

Committee to Bridge the Gap

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USNRC

DOCKET NUMBER
PROPOSED RULE **PR 2,19,20 et al.**
(64FR8640)

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OFFICE OF SECRETARY
RULEMAKING AND
ADJUDICATION STAFF

Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

ATTENTION: Rulemakings and Adjudications Staff

RE: Proposed Rule: Disposal of High-Level Radioactive Wastes in a Proposed
Geologic Repository at Yucca Mountain, Nevada (10 CFR Parts
2,19,20,21,30,40,51,60,61,63), 64 FR. No. 34, Feb. 22, 1999, pp. 8640-8679.

LACK OF NEED FOR THIS RULEMAKING

The proposed rule should be withdrawn. It is, at best, premature and a waste of agency resources and, worse, an attempt to pre-empt the Environmental Protection Agency's statutorily mandated role as promulgator of repository standards. The NRC is required by The Energy Policy Act of 1992 to "not later than 1 year after the [EPA] Administrator promulgates [repository] standards...modify its technical requirements and criteria...as necessary, to be consistent with the Administrator's standards..." To date, the Administrator of the EPA has not promulgated the new repository standards required by the Act. Therefore, it is premature for the Commission to propose any modifications of its licensing criteria. Since the goal of the licensing process is to assure compliance with the standards and protection of the public health and safety, licensing criteria must be based on a firm knowledge of exactly what the standards will require. Once the EPA standards are promulgated, it then will be clear what, if any modifications to the NRC licensing rule will be needed to maintain consistency.

The Energy Policy Act of 1992 supersedes the Nuclear Waste policy Act of 1982, as amended, with respect to regulatory criteria and standards. It mandates new EPA standards specific to a Yucca Mountain repository, but it does not mandate a new Commission rule specific to Yucca Mountain to replace its general rule for licensing geologic repositories, as required by the Nuclear Waste Policy Act. It only requires modification of NRC technical requirements and criteria, as necessary to be consistent with new EPA environmental and human protection standards once they have been promulgated. Further, the Energy Policy Act of 1992 does not authorize the Commission to expand its licensing jurisdiction to include proposing standards for human safety and environmental protection that are within the statutory mandate and jurisdiction of the EPA.

Although the U.S. Department of Energy may desire to have relevant regulations and standards in place early in 2000, the ostensible needs of the potential license applicant should not drive the regulatory process. Instead, the regulatory agencies should seek the protection of

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the public health and safety as required by law. By putting the licensing cart before the repository standards horse, NRC potentially exposes the public to a greater risk than would be the case if the regulatory process proceeded in the logical, statutorily prescribed order.

DEFENSE IN DEPTH IS NEEDED

The NRC's proposal to abandon defense in depth is troubling. The proposed repository at Yucca Mountain would remain hazardous for at least 240,000 years. Given that human history is only a few thousand years old, it is the height of arrogance to think that our society is capable of isolating its most toxic wastes and preventing the leakage of lethal radiation into the environment, where it will enter human bodies through multiple pathways. Since total containment is a virtual impossibility, regulators must take every possible step to prevent and minimize leakage. The proposed repository system must seek to assure defense in depth through evaluation of the individual effectiveness of the natural and engineered components of the multiple barrier system.

The meaning of defense in depth through multiple barriers in a geologic repository system is described in the Department of Energy's 1980 Final Environmental Impact Statement Management of Commercially Generated Radioactive Waste. The EIS states, "Geologic barriers are expected to provide isolation of the waste for at least 10,000 years after the waste is emplaced in a repository and probably will provide isolation for millennia thereafter. Engineered barriers are those designed to assure total containment of the waste within the disposal package during the initial period during which most of the intermediate-lived fission products decay." Any repository licensing rule must explicitly uphold at least this minimal notion of defense in depth through reliance on the characteristics and behavior of multiple barriers against loss of waste isolation.

ANSWERS TO SPECIFIC QUESTIONS

We will answer some of the specific questions posed by the Commission with respect to its proposed repository licensing rule, but with the reservation that, as stated above, the NRC should not be proposing any rule until the EPA's radiation protection standards are promulgated.

Question 1. The Commission solicits comments on the appropriateness of its proposed approach to defining the critical group and reference biosphere for Yucca Mountain.

YUCCA MOUNTAIN REGULATIONS SHOULD PROTECT THE REASONABLY MAXIMALLY EXPOSED INDIVIDUAL (RMEI).

The proposed rule would not assure adequate protection for future generations of people who may be exposed to radionuclide releases from a Yucca Mountain repository. The NRC should follow the recommendations of Thomas H. Pigford, Professor of Nuclear Engineering and member of the National Academy of Sciences panel on Yucca Mountain standards, who

correctly asserts that the critical group should be represented by the reasonably maximally exposed individual. He writes (Pigford, "Geologic Disposal of Spent Nuclear Fuel and Nuclear Waste: Ethical and Technical Bases for Standards and Criteria to Protect Public Health," an invited paper presented at the International Symposium on Radioactive Waste Disposal: Health and Environmental Criteria and Standards, Stockholm, August 31-September 4, 1998):

"Current international practice protects the public from environmental releases of radioactivity by ensuring that those people who could receive the maximum radiation doses are reasonably protected. Thus all other members of the public are also protected. To correct the considerable misunderstanding within the scientific community concerning the calculated 'maximum dose,' the EPA points out that the maximum dose to be used in a standard is the dose calculated for the reasonably maximally exposed individual (RMEI), not the theoretical upper bound estimate (TUBE) that could result from adopting the most conservative values of each parameter that affects the calculated dose. The RMEI dose can be estimated from a probabilistic distribution of doses calculated at a given location and time, adopting the mean of that distribution or (preferably) the dose calculated at the 95 percent confidence level.

"International practice now protects the public from nuclear radiation by requiring that the reasonable maximum radiation dose received by a member of the public is less than a specified limiting dose...The people most likely to receive a reasonable maximum dose from geologic disposal are farmers who draw their water from wells near the repository site, drink that water, irrigate their crops with contaminated water, and live at a time when water is most contaminated by leakage from the waste. Such a farming family would constitute the 'critical group,' to be protected according to the guidelines of the International Commission on Radiological Protection (ICRP). The lifetime-average annual dose to this critical group is calculated, to be compared with the dose-limit criterion.

"ICRP recognizes that when calculating dose for the far future, when the greatest doses can occur from geologic disposal, defining a critical group based on current information is problematical. ICRP recommends (ICRP, "Radiation Protection Principles for the Disposal of Solid Radioactive Waste," Report ICRP-46, *Annals of the ICRP*, 1985):

'When an actual group cannot be defined, a hypothetical group or representative individual should be considered who, due to location and time, would receive the greatest dose. The habits and characteristics of the group should be based upon present knowledge using cautious, but reasonable assumptions.'

Thus, it is reasonable that the RMEI alone, who uses water extracted from near the repository, can adequately represent the critical group."

Prof. Pigford demonstrates that it is not reasonable or cautious to assume, for dose-calculation purposes, that people will live no nearer to the site than present populations do, or that they will not ingest food grown by contaminated water from wells nearer to the site. These

assumptions would preclude the protection of future people residing nearer the site and eating crops irrigated with water from such wells.

The critical group must be defined as the people who would receive the greatest exposures. As Pigford says, "If the critical group is protected, then all persons of lesser risk will be protected. Further, just as the critical-group concept works for people of a given time and generation, it also applies across great spans of time -- protection of the critical group of a very distant epoch also protects people of times less distant."

Under these criteria, locating the critical group at a distance of 20 km (12 miles) down gradient from the waste emplacement area clearly fails the test of adequate public protection. Allowing a waste disposal facility to rely on such a long groundwater travel distance before requiring regulatory compliance is unprecedented and unacceptable. The purported advantage of geologic disposal is that it is supposed to contain and isolate the highly irradiated nuclear fuel; therefore, in order to receive a license, a geologic repository must demonstrate compliance with protective standards near the site of waste emplacement, not a dozen miles away. The NRC seeks to redefine the boundaries of the repository in order to facilitate licensing.

This regulatory prestidigitation is especially dangerous since the DOE itself predicts that through time expected doses will rise to a level that vastly exceeds the safety standard of the proposed rule. The proposed rule would achieve compliance with the safety standard by arbitrarily ending the regulatory compliance period after 10,000 years. This second definitional sleight-of-hand is in conflict with the recommendation of the National Academy of Sciences' Committee on the Technical Bases for Yucca Mountain Standards, which recommended that adequacy of health protection be assessed for the time of projected peak dose. Prof. Pigford, a member of that panel, explains:

"Even the most carefully designed containers and stable waste solids to be buried in a geologic disposal system will deteriorate slowly with time. There can be substantial delays before radionuclides in ground water can reach the biosphere. Calculations by geologic disposal projects in the U.S. and abroad predict that radiation doses to future people will increase with time. The U.S. Yucca Mountain project calculates doses at 10,000 years to be about 5,000 times greater than doses during the first 10,000 years (Atkins, J.E., J. H. Lee, S. Lingineni, S. Mishra, J.A. McNeish, D.C. Sassani, S.D. Sevougian, "Total System Performance Assessment -- 1995: An Evaluation of the Potential Yucca Mountain Repository," TRW, November 1995)." The arbitrary 10,000 year cutoff has no credible technical justification, and would allow people living after the cutoff to be exposed to unacceptably high doses of radiation.

The proposed 20 km compliance-free zone is four times worse than the 5 km zone set by EPA's 40 CFR 191 for the transuranic Waste Isolation Pilot Plant in New Mexico. Given that the wastes to be buried at Yucca Mountain would be far more hazardous than those scheduled for WIPP, the only rationale for such a fourfold increase would appear to be a fear that Yucca could not be licensed if compliance closer to the point of waste emplacement were to be required. So

the rule would set aside a large area in which radiation levels would go completely unchecked, creating an NRC-sanctioned sacrifice zone.

Question 2. The Commission solicits comments on the appropriateness of its proposed human intrusion scenario, and the assumed timing of its occurrence, as a reasonable measure for evaluating the consequences of intrusion at a repository at Yucca Mountain.

THE RULE DOES NOT FULLY ADDRESS THE HUMAN INTRUSION PROBLEM

The proposed rule assumes that "the human intrusion occurs 100 years after permanent closure and takes the form of a drilling event that results in a single nearly vertical borehole that penetrates a waste package, extends to the saturated zone, and is not adequately sealed." 10 CFR Part 63.113(d). Hazards to the intruders and public from the material brought to the surface are not to be considered. Instead, this is intended to be a single stylized scenario that demonstrates the repository's resilience to a breach of the engineered and geologic barriers, and its ability to still perform adequately if its barriers are breached. It is not intended to be taken as a prediction of the likely manner or frequency of intrusion.

This scenario does not fully address the concern about potential human intrusion. In the case of a Yucca Mountain repository, the inadequately sealed borehole could become a pathway for additional water to enter the repository, resulting in an eventual increased radionuclide release rate and quantity from the repository. Thus, in assessing the performance consequence of human intrusion, the frequency of intrusion, in both time and space, is of great importance, and a single borehole at a single time does not adequately reflect this condition.

If the human intrusion is a result of exploration for buried natural resources, it can be expected that attractive areas will be periodically re-explored for some time in the future because of exploration and extraction technology advances or because of demand for materials for new technologies for which there is not a demand today. Therefore, it is not unreasonable to establish a human intrusion scenario that takes place on a recurring basis. Borehole drilling could take place 100 years after closure, but then could be repeated every 100 years until 1,000 years after closure. This would mean 10 boreholes breaching waste containers at different locations over a 1,000 year period, thus affecting the repository performance over a portion of, or all of, the regulatory period.

ADDITIONAL COMMENTS

Again, these comments are made with the reservation that this rulemaking should not proceed at all until the EPA has promulgated its repository radiation standards.

63.51. License amendment for permanent closure: The decision to issue a license amendment for permanent closure would constitute a major federal action in that it includes a decision that retrieval of the waste is not necessary, and that the expected impacts of the waste

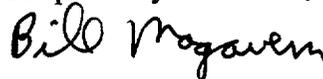
affecting the environment far into the future and far beyond the site are acceptable. Such a decision should be accompanied by a Final Environmental Impact Statement pursuant to the National Environmental Policy Act. This decision would be made many decades after the decision to license the repository, and the EIS that accompanied that decision would have little or no current validity. The situation clearly calls for a new, up-to-date Environmental Impact Statement dealing with all relevant issues and alternatives at the time.

63.113. Performance objective for the geologic repository after permanent closure: Section (b) should be amended to reflect the only U.S. regulatory precedent for doses from geologic repositories to members the public -- 40 CFR Part 191, which limits doses at WIPP to 15 mrem TEDE per year from all pathways, and 4 mrem per year from the groundwater pathway. These limits should not be exceeded in Yucca Mountain standards. There is no substantive rationale for setting weaker standards for a nuclear waste repository for highly irradiated fuel than those set for transuranic waste. In addition, the standards must account for the real possibility that the public exposed to releases from a Yucca Mountain repository will also be exposed to releases from at least two other known man-made sources of radiation in the area, the Nevada Test Site and the closed "low-level radioactive waste" disposal site at Beatty. It is uncertain what, if any, the dose levels to the public from these sources would be, but the situation calls for conservatism on the part of regulation of any new source terms contributing to radiation doses to the public in the same area. Finally, a groundwater standard is essential, since it is known that the most significant doses to the public from a Yucca Mountain repository will originate from pumped groundwater.

CONCLUSION

This proposed rule should be withdrawn and appropriate modifications to the NRC's repository licensing rule, 10 CFR Part 60, should be proposed in a timely manner after the EPA promulgates its mandated standards for a Yucca Mountain repository. The NRC's regulatory goal should be, once a license application is made, to objectively evaluate whether the proposed repository site can meet the safety standards set by EPA. Therefore, the NRC should wait until those standards are set before it sets licensing rules. This proposed rulemaking will only erode public confidence in the licensing decision, because this rulemaking appears intended to shape regulations in such a way as to make it easier for the potential license applicant, DOE, to have its application approved, even at the expense of the health and safety of thousands of future generations.

Respectfully Submitted,



Bill Magavern
Sacramento Director
June 29, 1999