formation to their overseas subsidiaries—unless, in each case, a license was obtained. Says Larry Sumney of the Defense Department, "The ITAR, if enforced to the letter, would cover virtually everything done in the United States. But people understand they are written very generally." He believes that industries, at least, have learned to live with the ITAR, accepting the necessity of such regulations and realizing that they will not be capriciously enforced.

Reactions to the issues raised in the letter vary widely. Government officials seem perplexed. "I have never in my life seen anything get so blown out of proportion," says Sumney. Henry Mitman at Commerce says, "The situation is not nearly so bad as everyone is making it out to be." On the other hand, some university and industry representatives feel the issues are, if anything, understated in the presidents' letter. "We've got a national disaster brewing that has to do with free enterprise in general, of which

Academic Freedom at odds with commercial and military security.

academic freedom is just one piece," says Carver Mead of Caltech. C. Lester Hogan of Fairchild Industries says that the government's plans to restrict the export of technology, "will cause the United States to lose its position of leadership. It's just the wrong thing to do."

No one denies, however, that there is technology leakage and that there are difficult questions of where and how the leaks should be stopped. Universities are involved in the problem because their tradition of open discussions of research results do not allow them to plug leaks. Industries are involved because they employ foreign citizens and have overseas subsidiaries and so they too may be a source of leaks.

Defense and Commerce Department officials explain that technology leakage is a serious problem because the Soviets are making an unprecedented effort to obtain technological data from the United States, particularly in the fields of microcircuitry, lasers, and fiber optics. So eagerly sought is this information, says Sumney, that some law firms are going to the extent of getting copies of grant proposals for research in high technology areas and then passing the proposals to agents in nonaligned countries. From there, the proposals are routed to the Soviets. The lawyers obtain the proposals through the Freedom of Information Act.

There is also concern in the government that U.S.-developed technology is being obtained by economic competitors, such as Japan. No one expects that new technology can be kept in the United States forever. But, says Sumney, "The general feeling is that if we could hold onto newly developed material for about 2 years, we could keep our lead."

The university presidents, however, do not believe that universities are set up to police the export of newly developed technologies. In their letter, they refer to three recent incidents that cause them concern, one involving Cornell University, one involving MIT, and one involving a large number of universities.

Donald Cook, vice president for research at Cornell, explains that earlier this year a Hungarian scientist was scheduled to visit Cornell and study electronic circuitry. Cornell was informed by the State Department, however, that the scientist could only receive information in classroom situations—no private seminars or discussions were allowed—and that he could not be given pre-publication copies of research papers. Under these conditions, says Cook, "the visitor did not come to Cornell."

At MIT, says Dummer, a recent $250,000 Air Force contract for research on computer-aided design contained a clause saying release of the research results was to be controlled for 2 years in order to deny access to foreign nationals. MIT, Dummer reports, declined the contract.

The third incident referred to by the university presidents is the most far-reaching and is the one that brought the whole issue of export controls to a head. It involves the use of the ITAR in the Defense Department's Very High Speed Integrated Circuit (VHSIC) program, which is administered by Sumney. The program is designed to support the development of microcircuits with very fast signal processing speeds and also with the ability to withstand heat and radiation so that they can be used to form the "brains" of military weapons. Research under the VHSIC program is being carried out by both industries and universities and involves studies of circuit design and materials science.

When Congress authorized VHSIC in

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Meltdown Too Hot for Maryland Science Center

"The subject was not too controversial; it was just inappropriate," says Owen Phillips, explaining why he, as chief of the science council at the Maryland Science Center, agreed at the last minute to ban the showing of a play on the center's stage in Baltimore. The play, *Meltdown*, deals with the troubles of a family in Pennsylvania living near the Three Mile Island reactor at the time of the accident in 1979. It was written by a physicist at the University of Maryland, Ivan Kramer, and by a historian of science at Johns Hopkins, Robert Kargon, who holds an undergraduate physics degree from Yale.

The confusion around this theatrical misadventure is, in a sense, a fitting celebration of the real event. As Kargon says, "Back by popular demand: chaos and mismanagement." On 10 April, just 3 weeks before the play was to open, the center's director, James Backstrom, called the authors and told them he had read their script and decided to cancel scheduled performances.

Kramer says that he and his coauthor received grants amounting to $7800 more than a year ago from the Maryland Committee for the Humanities to fund work on the play. As the authors had proposed, they produced a script based heavily on five federal documents dealing with nuclear accidents. Large chunks of dialogue were lifted directly from transcripts of Nuclear Regulatory Commission (NRC) proceedings, but much dialogue is fictional, and Kramer says that he doctored some of the NRC conversations to "eliminate embarrassing slips in physics." The authors claim that they thought they were doing the science center a favor: According to Kramer, the center does not attract adult audiences and needs both public attention and financial help.

Backstrom agreed last year to lend them use of the theater, his enthusiasm boosted by the fact that Kargon had served as a consultant on earlier shows. Backstrom says he was at first "delighted" at the idea of having an educational show about Three Mile Island but became worried as the opening night drew near and no script

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had been supplied. On 7 April he finally got a copy of *Meltdown*, the story of an engineer at the nuclear plant with a pregnant wife and in-laws who run a nearby dairy farm. It was an inclusive treatment of local panic. Backstrom judged it to be "antinuclear." He says: "We felt it was advocating, or over-advocating a position; we don't do that here." With the concurrence of the center's chairman of the board, banker Howard Scaggs, and Johns Hopkins oceanographer Phillips, Backstrom canceled the show.

Backstrom considers the play poor drama as well as unsuitable "political science." Although he agreed to banish the work, Phillips disagrees on its merits as drama, saying it is a good play that deals with important issues. Phillips will try to find the authors an "appropriate" venue for their work.

The authors, who are now shortening the play, believe the officials at the science center simply panicked. The officials' major concern, Kramer says, is "to avoid alienating potential corporate backers" of the science center. He does not consider *Meltdown* a piece of advocacy.—***Eliot Marshall***

The Perils of Isabelle: Under the Budget Ax

Federal funds totaling $25 million have been cut from the fiscal 1982 budget for Isabelle, a partially built particle accelerator at Brookhaven National Laboratory that is beset with design problems. The original construction budget called for $41 million.

The cutback was triggered by doubts about how to build 1100 superconducting magnets—the heart of the machine (*Science*, 21 November 1980). While greatly expanded R & D efforts are aimed at producing a new magnet design, work on the rest of the project, including a circular tunnel more than 2 miles long, has been slowed. The Reagan Administration cut $20 million from the fiscal 1982 request for appropriations, and the House subcommittee on energy development and applications cut an additional $5 million from its authorization bill. The bill has not yet left the full House Science and Technology Committee, and the remaining $16 million in construction funds, according to a congressional aide, could "still be turned upside down" in continuing budget battles. The Department of Energy (DOE), meanwhile, plans to come up with new estimates in June for the total cost of Isabelle and date of completion. The old schedule called for completion in 1986 at a cost of $423 million. Says DOE official James E. Leiss: "The project has been delayed 1 to 2 years and will cost more."—***William J. Broad***

Edwards Hears Criticism from Synfuels Industry

James Edwards, the secretary of energy, told a string of jokes but gave little comfort to an audience full of synthetic fuel fans who came to hear him speak in Washington on 15 April. Edwards appeared at a conference on synfuels, "Prospects Under the Reagan Administration," sponsored by the U.S. Committee of the World Energy Conference. If his talk is a guide, the prospects are not bright for alcohol projects, which at one point Edwards referred to as backyard stills. As for the rest of the industry, it can anticipate much deliberation before there will be any spending. The Administration has established a firm financial barrier: it will require at least 40 percent private equity in every future project it helps.

Walter Flowers, a former congressman who now represents a major backer of synfuels development, Wheelabrator-Frye Inc., challenged the secretary on the sluggishness that the Administration has shown in getting started. "Despite the soothing words we hear," Flowers said, "many in industry and on Capitol Hill suspect that the Administration has no intention of carrying through on the bipartisan effort Congress approved in 1980 to subsidize this new energy industry. Flowers listed six examples of initiatives delayed or killed and noted that there have been no nominations to the board of the U.S. Synthetic Fuels Corporation (SFC), which was created to oversee the subsidy program. Flowers warned that the government may be placing too much faith in domestic oil drilling as a solution to the energy problem, and he raised the specter of a panic leading to the creation of a national oil company. Like Flowers, other executives expressed frustration at their inability to find officials in the government interested in their problems. As several people pointed out, none of the senior appointive posts at the Department of Energy, save that of the secretary, has been filled.

Edwards' response was to reassure his listeners that he really does want to foster a commercial synfuels industry; he pointed out that $17 billion, the amount appropriated for SFC loan guarantees and subsidies, "is a lot of money." He did not say how soon the SFC might begin to disburse it.

—***Eliot Marshall***

College Students Fail Global Awareness Test

Most college seniors who took a test on international issues in 1980 could only answer half the questions correctly, according to the Educational Testing Service (ETS), which administered the test. It was given to 3000 students at 185 colleges. In announcing the results in April, ETS official Thomas Barrow said that he was surprised that only 10 to 15 percent of the seniors were able to achieve a passing grade—correct answers on two-thirds of the questions. The highest scores were in the middle eighties.

The questions were designed to gauge the students' knowledge of problems of larger than national scope; they dealt with such issues as the impact of oil consumption on the economy and the reasons for President Carter's attempt to discourage development of the nuclear breeder reactor. Historical questions proved the most difficult, Barrow reports, although students generally did better on questions on the social sciences than on those on the humanities. There was no correlation between courses taken and scores on the test. But there was one unsettling and clear-cut finding: students naming "education" as their field of study were by far the lowest scoring group. The high scorers were those who said they majored in history, math, and engineering, in that order.

—***Eliot Marshall***