

March 31, 2000

The Honorable Richard A. Meserve
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: COMMENTS AND RECOMMENDATIONS ON THE DRAFT FINAL RULE, 10 CFR PART 63, "DISPOSAL OF HIGH-LEVEL RADIOACTIVE WASTE IN A PROPOSED GEOLOGIC REPOSITORY AT YUCCA MOUNTAIN, NEVADA"

Dear Chairman Meserve:

In this letter we offer our comments on the draft final rule, 10 CFR Part 63, "Disposal of High-Level Radioactive Waste in a Proposed Geologic Repository at Yucca Mountain, Nevada," and the NRC staff draft final responses to public comments on several technical issues addressed in the draft rule (Reference 1). This letter responds to the staff requirements memorandum dated February 1, 2000, requesting the views of the Advisory Committee on Nuclear Waste (ACNW) on the draft final rule by March 31, 2000.

During the ACNW's 114th meeting on November 14–16, 1999, the NRC staff presented a summary of the public comments received on the proposed draft 10 CFR Part 63 and its interim proposed responses to the comments. In addition, during a joint Advisory Committee on Reactor Safeguards (ACRS) and ACNW meeting on January 13-14, 2000, on defense in depth, the NRC staff presented its proposed approach for clarifying the multiple-barrier requirement in the draft high-level radioactive waste (HLW) rule. Since that time, the staff has kept us informed of changes to the draft rule as it has evolved; however, the Committee has not reviewed the ultimate version of the draft final rule that will be forwarded to the Commission.

The following comments are submitted on the staff's proposed response to several specific technical issues addressed in the rule. These issues include the staff's proposed approach to clarify the multiple-barrier requirement and defense-in-depth concept, aspects of design basis events, waste retrievability, human intrusion, performance confirmation, and transportation of HLW.

RECOMMENDATIONS

1. **Multiple Barriers** — The Committee recommends that a quantitative dose limit not be set in the rule for hypothetical assessments for performance of multiple barriers. The Committee recommends an approach to quantify the contributions of barriers that compares estimated repository performance with and without the benefit of specific barriers. The Committee recommends that the detailed method of analyzing multiple

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barriers be limited to the guidance documents, as opposed to being a basic part of the regulation.

2. **Performance Confirmation** — The Committee agrees with the staff on the need for a repository performance confirmation plan that provides insights on post-closure performance while not compromising design flexibility. The Committee recommends that in its review of the Department of Energy's (DOE's) performance confirmation plan, the NRC staff encourages DOE to design its monitoring program in parallel with the repository design. Optimal placement of monitoring devices should not be precluded.
3. **Design Basis Events** —The ACNW supports the staff's proposed clarifications, including elimination of the term "design basis event" in the proposed rule to avoid confusion and miscommunication. The Committee recommends that the importance of event sequences in terms of their impact on overall repository performance, that is, on the radiation dose to the critical group, be the principal basis for allocating analysis and investigation resources to ensure the safety of the public and protection of the environment.
4. **Human Intrusion** — The Committee recommends that the staff avoid the use of surrogate risk values for human intrusion in the regulation. We recommend that the staff compare the results of the hypothetical intruder analyses to the results of the performance assessment analyses. If the staff decides that a license application could be evaluated more easily with a comparison of the results of the hypothetical calculation with a higher dose limit, for example, 1000 mrem (10 mSv) per year, we recommend that this approach be incorporated into the guidance rather than the rule itself.
5. **Waste Retrievability** — The Committee supports the staff's proposed approach to require DOE to plan for but not to demonstrate that the waste package is retrievable before issuing a license to construct the repository. The Committee believes that waste retrieval does not present an insurmountable technological challenge.
6. **Transportation** — The ACNW supports the staff's decision not to address transportation in 10 CFR Part 63. The Committee continues to emphasize the need for clarification and improved management of the overall transportation issue as no single agency appears to have the authority to take a total systems approach to address this public policy issue.

General Comments

1. The staff has done an outstanding job of summarizing and responding to the vast number and wide range of public comments received on the proposed draft rule. The ACNW commends the staff for this significant and noteworthy effort.
2. The staff has made considerable progress in its goal of improving public involvement during the past year through its interactions with the public on draft 10 CFR Part 63. We commend the staff for holding multiple workshops in the Yucca Mountain area to solicit input from stakeholders on the proposed rule. We also encourage the staff in its plans to hold follow-on workshops with stakeholders to convey the final resolution and

response to the public comments and its plans to post comment resolution on the Internet.

Specific Comments

1. Multiple Barriers

We understand that the staff's approach in the proposed regulation for demonstrating multiple barriers is to require that DOE demonstrate reliance on both natural and engineered barriers and that the repository system not depend unduly on any single barrier. We understand that the staff plans to require use of hypothetical calculations wherein barriers are assumed to perform to a lesser degree than anticipated, as a way of gaining insights into the contributions of barriers to overall repository performance. In addition, the staff may require in the rule that the results of the barrier underperformance analyses be compared to a numerical dose failure criterion. The staff also plans to provide more detailed guidance on acceptable methods to demonstrate compliance of multiple barriers in the Yucca Mountain Review Plan (YMRP).

The ACNW has closely followed the development of draft 10 CFR Part 63. In past advice, the Committee has endorsed the staff's general approach to address multiple barriers in the draft rule and has commended the staff for developing a regulation that captures the intent of risk-informed, performance-based (RIPB) regulation. We also advised the Commission that the performance of individual barriers should be quantified, and we recommended that the staff use a post-processor approach to decomposing overall repository performance assessments to quantitatively expose the contribution of individual barriers (References 2-6).

The Committee believes that the staff's proposal to calculate barrier underperformance is an acceptable approach for quantifying the contribution of individual barriers. However, we recommend that the staff not set a quantitative dose limit in the rule for comparison with the hypothetical assessments for performance of multiple barriers. In the spirit of a performance-based philosophy of regulation, the Committee would prefer that the measure of barrier performance always be in terms of its effect on overall repository performance. The ACNW recommends an approach (see enclosure) that involves comparison of risk curves showing calculated system performance with and without a specific functional barrier. Such an approach avoids comparison of the hypothetical results to a surrogate risk value or a subsystem requirement and, in our view, is more consistent with the staff's original performance-based strategy for draft 10 CFR Part 63 in SECY-97-300 (Reference 7).

We appreciate the competing demands placed on the staff to both specify a clear, numerical limit for evaluating compliance while at the same time develop a truly RIPB regulation that is less prescriptive. If the staff elects to use a surrogate risk value, as we understand is being proposed, we recommend incorporating the quantitative dose limits for the hypothetical calculations in the YMRP rather than in the rule itself.

2. Performance Confirmation

We understand that the NRC staff agrees with the public comments that some sections of the rule were too prescriptive and has modified the rule to allow DOE greater flexibility to develop a focused and effective performance confirmation plan. The Committee supports the staff's

proposed approach to performance confirmation. We recommend that in its review of the DOE's performance confirmation plan, the staff encourage that DOE's monitoring scheme be designed in parallel with the repository design. Optimal placement of monitoring devices should not be precluded.

3. Design Basis Events

The staff is considering a number of clarifications in the proposed final rule, including eliminating the term "design basis event" and replacing it with the term "event sequence," to clarify that the probability of a design basis event is based on the entire event sequence.

The ACNW supports the staff's proposed clarifications, including elimination of the term "design basis event" in the proposed rule to avoid confusion and miscommunication. The Committee considers that the traditional concept of design basis is contrary to or at odds with an RIPB approach. The concept traditionally has been used to prescribe design requirements that are not necessarily linked to the performance measure of risk.

We recommend that the importance of event sequences in terms of their impact on the radiation dose to the critical group be the principal basis for allocating analysis and investigation resources to ensure the safety of the public and protection of the environment.

4. Human Intrusion

We understand that the staff is proposing to revise the consequence limit for evaluating human intrusion to an annual dose limit of 1000 mrem (10 mSv). This approach is consistent with the approach used in other NRC regulations for beyond-design-basis conditions. Other aspects of the hypothetical intruder analyses remain unchanged, that is, a single borehole is drilled at 100 years, a single canister is breached, and release of radionuclides to the groundwater pathway is evaluated. The staff believes that its proposed approach provides insights into the repository's resilience to human intrusion, yet avoids the undue conservatism that would result by comparing the results of the hypothetical intruder analyses to the overall performance objective of 25 mrem (0.25 mSv) per year.

The Committee supports the Academies' recommendation (Reference 8) pertaining to human intrusion to analyze different human intrusion scenarios for purposes of testing the robustness of the repository, not for calculating its probability of occurrence. We believe that the best approach to the human intrusion issue is to test the "hardness" of the repository and avoid debating arbitrary frequencies (for example, a 100-year drilling scenario frequency) for an event over which there is very little control.

The Committee recommends that the staff avoid the use of surrogate risk values, such as 1000 mrem (10 mSv) per year, in the regulation. We recommend that the staff compare the results of the hypothetical intruder analyses to the results of the performance assessment analyses. If the staff decides that a license application could be evaluated more easily by a comparison of the results of the hypothetical calculation with a higher dose limit, we recommend that this approach be incorporated into the guidance rather than the rule itself.

5. Waste Retrievability

The staff notes in its response to public comment that NRC will conduct an extensive and careful review of DOE's retrieval plans as part of any construction authorization review. However, DOE will not need to build full-scale prototypes at the time of construction authorization but will have to demonstrate technical feasibility of its retrieval plans using sophisticated computer simulations before receiving a license to receive and emplace waste. NRC notes that DOE needs to design and build the repository in such a way that the retrieval option is not rendered impractical or impossible. The staff proposes no changes to this section of the rule.

The Committee considers that waste retrieval does not present an insurmountable technological challenge. The Committee supports the staff's proposed approach to require DOE to plan for but not to demonstrate that the waste package is retrievable before issuing a license to construct the repository.

6. Transportation

In its response to public comments, the staff makes clear that transportation of HLW is not addressed in 10 CFR Part 63 because NRC and the Department of Transportation (DOT) have existing regulations that address transportation of HLW to a repository. The staff also offers some clarification of NRC's and DOT's role and governing regulations for the transportation of HLW in general and specifically to the proposed repository.

The ACNW has previously recommended that DOE be required to perform a comprehensive assessment of transportation risk to be evaluated by the NRC as part of the overall licensing decision regarding Yucca Mountain (Reference 9). A large experience base of the radiological risks associated with transportation already exists. The ACNW supports the staff's decision not to address transportation in 10 CFR Part 63. We continue to emphasize the need for clarification and improved management of the overall transportation issue because no single agency has the authority to take a total systems approach to address this public policy issue.

Sincerely,

/s/

B. John Garrick
Chairman

Enclosure:

B. John Garrick, Draft Technical Note, "On the Quantification of Defense in Depth," January 13, 2000.

References:

1. Memorandum (undated) from Donald A. Cool, Office of Nuclear Material Safety and Safeguards, to addressees, requesting review and concurrence on a Final Rulemaking

- Establishing 10 CFR Part 63 - Disposal of High-Level Radioactive Waste in a Proposed Geological Repository at Yucca Mountain, Nevada (Predecisional).
2. ACNW letter dated October 31, 1997, from B. John Garrick, Chairman, ACNW, to Shirley Ann Jackson, Chairman, NRC, Subject: Recommendations Regarding the Implementation of the Defense-In-Depth Concept in the Revised 10 CFR Part 60.
 3. ACNW letter dated October 31, 1997, from B. John Garrick, Chairman, ACNW, to Shirley Ann Jackson, Chairman, NRC, Subject: Application of Probabilistic Risk Assessment Methods to Performance Assessment in the NRC High-Level Waste Program.
 4. ACNW letter dated March 6, 1998, from B. John Garrick, Chairman, ACNW, to Shirley Ann Jackson, Chairman, NRC, Subject: ACNW's Support for the NRC Staff's Approach to Assessing the Performance of Multiple Barriers.
 5. ACNW letter dated July 29, 1998, from B. John Garrick, Chairman, ACNW, to Shirley Ann Jackson, Chairman, NRC, Subject: Comments on NRC's Total System Sensitivity Studies for the Proposed High-Level Radioactive Waste Repository at Yucca Mountain, Nevada.
 6. ACNW letter dated September 3, 1998, from B. John Garrick, Chairman, ACNW, to Shirley Ann Jackson, Chairman, NRC, Subject: Advisory Committee on Nuclear Waste Comments on NRC's Draft 10 CFR Part 63 and Revision 0 of the Total System Performance Assessment Issue Resolution Status Report.
 7. SECY-97-300, dated December 24, 1997, Subject: "Proposed Strategy for Development of Regulations Governing Disposal of High-level Radioactive Wastes in a Proposed Repository at Yucca Mountain, Nevada"
 8. National Research Council, "Technical Bases for Yucca Mountain Standards," 1995.
 9. ACNW letter dated January 20, 2000, from B. John Garrick, ACNW, Chairman, to Richard A. Meserve, Chairman, NRC, Subject: Comments on the Draft Environmental Impact Statement for Yucca Mountain.