DEFENSE NUCLEAR FACILITIES SAFETY BOARD

February 21, 1996

MEMORANDUM: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: William White
Dermot Winters

SUBJECT: Trip Report on the Los Alamos National Laboratory Briefing Concerning the REBOUND Subcritical Experiment

1. **Purpose:** This report documents observations made by Defense Nuclear Facilities Safety Board (Board) staff members William White and Dermot Winters during a trip to the Nevada Test Site (NTS) on February 13-14, 1996.
2. **Summary:** On February 13, 1996, the Board's staff observed a Los Alamos National Laboratory (LANL) briefing to the Department of Energy/Nevada Operations Office (DOE/NVOO) readiness review team for REBOUND. The three hour brief on the REBOUND experiment was followed by a tour of the LYNER Complex. The staff was given information on the experiment and NVOO's plan for conducting a readiness review. On February 14, 1996, the Board's staff attended additional briefings at NVOO. These briefings included a classification review for the experiment, the purpose of the experiments relative to DOE's surveillance program, and LANL's plan for establishing an authorization basis for the experiment.

   DOE/NVOO personnel have not yet established a well-defined plan for oversight of the experiment, nor do they appear prepared to fully utilize this experiment to maintain test readiness. The details for LANL's plan to review the authorization basis for REBOUND are also not yet complete. However, the fact that LANL is making a serious attempt to establish a tailored authorization basis for this experiment is encouraging. The authorization basis used for REBOUND will set a precedent for the authorization bases of future subcritical experiments at NTS.

3. **Background:** REBOUND is a subcritical experiment to measure equation-of-state properties of weapons-grade plutonium. Three explosively-driven flyer-plate assemblies will be used, yielding three different flyer-plate velocities. These three assemblies will supply three points on the high-pressure Hugoniot curve of the plutonium by providing data on shock and material velocity [1]. The experiment will be conducted by LANL at the LYNER Complex at NTS.
4. **Discussion/Observations:** DOE/NVOO has not yet established a well-defined plan for its oversight of the experiment. This experiment, if properly conducted, would allow DOE to enhance the qualifications of personnel key to the safety of nuclear testing at NTS. It appears, however, that DOE/NVOO is not fully utilizing this opportunity.

   The details for LANL's and DOE's plans to review the authorization basis for REBOUND are not yet complete. However, the review by LANL is clearly a first for the laboratory, and the fact that LANL is making a serious attempt to establish a tailored authorization

basis for this experiment is encouraging. This authorization basis review is scheduled to be completed along four parallel paths: a containment review, a criticality review, a hazards analysis review, and an experiment review.

a. ***Containment Review***

The containment review, which is the most clearly defined review, will be conducted by a Containment Review Panel (CRP). The CRP will include representatives from LANL, Lawrence Livermore National Laboratory, the Defense Nuclear Agency, Sandia National Laboratories, the Desert Research Institute, and S-Cubed. It will operate in a less formal manner than the containment evaluation panel (CEP) and will be involved in the containment design process, interacting with test designers to make necessary changes in containment design.

The staff has two concerns with this review. First, this panel may lack sufficient independence, since its chairman appears to have been heavily involved in the containment design for the REBOUND experiment. Also, the DOE/NVOO readiness review team seemed to put more emphasis on the experiment and the review and approval process than they did on containment. Given the nature and scale of the experiment that may be entirely appropriate. However, future experiments at NTS will involve K(eff)'s more dosing approaching 1.0. Since the review process used for this experiment will set a precedent for future experiments, the focus may need to be broader to provide a more inclusive model for those future experiments.

b. ***Criticality Review***

The criticality review is mostly a formality given the nature of the REBOUND experiment, which will be in an unfavorable geometry for criticality. DOE Headquarters staff indicated to the Board's staff in telephone conversations on February 22, 1996, that a formal criticality review is scheduled for March 7, 1996, at NVOO.

c. ***Hazards Analysis and Experiment Reviews***

LANL personnel are still developing the hazards analysis (both internal and external) and experiment reviews. The internal hazards analysis review is scheduled for the week of February 26, 1996, but the details for this review have not been finalized. The experiment review still has not been scheduled.

5. **Future Staff Actions:** The details discussed above are particularly important since the authorization basis used for REBOUND will set a precedent for future subcritical experiments at NTS. In order to closely follow LANL's activities, the Board's staff will observe LANL and DOE authorization basis activities (i.e., hazards analysis and containment reviews) whenever possible. The staff will also obtain and review documents relative to the authorization basis for REBOUND.
6. **References:**

1. Hixson, R. L., and Fritz, J. N., "REBOUND 1 Experiment," Los Alamos National

Laboratory, 2 February 1996.