Department of Energy
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QA: N/A
Project No. W/M-00011

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OVERNIGHT MAIL

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TRANSMITTAL OF *TECHNICAL BASIS DOCUMENT NO. 2: UNSATURATED ZONE FLOW*, REVISION 1, ADDRESSING KEY TECHNICAL ISSUE (KTI) AGREEMENTS RELATED TO UNSATURATED ZONE FLOW

This letter transmits *Technical Basis Document No. 2: Unsaturated Zone Flow,* Revision 1 (enclosure 1) and a compact disk (CD) of the report (enclosure 2). The CD is a pdf file with 44,206 KB and is publicly available. This Technical Basis Document contains a summary of the current conceptual understanding of transport in the unsaturated zone and provides the context within which individual KTI agreements related to flow and transport in the saturated zone are addressed. Appendices A through G provide direct responses to the following Radionuclide Transport (RT), Thermal Effects on Flow (TEF), Total System Performance Assessment and Integration (TSPAI) KTI agreements, and related General (GEN) 1.01 agreements:

Appendix A - Flow in the Calico Hills Nonwelded Vitric Unit (Response to RT 1.01 and GEN 1.01 (Comment 26))

Appendix B - Geochemical and Hydrologic Data for Flow Below the Repository (Response to RT 3.02, TSPAI 3.24, and GEN 1.01(Comment 106))

Appendix C - Data for Calibration of the Unsaturated Zone Flow Model (Responses to TEF 2.11 and TSPAI 3.26)

Appendix D - Uncertainty of Hydrologic Properties for Future Climate Conditions (Response to TSPAI 3.22 AIN-1)

Appendix E - Evaluation of Uncertainty in Thermal-Hydrologic Models (Response to TEF 2.12)

Appendix F - Uncertainty in Continuum Models and van Genuchten Relations (Response to TEF 2.13 AIN-1)

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Appendix G - Integration of Water Flow Rates among Various Unsaturated Zone and Near-Field Flow Models Supporting the Total System Performance Assessment (TSPA) for the License Application (Response to TSPAI 3.27)

Enclosure 1 is one in a series of Technical Basis Documents that are being prepared to describe the Yucca Mountain, Nevada, repository system components and processes that are important for predicting the likely postclosure performance of the repository. The information presented in these documents, along with the associated references, forms an outline of the postclosure safety analysis that is being developed for the License Application (LA). This information also responds to open KTI agreements made between the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Energy (DOE). Placing the DOE responses to individual KTI agreements in the context of the applicable repository system components and processes allows for a more direct discussion of the relevance of the agreements to the postclosure safety analyses that will be presented in the LA. The goal of this approach is to provide a more direct and transparent discussion of the relevant KTI agreements.

Enclosure 1 provides a comprehensive review of the current understanding of flow paths in the unsaturated zone. It first reviews the geologic setting of the unsaturated zone and data collection activities related to flow processes in the unsaturated zone. It then presents the conceptual understanding of unsaturated zone flow paths (based mainly on the data that have been collected in the unsaturated zone) and discusses the development of the site-scale unsaturated zone flow model, including model uncertainties related to TSPA.

The DOE considers the KTI agreements covered in *Technical Basis Document No. 2: Unsaturated Zone Flow*, Revision 1, to be fully addressed, and pending review and acceptance by NRC, they should be complete.

There are no new regulatory commitments in the body or the enclosure to this letter. Please direct any questions concerning this letter and its enclosure to Carol L. Hanlon at (702) 794-1324 or e-mail carol_hanlon@ymp.gov, or Eric T. Smistad at (702) 794-5073 or e-mail eric_smistad@ymp.gov.

Joseph D. Ziegler, Director
Office of License Application and Strategy

OLA&S:TCG-1127

Enclosures:
1. *Technical Basis Document No. 2: Unsaturated Zone Flow*, Revision 1
2. CD of Enclosure 1

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