

Groundwater at the Nevada Test Site

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 the Nevada Test Site at depths ranging from approximately 90 to 4,800 feet below the ground surface. About one-third of these tests occurred near, below, or in the water table, which resulted in some radioactive contamination of the area's 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 by the formation of the Underground Test Area (UGTA) Sub-Project at the DOE Nevada Site Office.

Faced with the reality that no proven, cost-effective method existed then, or now, for remediating deep, extensive groundwater contamination, the UGTA Sub-Project team set out to develop an effective, long-term monitoring system. This network is being designed to identify radiological risks (if, where, and when they exist) to help ensure the safety of off-site populations. Scientists are developing and refining computer models to effectively position future monitoring wells within the monitoring network.

The "UGTA" Strategy

The complex geology and hydrology of the Nevada Test Site presents unusual challenges in understanding speed, volume, and direction of groundwater flow and the movement of contaminants. To meet these challenges, the UGTA Sub-Project team embarked on an investigative process that incorporates various research components including drilling and sampling of wells, contaminant characterization, and computer model development.

Definitions

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.

Contaminant Boundary: A boundary distinguishing where water is considered safe or not safe for domestic or municipal use.

Proof of Concept: A method of confirming predictions about groundwater behaviors and the movements of contaminants.

Stakeholder: Individuals with vested interests in remediation activities at the Nevada Test Site.

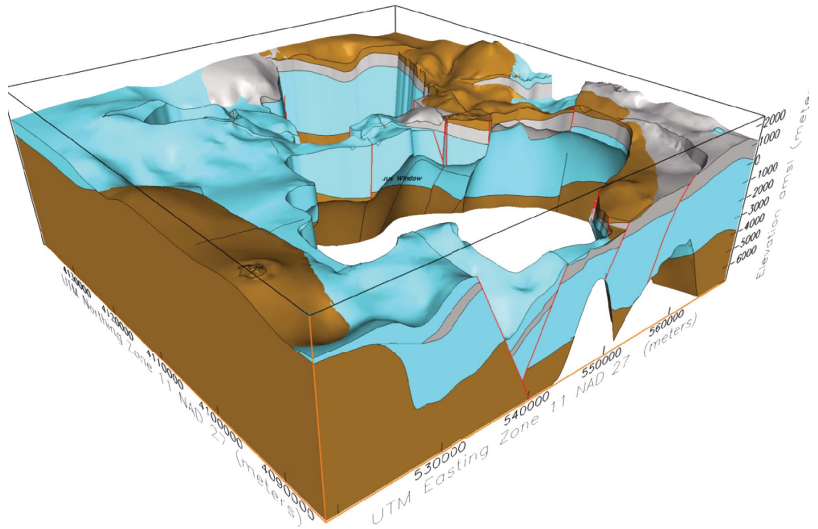
Water Table: Marks the very top of the groundwater layer where the pore spaces in rock and soil completely fill or "saturate" with water.

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With these components in mind, the team designed a phased approach. The objective is to establish a comprehensive monitoring network using both new and existing wells. The first phase of the strategy (already complete) consists of a regional evaluation, which explored the groundwater pathways over the entire Nevada Test Site. The second phase (currently in progress for some Corrective Action Units) will help scientists determine contaminant movement and the boundaries that are unique to each of the underground test areas. Both of these phases incorporate various components, such as sampling, contaminant characterization, computer modeling, and process validation.

In order to complete these local groundwater models, the Nevada Site Office will continue current sampling, characterization, and modeling activities until the year 2027. After modeling each site, the UGTA Sub-Project will engage in a five year proof of concept period to confirm the validity of the models' predictions regarding the behavior of the groundwater systems and the movement of contaminants.

If the results are acceptable to both the Nevada Site Office and the State of Nevada, the State will approve completion of UGTA characterization activities and the DOE will impose restricted access controls and implement a long-term monitoring program using existing wells and, if necessary, drilling new wells.



For more than 15 years, scientists have used computer modeling technology to understand how groundwater systems behave at the Nevada Test Site.

Long-Term Management

The Nevada Site Office will establish institutional controls, including restricted access and use of groundwater, for the areas associated with the UGTA Sub-Project. The Nevada Test Site, with the Nevada Site Office serving as the steward, will remain a restricted access facility for the foreseeable future. Approximately 30 water sources which are currently monitored in areas surrounding the Nevada Test Site will continue to be monitored on a regular basis. To date, this monitoring has shown no evidence of off-site contamination caused by underground nuclear tests.

Public Involvement

Throughout the years, public involvement has been a key element of the UGTA Sub-Project. Stakeholders have participated in UGTA related public meetings and informational tours and have provided specific recommendations on UGTA Sub-Project activities. The Nevada Site Office, in fact, worked closely with the Community Advisory Board for Nevada Test Site Programs and interested stakeholders to initiate an independent peer review of the UGTA strategy and has since implemented several recommendations of the peer review.

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