THE U.S. NUCLEAR REGULATORY COMMISSION OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS REVIEW OF THE U.S. DEPARTMENT OF ENERGY'S KEY TECHNICAL ISSUE AGREEMENT RESPONSES RELATED TO THE POTENTIAL GEOLOGIC REPOSITORY AT YUCCA MOUNTAIN, NEVADA: EVOLUTION OF THE NEAR-FIELD ENVIRONMENT 2.18

1.0 INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) issue resolution goal during this interim pre-licensing period is to ensure the U.S. Department of Energy (DOE) has assembled enough information about a given issue for NRC to accept a License Application for review. Resolution by NRC staff during pre-licensing does not prevent anyone from raising any issue for NRC consideration during the licensing proceedings. It is equally important to note that resolution of an issue by NRC staff during the pre-licensing period does not prejudge the NRC staff evaluation of the issue during the licensing review. Issues are resolved by NRC staff during pre-licensing when the staff have no further questions or comments about how DOE is addressing an issue. Pertinent new information could raise new questions or comments about a previously resolved issue.

By a letter dated May 27, 2004 (Ziegler, 2004), DOE submitted a letter providing information to support closure of the subject agreement. In the letter, DOE recommended agreement Evolution of the Near-Field Environment (ENFE) 2.18 be closed because the documents requested in the agreement either have been submitted or the specific technical issues planned to be addressed are provided in other DOE documents.

2.0 REVIEW OF INFORMATION PROVIDED FOR AGREEMENT ENFE.2.18

2.1 Wording Of The Agreement

Agreement ENFE.2.18 reads:

"The DOE will provide the documents requested by the dates indicated: Engineered Barrier System: Physical and Chemical Environment Model (ANL–EBS–MD–000033) Rev. 01: FY 02; Multiscale Thermohydrologic Model (ANL–EBS–MD–000049) Rev. 00, ICN 01: January 2001; Abstraction of Drift-Scale Coupled Processes (ANL–NBS–HS–000029) Rev 01: September 2001; Environment on the Surfaces of the Drip Shield and the Waste Package Outer Barrier (ANL–EBS–MD–000001) Rev. 00, ICN 01: January 2001; Waste Package Degradation PMR (TDR–WIS–MD–000002) Rev. 00, ICN 01: January 2001; Engineered Barrier System Degradation, Flow, and Transport PMR (TDR–EBS–MD–000006) Rev. 01: September 2001; Near-Field Environment PMR (TDR–NBS–MD–000001) Rev. 00, ICN 02: January 2001 and Rev. 01: September 2001; Hydrogen Induced Cracking of Drip Shield (ANL–EBS–MD–000006) Rev. 00, ICN 01: January 2001; Drift Degradation Analysis (ANL–EBS–MD–000027) Rev. 01: January 2001; Design Analysis for the Ex-Container Components (ANL–XCS–ME–000001) Rev. 00: January 2001; Longevity of Emplacement Drift Ground Support Materials (ANL–EBS–GE–000003) Rev. 01: January 2001; Stress Corrosion Cracking of the Drip Shield, the Waste Package Outer Barrier, and the Stainless Steel Structural Material AMR (ANL–EBS–MD–000005) Rev. 00, ICN 01: January 2001; In-Drift Microbial Communities

(ANL–EBS–MD–000038) Rev. 00, ICN 01: January 2001; Physical and Chemical Environmental Abstraction Model (ANL–EBS–MD–000046) Rev. 00, ICN 01: January 2001; Unsaturated Zone Flow and Transport Model PMR (TDR–NBS–HS–000002) Rev. 01: September 2001; General Corrosion and Localized Corrosion of the Drip Shield (ANL–EBS–MD–000004) Rev. 00: January 2001; Water Distribution and Removal Model (ANL–EBS–MD–000032) Rev. 01: January 2001."

2.2 Relevance to Repository Performance

Agreement ENFE.2.18 supports ENFE subissue 2 ("...Waste Package Chemical Environment") and is directly related to evaluating the quantity and chemistry of water contacting waste packages and waste forms. Total system performance assessment calculations of degradation of engineered barriers and radionuclide release from waste forms and waste packages depend on the abstraction of the in-drift environment and the chemistry of water contacting the engineered materials. According to Travers, 2003, "quantity and chemistry of water contacting waste packages and waste forms" has a "medium to high-risk significance." However, Agreement ENFE.2.18 is a request for documents, and does not specifically question any aspect of DOE's conceptual model. Therefore, NRC staff have rated Agreement ENFE.2.18 as having a "low-risk significance" (Travers, 2003).

2.3 Information Provided In DOE Agreement Response

The key technical issue (KTI) agreement states DOE was to provide the listed 18 documents to NRC. In the letter of May 27, 2004 (Ziegler, 2004), DOE stated 13 of those documents have been submitted. DOE also explained the disposition of the five remaining documents (which are underlined in the list given in Section 2.1). DOE explained that three of the outstanding documents are process model reports, which are no longer being developed as part of DOE Yucca Mountain Project. According to DOE, the planned technical contents of all of the five remaining reports, has been incorporated into other DOE documents.

2.4 NRC Evaluation And Comment

The ENFE.2.18 agreement requests DOE to provide the listed 18 documents. At the time of DOE's response, 13 of the documents requested had been received by NRC staff. DOE stated that it does not plan to submit the remaining five documents, but instead has incorporated the planned technical contents of those documents into other DOE reports. To date, the report requested and/or a substitute report has been received by NRC staff for the remaining five documents.

Specifically, DOE has made available the information in the remaining five documents as follows:

The requested document "Engineered Barrier System: Physical and Chemical Environment Model (ANL–EBS–MD–000033)" has been released, as well as incorporated into Technical Basis Document No. 5: In-Drift Chemical Environment. The planned technical content of the requested document "Abstraction of Drift-Scale Coupled Processes (ANL–NBS–HS–000029)" has been incorporated into Technical Basis Document No. 5: In-Drift Chemical Environment. The planned technical content of the the requested document "Engineered Barrier System Degradation, Flow, and Transport PMR (TDR–EBS–MD–000006)" has been incorporated into

Drift-Scale Coupled Processes (DST and THC Seepage) Models (MDL–NBS–HS–000001). The planned technical content of the requested document "Unsaturated Zone Flow and Transport Model PMR (TDR–NBS–HS–000002)" has been incorporated into Technical Basis Document No. 8: Colloids, and also into Technical Basis Document No. 3 (TBD No. 03): Water Seepage Into Drifts. The requested document "Near-Field Environment PMR (TDR–NBS–MD–000001)" has been released, as well as incorporated into Technical Basis Document No. 2 (TBD No. 02): Unsaturated Zone Flow. NRC staff accepts the approach taken by DOE and considers that the intent of agreement ENFE.2.18 has been satisfied.

3.0 SUMMARY AND STATUS OF THE AGREEMENT

NRC staff reviewed DOE's KTI agreement response presented in the letter. On the basis of this review, and the receipt of the information contained in all 18 of the requested documents, and notwithstanding new information that could raise new questions or comments concerning the above agreement, NRC staff considers DOE's response satisfies the intent of agreement ENFE.2.18. Therefore, NRC staff considers agreement ENFE.2.18 closed.

4.0 REFERENCES

Travers, W.D. "Final Staff Response to March 19, 2003, Requirements Memorandum on the Waste Arena Briefing–M030303A." Letter (June 5) to Chairman Diaz and Commissioners Dicus, McGaffigan, and Merrifield. Washington, DC: NRC. 2003. <www.nrc.gov/reading-rm/adams.html>

Ziegler, J.D. "Transmittal of Information Addressing Key Technical Issue (KTI) Agreement Evolution of the Near-Field Environment (ENFE) 2.18" Letter (May 27, 2004) to Director, Division of High-Level Waste Repository Safety, NRC. Washington, D.C., 2004.