UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
2300 Clarendon Boulevard, Suite 1300
Arlington, VA 22201

February 18, 2005

Mr. Robert R. Loux
Executive Director
Agency for Nuclear Projects
State of Nevada
1761 E. College Parkway, Suite 118
Carson City, NV 89706

Dear Mr. Loux:

This letter is in response to your November 25, 2003, letter to Dr. Michael L. Corradini on criticality. That letter was based primarily on an analysis by Dr. Michael C. Thorne, a consultant to the State of Nevada, of studies and documents produced in 1998 by U. S. Department of Energy (DOE) consultants and contractors. Those studies and documents were about the probability of the occurrence of internal criticalities in surface storage casks for a nominal case assuming the permanent loss of institutional control, and about the consequences of such criticalities.[1]

The likelihood and consequences of criticality, if it occurs, are recognized universally as important issues. The DOE has been studying such issues with respect to the disposal of spent nuclear fuel and high-level radioactive waste in a mined geologic repository, and the Board has been monitoring those DOE activities for well over a decade.

Analyses of potential criticality for waste packages emplaced in a repository should be based on representative assumptions about the packages and the conditions to which they would be exposed in a repository. There are significant differences between storage casks and emplaced waste packages that should be taken into account. The differences include the more corrosion-resistant material proposed for waste packages in the current design, the use of neutron-absorber plates or control rods in waste packages containing higher-reactivity spent fuel, and the use of drip shields over the emplaced waste packages. Such differences were not taken into account in the analysis underlying your November 25 letter.

In a recent report, the DOE concludes that the probability of internal criticality in a mined geologic repository for the nominal case during a 10,000-year regulatory compliance period is well below the threshold of regulatory significance.[2] We have reviewed this report and find that the conclusion drawn in the report is credible, given the credit for the integrity of the packages and the presence of the drip shields, which would prevent water from entering the packages, even with the assumption that 10 percent of the packages would fail over 10,000 years.

[1] An internal criticality is a self-sustaining nuclear reaction *inside* a storage cask (or waste package). A nominal case is a case that is not disrupted by seismic or igneous events.
[2] *Screening Analysis of Criticality Features, Events, and Processes for License Application,* ANL-EBS-NU-000008 REV 01, October 2004

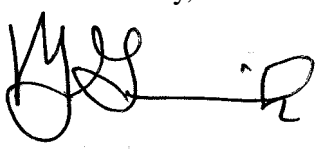
The DOE's conclusion and our finding, however, generally are based on analysis that covers the first 10,000 years after repository closure.

Last year, the United States Court of Appeals for the District of Columbia Circuit rendered a decision vacating the Environmental Protection Agency standard and the corresponding Nuclear Regulatory Commission (NRC) rule to the extent that the standard and the rule incorporated a 10,000-year compliance period. Presumably, a revised standard and a corresponding rule will be promulgated to reflect the court's decision. Any significant change in the standard and its corresponding rule regarding the regulatory compliance period or the definition of the threshold of regulatory significance will necessitate reexamining repository criticality issues.

The Board's mission is to evaluate the technical and scientific validity of DOE activities related to the Nuclear Waste Policy Act, including the packaging, transportation, and disposal of high-level radioactive waste and spent nuclear fuel. Criticality clearly is an important issue related to those activities. The Board has reported on criticality issues in the past and will continue to monitor ongoing developments and activities of the DOE's Office of Civilian Radioactive Waste Management related to criticality. Thus, we appreciate your letter of November 25 and the material that was enclosed with it.

Thank you for your interest in the Board.

Sincerely,



B. John Garrick
Chairman

cc:

Dr. Margaret S. Y. Chu, DOE
Dr. C. William Reamer, NRC

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