

## UPDATE ON THE YUCCA MOUNTAIN PROJECT SITE CHARACTERIZATION PROGRAM

Carl P. Gertz,  
Project Manager Yucca Mountain Project  
Office U.S. Department of Energy  
and  
Richard P. Christy,  
Science Applications International Corporation

### ABSTRACT

The U.S. Department of Energy (DOE) is evaluating Yucca Mountain in Nevada to determine if the site would be a safe location for a high-level radioactive waste repository. As mandated by Congress, DOE must study the geology, hydrology, environment and other factors to predict whether a geologic repository about 1,000 feet below Yucca Mountain's surface could isolate high-level waste for 10,000 years. The Yucca Mountain Project has embarked on an broad-based site characterization program designed to examine all factors that could impact the performance of a repository. While there are several site studies under way, an extensive surface-based testing program has not progressed as quickly as originally planned. The DOE is presently involved in litigation with the state of Nevada, which has refused issue environmental permits that are required before new site characterization studies can begin. This paper will examine progress made on the Yucca Mountain Project during the past year, discuss studies that are planned in the near-term, and will describe the prerequisites that must be resolved before new studies can be initiated.

### INTRODUCTION

Addressing Waste Management '89 one year ago I discussed various prerequisites that needed to be resolved in order for the U.S. Department of Energy to move forward with major investigations of the proposed Yucca Mountain high-level radioactive waste repository site. Our objective was to "move dirt in 1989," commencing a series of surface-based and underground studies that are necessary to determine if Yucca Mountain would be a suitable repository site. The ground breaking hasn't happened yet, but I'm pleased to note that significant progress has been made in the campaign to begin new site characterization activities.

The primary obstacle to performing new site characterization studies is DOE's inability to obtain environmental permits that are necessary for surface disturbing activities. The DOE has been trying to work with the state of Nevada for the past two years to obtain the permits, but the state refused to cooperate. The DOE filed suit against Nevada on January 25, 1990, seeking the necessary permits and an end to the delay in starting new site characterization activities. The suit contends that Nevada has prevented the DOE from carrying out necessary site studies by unlawfully refusing to act on DOE's permit application. The state has cited its "disapproval" of the proposed repository site as justification for not issuing the environmental permits. The DOE believes that Nevada's "disapproval" is premature and is without merit, since Congress provided for a state veto only after site characterization studies have proven that Yucca Mountain would be a suitable repository location and once the site has been recommend to the President.

The DOE completed its effort to obtain legal access to the Federal lands on which the Yucca Mountain site lies in October of 1989, when the Bureau of Land Management (BLM) granted a right of way (ROW) reservation for the

Nellis Air Force Range property. The ROW allows the DOE perform characterization studies on the property, but does not protect the site from intrusions by other parties. The DOE submitted an application to administratively withdraw 4,255 acres of Yucca Mountain area property from public use for mining activities. Public hearings concerning the land withdrawal application were held by the BLM in December 1989. The site will be protected from mining activities during a two-year "segregation period," while the BLM considers the land withdrawal application. The land withdrawal is necessary to protect the Yucca Mountain site from intrusions that might compromise scientific data or impact future repository performance.

A new concern that might have affected site activities developed in 1989. The U.S. Fish and Wildlife Service (FWS) listed the desert tortoise as an endangered species under emergency provisions of the Endangered Species Act of 1973. The DOE prepared a biological assessment of Yucca Mountain field activities' potential impact on the tortoise in October, 1989. The FWS reviewed DOE's biological assessment, Project planning documents, and other available biological information in order to prepare a Biological Opinion on the issue. The FWS opinion concludes that the tortoise population in the Yucca Mountain area is low, and that Project field investigation activities are not likely to jeopardize the continued existence of the desert tortoise. The DOE will implement personnel training and operating procedures that will avoid or minimize adverse effects to the tortoise and its habitat. The DOE plans to continuously monitor the desert tortoise and consult with the FWS to ensure that the tortoise population remains unthreatened as site characterization activities progress. The DOE has now complied with the Federal Endangered Species Act and surface-disturbing work could begin at the Yucca Mountain site as soon as the DOE receives the

appropriate environmental permits from the state of Nevada.

A prerequisite that was not completely resolved in 1989 is the need for a fully qualified, NRC accepted quality assurance (QA) program for the entire Yucca Mountain Project. QA is a paramount factor to the Project, since all data and research must be traceable and verifiable in order to be considered by the NRC for repository licensing purposes. The framework document for our QA - the Yucca Mountain Quality Assurance Plan - has been developed and accepted by the NRC. Individual Project participant organizations, including national labs and private contractors, must have approved QA plans in place before a fully qualified Project QA program can be established. Audit teams have evaluated the QA plans and procedures of all Project participants, and six out of eight organizations have been approved to conduct site characterization work. We expect a fully qualified Project QA program to be in place Project-wide by the summer of 1990.

The Nuclear Regulatory Commission completed its review of the Yucca Mountain Site Characterization Plan - the 6,300 page document that will guide site studies - in July, 1989. Comments received from the NRC will be addressed in on-going technical interactions with NRC staff and in the development of detailed work descriptions called Study Plans, which must be accepted by the NRC. Two Study Plans have already been accepted by the NRC; one for surface trenching in Midway Valley near Yucca Mountain and one for new mineralogy studies. The work in Midway Valley will include excavation of new trenches to obtain additional data on faults in the area. The mineralogy studies will be conducted in existing trenches to determine the origin of calcite silica deposits near Yucca Mountain. In addition to receiving NRC comments on the SCP, the DOE held three public hearings in Nevada to gather public comments on the document. More than 150 people provided oral testimony at the hearings, and additional public comments were received in writing. DOE has reviewed all SCP comments, and is expecting to release a comment response package in mid-1990.

Both the NRC and the Presidentially-appointed Nuclear Waste Technical Review Board (NWTRB) have endorsed the Yucca Mountain scientific investigation program. Robert Bernero of the NRC referred to the SCP saying the DOE has produced a "fundamentally usable" plan for collecting and analyzing data necessary to decide whether Yucca Mountain is a suitable repository site. NWTRB Chairman Dr. Don. U. Deere said "I have been favorably impressed with the work they have done and the quality of scientists working on the program ..." Frequent interactions with these independent regulatory and oversight boards have lead to a better understanding of the Yucca Mountain Project, and has allowed DOE to be

responsive to their comments and concerns. The DOE appeared before the NWTRB five times in 1989 and participated in 20 meetings with NRC staff and management.

Although scientific understanding of the Yucca Mountain site is far from complete, it is moving forward. To date, approximately 25 Study Plans covering geology, geochemistry, tectonics, and climatology have been completed and are in various stages of DOE review. Several of the study plans have been submitted for review by the NRC. Monitoring to prevent loss of irretrievable data and other ongoing investigations continued in 1989. These investigations include water table monitoring in the saturated zone, unsaturated zone gas sample monitoring, seismic monitoring, soil studies, surface flood monitoring, groundwater geochemistry sampling, geologic mapping and meteorological surveys. Almost 600 stations are being utilized for various monitoring activities. Also, new air quality and radiological monitoring programs were implemented in 1989.

Site characterization studies will require the recovery of dry, intact core samples from drill holes for laboratory study. This requirement is unique, in that previous dry drilling techniques have produced only fragmented cuttings. A program to develop dry drilling and coring equipment, methods, and procedures was initiated in Tooele, Utah. The objective of the prototype drilling program is to prove drilling technology and scientific instrumentation concepts, and to reduce uncertainties for the start of surface-based site characterization drilling at Yucca Mountain.

After initial testing, the DOE had planned to begin prototype drilling activities on the Nevada Test Site (NTS). Our problems with obtaining environmental permits prevented even preliminary testing of drilling equipment in the state of Nevada. The DOE was able to locate a site with geologic characteristics similar to Yucca Mountain near Milford, Utah.

Additional prototype testing was conducted at the Milford site, and several equipment modifications were prompted by results the Milford operation. The prototype drilling program will continue at a site near Apache Leap, Arizona. A LM-250 drill rig that is being custom-built by Lang Exploratory Drilling will be run for the first time at Apache Leap. Various drill bits, core recovery systems, dust control techniques and scientific instrumentation methods will be tested and analyzed during this phase of prototype drilling. Drilling at Apache Leap will begin in March 1990 and may continue well into 1991.

In addition to equipment development, the prototype program offers an opportunity for personnel training and a chance to "dry run" QA procedures, including sample handling and processing. The Yucca Mountain Project Sample Management Facility (SMF) has been placed on-line and is ready to receive core samples. The SMF will collect,

process, catalog and track geologic samples. The facility is designed so that a particular sample can be tracked in detail from the moment it is removed from the ground, including who had access to it and what type of research was performed on the sample.

The Yucca Mountain Project intends to maintain a strong scientific basis that will supplement new site characterization data that we expect to obtain in 1991. In the next year we intend to proceed with investigations in geology, hydrology, volcanology, geochemistry and repository performance assessment. Current activities are designed to ensure that the DOE will be prepared for surface-based drilling and other broad-based site characterization studies when the appropriate environmental permits are issued.

Additionally, there are three major studies under way to determine future program strategies. A Project team is conducting an Exploratory Shaft Facility (ESF) Alternative Design Study, to consider options for the design of an underground laboratory at Yucca Mountain. Input from the NRC, NWTRB, and the state of Nevada has prompted DOE to reevaluate ESF configuration and construction methods. Since the ESF would become part of a repository if the facility is built, the ESF design must consider its impact on future repository performance.

Also, a task force is reviewing the strategy for surface-based testing at the Yucca Mountain site. The task force's goal is to refocus surface-based testing priorities in order to identify potentially adverse conditions as early as possible in the program. This would provide a step-by-step approach that would allow surface studies to progress to the next phase unless a significant problem is encountered. The third study being performed to determine future strategies involves alternative approaches to repository licensing. Alternative licensing strategies are being evaluated to determine the best method for submitting the tremendous volume of data and research that the NRC must review when considering DOE's application for a license to construct and operate a repository.

Other activities planned for 1990 include the preparation and NRC review of 39 additional study plans. There will be a continued emphasis to interact with the NRC and

NWTRB, so that a timely exchange of information and recommendations is ensured.

## CONCLUSION

The Yucca Mountain Project public outreach program has continued to develop over the past year. Our speaker's bureau addressed more than 75 civic groups, professional associations, school classes and other audiences. The existing Yucca Mountain Information Office in Beatty, Nevada and a new Information Office in Las Vegas are available to provide local residents, the education community, government officials and the news media with readily accessible and credible information about the repository program. The DOE holds twice-yearly Yucca Mountain Project Update Meetings in the Las Vegas area, Nye County, and Northern Nevada. The Update Meetings have proven to be an effective means to let local residents know what the DOE is doing at Yucca Mountain, and to respond to Nevadans' questions and concerns.

The Yucca Mountain Project keeps in touch with many of Nevada's smaller communities by participating in "town hall meetings" that cover various DOE programs in the state. Additionally, we have an exhibit program that tours Nevada to participate in fairs, conventions and special community events. The Project has attempted to predict all "newsworthy" events, and has consulted with the media and scheduled press conferences in anticipation of significant media interest. In all aspects of public outreach, our willingness to respond to any request for information has been supplemented by pro-active efforts to let the people of Nevada know what is going on with the Yucca Mountain Project.

Beside the technical challenges that face the Project, there are serious political issues that have to be resolved before significant progress can be made at Yucca Mountain. The DOE and the state of Nevada have lawsuits pending against each other, and the outcome of those suits will determine how the Yucca Mountain Project moves forward. The litigation may continue for many months. Progress is being made in DOE's program to find a safe repository site, but many battles must be fought before the suitability of Yucca Mountain is determined.