

# New technology predicts contaminant migration

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Technology deployments within the core projects of the Groundwater/Vadose Zone Integration Project are enabling scientists to create a three-dimensional representation of underground contamination left from more than 40 years of defense production at the Hanford Site.

The Integration Project, managed by Bechtel Hanford, Inc., brings together science, technology and information necessary for contaminated soil and groundwater cleanup decisions at Hanford.

The spectral gamma logging system (SGLS) and the radionuclide assessment system (RAS) are two devices being used by MACTEC–Environmental Restoration Services, Inc. to provide information to the Integration Project. The technology measures radiological contaminants in the subsurface. The systems do not require soil sampling, but instead operate with highly sensitive radiological calibrated probes.

MACTEC–ERS is a prime contractor for the Department of Energy’s Grand Junction Office in western Colorado’s Grand Valley. The Grand Junction Office manages the Hanford Geophysics Program for DOE’s Richland Operations Office and the Office of River Protection, and MACTEC-ERS maintains and operates the SGLS and RAS.

“In the 200 Area Remedial Action Project, we use the technology to gather information about contaminant distribution in the vadose zone, which in turn helps in monitoring waste sites and predicting migration time for radiological contaminants toward the groundwater,” said Bruce Ford, 200 Area Remedial Action Project lead at Bechtel Hanford.

“In the Tank Farms Vadose Zone Project, the SGLS system has been applied to provide a baseline against which any changes in contaminant position can be judged,” said Tony Knepp, CH2M HILL Hanford Group project manager. “Likewise, the RAS system is being systematically used in the farms to identify changes.”

## Results without waiting

The gamma logging program gives near-real-time results and identifies radiological contaminant locations. Scientists do not have to ship soil samples to a laboratory for results. Furthermore, there is no need to create a new borehole to retrieve a soil sample. One borehole at each monitoring location can be used repeatedly for measuring changes in radiological contaminant movement or activity.

“Analyzing the SGLS data is a complex process, but a very effective method in measuring vadose-zone contaminants,” said Rick McCain, MACTEC–ERS technical lead. “The SGLS identifies man-made, gamma-emitting contaminants in the vadose zone and their location. The RAS is used to monitor changes in contaminant location so we can estimate when the contaminants might reach the groundwater.”



**Mike Herman of CH2M HILL Hanford Group lowers a detector probe into a borehole at the 200 West Area SX Tank Farm. The probe is deployed from a logging system attached to the bed of a pickup truck. By comparing gamma radiation measurements collected over time, geophysicists can document contaminant movement in the soil.**

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## New technology predicts contaminant migration, cont.

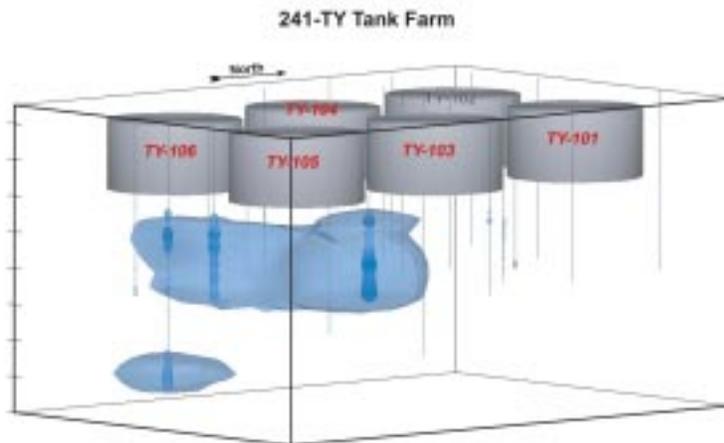
“The technology we use will aid Hanford in defining cleanup goals and in monitoring facilities where contamination is a potential risk,” said Jim Bertsch, MACTEC-ERS associate vice president. “Ultimately, the technology will help Hanford cleanup with efficient and cost-effective measurements.”

### Sharing the data

Once scientists have an understanding of contaminants and their concentrations below the surface, the data are entered into a Hanford-wide Web site. A series of charts and graphs are then constructed from the data, and the data are entered into the Integration Project’s System Assessment Capability, an integrated system of new and existing computer models and databases.

Scientists and workers use the models and databases to help DOE, the Washington State Department of Ecology and the U.S. Environmental Protection Agency reach site-specific cleanup decisions.

“DOE’s Office of River Protection and Richland Operations Office are benefiting from this technology,” said Richland Operations Office project manager John Silko. “Successful deployment of technology like the SGLS and RAS help DOE be an effective steward on the central plateau. In addition, the information will help us prepare for more cleanup in the Columbia River corridor and beyond.”



TY Tank Farm visualization of subsurface contaminant plume as determined from SGLS geophysical data.



**Teresa Musial, a MACTEC-ERS logging engineer, manipulates a hydraulic arm to lower a spectral gamma logging system probe into a monitoring well in Hanford’s 200 West Area. The gamma logging system provides high-resolution measurements that allow geophysicists to identify different radiological contaminants in the soil.**

The Groundwater/Vadose Zone Integration Project Internet site can be accessed at [www.bhi-erc.com/projects/vadose](http://www.bhi-erc.com/projects/vadose). ♦