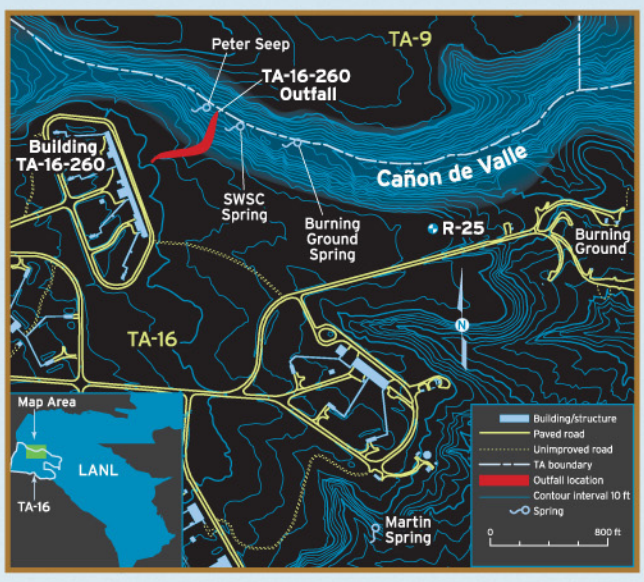
ENVIRONMENTAL TEAM TREADS LIGHTLY

Restoring Cañon de Valle



Area Affected by Contamination
Wastewater contaminated with high explosives (HE) was released into the outfall near the HE machining facility between 1951 and 1996. Nearby seeps, springs, perched aquifers, deep wells, and Cañon de Valle received contamination.

The stage was set decades ago—residues of high explosives (HE) and barium contaminated the water and sediment near the Los Alamos HE machining facility at Technical Area 16. Los Alamos researchers came in to investigate contaminant levels and distributions and determine site risks. They also evaluated a wide range of cleanup technologies to determine how best to remediate large amounts of contaminants at a low cost, while preserving the habitat of protected species nearby.

Investigations gauge groundwater and contaminant flow

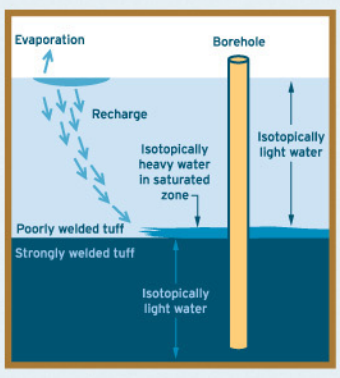
The team's efforts include hydrologic investigations of Cañon de Valle, spring systems, and the deep groundwater system. Over time, surface runoff and subsurface saturation move water farther from the contamination source. Researchers use boreholes, drilled at selected locations, to map high-permeability geologic units and the extent of contamination and flow. The team also studies how seasonal changes and the Cerro Grande fire (which destroyed 43,000 acres of forest in 2000) affect contaminant transport.

Immediate Remediation Efforts
Initially, the team focused on containing the water and source soil contamination. The team installed straw-bale best management practices, run-on barriers, and water diversion pipe and access controls. They also removed highly contaminated soils in the outfall area.

Focused action brings impressive results

One early priority was to remove as much of the source soil contamination as possible. As an interim measure, the team used robotic methods (for team and site safety) to remediate more than 90 percent of the HE in the source area soil. The team also installed a pilot-scale barrier system to control migration of spring water contaminants. This barrier system effectively removes HE from the spring water.

Identifying Recharge and Contamination Sources
The Martin Spring borehole encountered transient saturation during and after drilling. Teams used stable isotopes and chloride profiles to examine the saturated flow systems. Results are consistent with water sources in ponded waters that have undergone evaporation.



Model will help guide future efforts

From a tracer study and borehole data, the team developed a comprehensive hydrogeologic model of Cañon de Valle and surrounding areas. This model will serve as an important predictive tool that will let the team focus future environmental restoration efforts with greater precision and less impact on surrounding ecosystems and communities.

Modeling Cañon de Valle Contaminant Flow and Transport
The hydrogeologic conceptual model's features include transient and perennial surface and subsurface flow paths; stratigraphic control of lateral and fracture flow; and links between the mesa, canyons, and deep subsurface flow systems. Relating these features in a cohesive model helps the team understand and predict contaminant transport in the outfall area.

Illustration is courtesy of Andi Kron.

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