

**[DNFSB LETTERHEAD]**

September 23, 1993

The Honorable Victor H. Reis  
Assistant Secretary for Defense Programs  
U.S. Department of Energy  
Washington, D.C. 20585

Dear Dr. Reis,

During the period of July 28-29, 1993, members of the Defense Nuclear Facilities Safety Board (DNFSB) Staff and Outside Experts conducted a review at the Nevada Test Site (NTS). The review covered the topic of training and qualification of NTS personnel (including national laboratory personnel) in certain positions important to the safe execution of nuclear test activities. The Staff identified several areas of concern, which are identified in the enclosed trip report.

The Board, therefore, is providing these observations for your information and use.

Sincerely,

***John T. Conway***  
***Chairman***

Enclosure

c: Mark Whitaker, Acting EH-6 w/enclosure  
Nick Aquilina, Nevada Operations Office w/ enclosure  
James Hirahara, Acting San Francisco Operations Office w/ enclosure  
Bruce Twining, Albuquerque Operations Office w/ enclosure

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

August 12, 1993

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

**COPIES:** Board Members

**FROM:** Donald Owen

**SUBJECT:** Nevada Test Site Trip Report for July 28-29, 1993, Review of Training and Qualification of Personnel

1. Purpose: On July 28 and 29, 1993, Defense Nuclear Facilities Safety Board (DNFSB) Technical Staff and outside experts performed an initial review of the training and qualification of Nevada Test Site (NTS) personnel in certain positions important to the safe execution of nuclear test activities. This trip report describes information presented during the review and the observations of Don Owen, Jan Preston (DNFSB Technical Staff), John Drain and Richard Thompson (outside experts).
2. Summary:
  - a. Positions considered to be most important to the safe execution of nuclear tests activities (key positions- see attachment) at NTS were identified by DOE. Based on briefings provided during the review and interviews of several individuals in key positions, it was clear that key positions at NTS are filled by highly experienced individuals. Training of individuals in these key positions has largely been based on apprenticeship and on-the-job training during nuclear test activities, in lieu of other formal training mechanisms. Qualification or certification has been based on management judgement, in lieu of a determination that defined levels of knowledge and understanding had been obtained.
  - b. The staff believes the current nuclear test hiatus raises potential issues regarding DOE's ability to test safely at NTS in the future, including the loss of the current primary training mechanism (nuclear testing) for developing qualified personnel to replace key personnel who have left the program. While it appears that a sufficient number of technically qualified individuals can be retained in the near-term (3-5 years), long-term maintenance of safe testing capability may be difficult without appropriate, continuing attention to the problem.
  - c. Although some limited safety-related exercising is taking place, DOE does not appear to have a formal plan at this time to develop and fund a fully integrated program of non-nuclear or "near-nuclear" activities that will be sufficient to adequately exercise personnel in all of the safety-related duties of the key

positions.

3. Background:

- a. NTS is the operational test site for underground nuclear testing. DOE is currently in a planned hiatus from nuclear testing at NTS until at least late 1994. Capability to resume nuclear testing at NTS is currently being maintained, however, as nuclear testing may be required at any time as a result of potential international developments.
- b. The Board has noted the importance of training and qualification of personnel to the safety of operations in the DOE weapons complex. Board Recommendation 92-7 deals specifically with training and qualification of personnel in the defense nuclear facilities complex. This was the initial staff review of the training and qualification of NTS personnel.
- c. DOE is currently working on developing plans to implement Recommendation 92-7. For this review, the staff considered the requirements of DOE Order 5700.6C, Quality Assurance, and DOE Order 5610.11, Nuclear Explosive Safety. Criterion 2 of DOE Order 5700.6C deals with training and qualification requirements for all personnel. Chapter II of DOE Order 5610.11 contains training requirements for personnel assigned to nuclear explosive duties and therefore covers several, but not all, of the key positions identified by DOE. The DOE-Nevada Operations Office (DOE-NVOO) has previously indicated that no facility related to nuclear test activities at NTS is categorized as a "nuclear facility," as defined by DOE Order 5480.5, Safety of Nuclear Facilities. As a result, DOE has not applied the requirements of DOE Order 5480.20, Personnel Selection, Qualification, Training and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities, to nuclear test activities at NTS. As required by the DOE Implementation Plan for Recommendation 93-1, DOE will review the requirements of DOE Order 5480.20 (and other DOE orders, directives, etc.) to determine if changes are necessary to the overall requirements applied to nuclear test activities at NTS.

4. Discussion/Observations:

a. Review Scope:

- (1) Nuclear test activities at NTS include device assembly, on-site transportation, insertion/emplacement, detonation, and post-shot operations. DOE-NVOO provided an overview of the nuclear test organization and identified some thirty positions as most important to the safe execution of nuclear tests activities at NTS (key positions- see attachment).

- (2) The key positions are affiliated with several organizations including: DOE-NVOO; user organizations including the Los Alamos National Laboratory, the Lawrence Livermore National Laboratory, and the Defense Nuclear Agency; M&O Contractors including the Reynolds Electrical and Engineering Company, EG&G, and Wackenhut Security Incorporated; and other government organizations including the National Oceanic and Atmospheric Administration Weather Service Nuclear Support Office, the Environmental Protection Agency, and the United States Air Force. These key positions important to safety, as identified by DOE, and their organizational affiliations are provided in the enclosure.
  - (3) DOE and other NTS organizations provided briefings on training and qualification of individuals in key positions. The DNFSB review team also interviewed twelve individuals occupying some of these key positions.
- b. Training and qualification of NTS personnel in key positions: The following summarizes information presented during the review regarding training and qualification of individuals in key positions:
- (1) DOE and the other organizations demonstrated, through the briefings and during the interviews, that key positions at NTS are presently filled by highly experienced individuals. Most of these individuals have been associated with weapons/weapons test programs for 20 years, or more, and have been involved in numerous test events.
  - (2) DOE and other organizations stated that training of individuals in key positions has been largely based on apprenticeship-type training. This includes participation in nuclear test activities as understudy, and emphasis of on-the-job training (OJT) during nuclear test activities.
  - (3) In addition to apprenticeship/OJT, some job-specific training requirements for some key personnel were presented. Most of this training consists of briefings and discussions, required observations, required reading and tours for several key positions. Examinations are generally not given for this training. Most other training requirements presented included the following:
    - (a) Courses related to workplace health and safety practices, such as radiation worker courses, hazardous materials site worker training, first-aid and cardiopulmonary resuscitation courses.
    - (b) Management training of an administrative nature, and
    - (c) Certification requirements of the Personnel Assurance Program provided by DOE Order 5610.11 (e.g. medical, drug and alcohol,

and psychological evaluations).

- (4) Continuing training in job-specific areas has relied heavily on steady participation in ongoing nuclear test activities, and has generally not been based on a formal curriculum of study.
  - (5) For most key positions, qualification/certification is subjectively determined by management after observation of the individual's performance under instruction during nuclear test related activities and completion of other training requirements noted above. Written or oral examinations are not required to assess knowledge and understanding for most job-specific training outside of apprenticeship/OJT. Specific levels of knowledge required for qualification have not been formally defined for most of the key positions.
  - (6) DOE and other organizations noted throughout these presentations that formal, documented training and qualification programs outlining job-specific training, required apprenticeship/OJT and required examinations for qualification or certification were yet to be developed for many of the key positions.
- c. Staff assessment of training and qualification of key personnel: The approach to training and qualification of key personnel presented during the review does not appear to be in keeping with DOE Order 5700.6C which requires that management "ensure [emphasis added] that personnel are capable of performing their assigned work," and DOE Order 5610.11 (Chapter II) which requires written or oral examinations, as appropriate, for individuals assigned to nuclear explosive duties. This approach is also not in accordance with that required for operators and supervisors at reactor and non-reactor nuclear facilities by DOE Order 5480.20. This order specifically requires comprehensive, documented examinations for certification, oral and written, as well as operational evaluations for such personnel. Additionally, this approach is not in keeping with a tenet of Board Recommendation 92-7 concerning the need to "determine level of knowledge of appropriate personnel... by means of written, oral and practical examinations covering job-specific process knowledge requirements..."
- d. Future test activities: Based on discussion of the issue of maintaining capability for safe future testing with DOE-NVOO, laboratory, and M&O contractor personnel in these key positions, the Staff believes that the present testing hiatus raises the following issues related to DOE's ability to conduct nuclear tests safely at NTS in the future:
- (1) The use of nuclear testing activities as a primary training mechanism for developing qualified personnel is not available now and possibly will not be available for a period extending beyond the planned hiatus.

- (2) While the nuclear test hiatus impacts individual training as discussed above, senior managers and incumbents in key positions also stressed during the review the importance of team building among the several organizations to the safe conduct of nuclear testing activities. These individuals stressed that the ability to foster team building may be eroded over the course of an extended nuclear test hiatus without tangible goals.
  - (3) The tempo of nuclear testing has provided ample, effective apprenticeship/OJT and team building opportunities in the past. Consequently, development of other training opportunities such as full scale exercises, or integrated programs of alternate simulation activities have not received high priority in the past.
  - (4) The Laboratory and NTS contractor organizations currently have a limited program to exercise some test-related capabilities (post-shot drilling of historical sites, etc.). However, DOE does not appear to have a formal plan at this time to develop and fund a fully integrated program of non-nuclear or "near-nuclear" activities that will be sufficient to adequately exercise personnel in all of the safety-related duties of the key positions. Absence of such tools to meet individual training and team building needs during the hiatus impacts DOE's ability to ensure that testing can be safely resumed after the nuclear test hiatus.
  - (5) The reliance on apprenticeship and OJT and the passing down of specific experience (i.e., "tricks of the trade") to a prospective operator or supervisor in a key position has limited the establishment of fully documented training and qualification programs. DOE did not present formal plans to ensure that the substantive knowledge and experience of departing key personnel is adequately documented or otherwise captured in the form of training and qualification programs (or other areas such as procedures and performance standards). The anticipated loss of experienced personnel and their substantive knowledge and experience during the nuclear test hiatus will weaken DOE's ability to constitute such programs for future testing. While it appears that a sufficient number of technically qualified individuals can be retained in the near-term (3-5 years), long-term maintenance of safe testing capability may be difficult without appropriate, continuing attention to the problem.
5. Future Staff Actions: The staff will continue to review training and qualification of NTS personnel. The staff will review DOE actions in response to Recommendation 93-1 addressing applicability of the requirements of DOE Order 5480.20 (and other applicable DOE orders, directives, etc.) and determining if changes are necessary to the training and qualification requirements as applied to nuclear testing at NTS. The staff will also review DOE actions taken in response to Recommendations 92-7 and 93-3, as applied to NTS.

Attachment

KEY POSITIONS FOR THE SAFE EXECUTION OF  
NUCLEAR TEST ACTIVITIES

DEVICE ASSEMBLY

- o DEVICE ENGINEER (LLNL, LANL)
- o NUCLEAR EXPLOSIVES ASSEMBLY FACILITY COORDINATOR (LLNL, LANL)
- o ASSEMBLY TECHNICIAN (LLNL, LANL)

CONVOY--WSI CONVOY COMMANDER

EMPLACEMENT/STEMMING

- o TEST DIRECTOR (LLNL, LANL, DNA)\*
- o TIMING AND FIRING ENGINEER (LLNL, LANL)\*
- o CONSTRUCTION ENGINEER (LLNL, LANL, DNA)
- o REEC<sub>o</sub> DOWNHOLE SUPERINTENDENT
- o REEC<sub>o</sub> DOWNHOLE CRANE OPERATOR
- o HEALTH PHYSICIST/HEALTH AND SAFETY TECHNICIAN (LLNL, LANL, DNA, [SNL])\*

TEST EXECUTION

- o DOE TEST CONTROLLER\*
- o SCIENTIFIC ADVISORY PANEL MEMBER
  - SCIENTIFIC ADVISOR (CHAIRMAN) (LLNL, LANL)
  - EPA OFF-SITE RADIOLOGICAL SAFETY OFFICER
  - WSN<sub>SO</sub> METEOROLOGICAL ADVISOR
  - MEDICAL ADVISOR (REEC<sub>o</sub> CONSULTANT)
  - DOE HEALTH PHYSICS ADVISOR

- o TEST DIRECTOR (LLNL, LANL, DNA)\*
- o CONTAINMENT SCIENTIST (LLNL, LANL, DNA)
- o TIMING AND FIRING ENGINEER (LLNL, LANL)\*
- o EG&G/EM CONTROL ROOM TECHNICIANS
- o EG&G/EM RED SHACK TECHNICIANS
- o USAF LIAISON OFFICER
- o DOE TEST OPERATIONS OFFICER
- o DOE AIR OPERATIONS OFFICER
- o DOE RADIOLOGICAL OPERATIONS OFFICER
- o DOE SECURITY ADVISOR
- o WNSO EVENT RADIATION FALLOUT SUPPORT SPECIALIST
- o EPA OFF-SITE RADIOLOGICAL SAFETY PROGRAM PROJECT OFFICER
- o WSI EVENT LIEUTENANT

#### TRAILER PARK REENTRY

- o DOE TEST CONTROLLER\*
- o TEST DIRECTOR (LLNL, LANL, DNA)\*
- o HEALTH PHYSICIST/HEALTH AND SAFETY TECHNICIAN (LLNL, LANL, DNA [SNL])\*
- o DRILLING ENGINEER (LLNL, LANL)
- o HEALTH PHYSICIST/HEALTH AND SAFETY TECHNICIAN (LLNL, LANL, DNA [SNL])\*
- o REEC<sub>o</sub> DRILLING SUPERINTENDENT/RIG SUPERINTENDENT

#### OTHER

- o DOE/HQ DEPUTY ASSISTANT SECRETARY FOR MILITARY APPLICATION



- o DOE/NV MANAGER
- o NUCLEAR EXPLOSIVE SAFETY GROUP
- o CONTAINMENT ADVISORS (LLNL, LANL)
- o CONTAINMENT EVALUATION PANEL MEMBER
- \* THESE POSITIONS HAVE MULTIPLE RESPONSIBILITIES AS INDICATED ABOVE