

ENSURING PERMEABLE REACTIVE BARRIER EFFICACY AND LONGEVITY TOMASZ SUPONIK

Abstract: PRB technology is a technique of groundwater remediation where contaminants are removed from an aquifer by the flow through a permeable reactive barrier (PRB) filled with a special material called a "reactive material". In this paper problems connected with precipitate formation in zero-valent iron Fe_0 used as a reactive material were described – the precipitate may finally reduce the reactivity of this material and its hydraulic conductivity. Then, on the basis of the laboratory test changes of pH, oxidation-reduction potential (ORP), and dissolved oxygen (DO) concentration which accompany precipitate formation were demonstrated. Moreover, on the basis of hydrologic modeling the following rule was presented and proved: in order to increase PRB efficacy (in Funnel-and-Gate System) by increasing the hydraulic capture zone width, the ratio of the gate hydraulic conductivity ("gate" includes the reactive material in Funnel-and-Gate System of PRB Technology) to the aquifer hydraulic conductivity (k_{gate}/k_{aq}) should take the value of six. The precipitate formed in zero-valent iron may reduce the hydraulic conductivity of the reactive gate. Therefore, it was assumed that the ratio of k_{gate}/k_{aq} should amount to 10. This value gives certainty that reduction in gate hydraulic conductivity due to precipitate formation will not impact the hydraulic capture zone width. The above mentioned solution can ensure effective and long-lasting treatment process in reactive barrier.