NUCLEAR WASTE TECHNICAL REVIEW BOARD
1111 18th Street, N.W., Suite 801
Washington, D.C. 20036

August 29, 1989

Mr. Robert E. Browning, Director
Division of High Level Waste Management
Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Browning:

Enclosed is a copy of the NWTRB letter dated August 11, 1989 to the Department of Energy concerning the exploratory shaft facility at Yucca Mountain. Also enclosed is the DOE interim reply dated August 25, 1989.

We are also enclosing a copy of the draft reports by DOE contractors Golder Associates, Inc. and Roy F. Weston, Inc. concerning the evaluation of alternate ESF shaft construction methods. The DOE letter and draft reports are partial responses to the material contained in our August 11th letter.

This information is forwarded for such use as you deem appropriate.

Sincerely,

William W. Coons
Executive Director

Encls.

Telephone: 202-254-4792 Fax: 202-254-4803

NUCLEAR WASTE TECHNICAL REVIEW BOARD
1111 18th Street, N.W., Suite 801
Washington, D.C. 20036

August 11, 1989

Mr. Thomas Isaacs
Associate Director
Office of External Relations
and Policy (RW 40)
Department of Energy
Washington, DC 20585

Dear Mr. Isaacs:

In connection with the Exploratory Shaft Facility (ESF) at Yucca Mountain, questions concerning the method of actual construction of the shaft itself have arisen. In our Structural Geology and Geoengineering Panel meeting held at Las Vegas during April 11 and 12, 1989, the panel asked that DOE investigate the construction of ESF-2 by use of a raise-borer. The purpose of investigating the raise-bore method was (1) to eliminate the introduction of water into the repository block, and (2) to reduce perturbations to the surrounding geology due to the drill-and-blast method of excavation. An additional practical advantage that would accrue is a reduction in time and cost of construction. DOE prepared a draft action plan to cover the points raised by the NWTRB. This draft action plan was discussed during a conference telephone call on May 11, 1989 between the DOE and NWTRB. Following the conference call, DOE referred the study plan to a contractor who was to report to DOE by the end of June, 1989.

A meeting was held in the NWTRB office on July 24, 1989 to review the state-of-the-art of mechanical excavation techniques which could be used in the construction of the ESF. This meeting put particular emphasis on the technology advances in shaft boring machines (SBM's) and tunnel boring machines (TBM's) that have occurred over the last several years.

As a result of the July 24 meeting, the Panel felt that sufficient data exist to allow an effective investigation of the use of an SBM to excavate ESF-1. Several generations of SBM's have been developed in the U.S., in West Germany, and in the U.S.S.R. The technology has matured sufficiently to allow the matching of optional components to provide the most cost-effective equipment for a given geology, shaft diameter and depth of construction.

With regard to the horizontal breakouts and an alternate access/egress route to the ESF, TBM technology in the U.S. has matured such that circular or non-circular horizontal openings can now be excavated in a broad range of geologic conditions at higher rates and costs considerably less than by the use of conventional explosive techniques.

In view of these findings by the Panel, we would like to make the following requests:

o Please provide at your earliest convenience an interim report to the Board from the contractors examining the use of a raise-borer to excavate ESF-2.

o Re-examine the proposed ESF configuration, incorporating the use of a SBM to construct the ESF-1 shaft. As part of this examination, please re-examine the proposed ESF-1 finished diameter, putting particular emphasis on future utility, safety during construction, and schedule and cost of the finished shaft. We feel that an 18- to 20-foot finished diameter may be less costly, safer to construct, and have more utility than the proposed 12-foot diameter shaft.

o Re-examine the incorporation of an inclined drift in the proposed ESF configuration, excavated by the use of a TBM or other mechanical excavation equipment, to provide a second access/egress route in lieu of a second shaft. Such a drift could be constructed rapidly, could provide access for experimental alcoves at any horizon of interest, and possibly offer a down reaming option for the construction of ESF-1.

Sincerely,

Don U. Deere

Don U. Deere
Chairman

east-west expanse of the proposed repository. The report builds on this analysis by exploring the potential advantages of additional exploratory drifts designed specifically to investigate these geologic features. A draft of this report has been delivered to us and it is currently undergoing internal review. A copy is also enclosed for your advanced information.

The third report, an Office of Civilian Radioactive Waste Management overview, draws from and expands on the results of the other two evaluations and considers programmatic aspects of the shaft construction and exploratory drifting suggestions that were beyond the scope of the first two reports. This report will form the basis for the Office of Civilian Radioactive Waste Management consideration of any subsequent necessary evaluation of the current site characterization program in response to the Panel's suggestions. This report is nearing completion and is expected to be finalized in the near future.

We had planned to finalize these reports and complete our acceptance of the three aforementioned reports so that they can be transmitted to the Board no later than mid-September. If acceptable, we propose to provide all three final reports to the Board at that time. We also propose that the three reports discussed above be completed and transmitted to the Board, and not address the new requests in your August 11 letter, in order to provide the Board timely feedback on their suggestions from the April briefing.

We are currently developing a plan to conduct the necessary evaluations to address the other two requests in your August 11, 1989, letter; namely, additional examinations of construction methods and shaft sizes for the first exploratory shaft, and the use of a ramp (instead of a vertical shaft) for the second exploratory shaft. When we have a proposed plan, we would like to discuss it with you to ensure that we fully address your request. During this discussion, it would be most beneficial to the program if we could agree on a date certain when we have all of the Board comments on the exploratory shaft facility. In this way, we can adequately address all of your concerns and comments in an orderly manner as we proceed with the exploratory shaft facility design effort.

We recognize and appreciate the tremendous effort that the Board, both its individual members and consultants are making to understand this important National program and apply their expertise and experience to assure that it is conducted in the most appropriate technical manner.

Sincerely,

Tom Isaacs

Thomas H. Isaacs
Associate Director for External
Relations and Policy
Office of Civilian Radioactive
Waste Management

Enclosures - 2

Department of Energy
Washington, DC 20585

AUG 25 1989

RECEIVED
AUG 28 1989
NUCLEAR WASTE T.R.B.

Dr. Don U. Deere, Chairman
Nuclear Waste Technical Review Board
1111 18th Street, NW, Suite 1801
Washington, DC

Dear Dr. Deere:

We are in receipt of your August 11, 1989, letter which requests that the Department of Energy (DOE) send the interim report to the Board from our contractors examining the use of a raise-borer to excavate the second exploratory shaft, additional examinations of construction methods and shaft sizes for the first exploratory shaft, and an examination of the use of a ramp (instead of a vertical shaft) for the second exploratory shaft.

As you are aware, the Structural Geology and Geoengineering Panel request that the program examine the use of a raise-borer to excavate the second exploratory shaft is being considered as part of evaluations that we initiated in response to the Panel's requests at the April 11-12, 1989, briefing in Las Vegas, Nevada. That briefing and the ensuing discussions resulted in several specific suggestions from the Panel members and their consultants regarding alternative shaft construction methods, testing in the exploratory shafts and additional exploratory drifting during site characterization. These evaluations are being performed by program staff and contractors that are familiar with the program, but not actually engaged in the development of the exploratory shaft facility design. Their efforts are followed and reviewed by those actively involved in the development of the facility design. This approach was selected to provide a responsible, independent evaluation, while minimizing the impacts on ongoing priority program activities. The results of these evaluations will be documented in three separate reports.

The first report, by Golder Associates, Inc., is an evaluation of the Panel's suggestions related to minimizing the potential disturbance of and introduction of water to the rock surrounding the exploratory shafts by employing various mechanical mining techniques. This report also examines the feasibility and potential advantage of deferring or relocating the time-intensive tests currently planned to be conducted during construction the first exploratory shaft. A draft of this report has been submitted to this Office and is currently being revised by the contractor to expand on certain aspects of the evaluation. A copy is enclosed for your advanced information.

The second report, prepared by Roy F. Weston, Inc., analyses the currently planned exploratory drifting program with respect to its ability to characterize the Ghost Dance fault and to identify and characterize any other north-trending structural features that might exist across the