

EDUCATING THE PUBLIC ON HOW SCIENTISTS EVALUATE FUTURE REPOSITORY SAFETY

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INTRODUCTION

Bechtel SAIC Company, LLC, in conjunction with the U.S. Department of Energy's (DOE) Yucca Mountain Site Characterization Project (the Project) has developed a multi-media presentation for the public that explains the scientific evaluation of the future safety of a geologic repository for spent nuclear fuel and high-level radioactive waste. This presentation will be demonstrated at the '04 *Waste Management Symposium*.

BACKGROUND

Spent nuclear fuel and high-level radioactive waste will remain dangerously radioactive for tens of thousands of years. Before a repository at Yucca Mountain can be licensed and built, federal regulations require the DOE to provide reasonable expectations that the facility will safely isolate the waste and meet radiation dose and groundwater protection standards for at least 10,000 years.

To evaluate the future safety of a repository, scientists are performing detailed analyses of how the repository's different natural and man-made barriers would respond to changing climatic, geologic, chemical, and hydrologic conditions over tens of thousands of years. These analyses are unique in sophistication and complexity and are unprecedented in scope. They involve the use of advanced scientific methods, cutting-edge computing technologies, and detailed scientific data from over two decades of research at Yucca Mountain.

The preliminary results of these analyses show that a repository at Yucca Mountain will meet radiation protection standards during the 10,000-year regulatory period and for many thousands of years beyond.

WORK DESCRIPTION

The safe disposal of radioactive waste is not only an extremely complex scientific and engineering problem, but it is also a profoundly difficult social and political issue. The challenge to Yucca Mountain Project communications specialists is to inform the public of the thoroughness and reliability of Project safety analyses. Given the uniqueness and complexity of the Project's scientific approach, gaining public understanding and confidence is, in itself, daunting.

People are understandably concerned about the safety of a proposed repository for nuclear waste. However, many are not aware of the true scientific concerns associated with storing waste in a repository. For example, one of the primary threats to safety is related to how much water could reach the waste in the repository. Over time, water could eventually degrade the waste and then carry radioactive particles into the groundwater. Therefore, scientists have conducted extensive analyses on the climate and on how much water could flow in the layers of rock above the repository and how much could eventually contact the waste over thousands of years. Many members of the public are simply not aware of the effort we've expended in studying water at Yucca Mountain — or even why it is an issue.

To better educate the public, the Yucca Mountain Project has developed a CD-ROM that uses video, photographs, graphics, animations, interactive capabilities, and narration to describe to non-technical audiences the facts concerning our safety analyses. Eventually, parts of this presentation will be used on

the Project's web site. The goal of this multi-media presentation is to increase public confidence in the repository's long-term safety by explaining our detailed analyses in an easy-to understand way that is captivating, yet informative.

The presentation is divided into five easily navigated modules that first introduce basic concepts, then link to more technical information that builds on these concepts. The modules include:

- 1) An introduction to the nuclear waste problem and U.S. policy for safely disposing of it;
- 2) A description of the nuclear waste destined for repository disposal and how it could affect people and the environment;
- 3) An explanation of the repository's different natural and engineered features and how they will work to isolate radioactive wastes for thousands of years;
- 4) An explanation of the data, computer models, and scientific methods used to assess repository performance; and
- 5) The results of our total system performance assessment.

PRODUCTION

The production of "The Future Safety of a Repository at Yucca Mountain" involved a team of subject matter experts, writers, graphic artists, animators, and software developers.

The first phase of the project involved the development of detailed storyboards. The team met in extended sessions over several months to develop and refine the content frame by frame. Subject matter experts were extensively interviewed and key personnel reviewed the storyboards in a series of group review sessions.

While creating the storyboards, the team encountered the challenge of correlating the text to match the visuals in the final product. As a solution they adopted a two-column script format with video/images in one column and the corresponding narration in the other.

Once the storyboards were developed and approved, the team moved on to the technical production. Video clips were created to explain such topics as volcanoes and earthquakes, while animations were produced to explain concepts such as the proposed design of the repository.

The CD was produced with commercial software called Macromedia Director™ to incorporate more than 100 pages of text, narration, graphic illustrations, photographs, animations, and video clips into an easily navigated interactive format. Accessibility issues were addressed by creating a "text only" version for the hearing impaired.

The navigation is designed so that users can go through the top layers of information fairly quickly for an overview of the topic areas or they can stop and browse through many deeper layers of more detailed information.

The CD was tested on multiple platforms (PC and Mac) and operating systems (Windows 98, Windows 2000, OS 9, and OS 10). At this time a PC version that will run with any Windows operating system is available for general distribution. A version that will run on either platform is available for general distribution.

RESULTS

After two years in development, the multi-media presentation titled “The Future Safety of a Repository at Yucca Mountain” will be released to the public in 2004. Highlights of this presentation will be demonstrated at the *'04 Waste Management Symposium*.