

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

March 11, 1996

MEMORANDUM: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: William White
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SUBJECT: Hazards Analysis for the REBOUND Subcritical Experiment

1. **Purpose:** This report documents observations made by Defense Nuclear Facilities Safety Board (Board) staff members Charles Keilers and William White during a trip to the Los Alamos National Laboratory (LANL) on February 27-29, 1996, to review the draft hazards analysis for REBOUND.
2. **Summary:** A preliminary meeting between the LANL REBOUND team and an independent LANL team reviewing the hazards analysis took place on February 29, 1996. The meeting, which was observed by the Board's staff, allowed the LANL review team to give the REBOUND team their initial observations on the hazards analysis, which follows the Department of Energy's (DOE's) standard format for Safety Analysis Reports (SARs) [1].

Both the LANL REBOUND team and the independent review team emphasized that despite the similarity in format, this document was not intended to be a SAR. LANL views LYNER as an experimental test bed--not a nuclear facility--and does not consider the subcritical experiments conducted in LYNER to be nuclear operations.

This position does not appear to be supported by the facts. Many LYNER activities will be repetitive for foreseeable subcritical experiments, and they will involve special nuclear material (SNM) maintained in LYNER in sufficient quantities and for sufficient lengths of time to qualify LYNER as a hazard category 2 nuclear facility. Although the final hazards analysis for REBOUND will likely be sufficient to ensure safe conduct of this experiment, the Nevada Test Site (NTS) Joint Test Organization may need to consider a Basis for Interim Operation and eventually a tailored SAR for LYNER.

3. **Background:** REBOUND is a subcritical experiment to measure equation-of-state properties of weapons-grade plutonium. Three explosively-driven assemblies impacting special nuclear material (SNM) will be used. Shock and material velocity data from the three assemblies will provide three points on the high-pressure Hugoniot curve for the plutonium. The experiment will be conducted by LANL at the LYNER Complex at the NTS.
4. **Discussion/Observations:** The hazards analysis prepared for the REBOUND 1 experiment follows the format for SARs outlined in DOE Standard 3009 [1]. However, both the LANL REBOUND team and the independent review team emphasized that despite the similarity in format, this document was not intended to be a SAR. The executive summary of the hazards analysis cited Defense Programs (DP) interim guidance [3] to conclude that LYNER is not a nuclear facility and that the experiments conducted

there are not nuclear operations. On this basis, LANL concluded that a SAR, technical safety requirements, operational safety controls, and an evaluation of design basis accidents are not required for conduct of subcritical experiments in LYNER.

However, the staff considers LYNER a nuclear facility and subject to nuclear safety orders for the following reasons:

- a. The amount of SNM used in REBOUND (and most future subcritical experiments) will be sufficient to qualify LYNER as a hazard category 2 nuclear facility [2]. Interim guidance from Defense Programs [3] allows an exception to this if the period of residency of the material (in this case, plutonium) is less than 425 hours per year. Based on review of REBOUND security plans, the staff expects SNM for subcritical experiments to reside in LYNER for more than 425 hours per year, before experiments are performed, and to not be removed after experiments are done.
- b. Many operations and activities at LYNER will be common to all subcritical experiments: the transport of SNM into and through the tunnels, the transport of high explosives into and through the tunnels, the operation of secondary containment systems, etc. Since the national laboratories plan to conduct four experiments per year at LYNER, the complex will be in nearly continuous use. In effect, LYNER will become the nuclear facility for conducting subcritical experiments.

LANL does acknowledge that the DP interim guidance [3] requires a safety analysis for defense programs activities, and the hazards analysis being prepared for REBOUND should be sufficient to ensure safe conduct of the experiment, given the relatively low hazard nature of REBOUND. In fact, the staff was encouraged by comments from LANL's independent review team and expects the hazards analysis to systematically address both hazards and prevention and mitigation strategies in a manner adequate for REBOUND.

However, if LYNER is a nuclear facility, it will eventually require an approved graded SAR in accordance with DOE Order 5480.23. On an interim basis, the NTS Joint Test Organization should give serious consideration to preparing a Basis for Interim Operation in accordance with DOE standards [4].

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 the NTS. In order to closely follow LANL's activities, the Board's staff will continue to monitor LANL and DOE authorization basis activities related to REBOUND.
6. **References:**

1. DOE Standard 3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*.
2. DOE Standard 1027, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, December 1992.
3. DOE/DP, *Implementation Guidance for Authorization Basis*, August 21, 1995.

4. DOE Standard 3011, *Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans.*