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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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April 9, 1997

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

Dear Dr. Reis:

Members of the staff of the Defense Nuclear Facilities Safety Board (Board) have been reviewing the new Device Assembly Facility (DAF) at the Nevada Test Site (NTS). The Board understands that this facility is scheduled to start up later this year, and will be used to support activities related to nuclear test readiness and science-based stockpile stewardship, including assembly of subcritical experiments.

Integrated safety management is key to performing safely the unique activities envisioned for DAF and to maintaining NTS's capability for safe nuclear explosive operations, particularly in this era of retiring expertise. Based on the enclosed staff report, the facility already has or is developing many elements of a satisfactory integrated safety management system. A number of areas for potential improvement are identified. The Board believes it particularly important to set in place a system for review of activity-specific hazards in facilities such as DAF that are to be used as multipurpose facilities. Safety envelopes defined based on generic considerations may not suffice.

The Board and its staff will continue to monitor closely DAF preparations for startup.

Sincerely,

A handwritten signature in black ink, appearing to read "John T. Conway".

John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.
Mr. Terry Vaeth

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

March 11, 1997

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: C. H. Keilers, Jr.

SUBJECT: Nevada Test Site: Status of Device Assembly Facility (DAF)

1. Purpose

This report documents a review by Defense Nuclear Facilities Safety Board (Board) staff of the Device Assembly Facility (DAF) at the Nevada Test Site (NTS). This review addressed facility status and recent progress toward startup. Staff members T. Davis, J. Deplitch, C. Keilers, S. Krahn, C. Martin, C. Miller, M. Moury, J. Preston, and W. White contributed to this review.

2. Summary

DAF is a new, moderate-hazard facility for nuclear explosive operations that is expected to start up this year. It will support activities related to science-based stockpile stewardship and nuclear test readiness. Contractor and Department of Energy (DOE) Operational Readiness Reviews (ORRs) are scheduled for May and August 1997, respectively.

Overall, the staff believes that DAF design and construction provide significantly enhanced safety and security as compared with the older Area 27 assembly facilities. Also, DAF is distant from population centers and has few collocated workers, reducing the consequences of potential accidents. Furthermore, DOE and the laboratories have done a thorough job of identifying and analyzing the major hazards for expected generic operations. In an era of retiring expertise, aging weapons, and no nuclear testing, the enhanced safety that DAF can provide for stockpile stewardship research and development will become increasingly important.

DOE and DAF management face challenges before DAF begins operation. These challenges involve developing a meaningful authorization agreement, and ensuring that facility-specific controls are properly implemented and augmented, as needed, by activity-specific controls. They also involve verifying that key safety systems are adequate, verifying that safety programs and infrastructure are in place, and demonstrating readiness under the ORR process. This report discusses DAF status and these challenges within the framework of Board Recommendation 95-2, *Integrated Safety Management*.

3. Background

The following are recent DAF milestones in preparing an authorization basis:

- 3/95—DAF Safety Analysis Report (SAR) issued.
- 8/95—DOE Safety Evaluation Report (SER) on SAR issued.
- 2/96—Facility Use Permit issued by DOE to the weapons laboratories.
- 9/96—Nuclear Explosive Safety Master Study Input Document submitted to DOE.
- 11/96—DOE Nuclear Explosive Safety Study (NESS) begun.

The current DAF schedule is as follows:

- TBD—NESS Group submits its report and recommendations to DOE headquarters.
- 5/97—DAF Contractor ORR begins.
- 8/97—DOE ORR begins.
- 10/97—DAF enters operational status.

Previous staff observations on DAF are documented in staff reports dated December 8, 1993, and February 17, 1995.

4. Discussion

Since July 1996, the staff has observed the performance of line management and independent reviews of DAF by the laboratories and DOE. The staff has also reviewed the implementation of selected positive measures and controls intended to ensure nuclear explosive safety (NES). The key activities in this period have been laboratory preparations and the NESS Group review of the Master Study Input Document. In its draft report, reviewed by the staff, the NESS Group identified concerns and positive measures, made recommendations, and proposed supplementary NES rules.

In terms of the integrated safety management framework, staff observations are as follows.

Define Scope of Work. The DAF mission is to provide a modern, safe, and secure facility for NTS nuclear explosive operations. The DAF infrastructure will support a small number of unique operations per year. Specific operations have not yet been defined; however, they are expected to include assembling some subcritical experiments (others will be assembled in the LYNER/U1a tunnel complex), supporting test readiness exercises, training laboratory weapons engineers and technicians, and possibly developing improved surveillance technology for aging weapons. In addition, DAF may support disposition of damaged nuclear weapons.

Analyze and Categorize Hazards. As compared with the Area 27 facilities, DAF is farther from the public and has features that significantly enhance safety, particularly that of collocated workers. These features include assembly cells with gravel gerties and blast valves, enhanced blast protection provided by separated bays and blast doors, reduced combustible loading, shielded radiography buildings, and covered corridors to protect devices when being moved between buildings. Consolidating nuclear explosive operations at DAF also avoids locating special nuclear material (SNM) close to large high explosive (HE) charges that may be staged in Area 27 to support the Big Explosive Experimental Facility.

Overall, the laboratories and the NESS Group have thoroughly identified and bounded the major hazards at DAF for *generic* operations. Prior to the conduct of a *specific* operation (nuclear explosive or subcritical experiment), an activity-specific hazard analysis and authorization basis review would be performed by using the NESS process for a nuclear explosive or by using a still-to-be-determined process for a subcritical experiment.

The DAF authorization basis is structured around nuclear explosive operations; however, subcritical experiments do not involve nuclear explosives, and will not be subject to a device-specific NESS. The DOE Nevada Operations Office is preparing an order to specify the authorization basis requirements for subcritical experiment activities (not yet reviewed by the staff).

Develop and Implement Controls. The laboratories developed controls in the SAR and Master Study. Both the DOE SER team and DOE NESS Group reviewed these controls and made recommendations. Also, the NESS draft report lists those positive measures that the group considers key to meeting NES standards. Some of these controls are engineered safety features (e.g., blast valves, blast doors, and resilient floors). Others are administrative controls, such as restrictions on building HE/SNM inventory, uncased HE operations, corridor occupancy, and HE/SNM collocation. The administrative controls are implemented in DAF plans and procedures.

The staff has the following observations in this area:

- The role of the NESS Group Report in the authorization basis is not clear at this time, in particular, whether the controls identified in the study will become part of the DOE authorization agreement. It is also unclear which NESS Group recommendations need to be resolved before operations begin, and how SER recommendations will be closed out by DOE.
- The NESS Group list of positive measures appears complete, but without relative priority. The group's draft report indicates that changes that adversely affect the listed positive measures will be evaluated under the Unreviewed Safety Question (USQ) process.

- Some listed positive measures (e.g., those that mandate trained operators but do not specify criteria) may be subject to interpretation. The staff considers that a vague positive measure is equivalent to no positive measure and, in fact, may provide a false sense of security. As the authorization basis is improved, such positive measures need either to become more specific or to be purged.
- DAF procedures do not identify steps that implement NES positive measures. If these controls are part of the authorization agreement and are important to NES, implementing procedures should not only include them, but also identify them as such. It would also be useful if a database were prepared that, where appropriate, linked the source of a positive measure to the implementing step in a procedure.

The above improvements would (1) assist the facility in demonstrating that controls are initially implemented, (2) facilitate laboratory management in ensuring that controls remain implemented, and (3) assist operators (including temporarily assigned project personnel) in understanding those controls on which DOE is absolutely depending to ensure NES.

Perform Work/Confirm Readiness. DOE and the laboratories have identified several major safety deficiencies in DAF, particularly in the electrical and fire protection systems, resilient floor qualification, seismic support anchorage, and blast valve operability. Facility management has developed and implemented plans to address these deficiencies.

The staff has the following observations in this area:

- The open item tracking system (CATS) is being relied upon to document closure of pre-start items; however, the staff found several cases of inaccurate or weakly justified closeout. Accurate closeout, including the basis for closure and relation to references, would facilitate outside reviews and DAF certification. Facility management is pursuing this matter, including review of past closeout of selected key safety systems.
- Initial acceptance tests for key safety systems warrant review before operations begin. Several systems and components (e.g., in the vacuum system and cranes) were accepted without clear explanation when they actually missed stated criteria. The DOE SER identifies a similar concern for major electrical systems.
- Deficiencies in the installed fire protection system have resulted in a high reliance on operators responding with hand fire extinguishers. The facility has an effective sprinkler system flushing program to compensate for pipe liner damage, but increasing corrosion is expected, releasing debris that could obstruct sprinkler heads. Also, many sprinkler heads and sensors are improperly located, and the system has no manual actuation capability. The nearest responding fire station is now in Mercury, 30 minutes away. The staff believes a responsive, long-term program is needed to address these deficiencies.

- Facility and site emergency management needs improvement before operations begin. Currently, emergency action levels and protective action recommendations are based on SAR accidents and do not consider the full range of accidents (large and small) that could occur. The responsibilities within the emergency management organization are also not clearly consistent with the applicable DOE Order. Guidance for the incident commander has not been developed. The organization also needs a real-time capability to assess accident consequences.
- The inspection frequencies for DAF lightning protection systems do not conform with recommendations in the National Fire Protection Association (NFPA) 780 appendix on lightning protection of structures housing explosive materials. The DOE *Explosive Safety Manual* requires compliance with this appendix. Specifically, NFPA 780 recommends visual inspections every 7 months and electrical tests every 14 months. DAF performs visual inspections annually and electrical inspections every 47 months.

Feedback and Improvement. The staff has the following observations in this area:

- Operational safety may be improved if more direct, working-level communication is established between Pantex and DAF on current experiences, problems, and solutions. This would be consistent with the experience feedback requirements in the new DOE Order 452.2A, *Safety of Nuclear Explosive Operations*. Several current issues at Pantex may also apply to DAF (e.g., the potential need for linac safety limits), and in some cases, it would be worthwhile to understand why certain controls are implemented differently (e.g., two-person control of meters and the operations controller function).
- DAF controls that protect the facility workers can be improved based on process information in the Master Study. For example, it may be prudent to add SAR-based limitations on the presence of reservoir squibs within DAF and on the presence of unnecessary second-floor personnel during HE operations. In the future, it would also be advantageous to eliminate redundancy between the SAR and the Master Study Input Document.

5. Future Staff Actions

The staff will continue to follow DAF startup preparations.