Statement of Don U. Deere

Chairman

Nuclear Waste Technical Review Board

before the

Subcommittee on Nuclear Regulation

Committee on Environment and Public Works

United States Senate

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Mr. Chairman and Members of the Subcommittee:

I am Don U. Deere, Chairman of the Nuclear Waste Technical Review Board (the Board). On behalf of the entire Board, I would like to thank you and the Subcommittee on Nuclear Regulation, Committee on Environment and Public Works, United States Senate, for the opportunity to present our current views on the disposal of high-level radioactive waste (HLW), which includes spent nuclear fuel.

Background on the Board

The Board was established in the Nuclear Waste Policy Amendments Act of 1987 to evaluate the technical and scientific validity of the Department of Energy's (DOE) commercial radioactive waste management program. This broad charge includes the evaluation of activities related to the characterization of the candidate site for HLW disposal at Yucca Mountain, Nevada, and to the transportation and packaging of HLW.

The Board currently has seven internal working panels: Structural Geology & Geoengineering, chaired by Dr. Clarence Allen; Hydrogeology & Geochemistry, chaired by Dr. Donald Langmuir; Engineered Barrier System, chaired by Dr. Ellis Verink; Transportation & Systems, chaired by Dr. Dennis Price; Environment and Public Health, chaired by Dr. Melvin Carter; Risk & Performance Analysis, chaired by Dr. D. Warner North; and Quality Assurance, chaired by Dr. John Cantlon. A total of 17 panel meetings and technical exchanges have been held over the last 19 months. The full Board has met 10 times.

At full strength the Board will have 11 members, who are nominated by the National Academy of Sciences and appointed by the President. To date, nine members have been appointed to the Board. The Board, which met for the first time in

March 1989, two months after the first appointments, reports to the U.S. Congress and the Secretary of Energy at least twice a year. Its *First Report* was published in March 1990; the second report is scheduled for pubheation in mid-November.

Introduction

The disposal of HLW has been an issue of long-standing importance. In 1955, the National Academy of Sciences (i.e., the Committee on Earth Sciences of its National Research Council) first examined the problems associated with the disposal of HLW. At the time, it recommended permanent isolation of the waste in mined geological formations. This basic approach for disposal is still being pursued by the United States. There is currently a worldwide scientific consensus that a deep geologic repository is the best option for the disposal of HLW.

The development of a geologic repository is a complex undertaking. First, it involves scientific and technical challenges in many diverse areas. These areas include evaluating the geologic characteristics of potential repository sites, assessing the effectiveness of natural geologic and engineered barriers to radionuclide migration, designing the repository with its engineered barriers, and coping with the inevitable uncertainties involved in predicting repository performance for at least 10,000 years.

Second, there needs to be assurance that over this time period the HLW will not pose a threat to public health and the environment. Therefore, standards and regulations have to be developed that, if met, would provide such assurance. The HLW management program needs, in turn, to demonstrate in a licensing proceeding that any repository complies with these standards.

Finally, waste management decisions are made substantially more difficult by nontechnical and political problems. Waste management activities are inevitably conducted in an arena where there is considerable public interest and apprehension

about anything related to nuclear energy and radiation. Most localities don't want nuclear facilities sited in their "backyards" There also are many groups with diverse but special interests involved in HLW management. These include the public, the utilities, various environmental and public interest groups, Indian Tribes, state and local governments, and all three branches of the federal government.

Findings

The Board believes that there are no insurmountable technical reasons why an acceptable deep geologic repository cannot be developed. The Board also believes that an appropriate regulatory framework to protect the public and the environment should be based on sound scientific and technical considerations. Finally, the Board recognizes that substantial amounts of time and resources will be required to resolve emerging nontechnical as well as technical issues.

The Board's testimony will focus on three topics: (1) technical aspects of maximizing waste isolation, (2) regulatory improvements, and (3) nontechnical siting problems.

1. Technical aspects of maximizing waste isolation.

The current concept of geologic disposal involves using multiple barriers to isolate HLW from the accessible environment for at least 10,000 years. The proposed repository will consist of both natural geologic barriers and man-made, engineered barriers that together will contain the HLW. The overall uncertainty about a repository's long-term performance can be reduced by using redundant engineered barriers in addition to natural geologic barriers. Engineered barriers should be designed to contain the HLW for as long as reasonably possible. The Board believes that such a concept for a geologic repository is technically sound.

The Board believes that current science and technology make possible the development of improved engineered barriers. Our knowledge of metallurgy, materials science, and geochemistry is adequate for the development of long-lived containers and waste packages. Alternate emplacement configurations—along with knowledge of the geologic, hydrologic, and thermal environment-may maximize the waste isolation properties of the waste package.

Because of past ambiguities in the NRC's regulations, long-lived waste packages and other types of engineered barriers have not been used to their maximum extent by the DOE in current repository designs. However, the Board believes that a full range of waste packages and other engineered barriers should be seriously considered. According to a staff position paper issued by the NRC in July 1990, the DOE may use and receive licensing credit for any long-lived waste packages designed for greater than 1,000 years.

Improved engineered barriers can, in our judgment, make a substantial contribution to waste isolation and increase our overall confidence in the ability of the repository to meet its goals. The Board has recommended that the DOE investigate further the advantages and disadvantages associated with the use of long-lived engineered barriers.

2. Regulatory improvements.

Our regulatory framework should provide assurance that a repository will, in fact, isolate HLW. Finding a repository site that is judged to be suitable is but one step in the regulatory process. The repository design-incorporating natural geologic and engineered barriers—must also comply with our standards and regulations. The Board believes that the regulatory framework should be sufficiently conservative to fully protect public health and the environment But it should not be so restrictive as to foreclose at the outset the use of repository sites that can be shown to be suitable on the basis of sound scientific and technical considerations.

The Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC), respectively, have developed standards and regulations that affect site-characterization activities as well as the design, construction, and operation of geologic repositories. However, many in the technical community are currently concerned about our ability to construct and license a repository in accordance with present federal standards and regulations. These guidelines have been criticized as being too stringent and prescriptive; others as too ambiguous or simply inappropriate for geologic repositories.

The Board detailed several concerns about the EPA Standard, 40 CFR 191, in its *First Report to the U.S. Congress and the U.S Secretary of Energy.* Specifically, the Board questioned the conservatism of the Standard, as contained in Section 191.13 and illustrated by the numerical limits contained in Table 1, Appendix B. The Board recommended that those limits be re-evaluated in light of current environmental and regulatory requirements. A re-evaluation of the Standard should also consider the doses that the general population receives from routine exposures and natural sources of radiation. The Board also believes that the concept "as low as reasonably achievable" (ALARA) may be inappropriate for a repository. Other changes also could be made to clarify the Standard.

In making these recommendations the Board joined many other groups that have similar, and sometimes broader, concerns about our present regulatory framework. These groups include the Subcommittee on Waste Management of the NRC's Advisory Committee on Reactor Safety, the NRC's Advisory Committee on Nuclear Waste Management, the National Research Council's Board on Radioactive Waste Management, and various environmental and public interest groups.

The Board believes that the current regulatory framework can be improved. With such improvements, a candidate site, judged to be technically suitable, can also be licensed. In recent letters to William Reilly, the Administrator of EPA, and

Kenneth Carr, the Chairman of the NRC, we have suggested that the EPA and the NRC enter jointly into negotiated rulemaking on 40 ChR 191 and 10 CFR 60.

3. Nontechnical siting problems.

Any candidate site for repository development must undergo both surface and underground characterization before its suitability can be completely determined. Early evaluation of the suitability of the Yucca Mountain Site has been and continues to be a prime concern of the Board. However, the DOE's efforts to characterize the Yucca Mountain Site are presently constrained by the State of Nevada's refusal to issue the necessary state permits. Much of this state opposition is in direct response to the perceived manner in which the Yucca Mountain Site was chosen for characterization by the Congress in 1987. The recent court decision should bring us closer to site characterization.

Site characterization is an essential phase in determining the suitability of the candidate site for repository development. Any delays in site characterization will result in comparable delays in arriving at a judgment about site suitability.

Concluding remarks about the DOE's program

Managing HLW poses technical, regulatory, and institutional challenges. Within this context, the Board sees progress by the DOE in implementing its HLW management program. In November 1989, the Secretary of Energy issued a comprehensive report to the Congress refocusing the program. The Board believes that the changes in programmatic schedules reflect a more realistic appraisal of the complexities of waste management activities. In April 1990, Dr. John Bartlett was appointed director of the DOE's Office of Civilian Radioactive Waste Management One month later, Dr. Bartlett announced the development of a new management plan. In June, David H. Leroy was appointed nuclear waste negotiator to facilitate the siting of facilities for interim storage

and permanent disposal of HLW. These are all positive steps; however, the ultimate results of these changes can only be judged over time.

The DOE and its representatives have been very responsive to the Board in providing requested information, organizing meetings, and addressing Board concerns. We are generally pleased with the DOE's good-faith efforts to address the recommendations that the Board made in its *First Report.* This is particularly the case with respect to the need for additional underground exploration, prioritization of testing to determine site suitability, and the iterative use of performance assessment. As the DOE's program progresses, the NWTRB will continue to fulfill its congressionally mandated responsibilities of monitoring ongoing DOE activities.

Mr. Chairman that concludes my prepared remarks. I would be pleased to address any questions that you or any of the other subcommittee members may have.