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USNRC

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ADJUDICATIONS

Secretary
US Nuclear Regulatory Commission
Washington, DC 20555-0001
Attention: Rulemakings and Adjudications Staff

Ladies and Gentlemen:

I am submitting this letter as a public comment on the Proposed Rule, 10 CFR Part 63, "Disposal of High-level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada," published in the Federal Register, Vol. 64, No. 34, on Monday, February 22, 1999. I am a Nuclear Regulatory Commission (NRC) employee who worked on rulemaking and research to support the regulation of high-level radioactive waste (HLW) from 1980 through 1995. Until 1984, I was assigned by my branch to be cognizant of the development and use of the NRC's HLW performance assessment (PA) methodology. From 1984 to 1989, I was the project manager overseeing the development of the HLW PA methodology at Sandia National Laboratories. In 1989, I established the HLW PA research project at the Center for Nuclear Waste Regulatory Analyses and coordinated the initial efforts to transfer the methodology from Sandia to the CNWRA. From 1989 to 1993, I supervised the project managers of the Sandia and CNWRA PA research projects. From 1994 through the end of 1995, when the NRC HLW research program ended, I was the NRC project manager for the CNWRA's PA research project. From 1980 - 1995, I also managed HLW research projects outside the PA area and, from 1991 through 1995, I was the NRC program element manager for all HLW research at the CNWRA. I am basing my comments on Part 63 on this experience. The comments are mine and are not meant to represent the positions of any past or present NRC organizations with which I have been affiliated.

The writers of Part 63 have taken the commendable step of introducing a true safety criterion, the 25 mrem/year dose requirement, into NRC HLW regulatory policy. This step is a very positive, if belated, response to comments on the proposed 10 CFR Part 60, the "generic" HLW regulation that the NRC proposes to replace with Part 63 for the proposed Yucca Mountain repository, that Part 60's performance objectives did not address the issue of nuclear safety directly, and to points made in the National Academy of Science's 1983 report, "A Study of the Isolation System for Geologic Disposal of Radioactive Wastes."

Unfortunately, there are other facets of the proposed Part 63 that I believe could undermine the NRC's credibility as the HLW regulator. I do not believe that the proposed Part 63 should become a Final Rule in its present form for the following reasons. The supplemental information and the Proposed Rule place too much emphasis on performance assessment as a line of inquiry for determining compliance with regulatory requirements. Although the concept of defense-in-depth through multiple barriers is, and should be, contained in both Parts 60 and 63, the multiple-barrier requirements are so weak in Part 63 that they may be meaningless. The NRC should give further consideration to applying its dose requirement to an individual at maximum risk, require that this dose be the true maximum over time and not just over the first

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10,000 years after disposal, and refrain from codifying a particular conceptual model of transport from the HLW to a person receiving the dose.

Performance assessment

Estimating how an HLW repository will work far into the future is a very uncertain exercise requiring many lines of inquiry, none of which is adequate by itself to do the job satisfactorily. Performance assessment, i.e. the application of mathematical models to this problem, is no exception. I do not believe that PA is so robust that it should become an exclusive or dominant means for assessing repository safety. Other lines of inquiry, such as groundwater dating, the examination of archaeological and natural analogues, and investigations of geological stability, also should be used. The facts that retardation modeling and dispersion modeling, both at the very core of PA, remain controversial scientific issues, and that no mathematical model of subsurface transport has ever been validated (shown to agree with field observations without the aid of calibration) should give the NRC reason enough not to use PA an exclusive or dominant decision-making tool for HLW licensing.

I do not think that it is appropriate for the NRC to codify PA requirements, as it proposes to do in Part 63.114. Such codification gives PA more regulatory weight than it should have. The NRC should allow for flexibility in changes in PA and consider relegating Part 63.114 to regulatory guidance.

Defense in depth

Part 63 sacrifices much of the broad base on which Part 60's multiple-barrier requirements rest, potentially to the detriment of effective HLW regulation. This situation could be corrected if the siting and design criteria of Part 60 were retained and the performance objectives in Part 60 were replaced. One possibility is that Part 63's best features could be combined with Part 60's best features to create a rule that could stand as both a generic rule and as a site-specific rule for Yucca Mountain. For example, Part 63's dose requirement could be stated in Part 60.112 as the overall performance objective and Part 60.113's requirements could be replaced with requirements on the engineered and natural barrier systems that have obvious connections with the overall objective. The waste package could be required to outlast the fission products contained in HLW and the period during which HLW gives off heat. The engineered and geologic systems could each be required to meet the dose requirement.

Dose requirement

As stated in the proposed Part 63's supplementary information, the NRC "proposes a limit of 0.25 mSv (25 mrem) to the total effective dose equivalent, received in a single year and weighted by the probability of occurrence, by the average member of the critical group, as the overall system performance objective for the repository, following permanent closure." There remains the possibility that if this requirement is met, a maximally exposed individual could receive a higher dose. The NRC should consider adopting the recommendation of Professor Thomas Pigford in Appendix E of the National Research Council's "Technical Bases for Yucca Mountain Standards," in which he states that the HLW dose standard should be applied to "the subsistence farmer ... the individual at calculated maximum risk" because "the subsistence-farmer approach is *conservative and bounding*." (Emphasis added.)

The National Research Council, in its "Technical Bases for Yucca Mountain Standards," has recommended that the time over which compliance should be assessed should include the time when greatest risk occurs within the limits imposed by the stability of the geologic system, while the NRC has decided in the proposed Part 63 to limit the compliance period to 10,000 years. The NRC should adopt

the National Research Council's recommendation. The 10,000-year limit has its historical roots in the Environmental Protection Agency's 40 CFR Part 191 and did not have a strong technical basis. HLW organizations in other countries, for example Switzerland's Nagra in its 1985 Project Gewähr, have used dose standards applied over open-ended compliance periods without undue difficulty.

The proposed Part 63.115(b)(1), by specifying that "The critical group shall reside within a farming community located approximately 20 km south from the underground facility (in the general location of U.S. Route 95 and Nevada Route 373, near Lathrop Wells, Nevada)," would codify a particular conceptual model of transport from emplaced HLW to the critical group. It is possible that further site characterization and analyses of saturated-zone groundwater flow under the Nevada Test Site and Yucca Mountain could rule out this conceptual model. The NRC should drop the proposed Part 63.115(b)(1).

Sincerely,

A handwritten signature in cursive script that reads "John D. Randall". The signature is written in black ink and is positioned above the printed name.

John D. Randall