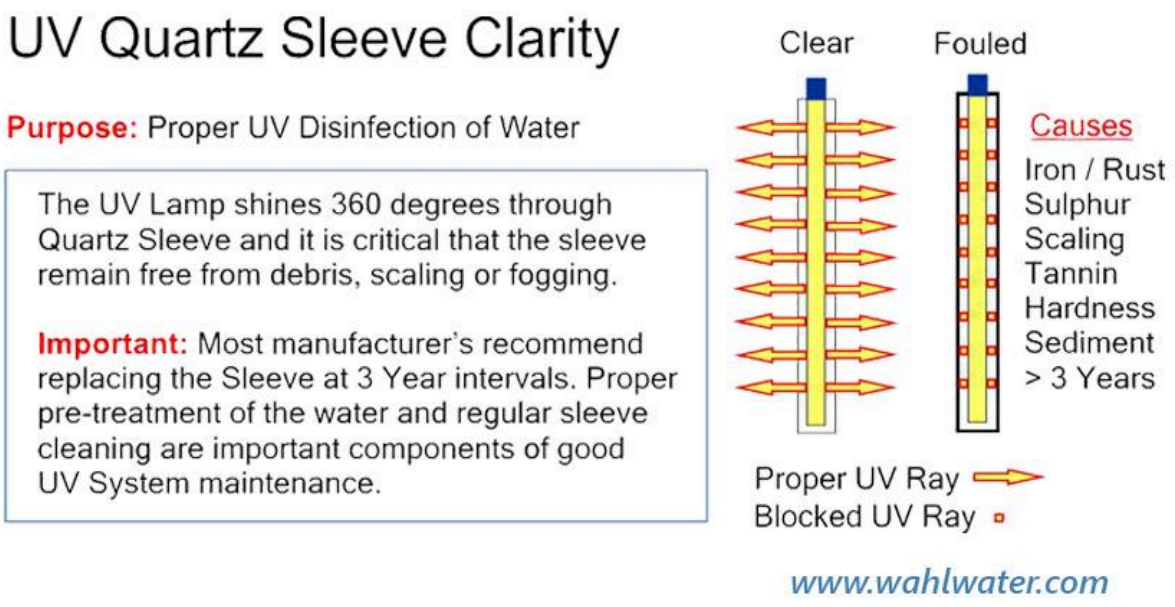
Facts on Viruses in Water

- Rainfall has been associated with increased detection of viruses in surface waters[6]
- Virus survival in groundwater has been estimated to be one to three years[7]
- Human enteric viruses can also survive septic system treatment[8]
- Transport distances of 400 to 1600 m have been reported for different aquifers[9]

Rural Treatment Options

Rural water is capable of being effectively treated to achieve Health Canada's guideline for 4-log (99.99%) removal for both surface and groundwater sources. The most common method is through UV disinfection, achieving a 40 mJ/cm^2 disinfection rate which is now common for most residential and all commercial applications.

This is making the assumption that the UV system has the proper pretreatment that is required based on the water source, as per manufacturer's requirements. This involves correct sizing, sediment filtration and removal of adverse hardness, iron, sulphur and other contaminants, as well as the required water clarity levels. Proper installation, water testing and maintenance are critical to ensure disinfection 365 days a year.



Two Step Approach

- Install a UV System (POE) and a Reverse Osmosis System (POU)
- Two step treatment with additional benefits and contaminate removal
- POE (entry) & POU (consumption) treats both ground & surface water

Commentary

Viruses are just one of many potential contaminants present in water that require treatment. Based on the evidence presented in current studies, it is reasonable to say that the potential for viral contamination is likely throughout all of the country's water sources. Without proper available testing, it is not possible or feasible to identify viruses in water. This leaves proper treatment as the only viable option for rural water supplies. Risk of contamination is amplified when your water source is in close proximity to a septic system or sewage discharge pipe.

There is evidence to support that excessive rainfall events are also contributing to viral contamination of surface and ground water. With our changing seasons, this is becoming an ever increasing risk to water quality across the country.

Treating Your Water

A qualified water treatment professional can assist you in navigating your options, due to the fact that water is complex. Having many potential contaminants, there is no "one size fits all" solution to your water problems. Consider treating your water properly if you have not already and enjoy the benefits of safe water in your home, business or cottage.

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