

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

December 26, 2003

MEMORANDUM FOR: J. Kent Fortenberry, Technical Director
FROM: C. H. Keilers, Jr.
SUBJECT: Los Alamos Report for Week Ending December 26, 2003

Weapons Engineering Tritium Facility (WETF): NNSA continues to owe the Board a rapid response on the functionality of the WETF NFPA 780 lightning protection system, which NNSA has designated safety-class (site rep weekly 11/18/03). LASO has provided input to NNSA headquarters. During the last year, two experts have concluded that lightning-induced rupture of multiple containers is incredible and that the much lower consequence scenario involving burn-through of thin-wall system tubing is the dominant lightning-related risk. The remaining lightning-related scenario that could drive a need for safety-class controls appears to be one involving a lightning initiated fire that spreads to multiple rooms. WETF defenses against this scenario included fire barriers and storage containers (both safety-class), fire suppression (safety-significant), and the combustible control program.

The site rep observes that the lightning protection system does nothing to prevent fires initiated by other sources - in fact, WETF had a small, uncontrolled flame from a failed electrical component under a glove-box in May, comparable to a small candle flame. More attention also is warranted on periodic inspection and upgrades of the safety-class fire barriers - particularly, upgrading the 1-hr fire rated wall between the vault-like room and the adjoining process room. NNSA and LANL may need to re-examine WETF fire accident scenarios and the selected controls in a more holistic sense.

Engineered Controls: NNSA and LANL need to apply more attention to ensuring that the engineered controls selected have clearly defined safety functions, that they will fulfill those functions, and that they constitute a complete set. The WETF issue above is an example. Other examples are described in site rep weeklies 7/3/03 and 11/28/03. LANL has a solid effort underway under the Integrated Facility Management Program to develop institutional procedures, but that effort is not fully funded this year. Several of the procedures are now being piloted in LANL Waste Operations - e.g., screening design changes, developing a design change package, designating vital safety systems and systems engineers.

There are also several other unfunded critical needs - e.g., inventorying vital safety systems, fully updating master equipment lists (MELs, a recurring issue seen in several assessments), and developing an implementation plan for the revised DOE Facility Safety order (DOE O 420.1A). MELs are being updated for nuclear facility fire protection equipment. The systems engineer program is funded. Some aspects of DOE O 420.1A are moving forward, such as training and qualification of systems engineers.

LANL also has some projects that have developed mature approaches to conduct of engineering, such as the Dynex Vessel Design Team (a recent recipient of an NNSA Award for Excellence). This team is working at the state-of-the-art and, in fact, has made advances that will likely improve national consensus codes. An independent Blue Ribbon Panel has mentored the Dynex project, contributing to this success. The panel has conducted 37 in-depth reviews during the last 4 years (cumulative time: 150 days), providing critical technical feedback. The project constructively accepted the feedback and made improvements in vessel design, quality assurance, and configuration management. Recently, the DARHT 2nd axis commissioning team (also working at the state-of-the-art) adopted some of these improvements, such as continuous peer review, bi-monthly independent reviews, and configuration management. NNSA and LANL would be well-served to review these two projects and possibly others (e.g., the Pu-238 scrap recovery line, the TA-18 temperature scram installation) for common lessons learned that could lead to site-wide improvements in engineered controls.