Controls on Trade and Technology: Pentagon Puts Stress on Know-How

Secretary of Defense Harold Brown has issued new guidelines governing the Defense Department's role in controlling the export of U.S. technology. The guidelines closely follow the recommendations of a Defense Science Board report which urges emphasis on control of know-how rather than technological end products. The initiative could lead to revision of what has been regarded as an inflexible system.

Congress and industry have been exerting increasing pressure for revision. The chief complaint is that the differing interests and responsibilities of the federal agencies which operate the control system have created a "standoff." The Department of Defense (DOD) has been the advocate of strictest controls among the agencies involved and the new guidelines may mark the first break in the stalemate.

Since the advent of détente there has been a debate in the United States over whether the export of advanced technology to the Soviet Union and other socialist countries amounts to a "giveaway" and is contrary to the national interest. To some extent that debate has been a theoretical one. Although trade between the United States and the Soviet Union has increased substantially in recent years, the sort of broad economic cooperation which some anticipated has not developed and the export of technology has remained fairly modest.

The controversy, however, continues, centering on the system of export controls established to deny the Soviet Union and other Communist countries technology that could strengthen them militarily. This control system is criticized for being unnecessarily restrictive and so cumbersome that export deals that are approved are often delayed unreasonably. The system is also scored as unrealistic since U.S. exporters are sometimes prohibited from selling products and technical data that are readily available on world markets from foreign competitors of U.S. firms. [There was a furor last year over charges that licenses had been issued for export to the Soviet Union of precision grinding machines which produced miniature ball bearings enabling the Russians to make guidance systems for multiple warhead (MIRV) missiles. The licenses were issued after an investigation in 1972 showed that similar ball-bearing technology was available in Switzerland and Italy.]

Since early last year, the focus of discussion of reform of the export control system has been a report titled *An Analysis of Export Control of U.S. Technology—A DOD Perspective*, done by a Defense Science Board task force headed by J. Fred Bucy, executive vice president of Texas Instruments. The new DOD policy statement draws explicitly on the recommendations of the Bucy report in giving "interim internal guidance" to DOD on export control matters.

Most notably, the statement puts emphasis on the control of know-how rather than hardware. As policy, "Defense will place primary emphasis on controlling exports to any country of arrays of design and manufacturing know-how; of keystone manufacturing, inspection and test equipment; and of sophisticated operation, application or maintenance know-how."

The Bucy panel was concerned exclusively with very high technology—aircraft, jet engines, instrumentation, and solid-state devices. The report, in discussing technology transfer in trade with socialist countries, stressed that design and manufacturing "know-how" is in many instances more important than end products. The task force emphasized innovation and urged that export controls be used to help the United States maintain its lead in the ability to convert science into product. The report defines several levels of technology transfer, the most strategically sensitive being the "active" forms such as those providing for establishing a turn-key factory and training foreign personnel.

On the other hand, Bucy and his task force were generally less concerned with protection of products. Product sales, they argued, in most cases, do not result in a transfer of current design and manufacturing technology. There would be exceptions to this rule in the case of commodities with direct military applicability. And in some cases, "reverse engineering" would make it possible to reconstruct know-how from the end product. But in most cases, the Bucy report seems to endorse a somewhat more relaxed attitude toward export of products incorporating sophisticated technology than has been the Pentagon's wont.

The policy statement does, however, also follow Bucyism in directing that proposed transfers of technical data be subjected to even closer scrutiny. The report asks that validated licenses be required for export of critical technology to all countries, not simply Communist ones. The statement voices support for negotiations with other Western industrial countries on measures to tighten up the leaks through export or reexport of critical technology to Communist countries.

Asked to comment on the policy statement, Bucy said he is encouraged that DOD officials appear to agree with the thinking of the Defense Science Board. He said the statement was a "step in the right direction," but that "nothing will happen unless changes are made in old charters and in old policies."

Changing export controls will not be easy. The machinery, constructed in the early stages of the Cold War, is based on a system of licensing that covers virtually all exports, but requires close scrutiny for only one category. Most commodities and technical data are exported under the so-called general license which is issued for exports not deemed to be of strategic significance. For exports on a list of designated products or technical data, a "validated license" is required. These licenses are issued only on the basis of detailed applications and often cover a single transaction.

Validated licenses are required for all products and materials on a commodities control list (CCL). Export of technical data is governed by Export Control Regulations that define and set conditions for the transfer of such technology.

The export control system has an international dimension. The United States cooperates with 14 other Western industrial nations—essentially the NATO countries plus Japan—in a voluntary organization called the Coordinating Committee (COCOM). COCOM has its own embargo list and works by consensus; each member country has a veto. The American list has a few more items on it than the COCOM list of items subject to scrutiny, but is not substantially different. What does differ, according to some critics, is the interpretation by some COCOM members of what can, in fact, be exported. Some COCOM nations are said to stress economic rather than security considerations in making decisions on sensitive exports. In addi-

tion, the control systems of member nations are regarded as much less elaborate than the control system of the United States. The result, say the critics, is a flow of strategic products and technology eastward.

The Department of Commerce is responsible for administering export controls through its Office of Export Administration (OEA), but policy is made in consultation with other federal agencies. Specific license applications which raise questions on strategic grounds are considered by the Interagency Operating Committee. The departments that dominate the operating committee are Commerce, State, and Defense although other agencies, including the Central Intelligence Agency, are represented.

The Pentagon role in the control system was given a firmer legislative base in the Military Procurement Act of 1974. This act bore an amendment requiring the Secretary of Defense to review virtually all applications for exports to Communist countries. Although the requirement was modified later to provide for consultation with OEA on which types of transactions needed to be reviewed, the act was widely interpreted as meaning an expansion of the Pentagon role, and, in fact, the questions it raised seem to have led to the commissioning of the Bucy report.

The view in industry is that DOD has what amounts to statutory veto power and has exercised it vigorously in cases where the strategic value of exports is in dispute. The critics say the committee's unanimity rule makes the Pentagon blackball decisive. Bureaucrats familiar with the process dispute the portrayal of DOD's reflex negativism. They say that disagreements occur in a fairly small number of cases and that when DOD recommends denial of a license, other agencies are polled and further facts in the case are sought and the matter negotiated. They admit that this process leads to delays, which industry finds frustrating, but argue that faster answers would probably mean more denials.

Meaningful data on the handling of export applications for Communist countries are hard to come by, but OEA did publish figures for the first 6 months of 1975 which provide a clue. In that period the office processed 1502 applications for the U.S.S.R., Eastern Europe, the People's Republic of China, and Cuba. Of these, 53 were rejected and the rest approved. The impression among those familiar with the control system is that the rate of denials is now somewhat higher than it was in 1975.

Federal officials deny that the ups and downs of détente have had any effect on the pattern of approval and denial of licenses. Their job, they say, is to apply the law and keep their eye on the criterion of national interest. Some detached observers say, however, that the general

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Harvard Under Fire for Mishandling Grant Money

In the spring of 1976, a special audit of a handful of research projects at the Harvard School of Public Health (HSPH) revealed that the school had mishandled federal grant money to the tune of $132,349.39. Harvard promptly paid the government back, but the incident raised questions about just how extensive the mishandling might be. This month, a team of federal auditors went back to Harvard to see what they can find.

And while the auditors pore over the books, lawyers will be preparing to defend the university against a suit filed by the man who blew the whistle on the fund mismanagement in the first place—a researcher named Phin Cohen who found himself out of a job (his appointment at the School of Public Health was not renewed) after going to auditors at the National Institutes of Health (NIH) to request an investigation of his own research funds which, he claimed, were being diverted by his boss to pay for other departmental expenses. Cohen's suit charges that he was let go because of the trouble he caused, not because of any failing as a scientist. Harvard denies any connection between the two events and has filed a petition for dismissal of the case, which probably will not go to court for some time because the court dockets are jammed.

Phin Cohen accepted a job at Harvard in 1969, with the understanding that he would have to support himself from grant funds because the HSPH had no money of its own for his research. Within a year, Cohen began getting grants but there were several months at first, after an anticipated grant failed to materialize, that Cohen's research was supported by the Department of Nutrition. Department chairman Frederick Stare decided that Cohen had to pay the department back. And so, the department began charging certain "non-Cohen" costs, such as the salaries of technicians who never worked in his lab, against his grants. It was the failure to get satisfaction from authorities within Harvard University that finally led Cohen to go directly to NIH with the allegation that his funds were being misspent in violation of government regulations and, certainly, he claimed, in violation of the spirit of the peer review system. And it was the NIH auditors who discovered that whistle-blowing Cohen's allegations were essentially correct.

The question now is whether Cohen is right in alleging that it is common practice to charge such items as technicians' salaries, laboratory equipment, and general supplies to the wrong grant. NIH auditors, who have also begun bookkeeping investigations of other universities, hint that it may be. And, off the record, a number of researchers questioned by *Science* admitted that it is not uncommon to "fudge a little," so that if there is a little extra money in one grant it may be applied to another. But it is, nonetheless, illegal, and the current round of auditing is likely to provide the makings of a scandal. It is also likely that Congress will get into the act with a series of hearings that might leave a number of research institutions embarrassed, to say the least.

Carter Revives Dream of a Sea-Level Canal

At his "town meeting" in Yazoo City, Mississippi, last 21 July, the President took everyone by surprise by resurrecting the idea of building a sea-level canal between the Atlantic and Pacific oceans. Replying to a question about the Panama Canal, Jimmy Carter said that "before many more years go by we might well need a new canal at sea level." The next day, he brought the idea up again. A "larger, wider, deeper," canal "might be in the interest of our national security militarily as well as economically," he said. "A new sea-level canal would not be unreasonable."

Carter's astonishing pronouncement

political atmosphere appears to have an osmotic effect and approvals seemed to come more easily during the palmier days of early détente.

Some observers see the new policy as making possible the increased export to China of high-technology equipment with military applications, such as computers and other electronics products. In general, China has sought to purchase finished high-technology goods from the United States, while the Soviet Union has been primarily interested in acquiring manufacturing technology.

Advanced technology, of course, represents only a small part of total East-West trade and is an important, but probably not dominant factor, in the overall trade relationship. There are signs that the upward trend in East-West trade has peaked, or at least paused. The most obvious damper on expansion of trade between the Soviet Union and United States was the U.S. action in 1974 making the granting to the Soviet Union of most favored nation status and increased trade credits conditional on Soviet liberalization of its emigration policies. As a result, the Soviets in 1975 declined to put into force the 1972 Soviet-U.S. commercial agreement, and the U.S. action has generally chilled U.S.-Soviet trade relations.

Other factors, of course, have had an arresting effect on expansion of East-West trade. The main ones are inflation in the West, which has made Western goods more expensive, and the growth of the East's trading debt, which has reached about $40 billion. Although socialist countries face serious long-term difficulties in earning hard currency necessary to finance imports from the West, their leaders' interest in U.S. advanced technology seems to persist.

In the United States, in addition to the human rights issue, there remains an underlying conflict on attitudes about technology transfer to socialist countries. In a special sense the antagonists can be called protectionists and free traders. At one extreme are protectionists who would embargo all technology as a means of waging economic warfare, since they assume that the socialist countries are dedicated to gaining dominance over Western nations. At the other pole are free traders who feel that restrictions on transfer of technology can only cause minor delays and hurt the United States more than the socialist countries. Some free traders argue that liberal policies on export of technology are advantageous to the United States because they create a dependence in the socialist countries for U.S. technology.

Needless to say, most of the serious discussion is carried on by those whose views are nearer the center of the spectrum. Bucy, for example, is regarded by many of his colleagues and competitors in industry as a protectionist. He de-

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caught many of his advisers back in Washington unawares and prompted speculation that the idea was nothing more than a negotiating ploy, part of some strategy to win support for the controversial Panama Canal treaty. The idea of a sea-level canal was thought to be only a dream that had long since been put to rest as being too costly and too environmentally risky. Contrary to the President's assessment, the proposition seemed entirely *unreasonable*.

But Carter was quite in earnest, it turns out, and the new treaty, signed ceremoniously on 7 September, contains a provision for a feasibility study by the Panamanian and U.S. governments of a future sea-level canal across Panama. Whether the project will ever go through is anybody's guess, but a reassessment of the scientific aspects of building such a canal has already begun.

On 1 August, presidential science adviser Frank Press, director of the Office of Science and Technology Policy (OSTP), wrote to National Academy of Sciences president Philip Handler, asking for a quick turnaround study that, from start to finish, would take only 8 weeks. Press wanted to know whether we know anything about the environmental consequences of building a sea-level canal that we did not know the last time the idea was raised and disposed of.

In December of 1970, the Atlantic-Pacific Interoceanic Canal Study Commission, using a report from the Academy among others, concluded that "the risk of adverse ecological consequences stemming from construction and operation of a sea-level Isthmian canal appears to be acceptable." Press said, "It seems appropriate to review our current state of knowledge of this issue."

The Academy duly appointed a committee which has met and is already preparing a report—due 30 September. And though its conclusions are not yet in, a couple of things can be said. One, according to individuals who sat through much of the 3-day meeting, is that no one can figure out how the 1970 commission came to the conclusion that the ecological consequences of a new canal "appear to be acceptable." One participant called it a "puzzlement" and added that "you sure couldn't draw that conclusion from the old Academy report."

Two, it seems almost certain that, leaving aside the enormous cost of construction, there would be strong opposition to a new canal on ecological grounds. The Academy committee, headed by Alfred M. Beeton, director of the Great Lakes Research Institute in Ann Arbor, Michigan, is likely to answer Press's "current state of knowledge" question by saying that there has not been any substantial change since 1970. Or, as one observer put it, "There is a good bit of new information about such things as the potential migration of marine organisms, but it is mostly fine detail—nothing that would enable you to make a policy decision that says a sea-level canal would be ecologically safe." "What we need," says Beeton, "is more information about the kinds of organisms that might migrate through a sea-level canal, particularly from the Pacific, which is higher, to the Atlantic."

According to the newly signed, but yet to be ratified treaty, if a decision were to be made to go ahead with a sea-level canal, the United States has right of first refusal to build it.

Thus far, OSTP and the Council on Environmental Quality have expressed interest in a sea-level canal from an ecological point of view, but a major feasibility study would certainly encompass a number of other issues, prominent among them the need for a new canal for military purposes since many modern vessels are too large to pass through the existing one. Interestingly, Secretary of Defense Harold Brown was once, in quite another context, a supporter of a sea-level canal. In the late 1950's Brown, then a young scientist at the Livermore Laboratory, was a forceful proponent of the Atomic Energy Commission's Project Plowshare, which was calculated to turn nuclear power to peaceful pursuits—among them, using a series of nuclear explosions to dig a sea-level canal. Brown has made no pronouncements about what he thinks of the idea of a sea-level canal today.

—Barbara J. Culliton

scribes himself as a free trader who feels it essential that U.S. "lead time" in strategic high technology not be eroded by uneconomic and unwise transfers.

Some of Bucy's peers in the electronics industry think that the Bucy report is oversolicitous in its concern about transfer of technology, but applaud the report and DOD follow-up action on it because it at least offers the hope of clearer ground rules for the control system and, perhaps, some lifting of the secretiveness that surrounds it.

The DOD initiative, however, is viewed as a small and still ambiguous one. And if there is one point agreed on by the disputatious partisans on all sides of the question, it is that any significant change in the system would require a very firm word from the White House.

—JOHN WALSH

McKelvey Ousted as Director of Geological Survey

In a move that is tantamount to a firing, Cecil D. Andrus, the Secretary of the Interior, has announced that on 1 January 1978 Vincent E. McKelvey will step down as director of the U.S. Geological Survey (USGS) to become a senior research geologist there. The move has alarmed prominent university geologists, survey scientists, and McKelvey himself, who worries that it is a first step toward "politicizing" USGS, whose excellent scientific reputation has been based partly on its independent character.

The cause for their alarm is that this will be the first time in USGS's 98-year history that an incoming Administration has asked to have its own director. McKelvey told *Science*, "One of the reasons for the quality of work by the Survey in the past has been the continuity of its leadership." He notes that the Survey has had only nine directors in the nearly 100 years of its existence.

However, it seems that McKelvey's job has been hanging by a thread since Andrus took office in January and promised sweeping changes and greater centralization of the sprawling department. According to two sources, at that time Andrus sought to get rid of McKelvey, but the dismissal was stayed by Frank Press, a fellow geologist who had just come to town as President Carter's science adviser. Press persuaded Andrus to follow the tradition of having the National Academy of Sciences duly certify qualified scientists as candidates for the job. The Academy acted in August, and Andrus announced McKelvey's exit almost immediately, on 6 September. Andrus is not bound to pick one of the five names the Academy has submitted to him, but the way that feeling in the geology community is running about McKelvey, the choice of a non-Academy candidate could stir the geologists' anger still more.

Since the Carter Administration has shown no particular hostility to science, or to the traditions governing federal science agencies, there has been considerable speculation about why the Administration decided to get rid of McKelvey at the risk of offending the geologists who have proprietary feelings about their "nonpolitical" Survey.

Two reasons have been suggested. One is that the Administration wants "its own man" in the job because estimates of domestic U.S. oil and gas reserves, the Survey's business, are a sensitive issue as it defends its energy plan ("the moral equivalent of war") which depends upon predictions of resource scarcity. The Survey's estimates are now in line with the Administration's, but, in the past, the Survey and McKelvey have been identified with figures now regarded as too high. In writing in the 1950's, McKelvey made some very optimistic estimates, and in recent years, as director, he has defended higher Survey figures against gloomier estimates of a dissident researcher, M. King Hubbert, whose views are enjoying a new vogue. So, the theory goes, the Administration may feel more comfortable with someone unencumbered with this history.

A simpler theory is also being advanced, namely, that McKelvey's personal style is incompatible with that of the new Andrus team. McKelvey's fellow scientists, all of whom regard him as an outstanding scientist and director, note that his manner of speech is probably too scientific, some say too long-winded, for the crisp, fast-talking reformers whom Andrus is bringing in. "Vince tries to answer every question thoroughly—even the rhetorical ones—and I think they want someone more glib," says one colleague.

However, despite the fears expressed by some, it may not be necessary after McKelvey's departure, for the USGS to start skewing their resource estimates or talking newspeak. The name most frequently mentioned as a successor is Randolph Wilson Bromery, the 51-year-old executive vice president of the University of Massachusetts. Bromery's name is not on the list the Academy forwarded to the White House, but he may be nominated anyway. For one thing, he is part of the Survey "family," having been a researcher there for 18 years until going to the University of Massachusetts. Second, Bromery has shown political acumen, having started at the university in 1967 as a humble associate professor of geology, risen to full professor and department chairman in 1969, and become chancellor of the university's Amherst campus in 1972. Now, as executive vice president of the entire, three-campus system, Bromery is in line for the presidency which comes open next 1 January. Third, Bromery is one of few black scientist-administrators on the national scene, and would be attractive to the Administration, which is now under fire from the black community. But despite his assets, it is still not clear whether the geology community would judge Bromery acceptable.

Barely a week after the firing, the Administration appeared to be trying to soothe the geologists' ruffled feelings. Joan Davenport, the 34-year-old assistant secretary for energy and minerals, who had asked for McKelvey's resignation, told *Science*, "We have absolutely no intention of putting a political person in there. We're going to put in a geologist of excellence. We certainly ought to be able to find such a person on that [the Academy's] list." And Frank Press, in the White House, told *Science*, "Both Andrus and Davenport have a healthy respect for the USGS's professionalism. But they have different priorities and a different agenda, and they are going to reflect that in their appointments."

But some geologists are saying they may weigh in with the Senate, at confirmation time, if Andrus' nominee for the job is too "political" for their liking.

—DEBORAH SHAPLEY