DOE Picks Up after Fires

Research was halted but little harmed by this summer's fire in Los Alamos. And both there and at other burned DOE nuclear sites, checks for, and measures against, radioactive contamination continue.

It wasn't a good summer for the US Department of Energy, what with fires raging at five of its nuclear weapons and waste sites. Worst hit was Los Alamos National Laboratory in New Mexico, where lives were disrupted and research isn't yet back up to speed.

In the aftermath of the New Mexico fire, LANL is also working to prevent radioactive and toxic soil from being washed into surrounding communities. The lab, like the other fire-stricken DOE sites—the Hanford Nuclear Reservation in Washington, the Idaho National Engineering and Environmental Laboratory (INEEL), DOE's former nuclear weapons plant at Rocky Flats, Colorado, and Lawrence Livermore National Laboratory in California—is contaminated from decades of making and studying nuclear weapons. The fires increased airborne radioactivity, notably upping the levels of plutonium on and near Hanford property.

Happily, however, the amounts of radioactivity and toxic chemicals that were released into the environment appear to be low. At press time, post-fire air, soil, and water monitoring and cleanup continued. Still, critics charge that DOE did not monitor enough and that it withheld and was slow to publicize key information. They say the summer's blazes should be a wake-up call for the agency to be better prepared for inevitable future—and potentially more serious—fires.

Back to normal, slowly

What became known as the Cerro Grande fire was started in May as a prescribed burn at Bandelier National Monument. It quickly got out of control. By the time it was finally doused two weeks later, it had destroyed 237 houses in the town of Los Alamos; burned nearly a third of LANL's 43 square miles; devoured nearly 40 lab structures, mainly office trailers and historic wooden sheds from World War II; damaged hundreds of desktop computers; ruined some experimental equipment; and shut down research for a month.

The Cerro Grande fire caused an estimated $1 billion in damage, including roughly $340 million to LANL alone. Equipment losses totaled $29 million. The lab plans to spend about $100 million on construction, including two new office buildings for the 200 people who lost offices and labs. And repairing damaged property, improving fire protection for on-site nuclear waste, and minimizing erosion add another $200 million.

The fire came close to some high explosives test sites and storage bunkers. "We had to check everything out, make sure it wasn't dangerous to be there," says LANL researcher Robert Deupree. "We had to replace a large number of power poles and lines, but things at the firing sites were pretty much okay—there was nothing that was going to be a show stopper." The fire did destroy some cryogenic vacuum pumps and compressors and other parts for a planned second accelerator for LANL's Dual-Axis Radiographic Hydrodynamic Test facility. When it's completed—up to six months late—DARHT will take three-dimensional x-ray snapshots during high explosives tests.

Some research was lost. "The worst is the logbooks—without them, our data is just so many numbers," says Alexandre Mikhailovski, a postdoc studying optical properties of semiconductor quantum dots. Mikhailovski works with Victor Klimov, whose research activities were among the hardest hit at the lab: The fire destroyed all of Klimov's postdocs' and students' offices, complete with computers, data backups, books, and papers. The lab survived, says Klimov, "but the soot was not healthy for optics, and the power surges hurt electronics. Some of our ultrafast lasers need to be replaced. Piece by piece, we are getting things running again."

In fact, postdocs took the biggest losses in the fire, because many of them had offices in the trailers that burned down. What's more, one of the most ravaged areas in town was a neighborhood where postdocs lived. For example, Christopher Fuchs, a quantum information theorist, was lucky to be carrying his current research with him, but his home was destroyed. "I lost every calculation I ever did, all the papers I ever copied, and about 500–600 books, most of them physics and math," he says, adding that one of his most prized possessions was melted by the fire: a piece of trinitite, or molten earth from the first atomic bomb explosion, a gift from a Los Alamos old-timer who had witnessed the 1945 Trinity test. LANL has offered to extend appointments so that postdocs can redo their work and have something to show when they apply for jobs.

"The people damage is more significant than the equipment damage,"

GARY WARREN, LANL

DOE

FIRE APPROACHES Los Alamos National Laboratory (left). And about half of the Hanford Nuclear Reservation was scorched in a brush fire this past June, although no facilities were touched (above).

says Deupree. "It's a big trauma even if you didn't lose your home. They say it takes a year to really get back to normal, to feel right again. We've been slow getting back to work, but we're getting there."

Contamination concerns

LANL and the other DOE fire-stricken sites are also dealing with the public's concerns about environmental contamination. In Los Alamos, radioactivity in the air during and after the fire was slightly higher than normal, but "with forest fires you release lots of natural radioactivity," says Lee McAtee, LANL's deputy director for environment, safety, and health. Of more concern is that radioactivity and toxic chemicals could be carried from LANL into the Rio Grande, which is used by 13 million people for irrigation and other activities.

With the land bared and topped by a waterproof crust of resin from burned pine needles, runoff will be worse for a few years until vegetation grows back. Already, says McAtee, "in canyons where we normally see [water flowing at] half a cubic foot per second, we're seeing 800–900 cubic feet per second." That's with less rainfall than usual.

The lab, with help from DOE, the New Mexico Environment Department, and other local and federal groups, is doing a lot to reduce runoff: laying logs, straw-filled tubes, and hay bales to block and soak up water; breaking up the soil crust; reseeding the land; reinforcing road crossings; pouring concrete to catch water; and moving some of the most contaminated soil. Twenty percent of the total contamination in one canyon was at two places, says McAtee. "We dug that up."

McAtee insists that radioactivity from LANL land wouldn't add significantly to anyone's average annual dose. The lab moved the radioactive soil, he says, "not because it was a health risk, but because people don't want contamination from the lab flowing onto their land, and we should respect that."

But according to environmental engineer Greg Mello, director of the Los Alamos Study Group, which keeps tabs on LANL, it's not known exactly how much radioactive waste is scattered about lab land. "There is no inventory that any decision-maker could use with confidence—there are very few tools with which to work," he says.

Plutonium is plutonium

Meanwhile, raised levels of airborne plutonium at Hanford, the nation's most radiologically contaminated site, were measured after a fire started by a fatal car crash scorched half of the site's 560 square miles this past June. The increased plutonium levels were probably caused by stirring up both contamination from Hanford activities and atmospheric fallout from past nuclear tests. "We don't exactly know the source," says Hanford technical adviser Wayne Glines.

"Plutonium is plutonium. Our real concern is that we don't have a public or worker health problem," Glines says, adding that the plutonium is not hazardous. The highest count was 0.0016 picocuries per cubic meter, or more than 1000 times above average. Says Glines, "If [the measured levels] persisted for an entire year, it would equate to 8 millirem. The [legal] limit is 10 millirem, and the average yearly background dose is 300 millirem."

Not surprisingly, Gerald Pollet, of the watchdog group Heart of America Northwest is not so sanguine: "For the first three days of the [Hanford] fire, DOE insisted that no areas of contamination had burned or were in jeopardy," he says. The burden of proof is on DOE, adds Arjun Makhijani, a nuclear fusion engineer and president of the Institute for Energy and Environmental Research in Takoma Park, Maryland. "LANL hasn't done a systematic study to estimate requirements for monitoring, so they don't know how much monitoring should be done to yield measurements of sufficient confidence. All these fires are severe warning signals that the nuclear labs—and other nuclear facilities—need to be much better prepared."

Public mistrust of DOE is nothing new, of course. It's one of the issues Thomas Leschine, a University of Washington professor who chaired the National Research Council's recent review, "Long-term Institutional Management of US Department of Energy Legacy Waste Sites," wants to look at in a follow-up to the Los Alamos and Hanford fires: "What were the DOE's reactions? People's reactions? How were things reported in the media?"

Lessons learned

There is broad agreement that the threat to the public and the environment would have been much worse had the Cerro Grande fire reached the hundreds of wooden boxes of transuranic waste stacked aboveground waiting to be taken to the Waste Isolation Pilot Plant in southern New Mexico. Or had the Hanford fire reached 350 exposed barrels of depleted uranium. Or had any of the fires burned spent fuel, or blown up nuclear reactors or other facilities at the various DOE sites.

"I don't think it's luck" that these worst-case scenarios were avoided, says Ellen Livingston, DOE's senior policy adviser for environmental affairs. "Each site has a response plan that spells out procedures for preventive measures. This makes the potential for a really serious fire low." The measures include spraying dunes to immobilize contaminated sand, thinning trees, killing weeds, putting gravel around facilities, and focusing on keeping flames from attacking hazardous areas. Says LANL's McAtee, "It's been absolutely essential that we work with everybody else that has been impacted by the fire. We can't do it alone."

Adds Brad Bugger of INEEL, where fires also increased airborne radioactivity levels, "We are doing a 'lessons-learned' exercise. We have fires every year, and this is the first time we've been asked, Have you done the analysis for specific radionuclides? We understand now that the public has a different threshold. That's requiring us to be more specific."

Toni Feder

Radio Astronomers Plan Mammoth Telescope

Scientists on four continents are pushing technology to sink the tab to below $1 billion for what they call the first "global-born" telescope.

Plans for the largest, most sensitive telescope ever got a boost in August, when radio astronomers from 11 countries officially teamed up to shepherd the Square Kilometre Array to construction. Technical, financial, and organizational problems lie ahead, but planners aim to choose a design and location for the SKA in 2005, begin construction in 2010, and see first light in 2015.

With a collecting area of one square kilometer, the SKA would be about 100 times more sensitive than the most powerful existing radio telescope, the Very Large Array in New Mexico. It would be able to detect surface brightness temperatures of 1 K with subarc-