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## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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98-0003126



September 21, 1998

The Honorable Victor H. Reis  
Assistant Secretary for Defense Programs  
Department of Energy  
Washington, DC 20585-0104

Dear Dr. Reis:

The Defense Nuclear Facilities Safety Board (Board) has been following the Department of Energy's (DOE) efforts at Los Alamos National Laboratory (LANL) to both establish pit production capability and resolve open seismic questions, such as potential surface faulting.

Enclosed for your information is an issue report prepared by the Board's staff that discusses recent seismic investigations at LANL. The Board is aware of DOE's active involvement in and review of the generic seismic ground motion issues at LANL. However, the staff notes that DOE has found evidence for the potential of a fault under the Chemistry and Metallurgy Research (CMR) building. The seismic capability of this fault is uncertain and may be difficult to determine because of human disturbance of the soil over the years.

According to the draft LANL site-wide Environmental Impact Statement, the preferred alternative for achieving pit production capability includes moving some operations out of the Technical Area-55 Plutonium Facility to CMR. In light of the new geologic information, indicating an increased possibility of surface rupture at CMR, further investigation of alternatives appears warranted before these operations are shifted.

The Board remains keenly interested in these geologic conditions. Please feel free to contact me if you have any questions on this matter.

Sincerely,

John T. Conway  
Chairman

c: Mr. Gene Ives  
Dr. Robin Staffin  
Mr. Mark B. Whitaker, Jr.  
Mr. Bruce G. Twining

Enclosure

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

**Staff Issue Report**

July 29, 1998

**MEMORANDUM FOR:** G. W. Cunningham, Technical Director

**COPIES:** Board Members

**FROM:** A. Hadjian and A. Jordan

**SUBJECT:** Seismic Investigations and Seismic Design Criteria at Los Alamos National Laboratory

This report documents information relative to the ongoing review of the seismic investigations and seismic design criteria at Los Alamos National Laboratory (LANL) by the staff of the Defense Nuclear Facilities Safety Board (Board).

**Background.** There are three major fault zones near LANL: the Pajarito fault zone, the Rendija Canyon fault, and the Guaje Mountain fault. Two seismic investigations are continuing: (1) geologic studies based on additional trenching at the Pajarito fault zone to better characterize Holocene (<10,000 years) movements of the Pajarito fault zone and improve the basis for the seismic design criteria; and (2) additional studies of canyon walls and bore holes to determine whether there is evidence of surface faulting at or near the Chemistry and Metallurgy Research (CMR) building and other structures. This work is an extension of exploration for surface faulting in the region of Technical Area-55 (TA-55).

**Investigations of the Pajarito Fault Zone.** Data from the additional trenching at the Parajito fault zone appear to indicate that one or two major earthquakes occurred in that fault zone within the Holocene period. Data on all three faults indicate the following:

Fault Zone	Years Since Major Earthquake	Events	Comments
Pajarito Fault Zone	Preliminary results suggest an event as recent as 1,500 years.	1 or 2	Additional dating information being obtained may resolve whether there was one or two events.
Rendija Canyon Fault	~8,000	1	
Guaje Mountain Fault	4,000-6,000	1	

**Surface Faulting at or Near CMR.** There is new evidence of a fault, possibly an extension of the Rendija Canyon fault, beneath CMR. The displacement of the fault, based on

bore-hole data, is estimated by the Department of Energy (DOE) and its contractors to be 9–10 feet. The Department of Energy (DOE) has concluded that the capability of the fault under CMR is uncertain, since human activity in the area makes it unlikely that this fault can be dated.

**Site-Wide Environmental Impact Statement (SWEIS) for Continued Operation of LANL.** The draft SWEIS, dated April 1998, presents as the preferred alternative for enhancement of pit production use of existing unused space in CMR for some hazardous operations currently conducted in the TA-55 Plutonium Facility.

**DOE/LANL Path Forward.** While firm schedules for all actions have not been established, the following schedules were discussed:

Related to Characterizing the Pajarito Fault Zone	Related to Characterizing Surface Rupture at TA-3 and near CMR
<ul style="list-style-type: none"> <li>• Characterization of Pajarito fault zone will continue. Peer reviewers for trenching work are W. R. Lettis and F. H. Swan. They are reviewing the FY97 final report and will review the FY98 report. Letter report expected 8/98.               <ul style="list-style-type: none"> <li>– FY97 trenching results final report by 12/98.</li> <li>– FY98 trenching results final report by 3/99.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• LANL is to publish final report on Probabilistic Surface Rupture assessment for TA-3 by 12/98.</li> <li>• LANL response to DOE (Ives) letter on seismic issues at LANL and use of CMR may be in a written report or discussed in a meeting. DOE decision on use of CMR is expected 12/98.</li> <li>• LANL is to issue final report on TA-3 bore holes, including bore holes around CMR, by 12/98.</li> <li>• LANL is to publish final report on stratigraphic survey for TA-3 by 3/99.</li> </ul>
<ul style="list-style-type: none"> <li>• DOE intends to have a review conducted by seismologists to provide a broad perspective on all geological data collected to date to aid in determining whether the probabilistic seismic hazard analysis should be updated. Initial results are expected by 12/98.</li> </ul>	
<ul style="list-style-type: none"> <li>• Final SWEIS for Continued Operation of LANL expected in November 1998.</li> <li>• Record of Decision for SWEIS expected to be issued about mid-January 1999.</li> </ul>	
<ul style="list-style-type: none"> <li>• Probabilistic seismic hazard analysis to be reviewed and modified, as necessary, in FY99.</li> </ul>	

In addition, LANL and DOE discussed the possibility of additional trenching (FY99 and beyond) on the Rendija Canyon and Guaje Mountain faults to investigate whether there was any activity on these faults coincident with the major events recently identified on the Pajarito fault zone. This additional trenching would help address the critical issue of fault interdependence, which is important in terms of seismic hazard characterization. The Board's staff considers an updating of the Woodward-Clyde hazard curves using the data gathered from all of the above activities may be warranted.