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U.S. Nuclear Regulatory Commission
ATTN: Mrs. Deborah A. DeMarco
Two White Flint North
11545 Rockville Pike
Mail Stop T8 A23
Washington, DC 20555

Subject: Transmittal of Abstract for the Society for Risk Analysis 2001 Annual Meeting

Dear Mrs. DeMarco:

Transmitted herewith for programmatic review is an abstract proposed for presentation at the Society for Risk Analysis 2001 Annual Meeting, to be held in Seattle, WA, December 2-5, 2001. The title of the paper is "An Application of Risk-Informed, Performance-based Techniques to Postclosure Repository Performance Assessment" by S. Mohanty, R. Codell, and D. Esh. This presentation demonstrates a part of the approach to be adopted by the U.S. NRC for conducting risk-informed performance-based review. In order to meet the conference deadline of May 11, 2001, this abstract has already been electronically submitted to the organization with the proviso that if the paper is found to be programmatically unacceptable it will be withdrawn.

If you have any questions regarding the technical content of these abstracts please contact either Dr. Mohanty at (210) 522-5185 or Dr. Gordon Wittmeyer at (210) 522-5082.

Sincerely,

Budhi Sagar
Technical Director

GWW/cw

cc:

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An Application of Risk-Informed, Performance-based Techniques to Postclosure Repository Performance Assessment

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ABSTRACT

The U.S. Nuclear Regulatory Commission (NRC) and the Center for Nuclear Waste Regulatory Analyses have jointly developed performance assessment tools for conducting a risk-informed, performance-based review of any safety case to be made by the U.S. Department of Energy (DOE) for the proposed Yucca Mountain high-level waste repository. We will use these tools to streamline the review process by identifying parameters, models, and subsystems significantly affecting repository performance.

To evaluate risk significance, we employ three complementary analyses using performance assessment tools: (i) parametric sensitivity analysis, (ii) alternative conceptual models analysis, and (iii) importance analysis. Parametric sensitivity analysis identifies influential input parameters whose uncertainty drives repository performance uncertainty. Eight different statistical and nonstatistical methods have been used to determine the influential parameters. We base the final list of influential parameters on the number of times the parameter appeared in the highest rankings of each method. We use alternative conceptual models and design options to determine the effect of model and design uncertainties on repository performance. Finally, we use importance analysis to determine which components are most important to limiting risk. The approach involves a series of one-off and one-on analyses in which individual influential parameters, models, subsystems, or their combinations cause reduced levels of performance.

Preliminary parametric sensitivity analyses showed that influential parameters are related to the flow of water onto waste packages, spent fuel dissolution rate, and saturated zone transport. Importance analysis showed that the degradation of the engineered barriers and transport through the saturated zone are most important to overall performance.

The approach presented allows NRC staff to focus its attention on the most important set of repository safety subsystems and to provide specific prelicensing guidance to the DOE on the models, parameters, and repository components that affect public health and safety and the environment.