Safe and Effective Use of Stabilized Hydrogen Peroxide for Cleanup of a Gasoline and Diesel Groundwater Plume, Silverdale, WA

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Platform Presentation

Hydrogen peroxide stabilized with sodium citrate was used to clean-up a gasoline and diesel groundwater plume beneath a UST site in Silverdale, WA. Stabilized Hydrogen Peroxide (SHP) was selected for use at the site because of its effectiveness in destruction of petroleum hydrocarbons and its ability to act as an activator of sodium persulfate. Use of SHP has been shown to significantly slow down the rapid decomposition of peroxide which normally occurs during a catalyzed hydrogen peroxide (CHP) reaction. The life of the peroxide can be extended from less than 24 hours when using CHP to up to 10-14 days by the use of a stabilizer, which allows for further dispersion of peroxide into the aquifer and more complete destruction of petroleum hydrocarbons.

A total of 8 direct push injection borings were used to inject both SHP and sodium persulfate into a treatment area of approximately 2,400 square feet. Injections were performed at 2 foot depth intervals using a bottom-up technique that started at 20 feet depth and progressed upward to 10 feet depth. The stabilized hydrogen peroxide and sodium persulfate were injected simultaneously into each depth interval by use of a specially constructed dual hose injection apparatus. An important safety benefit of using SHP (a patent-pending process), is it minimizes the occurrence and severity of chemical daylighting during site injections. At this site, the SHP injections produced significantly lower temperatures in the subsurface (50 to 70 degrees Fahrenheit lower), and much less pressure buildup (20 to 40 psi lower) than compared to typical CHP reactions.

The contaminant levels in two monitoring wells located in the treatment area were reduced significantly over a period of 301 days following the SHP injections, including significant reductions in TPH as gasoline (99%), TPH as Diesel (100%), toluene (100%), ethylbenzene (90%), and xylenes (99%).

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