

Microbial and Toxin Transport Through Soil Aquifer Using 2- Dimensional Model

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STATUS: **NEW** X Continuation

Objective

- To study the kinetics of bacterial and toxin transport through recharge basin using laboratory scale 2-dimensional model filled with porous media

Approach

- Study will be conducted in a 2D tank that has main frame made of welded stainless steel with a removable Plexiglas viewing window. Tank dimensions are 24-in wide x 39-in high x 4-in deep filled with 3744 in³ sand. The filter media has 30% porosity with 4.86-gal void volume. Side panels have threaded ports at uniformly spaced intervals to facilitate flow across the tank.

Tracer transport to predict microbial transport behavior

- Fluorescence

Microbial transport

- Bacteria - *E. coli* and *Legionella*
- Viral Indicator - *Bacteriophage P22*

Toxin Transport

- Peanut lecithin (as toxin surrogate)

Key Deliverables

- Documentation of kinetics of bacterial, and viral indicators and toxin surrogate transport through aquifer during the groundwater recharge practices

Key Findings

- The fluorescein dye travel rate was found to be 0.36 in/hr for the left side, and 0.37 in/hr for the right side
- The fluorescein dye was able to predict the arrival of the bacteria
- The predicted arrival time for the 5 inch port for *E. coli* was 14 hours and 48 minutes for the left side, and 13 hours and 42 minutes for the right side
- Pressure from bottom generated greater bacterial numbers than gravity flow, but the rate was the same

Budget Requested

- No additional budget is requested

Project Performance

- January 2018 – December 2018