

**Bromide and Sulfur Hexafluoride Tracer Experiment:
Preparation for in situ oxalic acid injections to mobilize arsenic at the Vineland
superfund site**

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Abstract

For 44 years, the Vineland Chemical Company manufactured arsenic biocides and for much of that time improperly stored arsenic-based by-products leading to groundwater contamination in surrounding areas and the need for clean-up through the Superfund program (EPA 2006). The current method for arsenic remediation involves both soil washing and a pump-and-treat system. Laboratory studies suggest that these methods are inefficient and that in situ additions of oxalic acid could mobilize ~85% of the remaining arsenic from the sediment and speed clean-up time. In order to study the mobilization through oxalic acid in situ, a set of 15 injection wells and one monitoring well were installed in the depression cone of an existing recovery well. In June/July 2008 a tracer experiment using bromide and sulfur hexafluoride were performed in order to examine the hydrology and recovery rate at various wells. The tracer solution (NaBr + SF₆) was pumped into the injection wells and then sampled periodically at an observation well and recovery well for nine days. The experiment showed a tracer peak at the observation well five days after injection. Forty-four percent of the bromide mass injected was recovered at the observation well. The next step for the project will be small-scale in situ oxalic acid injections to mobilize arsenic and determine potential use for site-wide clean-up.

EPA, 2006. Vineland Chemical Co., Inc National Priority List site fact sheet.

<http://www.epa.gov/Region2/superfund/npl/0200209c.pdf>.