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JUL 19 2001

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FISCAL YEAR 2001 (FY 01) SUPPLEMENTAL SCIENCE AND PERFORMANCE ANALYSES, VOLUME 2: PERFORMANCE ANALYSES

Enclosures 1 and 2 are paper and compact disc (CD) copies of the *FY 01 Supplemental Science and Performance Analyses, Volume 2: Performance Analyses* (SSPA). This report is provided for your information. This document is intended to supplement information contained in Analysis and Modeling Reports (AMR) supporting the *Yucca Mountain Science and Engineering Report, Revision 00* (S&ER). The S&ER and its supporting reports have been provided previously to the U.S. Nuclear Regulatory Commission (NRC).

The SSPA has been prepared to address several specific aspects of the existing uncertainties related to the performance of a potential Yucca Mountain, Nevada, repository. It describes new information developed since the completion of the S&ER and its supporting references, the Total System Performance Assessment for the Site Recommendation (TSPA-SR), and the AMRs and Process Model Reports cited therein.

Based on internal reviews of the S&ER and other documents, the U.S. Department of Energy (DOE) has identified and performed several types of analyses to supplement the treatment of uncertainty in support of the consideration of a possible site recommendation. The information in this report is intended to supplement, not supplant, that contained in earlier documents. In general, the studies and analyses described in this document provide additional information of three types:

1. Unquantified Uncertainties Analysis – to provide insights into the significance of the unquantified uncertainties and the degree of conservatism in the overall assessment of repository performance.

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2. Supplemental Scientific Information – to provide insights into the impacts of new scientific results and improved models and to develop additional confidence in the models and parameters used for TSPA.

3. Lower-Temperature Operating Mode (LTOM) Analysis – to provide insights into the effect of thermal parameters on predicted repository performance, including uncertainty of those predictions, and to increase confidence in the predicted repository performance over a range of thermal conditions.

Based on the results of these three types of supplemental information (documented in SSPA Volume 1 and transmitted to the NRC under separate cover), two types of analyses of the performance assessment of the potential repository were conducted using TSPA and are documented in this volume. First, a set of sensitivity analyses was conducted to evaluate the effects of incorporating the updated models and representations (based on the unquantified uncertainties, new scientific information, and updates necessary to evaluate an LTOM) one at a time. Then, the updated models and representations were abstracted and aggregated to produce a modified TSPA model, referred to as the supplemental TSPA model, that captures the combined effects of those alternative representations. This supplemental TSPA model was used to evaluate system performance over a range of thermal operating modes. The supplemental TSPA model results were compared with results of the TSPA-SR to provide insights into the cumulative effects of all model changes on the system results.

Due to an error in an input file, radiation heat transfer processes were only partially included in the LTOM process model results presented in SSPA Volume 1, Section 5.4. This error resulted in overprediction of waste package peak temperatures by about 5 degrees centigrade and underprediction of relative humidities by about 5-10 percent for early time periods in the information used to develop the supplemental TSPA analyses reported in SSPA Volume 2. Impacts of this correction on future analyses using the supplemental TSPA model will be limited to the LTOM case, and are not expected to significantly change the range of calculated annual dose histories. Results of the supplemental TSPA model higher-temperature operating mode case are not affected by the error, and the overall conclusions of SSPA Volume 2 remain valid.

Due to the SSPA's purpose, not all of the models, analyses, and data used in this study are fully qualified. It has not yet been determined which, if any, of these models, analyses, and data need to be fully qualified. Because of quality assurance requirements, the models, analyses, and data used in this study are not intended to be used, as is, in a license application (LA) if the Yucca Mountain site is found to be suitable for the development of a repository. However, if DOE

determines that information from the SSPA will be used in a LA, this information would be fully qualified for that purpose.

We are working with your staff to schedule an interaction on the enclosed report in the near future. If you have any questions or require further information, please call William J. Boyle at (702) 794-5506 or Timothy C. Gunter at (702) 794-1343.

April V. Gil

Stephan Brocoum
Assistant Manager, Office of
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OL&RC:TCG-1480

Enclosures:
1. Hard Copy of Enclosure 2
2. CD containing *FY 01 Supplemental Science and Performance Analyses, Volume 2: Performance Analysis*

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