

criteria is to establish as credible only those events with a probability of occurrence of one chance in 10,000 per year over 10,000 years. As discussed in Section 4.2.1.2 of the draft Yucca Mountain Review Plan, DOE must provide the technical basis for screening events based on probability.

Based on preclosing exchanges and on earlier iterative performance assessments provided by DOE, NRC anticipates that DOE would include many of the features, events, and processes identified by the commenters (e.g., climate change, volcanic disruption, seismic activity, glaciation, groundwater transport) in its performance assessment. If other features, events, and processes identified by the commenter are excluded from the postclosure performance assessment, DOE must include the technical bases for the exclusions as expressed by 10 CFR 63.114(e). Part of this technical basis must include site characterization information such as groundwater chemistry, location of faults and igneous features, and geomorphology.

To support the postclosure performance assessment, DOE is required to submit data on the hydrology, geochemistry, and geology of the Yucca Mountain site by 10 CFR 63.114(a). Specific information of the type identified in several comments (groundwater temperature, fluoride concentration, C-22 alloy performance) is the responsibility of DOE. NRC staff will evaluate the adequacy of this information as part of a licensing review, using the review methods and acceptance criteria presented in the Yucca Mountain Review Plan.

No changes were made to the Yucca Mountain Review Plan in response to these comments.

Issue 2: Why do the review methods in the Yucca Mountain Review Plan specify time and extent of past patterns of natural events?

Comment. A comment stated that review methods for probability models refer to site-specific information that NRC staff should consider during a review of a license application. The commenter argued that this information is too prescriptive and based on NRC judgements of what is important for probability models. The commenter asks for a more generalized discussion in Review Methods 2 and 3 of Section 4.2.1.2.2, "Identification of Events with Probabilities Greater Than 10^{-8} Per Year," of the draft Yucca Mountain Review Plan. The same commenter also expressed concern that the past patterns of natural events in the Yucca Mountain region provide overly prescriptive

information for NRC staff review of probability models.

Response. In using Acceptance Criterion 2 of Section 4.2.1.2.2, NRC staff would consider the past patterns of natural events in the Yucca Mountain region. This acceptance criterion is used considering the range of information that NRC staff may consider with respect to the timing and general extent of past events. Thus, Review Method 2 provides general guidance regarding the timing (e.g., "past igneous activity since about 12 million years") and extent (e.g., "within about 50 kilometers of the proposed repository site") of past natural events to provide a basis for use of Acceptance Criterion 2. DOE is not restricted to these general definitions for past patterns of natural events and may provide any technical basis that it believes demonstrates compliance with the requirements of 10 CFR 63.114(a)(4).

As noted in Acceptance Criterion 2, an appropriate technical basis for probability estimates would be based on past patterns of natural events in the Yucca Mountain region. Acceptable probability models would be based on past events in the Yucca Mountain region; however, these models may incorporate additional considerations, as deemed appropriate by DOE. These additional considerations would be reviewed by NRC staff in a licensing review.

No changes were made to the Yucca Mountain Review Plan as a result of this comment.

Issue 3: Why do the review methods call for use of independently developed probability models?

Comment. A commenter stated that Section 4.2.1.2.2, "Identification of Events with Probabilities Greater Than 10^{-8} Per Year," of the draft Yucca Mountain Review Plan, refers to the use of independently developed probability models. The commenter noted that more specific guidance to reviewers is needed for the use of independent probability models, and that use of independent models would bias NRC staff reviews.

Response. In its licensing review, NRC staff considers information submitted by the license applicant and results of independent NRC staff analyses. The use of independent probability models enables NRC staff to focus on those areas that are most important to risk consistent with a risk-informed, performance-based approach.

Guidance on the use of independent models in Review Method 3 of Section 4.2.1.2.2 has been modified.

Issue 4: Is it appropriate to relate igneous activity to other geologic processes?

Comment. One commenter asserted that igneous activity is incorrectly related to other geologic processes. The commenter also stated that the use of tectonic models in Acceptance Criterion 3 and Review Method 3 of Section 4.2.1.2.2, "Identification of Events with Probabilities Greater Than 10^{-8} Per Year," of the draft Yucca Mountain Review Plan is overly prescriptive and that the consideration of information from comparable volcanic systems outside the Yucca Mountain region in Review Method 4 of Section 4.2.1.2.2 also appears overly prescriptive.

Response. Review Method 3 in Section 4.2.1.2.2 states "Assess whether igneous-activity probability models are consistent with the range of tectonic models used to assess other geological processes, such as seismic source characterization, site geological models, and patterns of ground-water flow." This statement does not relate igneous activity to other geologic processes through tectonic processes. Rather, it instructs reviewers to evaluate the consistency between tectonic models used in igneous activity probability models with tectonic models used to evaluate other geologic processes. Consistent use of tectonic models for different, relevant geologic processes may provide support for probability models.

Not all parameters used in a probabilistic volcanic hazard assessment for Yucca Mountain would necessarily need to consider information from comparable volcanic systems. Paragraph 2 of Review Method 4 of Section 4.2.1.2.2 has been rewritten to clarify this point.

Issue 5: Does the Yucca Mountain Review Plan contain excessively prescriptive requirements with regard to the use of analog information to assess the effects of igneous activity on repository performance?

Comment. The commenter argued that use of analog information "to the extent possible" as discussed in Acceptance Criterion 3 of Section 4.2.1.2.2 is overly prescriptive and suggested use of analog information only "to the extent appropriate." The same commenter also suggested changing requirements for the accuracy of probability models to avoid excess prescriptiveness.

Response. DOE may submit any information it believes will satisfy the requirements of 10 CFR 63.114(a)(4). The use of information from analog volcanic fields, to the extent appropriate, could be used as a basis for model justification.

The text of the Yucca Mountain Review Plan has been modified to