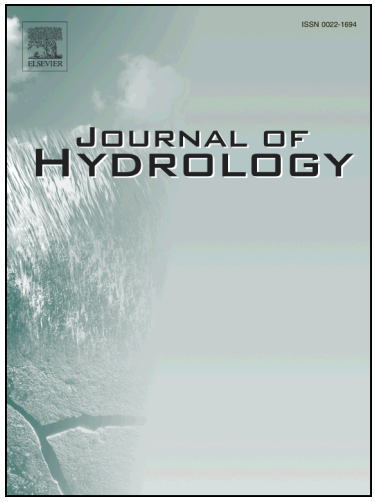

Research papers

Effective range of chlorine transport in an aquifer during disinfection of wells: from laboratory experiments to field application.

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Effective range of chlorine transport in an aquifer during disinfection of wells: from laboratory experiments to field application.

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Abstract

Microbiological contamination usually leads to erratic operation of drinking water wells and disinfection is required after disasters and sometimes to restore proper well performance for aquifer storage and recovery (ASR) and subsurface iron removal (SIR) wells. This study focused on estimating the fate of chlorine around an infiltration well and improving the knowledge about processes that control the physical extent of the disinfected/affected radius. Closed bottle batch tests revealed low chlorine consumption rates for filter gravel and sand (0.005 mg/g/d) and higher rates for clay (0.030 mg/g/d) as well as natural aquifer material (0.054 mg/g/d). Smaller grain sizes <1 mm showed 10- to 70-times higher initial chlorine consumption rates within the first hour after contact compared to the median consumption rates. Initial chlorine concentration most likely does not impact disinfection ability at grain sizes >1 mm, but results in more effective disinfection for very fine materials <0.063 mm. Column studies focused on the adaptation of the lab results to an actual SIR waterworks in Khabarovsk, Russia. Results reinforced the previous lab results with low 1st-order decay constants of 16 d^{-1} for filter material and much higher values of 254 d^{-1} for natural aquifer