RADIATION RISKS

Study Casts Doubt on Hiroshima Data

More than 5 years ago, the experts who calculate radiation risks began to be troubled by a nagging and unwelcome discrepancy in the data from the atom bomb blast at Hiroshima. Their uneasiness has grown steadily worse, and it now appears to be threatening the credibility of the world's most important database in this field, the 40-year-old studies of bomb-induced cancer in Japan. A report published this month by Tore Straume, a biophysicist at the Lawrence Livermore National Laboratory, is bringing new attention to this issue and may goad the U.S. government to invest in research aimed at resolving the uncertainties.*

Straume has shown beyond any doubt, say his colleagues, that there is a discrepancy between the measured level of neutrons emitted by the bomb in Hiroshima on 6 August 1945 and the neutron level that weapons experts calculate should have been generated. Straume and his Japanese partners have collected samples of concrete from various points around the city and subjected them to a new analytical technique—accelerator mass spectrometry—which provides a count of chlorine-35 and chlorine-36 atoms present. The ratio yields a reliable index of the number of low-energy or "thermal" neutrons on the scene in 1945.

Straume's chlorine data show that there were between two and 10 times more thermal neutrons in Hiroshima than bomb experts had calculated. If correct, this finding has serious implications. While thermal neutrons are not considered life-threatening themselves, they can only have been produced by fast neutrons—which are very dangerous. And if the fast neutron numbers were high, the actual radiation doses received by people in the city of Hiroshima must have been higher than the experts assumed. This would mean that radiation emitted by the bomb was less effective in producing cancer than has been assumed.

Even if this is correct, the experts aren't quite ready to begin revising cancer risk estimates yet, says Charles Edington, executive officer of the Board on Radiation Effects Research at the National Research Council (NRC). The NRC only a few years ago finished a major overhaul of its risk tables, and before it attacks the problem again, some important points need to be cleared up.

The first question that needs answering, according to Straume, is whether the same excess of thermal neutrons is present in both Hiroshima and Nagasaki. Straume is now testing concrete samples from Nagasaki, and preliminary results suggest that the discrepancy is not as great there. This could be because the Hiroshima bomb, known as "Little Boy," was a unique device, and one from which physicists never obtained experimental data. Their theoretical calculations of its output may have been wrong.

This speculation is not popular with those who calculated the bomb's output, like Paul Whalen of Los Alamos. He says the error probably lies in the assumptions used to calculate what happened as the neutrons interacted with the environment. The debate between the two camps—experts on bomb output and those who study neutron "transport" through the air—rages on.

Funding for research on these questions declined in the late 1980s, but now it appears to be headed up again to a "modest" plateau, says Robert Young, an official at the Defense Nuclear Agency. Recently he approved a couple of small ($200,000) grants to investigate the discrepancies at Hiroshima. At the moment, Young says, he is focusing on the speculative theory that the bomb's radioactive output needs recalculating. One study looking into the implications of changing the bomb output assumptions, to be conducted by researchers at the Oak Ridge National Laboratory, should be completed by next May, Young says.

–Eliot Marshall

*"Neutron Discrepancies in the DS86 Hiroshima Dosimetry System," by T. Straume, S.D. Egbert, W.A. Woolson, R.C. Finkel, P.W. Kubik, H.E. Gove, P. Sharma, and M. Hoshi, *Health Physics*, October 1992, pp. 421-426.

TECHNOLOGY POLICY

NASA Urged to Pump Up Its First 'A'

With mounting anxiety, U.S. commercial aircraft builders have been looking over their shoulder as foreign competitors erode their traditional lead in the global aviation market. But the National Research Council's Aeronautics and Space Engineering Board thinks this traditional area of strength for the United States can be safeguarded—with the help of another traditional symbol of American can-do, the National Aeronautics and Space Administration. In a report* released last week, the NRC urges that NASA spend more of its overall budget and research talent to advance the sort of commercial aviation technologies long considered to be primarily the responsibility of private industry.

For the agency that brought you the glamour of moon landings and reusable spacecraft, a shift toward workhorse technologies like subsonic commercial airliners and helicopters might sound like a comedown. But the report notes that preserving "the role of the United States as a leader in aeronautics technology" is part of NASA's original charter. And NASA, which is already paying more attention to economic competitiveness under its new director, Daniel Goldin, may be happy to heed the message. The NRC is "preaching to the choir," remarks a NASA spokesman.

The sermon derives its note of urgency from the U.S. industry's nose-dive in the global aviation marketplace. Between 1980 and 1989, the U.S. share of the global transport aircraft market plunged by more than a quarter, from 87% to 64%, the report says. In 1989, that decline took a stinging turn when the European aircraft manufacturing consortium, Airbus Industrie, overtook McDonnell Douglas as the world's second largest aircraft company, behind Boeing. Moreover, because the market is booming—it is expected to double every decade—the erosion of market share means a disproportionate loss of future economic opportunity for the United States, says JoAnn C. Clayton, director of the NRC's Aeronautics and Space Engineering Board and coordinator of the report.

Other countries gained an edge, notes Eu-

*"Aeronautical Technologies for the Twenty-First Century."

AIRBUS INDUSTRIE

Air superiority? The latest from Airbus Industrie, the European consortium.