

## **APPLICATION OF TIME-RELEASE ELECTRON DONORS AND ELECTRON ACCEPTORS FOR ACCELERATED BIOREMEDIATION**

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### **Abstract**

There are limited options for cost-effective approaches to remediate soil and groundwater contamination. One technology that has proven its potential involves the use of time-release electron acceptors to accelerate bioattenuation of aerobically degradable compounds and time-release electron donors to accelerate the natural bioattenuation of anaerobically degradable compounds. This technology enjoys its reputation as a sensible strategy for engineering accelerated bioattenuation because it consistently delivers results while 1) minimizing design, capital, and management costs and 2) allowing for the engineering of a low-impact application, invisible-remediation process.

Oxygen Release Compound (ORC<sup>®</sup>) is proprietary formulation of intercalated magnesium peroxide that slowly releases oxygen for up to a year. This facilitates the aerobic degradation of environmental contaminants including petroleum hydrocarbons, certain chlorinated hydrocarbons, ether oxygenates, and s-triazine herbicides.

Hydrogen Release Compound (HRC<sup>®</sup>) is a proprietary, food-grade polylactate ester. Upon being deposited into an aquifer, HRC slowly releases lactic acid for one to two years that ferments to hydrogen. Hydrogen donates electrons that drive reductive bioattenuation processes. Compounds degraded by reductive dehalogenation include perchloroethene, trichloroethane, carbon tetrachloride, and their daughter products; pentachlorophenol; and herbicides and pesticides such as dieldrin, dichloropropane, alachlor, and metolachlor. HRC has been used on over 300 sites, which we believe makes it the most widely used electron donor for accelerating bioattenuation.

**Key words:** HRC, ORC, reductive dechlorination, oxygen, herbicides, pesticides, pentachlorophenol