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Annette L. Vietti-Cook, Secretary
U.S. Nuclear Regulatory Commission
Office of the Secretary-M/S 016-C1
Washington, DC 20555-0001

U.S. DEPARTMENT OF ENERGY (DOE) COMMENTS ON PROPOSED REGULATION AT 10 CFR PART 63.342 – PROBABILITY OF UNLIKELY FEATURES, EVENTS, AND PROCESSES

On January 25, 2002, the U.S. Nuclear Regulatory Commission (NRC) published in the *Federal Register* its proposed amendment to 10 CFR Part 63.342, that would specify a range for the probability of unlikely features, events, and processes, that would be used in certain performance assessments for a geologic repository at Yucca Mountain, Nevada. DOE agrees that defining the term "unlikely" in quantitative terms through rulemaking is appropriate. This letter and its enclosure transmit DOE's comments on the proposal.

Under existing NRC regulations, unlikely features, events, and processes are included in the performance assessment for the individual protection standard but not for the human intrusion and groundwater protection standards, which DOE agrees is appropriate. DOE also agrees that specifying a probability range for unlikely features, events, and processes, as in the proposed rule, provides a clearer categorization than would specifying only an upper bound. The proposed regulation also provides a clearer and more appropriate approach than taking no action (i.e., leaving the determination of "unlikely" to the licensing process), or providing the range for "unlikely" only in guidance. DOE notes that the probability of very unlikely features, events, and processes, which are not considered in any performance assessment, has previously been established at 1 chance in 10,000 of occurring within 10,000 years of disposal.

DOE believes that the NRC's proposed probability of between one chance in 10 and one chance in 10,000 of occurring within the 10,000-year compliance period for unlikely features, events, and processes is a reasonable and conservative choice and agrees that its use in the rule is appropriate. As discussed in the enclosed comments, DOE believes that there is an analogue in NRC precedent for an upper bound of one chance of occurrence within 10,000 years (i.e., approximately 10^{-4} annual probability). This supports the premise that an upper bound of one chance in 10 of occurring within 10,000 years of disposal (i.e., approximately 10^{-5} annual probability) is conservative.

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If you have any questions regarding these comments, please contact Nancy H. Slater-Thompson of the Office of Civilian Radioactive Waste Management at (202) 586-9322 or April V. Gil of the Yucca Mountain Site Characterization Office staff at (702) 794-5578.

Sincerely,

Dr. Margaret S. Y. Chu, Director
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Enclosure:
DOE Comments on 10 CFR Part 63.342
Proposed Rule

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U. S. Department of Energy (DOE) Comments on 10 CFR Part 63.342 Proposed Rule

General Comment

The preamble to the U.S. Nuclear Regulatory Commission's (NRC) proposal discusses three broad categories for features, events, and processes (FEPs) based on their probability of occurrence: likely, unlikely, and very unlikely. NRC proposes a range for the probabilities of unlikely FEPs. DOE believes that the NRC's proposed probability of one chance in 10 of occurring within the 10,000-year compliance period as the upper bound for unlikely FEPs is a reasonable and conservative choice. The upper bound for probability of very unlikely FEPs, which are not considered in any performance assessments, has previously been established at one chance in 10,000 of occurring within 10,000 years of disposal.

The analysis for the individual protection standard includes both likely and unlikely FEPs. The analyses for the groundwater protection and human intrusion standards include only likely FEPs, i.e., these two standards were established by the Environmental Protection Agency (EPA) in 40 CFR Part 197 based on "expected" or "likely" performance of a repository at Yucca Mountain.

- For groundwater protection, not including unlikely FEPs is consistent with EPA's generic repository standards in 40 CFR Part 191 and reflects the narrower scope and lower limits of the groundwater protection standard. The individual protection standard, which includes all pathways, addresses groundwater contamination affected by unlikely FEPs.

- For human intrusion, not including unlikely FEPs is consistent with EPA's standards in 40 CFR Part 197 and is appropriate because EPA and NRC's stylized intrusion scenario (drilling for water from above the Yucca Mountain repository directly through a degraded waste package without recognition by the drillers) has been shown by DOE to not be feasible until much more than 10,000 years after disposal. A combination of this very low probability human intrusion scenario and an unlikely FEP, such as igneous activity within the 10,000 year compliance period is very unlikely and should not be considered.

In this regard, DOE notes that FEPs can be excluded on the basis of low consequence to the results of performance assessments. The last sentence of 10 CFR 63.342 allows exclusion of FEPs with low consequences, regardless of probability, from all performance assessments.

Specific Comment

DOE agrees with NRC that an upper bound for annual probability of unlikely FEPs of 10^{-6} or lower is inappropriate, because, as NRC explained, FEPs near this probability are neither expected nor likely. DOE believes that the NRC's proposed upper bound of 1 chance in 10 of occurring within the 10,000-year compliance period (i.e., approximately

10^{-5} annual probability) for unlikely FEPs is a reasonable and conservative choice. DOE also believes that there is an analogue in NRC precedent for an upper bound of one chance of occurrence within 10,000 years (i.e., approximately 10^{-4} annual probability), which supports the premise that an upper bound of a 1 chance in 10 of occurring within 10,000-years of disposal is conservative.

This precedent derives from NRC's use of Category 1 and Category 2 events in 10 CFR Part 60[1] and event sequences in 10 CFR Part 63. This analogue is presented in the following table.

NRC's probability basis for preclosure events or event sequences	**Occurs once or more during compliance period**	**Less than once and at least 1 in 10,000 chance during compliance period**	**Less than 1 in 10,000 chance during compliance period**
Preclosure events or event sequences (and applicable standards)	Category 1 events or event sequences: 15 mrem/year	Category 2 events or event sequences: 5 rem/event	No standard
Annual probability bounds for preclosure period	From 1 to 10^{-2}	Less than 10^{-2} and at least 10^{-6} [2]	Less than 10^{-6}
Analogue for postclosure FEPS			
Postclosure FEPs (and applicable standards)	Likely: Included for all performance assessments	Unlikely: Included for individual protection standard only	Very unlikely: Excluded for all performance assessments
Analogous postclosure average annual probability bounds (10,000 years postclosure period)	From 1 to 10^{-4}	Less than 10^{-4} and at least 10^{-8}	Less than 10^{-8}

Using the probabilities of occurrence during the relevant compliance period as a basis to compare preclosure and postclosure periods, this analogue suggests that an upper bound of 10^{-4} for unlikely postclosure FEPs would be appropriate. Part 60.2 even uses analogous terms in defining preclosure events: Category 1 events "are reasonably *likely* to occur regularly, moderately, frequently, or one or more times before permanent closure" and Category 2 events "are considered *unlikely*, but sufficiently credible to warrant consideration" (*italics* added).

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[1] Although 10 CFR Part 60 does not apply to a repository at Yucca Mountain, the 10 CFR Part 60 rulemaking establishing Category 1 and 2 events provides an analogue for establishing the upper bound for unlikely FEPs.

[2] These annual probabilities are based on a preclosure period of 100 years and were shown by NRC in its preamble to amendments to the final rule on design basis events for 10 CFR Part 60 (61 FR 64265, December 4, 1996). A different preclosure period would not change the analogous postclosure probability bounds.

DOE believes that, using the preclosure requirements as an analogue for defining probability bounds for likely, unlikely, and very unlikely FEPs, there is a basis for defining the upper bound of unlikely FEPs at 10^{-4} year. Selecting an upper bound of a one chance in 10 of occurring within 10,000-years of disposal (i.e., approximately 10^{-5} annual probability) is then a reasonable and conservative approach.

DOE also notes that FEPs can be excluded from any performance assessment on the basis of low consequence to the results of the performance assessment. The last sentence of 10 CFR Part 63.342 allows exclusion from all performance assessments of FEPs with a chance of occurrence (probability) higher than one chance in 10,000 of occurring in 10,000 years if the FEP has a low consequence, i.e., the results of the performance assessment would not be changed significantly by evaluation of the impacts resulting from the FEP.