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**F**ew nations (possibly excepting Ukraine) dispute Russia's claim to be the legitimate heir of the Soviet Union's nuclear arsenal. Russian possession of nuclear weapons, therefore, does not derail the Non-Proliferation Treaty or give added impetus to possible would-be proliferants. Nor do the Russians lack the technical and military expertise needed to exercise control over the weapons—the great majority of scientific and technical workers in the Soviet weapon complex were ethnic Russians and citizens of Russia, as were nearly all the Soviet experts who worked on nuclear doctrine and policy.

However, the problems of the Russian central government in maintaining control over all nuclear weapons, nuclear material, nuclear technology, and nuclear design information within its borders gives rise to serious proliferation concerns. A related issue is the degree of technical assistance that Russian missile and nuclear experts—apparently with the cognizance of the government—are believed to be providing China (see discussion below). A major goal of U.S. nonproliferation policy with respect to Russia is to prevent the transfer of any weapons or material to other states or subnational groups, and to prevent the export of vital nuclear expertise or information, through emigration for this purpose or otherwise.

Existing proliferation concerns would be tremendously aggravated if the Russian Federation itself were to fracture, with several local entities declaring independence. The ensuing disorder would present a strong challenge to the maintenance of administrative control of nuclear material and nuclear weapons (especial-



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ly tactical ones). The wide dispersion of nuclear material and weapons in Russia would make it very difficult to assure control over all such items under such circumstances. Figure 4 shows the distribution of relevant facilities in Russia.

Under the *ancien regime*, control over the Soviet nuclear weapon arsenal and infrastructure was assumed to be unassailable because of the Soviet government's tight centralized authority, particularly over internal security and exports. Following the sobering consequences of its uranium enrichment technology transfer to China in the 1950s, which led to the production of Chinese nuclear weapons, some of which were ultimately targeted on the Soviet Union, the Soviet Union has generally maintained a good record in supporting and enforcing world nonproliferation objectives. Since central control is now nowhere near as effective, achievement of nonproliferation objectives is less certain than before.

Russia contains the great majority of the Soviet Union's strategic nuclear warheads, including strategic land-based missiles, submarine-launched missiles, and most of the bombs and cruise missiles; it now contains all the tactical weapons of the former Soviet Union (FSU) as well. The total number of nuclear weapons has usually been publicly described as on the order of

30,000, although occasional reports have placed the number as high as 45,000.<sup>1</sup> Nearly 8,000 are strategic nuclear weapons. In addition, nearly all the elements of the nuclear weapon complex of the FSU are on Russian territory, including the two main research laboratories, Arzamas-16 and Chelyabinsk-70. According to the Russians, all the uranium enrichment, plutonium processing, warhead component, and weapon assembly facilities are located in Russia as well. In addition, there are at least 20 research reactors, most fueled by highly enriched uranium (HEU), and 28 civilian nuclear power reactors (with 18 more under construction).<sup>2,3</sup>

There have been numerous minor diversions of material, including tiny amounts of plutonium and small amounts of uranium of various degrees of enrichment, from former Soviet nuclear (although probably not military) facilities. In one of these cases, about 100 kg of low-enriched uranium (LEU) were reportedly removed from a MINATOM (Ministry of Atomic Energy) plant in Glazov, Russia, and recovered in Poland.<sup>4</sup> There have as yet been no verified reports of the diversion of more than a few kilograms of former Soviet highly enriched uranium (HEU) or plutonium.<sup>5</sup> However, the persistence of many cases of smuggling of lesser amounts or of low-enriched

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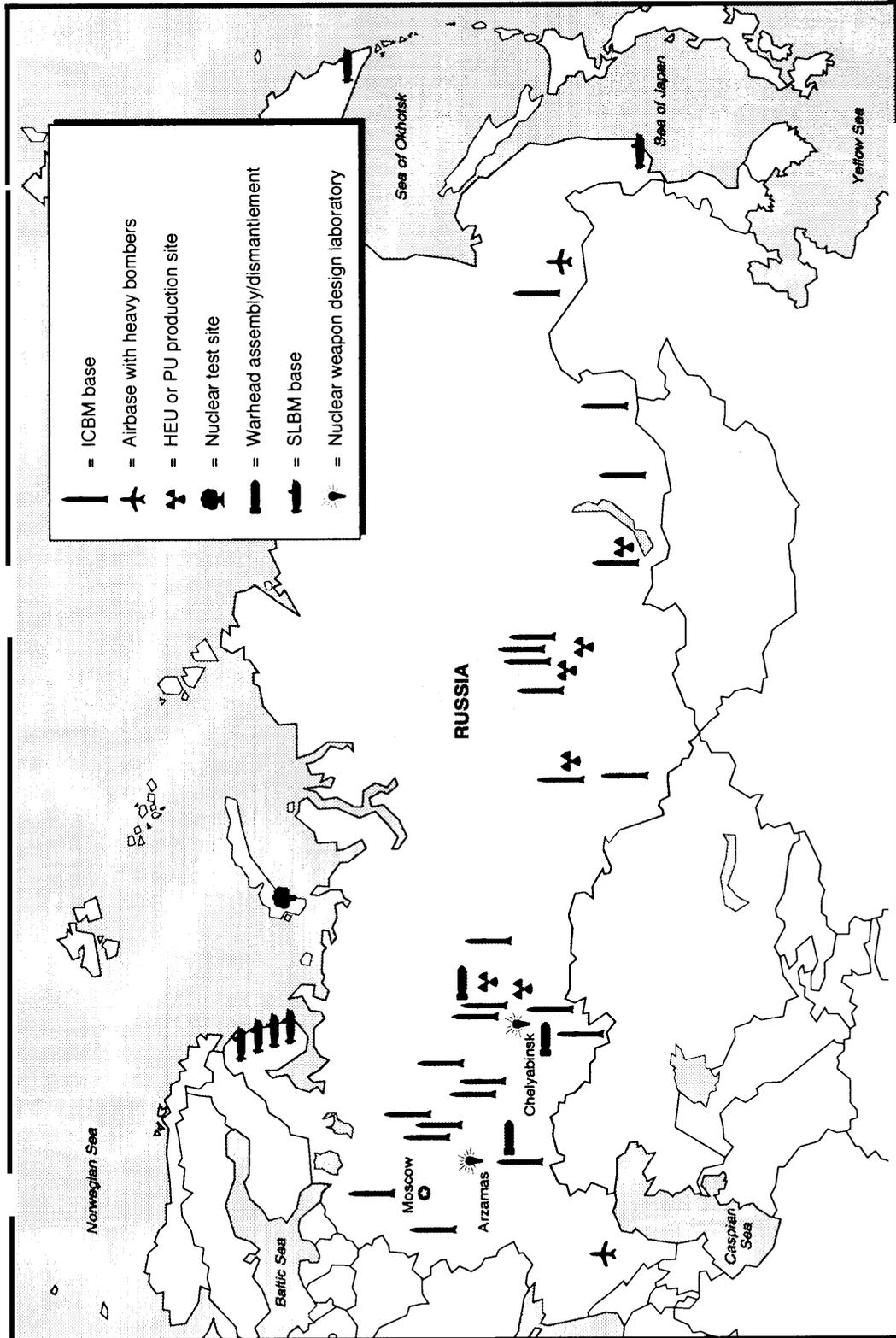
<sup>1</sup> See, for example, testimony by R. James Woolsey, Director, Central Intelligence Agency, before the Senate Committee on Governmental Affairs, Feb. 24, 1993, S. Hrg. 103-208, p. 12, for the former figure. For the latter, see statement by Viktor Mikhailov, Minister of Atomic Energy of Russia, in W. Broad, "Russian Says Soviet Atom Arsenal Larger Than West Estimated," *The New York Times*, Sept. 26, 1993, p. 1. This statement has not been confirmed by other Russian officials.

<sup>2</sup> W. p. te, "Nuclear Profiles Of the Soviet Successor States" (Monterey, CA: Program for Nonproliferation Studies, Monterey Institute of International Studies, May 1993).

<sup>3</sup> See U.S. Congress, Office of Technology Assessment, *Technologies Underlying Weapons of Mass Destruction*, OTA-ISC-559 (Washington, DC: U.S. Government Printing Office, August 1993), p. 182.

<sup>4</sup> See *Literaturnaya Gazeta*, Jan. 20, 1993, p. 13, FBIS, TND-93-006, Mar. 5, 1993, p. 21.

<sup>5</sup> Several kilograms of fresh nuclear submarine fuel containing highly enriched uranium were reportedly stolen from a nuclear submarine facility at Murmansk; see "Nuclear Fuel Rods Stolen From Murmansk Naval Base," Moscow Ostankino Television, Dec. 2, 1993, FBIS, JPRS-TND-93-001, Jan. 6, 1994, p. 24. The fuel was reportedly recovered on June 30, 1994, and three naval officers arrested. *Segodnya*, July 2, 1994, p. 7, FBIS-SOV-94-128, July 5, 1994, p. 27.



SOURCES: Carnegie Endowment for International Peace, Monterey Institute of International Studies, Office of Technology Assessment, 1994.

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uranium indicates some laxity in control over nuclear materials; more serious breakdowns in control, leading to the removal of material directly usable for nuclear weapons, cannot be excluded.<sup>6</sup>

The lion's share of Soviet expertise and experience in protecting, safeguarding, and handling nuclear weapons and materials remains in Russia. However, the reliability and integrity of some of those in charge of nuclear weapons and nuclear weapon materials is no longer beyond question, particularly as living conditions worsen. The individuals who are in a position to divert materials from their authorized uses may also know how to circumvent what protections do exist.

Even the elite Strategic Rocket Forces are apparently not immune to problems of maintaining minimal living standards. Russian TV reported in July 1993 on a strategic rocket installation at Ivanovo, not far from Moscow. While asserting that there were no serious problems in maintaining proper control over the nuclear weapons, the reporter stated that the soldiers had not been paid in two months and that many officers were without housing.<sup>7</sup> If such problems exist at rocket bases near Moscow, it is conceivable that the situation may be even worse at sites thousands of miles away and further from the center of authority.

Further, experts in safeguarding nuclear materials have alleged that material control and accountancy (MC&A) practices in Russia today are inadequate. Under the Soviet Union, control over

materials had been exercised primarily by controlling physical access to relevant facilities; accurate accountancy methods for keeping track of material inventories were never instituted.<sup>8</sup> Only a few facilities were ever offered by the Soviet Union to be placed under international safeguards (the Soviet Union, as a nuclear-weapon state, was not bound under the NPT to apply safeguards to its own nuclear facilities), and a consistent nationwide safeguards system was never developed. Efforts by the United States (under the Nunn-Lugar program) are under way to help establish better MC&A systems there, as in other republics of the FSU.

### "BRAIN DRAIN"

Since the Soviet Union's collapse, scientific establishments there have been restructuring themselves. Laboratories of the military establishment, the Ministry of Atomic Energy (including the 10 closed cities of the nuclear weapon complex, such as Arzamas and Chelyabinsk), the Russian Academy of Sciences, and independent and university-based institutions have been competing intensely for funds. The nuclear weapon laboratories are of particular concern from the proliferation point of view, both because the laboratory scientists could transfer vital nuclear weapon expertise to foreign parties, and because they have been greatly neglected by Moscow in the course of the political chaos of late 1992 and 1993.

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<sup>6</sup>A long article in *Literaturnaya Gazeta*, July 21, 1993, p. 13, FBIS, USR 93-107, Aug. 18, 1993, p. 49, relates how a shady network of black marketeers advertised HEU or plutonium for sale at enormous prices, apparently only delivering either tiny quantities or else low-enriched uranium. The article does refer to an International Atomic Energy Agency report listing 21 incidents of stolen radioactive materials, including the Glazov theft and other cases at different institutions, including Arzamas and Chelyabinsk. The black market networks allegedly have participants from the closed cities of the nuclear weapon complex. These stories maybe alarmist and may only indicate a network of criminals who are able to bilk foreigners, rather than divert significant quantities of nuclear material. However, the persistent number of incidents shows at least some smuggling of LEU and other radioactive materials.

<sup>7</sup>ITOGI TV, July 18, 1993, 1800 GMT; FBIS videotape, Arms Proliferation and Nuclear Issues 93-018.

<sup>8</sup>For example, see O. Bukharin, S. Rodionov, V. Shmelev, "Period of Transition--Proliferation Hazards in the CIS" (Heidelberg, Germany: Protestant Institute for Interdisciplinary Research, March 1993). The same has been reported by many foreign observers, including W. Potter, "Nuclear Exports From the Former Soviet Union: What's New, What's True," Arms *Control Today*, Jan./Feb. 1993, pp. 3-10, and, more recently, in "Russian Weapons Plutonium Storage Termed Unsafe by MINATOM Official," *Vuc/eonics Week*, Apr. 28, 1994, where Aleksei Lebedev of MINATOM is quoted assaying that Russia's interim plutonium storage facilities are not safe and not well guarded. He also mentioned problems with accurate accounting. He complained that the delays in Nunn-Lugar aid were to blame. Naturally, his comments might be construed as self-sewing.

Conditions at the weapon laboratories have deteriorated to the point where scientists there have been told to supplement their food by growing vegetables in their own gardens. Staff at the Arzamas and Chelyabinsk laboratories (roughly the equivalent of the U.S. Los Alamos and Livermore nuclear weapon laboratories, respectively) were not paid for two months in late spring of 1993, leading to protest rallies in late June at both institutions. Following the rallies, payments were resumed, relieving tensions for at least a time. As of June 1993, the pay scale for a Doctor of Sciences (the Russian equivalent of several years of research beyond the Ph. D.) was less than that of a railroad conductor; earlier reports had noted that a mid-level scientist received half the salary of a bus driver.<sup>9</sup> Previously, the inhabitants of the closed cities were kept in somewhat splendid isolation, with their material wants very well catered to by Soviet standards. The radical deterioration in their economic situation over the past three years is due not only to the ongoing economic and political crises in Russia, but also to the fact that their principal expertise—the development and design of nuclear weapons—is apparently no longer highly prized by the government. The result has been extreme demoralization, especially among the younger staff, who have not experienced the close camaraderie and patriotic purpose that were hallmarks of the early days at these laboratories.

Two active Russian nuclear physicists appearing on a French television program in March 1993 announced that they saw nothing wrong with aiding nuclear aspirants such as Iraq and Libya in their efforts to get the bomb. The fact that these scientists did not seem to fear any reprisals for their remarks might indicate either that the Russian authorities are not seriously concerned about

such activities, or, more likely, that the government has problems instilling and enforcing an ethic against proliferation. Even so, no instances of such migration of expertise have yet been confirmed.

Following the rally at Arzamas, on June 24, 1993, Scientific Director Vladimir Belugin remarked that it was risky to let such a nuclear facility “suffer.” He noted that, unlike conventional arms, which can be openly exported, “Our products cannot become a commodity sold on the market because of the nonproliferation agreement”—implying that the laboratory was thereby disadvantaged relative to other enterprises in Russia. He added that Iraq had offered Arzamas \$2 billion for a warhead.<sup>11</sup> Attacking the lack of U.S. aid, which, he said, had been more talked about than forthcoming for the past two years, he stated that U.S. policy was to “destroy us as soon as possible.”<sup>12</sup> This sentiment may have been expressed for propagandistic reasons, to scare the United States into providing more aid. It also is consistent with long-standing attitudes toward the West on the part of Soviet officials. Nevertheless, the statement was particularly upsetting to Los Alamos scientists who had been working closely with Dr. Belugin and had thought they had developed a good working relationship. Even if this declaration was self-serving and exaggerated, it does reflect a general sentiment in Russia.

In a similar vein, V. Gorshkov, deputy head of the trade union committee at Chelyabinsk, was quoted on Russian television as saying that if the “critical” situation continued, the laboratory would have to halt work on programs “connected with international treaties on arms control, destruction and nonproliferation of nuclear armaments.”<sup>13</sup> On August 19, 1993, the Russian news-

<sup>9</sup> See T. Beardsley, “Selling to Survive,” *Scientific American*, February 1993, pp. 92-100.

<sup>10</sup> *Antenne 2, Paris*, “F Comme Fiction,” March 1993.

<sup>11</sup> He did not provide any independent confirmation of this statement.

<sup>12</sup> UPI, July 13, 1993, A. Kacherov, Moscow.

<sup>13</sup> *Vesti Newscast*, July 4, 1993.

paper *Izvestiya* reported that Chelyabinsk was on the verge of bankruptcy. Evoking the financial problems there, the article referred to the December 1992 attempt of some 50 Russian rocket specialists to emigrate for jobs in North Korea, implying that similar problems might arise at Chelyabinsk if Moscow authorities did not heed the desperate pleas for economic aid and attention by members of the laboratory.<sup>14</sup>

Official statements regarding the possibility of nuclear theft or transfer of technology changed radically in tone over the spring and summer of 1993. For example, as recently as March 1993, Arzamas Scientific Director Belugin had remarked that no workers from Arzamas had been “lost” in spite of the economic difficulties and in spite of many “proposals” from “Middle East countries in particular.”<sup>15</sup> In the same period, Nikolai Yegorov, Deputy Minister of MINATOM, likewise denied such problems.<sup>16</sup>

By the summer, however, the tenor of these official statements changed, as can be seen in the statements quoted previously. Thus, comments from Russian officials have gone from high confidence in the winter of 1992-1993 to caution and trepidation the following summer. This shift may indicate concern over an apparent growing susceptibility of Russian nuclear scientists and technicians to foreign subornation. Because of the enormous quantities of nuclear materials and weapons in Russia, and because of the large number of employees of the nuclear complex (up to 1 million, although fewer have vital technical knowledge or direct access to nuclear materials that would be very useful to a would-be proliferant), one might expect an effort on the part of the world’s proliferants to seek either personnel or material there. As noted above, Russian officials

have reported attempts by various parties to do just that. **Given the many potential targets for this activity and the economic strains under which many of them operate, the threat of a diversion of nuclear expertise or material from Russia cannot be discounted.**

In 1992, the United States, with its allies, had already become concerned about economic difficulties at the weapon cities of the FSU. Reports that agents from several Middle Eastern countries were in Moscow attempting to recruit Soviet personnel fueled fears of nuclear proliferation. In response, the United States and Germany led an international effort to fund an International Science and Technology Center to be headquartered in Moscow. Originally intended to encompass all interested states of the FSU, political pressure resulted in a proposal for a second center in Ukraine. These institutions were to provide funding for research projects that would support scientists at the weapon laboratories so they would be able to work in peaceful areas that interested them, producing valuable science. However, the project took many months to arrange, requiring detailed negotiations among the United States, European governments, and Japan over issues of funding, project selection procedures, and programmatic control.

By the time the agreement among the donors to establish the center was in place—with the European Community, United States, and Japan each contributing about \$25 million—other difficulties arose. Scientists at the Russian weapon laboratories suspected that a Moscow bureaucracy was being installed that would milk most of the funds, leaving little to find its way to the institutions, much less to the scientists themselves. Worse still, conservative elements in the Russian parliament

<sup>14</sup> Article in *Izvestiya*, Aug. 19, 1993, 1 steal., p. 2, FBIS-SOV-93-162, Aug. 24, 1993, p. 32. The attempted emigration of missile specialists is described in the “Brain Drain” section at the end of chapter 3.

<sup>15</sup> *Le Nouvel Observateur*, Mar. 18-24, 1993, p. 8. FBIS, JPRS-TND-93-003-L, Apr. 22, 1993. Again, such statements must be viewed with caution unless independently substantiated because they may be intended to stimulate attention and concern in the West.

<sup>16</sup> Yegorov was quoted as saying, “... not a single one of our fellow countrymen has sold even one gram of weapons-grade uranium or plutonium. And he will not sell. This is virtually impossible. [emphasis added]” *Delovoy Mir*, Feb. 16, 1993, JPRS-TND-93-006, Mar. 5, 1993.

began to regard the centers as fronts for western efforts to steal scientific expertise from the highly respected and advanced technical institutions involved. Further, the foreign oversight of Russian scientific work was galling, particularly to nationalist factions in the Russian parliament. By early 1993, the issue had become embroiled in the power struggle between President Yeltsin and the Russian parliament.

These delays—both within the FSU and among the Western participants—may have been nearly fatal for the centers. By July 1993, the proposal to establish the center in Moscow was stalled in parliament and some Russian scientists were reporting to U.S. collaborators at Sandia National Laboratories that they considered the concept dead. This assessment was premature, preceding President Yeltsin's dissolution of the old parliament in September 1993 and the new parliamentary elections in December. The center was resurrected at the end of December by presidential decree and began operation in early 1994, without waiting for the new parliament to take action. The project is finally off the ground and it now includes participation by Armenia, Belarus, Georgia, and Kazakhstan, as well as Canada, Finland, and Sweden.

At this writing, it is not clear what effect the greatly strengthened extreme right-wing nationalist faction in the lower house of the new parliament will have on the ISTC. An article by a newly-elected member attacked the center, but, in the welter of issues facing the government, his complaints did not appear to find a resonance.<sup>17,18</sup>

To circumvent the bureaucratic delays that have stalled the International Centers so far, the

U.S. nuclear weapon laboratories have, under the oversight of the Departments of Energy and State, begun joint research projects directly with the weapon laboratories in Russia and some institutes in Ukraine. At the behest of the Department of Energy, the three U.S. nuclear weapon laboratories (Los Alamos, Livermore, Sandia) established an interlaboratory coordinating group that has since been expanded to 10 U.S. national laboratories. This group has been especially useful in forestalling interlaboratory rivalry and duplication on the U.S. side. As of summer 1993, Lawrence Livermore National Laboratory had transferred about \$1 million for work in peaceful areas of laser research to colleagues in Chelyabinsk; Los Alamos had engaged in joint research projects totaling some \$500,000 with scientists from Arzamas; and Sandia had entered into some hundreds of thousands of dollars in contracts for cooperative research with institutes in Tomsk, Yekaterinburg, and other cities in Russia, as well as with various metallurgical institutes in Ukraine. Given the value of the Russian ruble, estimates now (May 1994) are that about \$300 to \$400 per month would be sufficient to provide a livable salary for a scientist in the FSU.

These efforts have succeeded in aiding many former Soviet researchers, and plans are under way to expand the program. **This is an excellent example of how efforts by working-level officials and scientists on both sides can be effective where higher profile attempts bog down in bureaucracy and international politics.** However, all these efforts have so far been financed out of U.S. laboratory discretionary funds and are thus limited in scope.<sup>19</sup>

<sup>17</sup>V. Trofimov in *Nezavisimaya Gazeta*, Dec. 29, 1993.

<sup>18</sup>A similar situation has arisen in Ukraine, where nationalist pressure in the **Rada** (parliament) provided a political obstacle even to the signing of an agreement by the president. This resistance was finally overcome in October 1993, when President **Kravchuk** signed an agreement that the **Rada** does not need to ratify.

<sup>19</sup>In addition to governmental efforts, private professional organizations such as the American Astronomical Union, the American Mathematical Association, and the American Physical Society have transferred hundreds of thousands of dollars to former Soviet counterparts in an effort to keep science and research alive in the FSU. The efforts of the **Soros** Foundation and its founder, George **Soros**, who has expressed the intention of distributing up to \$100 million for such purposes, will have major beneficial effects on the state of former Soviet science and scientists. However, these efforts are aimed at civilian basic research only, and so have only indirect effects on nonproliferation.

Some relatively minor bureaucratic changes in procedure could significantly improve efforts to work with the Russian scientists. For one thing, U.S. scientists universally report great difficulties in receiving permission from the Department of Energy to travel overseas. Approval frequently comes at the last minute or later, severely disrupting travel planning and occasionally forcing trips to be cancelled. Moreover, when minor trip details are changed by the Russian side, the whole approval process must begin again.

On the other hand, U.S. policy has been that, for security reasons, Russian scientists cannot obtain multiple-entry visas from the United States, even though Russian businessmen can. This policy complicates the scheduling of trips, since each visa requires a month for approval, even if the individual has traveled several times previously to the United States. Flexibility on this issue by the U.S. government would facilitate a number of joint U.S.-Russian research projects.

Russian scientists and scientific organizations have let their U.S. counterparts know what they need to continue their professional activities effectively. First, they need to maintain contacts with the world's scientific communities, through receipt of professional journals (which are becoming prohibitive in cost due to the rapid inflation over the past three years) and through participation in international conferences (both in Russia and elsewhere) and topical schools. In addition, joint research projects are essential because they provide contact with foreign science and scientists, because they sometimes allow the transfer of funds to Russian scientists and institutions (helping keep the Russian scientific community afloat), and because they sometimes allow limited term exchanges of scientists between western countries and Russia.

Many U.S. and European professional societies have provided large numbers of scientific journals to satisfy the first of these requirements. Further, they also have instituted international conferences and schools in collaboration with Russian institutes. Joint research projects—generally aimed at civilian scientists—have been carried out between individual university researchers

and their partners in Russia. The relevance of most such programs to proliferation is indirect: by helping stabilize the Russian civilian industrial and research bases, they may help promote the eventual economic stabilization and recovery of the country. More directly, they provide civilian scientific employment opportunities. Such stabilization may play a role in reducing the risks of some avenues of proliferation—those that arise from severe economic stresses that pressure individuals and reduce the ability of the government to maintain custody and control over nuclear material.

There are also joint projects, both proposed and under way, between weapon scientists at U.S. national laboratories and those in Russia. These bear directly on “brain drain” proliferation problems. An institutionalized program of laboratory-to-laboratory exchanges, the Laboratory-Industry Partnership Program (LIPP, discussed in chapter 3), involves U.S. private industry as well as U.S. laboratories. It will make use of funds appropriated in the fiscal year 1994 Foreign Operations Appropriations Act. While such a program would be highly useful, it suffers from two drawbacks. First, funds for this program so far have been appropriated for only one year. If not renewed for several additional years, the program is unlikely to be productive, since the partnerships it envisages involve projects that will require support for two years or more. Second, the funds are taken from the appropriation for the Department of State and given to government laboratories in the Department of Energy. **In the future, it may be more efficient to add a line item within the Department of Energy budget specifically for such joint research projects involving U.S. national laboratories and Russian scientists (as well as those from other FSU republics).** Such a mechanism would allow past fruitful collaborations to continue without requiring that the funds come out of the State Department operating budget or other national laboratory research efforts.

## THE CHINA CONNECTION

The government of China has apparently successfully recruited Russian missile (and, possibly, nu-

clear) experts on a large scale. Russian scientists are said to be working for China, both onsite and via electronic mail, for salaries in the range of \$24,000 per year plus perquisites—some five or more times what they would otherwise earn at home. The Chinese media have reportedly claimed that up to 3,000 scientists have been recruited.<sup>20</sup>

It might appear at first glance that concerns based on these reports are minor, since China already possesses both nuclear weapons and relatively advanced missile technology. However, the transfer of this sort of technology to China presents two serious dangers. First, transfer of advanced Soviet nuclear weapon designs to China would greatly assist the development, manufacture, and deployment of multiple independently targetable reentry vehicles—a means of dispensing several nuclear warheads from a single missile. Implementation of this technology would permit China to increase its nuclear weapon stockpile and capability substantially, presenting an increased threat to its Asian neighbors and to the United States. Transfer of advanced Soviet nuclear weapon designs to China would greatly assist such developments. Second, **Chinese transfers of Russian technology to other nations could seriously exacerbate regional proliferation concerns.**

Past Chinese actions give cause for worry. China was reported in the 1980s to have transferred nuclear weapon technology to Pakistan.\*\* More recently, in summer 1993, the United States government imposed sanctions on China for the transfer of M-11 missiles to the same nation.<sup>22</sup> It cannot be assumed that China would not retransfer advanced technologies related to weapons of mass destruction and means of delivery. Such actions

could be taken for either strategic or financial reasons.

## U.S. POLICY OPTIONS REGARDING RUSSIA

**Russia is** still a great power, but it is undergoing sustained political and economic turmoil. Therefore, U.S. attempts to influence the course of events there may have only a marginal effect. On the positive side, most Russian political factions—despite their disagreements in other policy areas—agree that control of weapons of mass destruction and related materials should be as strong as possible. However, civil disorder, chaos, or anarchy would make it difficult or impossible to maintain such control.

Maintaining stability in Russia not only supports the world's nonproliferation regime; it may be essential to that regime's survival. While the United States cannot determine the overall course of events in Russia, U.S. actions can improve the current situation relative to nonproliferation. The issue of nuclear nonproliferation is of great importance to the national security of the United States and to global stability. Therefore, the consequences of failure provide a strong incentive to help, despite possible limitations on the ability of outside forces to solve Russia's internal problems.

## POLICY OPTIONS SUMMARIZED

- **Continue to pursue negotiations with Russia to implement reciprocal monitoring of nuclear weapon facilities in order to gain the right to inspect Russian facilities. Such monitoring would permit verification of weapon dismantlement under the Gorbachev and Bush initiatives.**

<sup>20</sup> see J. Fialka, "U.S. Fears China's Success in Skimming Cream of Weapons Experts from Russia," *The Wall Street Journal*, Oct. 14, 1993, p. 12, and T.M. Cheung, "China's Buying Spree," *Far Eastern Economic Review*, July 8, 1993, p. 24.

<sup>21</sup> See L. Spector, *Nuclear Ambitions* (Boulder, CO: Westview Press, 1990), pp. 93 and 33\*.

<sup>22</sup> For a brief discussion and citations to several press reports, see T. Halevy, "Chinese Compliance with the Missile Technology Control Regime: A Case Study," *National Security Quarterly*, vol. 1, No. 3, 1993, published by the Jewish Institute for National Security Affairs, Washington, DC.

## Findings Regarding Russia

- There is a possibility that nuclear material, technology, or expertise may be diverted from Russia to foreign parties. Similarly, expertise in areas such as biological weapons or chemical technology may also be diverted. The likelihood of such occurrences is difficult to assess,
- Many in the nuclear weapon complex, in other weapon development programs, and in the armed forces are under severe economic strain. This pressure saps morale and renders some individuals susceptible to bribery and other forms of coercion.
- The International Science and Technology Center, funded by the West and intended to help former Soviet weapon scientists with funding and with international joint research projects, was delayed for about a year and as of this writing is only beginning to function.
- There have been numerous cases of smuggling of nuclear and other materials. More effective control of commodity flows across borders is needed.
- Until the economic and political situations stabilize, adequate control over nuclear material in Russia will likely be difficult to maintain. This situation can be mitigated by improving material control and accountability methods. The IAEA is currently providing some assistance to this end, but this effort, constrained by the limited resources of the IAEA and the political weakness of the Russian nuclear regulatory agency, GOSATOMNADZOR, needs to be supplemented if the Russian system is to be improved rapidly,
- U.S. efforts to verify Russian weapon dismantlement or storage, or to examine the effectiveness of Russian material accountability and control, are likely to be frustrated unless the United States offers some reciprocity of access to Russian officials at analogous U.S. facilities. This may be eventually be accomplished under the recent agreement between MINATOM and the U.S. Department of Energy, which constituted a major step toward implementation of reciprocal inspections,
- Reports that Russian missile and nuclear scientists are working in or for China, if true, could lead to greatly improved Chinese nuclear capability and also to the spread of nuclear and missile technology to other countries.

*Rationale For:* In verifying that the dismantlement initiatives are being carried out properly, it would be desirable for the United States to assure itself that the quantities of plutonium and HEU declared to come from dismantled weapons actually do, rather than from some other source in the stockpile. Providing such assurance would require monitoring inflows and outflows at the dismantlement site, the plutonium storage facility, and the HEU blending facility. Unless the United States provides reciprocal access to the Russians, the Russians are not likely to grant such access to the United States.

The United States and Russia achieved an agreement on mutual inspections on March 16, 1994. At this writing, it is clear that inspections will take place at storage facilities, probably at the Pantex weapon assembly plant in the United States and at the Tomsk and Krasnoyarsk plants in

Russia. However, the question of access to the actual dismantlement facilities has not yet been decided. Negotiations are under way, and both parties hope to reach detailed agreements on implementation by the end of the year.

The United States is committed to negotiate such “transparency” measures with Russia under the terms of the agreement by which the United States is buying uranium from Russian weapons. U.S. national laboratories have been examining how to permit such access without revealing weapon design or other sensitive information. Defense Department officials have presented technical possibilities for accomplishing this.<sup>23</sup>

*Arguments Against:* It might be judged too difficult to prevent Russian inspectors from acquiring vital information about U.S. weapon designs. Given that it is in the United States’ interest to draw down Russian stockpiles of weapon-usable

23 M. Gordon, “Pentagon Offers New Way to Verify Disarmament,” *The New York Times*, Mar. 10, 1994, p. A6.

materials, even if those materials do not actually come from dismantled weapons, the added benefit gained from verifying that the materials did indeed come from weapons might not be deemed sufficiently worthwhile. Moreover, the time needed to negotiate and implement such a verification agreement might delay the actual dismantlement of nuclear weapons.

*Additional Comment:* Some observers have suggested that the IAEA become involved in monitoring material removed from nuclear weapons, and, indeed, IAEA officials have indicated an interest in this possibility. IAEA involvement has not yet been agreed to by the Russians, and the issue is under discussion.

The United States has already offered to make its own “excess” nuclear weapon material—that is, material in excess of that determined necessary for U.S. security needs—available for inspection by the IAEA. At this writing, this proposal is in an early stage, and policies to implement it are being discussed.

Monitoring compliance with a nuclear weapon arms control agreement would be a completely new task for the IAEA, which to date has not had any involvement with nuclear weapons. Some of the techniques and methodologies required for this new mission would be similar to those used in its past activities with nuclear materials, but others would not. The IAEA would need to develop new expertise and procedures, which could take some time. Furthermore, unless additional resources were explicitly provided, this additional mission would further stress the Agency’s seriously constrained budget.

It is even more critical to prevent members of the international inspectorate from obtaining weapon design information than it is to protect U.S. information from Russia, which has had nuclear weapons for nearly half a century. **Therefore, IAEA involvement in monitoring materials from weapons would not be appropriate unless protocols can be developed that make it possible to verify the non-diversion of stored materials without revealing critical design information.** If the range of procedures and the res-

olution of equipment used to monitor the materials is suitably limited, it may well be possible to meet both of these goals.

An advantage to IAEA participation would be the involvement of the international community as a participant and, thus, a stakeholder in a major arms control agreement, and to provide neutral third-party regulation of disagreements that may arise. IAEA involvement could be particularly important if the process of verified nuclear weapon dismantlement and management of military material stockpiles were extended to other nations. However, the participation of an additional party inevitably would complicate the negotiation of implementing agreements between the United States and Russia.

- **Increase funding to U.S. DOE national laboratories and to industrial partners for joint unclassified research projects with Russian and other former Soviet weapon scientists. Consider a separate line item for this purpose within the Department of Energy budget. Also, move to establish the nongovernmental foundation provided for in the FREEDOM Support Act, providing for civilian joint research projects between FSU and United States scientists.**

*Rationale For:* Scientists and technicians at Russian nuclear facilities are in extremely difficult straits, with salaries sometimes not paid and standards of living dropping. Without direct foreign support, they are largely unable to travel to the West to establish or maintain scientific contact. Direct laboratory-to-laboratory cooperation and the ISTC have had some positive results, but they only affect limited numbers of individuals. Further, these lab-to-lab contacts are funded out of existing U.S. laboratory budgets, without explicit Department of Energy support. The LIPP program does provide a specific earmark for such projects, but it is currently only envisioned for one year. Moreover, the funds come from the State Department budget, not DOE’S.

Providing hard currency support to collaborating Russian institutions (as is now being done in

the laboratory-to-laboratory research projects) can strengthen the resolve of individuals employed there not to transfer weapon-related information abroad. Moreover, since the level of Russian science is very high in many fields, the United States could benefit from access to these laboratories. Further, possible commercialization of products resulting from such joint projects eventually could benefit the Russian economy and thereby stabilize the political and economic situations there. Such commercialization would be one aspect of defense conversion, also suggested in other options. Finally, laboratory contacts are a useful source of information about conditions in the weapon facilities of the former Soviet Union.

Language in new national laboratory mission statements, currently being drafted within the Department of Energy, could endorse major activities in this area. In addition, the nongovernmental foundation authorized in the FREEDOM Support Act (see chapter 3) could provide another mechanism for joint research that would, perhaps more clearly than the LIPP program, include basic research as well as applied science.

*Arguments Against:* It may not be in the interests of the United States to help fund former Soviet weapon scientists, given the possibility of a resurgent nationalist Russia. Fiscal pressures and economic difficulties in the United States might argue for spending fewer funds overseas. Finally, continuing to require individual laboratories to pay for collaborative work out of their own budgets would impose the discipline of restricting joint projects to areas that are of significant interest to the United States.

- **Expedite travel requests by U.S. scientists engaged in joint research projects in the former Soviet Union and grant multiple-entry visas to former Soviet scientists engaged similarly.**

*Rationale For:* Difficulties with travel approvals and visa requests have disrupted joint research efforts in the past and could be eliminated at no cost to the United States. The Department of Energy could simplify and streamline its procedures for approving trips by U.S. national laboratory

personnel to the FSU to carry out cooperative research projects, thereby greatly facilitating such work. Russian businessmen receive multiple-entry visas to the United States; scientists should not be treated differently.

*Arguments Against:* Security reasons may still argue for increased scrutiny of Russian weapon scientists when they request entry into the United States.

- **Use Nunn-Lugar funds to aid in housing and providing other amenities for nuclear weapon custodians in Russia, especially for military forces.**

*Rationale For:* As indicated by the Belarusian request for assistance (see chapter 4) and by press reports, the living standard of the military units in charge of nuclear weapon in the FSU is a major concern. The lower that morale and living standards become among the weapon custodians, the greater U.S. concern over their performance should be. Some housing aid is now being provided for military personnel who are retiring from active duty in these areas, but not for those still in the armed forces. Aid could also include funding for hospitals, day care centers, assurance of adequate food supply, etc. Such a pattern of aid also would furnish an incentive to downsize Russian military forces more rapidly.

*Arguments Against:* Assistance given to active nuclear officers would be difficult to justify, politically and otherwise.

- **Relax restrictions on Nunn-Lugar funding that make it difficult to transfer Safe and Secure Dismantlement program funds to Russian agencies and manufacturers.**

*Rationale For:* One example where U.S. funds could make a major impact would be at MINATOM, which is the cognizant Russian agency for many of the projects proposed under the Nunn-Lugar program. One of the main concerns of MINATOM is maintaining its staff. There are already problems in paying them and keeping them busy. As with soldiers who have custody of nuclear weapons, MINATOM employees, particularly the technical staff of the laboratories and institutes of

the nuclear weapon complex, play a vital role in protecting nuclear material. Attempts could be made to reduce those economic difficulties that may tempt personnel to transfer material or technology abroad.

In addition, MINATOM is engaged in nuclear cooperative programs with countries such as Iran, largely for financial reasons. Given the serious economic difficulties facing MINATOM, U.S. leverage to prevent these agreements, as well as future ones with other countries that the United States would rather not see obtain Russian nuclear expertise and training, is limited. If the United States were to provide some support to MINATOM staff, it might have more influence over Russia's nuclear cooperation with other states.

Making some U.S. funding available to MINATOM workers involved in the Safe and Secure Dismantlement program would reduce, to a degree, the economic pressure on the workers in the system, build good will toward the United States in a vital segment of the Russian population, and improve morale among many of those directly involved in developing and implementing Russian nuclear safeguards.

However, the United States would need to ensure that its funds reached the intended recipients: the rank-and-file scientists and technicians working in the Russian nuclear complex. There are frequent reports of massive corruption in Russian society due to the sudden removal of strict police oversight of the population and to economic upheaval. Strict accounting procedures would be vital to assure that funds are not funneled, for example, to foreign bank accounts. Currently, funding mechanisms for the cooperative projects between U.S. weapon laboratories and Russian institutes appear to have been reasonably successful, in part because funds were transferred only after receipt of contractual deliverables. The ISTC also has a system that is intended to apply strict accountability.

*Arguments Against:* The United States has no direct interest in helping MINATOM pay its own

employees. It might be argued that this is a problem for MINATOM and the Russian government, and that the United States should not get involved in attempting to bribe a Russian Ministry to follow policies that the United States wishes. According to this line of argument, the appropriate avenue for informing Russia of U.S. concerns about official transfer of material and technology is through discussions with the Russian Foreign Ministry. Moreover, if MINATOM continues to engage in cooperative programs with states whom the United States considers to pose proliferation threats, U.S. support to MINATOM might be considered as indirect support for these programs. As a practical matter, the possibilities of misappropriating U.S. funds provided to MINATOM are not negligible, and such funding would require careful oversight.

- **Broaden permitted use of Nunn-Lugar funding to include the reduction of Soviet nuclear material stockpiles even if the material cannot be proven to originate from dismantled weapons.**

*Rationale For:* It is in the security interests of the United States to deplete stockpiles of nuclear weapon materials in the former Soviet Union that might be diverted to the black market, or that might at a later time be reconstituted into nuclear weapons. Therefore, the United States may wish to purchase such materials from Russia whether or not it can be verified that they came from dismantled weapons. This eventuality could arise if there are technical difficulties in determining the origin of the nuclear material.

*Arguments Against:* Nunn-Lugar funds were appropriated by Congress for the purpose of reducing the nuclear threat to the United States posed by Soviet nuclear weapons. Dangers posed by the possible diversion or reconstitution of other nuclear materials might be considered to be less pressing. Moreover, purchasing Russian nuclear materials without any assurance that they came from weapons might put the United States in the

position of being a paying customer of the Russian nuclear weapon material production complex.

- **Explore with the Russian government improved ways to transfer funds directly to recipient institutions and scientists.**

*Rationale For:* Because of difficulties in working through the Russian banking system, some private organizations in the West have felt compelled to transport cash directly to Russian recipients. Although laboratory-to-laboratory money transfers have been successful, there are some problems. First, taxes and currency exchange fees in such institutional interactions amount to nearly 50 percent. Transfers from professional organizations directly to Russian scientists, on the other hand, are not subject to this overhead, thanks to specific legislation passed by the last parliament. The Russians could be asked to confer the same benefits on laboratory-to-laboratory transfers, doubling the economic efficiency of joint cooperative research efforts. Secondly, Russian banks occasionally have been unreliable and sometimes have delayed transfers during inflationary periods to take advantage of changing exchange rates. Direct dollar transfers to recipients through United States banks with branches in Russia would be preferable, if such could be arranged. The ISTC and non-governmental organizations have made some progress in establishing reliable direct payment systems.

*Arguments Against:* The Russian government might object to this mechanism to avoid taxes, especially if other institutions and individuals in Russia seek equal treatment.

- **Provide help for improving material control and accountancy systems in Russia.**

*Rationale For:* While better than in the other republics, the nuclear material control and accountancy system in Russia is still rudimentary and piecemeal. It is in the interests of both Russia and the United States to improve it. Even the provision of simple office equipment (fax machines, personal computers, better e-mail communications) would help. Agreements have been reached with

Russia toward this end; they should be implemented as rapidly as possible.

A specific option in this area would be to provide support directly to GOSATOMNADZOR, the organization charged with overseeing nuclear activities in Russia. Such help would give it greater political strength and technical ability to overcome bureaucratic resistance within MINATOM to needed improvements in Russian MC&A systems. For example, GOSATOMNADZOR'S research laboratory at present is nearly moribund, due to a lack of funds.

*Arguments Against* Some elements in the Russian government could consider this effort an interference in their internal affairs.

- **Provide help to establish a more effective export control system in Russia; expedite Nunn-Lugar implementation to the degree possible, taking into account the fact that much of the delay is due to internal Russian problems.**

*Rationale For:* The same arguments apply to export controls as to the material control and accountancy systems. Better control of commodity flows across borders is urgently needed not only to stem smuggling of nuclear materials and technologies, but also to prevent smuggling of valuable metals and other products—many such cases already have occurred. Internal Russian politics have slowed the process of reaching detailed agreements to implement U.S. assistance to various parts of the bureaucracy. These disputes may have been due to turf battles within Russian ministries, between ministries, or between the president and the parliament. This last source of delay may not be as serious as in the past, given the dissolution of parliament in September 1993 and the adoption of a new Constitution on December 12, 1993, that gives greatly expanded powers to the president. Although some of these problems may be beyond the ability of the United States to influence, the United States could push for rapid implementation of accords aiding in the establishment of an effective export control system. Ineffective

Russian export controls increase the chances for illegitimate export of nuclear materials or dual-use items, not only contributing to proliferation but negating the effectiveness of U.S. and other nations' controls as well.

*Arguments Against:* Given the magnitude of Russia's internal problems, the likelihood that these funds would contribute significantly to their solution might be judged too small to be worth it, particularly in a time of fiscal constraint.

▪ **Offer increased aid for defense conversion.**

*Rationale For:* Programs along these lines have, in fact, been initiated, although little funds have thus far been expended. Economic stability will be increased by successful transition of defense industries to civilian uses. The economic situation in Russia is very serious and, if not radically improved soon, could lead to the emergence of a government much less friendly to the United States and much less likely to cooperate with it in the nonproliferation area. Therefore, the economic issue is vital to nonproliferation efforts. Increased economic stability will also reduce stresses that could tempt some with access to nuclear material or information to sell them to foreign parties.

*Arguments Against:* The economic problems in Russia may be so enormous and complex that U.S. efforts to help have only marginal effects at best.

▪ **Raise with the Russian and Chinese governments the reported cases of Russian nuclear and missile experts working for China.**

*Rationale For:* The United States could attempt to ascertain the accuracy of these reports. If it finds them to be true, the United States could in-

sist that Russia abide by its commitment not to transfer technologies whose export is proscribed by the multilateral Missile Technology Control Regime (MTCR, see chapter 3). Exports of missile technology to China would violate this commitment. Even though transfers of nuclear weapon technology to China would not violate the NPT (since only transfers to non-nuclear-weapon states are prohibited), the United States could also press the Russians to control the transfer of nuclear information to China anyway.

If requests for Russian restraint are not heeded, the United States could pressure China at least not to reexport nuclear technologies to non-nuclear-weapon states. China is bound by the NPT not to do so; in principle, it should have no problem agreeing to abide by its existing NPT commitments. China in the past also had stated its readiness to adhere to the MTCR, but it has not renewed this commitment following the tightening of MTCR guidelines in 1993. Moreover, questions about China's behavior in the past may make simple assurances insufficient to address U.S. concerns.

*Arguments Against:* If the reports concerning Russian-Chinese collaboration are inaccurate, the United States should protect its credibility and not raise the issue. Diplomacy is an important tool by which the United States will address proliferation problems in the future; if the United States is perceived as acting on the basis of poor information, it will lose influence. Even if its information is good, the United States may choose not to pursue this issue with the Russians or Chinese to avoid antagonizing those states and losing their cooperation on other issues judged to be of greater importance.