DEFENSE NUCLEAR FACILITIES SAFETY BOARD

May 11, 1993

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: Jan Preston, Nevada Test Site (NTS) Team Leader

SUBJECT: Trip Report for Staff Visit to NTS, April 28-29, 1993

1. Purpose: This report documents the DNFSB Staff trip to NTS that took place on April 28-29, 1993. The trip was structured as an initial Staff familiarization of NTS organizations, facilities, and activities. The team for this trip consisted of J. Preston, S. Krahn, M. Moury, and T. Quale (SPC).

2. Summary:

   a. Our visit to NTS included two days of briefings and site tours. An itinerary is provided as Attachment 1. On the second day, because of an expanded discussion of order compliance and the use of NTS Standard Operating Procedures (SOPs), briefings that had been planned on the Facility Representative Program, the Conduct of Operations Program, and Fundamentals of Operations Training were provided in hard copy format only.

   b. Areas identified for further examination include: the mechanisms by which DOE executes its technical management function, the need to review the containment design process from a systems engineering standpoint, key personnel qualification and training, and DOE Order compliance verification.

3. Background:

   a. Day 1 Overview:

      (1) The NTS work force is composed of three major management and operations contractors, three prime "user groups" [Los Alamos National Lab (LANL), Lawrence Livermore National Lab (LLNL), and the Defense Nuclear Agency (DNA)], and a number of other support organizations (including the U.S. Weather Service and the Environmental Protection Agency). On the first morning, representatives from each organization provided brief overviews of their NTS-specific organizational structure and operation. The DOE-Nevada Operations Office (DOE-NVOO) Assistant Manager, Jim Magruder, provided an integrated overview of NTS operations and a short introduction on the mechanics of preparing for and

conducting nuclear tests. To a greater extent than other DOE Operations or Area Offices (with the possible exception of DOE Richland), DOE-NVOO acts as an integrating contractor for the various components of NTS operations.

(2) Representatives from LLNL and DNA provided briefings on vertical shaft and tunnel containment of nuclear tests. Containment design is the key mechanism for limiting the release of the radioactive by-products of a nuclear explosion to the biosphere (atmosphere, groundwater, etc.). We were also briefed on post-shot sampling operations by LANL. Post-shot operations (drill-back sampling, tunnel purging, etc.) have historically resulted in releases of radionuclides to the atmosphere, and in personnel contamination events. After these briefings we were given tours of P-Tunnel operations by DNA and of a vertical shaft emplacement operation for the ICECAP event by LANL.

b. Day 2 Overview:

(1) A majority of the second morning was spent discussing the DOE-NVOO approach to DOE Order compliance, the self-assessment process, Requirement Identification Document development, and the use of NTS Standard Operating Procedures (SOPs). Several questions were raised by the review team on the material presented, and it was decided to have the briefings on the DOE Facility Representative Program, the Conduct of Operations Program, and the Fundamentals of Operations Training provided in hard copy format only.

(2) We were briefed on the NTS radiation protection program, the environmental restoration and waste management program, and the nuclear explosive safety program. Several questions arose regarding the nuclear explosive safety program, which is managed by DOE-NVOO personnel. As a result of our interest, the head of the DOE-NVOO Nuclear Explosive Safety Division, Ed Hanson, offered an open invitation for us to observe all future nuclear explosive safety studies (NESSs).

(3) During the afternoon, we toured one of the NTS radioactive waste management sites (into which NTS receives waste from other DOE generators), the Device Assembly Facility (DAF) that is under construction, the Area 27-"Able Site" Nuclear Explosive Assembly Facility, and the Treatability Test Facility.

4. Discussion/Observations:

a. DOE Technical Management at NTS:

(1) As mentioned above, DOE-NVOO appears to play the role of integrating contractor at NTS. However, the device assembly areas at NTS appear to be treated as "sovereign territory," under the control of the LANL and LLNL. Although nuclear explosive operations are reviewed by the DOE's NESS process, it was unclear how DOE ensures that its orders, requirements, and policies are being implemented for "user"-controlled operations.

(2) The responsibilities of and interfaces between the DOE Test Controller (TC) and "user" Test Director (TD) was another area that the review team felt warranted further examination. The Lab/DNA TD directs the day-to-day NTS contractor operations associated with a nuclear test, until D-Day, when control is handed over to the DOE TC. After the DOE TC authorizes reentry, direction of post-shot operations is again the responsibility of the Lab/DNA TD.

(3) DOE-NVOO personnel stated that their NESS process at NTS is being done in accordance with QC-2, rather than the more comprehensive requirements provided in DOE Order 5700.6C or QC-1. It is not clear whether the minimal requirements in QC-2 will lead to a satisfactory NESS process. Further examination of the NESS process appears warranted.

b. Nuclear Test Containment Design/Engineering: The containment system for a vertical emplacement nuclear test consists of alternating layers of coarse and fine gravel and locked-in concrete plugs. For a tunnel device emplacement, containment is achieved with a series of automatic closure mechanisms and grout (thin cement mixtures). (See Attachment 2 for diagrams of these containment schemes.) The design and construction of these containment systems are vital to ensuring that no radionuclides will escape to the environment after a test. The process used to design, engineer, certify, and then construct these containment systems should be compared to the systems engineering process envisioned by the Board in its Recommendation 92-4. Although significant changes were made in the nuclear test community's approach to containment verification after the significant 1970 BANEBERRY event release, the approximately 108 tests conducted from 1970-1988 have still released 54,000 Ci. (See Attachment 3 for a summary of these containment failures and "operational releases.")

c. Key Personnel: The DOE TC and Lab/DNA TD play pivotal roles in coordinating safe and effective test preparation and execution. However, no definite training and qualification requirements were presented for these personnel, or for the members of the Containment Evaluation Panel (CEP). Marly of the highly-experienced people currently filling these positions may soon retire. It is unclear how the current level of competence will be maintained without an established program to transfer experience. It is also unclear how competency is being uniformly maintained with the current incumbents.

d. Order Compliance:

(1) It is unclear how "user"-directed operations at NTS are being evaluated for compliance with DOE Orders. The LANL and Sandia personnel present at the briefings were unaware of any required order compliance reviews for their operations at NTS. LLNL personnel stated that the DOE-SAN-directed order compliance effort in Livermore included NTS operations. DOENVOO has not included assembly area "user" operations in their own order compliance effort. It was particularly unclear how DNA operations are governed at NTS. To help clarify this situation, the DOE-DNA memorandum of understanding for NTS operations has been requested for review.

(2) DOE-NVOO has made the determination that there are no nuclear facilities at NTS, including the existing device assembly areas and the new DAF. This could impact how many DOE Order requirements NTS contractors are directed to implement. The design, engineering, and construction standards used for the DAF might also be different, if it were determined to be a nuclear facility (e.g., DOE Order 6430.1, "General Design Criteria").

(3) Finally, it was unclear to the review team how DOE-NVOO uses its SOPs to "supplement" and "consolidate" the requirements of DOE Orders. The SOPs are evidently not used as implementing procedures, as has been seen at other facilities; a complete set of the NTS SOPs has been requested for review.

e. Uncertainty of the Nuclear Testing Schedule: Nuclear testing is currently on hold pending action by the Administration in response to the "Hatfield amendment." Testing may resume as early as August 1993, or it may never resume. This uncertainty has significantly impacted NTS operations and DOE-NVOO's ability to plan. If the Administration decides to use the full fifteen tests Hatfield allows between now and the end of 1996, a ramp-up of testing operations, above present levels, would be required over the next three-year period.

5. Follow-up Activities:

a. DOE Technical Management at NTS:

(1) Request that DOE-NVOO prepare and provide a coordinated Albuquerque, San Francisco, and Nevada Operations Offices response on how compliance with DOE Orders is being evaluated by LANL, LLNL, Sandia, and DNA for NTS operations.

(2) Review how the functions and responsibilities of the DOE TC and Lab/DNA TD interface during assembly operations, emplacement, conduct

of the test, and post-shot operations.

(3) Review the applicability of the requirements of Order 5700.6C to work at NTS, and how those requirements are currently being applied by DOENVOO and NTS contractors.

b. Nuclear Test Containment Design/Engineering: Review the containment system design, engineering, certification, and construction process according to the elements outlined in Recommendation 92-4.

c. Key Personnel: Further discuss the processes that exist at DOE-NVOO and the Labs/DNA for selecting and training TCs and TDs, respectively. Determine how these informal processes translate to the formal processes outlined in Order 5480.20 and Order 5700.6C.

d. Order Compliance: After completion of the DOE-Albuquerque Operations Office Order Compliance review by the DNFSB Staff, schedule an equivalent review for DOE-NVOO NTS operations. Include all "user" and other contractor activities, as well as consideration of the use of DOE-NVOO SOPs.

ATTACHMENT 1 Revised 4/27/93

NTS Itinerary

Jan Preston
Senior General Engineer
Nevada Test Site Team Leader

Steven L. Krahn
Senior General Engineer
Assistant Director, Weapons Team

Matthew B. Moury
Senior System Engineer

Theodore J. Quale
Expert

Defense Nuclear Facilities Safety Board
Staff Members

April 27-30, 1993

Tuesday, April 27

8:15 a.m. Visitors arrive on Northwest Airlines.

Hotel reservations are confirmed at Howard Johnson Plaza-Suite Hotel, 4255 South Paradise Road.

Wednesday, April 28

6:00 a.m. John M. McGrail, Project Manager, Device Assembly Facility, U.S. Department of Energy's Nevada Operations Office (DOE/NV), departs in Office of External Affairs van for Howard Johnson Plaza Suite Hotel, 4255 South Paradise Road

6:15 a.m. Arrive Howard Johnson Plaza Suite Hotel. Meet visitors in hotel registration lobby.

CAMERAS, BINOCULARS, AND RECORDING EQUIPMENT ARE PROHIBITED ON SITE.

6:25 a.m. Depart for Mercury Gate 100

7:40 am.	Arrive at Gate 100 for badge check
7:45 am.	Depart for Control Point-1 (CP-1)
8:15 a.m.	Arrive at CP-1.
8:25 a.m.	Introduction and overview of Nevada Test Site (NTS) operations by James K. Magruder, Assistant Manager for Operations, DOE/NV.
8:55 a.m.	Comments by Jan Preston, Nevada Test Site Team Leader, and introduction of Defense Nuclear Facilities Safety Board Staff members
9:10 a.m.	NTS organizational briefings by the following representatives
	Ronald A. Cosimi, Test Group Director, Los Alamos National Laboratory (LANL)
	A. Edward Langley, Resident Manager, Nuclear Test Operations Department, Lawrence Livermore National Laboratory (LLNL).
	Allen B. Church, Manager, Arming & Firing Systems Department, Sandia National Laboratories.
	Lawrence J. Gabriel, Deputy Chief, Construction Engineering Division, Defense Nuclear Agency (DNA)
	Dr. Darryl Randerson, Deputy Meteorologist-in-Charge, Weather Service Nuclear Support Office, U.S. Department of Commerce.
	Anson Burlingame, Deputy Manager, Reynolds Electrical & Engineering Co. (RE~Co), Inc.
	Thomas O. Edwards, Assistant General Manager for Performance Assurance, EG&G Energy Measurements (EG&G/EM), Inc.
	Walter N. Ferguson, Assistant General Manager for Operations, Wackenhut Services, Inc.
	Robert Nilsen, Deputy General Manager, Raytheon Services of Nevada
10:50 a.m.	Break
11:00 a.m.	"How We Do Nuclear Testing" by Magruder, Test Controller
11:30 a.m.	"Offsite radiological monitoring and emergency response," by Darryl J. Thome, Program Manager, Offsite Radiation Safety and Emergency Response,

Environmental Protection Agency

11:50 a.m. Shaft containment briefing by Dr. Norman Burkhard, Program Leader of Nuclear Test Containment, LLNL.

1:15 p.m. Depart for P-Tunnel

1:45 p.m. Arrive at P-Tunnel. Briefing by Gabriel or Maj. Gary Reynolds, Chief, Test Operations Branch, DNA

3:45 p.m. Depart for Ice Cap Ground Zero (GZ)

4:05 p.m. Arrive at Ice Gap GZ. Briefing by Lawrence F. Krenzien, Resident Test Director, LANL

4:45 p.m. Depart for Frenchman Flat, optional

5:20 p.m. Arrive at Frenchman Flat. Drive through briefing on weapons effects test structures and Liquefied Gaseous Fuels Spill Test Facility

5:35 p.m. Depart for Mercury Housing Office

5:45 p.m. Arrive at Mercury Housing Office. Check into rooms

5:50 p.m. Depart for Dormitory 535

5:55 p.m. Arrive at Dormitory 535

6:15 p.m. Dinner at Mercury Steak House, no host

Thursday, April 29

6:15 a.m. Breakfast, no host, at Mercury cafeteria

6:45 a.m. Depart for Nevada Test Site Office (NTSO)

6:55 a.m. Arrive at NTSO

7:00 a.m. Directive Management and Defense Program DOE Order Compliance Self Assessment Project, by Ivor L. Kilmer, Chief, Property and Information Branch, DOE/NV

7:45 a.m. Overview of Nevada Test Site Standard Operating Procedures, by McGrail

8:00 a.m. Facility Representative Program by Teri Lachman, Facility Representative Program

	Manager, DOE/NV, LANL Program, EG&G/EM
8:30 a.m.	Conduct Operations Program, Fundamentals of Operations Training. Briefings by Lachman; Audrey B. Clark, Chief, Training and Development Branch, DOE/NV; and Nelson F. Cochrane, Assistant Program Manager
9:00 a.m.	Break
9:15 am.	Radiation Protection Program and Personnel Qualifications by Milton Chilton, Chief, Health Protection Group, DOE/NV
9:45 a.m.	Environmental Restoration and Waste Management Program by Joseph N. Fiore, Acting Assistant Manager, Environmental Restoration and Waste Management Division, DOE/NV
10:15 a.m.	Nuclear Explosive Safety Program, by Edwin R. Hanson, Director, Nuclear Explosive Safety Divisiion, DOE/NV
10:45 a.m.	Depart for dormitory
10:55 a.m.	Arrive at dormitory. Load luggage
11:05 a.m.	Depart for Mercury Cafeteria and Mercury Housing Office
11:10 a.m.	Lunch, no host. Check out at Mercury Housing Office
11:30 a.m.	Depart for Area 5 Radioactive Waste Management Site (RWMS)
11:45 a.m.	Arrive at Area 5 RWMS. Review drive through briefing by Layton J. O'Neill, DOE/NV, in conference room
12:05 p.m.	Drive through briefing by Druce D. Becker, Chief, Radioactive Waste Section
12:45 p.m.	Depart device assembly facility (DAF)
1:00 p.m.	Arrive at DAF. Briefing by McGrail
1:50 p.m.	Depart for Area 27, via north gate, station 250
2:10 p.m.	Arrive at Station 250
2:15 p.m.	Depart Building 5100
2:25 p.m.	Arrive at Building 5100. Briefing by Richard L. Higgs, Nuclear Explosive Assembly Facility Coordinator, LANL

3:25 p.m. Depart for Area 27 South Gate, Station 560

3:35 p.m. Arrive at Station 560, badge check

3:40 p.m. Depart Treatability Test Facility (TTF)

4:10 p.m. Arrive at TTF. Briefing by Dennis Finney, Operations Superintendent, REECo.

4:40 p.m. Drive by inactive facilities, Engine Maintenance Assembly and Disassembly Building, and Reactor Maintenance Assembly and Disassembly Building

5:00 p.m. Depart for Gate 100

5:30 p.m. Arrive at Gate 100 for badge check

5:45 p.m. Depart for Howard Johnson Plaza Suite Hotel, Las Vegas

7:00 p.m. Arrive in Las Vegas

Friday. April 30

7:00 a.m. Visitors depart from McCarran International Airport on Northwest Airlines

NTS Room Assignments	Dorm/Room	Telephone
John M. McGrail	527/4	5-6905
Jan Preston	535/206	5-6156
Steven L Krahn	535/205	5-6155
Matthew B. Moury	535/208	5-6158
Theodore J. Quale	535/209	5-6159