

Federal Safety Board Concludes Fatal Doses Possible: Shutdown LANL's Criticality Experiments!

In May 2004, the Defense Nuclear Facilities Safety Board transmitted to the Department of Energy two reports outlining the potentially severe risks of conducting "criticality" experiments at Los Alamos National Laboratory's (LANL's) Technical Area (TA)-18. The Safety Board is an independent agency chartered by Congress to oversee safety issues at DOE's nuclear facilities, but has no regulatory power. Criticality experiments use "assemblies" of enriched uranium and/or plutonium to create self-sustaining nuclear chain reactions. These assemblies differ from nuclear reactors in that the nuclear reaction is not sustained (assuming there are no accidents). Another significant difference is that the critical assemblies have no containment or shielding.

TA-18 has long been a troubled site because of its longstanding safety and security concerns. The National Nuclear Security Administration (NNSA), the semi-autonomous nuclear weapons agency within DOE, is planning to relocate three of TA-18's five critical assemblies to the Nevada Test Site by September 2004. However, this process has already been long delayed. According to the Safety Board, two remaining critical assemblies "will continue to operate for the near term at TA-18 in a campaign mode." The Board identified unresolved safety issues and concluded that in an accident one of the assemblies could produce nearly a 700 rem offsite dose (500 rem is usually fatal). **These criticality experiments should not proceed until all safety issues are fully resolved and so verified by the Safety Board. Senators Domenici and Bingaman, Representative Udall and Governor Richardson should act forcefully in this issue to help protect New Mexicans** (to his credit Rep. Udall has already written to DOE Secretary Spencer Abraham expressing his concerns).

More broadly, in its FY2003 Annual Performance Appraisal of UC's Management and Operation of LANL, the NNSA itself found that:

During the evaluation period, LANL committed 45 violations of Technical Safety Requirements (TSRs) for its operating nuclear facilities (nearly a four fold increase over previous average violations per year)... [T]he TSRs are the major controls for nuclear safety in a nuclear facility to ensure that the residual nuclear risks to workers, the public, and the environment are acceptable. Additionally, LANL committed 18 safety basis violations. The numerous violations indicate that LANL has not been complying with operations of its nuclear facilities in accordance with approved DSAs [Documented Safety Analyses] and TSRs... LANL's implementation of this program and activity is considered unsatisfactory.

A Safety and Security History of Technical Area-18

- *1945 - 1946:* Two scientists die from acute radiation poisoning in two primitive criticality experiments (not at TA-18). Since then the experiments have been conducted remotely.
- *1948:* TA-18 operations begin, intentionally located at the bottom of Parajito Canyon so that the 200-foot canyon walls can provide some natural radiation shielding. This means that TA-18, with its estimated three tons of highly enriched uranium and plutonium, sits in a flood plain.
- *Early 1980's:* The congressional House Subcommittee on Oversight and Investigations examined DOE security issues. Chairman John Dingell concluded "the safeguards at the most critical facilities - which include Los Alamos - were in shambles while, at the same time, DOE's Office of Safeguards and Security was giving the facilities a clean bill of health."
- *1996:* DOE listed TA-18 as one of the ten most vulnerable sites in the country for storage of highly enriched uranium.

- *1997:* TA-18 failed a security exercise in which Army Special Forces acted as mock terrorists, "killed" most of the security guards and "stole" enough nuclear materials to make a bomb after pretending to load them on a K-Mart garden cart.
- *1998:* A motor spontaneously kicked into high gear during a criticality experiment, moving two piles of enriched uranium together. A technician was able to turn the machine off before criticality was reached. While completing its annual security survey, the DOE Albuquerque Operations Office found that TA-18 security was "unsatisfactory," but this was changed without justification to "satisfactory" by higher-ups.
- *2000:* DOE Secretary Bill Richardson (now NM governor) ordered TA-18 nuclear materials moved out by 2004. The Cerro Grande Fire burned approximately 7,500 acres of Lab property, increasing the threat of flood. DOE's nuclear safety division fined LANL for breaking safety rules for criticality experiments. TA-18 failed another security exercise
- *2001:* Safety requirements are violated at three different critical assemblies. A technician received a 200 millirem dose, equal to 40 chest x-rays.
- *2002:* An erratic electric motor suddenly kicked in, moving two piles of special nuclear materials together. Fortunately, enough material had been previously removed so that criticality was avoided. TA-18 failed another mock terrorist attack.
- *September 2003:* Due to all security and safety concerns DOE finally reached a formal decision to move TA-18's estimated three tons of enriched uranium and plutonium to Nevada.
- *November 2003:* A *Vanity Fair* article reported that the DOE nuclear safety officer at Los Alamos had to reject as a final safety measure a scientist's offer to drive a bulldozer into a critical assembly if it ever went out of control.
- *May 2004:* DOE announced new security initiatives, which include moving TA-18's special nuclear materials to Nevada. The Safety Board released its reports on criticality experiments at TA-18. DOE has still not released a formal decision to relocate TA-18's criticality experiments.
- *June 2004:* Security keys to sensitive facilities at TA-18 are missing for 16 hours.
- *July 2004:* LANL stands down all operations in order to ensure safety and security. The Lab should keep TA-18's criticality experiments stood down until they are certified to be safe!

Highlights of the May 2004 Safety Board Reports

- **"Postulated Accidents.** TA-18 is located one-half mile from the nearest site boundary and 3 miles from the town of White Rock. The laboratory buildings containing the critical assemblies offer no confinement in the event of an accident with a radiological release... The comparable postulated accident at TA-18 might be initiated by a sequence of operator errors, due to incorrect analysis, incorrect procedures, or failure to follow procedures that would result in an assembly with too much fissile material being assembled in an uncontrolled manner. It appears credible to drive these assemblies into a temperature regime that could melt plutonium."
- **"Documented Safety Analysis.** The accident analysis for SHEBA [one of the remaining critical assemblies] indicates that the offsite consequences for an accident... can reach nearly 700 rem cumulative effective dose equivalent; essentially all of this amount is from vaporization of the [plutonium] sample."
- **"Operational Oversight by NNSA and LANL...** Recent federal oversight in TA-18 has been minimal... [S]upport of LANL's senior management for [the Reactor Safety Committee] has been marginal at best.
- **"Conclusions...** [A] sequence of operator errors at TA-18 could initiate its worst accident - an uncontrolled reactivity excursion resulting in melting and partial vaporization of a plutonium core sample... NNSA and LANL are currently relying on a set of administrative controls and interim compensatory measures to prevent this accident... However, most of these controls are missing from the current list of those to be verified in response to the Board's Recommendation. It appears that these controls ought to be included and to have priority for verification."

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