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Pilot- and bench-scale testing of fecal indicator bacteria survival in marine beach sand near point sources

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ABSTRACT

The microbiological quality of water at public bathing beaches is regularly monitored using fecal indicator bacteria (FIB) as a surrogate for the presence of human sewage and pathogens. Exposure to FIB and associated pathogens may also occur through contact with contaminated beach sand, but no standards limiting levels of microbes in sand or required monitoring program has been established. As a result, the factors affecting FIB and pathogen survival/persistence in sand remain largely unstudied. This goal of this study was to examine biological and physical factors that affect die-off of FIB in beach sand following sewage spills. Solar disinfection with mechanical mixing was pilot-tested as a disinfection procedure after a large sewage spill in the Los Angeles area. Effects of solar exposure, mechanical mixing, predation and/or competition, season, and moisture were tested at bench scale. First order decay constants for *Escherichia coli* ranged between -0.23 and -1.02 per day, and for enterococci between -0.5 and -1.0 per day. Desiccation was a dominant factor for *E. coli* but not enterococci. Initial microbial community and sand temperature were also important factors. Mechanical mixing, common in beach grooming, did not consistently reduce bacterial levels. Chlorination was an effective disinfection treatment in sand microcosms inoculated with raw sewage influent.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2010AnnualReport/ar10_087_101.pdf