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**Performance Assessment for the
Proposed Yucca Mountain Repository**

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Abstract: The conceptual structure of the performance assessment for the proposed high-level radioactive waste repository at Yucca Mountain, Nevada, is described. The performance assessment was carried out to support the recently-submitted license application by the U.S. Department of Energy (DOE) to the U.S. Nuclear Regulatory Commission (NRC). Mathematically, the performance assessment involves three entities:

- 1) a probabilistic characterization of the uncertainty in the occurrence of future events that could affect the performance of the repository;
- 2) a linked system of models for predicting the physical behavior and evolution of the repository; and
- 3) a probabilistic characterization of the uncertainty associated with analysis inputs that results in a range of uncertainty on analysis output.

The presentation summarizes how the performance assessment is organized to address the regulations for the proposed repository and the overall results of the assessment. In addition, this presentation uses results from the performance assessment to illustrate the use of sensitivity analysis techniques to develop insight and understanding into a complex analysis. Finally, the presentation indicates the role of the mathematical sciences in the performance assessment.