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THE FACTS

Information About Environmental Cleanup at McClellan AFB.

Produced by McClellan AFB Environmental Management **Number 13**

Design of Pilot-Scale Soil Vapor Extraction System Completed

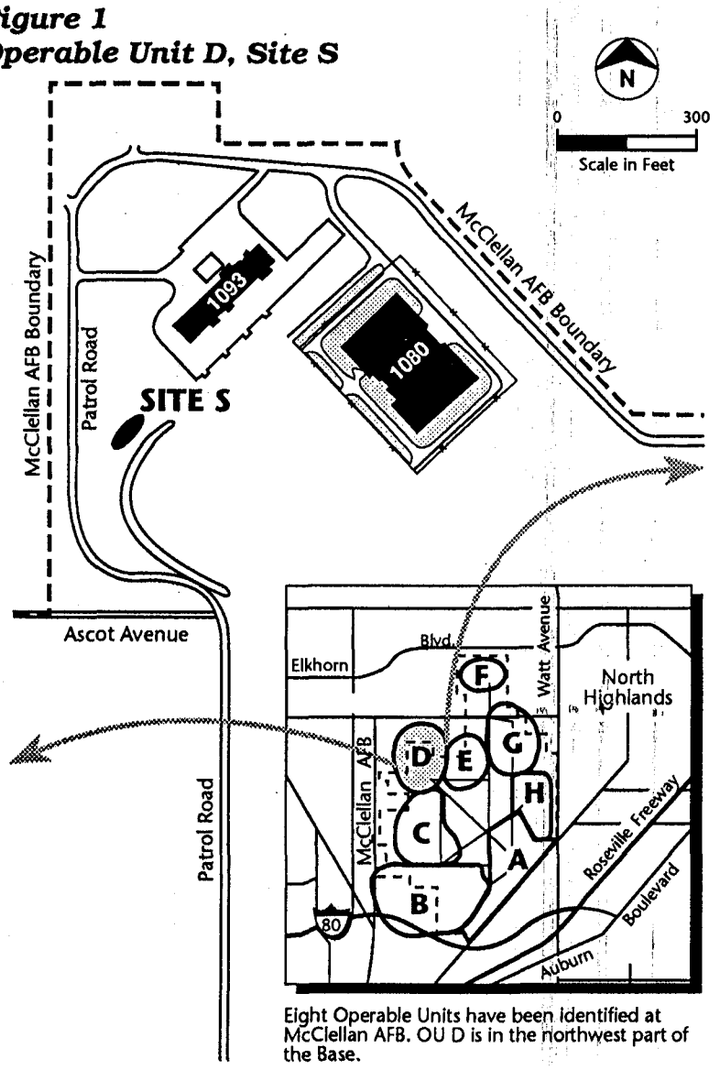
McClellan Air Force Base (AFB) has completed design of a pilot-scale soil vapor extraction (SVE) treatment system. The system will be used to test removal of soil vapor contaminants from Site S of Operable Unit D (OU D) (Figure 1). Site S, formerly a pit extending 4 to 15 feet below the ground surface, covers approximately 9,200 square feet and was historically used as a disposal site for fuels, oils, waste solvents, and industrial sludges. The SVE process involves using vacuum pressure to pull air through the soil to strip volatile organic compounds (VOCs) from the contaminated soil. The VOCs are then collected and destroyed in an emission control system. SVE technology was previously described in *The Facts*, Number 10.

Background

In the past, McClellan AFB disposed of wastes and solvents in pits in the northwest area of the base, now referred to as OU D. In 1985, an eight-acre cap was constructed over the pits to prevent rainwater from carrying wastes down through the soil to the groundwater. A collection and treatment system has also been constructed to treat contaminated groundwater. Since that time, McClellan AFB has been investigating methods to remove contamination from the pits and soil.

The pilot system will help determine the effectiveness of the SVE process in removing subsurface contamination.

Figure 1
Operable Unit D, Site S



Eight Operable Units have been identified at McClellan AFB. OU D is in the northwest part of the Base.

How Does SVE Remove Contamination?

The pilot-scale SVE system will consist of three individual networks of shallow (approximately 15 to 28 feet deep), intermediate (approximately 27 to 40 feet deep), and deep (approximately 40 to 95 feet deep) vapor extraction wells (Figure 2). Individual wells will be spaced approximately 20 to 30 feet apart and screened (perforated) to allow removal of contaminants from within and below the waste pit. The well networks will be connected to vacuum pump systems. The shallow well system will remove the soil vapor from within the pit area, and the intermediate and deep well systems will remove the soil vapor from beneath the waste pit. Water vapor will be separated from the soil gas and sent to the McClellan AFB Groundwater Treatment Plant.

The extracted soil vapor contaminants will be destroyed in a catalytic emission control system. In this system, the soil vapors are heated with a natural gas burner to approximately 800 degrees Fahrenheit (°F). The vapors then pass over a bed of catalyst where the contaminants are converted to carbon dioxide (CO_2), water (H_20), and hydrochloric acid (HCl). The catalyst is a material that initiates and accelerates the chemical conversion.

What About Air Emissions?

Based on performance of similar systems at other facilities, the emission control system is expected to remove and eliminate over 99 percent of the organic vapors extracted from the ground. In addition, the use of catalyst allows the process to take place at much lower temperatures (approximately 800°F) than a conventional incineration process (1,600 to 1,800°F). Because of the lower temperatures, the system will produce less air pollution (e.g., oxides of nitrogen [NO_x] and carbon monoxide [CO]).

The exhaust gas from the emission control system will be vented through a discharge stack that will be 12 inches in diameter and approximately 23 feet tall. The

exhaust gases will include CO_2, H_2O, HCl, NO_x, CO, and small amounts of residual soil vapors.

The exhaust emissions have been reviewed by the U.S. Environmental Protection Agency (U.S. EPA), the California Environmental Protection Agency (Cal-EPA), and the Sacramento Metropolitan Air Quality Management District (SMAQMD) to make sure that federal, state, and local requirements are met. During the test, stack emissions will be sampled. In addition, a human health assessment is being conducted to ensure that the potential health effects that might be associated with the exhaust emissions are within acceptable levels.

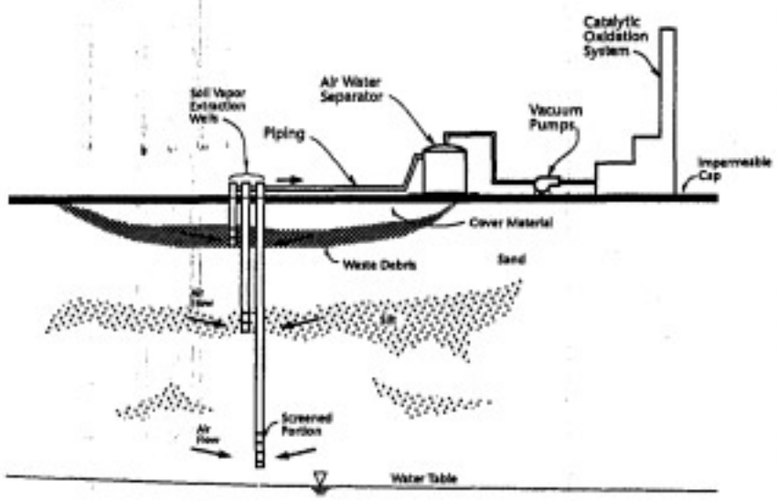
What Kind of Results Can Be Expected?

The pilot-scale SVE system design is based on the results of field studies of soil conditions, the nature and extent of the soil contamination, and experience with SVE at other sites. The system is expected to remove most of the contamination in and near the former pit area, and prevent it from reaching the groundwater table.

Based on field study results, the pilot-scale system could potentially remove 300 pounds per day of contaminants, or more. This compares to 12 pounds per day removed by the groundwater extraction and treatment system currently in place at McClellan AFB. Once the pilot-scale system is up and running (see the adjacent schedule), system performance and operation will be monitored closely to ensure safe operation.

SVE cleanup technology has been successfully demonstrated at hundreds of sites throughout the United States. Initial results from McClellan AFB studies are also encouraging. Implementing the pilot-scale SVE technology at Site S in OU D will help McClellan AFB move forward with its overall environmental restoration program. If SVE technology is successful in pilot tests, it may be used alone or in combination with groundwater treatment and other processes to clean up other sites on the base.

Figure 2
Soil Vapor Extraction (SVE) - Schematic



SVE Pilot Study Schedule

- *Complete Design*
  August 1992
- *Install Pilot System*
  July to October 1992
- *Pilot System Operation*
  Nov. 1992 to April 1993

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