Hanford's fallout: Increased thyroid risks

Unbeknownst to the public, nuclear weapons production at the Hanford Nuclear Site in Washington emitted measurable quantities of radioactive isotopes into the air and water for decades. Now, a federally funded study estimates that up to 5 percent of the people who lived in a 10-county area surrounding the complex shortly after it opened in 1944 — a time when Hanford's stack emissions went largely uncontrolled — may have received significant radiation doses. Most of this radiation arrived in milk from cows grazing on contaminated pastures, so small children probably received the highest exposures, the report's authors say.

Though preliminary, the dose estimates "are large enough to justify investigating the effects of radiation from Hanford on thyroid disease in the surrounding population," says John E. Till, a consultant based in Neeses, S.C. And indeed, the Centers for Disease Control plans to initiate such a study next year, says Till, who chairs a federally funded but independent panel of technical experts managing the Hanford Environmental Dose Reconstruction Project. The new report completes the first phase of that five-year project.

Until four years ago, the federal government "kept the lid on" data describing Hanford's radioactive emissions, says Jim Thomas, a staff researcher with the Hanford Education Action League, a citizen's group in Spokane, Wash. Responding to public pressure, the Energy Department publicly released some 19,000 pages of documents on Hanford operations to area libraries in February 1986. Those documents "showed that over the first 10 years of its operations, Hanford released more than 530,000 curies of iodine-131," Thomas says.

Dissolving reactor fuel in acid to extract plutonium caused the release of volatile iodine-131. And when Hanford first opened, any iodine that volatilized went right out the plant's smokestacks, because "there weren't filters on these stacks," says Angela Beers, a staffer for Till's panel. The new report attributes most offsite radiation exposures to short-lived iodine-131 emitted during the first few years of the facility's operations — before pollution controls and process changes cut emissions dramatically.

Researchers at Battelle Pacific Northwest Laboratory in Richland, Wash., which operates the Hanford site, developed the new dose estimates by analyzing the likely dispersion of iodine-131 and other radioisotopes.

Between 1944 and 1947, milk contaminated with iodine-131 may have delivered doses exceeding 33 rem to the thyroids of as many as 13,500 area residents, the report states. Indeed, it says, some 4,000 people drinking milk from cows grazing downwind of Hanford may have accumulated more than 100 rem, and a few may have received more than 2,500 rem.

During diagnostic procedures, endocrinologists have delivered iodine-131 doses of 50 to 100 rem to the thyroids of millions of patients, and "there is no evidence that that has ever caused any problems," observes David V. Becker, director of nuclear medicine at New York (City) Hospital-Cornell Medical Center. Cancers have been linked to higher doses, but such tumors tend to arise within 40 years of exposure. The message for people who lived near Hanford during the 1940s, Becker says, is that "if nothing has happened by now, it probably won't."

Over the next few years, Battelle researchers will refine their dose-reconstruction model. Their goal is a computer system that can generate individual dose estimates for residents based on where and when they lived in the area as well as their patterns of dairy-product consumption. Eventually, the system's designers also hope to tailor it to yield similar individualized chemical-exposure estimates for residents downwind of other polluting facilities. — *J. Raloff*

Shuttle may soon fly, but Hubble stays dim

The damage is done but the saga continues. Lew Allen, chairman of a panel assembled by NASA to investigate the Hubble Space Telescope's defective optics, told Congress last week that the mirror imperfection could have been detected on the ground "using relatively simple and inexpensive characterization techniques." Allen, who directs NASA's Jet Propulsion Laboratory in Pasadena, Calif., told a House space subcommittee that the telescope's spherical aberration is large enough for technicians to have spotted it, even without trying out the two mirrors in a $100 million test facility. NASA claimed earlier this month that detecting the flaw would have required such a facility.

This week, prompted by Hubble's troubles and the grounding of all three space shuttles due to fuel-system leaks in two of the craft, the Bush administration directed NASA to form an independent task force to review the space program's future. And NASA announced that ongoing repairs might enable it to launch two shuttle missions before the scheduled Oct. 5 liftoff of the shuttle-borne Ulysses solar probe, which must fly by Oct. 23 or wait 13 months for another launch window.

If workers can fix a faulty flange that connects the orbiter Atlantis to its external fuel tank without moving the shuttle off its launch pad, NASA says, a secret military mission, originally scheduled for June, could fly in mid-August. NASA also says that the shuttle Columbia, newly outfitted with fuel lines borrowed from a shuttle still under construction, is now scheduled to launch the long-delayed Astro-1 — a 10-day, three-telescope mission — in mid-September.

On the Hubble front, scientists have begun work to sharpen the telescope's brighter camera images through ground-based computer enhancement, in hopes of minimizing the focusing problem that appears rooted in the primary mirror (SN: 7/7/90, p.4). Robert A. Gonsalves of Tufts University in Medford, Mass., says preliminary work indicates image processing can double or triple the resolution of high-contrast, bright objects. But the technique cannot improve the quality of weaker images, adds NASA's Edward J. Weiler of Washington, D.C.

Roger Angel, an expert mirror designer at the University of Arizona in Tucson and a member of the Hubble investigative panel, told SCIENCE NEWS his group's visit next week to the firm that built the primary and secondary mirrors will likely focus on the accuracy and adequacy of tests used to assess the mirrors' optical performance. Angel notes that a fabrication or placement error in a lens used to evaluate the mirrors could have led opticians at the Hughes Danbury Optical Systems, Inc., in Danbury, Conn., to mistakenly conclude that an imperfect mirror met its design specifications perfectly.

The test, known as a null lens test, uses a small lens to optically alter a mirror so that it appears spherical to incoming light beams. The laws of optics dictate that light striking a perfectly spherical surface reflects back along the same path as an incoming beam. Any mismatch between the incoming and outgoing beams indicates that the mirror deviates from the ideal and may require further polishing to meet specifications. But if the null lens itself was fashioned improperly or placed at the wrong distance from the mirror, the test could have masked significant imperfections in the primary mirror, Angel says. He notes that errors in the null lens test have led to mirror problems before, most recently in a mirror designed for the European Southern Observatory's New Technology Telescope in Chile. But a former member of the team that made the two Hubble mirrors told SCIENCE NEWS the null lens test is only "one of many, many possibilities" for errors that could have caused Hubble's optical woes.

— *R. Cowen and J. Eberhart*