

EXPERIMENTAL EVALUATION OF A ROCK-BED FILTRATION MODEL

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Abstract

Mathematical modeling of the biofiltration processes has not been widely applied in natural water purification systems. Relatively little work has been reported on the incorporation of results of various experimental studies in comprehensive model development for water purification using rock-bed filtration.

A mathematical model of rock-bed filtration process in an on-site water/wastewater treatment system was formulated and a numerical computation scheme was developed in an earlier study. Selected physical and biological processes occurring in natural water purification were incorporated into the developed model. Subsequently, pilot-plant experiments were conducted along a canal in Bangkok, Thailand to evaluate the performance of the rock-bed filtration system under different operating conditions. Selected water quality indices and sediment deposits were analyzed over a period of more than one year. The target pollutants to be removed were inorganic and organic suspended solids, dissolved organic matter, and ammonium and nitrate nitrogen. A comparison of the simulated and experimental results obtained from the pilot-plant operation indicated that the rock-bed filtration model could adequately account for the changes in the effluent water quality indices and accumulated sediment heights.

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