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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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March 29, 2001

Brigadier General Thomas F. Gioconda
Acting Deputy Administrator
for Defense Programs
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0104

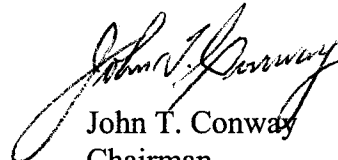
Dear General Gioconda:

Members of the staff of the Defense Nuclear Facilities Safety Board (Board) recently completed a two-part review at Los Alamos National Laboratory that focused on tritium facility operations and site-wide emergency hazard assessment activities. The Board's staff observed that significant progress has been made on upgrades to the safety bases of the enduring tritium facilities and the site emergency hazard assessment. However, several areas in which further improvements may be warranted were identified.

Specifically, it was not clear that evaluation guidelines were being interpreted and used properly in the Weapons Engineering Tritium Facility safety analysis activities, and the reliability of certain controls is questionable. Additionally, limited resources for emergency management and response have hampered the quality and comprehensiveness of the site emergency hazard assessment.

These areas for improvement, among others, are outlined in more detail in the enclosed report prepared by the Board's staff, which is provided for your consideration. The Board encourages continued progress in these areas, and its staff will continue to monitor efforts to this end. We would like to be informed of your conclusions when you have evaluated the enclosed information.

Sincerely,


John T. Conway
Chairman

c: Mark B. Whitaker, Jr.

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

February 12, 2001

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

COPIES: Board Members

FROM: T. Burns, F. Bamdad

SUBJECT: Review of Tritium Operations and Emergency Hazard Assessment at Los Alamos National Laboratory

Members of the staff of the Defense Nuclear Facilities Board (Board) F. Bamdad, T. Burns, C. Coones, M. Duncan, and A. Jordan were on site at Los Alamos National Laboratory (LANL) January 8–11, 2001, to perform a two-part review. The first part of the review focused on operations at the tritium processing facilities and the Special Recovery Line (SRL), and the second part focused on site-wide emergency hazard assessment (EHA) activities. This report documents the staff's observations during this review.

Tritium Processing Facilities. The staff's observations regarding the tritium processing facilities are summarized below.

Background—LANL includes three dedicated tritium facilities: the Weapons Engineering Tritium Facility (WETF) at Technical Area (TA)-16; the Tritium Systems Test Assembly (TSTA) at TA-21; and the Tritium Science Fabrication Facility (TSFF), also at TA-21. Though not a dedicated facility, the SRL in Plutonium Facility-4 at TA-55 can also handle limited amounts of tritium in the form of contaminated weapon components. WETF contains the largest inventory of tritium on the site (approximately 700 grams) and houses research and development activities supporting both stockpile boost systems and inertial confinement fusion (ICF). TSTA successfully completed its mission to demonstrate the feasibility of a tritium-based fusion fuel cycle and is slated for closure. The current tritium inventory in TSTA consists of approximately 66 grams in the form of contamination on process equipment. The TSFF performed salt processing operations involving tritium in the past, but current tritium operations involve only interim neutron tube target loading (NTTL) and ICF fuel pellet fabrication. The TSFF inventory of tritium is currently less than 18 grams. Other facilities that formerly processed tritium at LANL but are now shut down and awaiting remediation are located at TA-41 and TA-33. A metallography laboratory capable of handling up to 1000 curies (100 mg) of tritium contamination is also located at TA-35.

Current Schedule—Consolidation efforts are under way to relocate all of the laboratory's enduring tritium processing operations into WETF, with the exception of those at SRL. The interim NTTL and ICF operations currently being performed at TSFF are scheduled to be

relocated in mid-fiscal year 2001 (FY01). Thus, the enduring operations at WETF will include the following:

- Stockpile boost system research and development—includes functional testing of developmental boost systems (15 tests per year capacity), gas analysis, environmental storage, material science research, and support for significant finding investigations.
- Inertial confinement fusion support—consists of research and development activities, as well as fabrication of targets for the National Ignition Facility and the University of Rochester.
- Neutron tube target loading—involves loading tritium onto neutron generator components to be assembled at Sandia National Laboratories.

Roof upgrades to provide a Performance Category 3 level of seismic protection for WETF were completed in February, 2001. Additionally, a new facility Safety Analysis Report (SAR) is being developed. The 70 percent SAR (i.e., hazard and accident analyses completed, safety-class features proposed) was submitted to the Department of Energy's Los Alamos Area Office (DOE/LAAO) in January 2001, and a Final SAR is scheduled to be delivered to DOE/LAAO in March 2001. Contractor and DOE Operational Readiness Reviews are scheduled for late FY01 and early FY02 to support commencement of the consolidated tritium operations in WETF by mid-FY02.

Observations—The current SARs for WETF, TSTA, and TSFF were prepared in accordance with DOE Order 5481.1B and do not meet current expectations for authorization basis safety documents for nuclear facilities. Considering that TSTA and TSFF are to be vacated, there are no plans to upgrade the SARs for these facilities. Conversely, an effort is under way to provide a new SAR and Technical Safety Requirements (TSRs) for WETF that meet current expectations as outlined in the 5480 series of DOE Orders. Based on the recently completed 70 percent SAR, the total facility inventory limit is to be raised from 700 to 2,000 grams. Though this quantity is small in comparison with the tritium inventories at the Savannah River Site, the proximity of WETF to the site boundary means that significant off-site doses could still result from accidents if not properly mitigated.

During the staff's visit, several presentations were given on the new hazard and accident analyses. Additionally, both existing and potential control strategies were discussed and examined. On the basis of these presentations and discussions, the staff had the following observations:

- The new Process Hazard Analyses are likely to result in a much improved SAR.
- The Inventory Control Program, as currently implemented, lacks the rigor necessary to be credited as a viable control for a Category 2 nuclear facility.
- WETF's primary tritium storage area in Room 124 may not, in its current configuration (i.e, lacking fire walls, duct dampers, exterior wall protection, and

storage racks), be robust enough to be credited for providing special protection of hazardous materials from fires or other accidents.

- The consequences from some accidents approached, but did not exceed, the evaluation guidelines for identifying safety-class controls, for example, 21 rem versus a 25 rem evaluation guideline. It was therefore determined that safety-class controls were not necessary to protect against these accidents. This use and interpretation of evaluation guidelines does not appear consistent with current DOE guidance.
- Several administrative controls have been identified as safety-class. It is not clear what mechanisms will be invoked to make a safety-class procedural control more reliable than a procedural control less important to safety.
- The halon fire suppression system in the WETF control room is not likely to be effective for most fires as long as the door is kept open during normal operations. While the door has a smoke-activated closure, the smoke detector for closure is positioned significantly below the smoke detector for the halon system. Thus, the detector for the halon system could be triggered by smoke at the ceiling without activating the door closure, resulting in the escape of the halon.

Special Recovery Line. SRL, located at Plutonium Facility-4 at TA-55, provides a unique capability for processing weapon components that have been contaminated with tritium. The SAR upgrade effort for SRL is nearing completion; the 90 percent SAR (Chapters 3, 4, and 5 and TSRs in draft form) was provided to DOE/LAAO on January 2, 2001. The staff reviewed the draft safety analysis and proposed controls for SRL and found them to be reasonable.

However, during the course of the review, the staff noted that a lack of funding for SRL had nearly resulted in operations being placed into a cold standby mode. Until the Pit Disassembly and Conversion Facility becomes available, the SRL represents the only disposition path for a subset of relatively vulnerable pits currently stored at the Pantex Plant. It would appear to be prudent to stabilize funding for SRL to maintain the ability to dispose of vulnerable pits at Pantex should an acute problem arise there.

Emergency Hazard Assessment Activities. The Emergency Management & Response (EM&R) group in the Security and Safeguards Division is responsible for performance of the activities required for conformance with DOE Order 151.1, *Comprehensive Emergency Management Systems*. The EHA required by this Order is prepared by EM&R. It is a compilation of hazards and accident analyses taken from SARs, Bases for Interim Operation, safety analysis of chemical hazards, and other information provided in the authorization basis documents for nuclear and non-nuclear facilities. The EHA is used to derive protective action recommendations, emergency action levels, and emergency planning zones. Although a significant amount of effort has been made to prepare as complete an EHA as possible, limited resources may have created some issues in this regard:

- The EHA is based mainly on the existing authorization basis documents. This would represent a positive attempt to integrate identification and analysis of the hazards if

the facilities had comprehensive hazard analyses as part of their safety bases. The existing documents are of varying quality and degrees of completion or correctness. Consequently, the information provided in the EHA may not be complete, valid, or up to date. It should be noted that LANL has an authorization basis upgrade program under way to improve the quality of existing authorization bases for nuclear facilities during the next few years.

- The EHA has been prepared by one employee during the last few years. Preparation of this document requires a more comprehensive, team effort than can be provided by a single individual, regardless of his or her high qualifications. For example:
 - The analyses need to be independently reviewed and approved to ensure that an acceptable level of quality is maintained throughout the process. The current document lacks such quality assurance.
 - Preparation of the EHA needs to be coordinated with the Office of Authorization Basis to ensure that up-to-date information on hazards and their analysis is used. This coordination, which is necessary for continuous improvement and upgrading of the EHA, has not been carried out.
 - A more comprehensive assessment of all chemical hazards identified in the Automated Chemical Inventory System needs to be performed to ensure that all the hazards are captured in the EHA. Furthermore, an evaluation of the analytical methodologies is needed to ensure that the computer programs are not used beyond their expected capabilities. For example, virtual source points have been designated to calculate plume dispersions of area source terms (e.g., spills) that the computer codes are not written to handle.

Additionally, it appears that LANL needs to perform an assessment of the laboratory's protective action procedures to ensure that corresponding procedures are available at the facility level to respond to protective action recommendations made by EM&R. For example, the Board's staff noted that some facilities did not have procedures in place that would need to be referred to in case of an emergency, such as those for taking shelter in case of an accident in a neighboring facility.