TRANSPORT OF CRYPTOSPORIDIUM PARVUM OOCYSTS IN A SILICON MICROMODEL

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Real time transport of Cryptosporidium parvum oocysts was observed in a 2-dimensional microscopic pore structure consisting of an array of cylindrical collectors. Oocysts attached to the forward portion of clean collectors, where the flow velocity was lowest. After initial attachment, oocysts attached onto already attached oocysts. As a result, the region available for flow was reduced and straining increased. Results of attachment and detachment experiments suggest that surface charge heterogeneity allowed for oocyst attachment. Moreover, most oocysts entrapped in the secondary minimum energy well were either transferred to the primary minimum or released by bypass flow. The oocyst average attachment efficiency (α) for the micromodel was determined by normalizing the single collector removal efficiency (η) measured for repulsive conditions with the favorable condition removal efficiency ($\eta 0$). Oocyst attachment efficiencies increased with ionic strength for both micromodel and radial stagnation point flow setups. Lattice-Boltzmann simulations helped understanding the slightly nonuniform flow field and explained differences in the removal efficiency in the transverse direction. However, the hydrodynamic modeling cannot explain differences in attachment in the longitudinal direction.