Surface-groundwater connection: Effects of surface water contaminants upon subsurface bacterial transport

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Intermediate-scale (courtesy of J. Ryan, Univ. CO)

Large field-scale (USGS Cape Cod, MA array)

11 IL MAR

11 1 MIP

Small field-scale (Cape Cod, MA)



"Fast"





ABS surfactants (Municipal well, Falmouth, MA)



Ponding of discharged effluent (Otis Air Base, MA)





BACTERIAL ATTACHMENT/DETACHMENT IN AQUIFER SEDIMENTS





A. Field Test Site #1 (Cape Cod, MA)







B. Field Test Site #2 (Cape Cod, MA)







Predation:Sink for amended bacteriaAlters bacterial growth



Effect of substrate conc'n on hydrophobicity of Zymomonas mobilis



Ref: Zikmanis et al. 2007 Proc. Biochem. 42:745-750





CONCLUSIONS

Role of DOC in bacterial transport <u>complex</u>

Surfactants important

Microspheres are poor bacterial surrogates

Long-term exposure effects



Classic "Run & Tumble" Bacterial Chemotaxis



Porous medium

Ref: Modified from Ford & Harvey, 2007













Bacteria 0.1-3.0 µm

Protozoa 1.5-10 µm