DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Washington, DC 20004-2901

April 1, 2011

The Honorable Thomas P. D'Agostino
Administrator
National Nuclear Security Administration
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0701

Dear Mr. D'Agostino:

The staff of the Defense Nuclear Facilities Safety Board (Board) reviewed Lawrence Livermore National Laboratory's (LLNL) training and qualification programs, as well as the Livermore Site Office's oversight of these programs. The Board believes LLNL should take the opportunity to improve its training and qualification programs during its implementation of DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*. The Board notes significant improvements in the Livermore Site Office's oversight of the contractor's training programs since 2008. The enclosed report on this matter is provided to highlight areas in which training could be improved to enhance the safety of operations at LLNL.

Sincerely,

Peter S. Winokur, Ph.D.
Chairman

Enclosure

c: Ms. Alice C. Williams
Mrs. Mari-Jo Campagnone

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

January 31, 2011

MEMORANDUM FOR: T. J. Dwyer, Technical Director

COPIES: Board Members

FROM: C. Roscetti

SUBJECT: Lawrence Livermore National Laboratory Training Program Review

This report documents a review of the training and qualification programs at Lawrence Livermore National Laboratory (LLNL) conducted by the staff of the Defense Nuclear Facilities Safety Board (Board) during November 2–4, 2010. Staff members C. Roscetti, J. Anderson, D. Campbell, E. Gibson, J. Pasko, and J. Plaue examined the Livermore Site Office's (LSO) oversight of LLNL's training and qualification programs and the effectiveness of the training programs. Specifically, the staff reviewed the fissile material handler and facility operator certification and recertification processes; LLNL's continuing training program; the training provided to instructors; the content of training courses and exams; and the drill and exercise program. Although LLNL has not completed implementing Department of Energy (DOE) Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*, the staff reviewed the LLNL training and qualification programs based on the requirements in DOE Order 426.2. Most of the requirements in DOE Order 426.2 are unchanged from its predecessor, DOE Order 5480.20A. The observations and information contained in this report are intended to help LSO and LLNL enhance the site's training and qualification program and its implementation of DOE Order 426.2.

Oversight by Livermore Site Office. LSO's oversight of LLNL's training program has improved significantly since the appointment of a dedicated Technical Training Manager in 2008. Improvements include the use of performance evaluation plans for training and training surveillance reports, which LSO completed to meet the guidance in DOE Standard 1070-94, *Guidelines for Evaluation of Nuclear Facility Training Programs*. In 2008, LSO started using a subject matter expert in nuclear facility training to review the contractor's implementation of training. DOE Order 426.2 requires field organizations to periodically review the certification and recertification of shift supervisors and fissile material handlers; LSO plans to strengthen its oversight of the certification and recertification of shift supervisors and fissile material handlers in 2011.

Systematic Approach to Training. DOE Order 426.2 requires a systematic approach to training, which includes a methodical analysis of the jobs to be performed; learning objectives derived from the job analysis that describe desired performance after training; training design,

development, and implementation based on the learning objectives; evaluation of trainees' mastery of the objectives during training; and evaluation and revision of the training based on the performance of trained personnel in the job setting. DOE Handbook 1078-94, *Training Program Handbook: A Systematic Approach to Training*, and DOE Handbook 1074-95, *Alternative Systematic Approaches to Training*, provide guidance for implementing a properly graded systematic approach to training.

The Building 332-Plutonium Facility Documented Safety Analyses (DSA) credits training four times as a preventive or mitigative administrative control to protect the public from criticality hazards, and once as a mitigative administrative control to protect the public from the release of radioactive materials resulting from a fire. The Building 332 DSA also cites training as a preventive and/or mitigative administrative control for most of the scenarios in the hazards analysis table.

For both the credited and cited instances of training, LLNL could not provide an explanation of the specific safety functions provided by the training or demonstrate where in its training program those functions (e.g., operator actions, awareness, techniques) were covered in the form of course learning objectives, course content, or examination questions. The absence of such a linkage indicates the lack of a systematic approach to training. LLNL could improve its training program by documenting specific instances where the training program is being used to prevent or mitigate a hazard in the form of course learning objectives, course content, or examination questions.

Continuing Training Program. DOE Order 426.2 requires DOE nuclear facilities to implement a continuing training program, administered on a 2-year cycle, to maintain and enhance the knowledge and skills of personnel. Additionally, according to DOE Handbook 1118-99, *Guide to Good Practices for Continuing Training*, the goals of continuing training are not only to maintain but also to enhance the ability of personnel to perform job assignments and to ensure facility safety and reliability. LLNL representatives stated that LLNL's recertification and requalification processes fulfill the requirement for a continuing training program. However, some courses required for recertification and requalification do not repeat within a 2-year cycle. Although LLNL's continuing training program meets the most minimum interpretation of the requirements of DOE Order 426.2, the Board's staff believes the continuing training program could be improved and leveraged to enhance safety and operations.

LLNL's institutional and facility-level documents do not formally establish the elements of an effective continuing training program. As part of its continuing training program, LLNL conducts biweekly Safety Feedback and Improvement meetings; however, these meetings are generally reactive in nature. At the time of the staff's review, LLNL representatives could not articulate what topics would be discussed at the next two Safety Feedback and Improvement meetings. LLNL could benefit from setting annual, quarterly, or monthly training goals, which would shape the fixed or proactive content of its continuing training program and provide some predetermined content for its Safety Feedback and Improvement meetings. Developing these long-term goals would help enhance LLNL's training program above the current state of minimum compliance.

Training Provided to Training Instructors. LLNL uses the following types of training:

- Training Courses (classroom and web based);
- training on Operational Safety Plans (OSPs);
- training on Surveillance Requirement Procedures (SRPs); and
- On the Job Training (OJT).

Although LLNL has a train-the-trainers course available, LLNL does not currently require the instructors for OSP and SRP training to complete this instructor training. LLNL representatives acknowledged this gap and indicated LLNL's intent to expand existing instructor training or to develop tailored instructor training for OSP and SRP training. LLNL also does not require instructors to take any refresher training courses. This leads to inconsistencies in the rigor of training provided to instructors who are entrusted with enhancing the safety of operations, as evidenced by variability in instructors' training methods and training techniques. In the case of OSP and SRP training, instructors also write examinations. The lack of instructor training can result in inconsistency in the level of difficulty of the questions on written examinations for OSPs and SRPs.

In addition, although LLNL employs experienced and knowledgeable senior certified fissile material handlers, LLNL does not implement a formal method for senior certified fissile material handlers to mentor or train less experienced certified fissile material handlers. LLNL does not use learning objectives or any other written material to ensure that senior certified fissile material handlers conducting OJT ask a trainee to review and discuss all the knowledge that a certified fissile material handler would be required to know. For example, the task "bag out an item" requires a handler to select the correct technique, understand why that technique is used, and know the required actions in the event of abnormal occurrences. Without written learning objectives to guide the senior certified fissile material handlers, the knowledge that is discussed and imparted to trainees during OJT (e.g., response to alarms, spills, breached gloves, torn bags) varies widely. LLNL would benefit from a better delineation of the breadth and depth of subject matter knowledge required for OJT trainers, training instructors, and responsible individuals (i.e., OSP trainers).

Training Courses and Content. LLNL uses a variety of web-based courses, OJT, OSP training, and SRP training. A written examination may be used at the conclusion of each type of training to assess a trainee's level of knowledge. LLNL does not have institutional guidance on developing written examination questions and compiling examinations, nor does it utilize the existing DOE Handbook 1205-97, *Guide to Good Practices for the Design, Development, and Implementation of Examinations*. DOE Handbook 1205-97 suggests that test questions vary from simple to complex in the following order: multiple choice items, matching items, short answer items, and essay questions. DOE Handbook 1205-97 does not mention true/false or

yes/no questions because they do not provide a sufficient assessment of an employee's knowledge.

The staff reviewed three OSP training examinations, which varied widely in the number and types of questions. The written examination (Version C) for OSP 332.072, *Furnace Boxline*, contained 24 questions, 12 of which were either true/false or yes/no. The Building 332 Senior Fissile Material Handler Certification Examination (Version 1, Rev. 10) contained 100 questions, 23 of which were true/false. The Building 332 Certified Fissile Material Handler Examination (Version 1, Rev. 10) contained 70 questions, 14 of which were true/false. The staff also reviewed question-and-answer banks for examinations for Course PU-6070, *Initial Certified FMH Certification Exam and Hot Glove Box*, and Course PU-6070R, *Certified FMH Re-Certification and Exam*. The Board's staff determined that the question and answer banks were neither sufficiently large nor diverse enough to provide varied questions during each recertification period.

The staff completed various web-based courses and examinations before and after its on-site review. In these courses, the staff noted poorly defined learning objectives that resulted in poorly defined course content and examination questions. Course PU4400-W, *DSA/TSR Training*, required a self-review of the Building 332 DSA and a 50-question, open-reference examination. Course HS6001-W, *General Employee Radiation Training*, is a 19-page document that provides the trainee with basic facts for radiological workers. The examination consisted of 12 multiple choice and true/false questions. Course HS6901, *Radiological Worker Core Training*, contained lecture slides and a basic examination. Course HS-6900, *Supervisor Radiation Program Training*, included no slides or videos, only a 10-question examination. Based on this sampling of courses, the web-based courses and examinations do not appear to be sufficiently challenging to allow individuals to demonstrate their mastery of the material presented. Additionally, LLNL does not uniformly solicit feedback from trainees or trainers regarding training content or training examinations; no formal feedback is used to improve the content of training.

Drill and Exercise Program. It is not clear to the staff how a worker's participation in the facility-level drill (PU5000) and the makeup web lecture (PU5000-W) can satisfy the same learning objectives. LLNL's training program does not currently include operational or training drills, which are conducted to prepare personnel for responding to abnormal conditions, as required by DOE Order 426.2.

Conclusion. Overall, LLNL uses a certification and recertification process that includes elements of comprehensive training and qualification programs, which fulfills some requirements of DOE Order 426.2. However, LLNL would benefit from implementing a systematic approach to training, including describing how the training program fulfills the safety functions credited in the Building 332 DSA, formalizing its continuing training regime in accordance with DOE guidance, improving the quality and effectiveness of its training, and leveraging opportunities for continuous improvement in its training program. These objectives likely could be accomplished in conjunction with LLNL's full implementation of DOE Order 426.2.