Refurbished Z continues its march into the future

Ceremony celebrates success of complex renovation

Photos by Paul Silva, Charlie Robinson, Jimmy Potter, and Bill Doty

I REMEMBER THAT — Sen. Pete Domenici, R-N.M., at Sandia to participate in the reopening of the Z machine after a $90 million, multiyear refurbishment project, looks at historic photos of himself at the dedication of the Particle Beam Fusion Accelerator (PBFA), the predecessor to Z. To the senator's left is Keith Matzen, director of Pulsed Power Sciences Center 1600. Behind Domenici's right shoulder is NNSA Deputy Administrator for Defense Programs Robert Smolen. (Photo by Randy Montoya)

By Neal Singer

Despite the recent grim weather, the sun was shining on Sandia's modernized Z facility at a rededication ceremony held in Area 4 late last month.

Sandia President and Labs Director Tom Hunter, Executive VP Joan Woodard, and VP Rick Stulen welcomed Sen. Pete Domenici and Robert Smolen, deputy administrator for defense programs at NNSA, to the celebration. Also present were DOE SSO personnel, members of other national labs, and speakers representing New Mexico Sen. Jeff Bingaman and Reps. Heather Wilson, Steve Pearce, and Tom Udall. The point was to celebrate the nearly on-time, on-budget renovation of the one-of-a-kind facility.

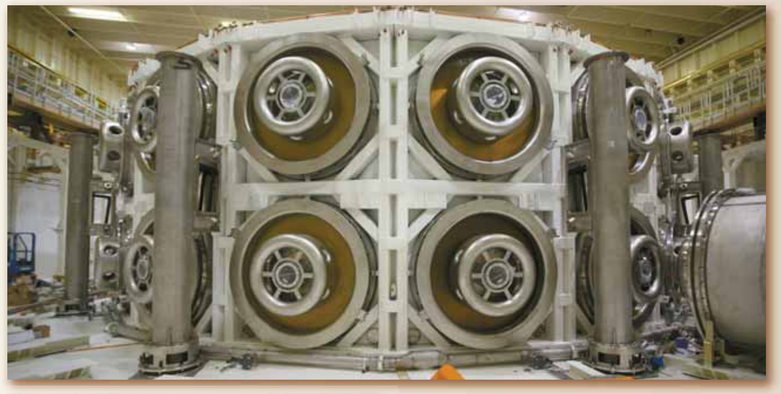
Among the many recognized for praise was Ed Weinbrecht (1630) for managing the refurbishment project; Sandia staff photographer Randy Montoya (3651) ("for making the ugly look good," quipped Domenici); those administrators, researchers, and technicians — "heroes," they were termed several times — who had made the refurbishment possible; and its succession of directors, beginning with VP Gerry Yonas, who was instrumental in growing Sandia's pulsed power programs beginning in the 1970s.

The facility's upgrade was completed late last year after a six-year effort that cost $90 million. It will take several more months to complete system testing at gradually increasing energies and to optimize experimental conditions for the research areas explored at the facility.

Z's original and still major purpose is to provide fundamental physics data and experimental tests of supercomputer models used to certify the US nuclear weapons stockpile. Inputs from its firings to date have helped avoid the need for underground nuclear tests. The more powerful version of Z is expected to provide still more precise data.

Additionally, the 107-foot-diameter machine's output advances the study of creating and controlling nuclear fusion in the laboratory. The so-called "dark-horse" entry in the fusion race has successfully squeezed a capsule containing heavy water to produce low-energy fusion neutrons. The big prize here, still decades distant, would be a method that uses similar pulses of power to produce electricity from (essentially) sea water, the most widely available substance on Earth.

After an extensive makeover that involved (among other improvements) new triggering lasers, larger electrical storage capacitors, and more durable parts, the facility can now deliver up to 26 million amperes to experiments, up from its previous incarnation's level of 18 million amperes. The question now to researchers is: What new insights will the machine produce with its additional energy?



Rebuilding Z

No one will ever compare Sandia Labs to a peacock. Showy, we're not. Some might call us understated. One famous Albuquerque remark has it that "Sandia Labs — no one really knows what goes on out there."

Even Sandia's Z machine — which regularly reaches the temperature of the sun only a few miles from downtown Albuquerque — is not only hidden behind protective fencing but is housed in a nondescript building about as glamorous as an old-time high school basketball gym.

So we thought we'd partially lift the veil to show some of the grit and glamour of the refurbishment of Sandia's Z accelerator that has taken place during the past two years. The sparks and arcs of a welder's torch, casings that resemble a Roman aqueduct in size, metal shapes that resemble someone's idea of flying saucers, and men protected against harmful dust in white total-body cover seen by ordinary citizens only in science fiction films.

The majestic construction effort shows the powerful underside of a mighty project that provides data to simulate the effects of nuclear weapons. A project that just may hold the key to eventually unlock the secrets of controlled nuclear fusion that could provide unlimited electricity from sea water.

Then we'll drop the curtain again. — *Neal Singer*