[DNFSB LETTERHEAD]

August 25, 1997

The Honorable Victor H. Reis
Assistant Secretary for Defense Programs
Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585-0104

Dear Dr. Reis:

The Department of Energy (DOE) recently executed the first subcritical experiment, REBOUND, at the Nevada Test Site. This experiment was executed safety, and its programmatic objectives were achieved. The Defense Nuclear Facilities Safety Board (Board) would like to commend DOE-Nevada and the Joint Test Organization for this success.

The Board's staff conducted several reviews and observations associated with REBOUND and with the next scheduled experiment, HOLOG. Two staff trip reports containing observations from these reviews are enclosed for your information and use.

The subcritical experiment program has experienced several schedule delays, and some of the operational skill maintained during the active nuclear testing program has degraded. While the REBOUND experiment was executed safely, and the HOLOG experiment design and construction appear to be adequate, nevertheless the enclosed reports, as well as others transmitted previously, reveal that these problems with the program have contributed to some inadequacies in quality assurance, safety basis documentation, and review integration. The Board anticipates that expeditious implementation of the two new DOE-Nevada Orders governing integrated safety management for future subcritical experiments will contribute to the resolution of these problems.

Sincerely,

John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.
Mr. Gerald W. Johnson
Dr. Siegfried S. Hecker

Enclosures

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

July 9, 1997

MEMORANDUM FOR:	G. W. Cunningham, Technical Director
COPIES:	Board Members
FROM:	J. Preston
SUBJECT:	Observation of REBOUND Experiment and Associated Test Readiness Excercises

The first subcritical experiment, REBOUND, was conducted at the Nevada Test Site (NTS) by the Los Alamos National Laboratory (LANL) on July 2, 1997. This report documents observations on the activities leading up to REBOUND execution, including Department of Energy (DOE) technical reviews and exercises of various emergency response functions that were conducted to maintain test readiness. These observations were made by J. Preston, a staff member of the Defense Nuclear Facilities Safety Board (Board).

DOE's Evaluation of the Safety of REBOUND. DOE's evaluation consisted of:

- Review and approval of the LANLproduced REBOUND Hazard Analysis, which addressed the entire spectrum of operations from material receipt, through assembly and emplacement, to experiment firing. The Board's staff reviewed this analysis, and reported its adequacy in a trip report dated March 11, 1996.

- Review by an independent Containment Review Panel, which certified to the DOE execution authority the design adequacy of this primary control against nuclear material release during firing. The Board's staff reviewed the containment design, review, and construction process, and reported its adequacy in trip reports dated March 4, 1996, and August 19, 1996.

- Review by an independent body that the experiment would remain subcritical. This was primarily a validation review of the experiment's compliance with the Comprehensive Test Ban Treaty. The JASONS group validated the adequacy of this review.

- Confirmation reviews by the DOE Test Controller, after receipt of execution authority from DOE Headquarters, of the asbuilt status of the experimental setup and of the readiness of the NTS support and response functions (e.g., medical, onsite/offsite radiological monitoring, plume forecasting, emergency response, security). These Test Controller reviews were executed on the day prior to experiment execution ("D1 Reviews"), and the support/response function readiness reviews were repeated on the day of execution ("Dday Reviews"). This report addresses the adequacy of these reviews.

D1 Activities. The NTS support and response functions were arrayed in basically the same manner as would be the case for an underground nuclear test. The weather conditions were forecast for experiment execution time, the potential release plume direction and extent were predicted, and the status of both onsite and offsite monitoring stations/personnel was reported. Medical personnel and other emergency

response functions were on standby, even though an accidental release of nuclear material above ground was extremely improbable. Site security was fully exercised. The REBOUND experiment exercised these limitedscope functions related to underground testing with reasonably graded fidelity.

The Test Controller was advised by a technical panel that included representatives from the DOE laboratories (the LANL Resident Manager, a LANL containment scientist, and a Lawrence Livermore National Laboratory [LLNL] containment scientist), the local Environmental Protection Agency, and the National Weather Service, as well as a BechtelNevada Medical Advisor. The latter received D1 asbuilt and readiness reports from the REBOUND Test Director, the BechtelNevada Project Manager, and the LANL and LLNL containment scientists on the advisory panel.

Although both the LANL and LLNL advisors confirmed the adequacy of the asbuilt containment design, it was revealed during the D1 review that this design was significantly different from what had been reviewed by the official Containment Review Panel. It appears that the design changes were made early enough to have been resubmitted to the Panel without impacting the experiment execution date; however, this was not done. Therefore, the D1 containment review, which was intended only to be confirmatory of the asbuilt condition, was actually the primary containment design review. This review was properly conducted by highly competent, independent containment scientists; however, DOE's process was violated. It should be noted that the orderly progression of DOE reviews for REBOUND was complicated by numerous mandated schedule changes.

Dday Activities. The Test Controller's Dday reviews repeated the confirmation of readiness by all necessary support and response functions. The REBOUND Test Director confirmed the successful completion of the Final Dry Run of both experiment execution and diagnostic systems. As delegated by the DOEHeadquarters execution authority, the Test Controller authorized the experiment to proceed, and it was executed at 10:00 am PDT. At approximately 7 minutes after execution, as predicted, carbon monoxide was detected outside the experiment chamber. Approximately 3 hours after execution time, it appeared that the experiment had been successfully contained.

Future Staff Actions. Violation of DOE's process of redundant, confirmatory reviews of containment design is problematic and will be pursued. A new DOENevada Order governing review, approval, and execution of subcritical experiments, if properly implemented, will have the potential to resolve similar process problems.

In addition, the staff intends to review the adequacy of emergency preparedness for subcritical experiments, with a focus on worker protection vice offsite consequences.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

July 25, 1997

MEMORANDUM FOR:	G. W. Cunningham, Technical Director
COPIES:	Board Members
FROM:	D. Winters
SUBJECT:	Review of Containmenta Construction Documentation for Lawrence Livermore National Laboratory (LLNL)-Sponsored Subcritical Experiment HOLOG and Other Issues

This report documents observations made by Defense Nuclear Facilities Safety Board (Board) staff member D. Winters during a July 2123, 1997, trip to the Department of Energy (DOE) Nevada Support Office and the Nevada Test Site (NTS). The primary objective of the trip was to review the asbuilt construction documentation for the LLNLsponsored HOLOG subcritical experiment, and evaluate whether it adequately describes all design changes and deviations that occurred during the containment construction process. Other objectives were to determine whether the integrity of the Containment Review Panel (CRP) process may have been violated for the completed Los Alamos National Laboratory (LANL)sponsored REBOUND experiment and to receive a debriefing on lessons learned from that experiment.

The Board's staff reviewed the HOLOG asbuilt construction documentation and toured the HOLOG location below ground in the Ula facility to observe the asbuilt condition of the HOLOG containment system. This system had previously been viewed in an early stage of construction. Based on the site visit and the documents reviewed, the staff concluded that the quality of the HOLOG containment construction documentation was very good. This finding indicates that significant improvement has been made since similar documentation was prepared for the earlier LANLsponsored REBOUND experiment.

Discussions were held with members of the CRP concerning whether the integrity of the CRP process may have been violated by having a significant REBOUND containment design change first reviewed during the D1 review. If such were the case, the D1 review would have been in part a primary review and not solely a confirmatory review. As reported in a July 9, 1997, trip report by J. Preston of the Board's staff, it appeared that the asbuilt configuration of the cable gasblocks was significantly different from that in the REBOUND prospectus previously reviewed by the CRP. Thus, the D1 review seemed to be primary rather than confirmatory in this respect. The Board's staff met with CRP members who explained that the gasblock design change in question had been reviewed at an earlier CRP meeting, even though the prospectus itself did not contain the final design. It was agreed that confirmation of this through copies of the appropriate pages from the verbatim transcript of the CRP meeting and other supporting data would be provided. Subject to receipt of this confirmatory documentation, it now appears that the integrity of the CRP process was not violated.

The Board's staff received a debriefing on a July 17 REBOUND lessonslearned meeting. A conclusion of that meeting, as explained during the debriefing, was that the execution of the experiment was essentially flawless, with the exception of a few peripheral areas. The most significant weakness noted was in the area of infrastructure. In the interest of cost savings, DOE had failed to maintain certain

minimum components of the NTS infrastructure; these had to be reconstituted prior to execution of the experiment by the sponsoring organization. DOE has accepted the lead in taking corrective actions in this area. Minor problems were also encountered in the areas of (ES&H) support and security. A lessonslearned report is being prepared to document these and other conclusions reached at the meeting. The Board's staff requested a copy of this report.

The Board's staff plans to follow up on this trip with a review of the requested documents. The CRP expects to meet this fall to review the design for the next LANLsponsored experiment, BOOMERANG, which may involve substantial modifications from REBOUND. The staff expects to observe the CRP's BOOMERANG review. Once construction of the containment system for BOOMERANG has been completed, the staff intends to review the containment construction asbuilt documentation to determine whether the improvement noted for LLNL's HOLOG will be carried forward to this second LANLsponsored experiment. Any concerns that arise during these followon and future reviews will be brought to the attention of the Board.