March 20, 2003

Joseph D. Ziegler, Acting Director
Office of License Application and Strategy
U.S. Department of Energy
Office of Repository Development
P.O. Box 364629 M/S 523
North Las Vegas, NV 89036-8629

SUBJECT: EVOLUTION OF THE NEAR-FIELD ENVIRONMENT (ENFE) AGREEMENT 1.07 AND TOTAL SYSTEM PERFORMANCE ASSESSMENT AND INTEGRATION (TSPAI) AGREEMENT 2.02, COMMENT J-9 AND COMMENT J-21, STATUS: PARTLY RECEIVED

Dear Mr. Ziegler:

In your letter dated September 26, 2002, the U.S. Department of Energy (DOE) transmitted information titled, "Response to ENFE 1.07: Results of Side-Wall Sampling Min-Pet Analyses of Drift Scale Test Samples," intended to close both ENFE Agreement 1.07 and TSPAI Agreement 2.02, Comments J-9 and J-21. The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed this information and has determined that the status of both ENFE Agreement 1.07 and TSPAI Agreement 2.02 should remain "partly received" (See Attached).

As noted in your letter, ENFE Agreement 1.07 has three components. The first component, (provide existing data from the Single Heater Test), and the third component (provide the Drift-Scale Coupled Processes Models Analyses Model Report), were submitted in March and April, 2001, respectively. Also, as noted in your letter these two components of the agreement are complete. The second component of ENFE Agreement 1.07 (provide results of on-going side-wall sampling "Min-Pet" analyses) is the subject of the enclosed staff review. Aspects of TSPAI Agreement 2.02 Comments J-9 and J-22 are also addressed to the extent that they relate to ENFE Agreement 1.07.

In summary, DOE has screened out the features, events, and processes (FEP) associated with the effects of mineral precipitation on hydrological properties from its total system performance assessment. Because of the relatively long duration of the thermally perturbed period compared with laboratory and *in-situ* tests, DOE has relied partly on numerical simulations of mineral precipitation/dissolution processes to justify the omission of thermal-hydrologic-chemical (THC) effects on seepage and flow and transport in the near-field as well as the far-field. A key DOE assumption is that results from the near-field THC coupled process model can be used to bound the effects of similar coupled processes on far-field flow and transport. ENFE Agreement 1.07 is concerned with the need for DOE to provide physical evidence that supports their model of matrix-fracture interaction precipitation effects associated with their drift scale test (DST) that support the DOE mineral precipitation predictions using their DST THC model, and associated FEP screening (TSPAI Agreement 2.02, Comments J-9 and J22).

The DOE response summarizes mineralogic and petrologic analyses of pre-test drill core, and of side-wall cores removed during the test period. The analysis of the pre-test core provides information on initial mineral abundances that can help constrain initial conditions for THC models. Descriptions and quantitative data on the mineralogy from the drift scale test are important in developing the necessary information for model support and model justification for the THC numerical and conceptual models. However, no analyses or comparisons between the observational results and estimates from the THC simulation model were provided. Such analyses contribute to NRC staff evaluations regarding whether the model abstraction used in performance assessment is adequately supported (e.g. YMRP Rev. 2 Section 4.2.1.3.3.2 and 3 Review Method/Acceptance Criterion 5), and the results are adequate for evaluating the inclusion or exclusion of related FEPs.

The staff notes that DOE recognizes (DOE response Section 3.1, and Section 3.5) that observations could be compared to the THC simulation result. As discussed with your staff, analyses such as these are needed to address both ENFE Agreement 1.07 and TSPAI Agreement 2.02 (Comment J-9 and J-22). The NRC staff anticipates that these comparisons/analyses will be contained in an FY 03 update to the AMR "Drift Scale Coupled Processes (DST and THC) Models" (MDL-NBS-HS-000001 Rev 02). DOE will also be updating FEPs in UZ Flow and Transport, ANL-NBS-MD-000001, to include information from ENFE Agreement 1.07, (as well as ENFE Agreements 1.04, 1.05, 2.06, and 2.16). Consequently, the status of ENFE Agreement 1.07 and TSPIA Agreement 2.02 (Comments J-9 and J-22) should remain "partly received" until staff has reviewed the updated AMR in the context of all of the information received to date. If you have any questions regarding this matter, please contact Bill Dam at 301-415-6710 or by e-mail at wld@nrc.gov.

Sincerely,

/RA/

Janet R. Schlueter, Chief
High-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: NRC Review of DOE Document
Pertaining to ENFE Key Technical
Issue Agreement 1.07

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The staff notes that DOE recognizes (DOE response Section 3.1, and Section 3.5) that observations could be compared to the THC simulation result. As discussed with your staff, analyses such as these are needed to address both ENFE Agreement 1.07 and TSPAI Agreement 2.02 (Comment J-9 and J-22). The NRC staff anticipates that these comparisons/analyses will be contained in an FY 03 update to the AMR "Drift Scale Coupled Processes (DST and THC) Models" (MDL-NBS-HS-000001 Rev 02). DOE will also be updating FEPs in UZ Flow and Transport, ANL-NBS-MD-000001, to include information from ENFE Agreement 1.07, (as well as ENFE Agreements 1.04, 1.05, 2.06, and 2.16). Consequently, the status of ENFE Agreement 1.07 and TSPIA Agreement 2.02 (Comments J-9 and J-22) should remain "partly received" until staff has reviewed the updated AMR in the context of all of the information received to date. If you have any questions regarding this matter, please contact Bill Dam at 301-415-6710 or by e-mail at wld@nrc.gov.

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Enclosure: NRC Review of DOE Document Pertaining to ENFE Key Technical Issue Agreement 1.07

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Letter to J. Ziegler from J. Schlueter, dated: March 20, 2003
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J. Charles, Ely Shoshone Tribe
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D. Eddy, Jr., Colorado River Indian Tribes
H. Jackson, Public Citizen
J. Wells, Western Shoshone National Council
R. Henning, BSC
I. Zabarte, Western Shoshone National Council

NRC Review of DOE Documents Pertaining to
Evolution of the Near-Field Environment Key Technical Issue Agreement 1.07,
and Total System and Performance Assessment and Integration
Key Technical Issue Agreement 2.02 (J-9 and J-21)

The U.S. Nuclear Regulatory Commission (NRC) goal of issue resolution during this interim prelicensing period is to assure that the U.S. Department of Energy (DOE) has assembled enough information on a given issue for NRC to accept a license application for review. Resolution by the NRC staff during prelicensing does not prevent anyone from raising any issue for NRC consideration during the licensing proceedings. Just as important, resolution by the NRC staff during prelicensing does not prejudge what the NRC staff evaluation of that issue will be after its licensing review. Issues are resolved by the NRC staff during prelicensing when the staff has no further questions or comments about how DOE is addressing an issue. Pertinent new information could raise new questions or comments on a previously resolved issue.

This enclosure addresses DOE/NRC Agreement 1.07 made during the Evolution of the Near-Field Environment Technical Exchange and Management Meeting on January 9–12, 2001, (see NRC letter[1] dated January 26, 2001, which summarized the meeting); and DOE/NRC Agreement 2.02 (Comments J-9 and J-21), made during the Total System Performance Assessment and Integration Technical Exchange and Management Meeting on August 6-10, 2001 (See NRC letter[2] dated August 23, 2001, which summarized the meeting).

Evolution of the Near-Field Environment Agreement 1.07

Wording of the Agreement:

ENFE 1.07

Provide physical evidence that supports the model of matrix fracture interaction precipitation effects (e.g., coring). The DOE will provide the following evidence that supports the model of matrix/fracture interaction precipitation effects: (i) existing data from the single heater test of post-test overcoring Mineralogy-Petrology analysis [single heater test final report (MOL.20000103.0634) and DTN LASL831151.AQ98.001] is expected to be provided to the NRC in March 2001, (ii) results of ongoing side-wall sampling Min-Pet analyses of drift scale test samples are expected to be provided to the NRC in fiscal year 2002, (iii) DOE expects to provide the *Drift-Scale Coupled Processes (DST and THC Seepage) Models* Analysis Model Report (MDL–NBS–HS–000001) Rev 01 to the NRC as evidence of matrix-fracture interaction in March 2001.

[1]Reamer, C.W. "U.S. Nuclear Regulatory Commission/U.S. Department of Energy Technical Exchange and Management Meeting on Evolution of the Near-Field Environment (January 9–12, 2001)." Letter (January 26, 2001) to S. Brocoum, DOE. Washington, DC: NRC. 2001.

[2]Reamer, C.W. "U.S. Nuclear Regulatory Commission/U.S. Department of Energy Technical Exchange and Management Meeting on Total System Performance Assessment and Integration (August 6–10, 2001)." Letter (August 23, 2001) to S. Brocoum, DOE. Washington, DC: NRC. 2001.

Total System Performance Assessment and Integration Agreement 2.02 (Comments J-9 and J-21)

Wording of the Agreement:

TSPAI 2.02

Provide the Technical Basis for the screening argument, as summarized in attachment 2. See comment # "... J-9...J-21..."

DOE will provide the technical basis for the screening argument, as summarized in Attachment 2, for the highlighted Features, Events, and Processes (FEP). The technical basis will be provided in the referenced FEPs AMR and will be provided to the NRC in FY03.

Text in Attachment 2 (Comment J-9): This issue is addressed by existing agreements between DOE and NRC (ENFE Subissue 1 Agreements 4 and 7 and ENFE Subissue 2 Agreement 6). FEPs in UZ Flow and Transport, ANL-NBS-MD-000001 will be revised at the completion of this work.

Text in Attachment 2 (Comment J-21): This issue is addressed by existing agreements between DOE and NRC (ENFE Subissue 1 Agreements 5 and 7 and ENFE Subissue 4 Agreement 3). FEPs in UZ Flow and Transport, ANL-NBS-MD-000001 will be revised at the completion of this work.

NRC Review:

Background: The DOE has concluded that the effects of mineral precipitation on hydrological properties are insignificant to the total system performance assessment. Because of the relatively long duration of the thermally perturbed period compared with laboratory and *in-situ* tests, DOE has relied partly on numerical simulations of mineral precipitation/dissolution processes to justify the neglect of thermal-hydrologic-chemical effects on seepage and flow and transport in the near-field as well as the far-field (i.e., FEP 2.2.08.03.00 and 2.2.11.02.00 - Geochemical interactions, including gas pressure effects, in geosphere and effects on flow pathways and radionuclide transport). The key screening assumption is that results from the near-field thermal-hydrological-chemical coupled process model (including gas pressure effects) can be used to bound the effects of similar coupled processes on far-field flow and transport.

Given the complex nature of thermal-hydrologic-chemical models and the relatively limited experience with multicomponent multiphase thermal-hydrologic-chemical simulations, staff consider comparisons between simulation results and direct physical observations to be an essential component of model support activities. ENFE Agreement 1.07 was designed to provide an indication that sufficient information exists or is being collected, analyzed and compared to modeled results. As indicated in the agreement, staff requested physical evidence and analyses to support the conceptual and numerical models for mineral precipitation and dissolution processes at matrix/fracture interfaces. TSPAI Agreement 2.02 (Comments J-9 and J-21) is related to ENFE Agreement 1.07 due to the fact that DOE has relied partly on numerical simulations of mineral precipitation/dissolution processes to justify the omission of thermal-hydrologic-chemical (THC) effects (including gas pressure effects) on seepage and flow and transport in the near-field as well as the far-field.

Summary of the Information Provided by DOE:

Applicable Regulatory Requirements/Guidance:

The DOE identified the following 10 CFR Part 63 requirements and Yucca Mountain Review Plan (YMRP) guidance as applicable to ENFE Agreement 1.07 and TSPAI Agreement 2.02 (Comments J-9 and J-21):

- 10 CFR 63.114(a): Include data related to the geology, hydrology, and geochemistry (including disruptive processes and events) of the Yucca Mountain site, and the surrounding region to the extent necessary, and information on the design of the engineered barrier system used to define parameters and conceptual models used in the assessment.

- 10 CFR 63.114(e): Provide the technical basis for either inclusion or exclusion of specific features, events, and processes in the performance assessment. Specific FEPs must be evaluated in detail if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.

- 10 CFR 63.114(f): Provide the technical basis for either the inclusion or exclusion of degradation, deterioration, or alteration processes of the engineered barriers that would adversely affect the performance of natural barriers. Degradation, deterioration, or alteration processes of engineered barriers must be evaluated in detail if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.

- YMRP Revision 2, Section 4.2.3.3, Acceptance Criteria for Model Abstraction for Quantity and Chemistry of Water Contacting Waste Packages and Waste Forms, Acceptance Criterion 1 - System description and model integration are adequate.

- YMRP Revision 2, Section 4.2.3.3, Acceptance Criteria for Model Abstraction for Quantity and Chemistry of Water Contacting Waste Packages and Waste Forms, Acceptance Criterion 2 - Data are sufficient for model justification.

- YMRP Revision 2, Section 4.2.3.3, Acceptance Criteria for Model Abstraction for Quantity and Chemistry of Water Contacting Waste Packages and Waste Forms, Acceptance Criterion 3 - Data uncertainty is characterized and propagated through model abstraction.

Staff Comments:

ENFE Agreement 1.07 was designed to provide a preliminary indication that direct physical observations of mineral precipitation and dissolution collected to date (as well as being collected) provide (and are likely to provide) the model support and model justification needed to defend the use of Drift Scale Test (DST) and THC model simulations used to screen FEPs

(TSPAI 2.02, Comments J-9 and J-21), as well as being used for other performance assessment related activities. Therefore, the resolution of ENFE Agreement 1.07 applies to any part of 10 CFR 63 for which the DOE DST THC model is applied to any performance related analysis (including but not limited to the screening of FEPs). Consequently, there are additional 10 CFR 63 requirements and YMRP guidance that are potentially applicable, and should be considered (see Appendix A).

DOE Basis for Regulatory Compliance:

The DOE provided the following reports in response to Evolution of the Near-Field Environment Agreement 1.07, and Total System and Performance Assessment Agreement 2.02 (J-9 and J-21): Drift-Scale Coupled Process (DST and THC seepage) Models (MDL–NBS–HS–000001, Rev 01, ICN 00), and the Single Heater Test—Final Report (BAB000000–01717–5700–00005, Rev 00, ICN 01).

DOE[3] also submitted *Response to ENFE Agreement 1.07: Results of Side-wall Sampling Min-Pet Analyses of Drift Scale Test Samples*. This letter report was derived from input into the in-process Analysis Model Report, *Thermal Testing Measurements Report*, ANL–HBS–000041 Rev 00, which is expected to be issued in fiscal year 2003 as a controlled document. The letter report summarizes mineralogic and petrologic analyses of a pre-test drill core and of side-wall cores removed during the test period. The analysis of the pre-test core provides information on initial mineral abundances that can help constrain initial conditions for thermal-hydrologic-chemical models. The side-wall sampling results revealed new deposits of amorphous silica, gypsum, and calcite on borehole surfaces, and, to a lesser extent, on natural fractures within the core samples. Only one sample showed evidence of dissolution during the test period. Because of the sparse nature of the side-wall sampling and the small size of the recovered samples, the side-wall sampling results are largely nonquantitative. That is, they are limited to descriptions and some quantitative data on mineral deposit thicknesses.

Staff Comments: Descriptions and quantitative data on the mineralogy and on mineral deposit thickness from the drift scale test are important in developing the necessary information for model support and model justification for the thermal-hydrologic-chemical numerical and conceptual models. However, no analyses or comparisons between the observational results and estimates from the thermal-hydrologic-chemical simulation model were provided. Such analyses contribute to NRC staff evaluations regarding whether the model abstraction used in performance assessment is adequately supported (e.g. See Appendix 1, reference to YMRP Revision 2, Section 4.2.1.3.3, Review Method/Acceptance Criterion 5), and the results are adequate for evaluating the inclusion or exclusion of a FEP.

Staff are aware that the observational mineralogical data from the side-wall sampling program are not directly comparable to quantitative thermal-hydrologic-chemical simulation results on the abundances of precipitated minerals or the magnitude of mineral dissolution. However (as noted in section 3.1, Paragraph 2; and Section 3.5, Paragraph 1), observations could be compared to the thermal-hydrologic-chemical simulation result for the types of secondary minerals deposited and the location of these deposits. These comparisons/analyses will be

[3]Ziegler, J.D. "Transmittal and Report Addressing Key Technical Issue (KTI) Agreement Items Evolution of the Near-Field Environment (ENFE.1.07) and Total System Performance Assessment and Integration (TSPAI.2.02), Comments J–9 and J–21." Letter (September 26, 2002) to J. Schlueter. NRC: 2002

contained in an FY 03 update to the AMR "Drift Scale Coupled Processes (DST and THC) Models" (MDL-NBS-HS-000001 Rev 02).

Section 3.5 of the letter report *Response to ENFE 1.07: Results of Side-wall Sampling Min-Pet Analyses of Drift Scale Test Samples* also mentions planned sample analysis of continuous core collected from zones where mineral alterations are anticipated to occur. Staff agree that such analyses would provide better constraints for the thermal-hydrologic-chemical simulations, and that successful comparisons with thermal-hydrologic-chemical simulations would enhance confidence where the same are used in performance assessment.

Additional Information Needed:

ENFE Agreement 1.07: A comparison between the thermal-hydrologic-chemical simulation results and observational data is needed to allow staff to evaluate model support and model justification considerations. DOE recognizes (DOE response Section 3.1, and Section 3.5) that observations could be compared to the THC simulation result, and that these comparisons/analyses will be contained in an FY 03 update to the AMR "Drift Scale Coupled Processes (DST and THC) Models" (MDL-NBS-HS-000001 Rev 02).

TSPAI Agreement 2.02 (Comments J-9 and J-22): All information needed to resolve ENFE Subissue 1 Agreements 4, 5 and 7, ENFE Subissue 2 Agreement 6 and 16, and ENFE Subissue 4 Agreement 3.

Status of Agreements:

- Evolution of the Near-Field Environment Agreement 1.07 will continue to be listed as "Partly Received."

- Total System Performance Assessment And Integration Agreement 2.02 (Comments J-9 and J-21) will be listed as "partly received."

REFERENCE:

Levy, S.S. "Response to ENFE.107: Results of Side-Wall Sampling MIN-PET Analyses of Drift Scale Test Samples." Provided by letter (September 26, 2002) from S. Brocoum to J.Schlueter. September 24, 2002.

APPENDIX A:

Appendix A, "ADDITIONAL 10 CFR 63 REQUIREMENTS AND YMRP GUIDELINES POTENTIALLY APPLICABLE TO ENFE AGREEMENT 1.07 AND TSPAI AGREEMENT 2.02 (COMMENTS J-9 AND J-21)."

APPENDIX A

ADDITIONAL 10 CFR 63 REQUIREMENTS AND YMRP GUIDELINES POTENTIALLY APPLICABLE TO ENFE AGREEMENT 1.07 AND TSPAI AGREEMENT 2.02 (COMMENTS J-9 AND J-21)

- 10 CFR 63.21(c)(1)(ii): (c) The Safety Analysis Report must include: (1) A description of the Yucca Mountain site, with appropriate attention to those FEPs of the site that might affect design of the geologic repository operations area and performance of the geologic repository. The description of the site must include information regarding FEPs outside of the site to the extent the information is relevant and material to safety or performance of the geologic repository. The information referred to in this paragraph must include: (ii) Information regarding the geology, hydrology, and geochemistry of the site, including geomechanical properties and conditions of the host rock;

- 10 CFR 63.21(c)(9): An assessment to determine the degree to which those FEPs of the site that are expected to materially affect compliance with Sec. 63.113--whether beneficial or potentially adverse to performance of the geologic repository--have been characterized, and the extent to which they affect waste isolation. Investigations must extend from the surface to a depth sufficient to determine principal pathways for radionuclide migration from the underground facility. Specific FEPs of the geologic setting must be investigated outside of the site if they affect performance of the geologic repository.

- 10 CFR 63.21(c)(10): An assessment of the anticipated response of the geomechanical, hydrogeologic, and geochemical systems to the range of design thermal loadings under consideration, given the pattern of fractures and other discontinuities and the heat transfer properties of the rock mass and water.

- 10 CFR 63.21(c)(14): An evaluation of the natural features of the geologic setting and design features of the engineered barrier system that are considered barriers important to waste isolation as required by Sec. 63.115.

- 10 CFR 63.114(b): Account for uncertainties and variabilities in parameter values and provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment.

- 10 CFR 63.114(c): Consider alternative conceptual models of features and processes that are consistent with available data and current scientific understanding and evaluate the effects that alternative conceptual models have on the performance of the geologic repository.

- 10 CFR 63.114(g): Provide the technical basis for models used in the performance assessment such as comparisons made with outputs of detailed process-level models and/or empirical observations (e.g., laboratory testing, field investigations, and natural analogs).

- 10 CFR 113(a): The geologic repository must include multiple barriers, consisting of both natural barriers and an engineered barrier system.

- 10 CFR 115(a): Identify those design features of the engineered barrier system, and natural features of the geologic setting, that are considered barriers important to waste isolation.

- 10 CFR 115(b): Describe the capability of barriers, identified as important to waste isolation, to isolate waste, taking into account uncertainties in characterizing and modeling the behavior of the barriers.

- 10 CFR 115(c): Provide the technical basis for the description of the capability of barriers, identified as important to waste isolation, to isolate waste. The technical basis for each barrier's capability shall be based on and consistent with the technical basis for the performance assessments used to demonstrate compliance with Sec. 63.113(b) and (c).

- YMRP Revision 2, Section 4.2.1.1, System Description and Demonstration of Multiple Barriers, Acceptance Criterion 2 - The capability of the identified barriers to prevent or substantially delay the movement of water or radioactive materials is adequately identified and described:

  – The information on the time period over which each barrier performs its intended function, including any changes during the compliance period, is provided;

  – The uncertainty associated with barrier capabilities is adequately described; and

  – The described capabilities are consistent with results from the total system performance.

- YMRP Revision 2, Section 4.2.1.1, System Description and Demonstration of Multiple Barriers, Acceptance Criterion 3 - The technical bases are consistent with the technical basis for the performance assessment. The technical basis for assertions of barrier capability is commensurate with the importance of each barrier's capability and associated uncertainties.

- YMRP Revision 2, Section 4.2.1.2, Scenario Analysis and Event Probability, Acceptance Criteria 1 - The Identification of an initial list of features, events and processes is adequate:

  – The Safety Analysis Report contains a complete list of FEPs, related to the geologic setting or the degradation, deterioration, or alteration of engineered barriers (including those processes that would affect the performance of natural barriers), that have the potential to influence repository performance. The list is consistent with site characterization data. Moreover, the comprehensive FEPs list includes, but is not limited to, potentially disruptive events related to igneous activity (extrusive and intrusive); seismic shaking (high-frequency-low magnitude, and rare large-magnitude events); tectonic evolution (slip on existing faults and formation of new faults); climatic change (change to pluvial conditions); and criticality.

- YMRP Revision 2, Section 4.2.1.2, Scenario Analysis and Event Probability, Acceptance Criteria 2 - Screening of the Initial List of FEPs is Appropriate:

  – The U.S. Department of energy has identified all FEPs related to either the geologic setting or to the degradation, deterioration, or alteration of engineered barriers (including

those processes that would affect the performance of natural barriers), that have been excluded;

– The U.S. Department of energy has justified excluding each FEPs. An acceptable justification for excluding FEPs is that either the FEPs is specifically excluded by regulation; probability of the FEPs (generally an event) falls below the regulatory criterion; or omission of the FEPs does not significantly change the magnitude and time of the resulting radiological exposures to the reasonable maximally exposed individual, or radionuclide releases to the environment; and

– The U.S. Department of Energy has provided an adequate technical basis for each FEPs, excluded from the performance assessment, to support the conclusion that either the FEPs is specifically excluded by regulation; the probability of the FEPs falls below the regulatory criterion; or omission of the FEPs does not significantly change the magnitude and time of the resulting radiological exposures to the reasonable maximally exposed individual, or radionuclide releases to the environment;

- YMRP Revision 2, Section 4.2.1.2, Scenario Analysis and Event Probability, Acceptance Criteria 3 - Formation of Scenario Classes Is Appropriate

  – Scenario classes are mutually exclusive and complete, clearly documented, and technically acceptable.

- YMRP Revision 2, Section 4.2.1.2, Scenario Analysis and Event Probability, Acceptance Criteria 4 - Screening of Scenario Classes is appropriate

  – Screening of scenario classes is comprehensive, clearly documented, and technically acceptable;

  – The U.S. Department of Energy has adequately considered coupling of processes in estimates of consequences used to screen scenario classes. Scenario classes were not prematurely excluded by a narrow definition;

  – Scenario classes that are screened from performance assessment, on the bases that they are specifically ruled out by regulation or are contrary to stated regulatory assumptions are identified, and sufficient justifications are provided;

  – Scenario classes that are screened from the performance assessment, on the basis that their probabilities fall below the regulatory criterion, are identified, and sufficient justifications are provided; and

  – Scenario classes that are screened from the performance assessment, on the basis that their omission would not significantly change the magnitude and time of the average annual dose, are identified, and sufficient justifications are provided.

- YMRP Revision 2, Section 4.2.1.3.3, Acceptance Criteria for Model Abstraction for Quantity and Chemistry of Water Contacting Waste Packages and Waste Forms, Acceptance Criterion 4 - Model uncertainty is characterized and propagated through the model abstraction.

- YMRP Revision 2, Section 4.2.1.3.3, Acceptance Criteria for Model Abstraction for Quantity and Chemistry of Water Contacting Waste Packages and Waste Forms, Acceptance Criterion 5 - Model abstraction output is supported by objective comparisons.

- YMRP Revision 2, Section 4.2.1.3.6, Acceptance Criteria for Model Abstraction for Flow Paths in the Unsaturated Zone, Acceptance Criterion 1 - System description and model integration are adequate.

- YMRP Revision 2, Section 4.2.1.3.6, Acceptance Criteria for Model Abstraction for Flow Paths in the Unsaturated Zone, Acceptance Criterion 2. - Model abstraction output is supported by objective comparisons.

- YMRP Revision 2, Section 4.2.1.3.6, Acceptance Criteria for Model Abstraction for Flow Paths in the Unsaturated Zone, Acceptance Criterion 3. - Data are sufficient for model justification.

- YMRP Revision 2, Section 4.2.1.3.6, Acceptance Criteria for Model Abstraction for Flow Paths in the Unsaturated Zone, Acceptance Criterion 4. - Data uncertainty is characterized and propagated through model abstraction.

- YMRP Revision 2, Section 4.2.1.3.6, Acceptance Criteria for Model Abstraction for Flow Paths in the Unsaturated Zone, Acceptance Criterion 5. - Model abstraction output is supported by objective comparisons.

  YMRP Revision 2, Section 4.2.1.3.7, Acceptance Criteria for Modal Abstraction for Radionuclide transport in the Unsaturated Zone, Acceptance Criteria 1-5. - (See acceptance criteria for YMRP Revision 2, Section 4.2.1.3.6).

- YMRP Revision 2, Section 4.2.1.3.8, Acceptance Criteria for Model Abstraction for Flow Paths in the Saturated Zone, Acceptance Criteria 1-5. - (See acceptance criteria for YMRP Revision 2, Section 4.2.1.3.6).

- YMRP Revision 2, Section 4.2.1.3.9, Acceptance Criteria for Model Abstraction for Radionuclide Transport in the Saturated Zone, Acceptance Criteria 1-5. - (See acceptance criteria for YMRP Revision 2, Section 4.2.1.3.6).

- YMRP Revision 2, Section 4.2.1.4.1, Acceptance Criteria for Demonstration of Compliance with Postclosure Individual Protection Standard, Acceptance Criterion 3 - The Total System Performance Assessment Code Provides a Credible Representation of Repository Performance.