# ASSESSMENT OF HEALTH RISKS

ASSOCIATED WITH VIRUSES IN GROUNDWATER SUPPLIES

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#### **KEY MESSAGES FOR DECISION MAKERS**

- → Groundwater is typically a safe source of drinking water. However, contaminants can be transported into aquifers.
- → Historical raw water quality data can shed light on the vulnerability of groundwater to surface contamination.
- → The presence of bacterial indicators indicates that contaminated surface water is entering the aquifer, which suggests the potential for further contamination by viruses.
- → Frequent sampling is necessary to detect incoming fecal contamination that would require disinfection to avoid a public health risk.

#### WHO IS THIS INFORMATION RELEVANT FOR?

- → Government agencies responsible for public health
- → Government agencies responsible for drinking water regulations
- → Municipal water managers
- → Drinking water treatment operators

#### WHAT WAS THE RESEARCH FOCUS?

- → To measure the occurrence of viruses in groundwater from selected communities in Canada, and assess the risk to public health.
- → To determine whether current microbial testing is adequate to monitor virus occurrence in groundwater.
- → To investigate the advantage of using other microbial indicators as virus surrogates.

### WHAT WAS THE RESEARCH METHOD?

In collaboration with the Ministries of Environment of Alberta, Ontario and Quebec, 35 municipalities using groundwater as their main drinking water source were selected for testing. Testing sites were located near human sources of pollution and had historic data on their raw water quality. Samples were obtained to establish the level of contamination of the groundwater as well as the efficacy of current testing methods.

## WHAT WERE THE RESEARCH RESULTS?

All sites except one that had a previous history of uncontaminated raw water quality were free of bacterial indicators and viruses during one year of sampling.

Viruses were mostly detected at sites where microbial fecal indicators frequently occurred. The presence of bacterial indicators suggests that contaminated surface water is entering the aquifer, with the potential for viruses to follow. Monitoring the combination of E. coli and total coliforms is a cost-effective method to assess waterborne health risks.

Water degradation can occur and disappear rapidly, particularly after rain events.

#### WHAT ARE THE IMPLICATIONS FOR DECISION MAKERS?

In this study, no bacterial indicators or human enteric viruses were detected in untreated groundwater with excellent historical bacterial quality. This reinforced the value of raw water quality data in assessing groundwater vulnerability to viruses and bacteria.

Water degradation can occur and dissipate rapidly, especially following rain events. Climate changes, including more frequent and higher intensity rainfall events, have the potential to alter groundwater quality. Frequent sampling of E. coli and total coliforms should be conducted to detect degradation of source water quality.

Adequate disinfection by chlorine or ultraviolet light of all groundwater used as drinking water is the safest option to ensure protection from episodic contamination from viruses.

Understanding the need for treatment and disinfection, the potential for rapid change in groundwater quality, and the connection between raw water sampling and vulnerability will better prepare water operators to provide safe drinking water to their communities.



