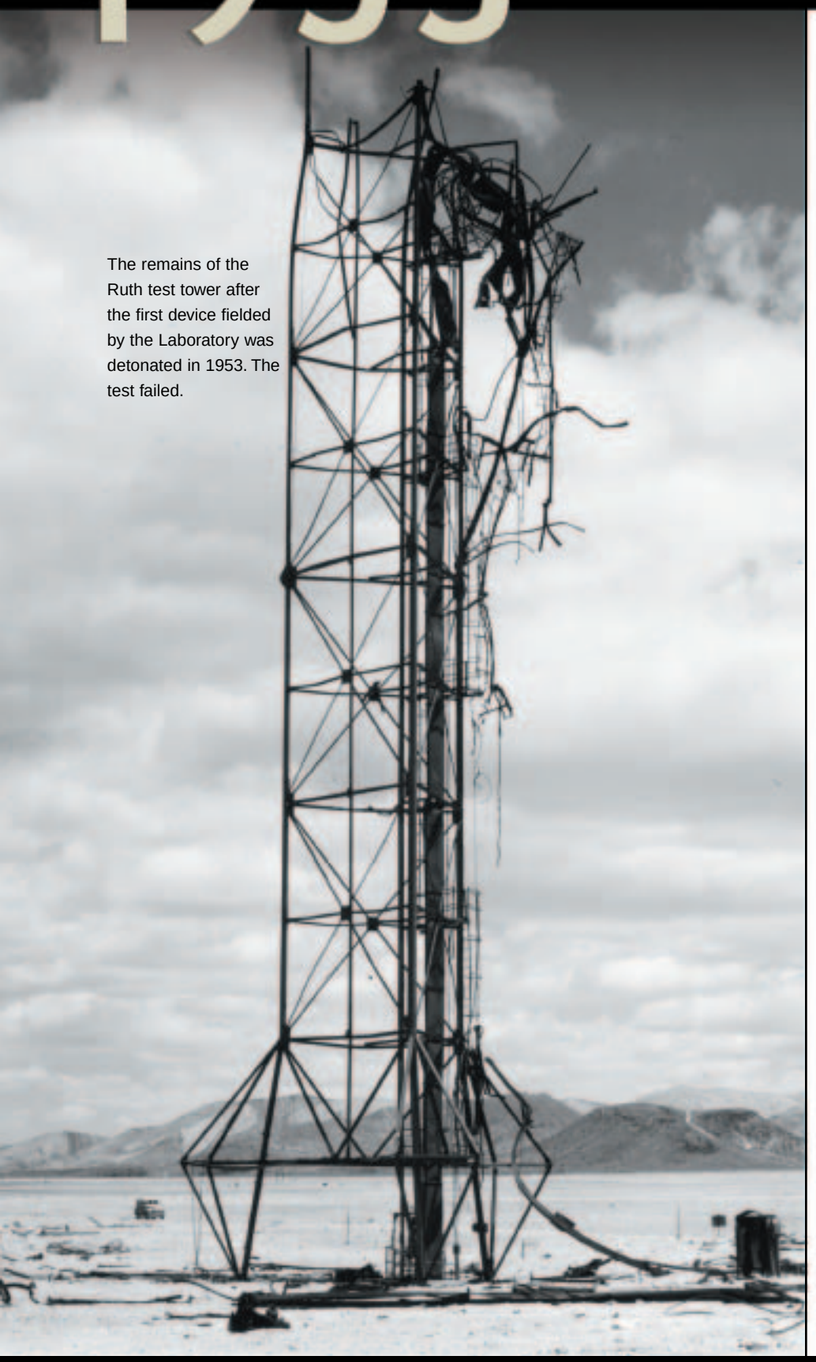
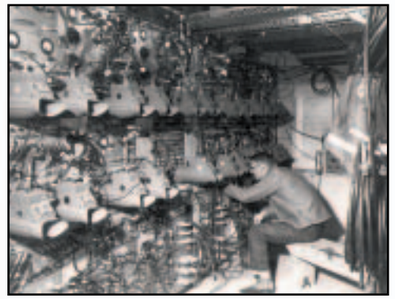
1953 RUTH



The remains of the Ruth test tower after the first device fielded by the Laboratory was detonated in 1953. The test failed.



Banks of oscilloscopes are used to capture data at the Nevada Test Site during Operation Teapot in 1955.

Shown in position inside a barge, one of the Laboratory's largest designs, the Tewa device, yielded five megatons when it was detonated near Bikini Atoll in 1956.

Pushing the Frontiers of Nuclear Weapon Design

Ruth, the Laboratory's first nuclear test, explored a new design for fission devices that offered hope for smaller, more efficient bombs and provided information about certain thermonuclear reactions. The experiment, and the test that followed (named Ray), exemplified Livermore's commitment to be a "new ideas" laboratory and, in the words of Edward Teller, to "plan and explore all kinds of new developments in the field of bomb physics."

The device was mounted on a 300-foot steel tower, and Ruth was fired on March 31, 1953—just six months after Livermore opened. The test was a fizzle. More than half of the tower remained standing afterward. Fired on April 11, 1953, Ray also was a fizzle, although legend has it that Ray was mounted on a shorter 100-foot tower to ensure its complete destruction. But the Laboratory pressed ahead in its quest for more compact weapon designs that were efficient in their use of nuclear materials.

Livermore's interest in novel small fission weapon designs would come to fruition in the 1950s, in part because of Los Alamos's attention to meeting the Air Force's needs for large H-bombs. The Army was interested in atomic projectiles between 8 and 11 inches in diameter, and the Air Force envisioned the need for nuclear-tipped antiaircraft missiles. Livermore's main thrust in this area was a new design concept that combined disparate elements from previous fission weapon designs. Ideas matured for fission weapons with a smaller diameter, requiring less nuclear materials and/or an increased yield to weight.

This research led to some of the Laboratory's first weapon-development assignments, including the W45 for the Little John and Terrier tactical missile systems and the W48 155-millimeter howitzer atomic projectile. A strong continuing interest in improved designs for tactical systems culminated in the Laboratory's work on the W79 enhanced-radiation artillery shell in the 1970s (see Year 1975).

The role of Livermore as the "new ideas" laboratory also guided the decision to focus thermonuclear work on the design of small H-bombs. As early as the Castle test series in 1954, Livermore investigated H-bomb designs smaller in size and yield than those designed by Los Alamos. The first thermonuclear test, Koon, also was a fizzle, yielding only 100 kilotons of an expected 1 megaton. Continuing efforts and future successes led to Livermore's development of much smaller diameter H-bomb missile warheads later in the 1950s, which made the Polaris submarine program possible (see Year 1956).

An Eyewitness Account of Ruth

Wally Decker, who later headed the Mechanical Engineering Department and finished his long career on the Director's Office staff, was a young engineer when he witnessed Ruth. According to Decker, "We got everything ready. We stood back with our dark glasses on, waiting for the device to go off. When it was fired, all we could see was a small speck of light on the horizon—no mushroom cloud, no nothing.

"But we didn't give up. We prepared for another event with a slightly different design. And when we fired the device, it was dismal, too.

"After those failures, our fortunes were at low ebb. We always said that we got a lot of good information from those failures—and we did—but you don't always get to stay around to play your best game. Fortunately, we did, and things got better for the Lab."