

Results from a Field Demonstration of Electrolytic Reactive Barriers (e⁻barriers) for Treatment of Energetic Compounds in Groundwater

Dave Gilbert and Tom Sale

Center for Contaminant Hydrology, Department of Civil and Environmental Engineering, Colorado State University

Matt Petersen

GE Global Research, Niskayuna, New York, USA

Abstract. In early 2006, an electrolytic reactive barrier (e⁻barrier) was installed at the Pueblo Chemical Depot (Pueblo, Colorado, USA) to intercept a plume of groundwater contaminated with RDX, HMX, 2,4,6-TNT, 2,4-DNT and 1,3,5-TNB. The demonstration e⁻barrier consists of 15 individual panels of expanded titanium mixed metal oxide mesh electrodes mounted on vinyl sheet pile. Power is supplied to the electrodes by a 2 kW solar power supply. Contaminated groundwater flowing through the e⁻barrier is subject to two sequences of electrolytic oxidation-reduction. The objective is degradation of dissolved explosives (and intermediates) to environmentally benign compounds. The demonstration is designed to evaluate barrier performance at several applied potentials. The primary performance metric is reduction in contaminant mass flux through the e⁻ barrier.

To date four applied voltage have been tested. Data collected at 5.3 V applied indicates transformation of 1,3,5-TNB of 92% through the barrier, TNT transformation of 58% through the barrier, 2,4-DNT transformation of 47% through the barrier, and RDX transformation from 20 ug/L to less than 0.2 ug/L through the barrier. Performance monitoring will continue through fall 2008. Details of design, installation, operation and results will be included in the presentation.