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Dr. B. John Garrick, Chairman
U.S. Nuclear Waste Technical Review Board
2300 Clarendon Boulevard, Suite 1300
Arlington, VA 22201

Dear Dr. Garrick:

I write in regard to your recent speech, *What have we learned about geologic disposal from the Yucca Mountain project experience?*, delivered at a January 2008 Symposium at Vanderbilt University. It is a frank talk and I appreciate that. You say this represents your perspective and your personal views on the issues, but as the speech is posted on the NWTRB web page we take it to represent the views of the Board, which makes it even more disturbing in terms of what it reveals about your outlook on both the science and the responsibilities of the Board.

There runs through your speech a denigration of so-called compliance arguments to ensure the design adequately protects public safety, and the regulatory process in general. The “driver” for the Board, you say, is “realistic assessment.” It would be good if we could have solid and reliable assessments of the future impact of emplacing waste in Yucca Mountain. The trouble is that while DOE brags of studying the site for twenty years, it has produced remarkably little reliable data in that time. And, as you suggest, the complexity of the site makes it unlikely that adequate data will ever be in hand. In this context, your push for “realistic assessment” amounts to a push for lower safety standards to make it possible to approve the site. In fact that has been the way it has worked historically. The Board’s congressional mandate is “to evaluate the technical and scientific validity of activities undertaken by the Secretary” related to implementing the Nuclear Waste Policy Act. It is not the Board’s job to push for approval of Yucca Mountain.

With the exception of one short qualifier at the end of your speech about not prejudging licensing, you portray the evaluation of Yucca Mountain as a march toward inevitable approval. You didn't tell your audience that when Congress selected Yucca Mountain in 1987 as the sole site to be characterized, it was still as a *candidate* site, to check whether it could meet both DOE and NRC safety standards. Your subsequent sentence: "A repository at Yucca Mountain would be constructed above the water table in fractured unsaturated rocks," gives a rather different impression. You might have mentioned that to get past the site's geological deficiencies, DOE subsequently abandoned its own geologic site rules which Yucca Mountain would not have met.

When it comes to the key issue of waste package corrosion, you leave out, as does DOE, the possibility of localized corrosion and package penetration during the thermal pulse, apart from that initiated by deliquescence. Dripping from preferential locations such as rock bolts remains a possibility even during the thermal pulse and such dripping would form crusts on the package surface under which localized corrosion could take place, very much like the Davis-Besse reactor vessel corrosion. You do point out that DOE has failed to obtain critical corrosion data. But what does it say about DOE's concern about public safety that after all these years it has not obtained the necessary data to judge the acceptability of the site?

You describe the Board urging DOE to use so-called expert elicitation in determining the probability of seismic and igneous events, and "realistic" assumptions. This amounts to a push for averages in the face of enormous uncertainty. I appreciate your predilection, given your professional background, for the machinery of combining probabilities to arrive at an overall answer, but here the problem is overwhelmed by uncertainty. The right figure of merit for deciding on the acceptability of the site is a social issue for which the Board is not particularly well equipped, and anyhow the issue is beyond the Board's mandate for evaluating the technical and scientific validity of DOE's work. Expert elicitation is in any case a doubtful procedure that is better at dressing up a number in respectable clothing than it is at reducing uncertainty.

You say the Environmental Protection Agency has introduced a number of "constraints" that have the effect of making the calculations of future public radiation doses "unrealistic." And EPA's compliance period stretches out to a million years, all of which makes it sound as if EPA is being too tough on DOE. You don't mention that EPA's standard waters down the calculated radiation dose to make it easier for DOE to qualify, such as measuring the dose at 18 kilometers from the site rather than closer, and artificially diluting the waste stream at the point of impact before comparing with the health standard. As for time scale, if localized corrosion is a serious problem, as we believe it is and as the Board apparently thinks it may be, then waste package penetration would take place in thousands of years, or even hundreds of year, not hundreds of thousands.

Under the heading of “transparency and traceability of analyses,” you never do say anything about traceability, even though document traceability been a big problem at DOE. And while you talk about DOE has undermined transparency by the complicated way it has gone about its work, you don’t mention DOE’s obsessive secrecy as a factor. That secrecy is completely out of place on a project affecting public safety and makes it nearly impossible for outsiders to know what the agency is doing.

You speak with approval of NRC’s “aggressive” implementing of a “total systems perspective” in the waste area, specifically, dropping subsystem requirements and relying on a single dose number in the area of safety regulation where the uncertainties are greatest (because they involve natural environments). No one, not even an NRC enthralled with risk assessment, is so irresponsible as to do so in the case of nuclear power reactors, where the components are much better understood and the failure probabilities much better known. The risks are too obvious. I believe the reason the regulators are able to rationalize the single number approach for waste has to do with the difference in time scale—in the case of a waste repository any failures would come well after the working lifetime of the designers and regulators so the normal sense of professional responsibility does not operate to the same degree it does in the case of reactors, or NASA rockets. The greater uncertainty and longer time scale in the case of waste are reason for tighter, not looser, standards, and specific subsystem requirements, which NRC could still impose.

You end with a plea for greater reliance on the “uncertainty sciences” in the evaluation of Yucca Mountain. I have to say that describing the accounting of failure probabilities as uncertainty *science* may sound impressive but it doesn’t reduce the uncertainty in the results. To urge DOE, which has already cut nearly every conceivable corner to make the site look acceptable, and leaned on their scientists to come up with best possible results, to now “allow” the scientists to come up with even more favorable results “unburdened by the concern of having to defend them in an adversarial adjudicatory process,” is to throw public safety to the winds.

Even more disturbing are your casual comments regarding “substantial” margins between dose levels calculated by DOE and the levels “at which biological damage to humans . . . may occur.” You say that even if the real dose were 100 times higher than DOE estimates, the health effects would not “be serious.” You don’t seem to be bothered that the dose would then exceed by many times the federal standard of 15 millirem per year,

which was set by EPA taking into account the health effects of radiation. And you go on to say that if the health effects of the radioactively contaminated water did turn out to be serious, well, there would always be the option of “not drinking the water, not consuming the food, *and even relocating people, if necessary.*” I have to say that this reflects a warped perspective. A nuclear repository has to serve the public, not the other way around. I do not think the views you express are compatible with assuring public safety in the evaluation of Yucca Mountain.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert R. Loux", with a stylized flourish at the end.

Robert R. Loux
Executive Director