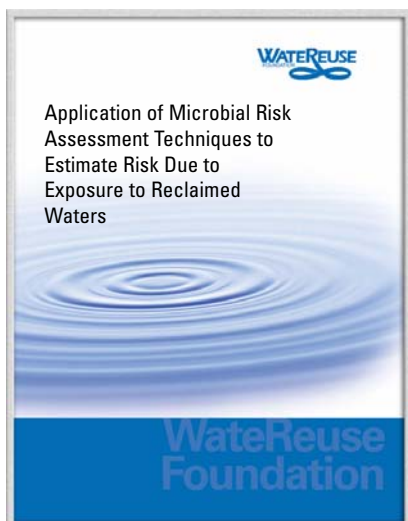


Application of Microbial Risk Assessment Techniques to Estimate Risk Due to Exposure to Reclaimed Waters



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Advancing the Science of Water Reuse and Desalination through Research



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Principal Investigators
Adam W. Olivieri, Ph.D., P.E.
EOA, Inc.

Edmund Seto, Ph.D.
University of California, Berkeley

The potential transmission of infectious diseases by pathogenic agents is the most common concern associated with nonpotable water reuse. While several states have developed standards that include treatment process requirements and microbial and other water quality limits, no existing state regulations are based on risk assessment methodology. This has resulted in widely varying criteria among the states that have developed

regulations and has raised issues and concerns (both real and perceived) by regulatory agencies, operating agencies, reclaimed water users, and the public in general related to the scientific basis of water reuse regulations and, hence, the public health protection afforded by existing regulations.

Microbial Risk Assessment techniques can be used to better define relative health risks associated with exposure to reclaimed water. Through analysis of differing reclaimed water management scenarios and reuse applications, relative health risks may be compared. Relative health risks, using predictive models, can be compared to inform decisions about water reuse projects.

Objectives

The objective of this project was to use existing microbial risk assessment approaches to assess nonpotable water reuse applications and develop a matrix of relative microbial risks associated with the use of reclaimed water under a range of different conditions.

The risk matrix and insights generated as a product of this work provide perspective on water reuse applications that water and wastewater utility managers can use as decision-making tools. Improved science and reduced uncertainty also may lead to increased public acceptance of reclaimed water, which has been problematic for several reclaimed water projects in the past.

Benefits

This report gives water and wastewater utility managers, regulators, and water quality scientists and engineers scientifically defensible data that can be used to compare the potential relative risks associated with nonpotable water reuse applications under a wide range of conditions.

Highlights

- The risks associated with full body contact recreation in undiluted effluent are estimated to be greater than those associated with landscape irrigation by approximately 5x and greater than those associated with crop irrigation by 10x.
- Under equivalent assumptions, the estimated attributable risks associated with human viruses, *Cryptosporidium parvum*, and *Giardia lamblia* are similar.
- For reclaimed water exposures, the risks associated with exposure to human viruses, *Cryptosporidium*, and *Giardia* are higher than those associated with other pathogens.
- The risks associated with disinfected tertiary effluent are lower than those associated with disinfected secondary effluent by approximately a 0.5 order of magnitude.
- The 90% confidence bounds of the risk estimates for pathogens in reclaimed water span approximately 3 orders of magnitude.

PROJECT PROFILE

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The mission of the WateReuse Foundation is to conduct and promote applied research on the reclamation, recycling, reuse, and desalination of water.