

Comparative Modeling of Full-Scale and Small-Scale Biosand Filtration Systems

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EXTENDED ABSTRACT

The goal of this experiment was to model the flow and performance of both full-scale and small-scale biosand filtration systems (BSFs). To test each system, tap water was continuously added to the tops of the filters in such a manner that a constant hydraulic gradient was maintained; steady state conditions ensured that the influent and effluent flow rates of the system were approximately equal. After measuring the hydraulic gradient of each system, a relatively low volume of highly concentrated KCl solution was added to each reservoir. A conductivity probe was used to measure the relationship between conductance of the effluent flows and time elapsed from KCl application. Effluent samples were tested with the probe every three minutes. By the combined applications of Darcy's Law and constructed Conductivity vs. Time plots, the performances of the full-scale and small-scale BSFs were compared. These comparisons will ideally lead to the generation of a general BSF model, which will increase both the accuracy and the efficiency of the laboratory testing related to BSFs. More importantly, by gaining a better understanding of the "black box" process utilized by BSFs, the quality of drinking water for multitudes of people may be improved.