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Soil Remediation For UST Sites

In Situ Soil Vapor Extraction

In situ soil vapor extraction (SVE) *is a technique for removing contaminants from unsaturated soils. The technique draws fresh air into the ground with a vacuum pump. The air brings the contaminants to the surface, where they can be treated and safely discharged.*

In situ soil vapor extraction is most effective in coarse-grained soils such as sand and gravel. It requires a minimum 5-foot-thick unsaturated zone of soil. This technique can be used in conjunction with air sparging, groundwater pumping, or bioremediation systems.

This technique is able to treat large volumes of soil effectively and with minimal disruption to business operations. It also can remove contamination from near or under fixed structures.

Petroleum Types And Constituents

- Fresh and weathered gasoline and diesel
- Volatile organic compounds (VOCs) such as benzene, toluene, ethylbenzene, and xylene (BTEX); and semivolatile organic compounds (SVOCs)

In Situ Soil Vapor Extraction	
Advantages	• Effectively treats large volumes (>1,000 cu yd) of soil • Removes contamination near or under fixed structures • Causes minimal disruption to business operations • Removes volatile contaminants from the zone of water table fluctuation
Limitations	• Effectiveness limited in heterogeneous soils or soils with high clay or organic content • Airflow may not contact all parts of soil • Leaves residual constituents in soil • Might require air discharge permits
System Components	• Vertical or horizontal extraction wells • Trenches • Vacuum blower or pump • Injection and passive inlet wells • Aboveground vapor treatment equipment (optional)

Wastestream Treatment	• Vapor treatment options (if needed):
	  • *Vapor phase biofilter*
	  • *Granulated activated carbon*
	  • *Internal combustion engine*
	  • *Catalytic oxidation unit*
	  • *Thermal incinerator*

Parameters to Monitor[1]	• Vapor concentration • Airflow rate
Cleanup Levels and Timing[2]	• Can remove 90% of volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) • For an ideal site[3], 90% in 6 months to 1 year • For an average site[4], 90% in 6 months to 3 years • Longer time required for heterogeneous soils and less volatile constituents
Costs[5]	• For an ideal site[3], $40,000 to $120,000 • For an average site[4], $100,000 to $150,000 • Vapor treatment costs can drastically affect total costs

[1]"Parameters to monitor" are for performance purposes only; compliance monitoring parameters vary by state.
[2]Cleanup standards are determined by the state.
[3]An "ideal site" assumes no delays in corrective action and a relatively homogeneous, permeable subsurface.
[4]An "average site" assumes minimal delays in corrective action and a moderately heterogeneous and permeable subsurface.
[5]Costs include equipment, and operation and maintenance.