SCIENCE NEWS of the week

Court Rules U.S. Responsible for Some Fallout Cancers

In a landmark ruling issued last week in Salt Lake City, U.S. District Court Judge Bruce Jenkins found the federal government guilty of "negligence" in its conduct — specifically, in its protection of civilians — throughout the period of aboveground nuclear-weapons testing during the 1950s and early 1960s. As a result, the government has been asked to pay more than $2.66 million in compensation to the survivors of nine cancer victims for their "wrongful deaths" (eight from types of leukemia previously linked to radiation exposure, and one from breast cancer), and $100,000 to Jacqueline Sanders as compensation for a thyroid cancer that Jenkins ruled "was more likely than not" caused by her exposure to fallout.

Fourteen other claims against the government for alleged fallout-related cancers were dismissed—either because they involved a cancer not previously shown to be associated with radiation exposures, or because it appeared unlikely that the victims' estimated radiation dose from fallout would have been "a substantial factor" contributing to the development of their injuries.

It took the judge nearly 18 months of sifting through the testimony of 98 witnesses and 1,692 documents presented during a 13-week trial — more than 7,000 pages of evidence in all — to arrive at the judicial resolution he crafted. Seldom can a person's injury be tied conclusively to one or more chronic and sublethal exposures to radiation; it's the nature of the beast that its slow savagery can assume the appearance of diseases caused by hosts of other environmental or natural agents. Therefore, Jenkins explains, judgment must be determined by what is "probable. Dispute resolution demands rational decision, not perfect knowledge."

His 489-page ruling is important for several reasons. First, it sets the ground rules by which 1,168 similar suits are to be resolved. The 24 cases tried in their entirety before Judge Jenkins were "bellwether" cases. They were chosen as typical cases, both legally and factually, against which the remaining cases would be compared and judged. Issues accepted or determined as facts in these first cases need not be proven again. Moreover, the other alleged injuries will be ruled deserving or not deserving compensation based on the same criteria applied here — as long as Jenkins's decisions are not overturned on appeal.

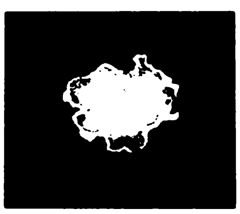
Second, the ruling attempts to resolve when the government has a right to immunity from prosecution for negligence under a provision in the Tort Claims Act. This provision prevents suits over injuries stemming from high-level federal policy decisions. For example, the government cannot be sued for conducting aboveground testing because that decision was "a discretionary choice [made] at the highest levels of government." Similarly, if in formulating that policy a decision was made to waive ordinary public-safety considerations — essentially sacrificing downwind communities so that they might yield valuable data as human guinea pigs — that too would be immune to compensatory claims from any injured parties.

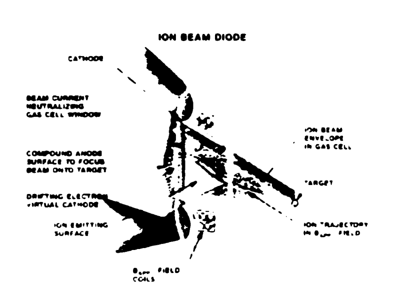
However, Jenkins says, because the stated U.S. policy was to ensure that civilian radiation exposures be kept lower than those exposures deemed acceptable for nuclear workers and military personnel, any injury resulting from a failure to observe that policy is litigable.

And that's precisely what was involved in these cases, he says. For instance, doses could have been minimized if the public had been warned when and how to limit their own contamination, such as by washing potentially contaminated dust from the skin. Though attempts were made to keep radiation doses to federal employees below 0.3 rads per week, at one point radiation-safety personnel were instructed not to alarm the public with "drastic action" until civilian exposures exceeded 25 or 50 rads, Jenkins notes. Finally, he writes, the government says its dose estimates for the plaintiffs represent the probable upper limit on exposure and cancer risks experienced. However, trial evidence suggests the contrary, he says: "Rather than serving as a ceiling . . . the exposure estimates currently offered by the government should likely be deemed to be *minimum* figures for use in risk estimation." These lapses in carrying out the government policy—and therefore its duty to protect the public — make the government responsible for any injury its actions have fostered, Jenkins ruled.

The "probability-of-causation" tables linking radiation exposures and cancer risks (SN: 11/19/83, p. 330), currently under development by the National Institutes of Health, were not finished in time to aid in Jenkins's difficult deliberations. By the time appeals have been concluded on this case, however, they might be. The judges due to handle the remaining 1,168 cases must surely hope so. —*J. Raloff*

Finding a diode focus for tiny targets





Sandia

An intense beam of protons can now be focused well enough to hit a spot roughly the size of a pin head. Less than two years ago, the best that scientists could do was hit a target the size of a golf ball. This achievement is an important step toward the development of inertial confinement fusion, say researchers at the Sandia National Laboratories in Albuquerque, N.M. In the new process, ion beams deposit tremendous amounts of energy into small pellets containing deuterium and tritium isotopes that fuse and release energy (SN:10/22/83, p. 268). Until recently, no one was sure whether beams of protons or lithium ions could be focused onto a sufficiently small target.

The dramatic improvement in focusing ability was the result of a small change in the curvature of the anode in a device called the "Applied-B diode." In this diode, schematically shown above right, a high voltage between the anode and the cathode generates a plasma of protons and electrons near the surface of the anode. The anode focuses the protons, and the cathode accelerates the particles toward the target. An applied magnetic field (B) helps direct the ions.

Sandia's David J. Johnson says, "For the first time, we were able to show that intense ion beam diodes behave like optical elements — a small change in the lens curvature produces a precisely defined change in the focal spot." Before this discovery, it was thought that a number of different effects caused beam spreading.

The computer-enhanced image on the left shows the 1.3-millimeter diameter focus achieved by the diode. In this case, the protons struck a titanium target and caused the emission of X-rays that were then recorded on film. The central dark patches show the areas of greatest intensity, and the line shows where the intensity has fallen by a factor of two.