REGULATORY ANALYSIS

10 CFR PART 63: DISPOSAL OF HIGH-LEVEL RADIOACTIVE WASTES IN A PROPOSED GEOLOGIC REPOSITORY AT YUCCA MOUNTAIN, NEVADA:

AMENDMENT TO SPECIFY A PROBABILITY FOR UNLIKELY FEATURES, EVENTS, AND PROCESSES

Issue:

The U.S. Nuclear Regulatory Commission (NRC) is amending its regulations on the disposal of high-level radioactive wastes (HLW) in a proposed geologic repository at Yucca Mountain, Nevada (10 CFR Part 63) to define a probability range for use in determining whether a feature, event, or process (FEP) or sequence of events and processes is considered to be "unlikely" and thus excluded from certain required assessments. This amendment is being made to provide clarification of how NRC is implementing the final environmental standards for Yucca Mountain issued by the U.S. Environmental Protection Agency (EPA). Specifically, EPA's final standards require the exclusion of "unlikely" FEPs, or sequences of events and processes from the assessments for human intrusion and ground-water protection, and NRC is to determine the probability of the unlikely FEPs (66 FR 32135; June 13, 2001).

A proposed rule, "10 CFR Part 63 --Specification of a Probability for Unlikely Features, Events, and Processes" was published in the Federal Register on January 25, 2002 (67 FR 3628). Five comment letters were received, from the State of Nevada, EPA, DOE, Exelon, and the Nuclear Energy Institute. These comments have been considered in the development of this final rule.

Background:

NRC is establishing a regulatory framework to prepare for a possible application by the U.S. Department of Energy (DOE) for a license to construct and operate a geologic repository for HLW at a potential site at Yucca Mountain, Nevada. The Energy Policy Act of 1992 (EnPA) made changes to the U. S. HLW repository program, originally established in the Nuclear Waste Policy Act of 1982. It directed EPA to issue public health and safety standards for HLW

disposal at a potential geologic repository at Yucca Mountain, Nevada, to be based on and consistent with a National Academy of Sciences (NAS) study of the technical bases for public health and safety standards governing the Yucca Mountain repository.[1] NRC was directed to modify its technical requirements and criteria for geologic repository disposal to be consistent with the new EPA standards. The EnPA directed NRC to do so within 1 year of promulgation of the final EPA standards. NRC published proposed Part 63, "Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada", on February 22, 1999. (64 FR 8640) EPA published its proposed standards for Yucca Mountain, 40 CFR Part 197, on August 27, 1999 (64 FR 46976), and its final standards on June 13, 2001 (66 FR 32073). NRC published final Part 63, revised to conform to the final EPA standards, on November 2, 2001 (63 FR 55731). These are the regulations that DOE must meet in any potential license application for construction and operation of the repository. EPA's standards for disposal include an individual protection standard (40 CFR 197.20); a human intrusion standard (40 CFR 197.25); and ground-water protection standards (40 CFR 197.30). These EPA standards have been incorporated into NRC's regulations at 10 CFR 63.311, 63.321, and 63.331, respectively.

FEPs are features, events, and processes used to characterize the repository system. Probabilities for FEPs in the context of the potential geologic repository at Yucca Mountain primarily have focused on igneous activity, seismic events, fault movements, and rock fall. At issue in postclosure performance assessments of the repository is which FEPs should be considered in performance assessments. For the purposes of analyses for estimating compliance with the standards for human intrusion and ground-water protection, Part 63 does not specify a quantitative probability limit for unlikely FEPs that should not be considered.[2] However, in the "statement of considerations" for the final rule, the Commission noted that it considered the approach of specifying a value in the regulations " ... to be consistent with the intent of EPA's final standards and may revisit the question of specifying a numerical value by rulemaking in the future" (63 FR 55734). EPA supports the approach of establishing a

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[1] National Academy of Sciences, Technical Bases for Yucca Mountain Standards, National Academy Press, Washington, DC, 1995.

[2] Section 63.342, "Limits on performance assessments," does specify a quantitative limit for very unlikely FEPs -- less than one chance in 10,000 of occurring within 10,000 years of disposal -- that should not be included in DOE's performance assessments.

numerical value for unlikely FEPs that should be excluded from the assessments for the human intrusion standard and ground-water protection standards.

Applicable Current NRC Regulations

Under 10 CFR 63.321(b)(1), DOE must demonstrate the earliest time after disposal that the waste package would degrade sufficiently that a human intrusion could occur without recognition by the drillers and ".... demonstrate that there is a reasonable expectation that the reasonably maximally exposed individual receives no more than an annual dose of 0.15 mSv (15 mrem) as a result of a human intrusion, at or before 10,000 years after disposal." The elements of the stylized human intrusion scenario are specified by 10 CFR 63.322 and specifically mandate that DOE must assume that no releases are included which are caused by unlikely natural processes and events.

With respect to the ground-water protection standards (10 CFR 63.331) DOE must demonstrate that there is a reasonable expectation that, for 10,000 years of "undisturbed" performance after disposal, releases of radionuclides from waste in the Yucca Mountain disposal system into the accessible environment will not cause the level of radioactivity in the representative volume of ground water to exceed the limits specified in a table attached to 10 CFR 63.33. NRC adopted a definition of "undisturbed" performance that excludes the need to consider "unlikely" events.

In assessing compliance with both the human intrusion standard and the ground-water protection standards, 10 CFR 63.342 provides that unlikely FEPs, or sequences of events and processes, shall be excluded "upon prior Commission approval for the probability limit used for unlikely features, events, and processes."

Objective of the Rulemaking:

NRC is making these amendments to Part 63 to clarify how NRC is implementing EPA's final environmental standards for Yucca Mountain. Although the Commission could review and approve a probability limit for unlikely FEPs in the context of its review of DOE's license

application, it prefers to set this limit in advance, through the rulemaking process, so that it will have the advantage of public views on this question, and so that DOE, interested participants, and the public will have knowledge, before the license application, of what probability the Commission would find acceptable.

Alternatives Considered:

(1) No action. Make no change to Part 63. Leave the delineation of what constitutes unlikely FEPs to be resolved in the course of the review of DOE's license application. The determination of which unlikely FEPs should be excluded from the analysis of compliance with the human intrusion and ground-water protection standards would not occur until the license application review stage of the licensing process.

This alternative would require no current resources to conduct a rulemaking, or otherwise revise NRC's regulatory guidance. However, this issue could be subject to contention in the licensing review. Resolving this issue could require a significant amount of future staff time from both NRC and the other parties involved in the licensing review.

(2) Amend 10 CFR 63.342 to include a probability limit for unlikely FEPs that should not be included in DOE's performance assessments for human intrusion and ground-water protection. The probability limit proposed would classify unlikely FEPs as those that are estimated to have less than one chance in 10 of occurring within 10,000 years of disposal, but at least one chance in 10,000 of occurring within 10,000 years of disposal (the upper limit of very unlikely FEPs).

This alternative would clearly delineate those FEPs that DOE must include in its evaluation of the effects of human intrusion and its evaluation of ground-water protection. This would provide clearer requirements for the content of the license application. This would allow DOE's license application to concentrate on these effects rather than to speculate on what constitutes unlikely FEPs, some of which might not be determined to be relevant as a result of the licensing review. It would also allow other parties to the review to know in advance what unlikely FEPs would be excluded, allowing them to more sharply focus their resources. The end result would be a more efficient licensing process.

Adequate public input would be assured because this rulemaking will follow the normal notice and comment process required by the Administrative Procedure Act. A proposed rule has been published, and public comments have been received and considered before publication of a final rule.

This alternative -- development of a rulemaking -- would be more costly in current staff resources than alternatives (1) and (3). It is estimated that the NRC staff resources needed for development of this rulemaking are 0.8 full-time equivalent staff years.

(3) Provide guidance on what constitutes unlikely FEPs in regulatory guidance -- the Yucca Mountain Review Plan -- rather than in the regulations in Part 63. The Yucca Mountain Review Plan, Revision 2 is being developed by NRC to provide guidance on how DOE's license application will be reviewed and evaluated. This alternative would take less time to develop, and require fewer staff resources, than alternative (2).

However, this alternative would not achieve the objective of delineation of what constitutes unlikely FEPs in DOE's assessments of human intrusion and ground-water protection. Unlike a rulemaking, which is codified in NRC's regulations, regulatory guidance is not legally binding. This issue of what constitutes unlikely features, processes, and events would not be resolved, and would still be subject to contention in the licensing review. DOE and other parties could not be certain about the assumptions that must be made in the analysis of human intrusion and ground-water protection until the review stage of the licensing process.

Also, the opportunity for public input is generally not as great in development of regulatory guidance as it is in development of a notice and comment rulemaking, which requires publication of the proposed rule in the Federal Register, followed by consideration of and response to public comments received thereon.

Decision Rationale

Alternative (2) -- conducting a rulemaking -- has been chosen as the preferred alternative. NRC believes that it would be in the interest of an efficient licensing process that the issue of what constitutes unlikely FEPs be resolved in advance of the licensing review. A rulemaking, with appropriate stakeholder and public input, can delineate what FEPs should be considered "unlikely" and therefore should be excluded from DOE's assessments concerning human intrusion and ground-water protection. This would help NRC in reviewing a DOE license application, by keeping the focus of the application on effects of FEPs on performance assessment that are likely to occur. It would also benefit other parties to the licensing review by allowing them to know in advance what FEPs will be considered in performance assessments of human intrusion and ground-water protection.

Implementation:

NRC's schedule for completion of a final rule to amend Part 63 calls for publication in 2002. Necessary guidance material for implementation -- the Yucca Mountain Review Plan, Revision 2-- would be revised accordingly.

Implications for Other NRC Regulatory Programs:

Promulgation of this rule would have no negative implications for other NRC regulatory programs.

Implications for Other Federal Agencies:

Promulgation of the rule will have no adverse impact on DOE's program for geologic repository development. The schedules described here will allow DOE to proceed with its currently stated schedule for a license application.

References:

(1) National Academy of Sciences, Technical Bases for Yucca Mountain Standards, National Academy Press, Washington, DC, 1995.

(2) U.S. Congress, Energy Policy Act of 1992, Public Law 102-486.

(3) Code of Federal Regulations, 40 CFR Part 197, "Public Health and Environmental Radiation Standards for Yucca Mountain, NV; Final Rule" (66 FR 32100; June 13, 2001).

(4) Code of Federal Regulations, 10 CFR Part 63, "Disposal of High-Level Radioactive Waste in a Proposed Geologic Repository at Yucca Mountain, Nevada, Final Rule" (63 FR 55731; November 2, 2001).

(5) "10 CFR Part 63 --Specification of a Probability for Unlikely Features, Events, and Processes" (67 FR 3628) January 25, 2002.