

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

September 17, 2004

MEMORANDUM FOR: J. K. Fortenberry, Technical Director
FROM: Michael J. Merritt, DNFSB Site Representative
SUBJECT: Lawrence Livermore National Laboratory (LLNL)
Report for Week Ending September 17, 2004

Plutonium Facility Safety System Degradation: The glovebox exhaust system ensures worker safety and prevents radioactive release to the environment and the public. During a recent engineering inspection, potential cracking was observed in the safety-significant portion of this system in one laboratory processing room. The system is constructed of stainless steel tubing with welded connections. The function of the system is to carry the glovebox exhaust to the final stages of the building high-efficiency particulate air (HEPA) filters. Similar ducting configurations exist in many other laboratory processing rooms.

Facility management was informed of the condition on August 31, 2004 (ORPS report OAK-LLNL-LLNL-2004-0040). This led to further inspections and evaluations. The occurrence report was categorized as a management concern, rather than a facility status issue. Contamination surveys were performed in the cracked areas, but no contamination was detected. Additional inspections revealed slight corrosion on the exterior of the ducts at the weld areas. Operations in the gloveboxes connected to this ducting have been suspended until "cuffs" are installed at the three locations where cracking was observed and at another suspect location. The cuffs are seismically qualified and have been used previously in similar situations where potential cracking has been identified.

The planned LLNL response to this situation consists of additional inspections and non-destructive evaluations and eventual replacement of the degraded sections of the system. LLNL's working assumption, based on experience in an adjacent wet chemistry laboratory, is that the degraded condition will most likely occur near welds on portions of the system that were exposed to processes that used acids. The precise cause of the degradation may not be fully understood by facility management which could limit the scope of the additional inspections to welds on a small number of duct segments. Based on the working assumptions, facility management will utilize process knowledge to identify ducting that requires inspection. Once the ducting sections are identified, the weld areas on just those sections will be inspected. It is not clear whether the basis for defining the scope of these inspections is technically justified.

The method of inspection has not been selected, but will likely be either visual inspection or ultrasonic inspection. Facility management prefers using ultrasonic inspection because that technique does not require the removal of paint from the exterior surfaces of the ducts. The effectiveness of ultrasonic inspection to detect cracking in the welded areas of thin-walled stainless steel ducting will have to be demonstrated before being accepted. Regardless of the inspection method, specific criteria for acceptance will have to be developed.

Currently, a project to correct a similar condition in the safety-class portion of the glovebox exhaust system is nearing completion. Cuffs were used initially on this part of the system until a decision was made to completely replace the safety-class section of the system. It is also noteworthy that DOE performed a vital safety system assessment of the glovebox exhaust system (August 2001) in response to the Board's Recommendation 2000-2. One of the conclusions of the report was that LLNL's process for detecting age-related degradation was immature.