

Natural Groundwater Constituents as Tracers for the Reactivity Assessment of Fe(0) PRB's

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ABSTRACT: Performance limitations of iron PRB's have been observed at several sites worldwide. Among the various reasons for this are barrier bypass, reversal of or changing flow directions, permeability loss of the barrier or passivation of the reactive sites on the iron surface. Current approaches such as isotope studies, sampling and analysis of barrier material, column experiments under accelerated flow have specific drawbacks and do not lead to the characterisation of the problem in the field. This poster presents an additional approach which utilises natural groundwater constituents (and their inhibitive interaction with iron) as reactive tracers to interpret both hydraulic behaviour within the barrier as well as changes in the surface of the iron. Data from column studies and geochemical data from PRB facilities were evaluated in terms of development of ion fronts and breakthrough curves in order to investigate the potential as well as the limitations of the groundwater constituents. We have thus been able to demonstrate that various naturally occurring groundwater constituents such as HCO_3^- or nitrate, can be used as indicators and that naturally occurring reactive tracers in conjunction with conservative tracers such as bromide or lithium can be used to assess basic problems in the long term functioning of PRBs, such as ageing, flow limitations and passivation of the iron surface.