

Installation of an Electrolytic Reactive Barrier for Treatment of Energetic Compounds in Groundwater

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Abstract. Electrolytic reactive barriers (e-barriers) have been a focus of research and development at Colorado State University since 1999. The e-barrier is a set of closely spaced permeable electrodes that are installed in the format of a permeable reactive barrier to intercept a groundwater contaminant plume. Application of low voltage direct current (DC) drives sequential oxidation and/or reduction of contaminants with the net benefit of reducing contaminant flux. To date, three experimental or pilot-scale field demonstrations have been conducted. The most recent design, including several significant advancements has been implemented at the Pueblo Chemical Depot (PCD) located near Pueblo, Colorado. The focus of this presentation is the application of an e-barrier to dissolved energetic compounds in groundwater at PCD.

Laboratory treatability studies using one and two-dimensional e-barrier analogs indicate that high fractional transformation of energetic compounds can be achieved without accumulation of detrimental intermediates. Building on these results, a field scale demonstration e-barrier has been installed at PCD to treat a contaminant plume containing hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX), 2,4,6-trinitrotoluene (TNT) and 2,4-dinitrotoluene (2,4-DNT). The demonstration barrier is 10 m in length and is operated using a solar power supply. The presentation will cover details of design and support studies, methods of construction, installation, operation and cost details.

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