APS opposes proposed restrictions on NSF supercomputers

The first professional group to speak out on the government's proposed policy restricting use by scientists from the Soviet bloc, North Korea and Vietnam of supercomputers at US campuses and research centers is The American Physical Society. In its statement of 3 November, the APS Council agreed that "restraints on the use of unclassified facilities by certain foreign nationals would be harmful to the quality of academic scientific research and would in the long term threaten the nation's technological leadership." The statement went on: "We recognize the legitimate right of the government to classify information that is essential to national defense. Restricting access to unclassified university facilities, however, is an unprecedented intrusion into institutional academic freedom.... We believe that any attempt by the government to dictate who may have access to unclassified academic research facilities must be resisted." (For complete text, see box; then turn to Editorial, page 144.)

APS statement on supercomputer access

At its meeting in San Diego on 3 November, the Council of The American Physical Society issued the following statement on ongoing discussions about whether to restrict academic researchers from Soviet-bloc countries, China and other potential adversarial nations from using supercomputers at US universities:

The Council of The American Physical Society views with concern the suggestion that certain foreign nationals engaged in research at American universities and academic research centers be denied access to university supercomputing facilities. We believe that restraints on the use of unclassified facilities would be harmful to the quality of academic scientific research and would in the long term threaten the nation's technological leadership.

We recognize the legitimate right of the government to classify information that is essential to national defense. Restricting access to unclassified university facilities, however, is an unprecedented intrusion into institutional academic freedom. Universities and academic research centers must be free to select faculty, set curricula and admit students and researchers on academic grounds. The government is properly excluded from intervention in the intellectual life of a university.

American universities are communities of scholars in which new ideas and research results are created and freely exchanged. The computer leads to a fundamental alteration both in the way new knowledge is generated and in the way it is communicated. Indeed, the academic supercomputer centers were born out of the conviction that the universities must be at the forefront of this new technology.

We believe that any attempt by the government to dictate who may have access to unclassified academic research facilities must be resisted.

The issue caused apprehension when it first came up last summer (PHYSICS TODAY, September, page 55). What started it all was the National Science Foundation asking the four universities it had selected a few months earlier as national supercomputing centers to sign agreements that included provisos placing the facilities off limits to researchers who are citizens of Warsaw Pact countries and other nations designated as unfriendly or hostile. NSF proposed that the universities police the machines and the networks connecting them to other research centers on or off campus. The reaction was swift. Officials at the supercomputer universities refused to sign any agreement requiring them to function as cops.

So far their fears have been premature. NSF backed down, removing the offensive clause from the contract. In doing this, though, it reminded the universities in each written contract that they would have to abide by whatever national policy on supercomputer access for foreign citizens was eventually put in place. Exactly what the policy will be and how it will be carried out have been engaging a working group of the Senior Interagency Group on Technology Transfer the past seven months. The SIGTT task force consists of representatives of the departments of Commerce, Defense, Energy and State, the National Security Agency, NSF, NASA, the Office of Management and Budget and the White House Office of Science and Technology Policy. Its chairman is the undersecretary of State for security assistance, William Schneider Jr, who admits to being "the man in the middle" of a national controversy.

Spying targets. The argument against access is made most fervently by Stephen D. Bryen, deputy undersecretary of Defense for trade security policy and director of the newly formed Defense Technology Security Administration, the Pentagon's watchdog on weapons and high-tech exports. Bryen's crusade for export controls is similar to that of Richard N. Perle, assistant secretary of Defense for international security policy, who has warned repeatedly against reopening scientific exchanges with the Soviet Union (PHYSICS TODAY, June, page 55). Universities in particular are "targets of opportunity for our adversaries, who include scientists from the Warsaw Pact countries," says Bryen. "They often are suspected or known intelligence agents.... Under cover of their own national academies, they have been known to abuse the exchange programs of our academies, foundations and universities. They appear to be legitimate researchers—and some of them are—when in fact they often are on specific intelligence-gathering missions."

The US intelligence community is worried that scientists and students from Communist countries, though legally prohibited by export-control laws and the International Traffic in Arms Regulations from getting militarily useful data or high-tech products, might break US codes, work on weapons problems or learn how to reconstruct the supercomputers. Even more important, by using US supercomputers these visiting researchers could gain the experience and sophistication to overcome the computer backwardness of today's Soviet culture. They also might test and develop fundamental algorithms and applications with potential military or intelligence uses.

Visa restrictions. SIGTT is considering either prohibiting these researchers from visiting universities with super-

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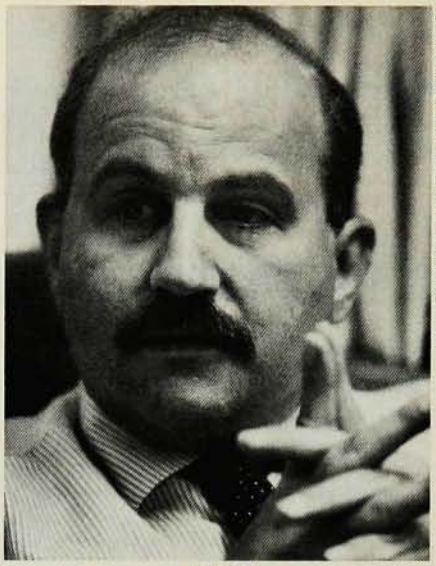
computers or, if they are allowed at those universities, placing the machines off limits. To achieve this, limitations on their travel or research would be entered on their visas. Bryen admits that the government would have great difficulty keeping watch on all scientists and students whose visas bear restrictions of one sort or another. Visa control would have to be enforced by government surveillance, probably by the FBI. Still, says Bryen, "the FBI follows them around now."

Such practices could exacerbate tensions between government agencies and academic scientists at a time when good relations and greater confidence are necessary. Since 1980, the Defense, State and Commerce departments have cracked down on scientists and engineers from the Soviet bloc and China who sought to attend unclassified technical meetings of US professional groups. In the past year, a few societies have imposed forms of self-censorship on their meetings, restricting attendance at some sessions to citizens of the US and friendly nations or to holders of Defense Department security clearances. Such actions have upset many academic scientists.

Independent of this, the Pentagon and White House are irked by the actions of some 2100 senior academic scientists, most of them physicists, who have signed petitions refusing to work on President Reagan's pet military project, the Strategic Defense Initiative, popularly known as Star Wars (PHYSICS TODAY, November, page 95). It hasn't escaped the notice of the Administration that three of NSF's supercomputer universities—Cornell, Princeton and the University of Illinois at Urbana–Champaign—are breeding grounds of discontent with SDI.

Symbolic act. "From the academic perspective," says John W. D. Connolly, director of NSF's Office of Advanced Scientific Computing, "there is fear that the government's concern with supercomputers is symbolic of something bigger. There are now questions about restricting certain foreign citizens from working at Fermilab and the National Magnet Laboratory and biotechnology research centers. Is the supercomputer problem a case of the camel's nose under the tent?" Rosemary Chalk, who heads the American Association for the Advancement of Science's Committee on Scientific Freedom and Responsibility, agrees. "The bottom line is that the proposed policy politicizes supercomputers," she says. "It's fair to ask what might be second on the list of restricted scientific instruments."

Even before that question is answered, there is the question of how far the proposed prohibition would extend. Other universities that have or soon



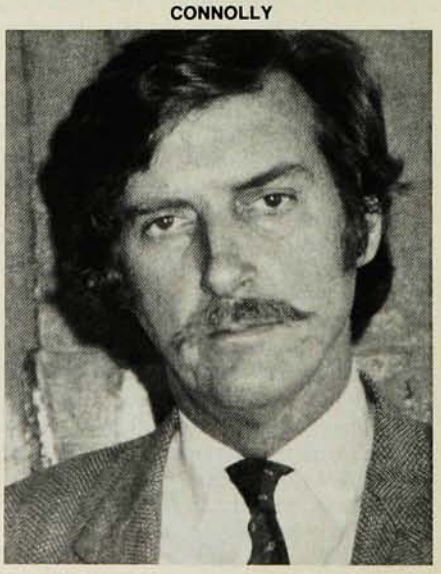
JOHN PHILLIPS/CHRONICLE OF HIGHER EDUCATION

BRYEN

will have supercomputers are Colorado State, Florida State, Purdue and the universities of Georgia, Minnesota, Pittsburgh and Texas. In addition, academic scientists on NSF grants can now access supercomputers at the National Center for Atmospheric Research, Boeing Computing Services, Bell Laboratories and Digital Productions, a Hollywood company that leases its Cray X-MP when it isn't creating graphics for television commercials and such far-out films as "Return of the Jedi." To complicate the situation, scientists and engineers working under NSF and Department of Energy grants and contracts are able to perform research through several existing networks connected to supercomputers, including ARPANET, TYMENET, CSNET and MFENET (the DOE's National Magnetic Fusion Energy Computing Center, operating at Lawrence Livermore).

"To control campus supercomputers and not commercial machines just wouldn't make sense," says Pamela Smith, an aide to Undersecretary

CONNOLLY



Schneider at the State Department. "We want to formulate any new supercomputer policy in consultation and cooperation with both the academic community and the private sector. It seems only logical, to be effective, that any national policy should be comprehensive. To be effective, the policy also would need to apply to US supercomputers outside our borders and possibly to supercomputers made by our allies."

Foreign proliferation. Some 145 supercomputers (currently defined as those operating at more than 100 millions of floating-point operations per second) are in use around the world. Of these, about 110 are Crays, with more than 70 in the US. But there are Crays, Cybers, Hitachis and Fujitsus in place in Canada, Britain, France, West Germany, Sweden, Italy, Japan, Saudi Arabia and the Netherlands. By next year, supercomputers will be installed in Norway, Switzerland and Abu Dhabi. Foreign sales of US supercomputers are controlled under the Commerce Department's export administration authority, and shipments of supercomputers from countries possessing them to the Soviet Union and other communist or hostile nations are restricted under Comex, the Western Alliance's multilateral coordinating committee on exports, and State Department bilateral agreements. In addition, State has asked countries with supercomputers to bar scientists from nations on the export-control list from using the machines.

NSF's Connolly argues that any restrictive policy should provide for exceptions and exemptions on a case-by-case basis—say Chinese scholars, in keeping with the Reagan Administration's policy of differentiating between the Soviet bloc and China. But the Pentagon's Bryen says he has "serious doubts that we are capable of administering exceptions in any meaningful way." Connolly recently ran the names of 700 principal investigators through State Department computers looking for those who might be excluded under the proposed policy. The computer spurted out the names of two Czech citizens. "At most this is a 1% problem," says Connolly. "If the government orders us to exclude certain foreign scientists from using supercomputers, it wouldn't make sense to risk a valuable program for a mere 1%."

On 27 September, in hope of averting any controls on supercomputer access, NSF Director Erich Bloch sent Schneider a five-page letter listing the procedures and practices that the foundation and center directors have agreed to put in place to prevent unauthorized use of the machines. Bloch argued that the proposed measures for access, control and security will provide "substantial assurance"

that unauthorized persons will not use the machines and that an accurate audit trail of users will be kept. Such measures, wrote Bloch, "also minimize the likelihood that persons who are authorized access for legitimate scientific research or education will misuse the access for unauthorized purposes."

Security strategies. Among the security measures: The supercomputers will be located in locked rooms and monitored 24 hours a day by staff. While user manuals for both hardware and software will be freely available on site, maintenance manuals will be held only by the computer contractors, and kept from the regular staff at the centers. Only those who have successfully "logged on" with an authorized identification number and password will be able to gain access or run programs. Existing files and programs will be usable only by the authorization of their "owners." Bloch concluded that "unauthorized access is difficult and does not represent a significant security threat. Abuse of authorized access is the more significant concern."

Though Bloch conceded that it is possible an authorized person might use the machine for unauthorized purposes, "anyone who significantly misuses authorized access would either be detected or fail to obtain further time." Small blocks of time will be allocated for peer-reviewed educational use and nonreviewed industrial use. Most time on NSF supercomputers will go to scientific and engineering research that has passed the peer-review process. "The system will thus ensure that only researchers of significant stature ... are able to obtain authorized access to the NSF-supported supercomputers," Bloch wrote.

One controversial suggestion by Bloch would enable Soviet-bloc students to obtain small periods of time to do educational computations under faculty supervision. This, he stated in the letter, "should entail no risk to national security separate or different from the risk inherent in admitting them to study."

For starters, all users will be informed that they have been allocated time for scientific or educational research as described in their proposals and that no other use of the supercomputer is authorized. Lists of all users will be reported to NSF and made available to intelligence agencies. Additionally, the centers have plans to monitor the use of each machine by the millisecond and to make reports of this available to principal investigators and NSF. "If a particular member of the group uses more time than appropriate for the work he or she is doing or warranted by the results he or she is reporting, that will quickly attract attention. In the case of a Soviet-bloc national," wrote Bloch, "I think it is safe to anticipate that loyal American scientists would be even more alert to any such inappropriate or unwarranted use of time."

Bloch's letter has been distributed to members of the SIGTT working group to weigh against options for tighter enforcement. If SIGTT finds for strict controls, it is likely the President will issue a directive on supercomputers.

—IRWIN GOODWIN

Congressmen review SSC with budget deficits on their minds

To the extent that the Superconducting Super Collider is *sui generis*, it is likely to be the last of a breed. There is deep concern that if and when it is built by the mid-1990s it may be too expensive—costing something like $6 billion. But as some of the most prominent particle physicists in the US and Europe told members of Congress all afternoon on 29 October, the true worth of the SSC cannot be based only on its cash cost. It seemed right that the setting for the hearing was the room usually used by the House Subcommittee on Space Sciences and Applications, its walls adorned with portraits of the nation's ventures in space, from Project Mercury to the Hubble Space Telescope, itself the biggest expenditure in history for a single scientific instrument.

The announced reason for the hearing was to review the decision by the SSC Central Design Group in favor of using superconducting magnets with a field strength of 6 to 6.4 tesla and to consider what else has happened on the way to deciding whether to build the behemoth proton accelerator with 20 TeV in each of its colliding beams. The hidden agenda, however, was to hear the case for the competing 3-tesla superferric magnet, which is under development at the Texas Accelerator Center, and to find out what is afoot at CERN that might overlap SSC if it were to be built.

In his opening statement, Representative Don Fuqua, a Florida Democrat who heads the House Science and Technology Committee, explained that the purpose of the hearing was not to debate whether to build an SSC, because "that is for another time," but to gain better understanding of future plans for the machine. For the Administration, Alvin W. Trivelpiece, director of the Department of Energy's Office of Energy Research, stated that no decision on SSC would be made before the fiscal 1988 budget appears early in 1987. "An object of this size and scope requires presidential endorsement," he said. Even after the White House and DOE say "go for it," the process of site selection is likely to take another 18 to 24 months. "I know people are eager to get on with this," said Trivelpiece, "but there are certain political and financial realities that need to be taken into account."

Passing milestones. Questioned by Representative Joe Barton, a Texas Republican, about the high cost of particle accelerators, Trivelpiece replied cautiously, like someone entering a thorny hedge and trying to emerge unscratched. Just about every particle accelerator has been built within its designated cost, he said, and Fermilab was brought in under estimate. Of course, said Trivelpiece, "there is the notable exception of Isabelle," though hardly anyone in the crowded hearing room needed reminding of the fate of Brookhaven's half-finished proton–proton collider (PHYSICS TODAY, December 1983, page 41). Actually, it was $20 million that Trivelpiece "reprogrammed" during Isabelle's death throes that went to support SSC plans and designs in its first year, fiscal 1984.

Funding of R&D for the supercollider during each of the following two years has been at the same level, and it is not likely to be much more than $20 million in fiscal 1987. So far, to the credit of the physicists who have been planning SSC, every milestone has been reached on time. Thus, in April 1984 the "Reference Designs Study" was delivered to DOE by the SSC Central Design Group (PHYSICS TODAY, June 1984, page 17). The group issued the "Siting Parameters Document" last June, but, Trivelpiece informed the 10 House members attending the hearing, DOE has not officially approved the site criteria (PHYSICS TODAY, September, page 53). In fact, he said, his letter offering to send the document to the 50 state governors was loaded with disclaimers—"I was saying in effect, *caveat emptor*." The reason for sending the site criteria to the governors, said Trivelpiece, was so they could "make sure whether or not, inadvertently, any bias had been incorporated that would cause one area to be favored over another."

Now that the magnet type has been selected (see page 58), the Design Group can get on with preparing a comprehensive conceptual plan and complete cost estimate, which are to be submitted to DOE by 1 April. When Representative Doug Walgren, a Pennsylvania