

The Environmental Corner

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Selecting A Remedial Technology

Selecting a remedial technology could be the most important decision you could make. So how does one go about selecting a cleanup approach and what factors come into play? The effectiveness of any cleanup technology is dependant on the chemicals being remediated (petroleum or perchloroethylene), the chemical concentrations, the geologic or stratigraphic setting of the site, the depth to groundwater and whether or not groundwater is impacted and will need to be remediated. If anyone tells you that they can cleanup contamination without knowing the specifics of the site, be very cautious of that individual.

Consultants generally screen several different alternatives using a matrix system that has up to nine (9) criteria. We always include a tenth criteria that focuses on how the remedial activities will effect the daily operations of the dry cleaner.

The screening includes:

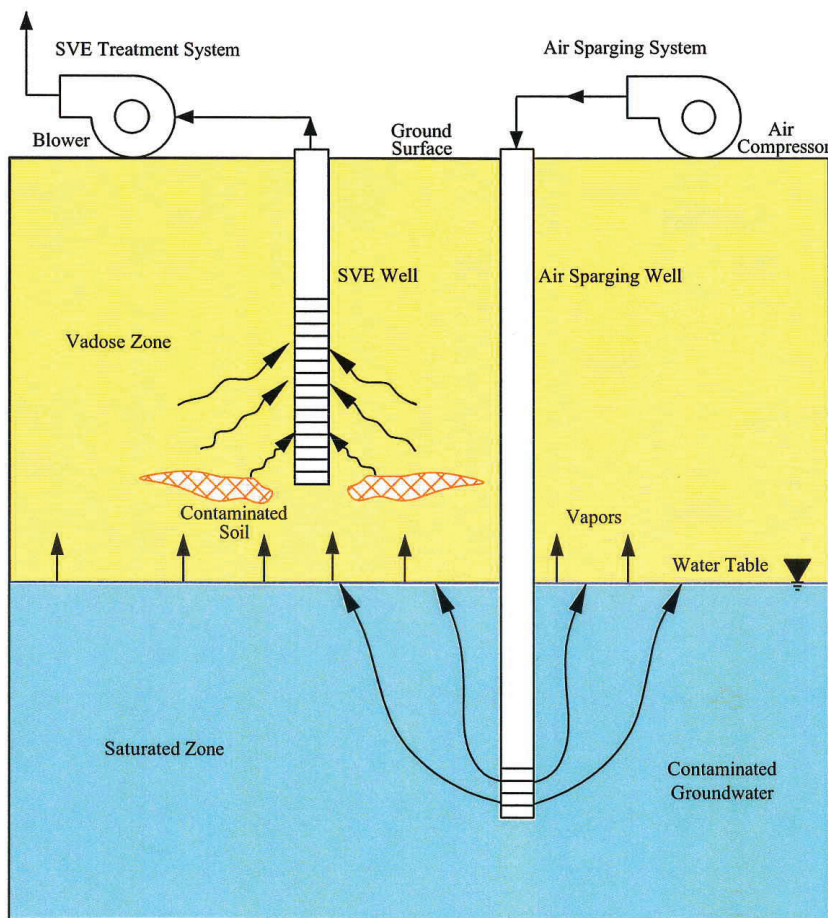
- Overall Protection of Human Health
- Compliance with Local, State and Federal Laws
- Long Term Effectiveness
- Reduction of Toxicity and Mobility
- Short Term Effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance, and
- Impacts to Daily Business Operations

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As Seen In...



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SVE And Air Sparging System Schematic (Not to scale)

The most common remedial technologies for cleaning-up contaminated soil are:

Excavation

Soil excavation involves physically removing the contaminated soil with an excavator or other equipment, loading the excavated soils into dump trucks (or storage bins), and transporting the soils off-site for disposal and/or treatment. This treatment technology, usually fast and inexpensive compared to other technologies, is generally good when the contamination area

is small to medium in size, and buildings or other structures are not located near or over the contaminated soil.

Soil Vapor Extraction

Soil vapor extraction (SVE) technology essentially removes volatile and semi-volatile chemicals from the ground by applying a vacuum to the soil. Typically, a blower (or multiple blowers) is connected to a network of extraction wells, which are generally constructed of slotted PVC or metal to allow airflow through the soil. The

contaminated air vapor is brought to the surface and usually treated before it is emitted into the atmosphere. SVE technology is generally preferred for loose soils, such as sand, and requires a trailer or shed for the equipment. Generally, pilot testing is required to determine the applicability of SVE, the blower(s) size, and SVE well spacing requirements. Typically, much operation and maintenance (O&M) is required for SVE systems.

Bioventing

Bioventing technology involves the injection of a gas into the contaminated soil to speed-up the biodegradation (remediation) of contaminants. The type of gas used depends on the type of contaminants, and typically include oxygen, nitrogen, hydrogen, and carbon dioxide. The gas is delivered into the soil through injection wells. SVE wells are sometimes used to remove the by-products that form after the gas reacts with the contaminants. Bioventing is typically faster than SVE alone, and requires little space for equipment and O&M. The use of this technology depends on the amount and type of bacteria and microorganisms within the soil. This technology requires pilot scale tests before a full scale operation is implemented.

Thermal Treatment

Thermal Treatment of contaminated soil involves utilizing electrical resistance heating using a 3- to 6-phase power supply as a mechanism to heat soil. Metal electrodes are installed to heat the soil to a

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temperature of approximately 1500 to 1600 Fahrenheit. The high temperatures cause the contaminants to volatilize, and can then be removed from the soil using SVE technology. This technology is generally preferred for stiff/tight soils such as clay. This technology requires a trailer for equipment and can be quite expensive.

The most common remedial technologies for cleaning up contaminated groundwater are:

Pumping Out Groundwater

Also known as pump and treat, this is the granddaddy of remediation technologies for affected groundwater. It has the advantage of being well understood and generally easily approved. The major disadvantage is that it takes a longer time (hence, more expensive) and has more equipment, outdoor shed sized, on the land than other technologies.

Air Sparging

Basically, this technology blows air from the atmosphere through impacted groundwater. The air flow entrains the solvent and daughter products. In most applications and in many states, the air that is forced through the media must be captured, usually by a system that essentially is an SVE system. Therefore, if unsaturated soil and groundwater are impacted, teaming air sparging and SVE is often a good option. This option is quicker than pump and treat for groundwater cleanup but has a larger footprint, trailer sized, on the surface.

Stimulation of Indigenous Bacteria and Other Microorganisms

A technology that adds food, generally a sugar or sometimes a more complex mix (ground shrimp carapaces have been used), to the groundwater system. This material stimulates the natural biological, mainly bacterial, activity which changes the overall chemical environment to favor degradation and which can bioactively degrade the solvents and daughters. Small surface impact and general low cost can be achieved. The change in overall chemical environment can lead to the release of iron and arsenic, if present. This technology requires a combination of lab testing and pilot field tests to implement. Lab or pilot testing may indicate that this is not an acceptable technology.

Injection of Hydrogen Release Compounds

A relatively new technology, injecting material that releases hydrogen to the groundwater will increase the normal rate of decay of solvents. This technology uses a chemical reaction largely but not completely independent of bacteria and microorganisms. Applica-

tion, as in biological stimulation, requires a careful study of the situation and pilot scale tests before going to full scale operation. And again, technology may be rejected by results of lab or field testing.

Injection of Potassium Permanganate

Another low area footprint technology, permanganate injection creates the opposite chemical environment than the preceding two technologies. Permanganate injection creates an environment in which the solvents and daughters are quickly destroyed by inorganic chemistry. Again, lab and field pilot tests are recommended as elements such as chromium may be released. The other drawback to this injection technology is that there are increased safety concerns during the injection process over previous injection technologies.

In summary, the selection of the remedial technology requires a balancing of the costs, benefits and implementability of any option. The consultant has to talk with you about the options for cleanup that are available, and you have to involve yourself in that discussion for the selection to be a happy one for all concerned.

As Seen In...

The logo for Western Cleaner & Launderer features the word "Western" in a smaller, white, sans-serif font at the top left of a red rectangular background. Below it, the words "Cleaner & Launderer" are written in a large, bold, white, sans-serif font, with the ampersand being particularly prominent.

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