

Warner North, Summary, for September 1, 2010

I shall first summarize the findings, conclusions, and recommendations of the 2001 National Research Council report, "*Disposition of High-Level Waste and Spent Nuclear Fuel*," especially as these relate to the Disposal Subcommittee's six questions. The challenge -- of choosing technologies, establishing the basis for regulation of the technologies, and the institutional system for operating waste storage and disposal facilities -- faces ALL countries that have nuclear power facilities, not just the United States. Because of the international character of the problem, many of the members of the committee that authored the *Disposition* report came from countries outside the United States. Three important findings and conclusions (*Disposition* report, Executive Summary, p. 3) are that:

- "Geological disposal remains the only long-term solution available;"
- "Today the biggest challenges to waste disposition are societal;" and
- "A stepwise process is appropriate for decision making under technical and social uncertainty."

No country has yet constructed a geological repository, emplaced high-level waste and/or spent fuel, and declared that its system is adequate to assure the safety and security of this highly radioactive material over the time period that it remains radioactive. Many nations are addressing the issues involved. Only a few nations appear close to the point of selecting the technologies and a site for geological disposal and making the case to their government and to their citizens that the system will assure adequate safety and security over the long time period involved.

I was one of the initial set of members of the Nuclear Waste Technical Review Board, established by the 1987 amendments to the NWPA. I regard NWTRB as a highly successful innovation in providing ongoing oversight and technical review of a first-of-a-kind activity to achieve a complex goal, geological emplacement of spent fuel from nuclear power plants and high-level nuclear waste from the nation's defense programs. While NWTRB offered comments on regulations affecting a repository (for example, First NWTRB report, 1990, p. 31-32), we were not responsible for setting such regulations. That assignment was split up among the Nuclear Regulatory Commission, the Environmental Protection Agency, and, for site evaluation, the Department of Energy. NWTRB was asked to review the program being carried out by DOE for proposed Yucca Mountain repository, and to report at least twice each year to the Secretary on Energy and Congress. Any interested party can read these reports. Over its more than twenty-year history the NWTRB has held public meetings, in Nevada and in other locations, to review specific issues. Its reports describe findings, conclusions, and recommendations on a large number of technical issues.

During my time (1989-94) on the NWTRB I chaired its Risk and Performance Assessment Subcommittee. I believe performance assessment is extremely useful as an ongoing investigative process, in particular for understanding the strengths and weaknesses of a complex natural and engineered system for assuring safety and security. I am less positive on the use of numerical results from performance assessment for judging regulatory compliance. The modeling of a system of engineered barriers and the hydrogeological environment underlies performance assessment. Scientific understanding of this system, and calculation via models of releases of radioactivity to the accessible environment, will evolve over time. Performance assessment is an ongoing task in support of adaptive management, to assure adequate safety and security, for a repository program that will take place over a period lasting many decades to centuries -- from initial site investigation to repository closure. (*Disposition* report, p. 97-102, and also p. 87-96, on modeling.)

I have also served on committees and panels of the National Research Council that have addressed the adequacy of federal processes for assessing, communicating, and managing risk by the federal agencies that are mandated by law to carry out such activities. Two of these reports are *Understanding Risk: Informing Decisions in a Democratic Society* (1996) and *Public Participation in Environmental Assessment and Decision Making* (2008). Both these reports stress the importance of good communication about risk, and of having a process that promotes social trust and credibility. A publication in *Science* (August 13, 2010: pp. 762-3) by a group of social scientists makes this recommendation: "The Blue Ribbon Commission, the DOE, and other responsible agencies should make the rebuilding of social trust and credibility central to their operations and their proposed strategies for waste management." I agree, but I think BRC must also address education, political leadership, and incentives as also needed to achieve enduring consensus between elected officials from a host state and federal authorities for the siting, construction, waste emplacement, and final sealing of a nuclear waste repository. This consensus must endure over many decades to centuries, as science evolves and Administrations change. In my judgment, establishing regulation for nuclear waste must be viewed in this larger context: a long-term process that will be viewed as trustworthy, with the flexibility to make adjustments as science advances, and with the host state(s) having an ongoing interest that coincides with the national interest: long-term geological disposal for nuclear waste from power plants and defense nuclear activities that is acceptably safe and secure.