Electrolytic Reactive Barriers for Treatment of Energetic Compounds in Groundwater

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Abstract. This project involves laboratory experiments to evaluate the application of electrolytic reactive barriers (e-barriers) to energetic compounds is groundwater. Through a series of batch and flow-through reactor experiments, the use of an in-situ electrolytic approach for treatment of dissolved energetic compounds appears promising. Initial studies focused on proof of concept level experiments using flow-through soil columns designed to evaluate sequential electrolytic degradation of dissolved energetic compounds in a reactive barrier format. The proof-of-concept studies indicated that high fractional transformation of TNT and RDX is possible at low power cost. In a second phase of experiments, electrolytic transformation of TNT and RDX was shown to be primarily through heterogeneous cathodic reduction. In flow-through reactor experiments, identified products included nitrite and azoxynitrotoluene. Other products of MW 78, 96, 98 were observed by LC/MS. Flow-through studies using RDX indicated that approximately 70% of the initial RDX was transformed in a single electrode set. Electrolytic RDX transformation appears to follow published reductive pathways RDX→MNX→MDNA→nitramide. DNX and TNX were also detected, but at very low concentration. Experimental details and design of a field scale e-barrier at the Pueblo Chemical Depot (Pueblo, CO) will be presented.