



Fact Sheet

Soil Vapor Extraction

Air Force Real Property Agency, McClellan

September 2008

This fact sheet describes a technology that is being used to clean up the contaminated soil at the former McClellan Air Force Base.

MMcClellan Air Force Base used many chemicals to support military activities while the base was active from 1936 to 2001. Fuels were used to power vehicles, airplanes and generators. Solvents were used to degrease machinery and equipment and to wash aircraft parts. Sometimes these chemicals escaped to the environment from leaking tanks, by being washed down floor drains or by being spilled during transportation and use. Past chemical disposal practices also contributed to soil and groundwater contamination. These previous disposal practices were legal in the past, but are now known to cause environmental contamination and are no longer used. The Air Force is committed to cleaning up the soil and groundwater contaminated with fuels, solvents and other chemicals from past activities at McClellan. Soil Vapor Extraction, one of the technologies used to clean up contaminated soils at McClellan, involves vacuuming contaminant vapors out of the ground.

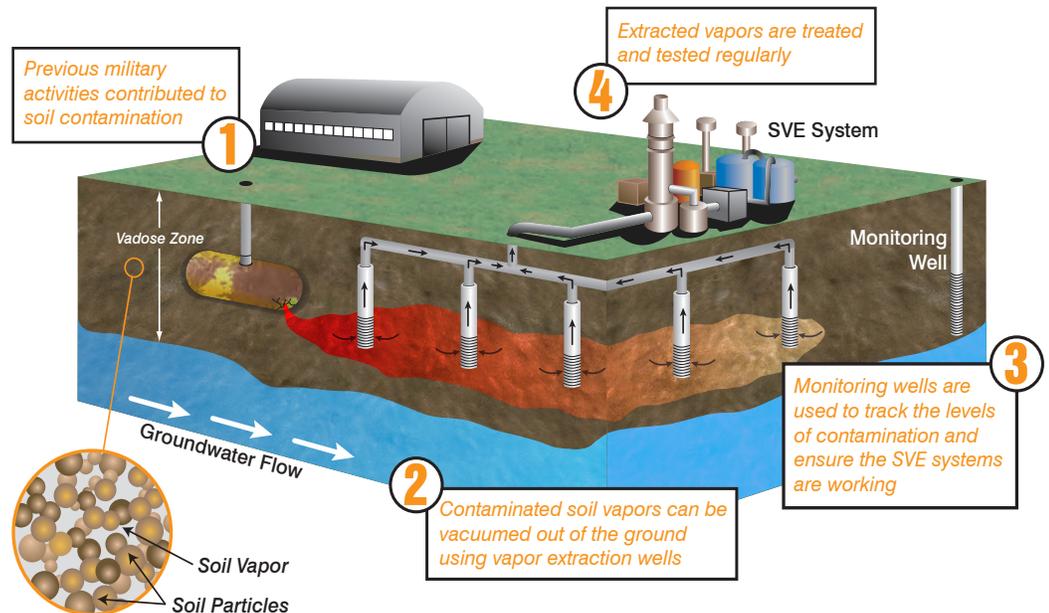
What is Soil Vapor?

The soil at McClellan is made of small bits of minerals, rocks, sand and clay, and organic materials such as pieces of plants. Also, there are other things in soil such as water and air in the spaces between soil particles. Soil vapor is gas in the spaces between soil particles. Soil vapor contains air, evaporated water, and in some places at McClellan, contaminants spilled onto the soil. Some of these chemicals evaporate (or “volatilize”) easily. Chemicals that readily change from liquid to vapor, including many solvents and fuel products, are called volatile organic compounds (VOCs). These VOCs can move with soil vapor through the soil in all directions, including down into groundwater and up into buildings.

What is Soil Vapor Extraction?

Soil Vapor Extraction (SVE) is a technology used at McClellan to remove contaminants from the soil above the water table (vadose zone). As the name suggests, SVE removes contaminants from the soil in vapor form, making it an ideal cleanup technology for VOCs. Soil vapor is vacuumed out

of the ground through extraction wells. These wells are like slotted straws and are installed in holes drilled through the vadose zone. The number of extraction wells depends on site conditions such as the amount of contamination and the type of soil. SVE is most effective in loose soils, such as sand and gravel, because soil vapor moves quickly through the large spaces between the soil particles. In tight soils, such as silt and clay, SVE systems must operate longer to get maximum results. Extraction wells are connected together using above- or below-ground pipelines, when are connected to vacuum pumps. When



soil vapors are removed from the ground, VOCs are captured and treated as appropriate to assure protection of human health and the environment.

SVE systems are easy to install, can be used with other cleanup technologies and are effective under a variety of site conditions. SVE does not require digging up contaminated soils. Soil vapors extracted using SVE usually require treatment, but costs for treating extracted vapors are low compared to costs for digging up and treating soil. Additionally, SVE prevents contaminants from migrating to the groundwater – cleaning up contaminated groundwater takes longer and costs more.



One of the sites where Soil Vapor Extraction is currently being used at McClellan.

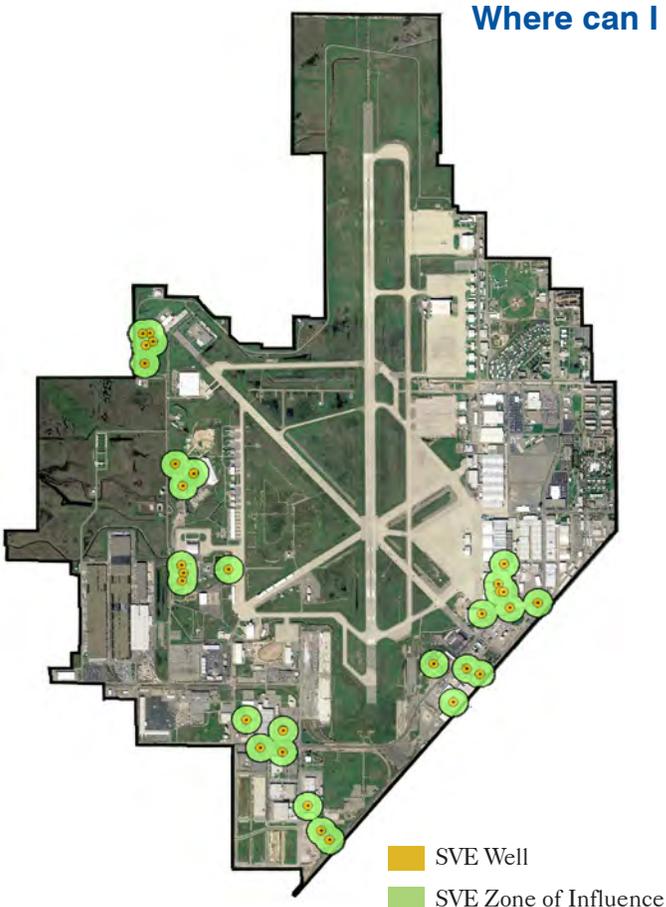
Soil Cleanup at McClellan using Soil Vapor Extraction

The first SVE system was installed in 1993; 14 SVE systems (shown in the map below) are currently operating at McClellan. Each SVE system at McClellan contains vacuum pumps, one to ten extraction wells, and a treatment system to remove VOCs from the extracted soil vapors. Extraction wells are installed up to 110 feet deep. To date, more than one million pounds of contamination have been removed from the soils at McClellan by SVE systems.

Effectiveness of the SVE systems at McClellan is tested regularly. Soil vapor monitoring wells are installed throughout the treatment areas and samples are collected routinely to track trends in contaminant concentrations. Treated vapors are also tested to make sure that the treatment technologies are effective and that they ensure protection of human health and the environment.

Treatment systems being used at McClellan include:

- **Carbon Adsorption** – granular activated carbon filters VOCs out of the vapors by making them stick to carbon particles similar to the way fish tank filters clean the water.
- **Flameless Thermal Oxidation** – turns VOCs into non-toxic compounds by heating them.
- **Catalytic Oxidation** – converts heated VOC vapor to carbon dioxide and water by passing the vapor over a catalytic material similar to the way catalytic converters work in automobiles.



Where can I learn more about Environmental Cleanup at McClellan?

For more information on the cleanup program,

- Attend the public Restoration Advisory Board (RAB) meetings
- Attend poster board sessions – a chance to ask one-on-one questions on the cleanup activities
- Sign up to be added to the mailing list
- Read the flyers and fact sheets
- Visit the Information Repository/Administrative Record at McClellan
Hours of Operation: 8:00 a.m. to 3:00 p.m. (M-F)
For appointment call: (916) 643-1250, Ext. 257

Air Force Real Property Agency

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