10th International Conference on
Environmental Remediation and Radioactive Waste Management

Establishing Baseline Environmental Conditions for the Proposed Yucca Mountain Repository, Nevada, U.S.A.

David S. Shafer, Karl F. Pohlmann, Charles E. Russell, Diana Hovey-Spencer, and Ming Ye, Desert Research Institute, Las Vegas, Nevada, USA 89119; Tim Minor, Desert Research Institute, Reno, Nevada, USA 89512; and Lee Bishop, U.S. Department of Energy, Office of Repository Development, Las Vegas, Nevada, U.S.A. 89036

Research is underway to develop baseline site conditions and design monitoring programs for assurance to offsite residents and for performance confirmation for the proposed Yucca Mountain (YM) high-level waste repository in Nevada. This includes evaluation of existing and potential impacts on the proposed "land withdrawal" for the repository. A significant portion of the proposed land withdrawal includes areas now managed as part of the Nevada Test Site (NTS), and there is both contamination and land disturbance associated with past NTS activities. Establishing baseline conditions for the land withdrawal is important to distinguish potential impacts from repository operations from those resulting from previous activities, including some that took place from activities outside the land withdrawal.

Among existing contamination is mixed fission products associated with the Nuclear Rocket Testing Program on the NTS in the 1960s. Some of these sites are being remediated as part of a federal facility agreement between the U.S. Department of Energy and the State of Nevada. However, even where radionuclides exist at levels below regulatory concern, characterizing them may be desirable if they are above background. In addition, Forty Mile Wash, the major drainage on the east side of YM, may be transporting radionuclides created from Plowshare project nuclear cratering experiments on Buckboard Mesa on the NTS. Although contaminant levels are not anticipated to present a risk, the point at which Forty Mile Wash leaves the proposed land withdrawal would be the closest point for an offsite receptor to YM.

In addition, there is existing land disturbance (not necessarily associated with contamination) on both the NTS, as well as the portions of the proposed land withdrawal currently managed by the U.S. Bureau of Land Management and the U.S. Air Force. To establish a land disturbance baseline, high resolution multispectral satellite imagery collected in 2004 as well as hyperspectral imagery is being analyzed. Spectral and textural classification algorithms are being used to separate disturbed features such as paths, jeep trails, and building structures from background features. Disturbance features will be incorporated into a geographic information system. Follow-on activities will include examining areas of disturbance on the ground to characterize them and determine their origin.

A longer term issue is the potential for radionuclide transport in groundwater from past areas of underground nuclear testing on the NTS (particularly Pahute Mesa) to areas where releases from YM could occur. To better address this, groundwater advective pathways are being traced from the proposed repository environment toward upgradient areas on the NTS. The Death Valley Regional Flow System model (issued in 2004 by the U.S. Geological Survey), which incorporates both YM and the NTS, is being used as the

framework for the modeling. It is further enhanced with information from the YM Site Scale model and YM- and NTS-defined hydrogeologic units. Simulated pathways that intersect nuclear testing areas will identify regions on the NTS where potentially contaminated groundwater may originate and the routes for its potential migration toward YM.