safety ❖ performance ❖ cleanup ❖ closure

Underground Test Area Sub-Project

Questions and Answers

U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office

The U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office works to protect Nevada's groundwater resources, and whenever possible, restore the environment at the Nevada Test Site. The Underground Test Area, or UGTA Sub-Project, was formed to better understand the behavior of groundwater at the Nevada Test Site and develop the best alternatives to protect the public, site workers, and the environment.

The geologic complexity of the Nevada Test Site presents unusual challenges for the scientists gathering information about the area's groundwater flow and possible movement of contaminants. UGTA Sub-Project staff work cooperatively with the State of Nevada and the scientific community to find the most practical and technologically advanced ways to approach these challenges. In addition, the UGTA Sub-Project uses a diverse technical working group, which includes national laboratories and other key organizations, to develop a comprehensive monitoring network.

To explain more about how the UGTA Sub-Project works, this brochure offers answers to frequently asked questions.

Each underground nuclear test is signified by a red dot on the Nevada Test Site map shown above. These test locations are then categorized into groups called Corrective Action Units. The UGTA Sub-Project Corrective Action Units are identified by the encircled areas and grouped according to types of contaminants and geographic proximity.

What problem does the UGTA Sub-Project address?

From 1951 to 1992, the United States conducted 828 underground nuclear tests at the Nevada Test Site as part of the nation's nuclear weapons testing program. Approximately one-third of these tests occurred near or below the water table, resulting in some radioactive contamination of the groundwater. The goal of the UGTA Sub-Project is to identify where radiological risks may exist in the groundwater, predict the movement of potentially contaminated groundwater, and define the extent of this migration. Ultimately, the information from this analysis will be used to establish a long-term monitoring network consisting of new and existing wells both on and off the Nevada Test Site.

Is there an immediate risk to the public?

Based on current scientific information, there is no immediate risk to the public. The contamination associated with Nevada Site Office activities is thought to be confined to areas on the Nevada Test Site where nuclear tests were conducted. Based on historic information and ongoing monitoring, the movement of radioactive material from these test areas has been minimal and has been encountered only within the immediate vicinity of the nuclear tests.

The Nevada Site Office knows where contamination originated and the general direction of its movement. What is not known with certainty is how long, if ever, it might take for the contamination to reach public water supplies. The Nevada Site Office is identifying contaminant boundaries (where water is considered safe or unsafe) and establishing a long-term monitoring network.

Understanding groundwater flow and the movement of contaminants at the Nevada Test Site is accomplished through well drilling and sampling, contaminant characterization, and computer model development. More details on the extent of contamination will be determined by ongoing UGTA activities as outlined in the UGTA strategy, with the goal of defining contaminant boundaries and protecting the public and site workers (see the U.S. Department of Energy Nevada Site Office "Groundwater Fact Sheet").

As a means of safeguarding the public and the environment, well drilling and sampling are part of ongoing UGTA activities to define contaminant boundaries.

Wells are drilled to collect groundwater samples, which help scientists determine contaminant boundaries and movement.

Q Has any groundwater contamination moved beyond the Nevada Test Site boundaries?

A No. To date, scientific data show no evidence of off-site contamination from the historic nuclear tests. This is based on periodic sampling of approximately 40 water sources (i.e., wells and springs) surrounding the Nevada Test Site. Sampling results from the majority of onsite wells also do not show any contamination.

Q If contamination did move beyond the Nevada Test Site, where would it go?

A Groundwater modeling indicates that if contamination did move beyond the boundaries of the Nevada Test Site, it would first occur in the area of Western Pahute Mesa, located in the northwest portion of the Nevada Test Site. Once off the site, migration would most likely occur in the direction of Oasis Valley because of its proximity to Pahute Mesa. Pahute Mesa is the location of the greatest number of monitoring wells.

Q What background tritium levels have been found?

A Tritium can be measured at very low concentrations (far below the regulatory standard), so it serves as a sensitive indicator of groundwater contamination. The Safe Drinking Water Act standard for tritium is 20,000 picocuries per liter. This means that water is considered safe up to this limit and poses no health risk. Background levels of tritium in Nevada Test Site groundwater are typically below detection limits when using standard laboratory techniques, which can reliably identify tritium at levels around 1,000 picocuries per liter. When using ultra-sensitive analytical techniques, tritium can be detected at extremely low levels (a few picocuries). Based on these more sensitive analyses, it has been determined that background levels of tritium around the Nevada Test Site may range from 0 to 30 picocuries per liter.

Safeguarding the public, the environment, and site workers is accomplished in part through a comprehensive onsite and off-site monitoring program.

Q Does the Nevada Site Office test for any contaminants other than tritium?

A The Nevada Site Office tests for a variety of contaminants in addition to tritium, including chlorine, helium, iodine, strontium, uranium, neptunium, technetium, carbon, cesium, plutonium, and krypton.

Q Does the Nevada Site Office have an early warning system in place?

A By actively analyzing water samples from the Nevada Test Site and monitoring surrounding public areas, the Nevada Site Office has a continuous early warning system in place. The Nevada Site Office regularly monitors 24 wells on Pahute Mesa and another 17 in Oasis Valley, most of which have been drilled as part of the UGTA Sub-Project.

The UGTA wells provide additional information regarding the geology of the area, how water moves through rock fractures, and the potential movement of contamination from the test locations to these wells. Once characterization and modeling are complete, the wells may be turned over to the Nevada Site Office Environmental Monitoring Program for inclusion in a long-term monitoring effort.

Q If contamination is found in off-site groundwater, how will the Nevada Site Office respond?

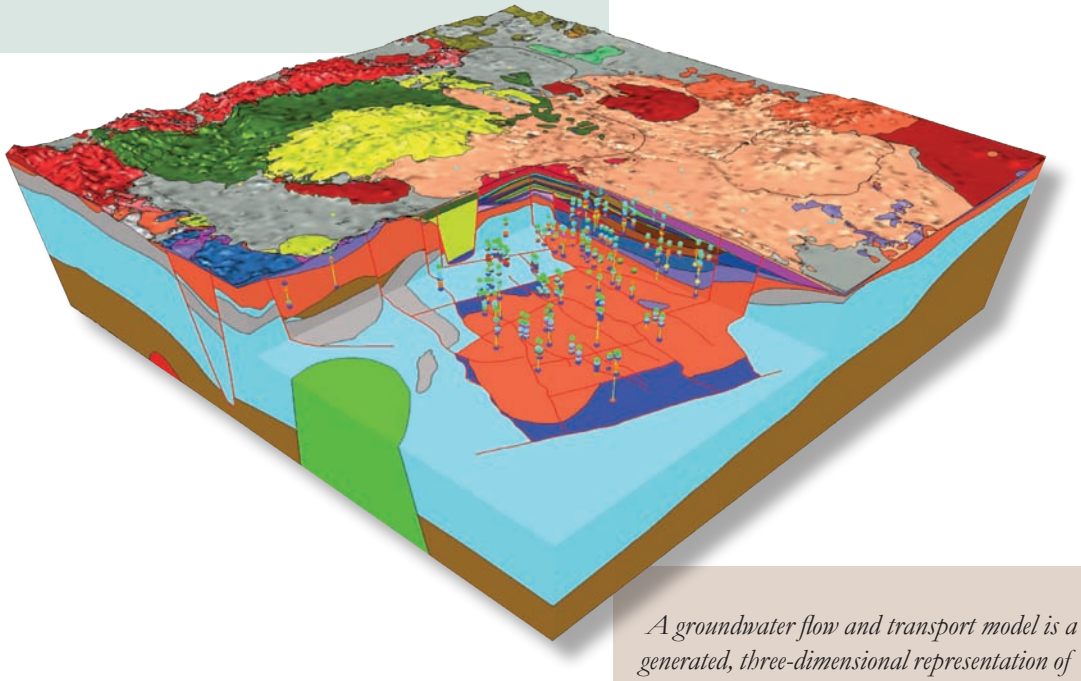
A The Nevada Site Office Environmental Monitoring Program is designed to identify and respond to situations in which elevated levels of contaminants are found. If contamination is suspected, additional analysis will be conducted to determine whether or not contamination actually exists. If contamination can be verified, especially in private wells or community water systems, the Nevada Site Office would request that the wells be shut down and alternative water supplies would be pursued.

Q What is the Nevada Site Office strategy for dealing with groundwater contamination?

A Since no proven cost-effective method currently exists for removing radioactive contamination from the groundwater, the Nevada Site Office strategy is to identify contaminant boundaries and implement an effective, long-term monitoring system.

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, helps scientists determine contaminant movement and the boundaries that are unique to each underground test area. Both phases incorporate various components, such as sampling, contaminant characterization, computer modeling, and process validation.

The regional water flow systems that supply water to Las Vegas and Pahrump are separate and distinct from the water flow system associated with the Nevada Test Site. Neither Las Vegas nor Pahrump is at risk from contaminant migration caused by underground testing.



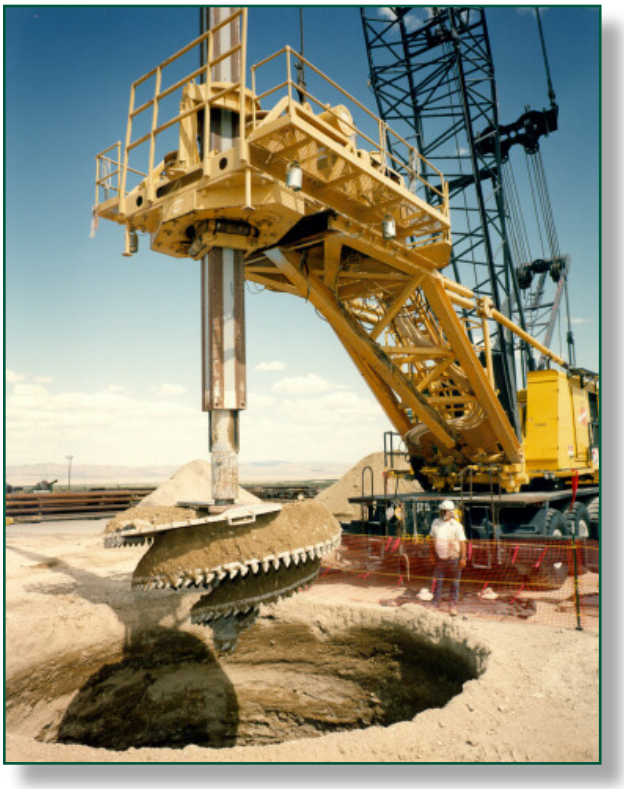
A groundwater flow and transport model is a computer-generated, three-dimensional representation of how water and contaminants move through rock.

Q When will the UGTA Sub-Project be completed?

A The UGTA Sub-Project is scheduled to be complete in 2027. Between 1989 and 2027, the Nevada Site Office will drill wells, conduct computer modeling of groundwater movement, analyze data, and install new monitoring wells based on the data collected. In 2027, the long-term monitoring phase will begin and the wells will be continuously monitored and replaced every 25 years, for a total of 100 years.

Q What is the projected total cost of the UGTA Sub-Project?

A The total cost of this 138-year effort is projected at approximately $2.7 billion, which includes 100 years of monitoring. The cost for the first 18 years of the UGTA Sub-Project (1989-2007) has been approximately $369 million. For the period between 2007 and 2027, when characterization activities will be completed, the Nevada Site Office estimates the cost at approximately $433 million. Between 2027 and 2127, the Nevada Site Office calculates that the total cost to construct the necessary 56 wells and conduct long-term monitoring will be approximately $1.9 billion. The Nevada Site Office may revise the number of wells once additional data from current modeling efforts become available. By conducting modeling now, the Nevada Site Office plans to optimize its long-term monitoring efforts by judiciously placing monitoring wells in the most ideal locations.



Through drilling and data collection activities, the UGTA Sub-Project will reach completion in the year 2027, followed by 100 years of continuous monitoring through the year 2127.

For further information about the UGTA Sub-Project
and issues relating to groundwater at the Nevada Test Site, contact:

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Definitions

Computer Groundwater Model: A computer program that can integrate various forms of raw data to ultimately produce three-dimensional representations of the subsurface environment.

Contaminant: A substance that is not naturally found in a particular environment. For the UGTA Sub-Project, radionuclides are of primary concern.

Contaminant Boundary: A perimeter that outlines the location of radionuclide migration over a specific period of time.

Contaminant Characterization: The process of identifying the components of radioactive contamination.

Radionuclide: Radioactive elements produced as a byproduct of nuclear tests.

Tritium: A radioactive isotope of hydrogen. It can be found naturally in air and water, but is present as a contaminant at the Nevada Test Site as a result of historic nuclear tests.

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