

REPOSITORY LICENSING CONSIDERATIONS

by
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I welcome the opportunity to appear before the TRB's Panel on Structural Geology and Geoen지니어ing and discuss with you the NRC's views on volcanic hazards at Yucca Mountain. Dr. John Trapp of our staff will present a technical discussion of the Regulatory staff's current perspective on volcanic hazards later on in the program. I would like to take a few minutes now to briefly outline the Agency's safety philosophy as it relates to the HLW repository and its relationship to volcanic hazards issues that are the subject of today's meeting.

Those of you who attended the Waste Management Conference this week will find in your copy of the proceedings a paper describing the NRC's overall approach to safety as applied to the HLW repository program. I intend to briefly touch on certain aspects of its application to tectonics issues.

The NRC's safety philosophy is based on the concept of "Defense in Depth" and can be described as having a three-tiered structure in the following manner. The first level is to require a conservative design for expected operational conditions. The second level is to incorporate redundancy and safety features into the design to accommodate unplanned incidents. The third level requires additional safety considerations for unexpected, but plausible events. It is within the third category that issues related to volcanism will most likely develop.

This philosophical structure takes the form of multiple barriers in regulatory practice. You are all probably familiar with the multiple barriers in nuclear reactors, that include a stable fuel form, fuel cladding, emergency reactor cooling systems, and containment. The repository follows a similar concept in 10 CFR 60 of specifying subsystem performance objectives for particular barriers after permanent closure; the waste package containment, gradual radionuclide release rates after the containment period, and a repository that permits only slow groundwater movement in the geosphere. The overall or total system performance objective requires a demonstration of compliance with EPA's environmental standard.

The staff's role in the regulatory process is familiar to many of you. It makes use of wide range of information, including applicant submittals, literature, and alternative interpretations of available data in preparing its evaluations. Staff positions will typically be on the conservative side when evidence reveals adverse conditions that may pose a potential risk to public health and safety or to waste isolation. The staff's evaluations, along with DOE's safety analysis report, become part of the evidentiary record for the hearings.

A unique complicating feature of the repository program is the duration of the license period, a minimum period under present regulatory structure of 10,000 years. Attempts to project repository performance over such a long time period introduce uncertainties that have led to the development of the probabilistic standards on which we are currently working. We will, of course, be hearing today about one of the more dramatic contributors to repository performance, volcanism.

As DOE develops the technical record for its license application, it must demonstrate that the Part 60 technical criteria are met. The matter of volcanic hazards will almost certainly need to be addressed in demonstrating compliance with the total systems performance objective. The NRC staff recognizes the difficulties associated with obtaining and evaluating volcanic data, and expects that there may be substantial reliance on expert judgement in this process. The use of expert judgement is to be expected in developmental projects such as the repository. However, where expert judgement is an important factor in compliance demonstration, it will be important for DOE's supporting analyses to clearly reflect the quality of the data, the reasonableness of its assumptions, and the logic behind its reasoning.

I would like to provide an additional observation on the formal use of expert judgement; specifically on using expert elicitation techniques for purposes of compliance demonstration. Such methods are currently being used by DOE and can serve a useful purpose in management decisions, documentation of technical bases and in reducing individual bias. For purposes of licensing, however, they should be used only when other sources of information are not reasonably obtainable. Their use for combining diverse expert opinions into a single measure for compliance demonstration purposes, should be considered of limited value in licensing unless the opinions of each expert have been evaluated on its own merits.

The above cautions notwithstanding, the staff has reviewed one of approximately twenty scheduled study plans related to volcanism and has found it to be acceptable. We look forward to the opportunity to review DOE's remaining study plans and the results of their investigations.