on the stockpile stewardship program; anyone wanting to read or contribute to the debate can visit http://stsfac.mit.edu/projects/sbss/.

An unhappy community

Browne has also inherited sour relations between the lab and the local community. The problem is widely attributed to the layoffs two years ago of about 700 people, which then-director Hecker says were made to increase the ratio of technical to support staff. But the layoffs, which also prompted claims of discrimination against Hispanics and older workers, are not the only source of tensions. In addition, the lab is dogged by issues concerning environmental safety, environmental restoration and the economic impact of the lab on the local community, as well as treatment of lab employees—and different issues raise the hackles of different sectors of the community.

Spurred by the community's concerns, in September when DOE renewed the University of California's contract to run the weapons labs, the agency said it would review LANL's and UC's performance on community participation and on environmental health and safety issues, including waste management. The review (which applies only to LANL) will take place in 1999, two years into the five-year contract. "LANL is under a lot of heat [for its] interactions with the local population," acknowledges Browne.

Last year, for example, Concerned Citizens for Nuclear Safety, a Santa Fe–based nonprofit organization, won a suit against DOE for not adequately monitoring radioactive air emissions. And in the past few months, says the organization's Jay Coghlan, "it's been demonstrated that there is migration of radioactive contaminants during storm water runoff events." Long-time LANL employee Charles Montaño, who is a member of Northern New Mexico's Citizens' Advisory Board, a DOE-funded group that advises the agency on local environmental cleanup issues, complains that the lab is not forthcoming with "information concerning lab actions and associated risks, so we cannot truly judge." Awareness of lab safety problems has also been heightened by a string of four serious (nonnuclear) accidents within the last three years.

There has also been a growing sense that LANL, which is the largest employer in northern New Mexico, does not do as much for the local economy as it could, says Tom Garcia, who heads the lab's community economic development effort. "People recognized that the largest economic engine was not involved in the community," Garcia says, but the lab is working hard to improve the situation. For example, in the last six months of FY 1997, "we shifted $50 million in procurements to northern New Mexico."

Browne plans to focus on community relations. "I'm going to be visible and personally listen," he says. "We are going to have to show [the community] we are doing business in a way that makes us good neighbors." But some would have preferred that the new director be an outsider. Says Montaño, "Browne's been a part of the decision making process. It's difficult to imagine him changing things."

As for Browne's predecessor, Hecker, who has been at LANL for about 26 years, he plans to stay on and spend about half his time studying the ma-

SNO Gets Set to Go

More than 2 km down a nickel mine near Sudbury, Ontario, the Sudbury Neutrino Observatory (SNO) is nearly set to start counting solar neutrinos. Shown here before the last of its 122 acrylic panels were glued into place, the 12 m diameter vessel was assembled underground. Next month, it will start to be filled with 1000 metric tons of heavy water. The rocks above the observatory will keep out cosmic rays, and light water will fill the barrel-shaped region around the vessel to block out background radiation.

It's the use of heavy water that distinguishes SNO from the world's other solar neutrino observatories, such as Super Kamiokande in Japan, which uses light water and went into operation in April 1996; see "Solar Neutrino Experiments: The Next Generation" in PHYSICS TODAY, July 1996, page 30. With heavy water, the flux of electron neutrinos and the total neutrino flux (electron, tau and muon neutrinos combined) can both be measured. So, "with one experiment, we will have a determination of whether neutrinos change flavors," says SNO director Art McDonald of Queen's University. If they do, it would explain the discrepancy between predicted and measured solar neutrino flux, and it would mean that neutrinos have mass. "This would be clear evidence for physics beyond the standard electroweak model and would also have significant implications in astrophysics," McDonald says.

Arranged around the vessel in a geodesic array 18 m across are 10 000 photomultiplier tubes that will be used to detect Čerenkov radiation from electrons resulting from the electron neutrino reaction ($d + \nu_e \rightarrow p + p + e$). The total neutrino flux will be measured in two ways. In one, neutrons from the reaction ($d + \nu \rightarrow p + n + \nu$) will be absorbed and counted by helium-3 counters suspended in the heavy water. (These counters will be installed in the full vessel by a remote-controlled minisubmarine.) In the other, experimenters will spike the heavy water with about two metric tons of magnesium chloride salt and measure the Čerenkov radiation produced when a chlorine ion captures a neutron.

Calibration measurements will be made during the three months it takes to fill the vessel with heavy water, and data collection is expected to begin in May.

SNO is a collaboration of about 100 scientists from Canada, the US and the UK; all three countries contributed to the $72 million (Canadian) construction costs. The heavy water, worth about $300 million, is on loan from Atomic Energy of Canada Ltd's reactor business.

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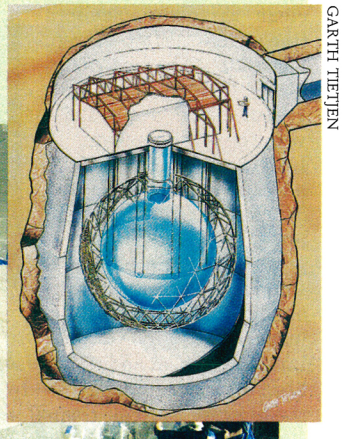

GARTH TIETJEN

BOB CHAMBERS