ed revenues over the next few years.

In contrast, DOE has concluded that the laser separation process, which is being developed at the Lawrence Livermore National Laboratory (see box), offers potentially significant cost advantages. In addition, a laser plant equivalent to GCEP could be built for $3 billion, a sum that would not put the enrichment enterprise in the red.

Consequently, according to John Longenecker, the head of DOE's enrichment program, the laser process emerged "a clear winner." DOE has therefore bitten the bullet and announced that it is getting out of the centrifuge effort all together. The GCEP program will be terminated and all R&D on advanced centrifuges will also be stopped. By the time all the close-out charges have been paid, close to $3 billion will have been spent.

Development of the laser program will continue at the level of $80 million to $100 million a year, according to Longenecker, and DOE should be in a position by the end of the decade to decide whether a production plant should actually be built.

This strategy entails some risk because a full-scale demonstration of the laser process has not yet taken place. But DOE figures that if unforeseen problems arise with the process, it has the option of taking the Oak Ridge plant out of mothballs to meet demand beyond 2000.

DOE's decisions have been greeted with dismay in Oak Ridge and Portsmouth because they will have an enormous economic impact on the surrounding communities. They have also been sharply criticized by some members of the subcommittee on energy research and production of the House Science and Technology Committee. The subcommittee is chaired by Representative Marilyn Lloyd (D–Tenn.) who represents Oak Ridge. According to a staff member of the committee, Lloyd was given a verbal commitment from former Energy Secretary Donald Hodel to maintain some research on the losing technology but Herrington has reneged.

In general, however, DOE's decision has been applauded. Says one long-time congressional observer of the program, "They finally did the calculations using real numbers."—**COLIN NORMAN**

NRC Finds Few Risks for Atomic Vets

A new study by the National Research Council has concluded that military personnel exposed to fallout from nuclear weapons tests in the 1950's generally have not suffered an unusual number of deaths from cancer or other diseases. It did, however, find that servicemen exposed to a test in 1957 have suffered from excess leukemia, and those exposed to a series of tests in 1956 have suffered from excess prostate cancer.

The study is expected to arouse some controversy on Capitol Hill, where veterans who were exposed to the blasts have been agitating for financial compensation from the government. Overall, 222,000 veterans participated in the open-air nuclear testing program between 1946 and 1962, so the stakes are fairly large. Public concern has been stirred by a series of congressional hearings, which documented lax radiation protection during the tests, and by a popular book, *Countdown Zero*, by two veterans, Thomas Saffer and Orville Kelly.*

The purpose of the study was to test the conclusions of a widely publicized report by epidemiologist Glyn Caldwell, who found in 1979 that an extraordinarily high number of leukemias had developed among soldiers exposed to a blast called Smoky. Mortality data were gathered for most—but not all—soldiers exposed to a portion of the atomic tests between 1951 and 1957. (Not all participants could be identified, and birth dates could not be ascertained for 6 percent of those identified.) The totals were then compared with expected mortality rates in the general U.S. population and found to be equivalent or lower for participants in each series.

Coauthors Dennis Robinette, Seymour Jablon, and Thomas Preston acknowledge that in 5 percent of the cases, the cause of death could not be ascertained. But they conclude that "when data from all the tests are considered, there is no consistent or statistically significant evidence for an increase in leukemia or other malignant disease in nuclear test participants." Significantly, they say, the study replicated the earlier Smoky findings. But they also suggest that this result may be nothing more than a statistical aberration. And they dismiss the discovery of excess prostate cancer, noting that no previous tie to radiation has been established.

Gloria Christopher, executive director of the Iowa-based National Association of Atomic Veterans (NAAV), says that the study is "garbage" and "ridiculous" because it compares the test participants with a control group of civilians, not veterans. This makes it subject to bias caused by the fact that civilians are in somewhat worse health than veterans throughout their lives; as a result, the incidence of excess mortality may be underestimated.

The difficulty, says Jablon, is that an adequate control group of veterans does not now exist, and preparing one would take three more years and a million dollars. The research council is expected to propose such a project later this year. "In retrospect, it might have been a good idea for this study," Jablon told *Science*, "but we were under pressure from the [Pentagon] to get the study out quickly." He estimates that in any event, it would not have altered the results by more than 10 percent, which is not enough to affect the conclusions.

Several independent experts, including Ross Prentice of the University of Washington and Michael Stoto of the Kennedy School of Government, praised the report and found its conclusions reasonable. Glyn Caldwell, who is presently assistant director of the Arizona Department of Health Services, describes it as "reasonably well done. It does have some shortcomings, but these are well identified." He adds that "there is no way to prove or disprove that the Smoky results are due to chance." Stephen Lagakos, a biostatistician at the Harvard School of Public Health, remarks that due to the study's low statistical power, the results are "not inconsistent with excess risk." And John Bailar, a statistical adviser to the *New England Journal of Medicine*, notes that the incidence of cancer might be slightly understated because the cause of death was not always ascertained, and no search was made for cancer victims who are still alive. But fundamentally, he says, "It is a very sound piece of work."—**R. JEFFREY SMITH**

* G. P. Putnam's Sons, New York, 1982.