

# Pathogen Project

## DRINKING WATER PROTECTION

The Minnesota Department of Health (MDH) has completed a research study known as the Pathogen Project, which was initiated by a request from the 2013 Minnesota Legislature and funded by the Clean Water Fund. The focus of the study was to understand the occurrence of pathogens (microbes that can make someone sick) in Minnesota public drinking water wells.

## Goals of the Pathogen Project

Pathogens are acute contaminants that can make a person sick even after a single exposure under the right conditions. MDH's goal is to prevent these conditions from occurring.

In earlier phases of the Pathogen Project, the study determined groundwater sources are more susceptible to pathogen contamination than previously thought. The goal for the last phase of the Pathogen Project was to understand the pathways of pathogen contamination to public wells to better protect the health of Minnesotans.

This phase of the study aimed to understand the types of microbial pathogens found in drinking water and wastewater and their seasonal presence in the water supply wells. MDH conducted microbiological and chemical sampling at four public water systems beginning in October 2020. Sampling and analysis investigated the relationship between aquifer recharge events, such as precipitation and snowmelt, and water quality. MDH will use results of the study to provide guidance to public water systems on protecting wells from contamination.

## Overall conclusions and findings

- The greatest chance of microbial detections and shortest lag times between precipitation events and detection occur in the wet periods of the year, particularly during spring thaw.
- The lowest chance of microbial detections and longest lag times are during and immediately after dry conditions.
- Microbial concentrations are at their highest following the transition from dry to wet conditions.
- Recharge events may occur despite visual indicators of frozen ground like ice on lakes.
- Chemical and isotopic indicators may reflect recharge and help assess risk but are not as sensitive as Quantitative Polymerase Chain Reaction (qPCR) methods for microbes.
- SARS-CoV2 was analyzed throughout the last phase of the study, but the virus was not detected in drinking water or wastewater at any of the four sites studied in this phase.

## Future actions and recommendations

The following are potential actions to maximize protection from pathogens in public wells based the results of the study.

### Water quality monitoring and well vulnerability characterization

- Focus future sampling studies or monitoring during spring thaw period and recharge events when microbiological activity is at its peak.
- Factor in considerations for changing climate conditions such as rainfall intensity and precipitation patterns into future monitoring strategies and vulnerability assessments.
- Monitor for chemical indicators, such as specific conductance and chloride/bromide ratios, when assessing source contributions.
- Take a weight-of-evidence approach instead of relying on a single indicator when assessing the vulnerability of public wells to more accurately assess risk.

### Water system operation and risk management

- Fully consider hydrogeologic conditions when siting new wells and potential contaminant sources such as sewers and septic systems.
- Investigate water storage options to respond to forecasted weather events that promote microbial transport and increase disinfection or other treatments, especially during spring thaw and recharge events.

## Acknowledgments

This study would not have been possible without the support and cooperation of the public water suppliers involved in this phase of the study. Completing this phase of the study involved the collaborative efforts and work of staff in the Department of Natural Resources (DNR), the United States Geological Service (USGS) and Minnesota Department of Health.

Minnesota Department of Health  
[health.legacy@state.mn.us](mailto:health.legacy@state.mn.us)  
[www.health.state.mn.us](http://www.health.state.mn.us)

1/2024

*To obtain this information in a different format, call: 651-201-4700.*