

The magnitude of the accident

Based on the observed neutron radiation levels, Hiroshi Sekimoto from the Nuclear Reactor Institute of the Tokyo Institute of Technology initially estimated that the chain reaction may have involved $1-8 \times 10^{18}$ fissions, consistent with a steady-state power 0.7–4 kW. (The thermal output of a typical commercial power reactor is about 3000 MW.) Since then, using information about the fission products found in samples taken from the precipitation tank on 20 October, he has revised his estimate to $1.8-2.8 \times 10^{18}$ total fissions.

Peterson and Ahn have also made a preliminary estimate of the power level reached during criticality and hence the maximum radioactive releases, by making some assumptions about the heat balance in the tank. They have concluded that the chain reaction generated heat at a rate of 5–30 kW. At that power level, it may have produced 30 to 180 curies of xenon-133 and 10–60 curies of iodine-131. (The explosion at the 1986 Chernobyl nuclear power plant in Ukraine spewed out tens of millions of curies of these isotopes.)

Thomas Cochran of the Natural Resources Defense Council has put the Tokaimura episode in perspective by examining 22 criticality events at US nuclear facilities other than reactors (all but one of which occurred before 1964). He found that the number of fissions generated by fairly similar accidents was in the range of 10^{17} – 10^{19} . Assuming that the Tokaimura accident was in the same ballpark, Cochran estimates releases of ^{131}I that overlap with those calculated by Peterson and Ahn. Cochran has concluded that the radiological impact on the public of the Tokaimura episode is not likely to be larger than that of the 1979 nuclear accident at the Three Mile Island nuclear power plant in Pennsylvania.

McLaughlin has been working over the past year to update a report on criticality accidents around the world by incorporating data now available on accidents in the former Soviet Union. Although he can't yet say what happened at the JCO plant, he did refer us to the list of "lessons learned" from past accidents. He noted that what many of the accidents have had in common have been failures in communications and operator training, improper procedures, lack of fissile-material accountability, and new or unfamiliar operations. Judging by the standards in the US, McLaughlin said, it appears that, in the Tokaimura incident, regulatory agencies and plant

managers were not diligent in following approved procedures.

The entire JCO plant, not just the purification operation, is now shut down, and STA has revoked JCO's operating license for the plant. Various investigations by government agencies are under way.

BARBARA GOSS LEVI

UC to Open New Campus in Central Valley

The University of California plans to open its tenth campus, near Merced in the San Joaquin Valley (the southern part of the Central Valley), with the first class of undergraduates to enter in the fall of 2005.

UC Merced is being planned as an all-around research university, but initially the emphasis will be on science and technology, says psychologist Carol Tomlinson-Keasey, who was named chancellor of the new campus this past summer, and has held academic and administrative positions at UC for nearly two decades.

To that end, UC Merced planners have begun forging ties with Lawrence Livermore National Laboratory, the Department of Energy weapons lab located about 85 miles northwest of Merced, with whom they hope to collaborate in areas such as environmental sciences, computing, and nonpolluting transportation. Also planned is the Sierra Nevada Research Institute, which would begin as a coalition of several existing UC multicampus research organizations, and would focus on natural resources and policy topics relevant to the region, such as water, air quality, and climate change.

In choosing a site for the new campus, "we quickly narrowed it down to the Central Valley," recalls Tomlinson-Keasey. "The reason was that it is woefully underserved in terms of higher education." The plan is to set up several UC Merced satellite sites around the valley—the first one opened in Fresno two years ago—where professional courses will be offered and some UC Merced courses will be available by video conference. Planners are also working closely with ten or so community colleges up and down the valley, so that "folks can get some portion of their education" cheaply and without leaving home, explains Tomlinson-Keasey.

Eventually, the new campus may serve up to 25 000 undergraduate and graduate students. But to begin with, the planners are aiming for

References:

1. Science and Technology Agency's Web site (<http://www.sta.go.jp/genan/jco/jcoe.html>).
2. C. M. Hopper, B. Broadhead, An Updated Nuclear Criticality Safety Slide Rule, NUREG/CR-6504 Vol. 2; ORNL.TM-13322/V2. US Nuclear Regulatory Commission, Washington, D.C., April 1998.



FUTURE UC MERCED STUDENTS?

Local fourth graders survey the site selected for the new campus, and draw their ideas of what it might look like when completed.

1000, and 100 faculty members, growing to 5000 and 300, respectively, within five years. That's only a small fraction of the 60 000 additional students that the UC system expects to be enrolling by 2010, notes Tomlinson-Keasey. "It's a terrific squeeze." There is also talk at UC of switching from the nine-month academic calendar to a year-round schedule, adds Karen Merritt, UC Merced's chief of academic planning.

The state of California is expected to provide about \$250 million for construction of the new campus, and UC is seeking other sources of public and private funding. "It's not like it was in the sixties, when the state funded almost everything," says Merritt, referring to the establishment of the three youngest UC campuses, in San Diego, Irvine, and Santa Cruz.

TONI FEDER

Canadian Institute Starts Program in Nanoelectronics

Nanoelectronics is the thrust of a network of scientists recently set up by the Canadian Institute for