Edwards Air Force Base
Installation Restoration Program

IRP Update

May 2001

Base Tests Common Cleanup Solution at Uncommon Site

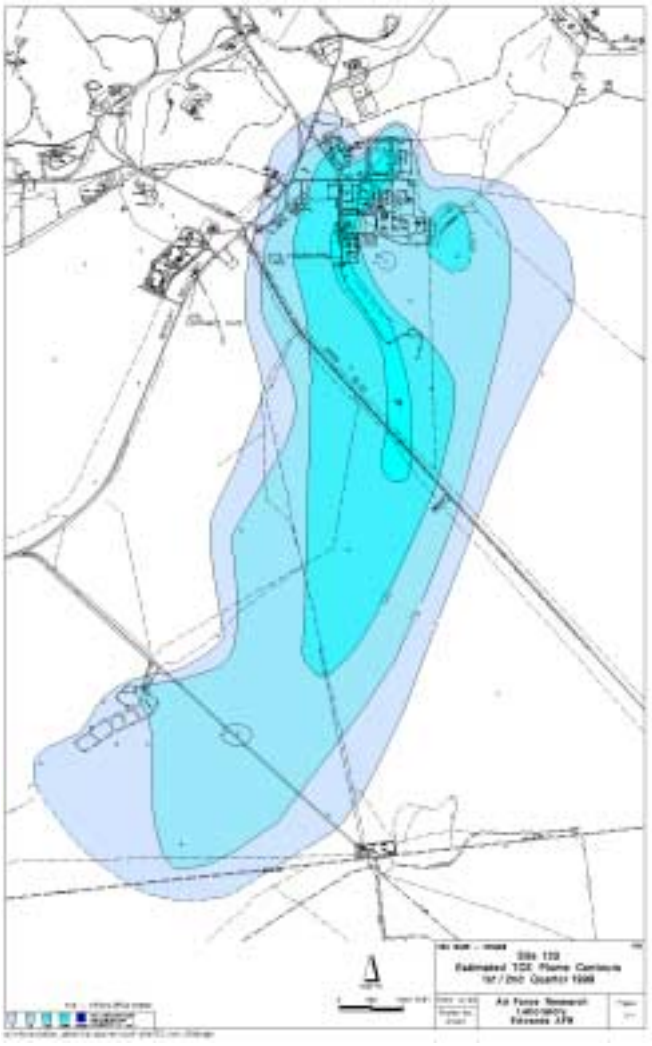
This IRP Update describes Site 133 and the treatment system the Air Force has installed for a Treatability Study.

The Air Force has installed a granular activated carbon (GAC) adsorption system to remove contamination from groundwater at a remote Air Force Research Laboratory (AFRL) Propulsion Directorate site. The location, known as Site 133, has a large plume of groundwater contaminated with solvents and other chemicals.

Site 133

Site 133 is one of the largest groundwater contaminant plumes under the Air Force Research Laboratory (AFRL) Propulsion Directorate, located on Leuhman Ridge. The plume stretches for nearly 2 miles down the south side of Leuhman Ridge, toward the center of the Precision Impact Range Area. To complicate cleanup, the plume occurs within fractures in the hard granitic bedrock that makes up most of Leuhman Ridge.

Although groundwater from the site is not used as drinking water, contaminants are a concern because they exceed regulatory limits. The primary contaminant at the site is the solvent trichloroethene (TCE), used in the past to clean rocket engine parts. Concentrations of TCE in groundwater samples have been as high as 6,100 parts per billion (ppb). The regulatory limit is 5 ppb. Other chemicals of concern and their maximum concentrations include the solvent tetrachloroethene (PCE) at 1,100 ppb, gasoline additive methyl



This plume map shows the extent of trichloroethene contamination at Site 133.

Air Force Flight Test Center
Environmental
Public Affairs
5 East Popson Avenue
Building 2650A
Edwards AFB, California
93524-1130
(661) 277-1454

tertiary butyl ether (MTBE) at 4,100 ppb, and rocket fuel additives N-nitrosodimethylamine (NDMA) and ammonium perchlorate at 0.0290 and 92 ppb, respectively.

Contamination Source

As with most Edwards sites, past practices are responsible for the contamination. The first suspected source was the laboratory landfill but further study showed the plume originated upgradient. During investigation, potential source areas grew to include the Civil Engineering yard, former disposal ponds at the AFRL chemistry laboratory, the old fire training area, dry wells located at several machine shops and former missile assembly buildings, and leaking sewer lines. The plume underlies five other Installation Restoration Program sites.

Treatability Study Goals

The treatment system was chosen for Site 133 with three goals: Foremost is to get the plume under control by stopping the further migration of the contamination downslope. Secondly, to begin removal of contamination from the groundwater. And third, to evaluate the effectiveness and cost of using GAC to treat perchlorate, MTBE and NDMA.

Cleanup Process

The cleanup process pulls groundwater from extraction wells, treats the water at up to 100 gallons per minute using three 2,000-pound GAC canisters in series and discharges it into the AFRL sewer system.

"This works somewhat like a charcoal water filter in your home," Air Force project manager Ai Duong said. The carbon usually consists of ground coconut shell charcoal that is thermally processed. This processing creates small porous particles with a large internal surface area. The carbon attracts and sorbs contamination. Water can be passed through a canister full of the charcoal relatively quickly.

The resulting water will be so clean that through dilution it may disrupt bacterial processes at the AFRL sewage treatment plant. If that should occur, nutrients for the bacteria, possibly a combination of dog food, sugar solution or fertilizer, will be added to the water before it is discharged into the sewer.

Once a canister can adsorb no more contamination, the system will be shut down and the carbon replaced within the canister. The sequence of the canisters will be rotated so that the newest carbon is always in the last canister. The carbon removed will be recycled off-base at a licensed regeneration facility.

Regular samples will be taken to determine the system's effectiveness. After 18 months, the Air Force will prepare a report evaluating the system and determine the future of the site cleanup.

Schedule and Cost

The test will be implemented in two phases. As of May 2001, most of Phase I has been completed. One pumping well, installed in 1996, was converted to an extraction well. Two new extraction wells and five observation wells were installed to a depth of 150 feet. To connect to electricity and the sewer, 4,000 feet of trenches were dug. The groundwater treatment system was installed. It includes a 1,000-gallon equalization tank, filters, the three 2,000-pound GAC vessels, a system control panel, electrical power, and associated piping.

Once the rates of water being removed and area of effect from the first three wells have been measured, Phase II will begin. Two or more additional wells may be installed to expand treatment of the contaminant hot spot, or area of highest concentration. Phase II will last at least 18 months before any further expansion.

It will cost about $1 million to build, operate and maintain the system for 1 year. After that, operations and maintenance will cost about $18,000 a month. This cost includes weekly maintenance and monitoring, and monthly sampling of the influent, two midpoints and the effluent.

For more information on this project or the Installation Restoration Program, contact Gary Hatch, chief, Environmental Public Affairs at (661) 277-1454 or e-mail:gary.hatch@edwards.af.mil.