DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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March 11, 2002

The Honorable Everet H. Beckner
Deputy Administrator for Defense Programs
National Nuclear Security Administration
U. S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0104

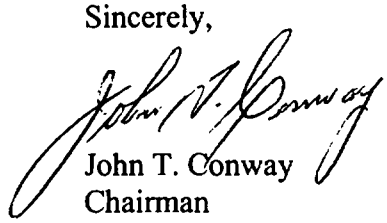
Dear Dr. Beckner:

The Defense Nuclear Facilities Safety Board (Board) visited Lawrence Livermore National Laboratory (LLNL) on January 23, 2002. During this visit, the Board was briefed on near-term plans for the deactivation of LLNL's Heavy Element Facility, Building 251. The Department of Energy (DOE) has strong safety and cost incentives to reduce the radiological hazards in this building. Deinventory and selected clean-out of equipment in the building would reduce the risk to workers and the public, particularly in the event of a fire or seismic event. Actions are very consistent with pre-decommissioning activities defined in DOE Order 430.1A, *Life Cycle Asset Management*. Additionally, DOE could avoid the cost of bringing the building into compliance with Title 10 of the Code of Federal Regulations, Part 830, *Nuclear Safety Management* (10 CFR 830). The planned inventory reduction and clean-out would reduce the facility from Hazard Category 2 (as defined by DOE Standard-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*) to radiological status and would obviate the need to implement the requirements in 10 CFR 830 for authorization basis upgrades for operational facilities by May 2003. Rather it would allow re-orientation of these safety analysis upgrade efforts to better fit the deactivation efforts and subsequently the de-inventoried state of the facility. The Board strongly supports the objectives of this important risk-reduction project.

The Board's staff performed an on-site review on February 20–21, 2002, to ascertain the technical details of the deactivation project. The project team includes personnel with strong technical expertise in processing heavy elements who have provided critical support in gathering data to assist with planning activities in the building. However, the staff's review indicated that enhancements to the planning process could improve both the safety and efficiency of the project. The enclosed report prepared by the Board's staff describes the need to strengthen the project planning by taking a comprehensive and integrated approach, rather than the piecemeal approach currently being implemented. The Board is aware that LLNL plans to request schedule relief from the May 2003 deadline for meeting 10 CFR 830. The Board believes that the project will probably require some amount of additional time to allow for adequate planning, a thorough readiness review, and safe execution.

The Board considers this project to be an opportunity for defense programs at DOE to establish a model for transition of facilities that have completed their mission activities. The DOE Order 430.1A contains guidance that was intended specifically for a facility like Building 251, that is at the end of its operational life.

Sincerely,



John T. Conway
Chairman

c: Mr. Michael Hooper
Mrs. Camille Yuan-Soo Hoo
Mr. Mark B. Whitaker, Jr.

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

February 27, 2002

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

COPIES: Board Members

FROM: M. J. Merritt

SUBJECT: Deactivation of Lawrence Livermore National Laboratory's Heavy Element Facility

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of the Heavy Element Facility, Building 251, deactivation project at the Department of Energy (DOE) Lawrence Livermore National Laboratory (LLNL). This review was conducted February 20–21, 2002, by staff members T. L. Hunt, M. J. Merritt, and J. Plaue.

Summary. The deactivation of Building 251 will involve the removal of about 300 items of radioactive material, some that pose a significant risk of external radiation exposure to workers and the potential for release of contamination in the building. Additionally, the decontamination and removal of 48 gloveboxes and contaminated systems will require careful planning to ensure that contamination is properly controlled. This project is just beginning and is being pursued on an accelerated schedule to achieve near-term risk reduction and avoid costly safety basis upgrades. The project is being approached piecemeal, and is not employing accepted planning methods typically used for this type of deactivation project.

The project has developed detailed data on many of the gloveboxes and is in the process of compiling data sheets on material items in storage. The material data sheets are expected to provide important information on the age and characteristics of the material and on the packaging configuration. During the staff's review, however, LLNL did not present information that would indicate a systematic and integrated approach to planning, scheduling, and controlling the project in a disciplined manner. The staff supports the use of a graded approach to complete the project expeditiously; however, the staff considers the use of comprehensive planning methods, such as those contained in the DOE Order 430.1A, *Life Cycle Asset Management* (LCAM), to be warranted. The use of these methods would likely result in safety and efficiency improvements through better identification of hazards and necessary controls, improved sequencing of tasks, and identification of repetitive tasks that could be standardized. These methods would also put in place the necessary elements of personnel training, equipment testing, radiological control procedures, and other elements of a thorough readiness review to ensure safety.

Background. Historically, Building 251 was used to carry out LLNL's fundamental research on transuranic elements and served the programmatic mission of preparation of heavy element tracers in support of underground testing of nuclear weapons. Based on the 1992

national decision to cease underground testing, the building was placed in program standby mode beginning in 1995. In October 2000, Building 251, a Nuclear National Security Agency, Office of Defense Programs, facility was transferred from the Physics Directorate to Laboratory Site Operations. As part of this transition, a Condition Assessment Scoping Team (CAST) was convened to study Building 251 and issue a recommendation on the building's future.

The CAST report identified a number of issues regarding the future of the building. Even with preventive maintenance, many of the facility's experimental and safety systems are quickly deteriorating, in large part because of the high specific activity of the elements handled in the building. In addition, Building 251 was constructed in eight increments between 1956 and 1981, with only a small portion of the building receiving a seismic upgrade in 1981. A recent evaluation of that upgrade revealed potential seismic vulnerabilities in the hardened portion of the building.

Significant cost implications of continuing operational activities were also identified. Building 251 is currently classified as a Hazard Category 2 nuclear facility (as defined by DOE Standard-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*) and would require significant expenditures to achieve compliance with Title 10 of the Code of Federal Regulations, Part 830, *Nuclear Safety Management* (10 CFR 830). LLNL estimates the cost of 10 CFR 830 compliance for Building 251 as a Hazard Category 2 facility to be approximately $100 million. Instead, LLNL has decided to de-inventory the facility with the goal of reducing the facility hazard category to that of Radiological Facility before the May 2003 mandate for implementation of 10 CFR 830. This deactivation project would be funded entirely from general laboratory overhead and is expected to cost about $14 million. The project consists of three primary activities: (1) removal of glovebox ventilation systems from the unhardened areas of the facility; (2) decontamination and subsequent removal of 48 gloveboxes and cave systems (shielded glovebox with remote-handling manipulators) in the building; and (3) removal of the 296 radiological items currently stored in the facility's 13 underground storage vaults (USVs), two Mosler safes, and four hot cells. Concurrently, the laboratory is also seeking a waiver from DOE to extend the May 2003 deadline for the building's achieving radiological facility status in the event of unanticipated delays.

Project Approach to Decontamination and Decommissioning. The project is proceeding with a three-phased approach. Specifically, the phases will include the following work:

- Removal of glovebox high efficiency particulate air filtration units and the associated ventilation ductwork located in the unhardened area of the facility that are deemed unnecessary for future work. This phase is currently under way, and equipment is being characterized through sampling to determine the proper disposal path. It is

- Decontamination and removal of 48 gloveboxes and caves. The laboratory is undergoing an extensive sampling and characterization campaign to determine the appropriate amount of decontamination and subsequent disposal path for these enclosures. Initial sampling results and historical process knowledge suggest the boxes will be disposed of as either low-level waste, transuranic waste, or mixed waste. The goal for the facility is to decontaminate 16 boxes by the end of fiscal year 2002.

- Removal of radiological items from the building contained in 13 USVs, 2 Mosler safes, and 4 hot cells. Plans call for retrieval of the items followed by inspection, assay, x-ray, and repackaging prior to shipment to off-site or other on-site facilities (e.g., Building 151 and Building 332). The laboratory is striving to develop a comprehensive disposition path for the entire inventory. Many items will be shipped to other DOE laboratory facilities.

The deactivation project poses potential risks associated with worker radiation exposure and industrial hazards. An updated version of the Safety Analysis Report for the facility, supplemented heavily by the Oakland Operations Office's Safety Evaluation Report, was approved in April 2001 and has recently been used to update the contractor's Facility Safety Plan. A positive Unreviewed Safety Question was issued for the retrieval and opening of radiological items from the USV. The facility is working to update the safety basis for this activity.

Applicability of Deactivation Standards. Thus far, project management considers this task to be a risk reduction effort and contends that the type of work will be similar to operations conducted previously in Building 251. The staff believes the scope and intent of the project merit a graded implementation of deactivation standards in order to ensure safety.

DOE has identified three documents that provide standards for planning and carrying out deactivation and decommissioning activities. With these documents, DOE has attempted to outline a general approach to ensure that project managers conduct adequate planning to achieve the objectives of facility disposition. The three documents are as follows:

- DOE Order 430.1A with implementation guides

- DOE Standard-1120-98, *Integration of Safety and Health into Facility Disposition Activities*

- *Policy on Decommissioning DOE Facilities Under CERCLA* (Comprehensive Environmental Response, Compensation, and Liability Act) (not applicable to the Building 251 Deactivation Project)

The LCAM Order requires that a deactivation plan, or equivalent documentation, be prepared for nuclear facilities prior to the execution of work. Policy and operational issues that

apply to deactivation need to be determined as early as possible to ensure that tasks can be planned as effectively as possible. The deactivation plan functions as a detailed design for the project, serves to communicate the scope of the dispositioning to regulators and stakeholders, and describes the physical work to be done. The LCAM Order and associated Deactivation Implementation Guide recommend that the deactivation plan describe work to be performed and methods to be used to accomplish the work. As such, the plan identifies the desired end points, and the specific activities that must be carried out to achieve the overall endstate. The deactivation plan also describes any issues and barriers that must be overcome and any special management methods required in the performance of the disposition tasks. According to the implementation guide, the information contained in the deactivation plan forms the basis for the development of detailed work packages. The work packages provide safety and health requirements, as well as instructions to the workers responsible for conducting the work. Typically, task-specific analyses of hazards are carried out during development of the deactivation plan.

The standard *Integration of Safety and Health into Facility Disposition Activities* is an integral document that supports the planning and conduct of disposition activities. The standard states that the disposition/deactivation plans required by the LCAM Order, in general, should discuss the intended Integrated Safety Management approach and methods for its implementation. The discussion should include: (1) the hazard identification, analysis, and control strategy; (2) identification of environment, safety, and health (ES&H) requirements; (3) ES&H performance measures and progress metrics to be used; (4) a description of organizational responsibilities for ES&Hs; (5) waste management considerations, such as minimization and pollution prevention measures; (6) the facility safety basis and potential impacts during disposition; and (7) environmental permits and methods for achieving compliance with permit conditions for deactivation, as well as long-term surveillance and maintenance activities.

An example in which an acceptable deactivation plan has been developed is at the Y-12 National Security Complex. The plans for Building 9206 deactivation are outlined in the *9206 Complex Phase Out/Deactivation Program Management Plan* and *9206 Complex End Point Technical Specification Document.* The plan sets forth the strategy, phase-out goals, projected costs, and schedule for the deactivation of the facility in accordance with the requirements of the LCAM Order. In the plan, major activities are broken up into subprojects to allow for more detailed planning. Each subproject is evaluated for task-specific hazards as part of the deactivation plan. The subproject areas and equipment are defined, and the proposed activities for their deactivation are outlined.