By the end of the decade, détente with the Soviet Union was defunct and Soviet actions in Afghanistan and Poland had chilled U.S.–U.S.S.R. relations. The low point was reached after Soviet downing of a Korean airliner in 1983. In President Reagan's first term, U.S. withdrawal from the International Institute for Applied Systems Analysis near Vienna and a pullout from Unesco and a resulting sharp cut in funding of international science activities were interpreted as indicating a reduced American commitment to international science.

The Administration in recent years has grown concerned about signs of lagging U.S. competitiveness in high-technology trade and about the transfer of strategic technology to the Soviet Union and other socialist countries. Recently, the Administration, in a more relaxed postsummit mood, appears to be looking ahead to some resumption of cooperation with the U.S.S.R. in science and technology. The Administration is evidently determined, however, to find a formula that will permit such cooperation without a sacrifice of strategic advantage. Some observers suggest that the new initiatives in international science indicate recognition by the Administration that to succeed in achieving such goals it will have to build the government's capacity for making and managing international science policy. ■ JOHN WALSH

Utilities Press Congress to Salvage Nuclear R&D

A proposal to reduce DOE's advanced civilian reactor research and expand military work worries nuclear industry

ENERGY Secretary John Herrington's plan for reordering the mission of his department's civilian nuclear research program has stirred up the nuclear power industry. Until now, Reagan Administration appointees to the Department of Energy's top post have enjoyed broad support from industry suppliers and power companies. But Herrington's decision to intensify research on space and terrestrial power needs of the military at the expense of commercial reactor R&D is angering longtime allies in industry and in the Congress.

Funding for nuclear power research has been declining in recent years, as it has for other energy technologies. The Reagan Administration has emphasized high-risk, long-term research over applied research and demonstrations, on the grounds that industry should be responsible for technology development. But the Administration's latest policy proposals, says Thomas J. Price, vice president of the American Nuclear Energy Council, go too far. He contends, "They will lay the foundation for eliminating DOE's civilian nuclear programs."

Overall, the proposed fiscal year 1987 budget for civilian reactor research is $222.5 million, a deep cut below this year's budget of $319.7 million. Funding for advanced reactor R&D alone shows a 61.5 percent reduction to $49.5 million. These and other reductions imposed by the Office of Management and Budget, DOE officials acknowledge, were accepted without protest by Herrington. OMB restored $50 million in funding to the nuclear R&D budget only after Senator James McClure (R–ID) and Senator Slade Gorton (R–WA) intervened prior to the unveiling of the President's budget on 5 February. The additional funds were needed to ensure continued operation of key facilities at Argonne National Laboratory in Idaho, such as the Experimental Breeder Reactor II and the Fast Flux Test Facility at the Hanford Engineering Development Laboratory in Washington State. Both facilities are slated to conduct more military power reactor research.

"It's a disgrace," says Loring E. Mills, vice president for nuclear programs at the Edison Electric Institute, who is disturbed by the deterioration of the civilian research base. He describes DOE's new emphasis on military reactor work as "gamesmanship" and as "a Defense Department effort to find ways to get their programs subsidized."

Much of the $97.2 million in savings derived from these reductions have been used to boost research on small nuclear power systems for the military, primarily President Reagan's Strategic Defense Initiative (SDI). Spending on these terrestrial and space-power systems is up $51.4 million to $71.6 million. The budget for advanced isotopic power systems to support military and National Aeronautics and Space Administration programs would increase by $3.7 million.

In contrast, funding for liquid metal breeder reactors would be cut by $13 million. Component testing is slated for elimination and fuel-cycle work would decline sharply. Hardest hit by cuts is high-temperature, gas-cooled reactor (HTGR) research, which had received steady support from DOE in recent years. A fission reactor that has been under development since the late 1950's, it is slated to be chopped from $30.6 million to $5.3 million. The technology promises to offer higher operating efficiencies, less downtime, and significantly greater safety than light-water reactors. The Energy Research Advisory Board, in its December 1985 recommendations to Herrington, suggested that HTGR research be continued at modest levels to ensure the availability of the technology in the 1990's.

Ranking program officials declined to discuss the nuclear research program in detail with *Science* until after congressional hearings are completed in March. But one DOE official said privately that despite competing research efforts in Japan, West Germany, and the Soviet Union, the HTGR was a logical choice to phase out. Gas-cooled reactor technology, he noted, already has been demonstrated in power plants in Pennsylvania and Colorado. A modular HTGR concept, which is the focus of current research, congressional staffers note, also is near the point where significant budget increases would be needed to test components.

To date industry has financed 60 percent of R&D costs, according to GA Technologies, Inc., part of Gas-Cooled Reactor Associates, a consortium of utilities and equipment vendors involved in the technology.

But with the grim budget outlook, funding restorations, industry and congressional aides say, may have to be gotten by cannibalizing other nuclear research programs. The water-cooled breeder program, industry analysts say, could be tapped for funds. Likewise, the light-water reactor program, funding for which is dropping $7.1 million to $41 million, is seen by some lobbyists as another potential target. It includes research related to the cleanup of Three Mile Island II; safety and licensing reform and simplification; and research for a standardized, second generation of light-water reactors, which vendors hope to sell in the 1990's.

John Landis, head of the Energy Research

Advisory Board's subpanel on nuclear power, warns that Congress and industry must be careful in tinkering with the remains of the civilian research budget. "The main point of our panel findings so far is that we must resolve the problems for light-water reactors—both institutional and technical." Otherwise, says Landis, who also serves as senior vice president of Stone and Webster Engineering Corporation, "there is no sense spending one dime on advanced reactors."

The budgetary upheaval touches a broad range of nuclear research activities, including the department's atomic vapor laser isotope separation (AVLIS) program for enriching uranium. The agency proposes to wind down research activities aimed at producing the next generation of enrichment equipment to enable the United States to stay competitive with foreign suppliers. DOE wants private industry to commercialize the technology, but industry officials are skeptical. "There is not going to be someone that will come forward with $850 million on additional research on a process they are not sure will work," says EEI's Mills.

Laboratory operations such as those at Oak Ridge National Laboratory also would be hard hit. Fred R. Mynatt, director of nuclear and engineering technologies at ORNL, says 270 people working in fuel reprocessing and in liquid metal and gas-cooled reactor research will be laid off in 1987. Similarly, John E. Nolan, director of the Hanford Engineering Development Laboratory, says 240 jobs will be lost due to the decline in civilian nuclear research.

The militarization of DOE's nuclear program, says ANEC's Price, runs deeper than just shifts in research budgets. He contends that DOD should be bearing $30 million in charges for operating, construction, and equipment expenses of research facilities that now are part of a $121.8-million charge in the civilian nuclear R&D budget.

The intermingling of civilian and military nuclear research programs and budgets, says Price, must be stopped. Defense activities should be placed in a separate budget function, so the Congress is not misled about the actual level of civilian nuclear research and the costs of military programs. But the prospects for getting restitution for facilities operating costs or core nuclear research programs this year appears slim, industry officials concede. Says one Senate Appropriations Committee staffer, "The possibility of raising any one level more than a trifle is near impossible. This is an election year and there are less than 80 [working] days left for Congress." Faced with this uncertainty, industry lobbyists in Washington are pursuing a strategy of damage control for 1987. ■

MARK CRAWFORD

Briefing:

Biotech Firm Gets Another Black Eye Over Experiment

Advanced Genetic Sciences (AGS), the small California company that wants to conduct what would be the first field test of a genetically modified microbe, has shot itself in the foot again. The *Washington Post* disclosed recently that the company injected the bacteria into trees located outside on the rooftop of its Oakland laboratory without the knowledge or approval of the Environmental Protection Agency. News of the tests has brought more woes to AGS, EPA, and the industry as a whole as they grapple to develop a regulatory process governing the environmental release of biotech products.

Although the altered organisms, *Pseudomonas syringae* and *P. fluorescens*, are generally regarded by scientists and regulators as innocuous, Jeremy Rifkin, an author and activist, seized upon the disclosure of the tree tests as evidence that government regulations in biotechnology are inadequate, and that AGS and the industry cannot be trusted. The news prompted a federal judge to postpone a decision in a suit brought by Rifkin related to the AGS proposed experiment. In addition, a House subcommittee scheduled a hearing on the tests for 4 March.

The publicity about the tree tests is another blow to AGS, whose public image has taken a beating lately. In December, the company finally won permission from EPA and state authorities to field-test the bacteria, modified to prevent frost formation, on a one-tenth-acre strawberry patch in Monterey County. But community protests against the test erupted because, by AGS's own admission, the company failed to educate the local residents about the experiment (*Science*, 14 February, p. 667).

It was EPA that requested the tree tests in order to determine the potential of the modified bacteria to cause disease in several species. But the agency thought the tests would be conducted indoors. According to John Bedbrook, head of research at AGS, the trees were tested outside because they were too large to fit in the company's greenhouse. Bedbrook asserts that the experiment was contained because the altered bacteria were confined to a syringe and then injected into the bark of the trees. He says that no bacteria escaped. Steven Schatzow, head of the pesticides program at EPA, says, however, that the company violated agency rules and simply should have used smaller trees that would have fit in the greenhouse.

In any event, the experiment, which lasted 4 months, demonstrated that the modified microbes did not cause disease, according to Bedbrook and EPA. Although there have been press reports giving the impression that the trees injected with the modified organisms developed canker, Bedbrook and an EPA official pointed out in interviews that canker developed only in control trees that were injected with a pathogenic strain of the same microbial species. Bedbrook said that at the end of the experiment, the inoculated branches were autoclaved as a precaution.

Rifkin has also charged that the company's greenhouse was inadequate to contain the bacteria and that the windows of the laboratories were open during some of the indoor experiments. Bedbrook says that the company was vigilant. Greenhouse plants, for example, were sprayed or injected with the altered microbes in a Plexiglas container. After they were transferred out of the box, adjacent plants in the greenhouse were monitored to see if the bacteria moved from one plant to another. The tests were negative, Bedbrook says.

News of the tree test came a few days before a scheduled court hearing related to the AGS experiment before the U.S. District Court for the District of Columbia. After EPA approved the experiment last fall, Rifkin asked the court to halt the test, faulting the agency's decision on procedural grounds. But it is doubtful Rifkin can win because he must prove that the agency made an "arbitrary and capricious" decision. The agency spent more than a year reviewing the case and brought in an outside panel of scientists to review the experiment. Judge Thomas Hogan said he intended to rule in the first week in March. ■ MARJORIE SUN

Bloch Pares '86 NSF Grants Across the Board

The National Science Foundation, facing a $34-million budget cut under the Gramm-Rudman-Hollings deficit reduction act, has decided to trim the size of individual grants rather than cut the number of awards it will make in fiscal year 1986.

The decision was outlined in a statement signed by NSF director Erich Bloch on 13 February. The message, however, appears to have been slow to get out. When Bloch mentioned it on 26 February at a meeting of 300 invited guests at a National Academy of Sciences gathering on the federal budget outlook for research, it produced howls from academics. They complained it could