

**Successful Applications of Field-Scale Two-Region Modeling to  
Evaluate SVE Rebound Tests**

*L.D. Stewart*

Praxis Environmental Technologies, Inc.  
Burlingame, California, USA

A theoretical framework for evaluating rebound data collected after soil vapor extraction (SVE) is presented along with case studies of implementation. Rebound testing is commonly performed to assess residual contamination in the vadose zone. The underlying premise is that soils are inherently inhomogeneous and can be divided into two categories: mobile (advection-dominated) and immobile (diffusion-dominated). During SVE, vapors flow only in the mobile soils intersected by extraction wells and contaminant removal is from these soils. This extraction creates a disequilibrium, or gradient, in the concentration between the mobile and immobile soils. Contaminants residing in the less permeable soils are removed only after transport into more permeable soils where vapors are flowing. A rebound test is initiated when extraction is ceased and mobile and immobile soils are allowed to re-equilibrate. Currently, field practitioners hope rebound concentrations are indicative of residual contamination; however, little guidance is available relating mobile and immobile concentrations or the timescales for re-equilibration. In this presentation, straightforward mathematical expressions are derived describing SVE and rebound in two-region soils. The expressions are applied to data from two sites yielding estimates for the mass of residual contamination, the field-scale mass transfer coefficients, and forecasts for results of additional SVE.