Clean Properties Inc.
Environmental Assessment & Cleanup

REMEDIATIONS
SOIL VAPOR EXTRACTION
...In-Situ Removal of Volatile Hydrocarbons

OBJECTIVE

Soil Vapor Extraction (SVE) systems are effective in removing contaminants associated with volatile hydrocarbons from permeable soils above the groundwater zone, in controlling the potential entry of such volatile hydrocarbons from contaminated soils and/or groundwater into overlying buildings, in removing volatile contaminants left within the zone of water-table fluctuation or drawdown when used in conjunction with a groundwater extraction system, and in removing volatile organic contaminants from shallow unconfined groundwater systems when coupled with air injection (air sparging) below the water table.

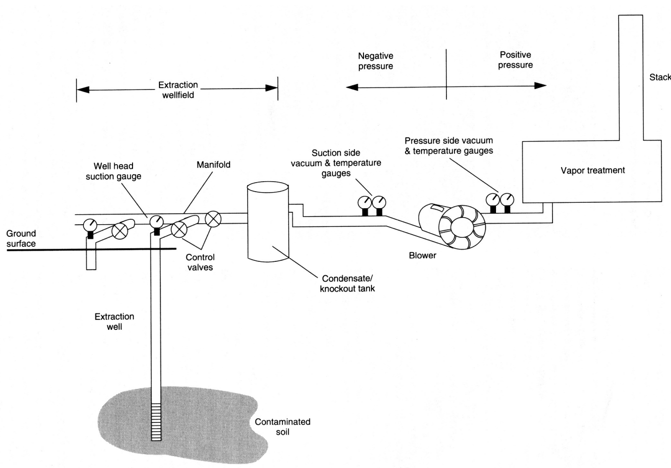
OPERATIONAL THEORY

Soil Vapor Extraction consists of mechanically withdrawing hydrocarbon vapors from soil pores via wells, trenches, or other subsurface structures using a vacuum pump. The withdrawn soil gases usually have to be treated to remove contaminant phases prior to discharge to the atmosphere. Volatile hydrocarbons in contaminated soils partition in specified proportions among gases contained within soil pores, the adsorbed phase attached to soil surfaces and the liquid phase as free product or dissolved in soil moisture. Removal of soil gas containing volatile hydrocarbons and its replacement with clean air causes more hydrocarbons to be released to the soil gas from adsorbed and liquid phases. Injection of air under pressure into the saturated zone also can release dissolved gases (such as volatile contaminants) into the overlying unsaturated zone, making them also available for Soil Vapor Extraction.

ADVANTAGES AND DISADVANTAGES

Soil Vapor Extraction has the advantages of being effective at significant depths within unsaturated soils and from beneath structures that prevent feasible remediation by soil excavation, being able to remove volatile contaminants from a zone of groundwater fluctuation, and being effective in soils with moderately low hydraulic conductivity typically considered inappropriate conditions for bioremediation. Disadvantages of Soil Vapor Extraction include the added cost of treating vapors prior to atmospheric discharges, the inability of the technique to address free product residuals, ineffectiveness in impermeable soils, and limited effectiveness of the technique for hydrocarbons rich in semi-volatile components such as diesel fuel.

FEASIBILITY AND DESIGN CONSIDERATIONS



Conceptual Configuration for Soil Vapor Extraction System

The basic components of a simple Soil Vapor Extraction system include wells or trenches for withdrawing vapors, piping connecting these features to the suction of the vacuum blower or pump, and some form of emissions control. Proper implementation of Soil Vapor Extraction, however, requires complex engineering design, with the number, capacity, and location of system features and operational vacuum pressures balanced appropriately based on local soil permeability, contaminant volatility, and contaminant concentration. Similarly, treatment systems for atmospheric discharges also must be engineered to include the appropriate combination of activated carbon adsorption, thermal or catalytic incineration, or combustion as a fuel for remedial systems, depending on contaminant concentration and recovery rate. Implementation design may supplement Soil Vapor Extraction with Groundwater Extraction, Bioremediation, or other remedial techniques to maximize overall remedial efficiency and effectiveness.

CLEAN PROPERTIES' STAFF & EXPERIENCE

Clean Properties' engineers are expert in designing SVE systems optimal for site-specific geologic and contaminant conditions to assure that remediation proceeds with maximum efficiency at minimum cost. The staff at Clean Properties are experienced in installing, operating, and maintaining SVE systems. Clean Properties has successfully implemented SVE technologies to remediate soils contaminated with gasoline, dry-cleaning fluids, and chlorinated solvents.

CLEAN PROPERTIES, INC., 111 Boston Post Road, Suite 214, Sudbury, MA 01776
Phone: 800-977-1982 *Email: MBerger@CleanProperties.com*