Fact Sheet

Kelly Air Force Base Conversion Agency

Groundwater Flow Modeling

The former Kelly Air Force Base, located in San Antonio, Texas, was first used during World War I as a pilot-training base. Its training mission grew substantially during World War II. In addition to training, the base took on the role of aircraft maintenance, becoming one of five main aircraft maintenance depots in the country. Aircraft maintenance became the primary mission until base closure in summer 2001. In these roles, the former Kelly AFB used large quantities of fuels and cleaners, some of which seeped into the soil and groundwater from spills or leaks. The U.S. Air Force Base Conversion Agency (AFBCA) is currently evaluating possible environmental remediation options for sections of the former Kelly AFB contaminated by more than 50 years of training and maintenance operations.

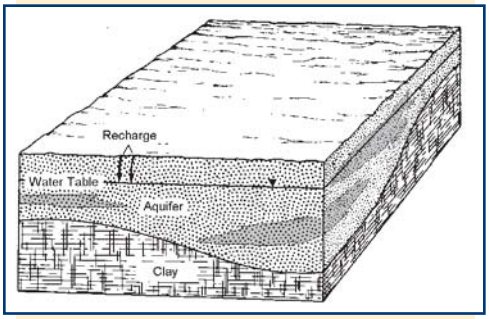
What is Groundwater Flow Modeling?
Groundwater flow modeling is a proven, scientific and objective tool the Air Force can use to compare different methods of environmental remediation activities. It combines mathematical formulas with data measured in the field to predict how groundwater naturally flows and how contaminants travel and change their chemical makeup beneath the former Kelly AFB and the nearby area. Modeling reproduces complicated physical, chemical and biological processes that occur in the shallow groundwater to create a three-dimensional drawing that helps the Air Force project the amount of time it will take to reduce concentrations of contaminants in shallow groundwater.

How was the former Kelly AFB's shallow groundwater model developed, and how is it used?
The shallow groundwater model known as MODFLOW-SURFACT was developed for use at the former Kelly AFB by HydroGeoLogic, a groundwater modeling company. The model is a modified version of MODFLOW, a computer program developed by the U.S. Geological Survey.

To adapt the MODFLOW to the former Kelly AFB, 15 years of environmental data collected from both on and off base are entered into a computer program. These data create a baseline and allow scientists to consider historical information concerning regional groundwater flow patterns. The baseline flow conditions are compared to the field observation to observe how well the model is calibrated. Once the model is calibrated, different combinations of cleanup technologies are simulated. All technologies are compared to one another and to the natural groundwater flow patterns evident in the baseline. The comparison helps to evaluate which cleanup plan would be the fastest and most effective. The modeling can also be used to evaluate the flow rate or capture zone of a groundwater recovery system, determine the distance a plume may migrate, or help establish the biodegradation rates for the contaminants. Modeling is only one of the methods used to evaluate a cleanup technology. Other factors considered include technical practicability, short- and long-term effectiveness and cost.

Groundwater modeling is a tool the Air Force uses to:

- Predict the way groundwater flows
- Predict the way contaminants flow
- Predict what happens to contaminants
- Assist scientific analyses
- Help assess cleanup options



This three-dimensional picture shows a groundwater aquifer system similar to the one in San Antonio. This is one tool scientists use to find a suitable cleanup method. Using modeling results, scientists make a similar picture of shallow groundwater beneath the former Kelly AFB.

Contact information

Call the Public Information Line at (210) 925-0956 or mail to AFBCA, 143 Billy Mitchell Blvd., Suite 1, San Antonio TX 78226.

Groundwater Flow Modeling

For More Information
Several reports have been written about Zone 4 shallow groundwater cleanup at the former Kelly AFB and MODFLOW. Learn more about remediation activities at the former Kelly AFB through the following outlets:

References
HydroGeoLogic, Inc. Basewide Groundwater Flow Model for Kelly AFB, Texas, Draft Final. 1999.

HydroGeoLogic, Inc. Evaluation of Remediation Alternatives at Site S-4, Kelly AFB, Using a Groundwater Flow and Transport Model, Final. 2000.

Appel, C.A., and T.E. Reilly. Summary of Selected Computer Programs Produced by the U.S. Geological Survey for Simulation of Groundwater Flow and Quality, Circular 1104. 1994.

Web Sites
Department of Defense web site for Groundwater Modeling Systems:

http://www.chl.wes.army.mil/software/gms

U.S. Air Force Center for Environmental Excellence web site for Predictive Modeling:

http://www.afcee.brooks.af.mil/er/ert/predict.htm

U.S. Environmental Protection Agency web site for Groundwater Modeling:

http://www.epa.govncepihom/Catalog/EPA540S92005.html