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## The United States must save Soviet science

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*Over the past 40 years, the largest scientific community in the world was built in the Soviet Union. Marsha Freeman reports on the U.S. policy needed to preserve this endangered capability.*

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At this moment, the United States has a unique opportunity, as well as a responsibility, to take aggressive steps to preserve and further the scientific capabilities developed in the former Soviet Union. This single largest community of scientific "workers" in the world, encompassing expertise on the frontiers of physics, mathematics, directed energy technologies, space exploration, and other fields, is now in danger of disintegrating.

In our Oct. 18, 1991 issue ("Worldwide Mobilization Is Needed for Moon-Mars Mission"), we printed a call for the U.S. to gather together the technical resources in eastern Europe and the former Soviet republics, for the purpose of carrying out the Moon-Mars program which has been on the world space agenda since the 1960s. Such a worldwide effort would require pushing forward to the frontiers in next-generation nuclear technologies, developing thermonuclear fusion for propulsion systems, solving many of today's riddles in bio-medicine for long-term space flight, and inventing thousands of advanced technologies which will allow mankind to "terraform" the underdeveloped regions of the Earth, as well as the Moon and Mars.

We would soon find that there are *too few*, not *too many*, scientists and engineers to bring to this effort, and the hand-wringing over "what to do" with the increasing numbers of unemployed former Soviet scientists would abruptly end. However, as many Russian scientific spokesmen have testified before Congress and have repeated elsewhere, time is of the essence.

But if the machinations in Washington over the past year are any indication, this country is having more difficulty working with the scientific community in the states of the former Soviet Union on common goals, than it had working

against the Soviet Union during the cold war. While President George Bush and Secretary of State James Baker have been speechifying that the former Soviet peoples are now our friends, a cabal inside the Defense and State Departments has been working overtime to prevent any actual change in policy toward our former enemies.

Why a change is necessary and why time is of the essence have been laid out quite eloquently by representatives of the Russian scientific community since the failure of the August coup and subsequent breakup of the Soviet Union. The overall economic crisis in the Community of Independent States; the dramatic reduction of Soviet military research, development, and production; and the lack of coherent goals beyond immediate survival for the newly independent CIS republics have left the scientific community and its vast capabilities in a state of chaos.

Academy of Sciences Vice President Yevgeny P. Velikhov, who currently heads the Russian Federation's program to convert military enterprises to civilian facilities, made an impassioned plea for the protection of this scientific treasure to representatives of the republics themselves, in a speech before the Extraordinary U.S.S.R. Congress of People's Deputies on Sept. 2, 1991. As reported in *Izvestia*, Velikhov pleaded with the deputies not to "break things so violently that the pieces cannot be put back together again."

Velikhov has played a leading role in every scientific frontier in Soviet research over the past two decades, including magnetohydrodynamics energy conversion, thermonuclear fusion, laser applications, ballistic missile defense, and computers. After enumerating economic problems in the economy, he said: "What distinguishes Third World countries from those in the First World? In the main, Third World



*Former director of the Soviet Space Institute in Moscow, Roald Sagdeev, meeting with Maryland Sen. Barbara Mikulski at the April 9 Goddard Memorial Symposium in Washington. Sagdeev is now a physics professor at the University of Maryland.*

countries have resources, they have a work force, too, but they do not have science or expertise. . . . If we destroy science we shall never rebuild it. . . . Then we will have no future. . . . Science is an interpublic phenomenon. . . . Science is a very delicate instrument, and it is now collapsing very quickly." Science is also international, and should be considered an international responsibility, Velikhov and the leadership of the former Soviet scientific community have been more recently trying to impress on U. S. policymakers.

One of the most striking and dramatic examples of the rapid decline and disorganization taking place throughout the former Soviet Union can be seen in what is happening to the space program. Most of the recent coverage of the Soviet space program has centered on the plight of cosmonaut Sergei Krikalev, launched before the August putsch for a six-month tour on the space station Mir. As a result of the upheaval in the former Soviet Union—including the division of parts of the space effort between Russia and Kazakhstan—he spent five extra months on the space station. While this story has its pathos, it is critical to remember that it was the Soviet Union that successfully launched the first satellite, the first man, and the first woman into Earth orbit; performed the first extravehicular activity or space walk in orbit; and manned the first space station.

### **Space assets are 'endangered species'**

One of the most eloquent and knowledgeable spokesmen regarding the plight of the former Soviet space program is Dr. Roald Sagdeev, former director of the Soviet Space Research

Institute in Moscow and currently professor of physics at the University of Maryland. At a Feb. 21 hearing before the Senate Subcommittee on Appropriations for Veterans Affairs, HUD, Independent Agencies, Dr. Sagdeev stated:

"The collapse of the Soviet Union has left its space assets an endangered species. In the current economic climate, it seems highly unlikely that Russia, or any other independent state of the newly born Commonwealth, could carry a space program even remotely similar in size and quality to that which developed since 1957, after the launch of the first Sputnik. The assets . . . represent quite an elaborate and broad network of design bureaus and enterprises, of space industry and scientific institutions for space exploration."

One reason why the space program is endangered, explained Sagdeev, is that most of the efforts "were controlled by the military-industrial complex," which is now rapidly contracting. "The major owner of space objects, the former Ministry of General Machine Building, was one of the nine powerful military-industrial ministries, amounting to up to a million employees mostly in the territory of Russia and Ukraine. The total budget of operations was close to 10 billion rubles at the peak, with about 50% of it spent for purely military space, such as rocketry, reconnaissance, early warning, command and control, and telecommunication systems.

"Out of the remaining 50% of the budget, only a small fraction, about 10%, even less, were in the area of purely civilian, commercial, or scientific space programs, including such components as deep space exploration, planetary launches, remote sensing of the Earth, and commercial tele-

communication and weather satellites. . . . The control over launching sites and ground-based communication centers was by the military, even in the cases where final customers were in civilian area. In large measure it was done to minimize the cost, using the Army as a cheap labor force." Sagdeev estimated that, by now, "in real rubles, the space budget has probably lost somewhere close to one-third" of the level of its previous support.

"It is true that Soviet space assets could be considered as truly international treasures, and it would be extremely painful if, in the process of economic disorder and disintegration . . . these tremendous achievements of humankind would be lost," Sagdeev stated.

### **The political legacy**

Russian President Boris Yeltsin decreed that there be established a Russian Space Agency on Feb. 25, after meeting with representatives of the space program, in an effort to stem the tide of disintegration and "rescue the assets and brains" of the space programs. Yuri N. Koptev, former deputy minister of General Machine Building, was appointed to head the new agency. It will supervise 12 Russian centers for design, testing, and evaluation in space technology, and the rest of the enterprises will serve as contractors to the government.

But the same day as Yeltsin's announcement, hundreds of Russian soldiers rioted at the Baikonur launch site in the republic of Kazakhstan, protesting poor food and working conditions. Although 80% of the space program is in the Russian republic, crucial parts of it are not, including the equivalent of Cape Canaveral, the launch complex at Baikonur. The Russian technicians who manned the Baikonur launch facility have now gone home. On March 23, Russia and Kazakhstan signed an agreement for technological cooperation in space, but the financing of the launch complex has not been determined. Already last year, there were only 59 space launches, about half as many as previous years.

At the annual Goddard Memorial Symposium held April 9-10 near Washington, Sagdeev stated that he thought some portion of the \$24 billion financial aid being discussed for CIS aid by the Group of Seven nations should "be given to the space program." What had driven both the U.S. and Soviet space programs since their inception, he remarked, was the competition engendered by the Cold War, and therefore, if the Russian program disappears, *all* space budgets will go down. Half-joking, he said, now, we have an "enemy gap," which also endangers the U.S. space program.

At the symposium, Dr. Igor Khripunov, the new first secretary of the Russian embassy, stressed, "It is imperative that the world community not let the Soviet space capability disintegrate." Recalling that he was 11 years old when Sputnik was launched, he described how every schoolchild wanted to go into science or engineering. What is now left of that space program covers six member states of the CIS, he

explained, but the problem is not simply a geographic one; it is a political one.

Both Dr. Khripunov and Dr. Sagdeev recounted, with chilling detail, how the Soviet space program had been a political "tool of the socialist state," for 30 years, which now leaves it with no real popular base of support among the "taxpayers." Because the space race was "ideologically and politically motivated," Khripunov stated, there were "a lot of precipitated launchings on the Russian side, which led to casualties and explosions." A 1980s proposal for developing a U.S.-Soviet space rescue capability was nixed by the regime, he said, because if the United States had ever had to rescue cosmonauts, "it would seem that we were victims."

In a very candid presentation during the final panel of the conference, Sagdeev shed light on the inner workings of the Soviet space program, which have been only hinted or guessed at by western experts. Although in his recently published memoirs, Nikita Khrushchov's son Sergei vigorously denies any political pressure on the space program by his father, Dr. Sagdeev provided examples of how the opposite was true: Before a launch in April 1958, Soviet space program Chief Designer Sergei Korolev received a call from Khrushchov, who insisted the launch take place, even though it was not ready, because the Communist Party of Italy was hoping it could bring them 5 million more votes in a pending election!

"The space program was always used for politics," Sagdeev said. "They used references to spectaculars as a proof of the superiority of socialism." The scientists had to participate in a "noble coverup," he said, under "tremendous pressure to jump on a traveling circus to excite the taxpayers. In 95% of the cases, it was a sheer lie, to have to attribute scientific uses for every launch." Earlier, in a March 6 interview, former Soviet space head Alexander Dunayev underscored the same problem: "Our tragedy is that, to this day, we have not formed a stable public opinion as to why we need cosmonautics. Certainly cosmonautics is no longer contained to defense enterprises, where everything was kept secret, while society only saw parades. Now, the cover was lifted, and it turned out that people were unprepared to associate space science with useful deeds and national economic problems. Cosmonautics seems to them, a burden."

Sagdeev reported that even through the Gorbachov regime, political exigencies overshadowed technical criteria in space policy. At a state dinner with President Reagan in 1988, Gorbachov made the proposal that the United States and Soviet Union go to Mars together, and that the Soviets' Energia heavy launch rocket be used for that purpose. "He thought it would divert U.S. attention from the SDI," Sagdeev told the symposium attendees, because a manned Mars landing project could provide similar economic spinoffs that the Reagan administration expected to obtain from the Strategic Defense Initiative technologies. "Anyone who would talk about a manned mission to Mars today," Sagdeev added,

“would be killed by people waiting on food lines.”

Nonetheless, given the advanced nature of Soviet science, it is obvious that cooperative programs in nuclear fusion, laser applications, space science and technology, materials development, and dozens of other areas, in addition to space technology, would be of benefit to the science, technology, and economic growth of the United States. Why the hesitation, then, in preserving for all of mankind a premier scientific capability and some “very elegant technology,” as former NASA Administrator Adm. Richard Truly put it, which would also transfer some of the 40 years of secret technology to the West?

### **The real military-strategic risk**

One oft-repeated argument against closer cooperation with the former Soviet states from the State and Defense Departments has been that any “help” would revitalize the military capability of these countries, which might very well become our enemies once again if current reform efforts fail—i.e. the almost-hackneyed “dual use” argument. Testifying on Feb. 21 at the request of the Senate Appropriations subcommittee responsible for the NASA programs, Dr. John Boright of the State Department Bureau of Oceans and International Environmental and Scientific Affairs stated, “Many of the technologies are dual use and most of the former Soviet Union’s space infrastructure has been and still is tied to military operations. Therefore, even as we expand our cooperation in space we will have to be cautious not to inadvertently support organizations and capabilities that could represent a future threat.”

Since it is well known that even the “civilian” part of the Soviet space program was run by the military, if the policy precludes cooperation in space technology that could in the future, or has in the past, been used by the military, the policy precludes cooperation on *any* space technology. None of the senators attending the hearing was swayed at Boright’s bureaucratic double-talk.

One month later, on March 25, representatives of the State, Commerce, and Defense Departments were hauled before the space subcommittee of the House Committee on Science, Space, and Technology, to shed light on why there was still no apparent movement forward in approving various cooperative space technology agreements, some of which, like the Topaz-2 space nuclear reactor, had been in the works for over a year.

Rep. James Sensenbrenner (R-Wisc.) described the excuses for the delays in changing policies to allow the U.S. to “import” technology and hardware from the former Soviet states, as “bureaucratic gobbledygook,” and demanded to know what the risks of closer cooperation really were. “We have a de facto boycott” of this technology, he stated. Rep. Dana Rohrabacher (R-Calif.) said that this kind of bureaucracy “is what the [former] Soviet Union is overthrowing.”

Congress has mandated in NASA’s budget that the space

agency make a thorough study of what can be purchased from the former Soviet space program, more because it has a misguided idea of “saving money” in the U.S. space program, than from concern for U.S. foreign policy. There is, however, a serious concern, particularly in the House Science Committee, to preserve the broader scientific and technological capability of the world’s largest technical establishment. There is a recognition that what will almost ensure that economic stability is never achieved, raising the specter that military means might be needed to control chaos, is the destruction of the scientific capability and technological innovation which is prerequisite for economic growth.

Sitting back and watching the Soviet capacity for innovation dissolve, while, at the same time, promoting a state of slavery through indebtedness to the International Monetary Fund, is a prescription for disaster in the former Soviet Union. Perhaps some policymakers in the Defense Department have this self-fulfilling prophecy as policy, hoping that within a year the threat of a new “evil empire” will restore the tens of billions of defense dollars being cut.

As early as last year’s annual international science conference in Erice, Italy, on Aug. 24-26, Yevgeny Velikhov suggested that decommissioned SS-18 missiles be converted to space boosters for \$34,000 a piece, and be used to launch environmental satellites. Los Alamos National Laboratory physicist Gregory Canavan reported after the meeting that “the Soviets have an economic problem . . . [and] they don’t see a reason to keep military secrets any longer, at least not from the United States.”

Charles Duelfer, the director of the Center for Defense Trade at the State Department said his department was giving a lot of thought to easing restrictions on importing Soviet technology, but said that they would not take action “until we get the signal from the White House.” On March 1, the *New York Times* reported: “The federal officials said their opposition to the purchases [of Russian space equipment] is part of an administration policy intended to force the Russian space and military industry into such a decline that it poses no future threat to the United States. But the policy, which threatens hundreds of potential deals by government agencies and American industry, has come under mounting criticism both in the United States and abroad.

“Industry experts said the Department of Defense and Department of State are making any deals virtually impossible. Last week, Donald J. Atwood, deputy secretary of defense told the Senate defense appropriations subcommittee that he has blocked [the department] from buying the Topaz, saying the administration had ‘great concern’ about aiding the military-industrial complex.”

Representatives of the Russian scientific community were finally given the opportunity to respond directly to the “concern” over “supporting” the Russian military establishment, during a teleconference conducted by the full House Committee on Science, Space, and Technology on March

25, stressing two essential points. Academician Velikhov stated that the major threat to disarming the former Soviet military establishment is that factories and enterprises in Russia do not have the capital to retool and convert to civilian production, which has been mandated by the government. If the U. S. would help former defense enterprises with capital investment to retool, it would not have to worry about increased military production.

Though Velikhov made the blanket statement that scientific institutes are “not doing defense work,” Russian Minister of Science, Advanced Education and Technology Policy Dr. Boris Saltykov was more precise, even frank. Although there is a major demilitarization, he said, the government is undertaking some military work for the country’s future defense. “The government will find the resources for defense, whether or not the Energia is sold” for American dollars. There is still such a thing as sovereignty, he indicated.

If the U.S. Defense Department is truly worried that Russian enterprises will gear up military production to keep people employed during this period of economic crisis, it would be leading the charge to help the conversion to civilian production, which is the Russian government’s policy.

### **Reject new Morgenthau Plan policies**

Since this has not been the Pentagon’s perspective, perhaps there are other agendas. Turning the world’s only other superpower into warring tribes of pastoral peoples does remind one of a previous policy considered for a defeated enemy. In the March 23 issue of *Aviation Week* magazine, Benjamin S. Lambeth, RAND senior defense analyst, laid out a perceptive view of one agenda of the erstwhile cold warriors. It is quite remarkable that such an insightful analysis should come from the RAND Corp., which had spent years formulating hundreds of psychological warfare operations against the Soviet Union—particularly against the Soviet space program.

“The idea that the United States should have an interest in permanently crippling the defense industry of the former U.S.S.R. evokes memories of the benighted Morgenthau Plan that would have reduced defeated Nazi Germany to a pastoral society after World War II. Fortunately, the Marshall Plan that prevailed brought Germany into the Atlantic Alliance as a trusted security partner—and no doubt precluded the bitter territorial disputes that a divisive strategy like the Morgenthau Plan would surely have caused.

“The danger of any such [military] resurgence is negligible,” he wrote. “Consider Yeltsin’s recent authorization for the former Soviet Air Force to sell up to 1,600 combat aircraft to help feed and house its officers and their families. . . . There are forces in this country determined to exploit Russia’s predicament to deliver the final blow. Apart from being wrong-headed in principle, such thinking fails to understand that the problem all along was Soviet communism and expansionism, not the military-industrial complex. U.S. efforts to

hobble Russia’s defense industry can succeed in the near term. But it will guarantee resentment and long memories of American betrayal among precisely those members of the Russian security establishment we should be trying to coopt.”

The question of which historical precedent is apt here was raised in a thoughtful way by nuclear physicist Edward Teller and former U.S. ambassador to Moscow Jack Matlock at the March 25 House space subcommittee hearings. Matlock, who had just returned from Russia, said the overall policy choice facing the United States was either to take the Versailles Treaty path following World War I, or the Marshall Plan, after World War II. Taking a tack opposite from the “let them collapse” school, Matlock explained that if we take the path “of the victors after World War I where Germany was humiliated, and current generations feel they have been exploited or trampled on, we could see a replay of Germany in the 1930s” with the emergence of a demagogue leading to increased military expenditures.

When the congressmen reacted predictably, saying that the Marshall Plan only created the economic Frankenstein monsters of today’s Germany and Japan, Matlock shot back that “it is a false rap that the Marshall Plan hurts U. S. competitiveness today.”

Both Matlock and Dr. Teller stressed that the best way to keep tabs on what the CIS military might be doing is to have as many open programs as possible and to collaborate on the most advanced areas of science. All his life, Edward Teller, who has worked on the most advanced weapons systems in the United States, has advocated the easing secrecy restrictions on scientific knowledge. Classifying information does not provide security, he has stressed: only being smarter and ahead of the opposition does. “I would underscore *openness*,” Teller insisted to the congressmen.

### **The Topaz-2 reactor purchase fiasco**

At the annual 1989 Symposium on Space Nuclear Power Systems in Albuquerque, New Mexico, Nikolai N. Ponomarev-Stepnoi from the Kurchatov Institute of Atomic Energy in Moscow, shocked his U.S. audience when he revealed some of the details of the highly classified Soviet Topaz space nuclear reactor for the first time. At that conference, a California firm, Space Power, Inc., presented an exhibit on space nuclear power, to which the Soviets reacted by raising the question: Why spend time and money developing your own reactor? You can just buy ours! SPI had been developing an original advanced space nuclear power reactor design in 1987-88, which didn’t rely on any Soviet technology. The company’s president, Joseph Wetch, holds one of the earliest patents on the first U.S. nuclear space SNAP reactor, developed and flight tested in the 1960s.

Following the 1989 symposium, the *New York Times* wrote about the Soviet presentations that the Soviets had presented classified material to the U.S. audience. There was a big flap back in Moscow, which eventually got “straight-

ened out." In April 1989, SPI representatives went to the Soviet Union and hashed out an agreement for the company to market Topaz technology in the United States, which took almost a year to get through and ratified. The agreement was formally announced in a press release, at the following year's 1990 Albuquerque conference.

At the Seventh Symposium on Space Nuclear Power Systems, Jan. 7-10, 1990, one paper presented was on "The Commercial Potential of the 'Topaz' Power System," by SPI president Joseph R. Wetch, and Nikolai Ponomarev-Stepnoi, Kurchatov Institute of Atomic Energy. The Topaz-1 reactor has been used in the Soviet space program to designate the series of nuclear reactors to power the Soviet RORSAT radar ocean reconnaissance satellites for 20 years. The newly designed Topaz-1 was flight tested twice by the Russians in 1987, the year that marked the 20th anniversary of Soviet nuclear reactors being used to power ocean reconnaissance satellites. One of the reactors had operated for almost a year.

The next-generation Topaz-2 is a 6-7 kW reactor, with a five-year lifespan, using in-core thermionic conversion. SPI and the Soviets state that the major use would be to power very large communications satellites used globally, coupled with arc jet plasma propulsion systems for orbital transfer. Higher power aboard the spacecraft allows the use of smaller boosters for orbit, and lower-cost ground receiving systems to pick up the signals. There could be more channels per satellite, which would cover a larger area. In January 1990, Wetch stated that the Soviet system would be ready for delivery in one year.

The Topaz in-core thermionic reactor is a more sophisticated, direct nuclear-to-electric energy conversion technology than the thermoelectric technology that the U.S. is developing for its SP-100 reactor. It runs at a higher temperature and is therefore more efficient than the thermoelectric technology. In-core thermionics was developed first for the U.S. space nuclear program, but was never deployed, or chosen for the SP-100 reactor, because it was considered to be "higher risk."

Space Power reported in 1990 that the Soviets had already built small Topaz reactors and that units could be shipped as soon as U.S. customers cleared all the paperwork with the proper agencies. At that time, SPI estimated this would take about a year from the time the order was placed.

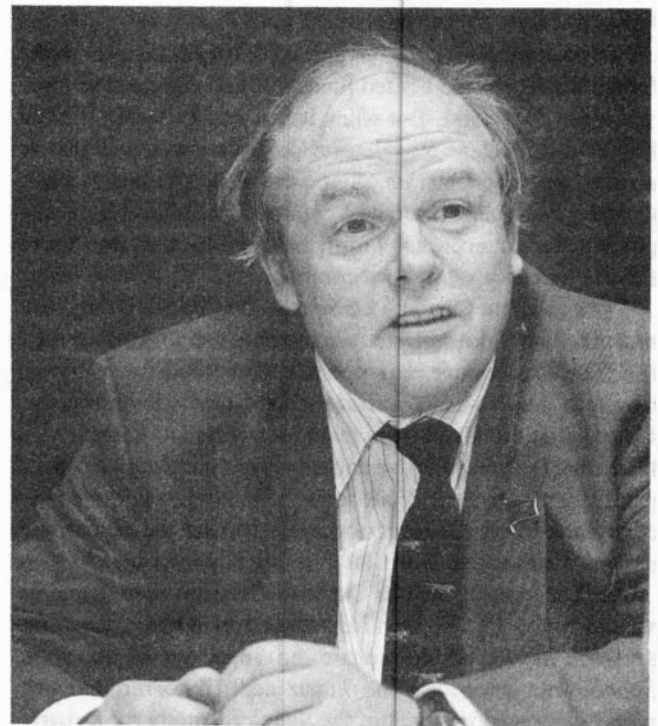
In order to accommodate other uses of Topaz, the Soviets offered to "stretch" the Topaz-2 to produce 10 kW, and also proposed to develop a 30 kW version. A 30 kW system could be used in a nuclear propulsion system for an orbital transfer vehicle. It would also be the right size for direct satellite broadcast television, large communications, and remote sensing satellites.

In 1990, when the Soviets believed the United States still had an SDI program, they insisted that the reactor not be used for military applications, and SPI promised that only civilian users would be allowed to buy Topaz. At that time, Wetch

reported, he was not worried about meeting the Soviet non-military requirement, because he did not think the U.S. military would depend upon a foreign source for such a critical capability. The Soviets were more worried about losing the commercial edge than the military one and, therefore, decided they would not sell the Topaz to Japan, where they feared it could be produced more cheaply!

According to SPI, even this early offer of Topaz from the Kurchatov Institute was a result of heavy pressure on the Soviet scientific institutes to earn hard currency for their funding.

By the time the 1991 Space Nuclear Symposium opened, the situation in the Soviet Union had changed. Sen. Pete Domenici (R-N.M.) made the dramatic announcement that the U.S. would be buying a Topaz-2 space nuclear reactor for \$10 million, and *Aviation Week* reported on Jan. 14 that it was the SDI Organization which was planning to buy it. Dr. Ponomarev-Stepnoi said the sale would bolster decreased government science funding. Richard Verga from SDIO estimated at that point that Topaz-2 would be delivered in about six months. He said the purchase was designed to "jump start" lagging U.S. thermionic reactor development by injecting the Soviet technology into the program. Verga and Wetch visited the Kurchatov Institute. "We couldn't reproduce their development facilities for \$1 billion, and the Soviets employ 1,000 people where we have 12," Verga said.



*Academy of Sciences Vice President, physicist Yevgeny P. Velikhov at a May 1990 press conference, presently responsible for converting military industries for civilian use. Last September, he urged the Congress of People's Deputies, not to "break things so violently that the pieces cannot be put back together again."*



Physicist Edward Teller. A life-long ardent anti-communist, Teller has been in the forefront of demands for joint U.S.-CIS efforts to preserve both the vast Soviet scientific physical capability and its highly trained manpower pool.

### Catch-22 in Washington

In the spring of 1991, an unfueled Topaz-2 was brought by the Soviets to the United States for an exhibit at the University of Maryland. But when it came time to ship it back home, the Nuclear Regulatory Commission stated that it needed an export license. Since the Soviet Union is on a Commerce Department list of countries prohibited from importing nuclear technology from the United States, the export license was not exactly forthcoming.

The fact that this was a Soviet import of Soviet nuclear technology did not seem to faze the bureaucrats in Washington. The *Washington Post* reported: "Soviet scientists trying to return home with a nuclear reactor they brought to the United States to display at a recent scientific conference . . . have encountered some bureaucratic red tape that must seem painfully reminiscent of Moscow." Finally in May, the Nuclear Regulatory Commission agreed to let the reactor be shipped back to the U.S.S.R.

In September 1991, a Defense Department delegation visited the Soviet Union and announced an SDIO team would go there in October to prepare the Topaz-2 for shipment. *Space News* warned, "The Topaz deal, however, has not received the endorsement of the State or Commerce Departments, which want a say in high-technology purchases from the Soviets." As time wore on, it became clear that the SDIO purchase had not obtained the endorsement from the top levels of the Defense Department, either.

A series of House and Senate committee hearings over March and April scored administration representatives for the decision not to clear the paperwork for the Topaz-2's shipment. The reactor, it was reported, has been sitting on a dock in St. Petersburg since last October, and Soviet scientists have expressed concern that the waiting may cause it to suffer damage. (They have also marveled at the red tape and bureaucratic interagency turf warfare in the U.S., which they thought only existed in the former Soviet Union.)

On March 26, 1992, more than three years after the Soviets offered the Topaz-2 for sale, Senator Domenici announced that the Pentagon had approved the purchase. SDIO will pay \$7.5 million for the reactor, which will include the equipment to run tests on the reactor and Russian engineers to show their American colleagues how to set it up. In a private conversation with this reporter on April 9, Dr. Sagdeev remarked that it will still take months to get the Topaz-2 Stateside. Who knows? If the Russians had offered to give us the nuclear reactor for nothing, perhaps it would have taken an *additional* two years for the Pentagon to decide it wanted it.

### The real 'brain drain' issue

Defense Department spokesmen are quick to remind us that the former Soviet Union has had thousands of nuclear-armed missiles pointed at the U.S. for three decades, and hundreds of thousands of evil geniuses in the scientific community planning our nuclear incineration.

In the Oct. 15, 1991 issue of *Pravda*, an article entitled, "Brain Drain . . . Nuclear Scientists from the U.S.S.R.—'For Hire' to Dictators?" carried a warning by Dr. François Heisbourg, director of the British International Institute for Strategic Studies, that "the chaotic and unsystematic curtailment of Soviet research in the military sphere could lead to the emergence of a body of scientists for hire whom dictators seeking nuclear [capabilities] might tempt with good pay and working conditions." In fact, the article reported, rather than heading for Iran or Libya, "many of the 50,000 Soviet citizens who have arrived or will arrive in the United States this year for permanent residence are scientists."

A Jan. 1 *New York Times* article covered a classified CIA report, which "warns that the potential for nuclear mercenaries is more worrisome than the danger of nuclear-related materials going astray." And on Jan. 6, Reuters reported that German Foreign Minister Hans-Dietrich Genscher warned against the "proliferation of nuclear knowledge." (It should be noted at this point, as *EIR* has made abundantly clear, that acquisition of nuclear weapons by Third World nations is not what worries the Bush administration so much as the acquisition of nuclear technology—or any high technology for that matter.)

Considering that many of the supposed terrorist regimes that are allegedly luring Soviet nuclear weapons scientists are Arabic, it is interesting that the Jan. 28 issue of the

*Jerusalem Post* printed interviews with Russian scientists confuting this pet theory. Kurchatov Institute physicist Genadi Smirnov told the *Post* that “he and his colleagues find all the speculation in the western media about Soviet physicists peddling their expertise to Third World countries to be far-fetched, and in rather bad taste.” While it was widely reported that Libya had offered jobs to two physicists for \$2,000 per month, the U. S. media had to admit that they had turned the jobs down. AP quoted Prof. Valery Mikhailov: “The country must not lose their [the scientists’] knowledge, their brain power, at any cost. These are the crown jewels of our science.” They are “patriots, responsible people,” he said.

On Feb. 14, Secretary of State James Baker met with the elite of Russia’s nuclear weapons physicists and was surprised to find them ready with a wish-list of joint projects with the United States. The spokesman at Chelyabinsk-70—one of 10 closed military industrial cities, employing 16,000 people, of whom 7,000 are scientists and engineers—was chief scientist Dr. Yevgeny N. Avrorin. He presented Baker with a list of commercial projects they were ready to work on if the West would invest in them. These included industrial diamonds, fiber optic equipment, nuclear medical equipment, and food irradiation technology.

The administration responded on Feb. 17 with the issuance of a “Tripartite Statement on Proposed International Science and Technology Center.” Baker, German Foreign Minister Genscher, and Russian Federation Foreign Minister Andrei Kozyrev agreed to call for the creation of this institution, to be based in Moscow. The United States committed \$25 million to the project, and Germany agreed to raise an additional \$75 million.

On March 11, Robert L. Gallucci, senior State Department coordinator on the question of former Soviet scientists described for a Senate committee what the new center would entail: It will “serve as a clearinghouse for developing, approving, financing, and monitoring proposals to engage weapons scientists and engineers in productive civilian science and technology projects,” he said. “The center’s primary objective is to minimize the potential for proliferation of [defense] technologies by providing good opportunities for these specialists to pursue peaceful research . . . during this period of disarray and dissolution of weapons research laboratories and production facilities. . . .

“Our primary goal is to address the threat posed to international security by scientists and engineers with unique skills in the production of weapons of mass destruction who may find themselves without means of financial support,” he said. However, the center will be run by a multinational oversight board, which will have to process, evaluate, and approve any project the center will fund. Peer review and other methods of delaying the start of work, as well as controlling who does what, will be the *modus operandi*. There is no perspective of when any work will begin, and the State Department’s Gallucci made very clear that work will only

involve weapons scientists.

The American scientific community has had a different view of both the problem and solution of maintaining the integrity of the Soviet scientific body. On March 17 at a hearing before the Senate Foreign Relations Committee, presidential science adviser Allan Bromley warned that former Soviet scientists’ “research is deteriorating for lack of equipment, for lack of support, and, perhaps as important, communication with the world scientific community is in jeopardy because . . . they are cut off from modern scientific journals, and they simply are unable to travel.

“The scientists with whom I have talked tell me that their greatest problem, as they see it, is not the potential brain drain, but rather that of trying to maintain a proud and productive scientific enterprise through an exceedingly difficult period that we all see ahead for them.” Bromley, having a grasp of the scientific treasure trove now available to the West for the first time, continued: “There is now a substantial backlog of new discoveries and new technology available for exploitation . . . within the Soviet Union and, of course, throughout the rest of the world.

“In my estimation, based on my discussions and my visits to the Soviet Union, I conclude that it is impossible for the republics to make the changes that are required, by themselves . . . they simply must receive help from the world community.”

During the March 25 teleconference hearing on Russian-U. S. Cooperation by the House Science, Space, and Technology Committee, Russian scientific managers had an opportunity to respond to the question of a nuclear weapons “brain drain.” Minister Saltykov commented that the military brain drain “is not as acute as American politicians think,” and that a “brain drain” from other, open scientific fields “could be much more harmful.”

More than one scientist stated that the most serious problem for Russia is that younger scientists are leaving—not for so-called terrorist countries—but “for work in commercial areas in our own country, leading to an insufficient inflow of new students.” Saltykov responded to a question that the cadres who have left are not, in general, leaving permanently, but are taking one or two year contracts, until things improve. “Sometimes scientists are ready to live on modest salaries,” he reported, “but we don’t have the funds to purchase the necessary equipment” so they can carry out the new experiments they having been working toward for years.

The major loss of scientific manpower, which will become a serious problem for any real economic development program in the CIS nations, is primarily to the United States. No one has ever substantiated former Soviet weapons designers running off to Third World countries to build bombs, and the establishment of a cumbersome international center which will bureaucratically stultify the research work of former Soviet scientists will only delay getting joint research under way, and will, thereby, worsen the problem.