

# Threat Reduction

## Critical Experiments Facility

### Program Profile

The Critical Experiments Facility (Technical Area 18, or TA-18) is the only site in the entire Department of Energy complex where general-purpose research and hands-on training can be conducted into nuclear safeguards, criticality safety and emergency response using Category 1 level nuclear materials. Some 400 professionals train at the facility annually. Three areas of research and training take place at TA-18:

- Critical experiments supporting the Laboratory's and the DOE's missions of stockpile stewardship and management
- Emergency response in support of counter terrorism activities, and
- Nonproliferation, safeguards and arms control supporting national and international programs.

### Critical Experiments

Safety is paramount where nuclear materials are involved. Constructing criticality safety evaluations for process operations requires use of an experimental database that is credible.

The stockpile stewardship/management mission of today frequently involves working with nuclear materials in different concentrations or contexts than in the past. As a result, the existing database of knowledge is no longer adequate by itself for constructing the evaluations or limits of safe handling. Thus, knowledge developed here is essential to testing and qualifying new calculations by expanding on existing

data. It is also necessary for qualifying and testing such equipment as criticality alarms and nuclear accident dosimeters (or radiation devices).

A crucial and high-value aspect of the program rests in maintaining the capability and expertise of DOE, the Laboratory and skilled contractors in criticality safety. As the focal point for this research and training in the DOE, and as the home of the largest collection of nuclear critical mass assembly machines in the Western Hemisphere, the program at Los Alamos is charged with maintaining the highest standards and operating at the highest level of safety and credibility.



Hand-held nuclear material monitoring units developed at Los Alamos are capable of identifying, locating and differentiating between different types of radioactive materials, such as uranium and plutonium.

### Emergency Response

Combining their expertise and nuclear material inventory, the facility's staff are able to create realistic target devices that can be used to develop, test and validate emergency response equipment, methods and diagnostic procedures. For training of emergency response teams, TA-18 can supply mockups of U.S. weapons and theoretical foreign designs that might be in the hands of terrorists.

To anticipate new terrorist capabilities, the range of target design devices here is greater than current war reserve components and configurations. As a result, the technical challenges are also greater, such as for predictions of yield as well as the safety of the design when transported.

### Nonproliferation, Safeguards and Arms Control

Another of Los Alamos' missions is providing the technology that enables the nation to respond to the threat of nuclear weapons proliferation. For example, researchers here are investigating the use of active interrogation of cargo containers to determine whether nuclear material is present. To meet the requirements of nuclear arms reduction treaties, the Laboratory has developed and tested nuclear-measurement technologies. These same technologies have another important use: to provide the verification or transparency of declarations made by other nations concerning their nuclear weapons.

Another key to countering the proliferation of nuclear weapons and terrorism is in developing and evaluating equipment for and training of law enforcement and first responder teams. Training objectives often require the use of a range of actual nuclear materials all in one location. TA-18's capabilities offer an environment unique for this work.

### Quick Facts

Technical and support staff: 65  
Number of postdocs, students: 8  
Annual budget: \$23.3 million



*Los Alamos National Laboratory is operated by the University of California for the U.S.  
Department of Energy's National Nuclear Security Administration*

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