

NEWS from



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For immediate release

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DEPARTMENT OF DEFENSE SEEKS TO REDUCE COSTS AND SPEED ENVIRONMENTAL CLEANUPS USING HRC®

SAN CLEMENTE, CA, February 23, 2002 – An innovative groundwater remediation product, Hydrogen Release Compound® (HRC®), developed by Regenesis of San Clemente, CA, is proving extremely efficient and cost-effective in degrading a range of contaminants commonly found at Department of Defense (DOD) and military-related sites. From the more ubiquitous chlorinated solvents perchloroethene (PCE) and trichloroethene (TCE) to nitroaromatic explosives and perchlorate, HRC is being used to address these groundwater contaminants and others at two major DOD / Superfund sites in Colorado. At the Army's former Pueblo Chemical Depot, a recent study by

Earth Tech, Inc., verified HRC's performance and concluded that enhanced anaerobic bioremediation using HRC caused "reductions in the concentrations of all contaminants of concern at the site." Meanwhile a 60-day bench-scale study at the former Rocky Mountain Arsenal chemical weapons site in Adams County, funded by the Environmental Protection Agency's Superfund Innovative Technology Evaluation (SITE) program, has shown significant reduction in concentrations of explosive contaminants and nitrates (by up to 98%-100%) within the initial test period of 105 days.



Safe and easy to handle, HRC is most effective when injected into soil through direct push rods using hydraulic equipment.

HRC is a passive, proprietary, *in-situ* bioremediation treatment that works by accelerating the natural attenuation of contaminants in the soil. When HRC, a viscous, honey-like substance, is injected into the soil, contact with groundwater causes the compound to slowly release lactic acid. Naturally occurring anaerobic microbes metabolize the lactic acid to produce hydrogen, which in turn is used by other microbes to break down anaerobically degradable compounds. Compared with conventional soil removal or pump-and-treat methods, total costs for HRC treatment are often one-half to two-thirds lower than competing technologies. HRC also has the added benefit of being unobtrusive, quiet and easy to apply. Due to the nature of its application techniques, HRC can also be applied beneath the foundations of structures and in difficult-to-reach spaces such as between buildings or in small, confined areas.

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Since the late 1980s, the DOD has mounted a massive environmental compliance and cleanup effort at military installations and decommissioned bases nationwide. Contamination from explosives and their derivatives has become a focal point for this effort; a recent Defense Department paper noted that more than 1,200 sites were impacted with explosives, and that 87 percent of them showed contamination in the groundwater. In addition, the DOD has also recognized that conventional cleanup technologies are often too costly and invasive, requiring the transport of large volumes of soil and/or water, and are also characterized by energy-, labor-, and material-intensive practices. As a result, the DOD has been actively seeking out more innovative, preferably on-site and *in-situ* technologies, including bioremediation technologies, which hold the promise of better performance and increased economic benefits.

The Pueblo Chemical Depot (PCD) and Rocky Mountain Arsenal (RMA) sites presented an ideal application opportunity for HRC and accelerated anaerobic dechlorination activities. The PCD site had been used for more than three decades for large-scale munitions storage and reprocessing operations resulting in the release of trinitrotoluene (TNT) and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX). Additionally, breakdown products of TNT such as 2,4 DNT and 1,3,5 TNB were also found in the aquifer. The 27-square-mile RMA facility, currently being restored as a National Wildlife Refuge, was established during World War II as a chemical weapons manufacturing site and was later used for the manufacture of nerve agents, pesticides, and herbicides, with liquid wastes being disposed of in numerous unlined waste-disposal basins and trenches. Compounds of concern at RMA have been called a “witches’ brew of contaminants,” including PCE, TCE, carbon tetrachloride, chloroform, dieldrin (a pesticide), and unusual compounds such as diisopropylmethylphosphonate or DIMP, a by-product of nerve gas production.

Since conventional remediation methods such as pump-and-treat or excavation would have been prohibitively more expensive and time-consuming, preliminary bench-scale and pilot tests were performed at both sites before using HRC. These tests offered strong indications of whether or not HRC would be applicable at the sites either making or breaking the way for full-scale application. The PCD site has already completed a successful pilot-scale test and is awaiting further direction for full-scale implementation. RMA has completed a laboratory bench-scale test and is currently in the field pilot phase of the program.

HRC and a second Regenesis product, ORC® (Oxygen Release Compound®) have also been applied at several other DOD facilities, including Cape Canaveral, Andrews AFB (Maryland), the Beaufort, S.C., Marine Corps Air Station, and the Naval Amphibious Base in Norfolk, VA. Several of these and other projects have been published in peer-reviewed journals and various conference proceedings. For additional information on these sites or about HRC, please contact Mr. Bryan Vigue at Regenesis by telephone at (949-366-8000) or by e-mail at (bryan@regenesis.com) or visit www.regenesis.com.

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About HRC®

Hydrogen Release Compound (HRC®) was developed by Regenesis starting in 1997 as a product specifically formulated to remediate groundwater contaminated with anaerobically degradable compounds such as perchloroethylene (PCE) and trichloroethylene (TCE).

HRC is an all-natural product that when injected into groundwater releases ingredients crucial to microbial survival and contaminant degradation. The product is based on a three-carbon glycerol polylactate ester structure. When hydrated, HRC releases lactic acid, which is then metabolized by microbes to form other organic acid intermediates, with hydrogen being released as a byproduct. The hydrogen in turn is used by other microbes to fuel the reductive dechlorination of chlorinated hydrocarbons. The lactic acid is released in small quantities over a 9- to 18-month period, sustaining degradation and furthering remediation at the site.

Field results of cleanups employing HRC have shown it to be a groundbreaking alternative to conventional, operation-intensive approaches for remediating chlorinated hydrocarbons in groundwater, or the slow and inconsistent practice of natural attenuation.

Incorporated in 1994, Regenesis (formerly Regenesis Bioremediation Products) is recognized today as the world's leading developer and distributor of products used to restore contaminated groundwater, principally Oxygen Release Compound (ORC®) for remediation of aerobically degradable hydrocarbons and Hydrogen Release Compound (HRC®) a slow-release electron donor for treatment of anaerobically degradable compounds such as chlorinated solvents. These products are sold to hundreds of independent environmental engineering and consulting firms, who provide an independent verification of the products' effectiveness on their customers' sites. Regenesis' products have been used to restore groundwater quality at over 6,500 sites in 12 countries around the world, including sites owned by oil companies, real estate firms, pipeline companies, refineries, utilities, and transportation companies, among others. Readers are invited to call Regenesis at 949-366-8000 to arrange a free site evaluation for the application of ORC® and/or HRC®.

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Editor, please note: If you would care to use the graphic in this news release, please contact Serena Siegfried at SBC (212-873-1944 or serena@salwen.com) and we will be happy to provide a glossy print or a downloadable high-resolution graphic file upon request.