



Fact Sheet

Soil Vapor Extraction

Air Force Base Conversion Agency, McClellan

No. 2-03

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

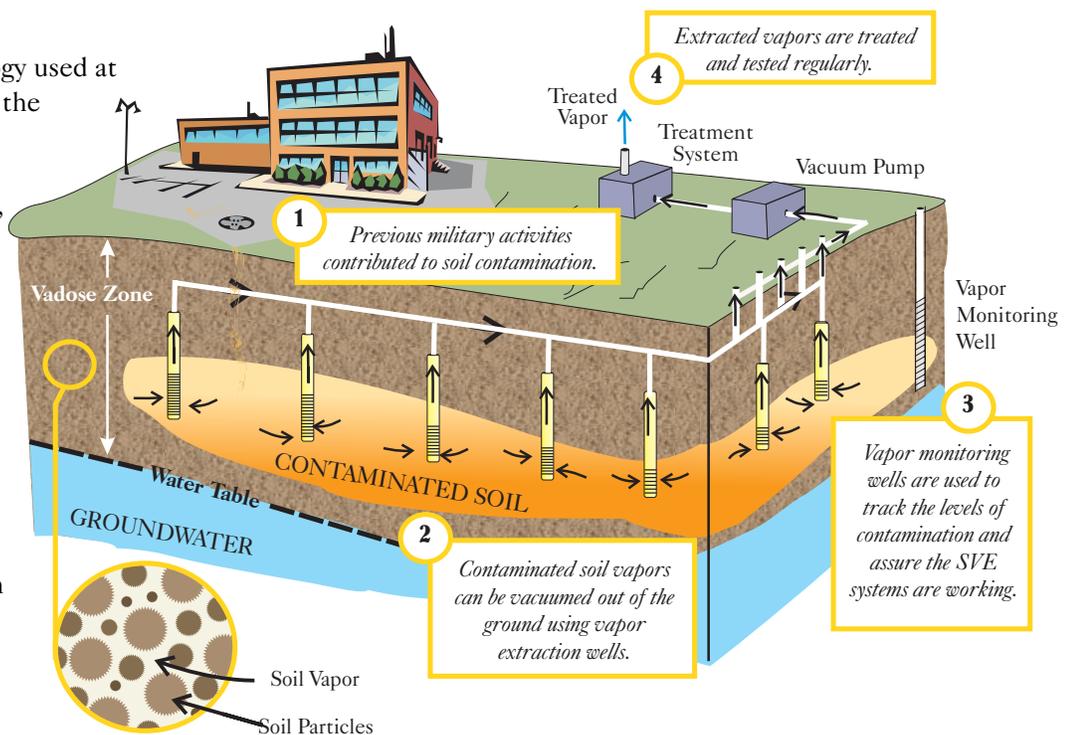
McClellan Air Force Base used many chemicals to support military activities while the base was active from 1936 to 2001. Fuels were used to power vehicles, airplanes and generators; solvents were used to degrease machinery and equipment; and cleaners were used to wash aircraft parts. Sometimes these chemicals escaped to the environment from leaking tanks, being washed down floor drains or being spilled during transportation and use. Past chemical disposal practices also contributed to soil and groundwater contamination. These were accepted disposal practices but are now known to cause environmental contamination and are no longer being 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 is one of the technologies being used to clean up contaminated soils at McClellan.

What is Soil Vapor?

The soil at McClellan is made of small bits of rocks and minerals like sand and clay, and organic materials like 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 gases that we breathe, evaporated water, and 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, and these networks are connected to vacuum pumps. When soil vapors are removed from the ground, VOCs are captured and treated 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 is more time consuming and costly.

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 and plans are underway to install four more systems by September 2003. 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, close to one million pounds of contamination have been removed from the soils at McClellan by the SVE systems.

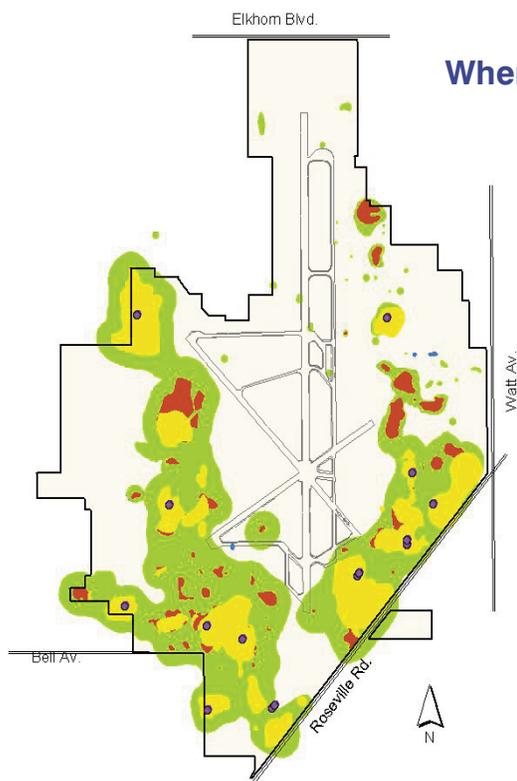
Effectiveness of the SVE systems at McClellan is tested regularly. Soil vapor monitoring wells are installed throughout the treatment areas and samples are collected routinely to track trends in contaminant concentrations. Treated vapors are also tested to make sure that the treatment technologies are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



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

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,

- Visit the website: <http://www.afbca.hq.af.mil/mcclellanem/>
- 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-Th and every other Friday; Contact: Laraine McQuillen at (916) 643-1250, Ext. 239

Soil vapor contamination and existing treatment system locations at McClellan. Green areas have low amounts of contamination that do not exceed agreed upon cleanup levels. Yellow areas are currently being treated by SVE systems; red areas will be addressed in the future.

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