

Toolkit for Greener Practices
Showcase of Ideas
Option 1-1: In -Situ Treatment

Reagent Injection - Source Area

Site conditions:

A major release of chlorinated solvents to ground water from a former plating shop operated by a farmer out of his barn (Brooklyn Plating and Polishing). Impacts in the source area extended below the water table. Concentrations of trichloroethene (TCE) at the source were as high as 140 ppm in ground water and 9.2 ppm in the soil. The site investigation indicated an aerobic microbial environment; natural degradation was unlikely.

Preventive activity description:

The Minnesota Pollution Control Agency (MPCA) worked with the consultant to conduct a pilot project for *in-situ* treatment of TCE. Injection of a potassium permanganate reagent will break down the TCE into non-hazardous byproducts. The pilot study results showed significant reductions in the concentrations of TCE detected in soil and groundwater samples before and after injection of the potassium permanganate. Based on these results, the MPCA and the Minnesota Department of Health (MDH) have approved a Response Action Plan for the site that includes full-scale implementation of this alternative in the source area.

Benefits realized through the Pollution Prevention/Sustainability approach:

- Cross-media transfer during excavation and disposal of contaminated soil or treated water will be avoided.
- Reagent injection is a low-energy alternative that shows promise for addressing high groundwater concentrations at the source. This ongoing source must be addressed to stabilize an already huge groundwater contaminant plume.
- Anaerobic environment was maintained, avoiding natural degradation of TCE to the highly toxic vinyl chloride byproduct.

Keys to Success:

- The environmental consultant did his homework. His research helped win approval for this precedent-setting pilot from the MDH and the MPCA. MDH rules prohibit injection to ground water without a variance to the Minnesota Rules. A variance was waived for the pilot study, but issued for the full-scale implementation.
- Detailed stratigraphic study of the source area to map probable permeability horizons within the affected sand sediments. Estimates of injected volume depended on this careful characterization and extensive monitoring to avoid an unwanted release of reagent beyond what was necessary to degrade the TCE.
- MPCA and MDH staff championed the pilot study and the full-scale implementation.

Regulatory administrative/legal tools:

- Interim Response Action approval from the MPCA Voluntary Investigation and Cleanup (VIC) Program for the pilot
- MPCA-approved Implementation Report (pilot details are well documented here.)
- An approved Response Action Plan (RAP)

Recognition: Mark Millsop at GME Environmental Consultants