NNSS Groundwater Program

safety ❖ performance ❖ cleanup ❖ closure

Nevada National Security Site (NNSS) Groundwater

From 1951 to 1992, the United States government conducted 828 underground nuclear tests at the NNSS. About one-third of these tests occurred near, below, or within the water table–the very top portion of the groundwater layer where rock and soil are completely saturated with water. As a result, some groundwater was contaminated.

The U.S. Department of Energy (DOE) launched an intensive groundwater investigation program in 1989 to address the effects of groundwater contamination. Though contamination from underground testing at the NNSS has never been detected in a publicly-accessible groundwater source, DOE is committed to developing an advanced, reliable monitoring network that ensures the long-term protection of the public. DOE's Environmental Management (EM) Nevada Program, and its cadre of scientists and technical experts, work closely with the State of Nevada to carry out their mission for the safety of nearby communities today and into the future.

Program Approach

Understanding contaminant movement at the NNSS is a challenge, given the geologic complexity and sheer magnitude of the site. Risks associated with contamination remain low due to the immobility of some contaminants and the extremely slow movement of others. Scientists consider these and other factors in their groundwater approach, which integrates the following elements:

Drilling and sampling – Dozens of groundwater characterization wells have been drilled throughout the site. "Characterization" refers to the process of testing well samples to gauge groundwater chemistry, pressure levels, temperature, and geologic properties.

Data interpretation – Samples are sent to Nevada-certified, independent laboratories for analysis. Results become data points in a highly sophisticated computer database.

Computer modeling – When experts gather enough data points from sampling, the database is used to build a computerized model – a three-dimensional representation of the NNSS subsurface.

Monitoring – Groundwater characterization wells supplement an existing network of more than 100 water supply locations on and off the site that are part of routine monitoring activities.

Underground Test Areas

Scientists explore groundwater flow patterns on a regional scale before focusing on specific underground test areas that are grouped by geographic location (see map on reverse side) to characterize the groundwater. Computerized contaminant flow and transport models are created for each of these areas to help experts make projections about where contaminants are moving and how quickly.

Definitions

Computer Modeling: Three-dimensional representation of the subsurface derived from sampling data that are used by experts to make projections about where and how quickly contaminants are moving with the groundwater.

Groundwater Contamination: Radioactive and hazardous constituents released underground during a nuclear detonation that have migrated into the groundwater.

Water Table: Very top portion of the groundwater layer where rock and soil are completely saturated with water.

NNSS Groundwater Program

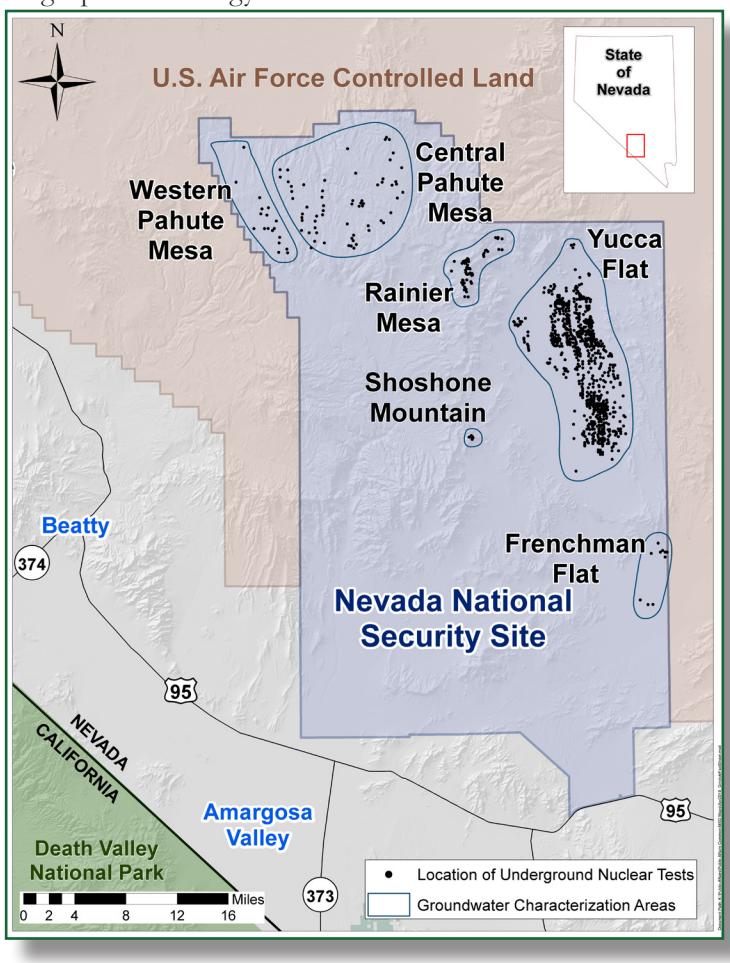
Agreement with the State

The objectives of the NNSS groundwater program are outlined in an agreement with the State of Nevada. Under this agreement, work will proceed over a period of years following a phased strategy:

Investigation Stage - Drill wells; gather new data to build transport models for each of the underground test areas; review results; and supplement as necessary.

Decision/Action Stage - Develop a model evaluation plan to challenge and refine model projections; use model evaluation plan to identify location for new wells.

Closure Stage - Negotiate use restrictions and regulatory boundary; establish institutional controls and requirements; and initiate long-term closure monitoring program (to remain in place for the foreseeable future).



Status

Frenchman Flat was the first underground test area approved by the State to move into Closure. The Yucca Flat area is undergoing model evaluation as part of the Decision/Action Stage. The Rainier Mesa and Shoshone Mountain areas have entered the external peer review portion of the Investigation Stage. And the two Pahute Mesa characterization areas are progressing through the Investigation Stage with internal peer reviews beginning in fiscal year 2018.

Stakeholder Involvement

Over the years, the EM Nevada Program has invited stakeholders external to the daily conduct of groundwater characterization activities to provide feedback on the collection and interpretation of data. This includes external peer reviews involving industry experts that review and evaluate characterization and modeling efforts and provide feedback regarding use of the model to aid in regulatory decision making. Representatives of the Nevada Site Specific Advisory Board (NSSAB) and Nye County can also participate in these peer reviews which are a key element in the regulatory strategy process.

The sampling and analysis of groundwater is also independently conducted through the Nye County Tritium Sampling and Monitoring Program and Community Environmental Monitoring Program. These two community-based radiological monitoring programs provide independent results for the presence of man-made radionuclides in air and groundwater samples from communities surrounding the NNSS. Results of sampling activities are published annually in the NNSS Environmental Report.

Public Involvement

To encourage open dialogue with the public and promote information transparency, the EM Nevada Program invites the public to attend NSSAB meetings and groundwater information events, and visit the NNSS website. In addition, groundwater-focused tours of the NNSS are periodically offered to residents of nearby communities.

Residents in communities near the NNSS may also apply to be a member of the NSSAB, which provides recommendations to the EM Nevada Program. The Board has been influential in decisions relating to peer reviews as well as the selection of a well location in Pahute Mesa.

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