Contribution ID: **515** Type: **Oral Presentation**

Microbial safety of a variable flow-regime of Dutch drinking water production from groundwater wells

Tuesday, 20 May 2025 09:05 (15 minutes)

Groundwater is the most important source of drinking water in many regions of the world. Farm animal manure, and wastewater from leaking sewers and septic tanks may contaminate groundwater. Soil acts as a natural filter (1), and therefore groundwater can be protected from contamination with pathogens by adequate setback distances (protection zones) between contamination sources and the groundwater well system (2).

According to the Dutch drinking water legislation, Dutch drinking water production companies are obligated to conduct a Quantitative Microbial Risk Analysis (QMRA) for drinking water production. The Guideline Analysis Microbiological Safety for Drinking Water provides information on how to conduct a QMRA for drinking water from surface water and groundwater (3). The guideline document is developed in cooperation with the environmental inspectorate and the drinking water companies.

The currently used QMRA model (4) is based on steady-state flow where mechanical filtering of pathogens occurs through a combination of low flow velocities and attaching/detaching probabilities, where in particular virus inactivation is primarily a time-dependent process. Increasing the residence time increases the probability of inactivating the virus, making the virus harmless.

In this talk, we will discuss the consequences of variable flow for the required setback distance. First, there is a dynamic change in balance between shortened travel time and dilution (from a greater volume being pumped). Secondly, a change in flow causes a temporal change in hydrostatic pressure. And finally, the frequency and magnitude of flow variations play a role.

With a higher demand for drinking water, and water scarcity (drought) and water surplus (intense rainfall) due to climate change, we argue that it is vital to include these dynamics into the QMRA calculations for drinking water safety.

Country

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References

1) J.F. Schijven & S.M. Hassanizadeh (2000). Removal of Viruses by Soil Passage: Overview of Modeling, Processes, and Parameters. Critical Reviews in Environmental. Science and Technology 30, 49-127. 2) J.F. Schijven, S.M. Hassanizadeh, A.M. de Roda Husman (2010). Vulnerability of unconfined aquifers to virus contamination. Water Research 44, 1170-1181. 3) Anonymous (2019). (Dutch) Richtsnoer Analyse Microbiologische Veiligheid Drinkwater (AMVD). https://www.ilent.nl/documenten/leefomgeving-en-wonen/drinkwater/drinkwater/publicaties/richtsnoe analyse-microbiologische-veiligheid-drinkwater-amvd 4) QMRAWell: QMRAwell | RIVM

Primary author: DE WINTER, Matthijs (RIVM)

Co-authors: Mr VAN ZOGGEL, Sven (Utrecht University); Dr VAN DEN BERG, Harold (RIVM); Prof. SCHIJVEN, Jack (RIVM); Mr VAN STEIJN, Tom (BrabantWater)

Presenter: DE WINTER, Matthijs (RIVM)

Session Classification: MS18

Track Classification: (MS18) Innovative Methods for Characterization, Monitoring, and Remediation of Contaminated Soils and Aquifers