



Development of WBC-2 and the Reactive Mat for Treatment of Chlorinated VOCs in Ground Water at APG

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Ground water impacted with 1,1,2,2-tetrachloroethane (TeCA), chlorinated methanes, and chlorinated ethenes discharges in localized seep areas into surface water at the West Branch Canal Creek area of Aberdeen Proving Ground, Maryland. In situ treatment of ground water in the shallow aquifer presents substantial technical challenges. The wetlands surrounding West Branch Canal Creek have been previously shown to support the natural degradation of TeCA and other chlorinated aliphatics as they migrate from the groundwater through wetland sediments; however, similar activity was not observed in high flow seep areas. Seep areas are considered sources of surface-water contamination.

Working under complementary agreements with Aberdeen Proving Ground, the USGS enriched a consortium of microbes (**WBC-2**) capable of degrading TeCA and other chlorinated aliphatics. GeoSyntec propagated it to provide large quantities for bioaugmentation into various treatment programs for TeCA degradation.



Following laboratory and field investigations, **WBC-2** was deployed in a **reactive mat** constructed at a seep in West Branch Canal Creek. The mat was designed to passively intercept and degrade the VOC at the seep surface. The **reactive mat** is an engineered, multicomponent, horizontal, permeable, biologically active mat that was bioaugmented with **WBC-2** for chlorinated ethane and ethene treatment. The mat includes a system for re-amendment of the biologically reactive layer with electron donor or **WBC-2** if needed. Multilevel sampling points were installed underneath and through the **reactive mat** to evaluate performance. Preliminary results suggest the mass removal of VOCs through the mat exceeds 95 percent.

Work performed by USGS at the site provided a feasible alternative for cleanup of chlorinated VOCs within the sensitive wetland ecosystem. The targeted exposure point treatment is expected to have transferability to other wetland, estuarine, riverine, and coastal environments.

USGS and GeoSyntec Consultants Collaborate on Development of New In Situ Bioremediation Technology



United States Geological Survey [USGS], a division of US Department of the Interior, and GeoSyntec Consultants signed a cooperative research and development agreement (CRADA) to collaborate on the development of an in-situ bioremediation technology application that combines bioaugmentation with an engineered mat to passively treat dissolved contaminants. The engineered, horizontal, permeable, biologically reactive mat ["reactive mat"] consists of several different media layers impregnated with specially selected and harvested biological agents designed to degrade contaminants directly at the point of groundwater discharge to surface water.

This targeted exposure point treatment has been effectively piloted by USGS and GeoSyntec at the Edgewood Area of Aberdeen Proving Ground, at an area where chlorinated solvents seep into a creek. By utilizing a dechlorinating consortium of microorganisms [WBC-2], 1,1,2,2-tetrachloroethane [TeCA] and several other chlorinated ethanes and ethenes were rapidly degraded.

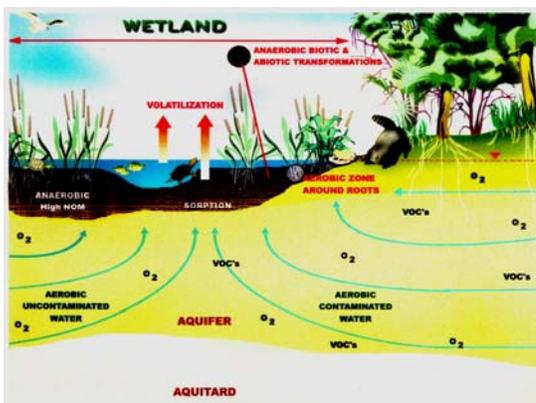
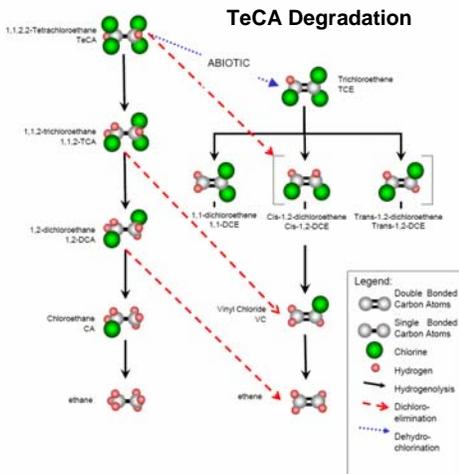
The technology is expected to significantly contribute to the field of in-situ remediation solutions, particularly for exposure point treatment in estuarine, riverine, wetland, and coastal environments. Plans are to further develop both the reactive mat and the dechlorinating consortium WBC-2 for use with other contaminants and other physiographic settings.

GeoSyntec, a leader in chlorinated solvent remediation, is a private, Florida-based engineering consulting company with over 500 employees in North America, the United Kingdom, and Malaysia.

USGS is the Nation's largest water, earth, and biological science and civilian mapping agency, which collects, monitors, analyzes, and provides scientific understanding about natural resource conditions, issues, and problems. The 10,000 scientists, technicians and support staff of the USGS are located in nearly 400 offices in every State and in several foreign countries.

Aberdeen Proving Ground in Maryland originated as a munitions testing site in 1917, and evolved to a R&D facility for powders, projectiles, bombs, and ballistics. It is considered one of the Army's finest test, evaluation, research, development, and training facilities.

A CRADA allows a government agency and private company to optimize their resources, share technical expertise in a protected environment, share intellectual property emerging from the effort, and speed the commercialization of federally developed technology.



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