

because the design of their fuel cores and heat-transfer systems does not permit conversion with fuel elements now available.

The US is responsible in part for the situation. Under the Atomic Energy Act of 1954 the government encouraged universities to build research reactors to train scientists, engineers and technicians. In the early 1960s the US exported low-enriched uranium for research reactors abroad as part of the "Atoms for Peace" program. As greater power levels and neutron fluxes were needed to perform new experiments, the quantity of U^{235} was stepped up, either by using fuels of high uranium density or by increasing uranium enrichment. The Nuclear Proliferation Act of 1978 was intended to reduce high-enrichment inventories both at home and abroad as a principal way of decreasing the risk of weapons-grade uranium from falling into the hands of agitators and adversaries.

At the 25 September hearings before the House Committee on Science and Technology, arguments were presented against the NRC rule. "I believe the evidence is compelling," said Edwin L. Zebroski of the Electric Power Research Institute, "that a number of research reactors are likely to cease operation and cease to be available for training, research, testing or the production of radioisotopes for research and medicine" if the rule is imposed. "Our society—and with it our regulatory, legislative and judicial establishment—is in considerable disarray on how to define or specify 'how safe is safe enough'... The proposed rule on conversion is an apparent attempt to reach an objective the NRC uses in the phrase 'preferably zero risk.'"

No known threat. Safety and security measures, including increased physical barriers to access, alarms, guards and television monitoring systems, have been upgraded in the past few years, said Zebroski. Indeed, NRC staff testified that there has never been an attempted theft of fuel at a research reactor facility in the nearly three decades that they have been running and that no known threat exists.

For DOE, James S. Kane, deputy director of energy research, observed that if as much unirradiated fuel as possible were to be stored at secure DOE facilities, "theft or diversion ceases to be an issue. We have never considered the diversion of irradiated fuel to be an issue. The difficulties in surreptitiously handling a highly radioactive element, plus the technical and financial resources needed to separate the uranium in sufficient amount for a nuclear device, make such threats, if any, extremely remote. Our main disagreement with the proposed rules centers on the treatment of reac-

tors that have essentially a lifetime supply of fuel. It is worth noting that the US government is not seeking the conversion to low-enriched uranium of foreign reactors with lifetime cores. With the exception of the four 1-MW TRIGA reactors at Texas A&M, Washington State, Oregon State and the University of Wisconsin, which use a different type of fuel with 70% enrichment, our research reactors are low powered with in-core inventories of less than 5 kg of U^{235} . The total amount of high-enriched uranium currently in storage at all of these reactors is less than 15 kg." So, to gather enough U^{235} for a workable weapon would require the theft of all the fuel in storage either simultaneously or in rapid succession. "That is extremely improbable," said Kane.

'Negligible benefit.' Kane went on to observe that DOE holds university reactors to be "very important" in training nuclear physicists and chemists, as well as reactor engineers and technicians. "If conversion of all US university reactors is mandated," he said, "some are almost certain to be shut down. For negligible benefit, we will have lost a valuable nuclear training and research capability."

Congress enacts peace research institute

A National Academy of Peace is an old idea whose time has come at last. Ironically, though, a variation on the idea came in an amendment buried in the last big spending bill of the 98th Congress, the Omnibus Defense Authorization Act of fiscal 1985. Under it, the nation's military programs will get \$297 billion for the year, while the new Federal agency will receive \$16 million for peace research and training over the next two years, with \$4 million provided during fiscal 1985.

The concept of a government institution dedicated to the study of resolving conflicts through peaceful means dates back to 1793, when Benjamin Rush, a prominent physician and signer of the Declaration of Independence, proposed a US Peace Office. Just about the only backer of Rush's idea was Benjamin Banneker, a black mathematician. In the 20th century, Senator Matthew Neeley of West Virginia introduced a bill in 1935 for a Federal department that would advance nonviolent alternatives to hostilities among nations and peoples—in contrast to the activities practiced by the existing War Department. Since World War II, nearly 150 bills have come before Congress from prominent members of both major political parties to create some form of peace department or academy.

Of those reactors that comply with the low-enrichment order, argued Robert S. Carter, chief of the Reactor Radiation Division at the National Bureau of Standards, their beam intensities would be decreased by 10%–15% and undesirable radiation would increase by a similar amount. Reducing the enrichment from 93% to 20% implies, whatever the fuel type, adding 10 kg or more of U^{235} to the reactor core. While studies of core physics show this is feasible, there is marginal loss of fast neutrons and substantial loss of thermal neutron flux, according to Carter. Accordingly, performance of some campus and commercial reactors would decrease.

For his part, DiMeglio told members of Congress that the expense of converting university reactors, presumably to be funded by DOE, "will have no discernible education benefit." DOE now provides about \$200 000 per year for the use of university reactors. The \$8 million to \$15 million to implement the new rule could be spent more productively to upgrade obsolescent university laboratories, he observed, "which would have a major effect on improving the quality of science and engineering in this country." —IG

Until now, those proposals have met quiet deaths on Capitol Hill. Many politicians and academics thought of the idea as pie-in-the-sky. Some feared that any peace agency would be a haven for pacifists or crackpots and that it would send a signal of weakness to foreign adversaries. Other opponents claimed the US already had three peace academies—West Point, Annapolis, and the Air Force Academy.

Wishful thinking. Many of the same arguments continue to be made. The most recent bill, introduced in 1983 by Senator Spark Matsunaga of Hawaii and 51 Senate colleagues, was opposed by the Reagan administration on the grounds that it would increase the already massive budget deficits and that its job is being done by the State Department and Arms Control and Disarmament Agency. David Stockman, director of the Office of Management and Budget, informed Congress last year that ACDA already serves "as the primary source of governmental assistance to studies in the area of international peace and understanding." A small band of senators led by Dan Quayle of Indiana and Jeremiah B. Denton of Alabama, called the proposal "flawed in concept, lacking in definition, entailing large expenditures for few benefits, duplicative of activities



US SENATE PHOTO

New Institute of Peace was championed by Senators Jennings Randolph (left), retiring after representing West Virginia since 1933, and Spark Matsunaga of Hawaii.

already underway in our educational system, and reflective more of wishful thinking than of sound planning and analysis." Political commentator George Will wrote that the academy concept "is based on the mistaken premise that peace can be taught as a discrete subject, like dentistry."

One NSF model. Notwithstanding the criticism, support for the academy continued to increase in Congress. One of its most ardent advocates was Senator Jennings Randolph of West Virginia—who had announced he would retire at the end of the session (at the age of 82), ending a Congressional career that began at the start of the New Deal in 1933. Randolph had proposed a US peace department back in 1945. In 1980, he and Matsunaga cosponsored legislation to create the Commission on Proposals for the National Academy of Peace and Conflict Resolution. The commission recommended to President Reagan the following year that the government should fund a nonprofit, independent corporation, modeled after the National Science Foundation, to support research, education and training programs in conflict resolution, diplomacy and international affairs. Like NSF, it would provide research grants and fund graduate scholarships and university programs.

As originally proposed, the academy would get \$23.5 million for its first two years. In the Senate-House conference on the defense bill, the scope of activities was cut way back and its title changed to the US Institute of Peace. Moreover, a grants program for graduate and postdoctorate students was established bearing the name of Senator Randolph.

New science. Kansas Congressman Dan Glickman, the key manager of the legislation in the House, says the purpose is not to teach peace. "The purpose of the institute is to create a

science of conflict resolution, something beyond mediation and arbitration, and teach people the skills of the science," says Glickman. "This will not make us weaker, as some skeptics argue, but will add to our power, because it makes it more likely that we will prevail in a world at peace."

Academics have been split on the need for such an institute. Roger Fisher, who teaches negotiating skills at Harvard Law School, observes that it would fill an existing gap. "We currently have a number of professional schools—the War College, Fletcher School of Diplomacy, Foreign Service Institute. These places have almost no training in conflict resolution," he says. "We need new teaching materials, teachers' conferences, more skills." Richard Pipes of Harvard's Russian Research Center, a consultant to the State Department, compares the way the British solved the problem in Rhodesia-Zimbabwe with the US handling of Middle East troubles. "Britain gave us a brilliant example of diplomatic skills," says Pipes. "Here was a situation that to all appearances looked hopeless, and I must say I expected general carnage to ensue. British diplomats managed to defuse the conflict

and achieve peaceful resolution. I doubt if we could have done it, not because we lack the good will, but because we lack the skill."

But Alan Cameron, formerly associate dean of the Fletcher School in Boston, disagrees, saying the notion that US officials don't know how to negotiate and don't have training readily available at universities and the State Department isn't true.

Neither Randolph nor Glickman is so naive to think the institute will bring peace itself. "Over the long term," says Glickman, "it's certainly going to help." Next year, when it is housed in a building—still to be designated—in Washington, D.C., the institute will:

- ▶ examine the nature and processes of conflict and civil strife through such disciplines as the social, behavioral and physical sciences

- ▶ develop techniques to resolve economic, political and cultural hostilities between countries and peoples

- ▶ provide support and coordination for various organizations currently engaged in peace studies, such as the Institute on Global Conflict and Cooperation at the University of California, San Diego; the Center for Conflict Resolution at the University of Michigan; the Carnegie Endowment for International Peace; and the Center for International Security and Arms Control at Stanford.

"One of the institute's principal functions," explains Randolph, "is as a clearinghouse for research that goes on in fragmented ways. The institute should strengthen and symbolize the relation between the worlds of learning and public affairs in matters of peace research." The legislation establishing the institute gives President Reagan 90 days after his second inauguration on 20 January to nominate 11 members for Senate confirmation to the institute's board of directors. In addition, the board will have four *ex officio* members—the secretaries of State and Defense, the head of the Arms Control and Disarmament Agency and commandant of the National Defense University.

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Peer-review evasions rebuffed, but recur

University administrators are learning to do business a really old-fashioned way when it comes to science facilities. Increasingly in the past few years they have decided that traditional peer-review procedures are creaky, cumbersome and capricious. They have found more effective an even older style of operation—political influence, which enables them to "bring home the bacon" by dipping into the Congressional pork-barrel.

Some university leaders have called on their Congressmen to rejigger agency budgets to finance new construction, with results that are mixed blessings for the government, universities and science. True, several institutions—among them, Catholic University of America, Columbia, Florida State, Boston University and University of Oregon—have succeeded in wheedling new facilities for their campuses without benefit of traditional peer review.