Electrolytic reactors for treatment of contaminated groundwater

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Abstract. A primary focus of research at Colorado State University's Center for Contaminant Hydrology is the use of electrolytic reactors for in-situ and ex-situ treatment of contaminated groundwater.
For in-situ application, the concept is that of a permeable reactive barrier using closely spaced permeable electrodes powered by low voltage direct current. To date, several reactor designs and electrode materials have been tested. Contaminants tested include chlorinated solvents, nitroaromatics, nitramines. and other emerging contaminants. Over the past five years, three in-situ electrolytic reactive barriers have been demonstrated:

1. Canadian Forces Base Borden (contaminants PCE, TCE)
2. F.E. Warren Air Force Base (contaminant TCE)
3. Pueblo Chemical Depot (contaminants RDX, TNT, 2,4-DNT, 1,3,5-TNB)

The design has evolved between demonstrations from a three electrode design to a four electrode modular design. Power supplied to the electrodes has evolved from AC rectified power to solar photovoltaic. Details regarding design evolution and field performance will be presented.
In response to industry needs, ex-situ electrolytic reactors for several emerging contaminants (e.g. chlorobenzenes) are currently under development. These reactors would be deployed as an alternative to granular activated carbon in a groundwater extraction and treatment scenario. To date, two reactor designs have been tested under laboratory conditions. Reactor design and results will be presented.

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