

January 9, 1986

## **U.S. - SOVIET ACADEMIC EXCHANGES NO LONGER SHOULD FAVOR MOSCOW**

### **INTRODUCTION**

During the Geneva summit, Ronald Reagan and Soviet Communist Party General Secretary Mikhail Gorbachev signed an agreement on U.S.-Soviet cultural, educational, and scientific exchanges. Although Reagan personally proposed some new ideas about improving contacts between Soviet and American citizens, the agreement itself is nothing new; it simply revives the agreement that was to have been renewed in 1980 but was allowed to expire because of the Soviet invasion of Afghanistan.

The U.S. and USSR by now have a long history of cultural exchanges, dating back to 1958. The record of these exchanges reveals asymmetrical benefits for the U.S. and Soviet Union. While Moscow has sent some ballet troupes and art exhibits to the U.S., it has been mainly Soviet scientists who have visited American research centers. Their purpose has been to become acquainted with U.S. technology that could be used for Soviet weaponry.

Because of the centralization of scientific and technological activities in the Soviet Union, and the priority assigned to the military, the Soviets are well equipped and given to exploit exchanges with the U.S. for military purposes. By placing their scientists in the American scientific community, the Soviets obtain valuable information which is not contained in publications about personalities, institutions, and methods of work in American science, research, and development.

The U.S. government estimates (apparently on the basis of hard intelligence data obtained by the French) that, in the course of scientific exchanges with the U.S., the Soviets have obtained information on "developing and manufacturing composite materials for missiles and space systems; automated control designs for highly

accurate coordinate-measuring machines for quality control of weapons components and subassemblies; information on automatic control systems for optimizing rolling mills; acoustical data for developing low-frequency sonars for submarines; and information on aerial photography, magnetic recording systems, and lasers."<sup>1</sup>

The fact that Moscow has exploited past scientific exchange programs, however, should not prevent future U.S.-Soviet exchanges in other areas. It is useful, for instance, for U.S. specialists in Soviet affairs to get a taste of Soviet reality. It also is worthwhile for the U.S. to maintain some presence in the USSR beyond the American diplomats whose contacts with the Soviet people are severely restricted. Yet there is no need for Washington to rush into new scientific exchange programs. The top priority should be to improve existing programs so that they no longer endanger U.S. national security.

To this end, the U.S. should establish a bipartisan Advisory Committee on Exchanges, which would report to Congress. It would conduct ongoing evaluations of all exchange programs with the Soviets and their East European satellites, review past exchange projects, and complete exhaustive risk assessments before embarking on new exchanges in science and technology. For this work, a Committee on Exchanges would draw on the knowledge and experience of Soviet emigre scientists in the U.S. The Committee should establish criteria by which existing U.S.-Soviet exchanges could be evaluated, and as new exchanges were proposed or implemented, they should be measured by these criteria.

#### DIRECT ACCESS TO MILITARILY SIGNIFICANT TECHNOLOGIES

Through scientific exchanges, the Soviets have obtained direct access to American militarily significant technologies. From 1976 to 1977, Dr. Sergei Gubin of the Moscow Institute of Physical Engineering (an institution of higher education famous for training military R&D specialists) visited the Department of Mechanical Engineering of the University of Michigan. There he studied the technology of fuel-air explosives<sup>2</sup> under a professor who was a consultant to the U.S. Navy on fuel-air explosive devices. Upon returning to the Soviet Union, Gubin continued working on fuel-air explosive weapons.

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1. Soviet Acquisition of Militarily Significant Western Technology: An Update (Washington, D.C.: 1985), pp. 21, 24.

2. Fuel-air explosives munitions are based on a principle of creating an aerosol cloud of fuel-air mixture which is then detonated to achieve an explosive effect.

Kirill Rozhdestvenskiy from the Leningrad Shipbuilding Institute (the top training and R&D institution for Soviet naval architects) in 1979 and 1980 visited the Department of Naval Architecture and Marine Engineering at the University of Michigan. There he studied the "wing-in-ground effect" aerodynamic vehicle,<sup>3</sup> in which the Soviet military had been interested for some time.

From 1980 to 1981, Talis Bachman, a psychologist from the Tartu University in Estonia, one of the best teaching and research institutions in the Soviet Union, visited Vanderbilt University to study the interaction of man and machine. This field is important for designing heads-up displays that optimize the amount of data presented visually to a military weapons system operator. Heads-up displays are used to project flight data on aircraft cockpit glass, thus eliminating the need for the pilot to look down at instrument gauges. Among his other activities, Bachman attended a state of the art demonstration of such work funded by the Pentagon.<sup>4</sup>

#### WHAT ARE THE SOVIETS SEEKING?

It is argued that their presence at American research centers tells the Soviets nothing they could not learn by reading American scientific literature. There is some truth to this. What the argument overlooks, however, is that, although Soviet theoretical science is generally strong, the USSR encounters constant problems translating theoretical discoveries into hardware. According to Arthur Alexander, the Rand Corporation's leading expert on the Soviet weapons acquisition process, the critical information is know-how, which is something the Soviets cannot find in journals. Writes Alexander: "It requires personal contact, and frequently, dedicated effort by both parties. This applies to the transfer not only of know-how concerning a device or process, but also to purely theoretical information."<sup>5</sup> Exchange programs close this gap.

Another problem of the Soviet scientific establishment is excessive bureaucratization, which makes indigenous progress

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3. A "wing-in-ground effect" aerodynamic vehicle is an extremely low flying aircraft; it uses the aerodynamic effect created by its proximity to the ground to increase its payload without additional fuel consumption and/or increased power of engines.

4. The Honorable Frank Carlucci, "A Letter to Dr. William D. Carey," Science, January 8, 1982, pp. 140-141.

5. Arthur Alexander, Soviet Science and Weapons Acquisition (Santa Monica, California: Rand Corporation, 1982), pp. 37-38.

difficult. Because of the Russian tradition of relying on Western science and technology, information about Western developments serves as a catalyst for the Soviet decision-making process in science and R&D.<sup>6</sup> Firsthand information derived from Soviet-American exchanges is particularly important in this respect.

The accessibility and sheer volume of American scientific literature actually creates certain problems for the Soviets. It is difficult to establish, on the basis of scientific journals alone, what are the most promising directions of American research and which institutions and personalities are especially worth watching. But exchanges, which allow Soviet scientists to work in the midst of the American scientific community as colleagues, help Moscow address this problem. Soviet scientists who gain firsthand knowledge of the American scientific community, moreover, can help plan subsequent Soviet illegal acquisition of American militarily significant technologies.

#### SOVIET SCIENCE AND THE MILITARY

The Soviet bureaucracy is organized primarily for national security objectives. Coordinating all defense-related projects of the ministries, Academy of Sciences institutes, and universities is the powerful Military-Industrial Commission.<sup>7</sup> This coordination allows Moscow to ensure that exchange programs with the U.S. benefit the Soviet military.

According to Rand's Alexander, the role of "big science" in weapons development in the Soviet Academy of Sciences and the best universities has been growing since the 1960s.<sup>8</sup> This is of particular importance to the Soviet-American exchanges since the Soviet scientists sent to the U.S. usually are not specialists from weapons design offices. This would make the true purpose of the exchange too obvious. Instead these scientists typically work in the Academy research institutes or universities. The Soviets send to the U.S. scientists in their 30s and early 40s, who have no apparent background in weapons design and, therefore, are unlikely to be denied admission to the U.S. While in the U.S., the Soviet visitors have unrestricted access to the facilities and labs in universities and institutes.

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6. Ibid., pp. 38-39.

7. Soviet Acquisition..., op. cit. pp. 2, 3.

8. Alexander, op. cit., p. 28.

The Soviets are very well aware of the fact that it is becoming increasingly difficult to draw the line between what in modern science is important for weapons R&D and what is not. Soviet Major General M. Vasyukov, writing in Communist of the Armed Forces, the official journal of the Soviet Ministry of Defense in October 1985 stated:

Today it is difficult to overestimate the party's concern for the cardinal acceleration of scientific-technological progress in the matter of strengthening military-economic potential. After all, the leading directions of scientific-technological progress--the robot technology, computer technology, instrument making, and electronics--are simultaneously the basic catalyst of military-technical progress.

Therefore, the Soviets can send scientists to the U.S. who have never worked directly in the military R&D, and never will, but are able to obtain information that is useful for the overall advancement of Soviet military technology.

#### TARGETING AMERICAN UNIVERSITIES

The Soviet Military-Industrial Commission assigns high priority to gaining access to major American universities. The Commission has targeted MIT and Carnegie-Mellon, Cincinnati, Kentucky, Michigan, and Wisconsin universities as sources of information on new high-strength, high-temperature alloys, lightweight structural alloys, and powder metal processing. For methods of evaluating strategic concepts on space, aviation, and missile systems, the Commission is targeting the California Institute of Technology, Harvard, and MIT. Aerodynamics research at the California Institute of Technology, MIT, Princeton, and Stanford also is of great interest.<sup>9</sup>

Soviet scientists actually worked on the problems of communications at MIT's Operations Research Center; computers at the Operations Research Center at Berkeley and the Digital Systems Laboratory at Stanford; ceramic materials (crucial for space technology) at the Department of Material Science and Engineering at MIT; gas turbine aircraft engines at the Department of Aeronautical Science and Mechanical Engineering at Northwestern University;<sup>10</sup>

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9. Soviet Acquisition, p. 21.

10. International Research and Exchanges Board. Annual Report 1977-78 (New York: IREX, 1979), pp. 48-51.

computers at the Computer Science Department of UCLA; space technology at the Department of Aeronautics at MIT;<sup>11</sup> aircraft gas turbine engines at the Department of Aerospace Engineering at Georgia Institute of Technology; and semiconductors at the Department of Material Science and Engineering at MIT.<sup>12</sup>

By contrast, American scientists, for the most part, use exchange programs for short-term "scientific tourism." The typical American in the USSR on a long-term exchange program is a graduate student or junior university faculty member specializing in Soviet politics, history, languages, or culture. Thus benefits from the cultural exchanges unquestionably have been in Moscow's favor.

Even a cursory look at the institutional affiliation of Soviet participants in only one exchange program (International Research and Exchanges Board, established in 1968 by the American Council of Learned Societies to conduct exchanges with the Soviets and Eastern Europe) confirms the bias toward military research and development in Soviet approach to the exchanges. In the past decade, the Moscow Institute of Engineering Physics dispatched eleven scientists to study in the U.S.; the Moscow Aviation Institute sent four; Moscow Institute of Steel and Alloys, three; Moscow Advanced Technical School, four; Moscow Physical Technical Institute, two; Moscow Institute of Electronic Technology, two; Kuibyshev Aviation Institute, three; Leningrad Aircraft Instrumentation Institute, two; Leningrad Shipbuilding Institute, two; and Leningrad Polytechnical Institute, three. All these institutions are famous for training military R&D specialists and conducting their own R&D programs for the military.

These numbers would have been much larger had not the Afghanistan invasion and the Reagan Administration finally forced the State Department to be more selective in granting visas to Soviet exchange program applicants. The flow, however, continues. Example: even after Washington's row with the NATO allies over exports of pipeline technologies to the Soviet Union, Gennady Vasil'ev, a Soviet scientist from the Moscow Oil Institute, was allowed to come to the U.S. in 1984 and 1985 to study design and construction of oil and gas pipelines.

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11. International Research and Exchanges Board Annual Report 1979-90 (New York: IREX, 1981), pp. 45-46.

12. International Research and Exchanges Board Annual Report 1980-81 (New York: IREX, 1982), pp. 44-46.

## PSYCHOLOGICAL AND POLITICAL DIFFERENCES FAVOR SOVIETS

An argument is often made that both sides gain from scientific exchanges because American scientists learn about Soviet science from Soviet scientists visiting the U.S. This is far from true. Soviet scientists are instructed when departing to the West, "in speeches and conversations [to] abide only by those facts which have been published in our open press and have been authorized for publication abroad."<sup>13</sup> This instruction was strengthened considerably by a "workplace secrets" law of 1983, which is formulated so broadly that, in effect, no Soviet can convey any professional information to a foreigner without prior authorization of the secret police. A violation is treated as a crime punishable by up to eight years of hard labor.<sup>14</sup>

This law, combined with the unceasing "vigilance campaign" against Western "spies and saboteurs" waged for the last several years in the Soviet press, ensures that every prudent Soviet scientist will do as much listening and as little talking as possible in contacts with his or her foreign colleagues.

Soviet scientists are psychologically better suited than their American counterparts for protecting secrets. To survive, a Soviet citizen must learn to be on guard constantly, lest an incautious word slip out in the presence of a stranger who could be a secret police informer. Soviet scientists traveling abroad have to be certified by the KGB as "politically reliable." This means that the scientist has demonstrated superior ability to keep his mouth shut. An additional incentive for Soviet caution is the Soviet fear that information passed to an American in confidence may one day appear in the Western press.

## U.S. OBJECTIVES AND REALITY OF EXCHANGES

The U.S. has pursued several objectives in its exchanges with the Soviets. First, there has been a desire to improve mutual understanding between the Soviet and American people through exchanges of individuals and ideas. Second, there have been attempts, particularly in the 1970s, to use exchanges as one strand in the web of relations supposedly designed to moderate Soviet international conduct. And third, exchanges have been used to give American

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13. Michael Taksar, "Taksar Tells How Soviets Control Profs Visiting U.S.," Campus Report, March 16, 1983, Stanford University, p. 2.

14. Current Digest of Soviet Press, vol. XXXVI, No. 8, p. 13.

specialists on Soviet politics, history, economy, and culture a firsthand experience of Soviet reality.

It is the third objective that serves American national interest directly. Admiral Bobby Inman (USN, Ret.), a former Director of the National Security Agency and Deputy Director of the CIA, stated in 1983 that Soviet-American exchanges play an important role in fulfilling the needs of the U.S. intelligence community, Foreign Service, and other branches of the government for specialists in Soviet affairs with the firsthand knowledge of Soviet society.<sup>15</sup>

The first Soviet-American exchanges began in the late 1950s. While the U.S. sought to improve mutual understanding, it is now clear that the Soviets were interested primarily in American science and technology and in improving their image in the U.S. The same was true when exchanges began to flourish during the detente years. In 1972 to 1974, detente's heyday, twelve U.S.-Soviet exchange agreements were signed. They embraced existing exchange programs for students, and added exchange and cooperation programs in science and technology, environmental protection, medical science and public health, space, agriculture, world oceans, transportation, atomic energy, artificial heart research and development, and housing.

The State Department's control over the exchanges has consisted mainly of its power to issue or deny visas to Soviet visitors. During the 1970s, responding to the "spirit of detente," the State Department granted visas to just about any Soviet who asked. U.S. national security considerations were rarely, if ever, a factor in the decision to grant visas.

The most visible Soviet-American cooperative project was the 1975 Soyuz-Apollo space flight. This cost the U.S. \$250 million. It convinced the American participants that the U.S. was substantially ahead of the Soviet Union in space technology. But the Soviets got their foot into NASA's door and surely picked up useful and valuable information about space technology.

The U.S.-Soviet exchanges quickly ran into predictable snags. Americans had difficulty dealing with the Soviet bureaucracy. More important, Moscow was reluctant to give Americans access to areas of Soviet achievement, such as mathematics, or to the best research centers, such as the complex of Soviet Academy of Sciences institutes at Chernogolovka near Moscow, presumably because classified research is conducted there.

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15. Yale Richmond, Soviet-American Cultural Exchanges: Ripoff or Payoff? (Washington, D.C.: Kennan Institute for Advanced Russian Studies, The Wilson Center, 1984), p. 32.



American access to the best personalities in Soviet science also has been very uneven, particularly when it comes to Soviets attending conferences in the U.S. Then President of the National Academy of Sciences, Dr. Philip Handler, observed in 1978: "When American scientists invite Soviet scientists to come to their laboratories...they are told with monotonous regularity that the invited scientists cannot come and are then asked to accept someone else."<sup>16</sup> As early as 1975, the General Accounting Office reported that "the exchange of know-how may favor the Soviet Union." It added that perhaps "political considerations might justify this concession."<sup>17</sup>

Not until the latter part of the Carter presidency, with Soviet-American relations already deteriorating, were exchange agreements reviewed critically by the U.S. government. An interagency group evaluated the exchanges. It found that many of the projects had been approved because they fueled detente, rather than because they could be of scientific value to the U.S. It also was discovered that there was no centralized government management and oversight of exchanges, that statistical data on exchanges conducted under different federal bureaucracies were not readily available, and that it was impossible to establish how much the U.S. was spending on the exchanges.

This review was interrupted by the Soviet invasion of Afghanistan, after which a number of exchange programs were cancelled or allowed to lapse. In 1980, the National Academy of Sciences cancelled its federally funded exchange program to protest the internal exile of Nobel Laureate Andrei Sakharov. At the same time, the International Research and Exchanges Board, a nongovernment organization funded to a large degree by the U.S. government, also scaled down its Soviet exchange program. In response to the imposition of martial law in Poland in December 1981, President Reagan allowed U.S.-Soviet exchange agreements on science and technology, space, and energy to lapse.

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16. Dr. Philip Handler, "The Exchange Program between the National Academy of Sciences of the U.S.A. and the Academy of Sciences of the USSR," statement before the Subcommittee on Domestic and International Scientific Planning, Analysis and Cooperation, Committee on Science and Technology, House of Representatives, October 4, 1978, p. 75.

17. Comptroller General of the United States, A Progress Report on United States-Soviet Union Cooperative Programs, January 8, 1975, p. ii.

## CURRENT U.S. EXCHANGE PROGRAMS AND POLICIES

The U.S. government mechanism for dealing with exchanges with the Soviet Union is insufficiently comprehensive and lacks public accountability. The policy guidelines for Soviet-American exchanges are developed by the Interagency Coordinating Committee for U.S.-Soviet Affairs (ICCUSA). It is chaired by the Undersecretary of State for European Affairs (at this time, Rozanne Ridgway), and includes representatives from all U.S. agencies involved in exchanges, as well as those concerned with national security, such as the Department of Defense and the CIA.

The State Department's Office of Soviet Affairs has one officer solely responsible for representing the U.S. side in dealing with the Soviets over the issues of exchanges. The Bureau of Oceans and International and Scientific Affairs in the State Department has scientific experts to help in coordination with Soviet-American exchanges in science and technology. It is the individual U.S. agencies, designated for implementing exchanges, that administer such bilateral agreements. Soviet nominations for exchanges in science and technology are screened by the Committee on Exchanges (COMEX), which is a subcommittee of the Technology Transfer Intelligence Committee established in 1981 by the CIA. COMEX advises the State Department on issuing visas to the Soviets, but the State Department has the final word.<sup>18</sup>

The oldest existing exchange program is conducted by the International Research and Exchanges Board (IREX); it is relatively small with only some 1,742 Americans and 1,770 Soviets exchanged under its auspices from 1958 to 1983.<sup>19</sup> It is financed partially by grants from the U.S. Information Agency and the National Endowment for the Humanities and partially by grants from private foundations. IREX staff includes professional Sovietologists with long experience in dealing with the Soviets.

In the last several years the State Department has been more selective in admitting the Soviets to IREX programs. Perhaps as a result of this, IREX has succeeded in forcing the Soviets to accept more American students working on contemporary Soviet affairs, something the Soviets were loath to do for many years. IREX obtains data sheets on Soviet exchange nominees well ahead of time, which allows for a review process on visa issuance, and makes public the lists of all exchange participants. IREX is an independent body, but it formulates its policy in consultation with the U.S. government.

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18. Richmond, op. cit., pp. 26, 27.

19. Ibid., p. 22.

The situation is similar at the National Academy of Sciences, which has its own exchange program with the Soviet Union funded mostly by the U.S. government. This program includes seminars, conferences, and short- and long-term visits.

Special problems have come up in the past concerning bilateral agreements between Soviet agencies and such U.S. agencies as the Department of Energy, Department of Agriculture, and NASA. These U.S. agencies have no special expertise for dealing with the Soviets. Protecting American national security is not normally part of their agenda. Yet the exchanges resulting from these bilateral agreements can be sizable. In the late 1970s, for instance, the USSR annually sent nearly 1,000 visitors to the U.S. under these accords. The U.S. agencies have not always insisted on Moscow's providing full data on their exchange nominees well in advance, which made review by the intelligence community nearly impossible. The U.S. government agencies also take a possessive, proprietary view of "their" exchange programs with the Soviets. In the past, they tended to shield them and press the State Department to issue visas to Soviet visitors without sufficient review.

#### SOVIET-AMERICAN EXCHANGES AFTER THE GENEVA SUMMIT

At his meeting with Gorbachev in Geneva, Reagan signed an umbrella accord on exchanges. A number of bilateral exchange agreements had been renewed even earlier: in environmental protection, medical science, agriculture, world oceans, atomic energy, artificial heart R&D, and housing. Also under discussion with the Soviets is the possibility of a mammoth 35-year cooperative project on nuclear fusion, which would cost at least "\$3.5 billion in contributions from both nations" and involve "construction of expensive facilities."<sup>20</sup> This expanded exchange agenda, reminiscent of the 1970s, could pose threats to U.S. national security.

Much more to U.S. liking would be the large-scale exchanges between Soviet and American high school and college students proposed by Reagan. In negotiating the terms of such agreements, Washington should not allow Moscow to substitute programs that emphasize sending Soviet scientists to the U.S. College and high school student exchanges always have worried Moscow.

The new umbrella agreement will convey the impression to the U.S. federal bureaucracy that Soviet-American exchanges are to be encouraged at any cost. This might result in haste, poor oversight,

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20. The Washington Post, November 13, 1985.

and reluctance to resist Soviet demands. Such developments would negate much of the Reagan Administration's progress in reducing the transfer of militarily significant U.S. technology and know-how to the Soviet Union.

## RECOMMENDATIONS

Public accountability and well coordinated U.S. control over exchanges with the Soviet Union and its allies are necessary. To achieve them:

- o A U.S. Advisory Committee on Exchanges with the Soviet Union and its East European satellites should be established. It should be bipartisan, contain representatives from the Executive Branch, Congress, and the private sector, and should submit annual reports including criticisms and recommendations to Congress on the status of all exchange programs funded fully or in part by the U.S. government. These reports should be made public in an unclassified version.

- o The existing Committee on Exchanges (COMEX) under the CIA should provide all necessary information to the Advisory Committee. COMEX should have power to review all exchanges with the Soviets and East Europeans and to override decisions of government agencies conducting exchanges.

- o The State Department should negotiate concrete terms of new agreements only within the guidelines set at the start of the Reagan Administration that established the protection of U.S. national security as the condition of Soviet-American exchanges. The Department of Defense should be a participant in developing the U.S. position.

- o No agency of the U.S. government should be authorized to fund an exchange agreement or to accept specific Soviet participants without a review by the Department of Defense.

- o An extensive review of past exchanges should be conducted to determine their benefits and disadvantages before new exchange programs are launched.

- o No new program of scientific exchange should be undertaken without a sound risk assessment.

- o The many Soviet emigre scientists who live and work in the U.S. and who have firsthand knowledge of Soviet science, institutions, personalities, and decision making should be asked to help review past U.S.-Soviet exchanges. Their views would contribute to the risk assessment for future exchanges.

o Soviet scientists should be allowed into the U.S. only in proportion to the number of American specialists on contemporary Soviet politics who are allowed to conduct their research without obstruction in the Soviet Union and with reasonable assurance that no transfer of militarily significant technology and information from the U.S. to the USSR takes place.

o It should be made clear to the Soviets that exchanges make sense only if Americans can meet freely with whomever they chose in the Soviet Union, and if the Soviets stop reducing their participation in exchanges to the same small group of "dependable" officials and academics from government-run institutions.

## CONCLUSION

Moscow abused the so-called cultural exchanges of the 1970s by sending to the U.S. Soviet scientists assigned to acquire knowledge of U.S. defense research and development. The Reagan Administration has been able to remedy the situation somewhat. But more must be done in view of what the U.S. now knows about exchanges with the Soviets. Such scientific and cultural exchanges do not reduce tensions in East-West relations in and of themselves. Attempts to meet the Soviets more than half way may endanger U.S. national security and will hardly earn respect from the Soviets.

Soviet-American exchanges should be conducted along the following policy guidelines. First, there should be public accountability and guidance to be implemented through an Advisory Committee reporting to Congress. Second, sound risk assessment should be conducted for every new exchange program in science and technology. Third, there should be strict reciprocity in exchanges: Soviet visitors should enjoy access to American science equal to that enjoyed by American specialists in contemporary Soviet affairs to research resources in the Soviet Union.

Only such a consistent and patient policy on the part of the U.S. can turn the Soviet-American exchanges into a two-way street.

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