

Treating 1,4-Dioxane with Activated Potassium Persulfate

Stacey Telesz, Brant Smith and Brianna Desjardins, Evonik

Background

1,4-Dioxane has emerged as a contaminant of concern for numerous sites. It is most commonly found at sites co-mingled with the chlorinated solvents it was used to stabilize and their daughter products. The co-mingling of 1,4-dioxane with chlorinated solvents can make treatment of the entire contaminated suite more complex as 1,4-dioxane is typically treated using an oxidative radical pathway and several of the chlorinated solvents are best treated with a reductive pathway. In several instances this has led to sites where the chlorinated solvents were treated only to expose the untreated 1,4-dioxane.

Approach

Alkaline activated potassium persulfate was evaluated at two separate sites contaminated with a mixture of 1,4-dioxane, chlorinated ethenes, and chlorinated ethanes. The sites were first evaluated in a series of column reactors where site groundwater was then run through the columns until the potassium persulfate had been consumed. One of the sites subsequently had a successful field pilot test with alkaline activated potassium persulfate applied with a full-scale application in 2018.

Results

The data indicate hydrated lime induced alkaline-activated potassium persulfate reduced 1,4-dioxane, chlorinated ethenes, and the chlorinated ethanes concentrations to below the detection limit. Field data not only evaluated treatment effectiveness but also the persistence of potassium persulfate compared to the site's groundwater velocity. Field data indicates the potassium persulfate was persisting as expected based on the observed groundwater velocities and that 1,4-dioxane was treated to below the detection limit at the PRB and significant reduced down gradient.

Stacey Telesz

Stacey Telesz has seventeen years of experience in the environmental remediation industry. She graduated from Michigan State University with a Bachelor of Science in Civil Engineering. Stacey started her career in helping engineers with technical assistance and design of gas vapor barriers used to prevent vapor intrusion into buildings. She has been with Evonik (formerly PeroxyChem) for over nine years, where she covers the Western Region helping clients remediate sites with Evonik's broad portfolio of technologies for soil and groundwater remediation. She resides in Newport Beach, CA and helps with clients West of CO including Western Canada.