

Combinations of EVO with Sulfidated ZVI

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Batch studies evaluated the impact of zero valent iron (ZVI), several sulfidation agents, emulsified vegetable oil, and bioaugmentation with *Dehalococcoides* and *Dehalobacter* on the treatment of chlorinated ethenes, chlorinated ethanes, chlorinated methanes, brominated methanes, and brominated ethanes. A low ratio of sulfur in the form of sodium sulfide, sulfur, sodium dithionite, and ferrous sulfide solution to 4 to <125 μm ZVI particles generally increased the extent of reaction with volatile organic contaminants. A column study showed greater removals of the parent and daughter products with the combinations of a 4 μm ZVI at 10 g/kg and ferrous sulfide solution (FSS) than ZVI alone. A mixture of bioaugmentation cultures including *Dehalococcoides* and *Dehalobacter* on Day 15 and on Day 17, 1.1 g/L of FSS was added to the influent of all columns. The combinations of SRS, ZVI, and FSS resulted in 97.8% or greater of trichloroethene, 1,1,1- trichloroethane, and chloroform in the influent. The treatments with FSS and ZVI outperformed the ZVI or SRS-Z without FSS. SRS-Z with low FSS performed the best. The addition of the FSS to the influent on Day 17 increased the removal efficiency on Day 29 over the previous sampling period at Day 22.

Field applications of SRS, ZVI, and FSS are being conducted at several sites. Results from one case history will be discussed.