

# Nevada National Security Site Groundwater Characterization Strategy

safety ❖ performance ❖ cleanup ❖ closure



*Wells are drilled to collect groundwater samples, aiding scientists in determining contaminant boundaries and movement.*



## Background

From 1951 to 1992, the United States government conducted 828 underground nuclear tests at depths ranging from approximately 90 to 4,800 feet below the ground surface of the Nevada National Security Site. About one-third of these tests occurred near, below, or in the water table, resulting in some radioactive contamination of the groundwater. The U.S. Department of Energy (DOE) began preliminary hydrologic research in the 1970s; but a more intensive groundwater studies program was launched in 1989 when DOE formed the Underground Test Area (UGTA) to investigate potential impacts resulting from radioactive contamination.

## The “UGTA” Strategy

The complex geology and hydrology of the Nevada National Security Site presents unusual challenges in understanding speed, volume, and direction of groundwater flow and the movement of radioactive contaminants in water. To meet these challenges, the UGTA team developed a process that incorporates various components including drilling and sampling of wells, contaminant characterization, computer model development, future long-term monitoring, and institutional controls; all of which are designed to work in combination to build confidence in the strategy to protect the public. The ultimate objective of this strategy is to establish a comprehensive long-term monitoring network.

With these components in mind, the team designed a phased approach which requires approval at each stage by the State of Nevada Division of Environmental Protection (in accordance with the Federal Facility Agreement and Consent Order). This strategy starts with a regional evaluation to explore groundwater pathways over the entire Nevada National Security Site and progresses to more detailed studies at individual areas where underground nuclear testing was historically conducted. These detailed studies have progressed significantly at Frenchman Flat, Yucca Flat, and the Pahute Mesa areas. Currently, the process of determining contaminant movement and boundaries unique to each of the five (5) underground test areas (Frenchman Flat, Yucca Flat, Central Pahute Mesa, Western Pahute Mesa, and Rainier/Shoshone Mountains) is taking place.

## Definitions

**Characterization:** The process of identifying the type, amount, and location of contamination.

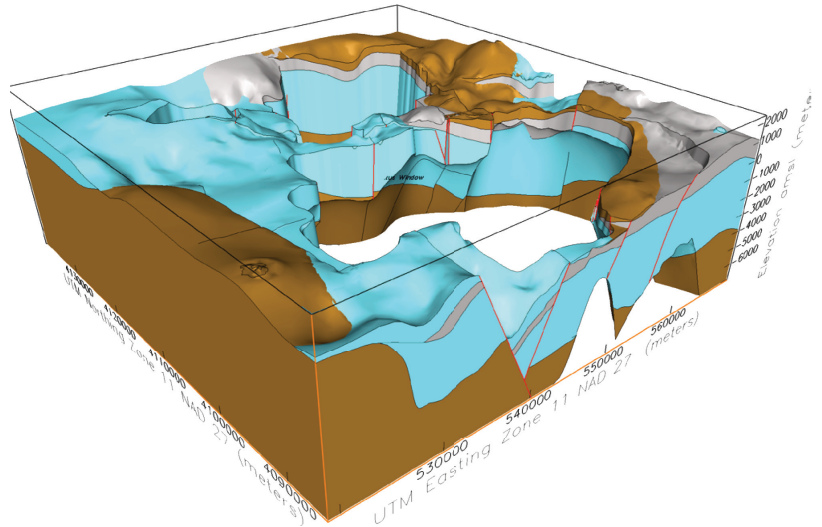
**Computer Model:** A computer-generated, three-dimensional representation of groundwater flow and contaminant transport used to identify contaminant boundaries for the purpose of refining existing monitoring networks.

**Stakeholder:** Individuals with vested interests in remediation activities at the Nevada National Security Site.

**Water Table:** Marks the very top of the groundwater layer where the pore spaces in rock and soil completely fill or “saturate” with water.

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Key to the UGTA strategy is the continuing development of contaminant transport models. These models are three-dimensional, computerized forecasts of where and how quickly radioactive contamination is moving in the groundwater. The models use data collected during historic nuclear testing, and from UGTA well drilling and sampling which includes the eight (8) new wells constructed in the Pahute Mesa area during 2009 and 2010. Progress includes acceptance of the Frenchman Flat contaminant transport model by the State of Nevada Division of Environmental Protection in November 2010. The Nevada Site Office expects to complete the remaining groundwater models by 2023.



*Scientists use computer modeling technology to understand how groundwater systems behave at the Nevada National Security Site.*

## Long-Term Management

Once the Nevada Site Office and the State of Nevada Division of Environmental Protection find UGTA groundwater study results acceptable, the State will approve completion of characterization activities. The Nevada Site Office then implements long-term monitoring using existing wells and, if necessary, drilling additional wells that continue testing models and build confidence in regulatory decisions to ensure the safety of communities surrounding the Nevada National Security Site.

### For more information, please contact:

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## Public Involvement

Throughout the years, public involvement has been a key element of UGTA. Stakeholders have participated in groundwater related public meetings and informational tours, and have provided specific recommendations on groundwater activities. The Nevada Site Specific Advisory Board (NSSAB) requested the Nevada Site Office obtain an independent peer review of the UGTA strategy. The peer review resulted in an overall confirmation of the strategy and implementation of several recommendations. The successful involvement of the NSSAB and other stakeholders was integral to the site selection of a new UGTA well drilled in the Pahute Mesa area during June 2009. The Nevada Site Office encourages the continuation of participation by the NSSAB and other stakeholders.

For information on all Nevada Site Office Environmental Management activities visit:

[www.nv.energy.gov/envmgt](http://www.nv.energy.gov/envmgt)

