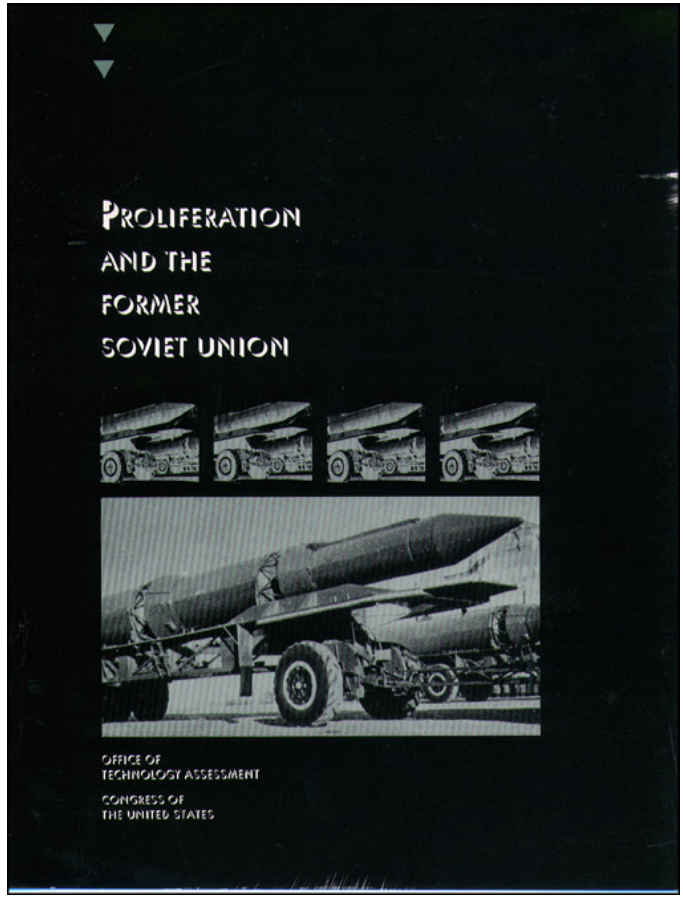
Proliferation and the Former Soviet Union

September 1994

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Foreword

The end of the Cold War dramatically lowered the direct threat that the Soviet Union's nuclear and other weapons of mass destruction posed to the United States. As the Soviet Union has collapsed, however, fears have arisen concerning the spread of nuclear materials, technology, expertise, or actual weapons to other countries or to subnational groups.

This report, the fifth publication from OTA'S assessment on the proliferation of weapons of mass destruction, examines the whole range of consequences for proliferation of the Soviet Union's breakup. [1] One effect may be the erosion of international nonproliferation treaty regimes. In spite of the continuing desire of most of the newly independent states of the former Soviet Union to support nonproliferation goals, these states face severe internal challenges: social and economic disruption are rampant and the degree of central governmental control over activities nominally within their jurisdictions is often questionable. Of particular concern are economic hardship and low morale among many individuals with access to vital weapon information or sensitive facilities—a situation aggravated by as-yet inadequate national systems to account for and secure nuclear materials, to control exports, and to police borders.

Given the severity of the problems facing Russia and the other newly independent states, the United States and other Western powers may have only marginal ability to influence the overall course of events there. This study describes how U.S. assistance may reduce specific proliferation risks in the former Soviet Union. The consequences of failure to stem these risks provide a strong incentive for the United States to help the newly independent states address them.



ROGER C. HERDMAN
Director

[1] Previous publications include: *Proliferation of Weapons of Mass Destruction: Assessing the Risks, OTA-ISC-559* (Washington, DC: U.S. Government Printing Office, August 1993), *The Chemical Weapons Convention: Effects on the U.S. Chemical Industry,* OTA-BP-ISC-106 (Washington, DC: U.S. Government Printing Office, August 1993), *Technologies Underlying Weapons of Mass Destrucrion,* OTA-BP-ISC- 11 5 (Washington, DC: U.S. Government Printing Office, December 1993), and *Export Contols and Nonproliferation* Policy, OTA-ISS-596 (Washington, DC: U.S. Government Printing Office, May 1994),

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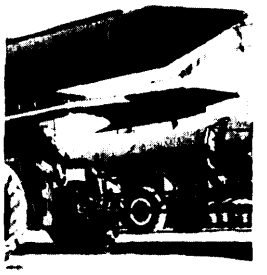
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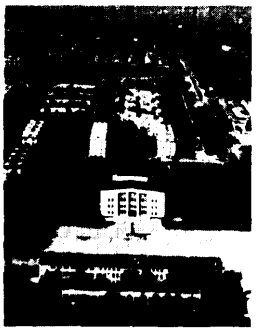
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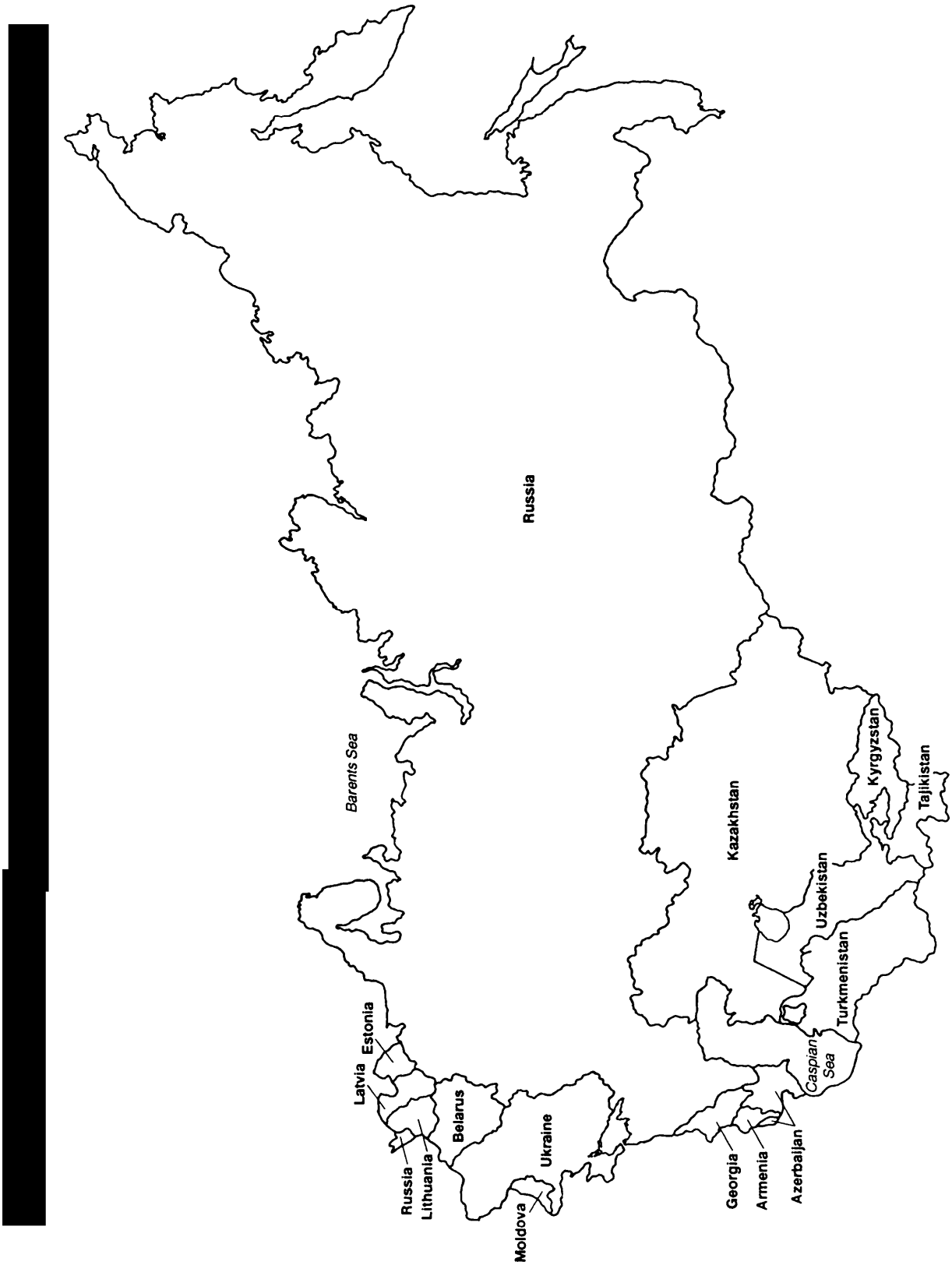
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Part I: Executive Summary 1

The collapse of the Soviet Union has led both to freedom and to the construction of democratic institutions for many of its former citizens. However, in many of the new republics that have emerged from the former Soviet Union (FSU; see figure 1), the collapse of the center has also led to economic deterioration and political chaos. In most, if not all of them, central political and administrative authority have markedly weakened. Part of this weakening is a devolution of power to democratic institutions on local and regional levels and could be considered a healthy development. But this reduction in central authority has also lead to the buildup of local fiefdoms, as individuals and local authorities seek to assure their own futures. Other manifestations of this phenomenon have been increased disorder and crime, including corruption at all levels of government.

The outlook for many of these new nations is uncertain. Any instability in this large area of the world is regarded with apprehension, not only by neighbors, but also by nations that are continents and oceans removed. A major reason for this long-distance concern is the presence in the territory of the former Soviet Union of tens of thousands of nuclear weapons and hundreds of tonnes of nuclear material suitable for nuclear weapon manufacture. Another concern is the resident expertise in nuclear, chemical, and biological weapons and missile systems. Severe economic disruptions in the FSU and the decrease in central authority of many of the new governments increase the chances that weapons of mass destruction, their components, or related expertise could be transferred to foreign parties. **Such transfers would greatly aggravate the threat that proliferation of these capabilities al-**

"All the nuclear inheritor states have difficulties in managing nuclear materials and nuclear weapon-related components on their territories."


Russia
Barents Sea
Kazakhstan
Kyrgyzstan
Tajikistan
Uzbekistan
Turkmenistan
Caspian Sea
Latvia
Estonia
Russia
Lithuania
Belarus
Ukraine
Moldova
Georgia
Armenia
Azerbaijan

ready poses to U.S. interests and to international peace and security.[1]

This study examines the implications of the current situation in the FSU for the proliferation of weapons of mass destruction and their delivery systems. It **concentrates on the nuclear component of this broad issue,** which has thus far been foremost in the views of most western observers. However, it also addresses threats that the Soviet Union breakup has posed to the chemical and biological weapon nonproliferation regimes.

FINDINGS AND POLICY OPTIONS

The following is a set of general findings and policy options regarding proliferation and the FSU. All points are discussed in detail in the body of the report. In addition, there are further findings and options specific to each of the four nuclear inheritor republics of the Soviet Union (e.g., those with strategic nuclear weapons on their territories when the Soviet Union ceased to exist) that may be found in the chapters on each of these nations (Belarus, Kazakhstan, Russia, and Ukraine).

The situation in the FSU has been fluid since the disintegration of the Soviet Union. **The analysis in this study, including findings and options, is current as of July 1994.** Major political or economic changes since that date could render some of the analysis obsolete. While this caveat holds in any analysis of current international politics, events in the former Soviet Union have moved particularly rapidly in the past three years and are likely to continue to do so.

Nonproliferation Policies and Agreements

FINDING: *From the perspective* of adherence *to international arms control agreements, the positions of the four nuclear inheritor states of the FSU have much improved since mid-1992. This shift constitutes a major success in strengthening the international nuclear nonproliferation regime.*

In the first months following the end of the Soviet Union, Russia was the only one of the states with Soviet nuclear weapons on its territory that had agreed to ratify both the Nuclear Non-Proliferation Treaty (NPT) and the START I arms reduction agreement. Its START ratification was (and still is) contingent on ratification of both agreements by the other three. Since then, due in part to major efforts by two U.S. administrations, all four inheritor states have ratified START I, and all but Ukraine have acceded to the NPT. Ukraine is believed likely to accede to the NPT shortly and, in any case, has agreed to return all strategic nuclear weapons on its territory to Russia within seven years. According to many statements from officials from both Russia and other FSU republics that are apparently accepted by the U.S. government, all tactical nuclear weapons had already been returned to Russia from the other republics of the FSU by mid-1992. These agreements and actions have removed a major threat to achievement of a long-term extension to the NPT at that treat y's Extension Conference in 1995, and are an important gain for the international nuclear nonproliferation regime.

FINDING: *The recent agreement by the United States and Russia to verify mutually their nuclear weapon dismantlement will strengthen the nuclear nonproliferation regime by Instituting an international arrangement to protect and monitor the nuclear material from the weapons.*

Under the so-called Nunn-Lugar program, the United States is providing assistance to the FSU for dismantling Soviet nuclear weapons and reducing the threat that these and other Soviet weapons of mass destruction pose to the United States and the rest of the world. In implementing this program, the United States must decide what de-

[1] See U.S. Congress, Office of Technology Assessment, *Proliferation of Weapons ofMass Destruction: Assessing the Risks,* OTA-ISC-559 (Washington, DC: U.S. Government Printing Office, August 1993), an earlier publication of this OTA study, for a description of the dangers that the proliferation of weapons of mass destruction pose to the United States and the world.

gree of assurance it needs that such dismantlement is indeed being conducted. Monitoring nuclear weapon dismantlement could be carried out in several ways:

1. through bilateral inspections at the facilities where nuclear material from weapons is blended and stored;
2. through inspection by the International Atomic Energy Agency (IAEA) at blending and storage facilities;
3. through bilateral inspection at the dismantlement facilities themselves, in addition to the blending and storage facilities, and;
4. through inspection by the IAEA at blending, storage, and dismantlement facilities.

At present, the first of these options has been agreed to, and discussions are now underway regarding the second and third. In earlier informal discussions, Russian officials refused to consider verification of dismantlement in the absence of U.S. willingness to permit reciprocal verification of its own dismantlement activities. The United States government had previously resisted such verification for reasons of secrecy, but has recently become more flexible. As a result, the United States and Russia have agreed to institute mutual verification procedures at each other's facilities. The two countries have so far agreed only to permit monitoring of their storage areas, which in the United States include parts of the Pantex facility near Amarillo, Texas, where weapons are dismantled and nuclear components stored. However, it has not yet been settled whether there will be inspections at the actual buildings where dismantlement takes place. Even if only storage sites are inspected, procedures may still need to be implemented to protect classified weapon design information on each side.

Since only U.S. and Russian inspectors would be involved, there maybe somewhat less concern about protecting weapon-related information than there would be if other nationals participated. Both the United States and Russia have sophisticated nuclear arsenals and would not likely gain significant advantage from whatever information on weapons might be revealed despite the confidentiality measures. Moreover, implementation agreements and inspection protocols should be easier to negotiate bilaterally than they would be if three or more parties were involved, which would be the case if the IAEA were to participate. The negative aspect of a bilateral arrangement between the United States and Russia is that it excludes the rest of the world. In particular, it excludes the three other declared weapon states—the United Kingdom, France, and China—that have direct interests in nuclear disarmament, and that may need to be involved in future nuclear arms reduction agreements.

Involving the IAEA in these inspections would give the world community an active role and stake in the disarmament process, setting an important precedent for future nuclear disarmament. Indeed, the U.S. government has committed itself unilaterally to submit to IAEA monitoring of nuclear material from weapons determined to be in "excess" of U.S. military requirements. The multilateral approach, however, has several disadvantages. First, inspectors from many countries, including possible would-be proliferants, would be routinely touring nuclear weapon facilities. Even basic weapon information would have to be protected during the process by which material inputs and outputs were to be quantitatively verified. This may be technically possible, but-even if the actual dismantlement process were not under international observation-IAEA involvement would probably cause ongoing concerns about the possible leakage of nuclear design information to non-nuclear-weapon states.

Blocking Access to Nuclear Weapons and Materials

FINDING: *All the nuclear inheritor states have difficulties in managing nuclear materials and nuclear weapon-related components on their territories.*

These difficulties range from inadequate means of controlling, accounting for, and protecting the nuclear material on their territories (including a lack of international safeguards providing for external audits and technical verification of the na-

tional systems of accounting for the material) to inadequate border controls, customs, and export controls. These difficulties also extend to controls over dual-use items: objects having innocent, commercial applications but that also have uses related to nuclear weapons.

FINDING: *External aid is vital to bringing control over such materials and goods up to international/ standards in the shortest possible time.*

Belarus, Kazakhstan, and Ukraine do not have adequate export control systems or national systems to control nuclear materials. Neither do they have nuclear safeguards agreements in place with the International Atomic Energy Agency (IAEA). For example, one or two years will be needed to put a national nuclear material accounting and control system in place in Kazakhstan and to implement a nuclear safeguards agreement with the IAEA, according to current estimates. Even in Russia, improvements in nuclear safeguards and export controls are essential. The sooner international safeguards are in place, the sooner one window for diversion will be closed.

OPTION: *The United States could expedite its assistance for improving material control and accountancy and export control to all the nuclear inheritor states in an effort to close quickly any windows of opportunity that may now exist to divert nuclear materia/ or information.*

The process of dismantling thousands of nuclear weapons in the United States and in Russia, as outlined in the parallel initiatives of Presidents Gorbachev and Bush in 1991, is still in its early stages in both countries. In 1991, the United States also began a large-scale aid program referred to as the Nunn-Lugar or Cooperative Threat Reduction program. Through this program, four hundred million dollars have been provided in each of fiscal years 1992, 1993, and 1994 to assist Russia and the other nuclear inheritor states in the dismantlement of nuclear and chemical weapons and to fund related projects. In addition to weapon dismantlement, these funds may also be used to convert defense facilities to non-military use, as well as to help prevent proliferation of weapons of mass destruction through means such as developing export control systems, improving nuclear safeguards, and preventing the diffusion of related expertise from the FSU. **As of March 22, 1994, about $75 million have been proposed for obligations to improve nuclear safeguards and to develop export control systems. However, less than one million dollars have actually been obligated for these purposes and even less actually spent.**

The "Brain Drain"

OPTION: *Any assistance that the United States and the West could provide to assure a minimal living standard for weapon scientists and custodians of nuclear weapons in the FSU would help protect those weapons and their nuclear material from unauthorized uses. Moreover, spending some U.S. Nunn-Lugar funds on contractors in Russia and the other inheritor states, as well as speeding implementation of U.S. assistance, could help dispel hostility towards the United States and help dissuade weapon scientists and engineers from contributing to the development of weapons of mass destruction by other states,*

More efficient delivery of U.S. and Western assistance could work to counter the impression, now prevalent among Russian scientists and politicians, that the U.S. program is mainly aimed at aiding U.S. industry and at disarming the Russian military. Such an impression, which has been strengthened by the slow progress made thus far in implementing the programs for U.S. assistance to the FSU, is not conducive to increased U. S.- Russian cooperation in nonproliferation and other areas. **Of the $1.2 billion authorized in fiscal years 1992-1994, only $117 million had been obligated as of March 22,1994 (table 1).** Indeed, Congress refused to roll over $208 million in fiscal year 1992 funds that had not been obligated by late 1993. In order to implement the projects planned for those funds, money was taken from the $400 million appropriated in fiscal year 1994.

TABLE 1: Proposed Funding Allocations of $1.2 Billion Authorized in Cooperative Threat Reduction Program, as of March 1994 ($ millions)

Country	Notifications to Congress	Obligations
Belarus	76,06	5.17
Kazakhstan	99.96	0.12
Russia	492.96	108,63
Ukraine	277.06	0.18
Total	946.04	**114.10**

SOURCE. U.S. Department of Defense, 1994.

Part of the delay in spending these funds had been due to difficulties in negotiating agreements with the FSU republics, but part of the problem was also the glacial rate at which the U.S. government approved projects and obligated and transferred funds. In addition to time-consuming review within the executive branch, Congress, represented by the Appropriations and Armed Services Committees in each house, must be notified by the Department of Defense (DOD) of the intent to obligate funds for each program. In practice, this means that individual programs may be blocked by objections from the Committees. Thus, in a sense, programs need to receive tacit approval from these committees before funds can be obligated.[2]

The Defense Department has announced its intent to obligate an additional $420 million by the end of fiscal year 1994 and $430 million by the end of fiscal year 1995, having reached agreement with the receiver nations for over $900 million in future projects.[3] These expenditures will come mostly from fiscal year 1993 and fiscal year 1994 funds. However, the successful expenditure of this amount by that time will require that Congress and the executive branch proceed more expeditiously on this matter than they have in the past.

In addition to providing specific help for weapon dismantlement, U.S. assistance could also help stabilize the economic situation in the Russian nuclear weapon complex. There are indications that housing and other conditions for officers in charge of manning and protecting strategic nuclear weapons in the FSU are poor, as it reportedly is among many elements of the Russian military. Improving the living conditions for personnel with control over nuclear weapons and nuclear materials could significantly improve their morale and substantially increase security over the nuclear arsenal.[4]

Moreover, legislative restrictions on Nunn-Lugar spending that require the use of U.S. technology and experience "where feasible" could be relaxed, so that more than the current minimal level could be spent on local contractors in the FSU. Easing such restrictions could be done either in future legislation reauthorizing the Cooperative Threat Reduction Program, or by a less restrictive interpretation of the word "feasible" by the Department of Defense in the implementation of the program.

Another serious problem that Western assistance might ameliorate is the so-called "brain drain": the possibility that technical personnel with expertise in weapons of mass destruction might emigrate to would-be proliferant countries or otherwise provide relevant material, expertise, technology, or information to unauthorized parties outside the FSU. Severe economic stresses in Russia and other republics of the FSU could tempt

2 Nunn-Lugar funding obligations must be reported to Congress at least *15 days* before such obligation takes place. This requirement has been in the authorizing legislation since fiscal year 1992. In the fiscal year 1994 Defense Authorization Act, section 1206 addresses the prior notice to Congress of obligation of funds and section 1208 defines the relevant committees.

3 Telefax from the Office Of the Assistant to the Secretary of Defense for Atomic Energy, Apr. 25,1994.

4 A somewhat different perspective on aid strategies for stabilizing FSU republics may be found in "A New Strategy for United States Assistance to Russia and the Newly Independent States" (Washington, DC: The Fund for Democracy and Development, January 1994). While not focused on the nonproliferation issue, the report stresses providing housing and job training for military personnel and increasing the use of the private sector for distributing humanitarian aid. It also emphasizes accelerating implementation of Nunn-Lugar assistance and expanding technical exchanges.

such individuals to sell knowledge or material to which they have access. Aggravating this problem is the fact that funding for science in general, and for nuclear weapon institutions in particular, has become severely restricted in Russia. The two major nuclear weapon design laboratories, at Arzamas and Chelyabinsk, have had problems supplying their employees with minimal salaries, let alone the comfortable living standards that had been their due as honored and vital workers in the Soviet Union. As a result, scientific workers at these establishments have engaged in public demonstrations and protests. U.S. visitors to one of these sites report even a lack of basic medicines and anesthetics at hospitals. Although there is no evidence that deprivation has yet resulted in anyone emigrating beyond the FSU to perform weapon-related research, concern remains that such may occur if conditions continue to deteriorate.

The United States, along with allies in Western Europe and Japan, has set up an International Science and Technology Center (ISTC) in Russia for the FSU. A smaller, separate center (including Canadian participation as well) is planned for Ukraine. The goal of these centers is to provide nonmilitary research opportunities for former Soviet scientists, in collaboration with colleagues from the West. These efforts have proceeded very slowly. The Ukraine Science and Technology Center is still blocked by political problems in Kiev. The ISTC, however, finally began operation in March 1994, broadening its original membership to include Kazakhstan, Belarus, Armenia, and Georgia.

OPTION: The *United States could consider the establishment of independent science and technology centers in Belarus and Kazakhstan.*

Both Belarus and Kazakhstan have acceded to the ISTC agreement, and the installation of ISTC branch offices in their respective capital cities in under review. However, no independent centers focused on weapon scientists in these two countries are now being considered. This somewhat offhand treatment might be viewed as making Belarus and Kazakhstan appear to be unimportant nations with whom the United States will deal only through the former imperial power, Russia. The lack of a separate center is of concern especially in Kazakhstan, which contains the original Soviet nuclear test facility and which has become the new home of a large number of its weapon scientists and technicians. Kazakhstan also has former Soviet chemical and biological weapon facilities on its territory.

Separate science and technology centers could be established either under the auspices of recently signed science and technology umbrella agreements with the two countries, or under the Nunn-Lugar program. Such arrangements would have the effect of providing research possibilities for weapon and civilian scientists, furnishing them with much desired contacts with Western colleagues. They would also assist these countries in the development of a scientific and technical base, essential to economic recovery in a time of difficult transition. Both results are important to preventing proliferation, since they would help in stabilizing economic conditions and promoting political calm.

OPTION: *Expand the scope of the science and technology centers and laboratory-level collaborations and assure contlnuing funding for the Laboratory-Industry Partnership Program (LIPP). In addition, Institute procedures to speed up operations and render the collaborations more efficient.*

It is in the vital interests of the United States that former Soviet nuclear weapon scientists have some means other than selling nuclear secrets to provide minimal living standards for their families. The more effort expended on helping such scientists maintain both their professional activities-directed to peaceful research—and a decent standard of living, the better protected will be the information to which they have access. Furthermore, applying their skills to the production of commercially viable products could help stabilize the shaky economies of the FSU republics. Such stabilization, in turn, would improve the general prospects for an orderly society, vital for maintaining an effective nonproliferation regime in

those nations. This last point argues for also involving scientists who are not weapon researchers in these assistance programs, as in fact is being done in the ISTC and other collaborative projects.

In addition to the ISTC, numerous laboratory-to-laboratory contacts and joint research projects have been organized between scientists at U.S. national laboratories and their colleagues in Russia and Ukraine. Some of these are aimed at basic research and others have the goal of developing commercially viable products, in collaboration with a third party: private industry in the United States. These activities, often initiated on a personal level, have resulted in a multimillion dollar effort that has provided support for a (still) relatively small number of former Soviet nuclear scientists and also provided them much desired contact with science and scientists in the West.

The Laboratory-Industrial Partnership Program (LIPP)—a formalized effort to fund industrial partnerships with scientists in the FSU—has been developed by the Department of Energy in cooperation with the Department of State. Funding at the level of $35 million is currently specifically earmarked in the Foreign Operations Appropriations Act for fiscal year 1994. However, no funding beyond fiscal year 1994 has yet been assured. A more regularized funding arrangement than the current one could be instituted. One possibility would be to include LIPP and, possibly, other laboratory-to-laboratory projects as a line item in the Department of Energy appropriations.

Finally, joint projects with FSU scientists have been impeded in the past by difficulties in obtaining multiple-entry visas for FSU scientists to visit the United States and by frequent lack of timeliness by the Department of Energy in granting its scientists' travel requests to the FSU. Expediting these processes would contribute to the efficiency of collaborative efforts between the United States and republics of the FSU.

The China Connection

A further problem connected with limited employment opportunities among weapon scientists in Russia is the apparent increase in military research collaboration between Russia and China. Many Russian experts are reported to be working on Chinese military projects in the nuclear and missile areas.[5] Although China already has advanced nuclear weapon and rocket technology, the transfer of additional capability is not in the interest of the United States for two reasons. First, China could thereby pose a greater military threat to other nations in the region and even to the United States itself. Second, China might sell some of its newly acquired technology to third parties that do not currently possess nuclear or long-range rocket capability, possibly threatening regional and even global stability. On the other hand, if the United States were to press this issue, Russia might expect the United States to increase its assistance to make up for any resources that would be forgone if this alleged collaboration with China were discontinued.

OPTION: *The United States could make strong efforts to verify whether the reports of Russian/Chinese collaboration in nuclear weapon and missile research are true. /f those reports are confirmed, the United States should consider taking up this issue in contacts with the Russian government, asking for assurances that nuclear weapon and rocket technology not be transferred to China,*

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[5] See John 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, in which a Russian Ministry of Defense official is cited as confirming that over 1,000 scientists and technicians have traveled to China on exchanges and 300 are permanently based there. In addition, the article refers to "scores" who have been recruited by the Chinese government. It is not clear how many of these are nuclear or missile scientists, however.

SUMMARY FINDING

Russia and Ukraine are large countries with immense and complex problems. The United States and other external forces have only limited abilities to affect the course of events in those countries or in the rest of the FSU. Nevertheless, the United States can take some actions to counter the threat that the breakup of the Soviet Union poses to international nonproliferation regimes. Many such actions have been and are being assiduously pursued by the U.S. government. However, further steps can be taken, as suggested in the options just presented as well as in further options presented in later chapters that are specific to each of the nuclear inheritor states.

ORGANIZATION OF THIS REPORT

This report analyzes proliferation issues associated with the breakup of the Soviet Union and presents options for dealing with them. Chapter 2 considers the threat posed by the breakup to the multilateral nonproliferation treaty regimes and addresses the importance of buttressing those regimes. Chapter 3 examines perhaps the most acute concern: the need to block proliferants from acquiring nuclear weapons, weapon materials, or associated expertise and technology from former Soviet republics. Together, these chapters comprise Part 2.

Since the United States has no direct control over activities in the former Soviet Union that might contribute to proliferation, it can exert influence only through the incentives or disincentives it offers the people, institutions, and governments of the FSU'S newly independent states. Chapters 4 through 7 examine each of the four nuclear inheritor states in turn, discussing individual problems and analyzing solutions for each of them. These chapters, comprising Part 3 of the report, elaborate on the general findings and options summarized here and go on to develop country-specific findings and options.

Part II: Proliferation Threats and Responses

The Soviet Union ceased to exist at the end of 1991. The collapse of this monolithic political structure, able to impose its will on a large part of the world, was greeted with relief by many, both within and without its territory. However, in the wake of its demise, many doubts emerged about the stability of its successor political structures. In the newly independent states of the former Soviet Union (FSU), issues of border definition, rampant criminal activity, ethnic rights, and ethnically based domination have not been resolved and, in some cases, are even becoming more acute. Even more worrying to the rest of the world is the possibility that the residual chaotic situation in the FSU might lead to loss of responsible state control over:

- nuclear material;
- facilities used to produce nuclear material;
- expertise, information, and technology that could be used in the manufacture of nuclear weapons or other weapons of mass destruction, or, in the worst case;
- nuclear or other weapons of mass destruction, themselves.

Such lack of control could result in nations (and perhaps even subnational groups) outside the FSU achieving nuclear weapon capability. Alternatively, nuclear inheritor states (i.e., those with strategic nuclear weapons on their territory when the Soviet Union ceased to exist) within the FSU might retain control of their nuclear infrastructure, and may make deliberate efforts to ac-

*"A proliferant state able to acquire nuclear weapons or weapon materials from the **FSU** would gain a tremendous head start for its own nuclear weapon program."*

quire the ability to produce or use nuclear weapons themselves. ' The net result in either case could be an increase in the number of nuclear weapon states, either within the borders of the FSU or beyond them.

Besides increasing the chances of nuclear proliferation, the Soviet Union's demise may also contribute to chemical and biological weapon proliferation. However, the increased proliferation risk attributable specifically to the collapse of the Soviet Union is somewhat less in the chemical and biological case than it is for nuclear proliferation. Nuclear weapons—and in particular, the enriched uranium or plutonium required to make them—are much harder to produce than chemical or biological weapons. Therefore, a proliferant state able to acquire nuclear weapons or weapon materials from the FSU would gain a tremendous head start for its own nuclear weapon program, whereas its acquisition of Soviet chemical and biological agents would provide comparatively less assistance to its chemical or biological weapon program. Moreover, the necessary expertise and materials to produce chemical and biological weapon agents are available from many sources besides the FSU. Hence, any leakage of chemical or biological weapon technology from the FSU (except, possibly, in the area of weaponization) would not make such a dramatic difference in potential sources of supply.[2]

Russia's compliance with the Chemical Weapons Convention and the Biological Weapons Convention is, however, vital for the success of those treaties. **Accordingly, this report addresses possible effects of the breakup of the Soviet Union on chemical and biological nonproliferation.**

On balance, however, this report concentrates on *nuclear* proliferation issues. Of primary concern are Russia, Ukraine, Kazakhstan, and Belarus, the nuclear inheritor states of the Soviet Union that could serve as sources for nuclear weapons or weapon materials.[3]

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[1] The Soviet Union had been one Of the *five* countries (along with the United States, the United Kingdom, France, and China) whose nuclear arsenals were recognized and permitted-at least in the near term—by the Non-Proliferation Treaty (NPT). Russia is considered by the world community to be the nuclear successor state of the Soviet Union, inheriting its nuclear arsenal and its status as a nuclear-weapon state under the NPT. The other former Soviet republics with strategic nuclear weapons on their territories—Belarus, Kazakhstan, and Ukraine-do not have control over or undisputed ownership of those weapons and are not recognized as nuclear weapon states. Together with Russia, these states are termed "nuclear inheritor states" in this report.

2 This report does not address the relative threats posed by various weapons of mass destruction, but rather the effects on proliferation Of the breakup of the Soviet Union. For a discussion of the relative effects and military significance of nuclear, chemical, and biological weapons, see U.S. Congress, Office of Technology Assessment, *Proliferation of Weapons of Mass Destruction: Assessing the Risks,* OTA-ISC-559 (Washington, DC: U.S. Government Printing Office, August 1993), especially ch. 2. For an analysis of the relative technical requirements to produce these weapons, see U.S. Congress, Office of Technology Assessment, *Technologies Underlying Weapons of Mass Destruction,* OTA-BP-ISC-115 (Washington, DC: U.S. Government Printing Office, December 1993).

3 This does not imply that no other republics are a cause for *worry.* Estonia and Lithuania, for example, have been conduits for many types of contraband. Armenia has large unsafeguarded nuclear power reactors (currently shut down) and considerable technical expertise. Many other republics have civilian nuclear power or research facilities or uranium mining and milling operations (e.g., Lithuania, Uzbekistan, Kyrgyzstan, Turkmenistan, Georgia), but none other than the four nuclear inheritor states is thought to possess nuclear weapons or means of producing the material essential for nuclear weapons (that is, highly enriched uranium or plutonium).

Threats to International Nonproliferation Regimes

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Actions taken by Russia and other former Soviet republics will have a significant influence on the implementation of the major international treaties banning the proliferation of weapons of mass destruction: the Nuclear Nonproliferation Treaty, the Chemical Weapons Convention, and the Biological Weapons Convention.

THE NUCLEAR NON-PROLIFERATION TREATY

Emergence of more than one nuclear power among the newly independent states of the former Soviet Union would seriously damage the nuclear nonproliferation regime. Such an action, which would signal that the political and diplomatic costs of rejecting the nuclear nonproliferation regime were tolerable, would threaten to derail the extension of the nuclear Non-Proliferation Treaty (NPT) in 1995. It would also significantly upset the security relationships in a newly unsettled part of the world, possibly leading other states in the region to reconsider their own commitments to nuclear nonproliferation. States with the incentive and the ability to seek nuclear weapons (e.g., Iran, Taiwan, North Korea) might either openly renounce the Treaty or work to kill it. A chain of events might well culminate in the termination of the Treaty as an effective arms control regime, producing an arms race in which tens of nuclear powers could emerge. While such a catastrophe would not be inevitable if Belarus, Kazakhstan, or Ukraine pursued nuclear weapons, such an outcome would be conceivable. Therefore, Russia and the West share a common interest in persuading these three countries to accede to the NPT as soon as possible.



Belarus was the first to do so, ratifying the NPT in 1993. It had hesitated primarily for economic reasons, clearly having at least

considered whether there was some way of using the presence of nuclear weapons on its territory to gain economic benefits in a time of difficulty. Kazakhstan hesitated for these reasons as well, but also was concerned about obtaining security assurances in return forgiving up the weapons. Nevertheless, the government of Kazakhstan followed Belarus' example and signed the NPT, submitting it to parliament during a 1993 visit of U.S. Vice President Al Gore and ratifying it by a near-unanimous vote on December 13, 1993.

In Ukraine, where the Treaty has faced the greatest opposition, its fate is still uncertain. Resistance to giving up the nuclear weapons on its territory was driven principally by security concerns--Ukraine being the most worried of the three states about perceived Russian designs on its sovereignty, territorial integrity, and very existence—but economic considerations were an issue there, too.

On the positive side, Ukrainian leaders have stated that Ukraine will become a party to the Nuclear Non-Proliferation Treat y as soon as practicable, joining the regime as a non-nuclear-weapon state. [1]They have already succeeded in securing ratification of the START I nuclear arms control treaty by the parliament (or Rada), overturning a previous action that had placed crippling conditions on that Treaty's ratification.

However, Ukraine has failed to deliver on similar commitments in the past. In May 1992, Ukraine, along with the other nuclear inheritor states of the FSU, signed the Lisbon Protocol to START I, promising to ratify START I and to join the NPT as a non-nuclear-weapon state.[2] Indeed, since 1991, President Kravchuk has often stated that Ukraine would eventually accede to the NPT.[3] Many other politicians, however, were ambivalent on the issue. In May 1993, many urged the Rada to keep at least some strategic nuclear rockets (all 46 of the SS-24s then on their territory) for the near future. Around the same time, 162 members of the Rada (about 40 percent) signed a petition asserting that Ukraine was already a nuclear-weapon state, since the Lisbon Protocol considers the four inheritor states to be successor states for the purpose of START I arms reductions. The petition further declared that Ukraine should remain a nuclear-weapon state. This novel legalistic position, presented by Yuri Kostenko, head of the Rada parliamentary working group on START I ratification and disarmament, has not been accepted by any of the other former Soviet signatories of the Lisbon Protocol, nor by any Western states.

In Ukraine, parliamentary debate on START I began fitfully in June 1993. Postponing its consideration until the fall, the Rada "ratified" START I on November 18, 1993 with a large number of conditions attached, rendering the situation even more ambiguous than before. To the consternation of the international community, the conditions included a demand for additional international security guarantees, for foreign aid of at least $2.8 billion to cover the cost of weapon dismantlement, and, most disturbingly, for the destruction of only a fraction of the SS-19 and SS-24 missiles on its territory.[4] The West had expected that all of the SS- 19s and SS-24s would be destroyed, pursuant to the Lisbon Protocol. The Rada specifically

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1 All signatories to the NPT other than five acknowledged nuclear-weapon states agree to forego nuclear weapons and are designated as "non-nuclear-weapon states" by the Treaty. See footnote 1, p. 3.

2 Russia has made its own ratification Of START I (and START 11) contingent on Bela-us, Kazakhstan, and Ukraine honoring this pledge: that is, to ratify START I and accede to the NPT.

3 See, for example, T. Bernauer et al., "Strategic Arms Control and the NPT: Status and Implementation," G. Allison, et al., eds., "'Cooperative Denuclearization: From Pledges to Deeds" (Cambridge, MA: Center for Science and International Affairs, Harvard University, January 1993), p. 48 and several press articles in FBIS, JPRS-TAC-93-O03, Feb. 25, 1993, pp. 30-34.

4 The Rada agreed to the dismantlement of 36 percent of the launchers and 42 percent of the warheads in Ukraine. This fraction was determined by taking the fraction of launchers and warheads of the entire Soviet arsenal to be removed and applying it to those on Ukrainian territory.

withheld ratification of Article V of the Lisbon Protocol, which contained the commitment to accede to the NPT as a non-nuclear-weapon states

Considerable progress was made on January 14, 1994, when Presidents Clinton, Yeltsin, and Kravchuk signed a trilateral declaration concerning the nuclear weapons in Ukraine. The deal includes the agreement by Ukraine to transfer all nuclear weapons on its soil to Russia by the year 2000, as agreed under the Lisbon Protocols. In return, Russia will compensate Ukraine for the uranium in the warheads, valued at about $1 billion, through some combination of cash, nuclear fuel for Ukraine's reactors, and partial relief of the substantial debt owed by Ukraine to Russia for previously shipped energy supplies. The uranium itself will be blended from high enrichment (required for weapons) to much lower levels, characteristic of nuclear fuel for power reactors. In addition, further security guarantees from Russia and the United States, including recognition of current borders, were given Ukraine, contingent on accession to the NPT. The United States also promised financial aid, including $175 million for dismantlement costs and $155 million for economic development that it had earlier offered. After this agreement was reached, the Rada withdrew its earlier reservations about Article V of the Lisbon Protocol and ratified the START I treaty unconditionally on February 3, 1994.

The Rada also endorsed the trilateral presidential declaration on February 3, 1994, removing considerable uncertainty as to whether the declaration would, in the end, be implemented. Even so, many of the nationalist voices for a nuclear Ukraine violently attacked the agreement and President Kravchuk as well, some going so far as to accuse him of "high treason."[6] In addition, the Rada refused to ratify the NPT. It is likely that the new Rada, elected on March 27, 1994, will consider the NPT after a resubmittal by President Kravchuk.

The final outcome of the NPT in Ukraine will depend on many political factors, including economic developments, the composition of the new Rada, and the relationship between the president and the Rada. Given, however, that Ukraine has already committed to remove all Soviet nuclear weapons from its territory, refusal to accede to the NPT at this point appears to have lost any political or strategic advantage, while the negative repercussions of a refusal would be considerable. The logical outcome is, therefore, that Ukraine will soon accede to the NPT, which would allow the START process to continue, remove considerable political uncertainty in eastern Europe, and eliminate a major threat to the long-term extension of the NPT at the extension conference in 1995.

THE CHEMICAL WEAPONS CONVENTION

As the possessor of the world's largest chemical weapon arsenal, Russia's participation in the international chemical nonproliferation regime is essential to its viability.[7] Failure of the Russian government to ratify and comply with the multilateral Chemical Weapons Convention, or to implement existing bilateral chemical disarmament agreements with the United States, could therefore have serious consequences.

The United States and the Soviet Union arrived at a number of chemical arms control agreements in 1989 and 1990. On September 23, 1989, Secretary of State Baker and Soviet Foreign Minister Shevardnadze signed a Memorandum of Understanding (MOU) at Jackson Hole, Wyoming, that

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[5] See J. Lepingwell, "The Ukrainian Parliament's Resolution On START I Ratification," Nov. 19, 1993, RFE/RL Research Institute FAX, and S. Erlanger, "Ukraine's Hedging on A-Arms Angers Russia," *The New York Times, Nov. 22, 1993.*

[6] *See,* for example, "UNA Accuses Kravchuk of 'High Treason' Over Nuclear Issue," *Demokratychna Ukrayina*, Jan. 25, 1994 in FBIS-SOV-94-018, Jan. 27, 1994, p. 34, and "Rukh Leader Terms Treaty Signing 'National Betray al'," *UNIAN,* Jan. 14, 1994, FBI S- SOV-94-1OI , p. 71.

[7] Of the republics of the FSU, only Russia had significant capability in chemical and biological weapon research, although some production facilities and a test range were in what are now Uzbekistan and Kazakhstan.

provided for a two-phase process. The first phase included bilateral facility visits and the exchange of general data on each side's chemical weapons. Later, in a second phase, more detailed data would be exchanged, with more rigorous bilateral inspections of chemical weapon production and storage facilities for the purpose of verification of the data. This agreement was carried further by the Agreement on Destruction and Non-Production of Chemical Weapons and on Measures to Facilitate the Multilateral Convention on Banning Chemical Weapons (also known as the Bilateral Destruction Agreement or BDA), signed by Presidents Bush and Gorbachev on June 1, 1990. The original version of this accord provided for the actual destruction of chemical weapon stockpiles down to the level of 5,000 tonnes of agent on both sides by the year 2002;[8] the latest proposal is to revise the deadline to 9 years after the BDA enters into force (which it has not yet done, pending additional negotiations). In addition, both parties agreed to stop producing chemical weapons and to institute onsite inspections that would verify the stockpile destruction.

In July 1992, the United States and Russia signed an agreement to cooperate in the destruction of chemical weapons in Russia. Under this cooperation agreement, distinct from the BDA, the United States promised about $25 million to help Russia destroy its stockpile; there are ongoing discussions about possible further help. One recent concrete result has been the decision to fund the construction of a chemical demilitarization laboratory in Russia. U.S. aid is important because Russia currently lacks the funding and, possibly, the technical infrastructure to dispose of its stockpile in time to satisfy the requirements of the Chemical Weapons Convention (assuming that treaty's entry into force).

An important first step was taken on January 10, 1994, when the United States and Russia signed the 1994 Plan of Work for the U.S. Chemical Weapons Destruction Support Office in Moscow. This agreement paves the way for the release of up to $55 million in so-called Nunn-Lugar funding (see section in chapter 3 on U.S. assistance to the FSU)-including the $25 million referred to above-to initiate the program. U.S. help will certainly speed up the process of chemical demilitarization, although it may not guarantee achievement of the timetable.

The bilateral chemical weapon accords with the United States had been intended to pave the way for the multilateral Chemical Weapons Convention (e.g., by helping to persuade other nations to accede and by providing a bilateral template for inspections that would be overseen by multilateral efforts later). However, the bilateral accords are being overtaken by the progress of the Convention, which was opened for signature on January 13, 1993. Meanwhile, there have been many delays in the implementation of the two bilateral accords, in part caused by the dissolution of the Soviet Union and the consequent upheaval in Russia. So far, there have been a general exchange of data and some visits. Implementation of the second phase of the MOU regarding inspections and detailed exchanges of data was delayed for some time. Phase 11 was finally agreed to and implementation documents signed on January 14, 1994 in Moscow, and reciprocal inspections will begin soon. In April 1994, the first of the information exchanges actually occurred.

The United States has a number of concerns regarding Russian chemical weapons. First, the Soviet/Russian declaration of the total amount of stockpiled chemical weapons (equivalent to 40,000 tons of agent) has aroused skepticism

[8] The Soviet Union had declared 40,000 tonnes of chemical weapon agents in its stockpile; the United States has approximately 31,000 tonnes. United States General Accounting Office, "Status of U.S.-Russian Agreements and the Chemical Weapons Convention," GAO/NSIAD-94-136, March 1994, pp. 10-11.

among some observers in the United States and even in Russia, who feel this number is too low.[9] Second, allegations of continued Russian chemical weapon development have attracted international attention. In the best known instance, one scientist previously working in the Soviet chemical weapon complex, Dr. Vil Mirzayanov, has claimed in the Russian and American press that Russia was developing new, highly potent binary agents, at least on a laboratory scale. [10] While not yet a violation of the letter of the BDA (which would restrict the *production,* rather than the *development,* of chemical weapons), such activity would certainly violate the spirit and the norms of the evolving international regime on the banning of chemical weapons. Moreover, if this development were to continue after the Chemical Weapons Convention enters into force, it would violate that treaty. Official Russian statements have been evasive as to whether Dr. Mirzayanov's allegations are true, but his prosecution for revealing state secrets (only recently halted) lends some credibility to his testimony.

A third concern has been the lack of progress in implementing the two bilateral accords. Although agreement has been reached on Phase II of the MOU, the BDA remains deadlocked. After delays, talks were finally held in March 1993, but Russia failed to follow up on the agreement, despite several requests by the United States. In September 1993, the Russians still had not agreed to follow up and instead asked for additional changes to the text.

THE BIOLOGICAL WEAPONS CONVENTION

Recently, concerns have arisen in the United States about the delayed Russian compliance with the 1972 Biological Weapons Convention (BWC). If these concerns are not satisfactorily addressed, that treaty regime could be threatened.

For some time, the United States had suspected the Soviet Union of conducting biological warfare activity despite Soviet ratification of the Biological Weapons Convention and the Soviet Union's status as a depository government of that treaty. In 1979, scores of people died of respiratory anthrax in Sverdlovsk (now Yekaterinburg), caused by what the United States suspected—and the Russian press and politicians have since confirmed—was an accidental release from a military research facility. Further revelations concerning the Soviet/Russian biological weapon program have appeared in the Russian and international press. On April 11, 1992, Russian President Yeltsin issued a decree securing Russian fulfillment of its international obligations and confirming the termination

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[9] U.S. Director Of Central Intelligence R. James Woolsey, elaborating on his testimony before the Senate Committee on Governmental Affairs in February 1993, stated for the record that "We cannot confirm that the Russian declaration of 40,000 metric tons is accurate. In addition, we cannot confirm that the total stockpile is stored only at the seven sites declared by the Soviets—all of which are in Russia. Some other republics maintain that Russia still has CW [chemical weapon] materials on their territories." In fact, according to a press report, some Russian officials have conceded the number is too low. See M. Gordon, "Moscow Is Making Little Progress In Disposal of Chemical Weapons," *The New York Times, Dec.* 1, 1993. Further, on Mar. 10, 1994, Aleksei Yablokov, Chairman of the Russian Security Council's Interdepartmental Commission for Ecological Safety, claimed that up to a factor of 10 more chemical weapon stocks had been manufactured in the Soviet Union. Reportedly, the excess over 40,000 tons had been dumped. See, for example, Radio Rossii, Mar. 10, 1994 in FBIS-SOV-94-048, Mar. 11, 1994, p. 28.

A report of the House Committee on Armed Services, "Countering the Chemical and Biological Weapons Threat in the Post-Soviet World" (Washington, DC: U.S. Government Printing Office, Feb. 23, 1993), refers to a report in *The* Washington *Times* alleging that the U.S. Defense Intelligence Agency put the Soviet stockpile at 75,000 tons, whereas the Central Intelligence Agency estimated the total hto be under 50,000 tons.

[10] See W. Englund, The *Baltimore* Sun, Sept. 17, 1992, and V. Miryazanov and L. Fedorov, "A Poisoned Policy," *Moskokovskiye Novosti,* Sept. 20, 1992 and more details in an interview with Miryazanov, *Moskovskiye Novosti,* May *30,1993,* from FBIS, JPRS-TND-93-016, June 1, *1993.* Binary agents consist of two relatively harmless substances that, when mixed together, react to form the nerve agent.

of offensive biological weapon research. [11] Nevertheless, reports persist in the press that allege continuing biological warfare research activity on the part of the military, possibly without the knowledge or consent of political leaders.[12]

In September 1992, the United States, the United Kingdom, and Russia agreed to allow mutual visits to biological facilities and to exchange data in order to address concerns regarding compliance with the BWC. Under the provisions of the agreement, visits will be allowed at anytime (and by either side—some U.S. visits have triggered Russian requests for visits to U.S. facilities) to any nonmilitary biological research site in order to remove ambiguities. Visits to military facilities are envisioned in the second phase of the agreement. This provision is subject to the need to respect proprietary information on the basis of agreed principles. Except for that constraint, such visits will permit unrestricted access, sampling, interviews with personnel, and audio and video taping. As of December 1993, some visits and data exchanges had been carried out, but more work along these lines is needed to satisfy U.S. officials that Russian former biological weapon facilities do not constitute "an active or short-term standby illegal program."[13]

SUMMARY

If Ukraine, following Belarus and Kazakhstan, accedes to the Nuclear Non-Proliferation Treaty, two major proliferation threats will have been successfully averted: as NPT parties, these states will have committed themselves not to seek possession or control over the Soviet nuclear weapons on their territories, and they will have agreed not to "mine" the materials in the weapons or in civilian nuclear facilities to manufacture their own devices.

The slow pace of implementation of Russia's chemical and biological nonproliferation obligations, on the other hand, has given the United States cause for some concern over Russia's commitment to these regimes. Russian noncompliance could have serious consequences. **However, the United States and Russia are in frequent contact on these matters. Russian officials seem to be striving towards eventual implementation, but there is still concern over the possibility that the military may be continuing its chemical and biological weapon activities beyond control of the political leadership.** Finally, an indication of Russian government concern with its progress towards chemical and biological weapon dismantlement might be found in the fact that on April 8, 1994, Anatoly Kuntsevich was dismissed from his post as chief of the office for dismantling chemical and biological weapons. This official had been responsible for building much of the Soviet Union's chemical weapon capabilities, and his commitment to dismantling these weapons was widely mistrusted by Western diplomats as well as by Russians.[14]

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11 Of the republics of the FSU, only Russia had significant biological warfare capability; see footnote 7.

12 See J. Adams, "The Red Death," *The London Times*, Mar. 27, 1994.

13 An American official quoted in M. Gordon, *The New York Times*, Op. cit., footnote 9.

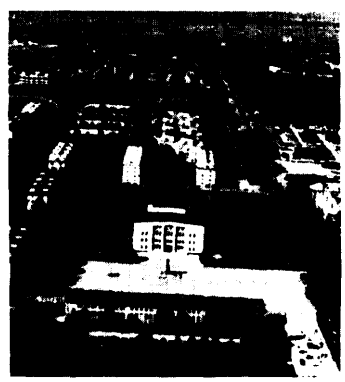
14 ITAR-TASS, MOSCOW, Apr. 8, 1994, FBIS-SOV-94-068, Apr. 8, 1994, p. 32. See also J. Adams, footnote 13.

Blocking Access to Nuclear Weapons, Materials, and Expertise

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Even if Russia and the other newly independent states meet their obligations under international nonproliferation treaties, considerable dangers will still remain. Nuclear weapons or weapon materials might find their way into the hands of foreign governments or nongovernmental groups. Experts on nuclear weapons or other weapons of mass destruction might assist foreign weapon programs by working directly for them, or by transferring vital information or sensitive technology that would help proliferants produce their own weapons. To forestall these threats, the newly independent states must strengthen controls over nuclear weapons and weapon materials, implement international safeguards at nuclear facilities, institute effective export control and customs procedures, and provide alternate employment for technical professionals.

None of the measures mentioned above can be carried out if the central government authorities in these states do not have effective control over legal, administrative, and other vital activities on their territories. At present, such control cannot always be assumed to exist in Russia or any of the other newly independent states. An obvious indication of this state of affairs was the violent showdown between the president and the parliament in Moscow in September 1993. But beyond the battle among reformers and democrats, nationalists, old communists, and various lesser groupings, central authority appears to have broken down from several points of view. Of particular importance are criminal activity, endemic corruption, and strong, semi-autonomous local authorities which have, to various degrees, taken certain admin-



istrative powers from Moscow.[1] Levels of disorganization and anarchy in other former Soviet republics vary, but in all cases, central authority over important matters-for example, customs services or physical security over nuclear installations-cannot be assumed. Until the situation stabilizes and improves, this reality must set the framework for the policies discussed in the rest of this study.[2]

POLITICAL CONTROL OVER NUCLEAR WEAPONS

When the Soviet Union was dissolved in December 1991, the first concern of the West was who had control over Soviet nuclear weapons while the political situation was in flux. The world saw a news photograph of a military technician handing Boris Yeltsin, the president of Russia, what was purported to be the box for transmitting nuclear launch release codes. A few months earlier, during the aborted coup of the old-line apparatchiks in August, it had not been clear who had effectively controlled the "football" during the four critical days of turmoil.[3]

The situation was more complicated than this might indicate: under the new political structure of the successor republics to the former Soviet Union (FSU), emerging leaders of several of the former Soviet republics formed an entity called the Commonwealth of Independent States (CIS). It comprised the states of the former Soviet Union except for the Baltic republics (Lithuania, Estonia, and Latvia), Georgia, and Azerbaijan.[4] As part of CIS military cooperation, the former Soviet strategic nuclear forces were placed under nominal CIS command, headed by the last Soviet Defense Minister, Marshal Yevgeny Shaposhnikov. In conjunction with Shaposhnikov, control over these nuclear forces was supposed to be exercised by the heads of state of the four former Soviet republics that were left with strategic nuclear weapons on their soil: Russia, Ukraine, Belarus, and Kazakhstan. This temporary resolution mollified concerned policymakers around the world, but only somewhat.

In addition to the strategic nuclear forces, now apparently under control of what appeared to be reasonably stable new nations, there were tens of thousands of tactical nuclear weapons. Russia insisted from January 1992 onwards that these weapons—more portable than their strategic counterparts, and possibly usable by local military commanders—should be returned to its territory forthwith.

In fact, the Soviet Union had in 1990 already begun to withdraw some nuclear weapons from regions where near-civil war had reigned, such as Azerbaijan, Armenia, and Georgia. By exerting

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[1] In some respects, this devolution of power may be considered positive because it would tend to result in greater home rule. However, often the local authorities are not democratically oriented officials but, rather, authoritarian figures who resist Moscow to maximize their own power and wealth. The extreme example of this is in Chechnya, a small republic in the north Caucasus, where a former Soviet Army General, Dzhokar Dudayev, has installed himself as President of a self-declared independent republic. (No other area in the Russian Federation has asserted full independence.) Constant turmoil has resulted, and there is little evidence that Dudayev's government is engaged in carrying out the popular will. The opposition to Dudayev, although strong, is kept in check by military means, and, even within Chechnya, local areas have established varying allegiances.

[2] For example, see Robert Seely, "NuclearTheft Found at Chernobyl," *The Washington Post*, Nov. 12, 1993, p. A44, and "*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 latter case is of particular concern, as the stolen material was probably highly enriched uranium, suitable for weapons. Some press reports later described the missing quantity as only a few kilograms, far short of the amount needed for a nuclear weapon. Later reports asserted that the material had been recovered. Nevertheless, the fact that this extremely sensitive material could be stolen from a military facility in the first place is worrisome.

[3] Explanations were later given that there were actually three "footballs" which all had to be in agreement for a nuclear launch to occur, possessed by the President, the Defense Minister, and the military Chief of Staff. The explanation was not particularly reassuring, since it was not certain who was acting in these positions during the coup. It was clear that President Gorbachev's "football" was not under his effective control.

[4] Azerbaijan and Georgia joined the CIS in 1993.

strong pressure, the Russian government was apparently successful in transferring all Soviet tactical nuclear weapons to its territory by July 1992, as it had earlier promised. This accomplishment was achieved in spite of a temporary halt in the transfers by Ukraine in April.[5] Worldwide interest in the situation, together with Russian economic threats, resulted in a rescission of the Ukrainian effort to freeze the shipment of the tactical nuclear weapons to Russia.

By July 1992, therefore, some of the most immediate nuclear proliferation issues resulting from the end of the Soviet Union—those concerning operational control over the Soviet nuclear stockpile—had been at least partially resolved.[6] Moreover, the discussion of NPT issues in chapter 2 also shows that the ultimate status of the strategic nuclear weapons in Belarus, Kazakhstan, and Ukraine may be close to resolution as well. Nevertheless, many other issues, only slightly less pressing, remain on the agenda, as described below.

SECURITY OVER NUCLEAR WEAPONS AND NUCLEAR MATERIALS

The question of which governments will assert political control over Soviet nuclear weapons appears nearly settled. However, serious questions remain concerning the security and operational control of weapons and nuclear materials in their current locations, particularly given the questionable degree of societal control exercised by central governments in the newly independent states.

Aside from Russia, the newly independent republics have all had to constitute armed forces and local security personnel more or less from what was left of the Soviet Army after Russia (and, to a lesser extent, Ukraine) appropriated the lion's share. Most Soviet Army officers were Russian or Ukrainian, leaving a leadership vacuum in most of the other republics. For example, in Belarus, most of the officers are still Russian. One of the last of the former Soviet republics to establish its own armed forces was Kazakhstan, one of the four nuclear inheritor states. If the quality and cohesiveness of newly constituted security forces is not of the highest level, the ability of these forces to provide adequate physical protection of nuclear weapons and materials necessarily suffers.[7]

This issue is even more acute considering that some Middle Eastern states (notably Iran), apparently interested in acquiring nuclear weapons, are reportedly actively engaged in efforts to establish strong ties with central Asian states that possess parts of the defunct U.S.S.R. nuclear weapons complex. Again, Kazakhstan, an attractive target due to its nuclear facilities, is a region of concern.

A government seeking to prevent nuclear proliferation must prevent the diversion not only of nuclear weapons, but also of nuclear material useful to weapon manufacture. The two materials of primary concern are highly enriched uranium (consisting of at least 20 percent of the fissionable uranium-235 isotope) and plutonium.[8] There is also some concern about low-enriched uranium,

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[5] See, e.g., TASS report Mar. 12, 1992, from FBIS JPRS-TAC-92-012, Apr. 9, 1992 on the halt in transfers, and TASS report Apr. 16, 1992, from FBIS-SOV-92-075, Apr. 17, 1992, on the agreement, later carried out, to move the weapons from Ukraine to Russia by July 1, 1992.

[6] In June 1993, the military organization of the CIS was dissolved at a meeting of the CIS heads of state. At this point, the nuclear rocket forces came under unambiguous Russian control. (Previously, the control was ambiguously Russian: the heads of state of the four nuclear inheritor states allegedly held the right of veto over a launch, but except for Russia, this right was exercised only by consultation.)

[7] Protection of nuclear weapons in the non-Russian nuclear inheritor states is accomplished by Russian forces, except in Ukraine, where military forces securing nuclear weapons have been pressured to swear allegiance to Ukraine, However, civilian nuclear materials are protected by the security forces of the country in which the facilities are located.

[8] Both weapon-grade plutonium (composed of more than 90 percent of the plutonium-239 isotope most useful for nuclear weapons) and reactor-grade plutonium (that is, with more than 20 percent of the plutonium isotopes other than plutonium-239) pose serious proliferation concerns, since either can be used to make nuclear weapons. See ch. 4 of U.S. Congress, Office of Technology Assessment, *Technologies Underlying Weapons of Mass Destruction*, OTA-BP-ISC-1 15 (Washington, DC: U.S. Government Printing Office, December 1993).

which might be enriched to weapon grade with substantially less effort than needed to enrich natural uranium; heavy water and ultra-pure graphite, either of which can be used as a moderator with natural uranium fuel to operate a plutonium-producing reactor; and tritium, a radioactive isotope of hydrogen that can be used to increase greatly the explosive power of so-called "boosted" nuclear weapons.

Nearly all nations with nuclear power or research reactors have accepted International Atomic Energy Agency (IAEA) safeguards, designed to verify—through inspections and technical analyses—that nuclear material destined for civilian use at declared nuclear facilities has not been diverted to weapon applications. The five declared nuclear-weapon states—the United States, Russia (formerly the Soviet Union), the United Kingdom, France, and China—are exempt from these inspections, but all have agreed, at least in principle, to inspections of some civilian facilities. In practice, very few sites in the Soviet Union were ever submitted to these international safeguards.

Due both to the lack of international safeguards requirements on the Soviet Union and to the political power of the Ministry of Atomic Energy (MINATOM), which has long been successful in protecting its turf against other bureaucracies, most nuclear facilities in the former Soviet Union have never had to meet IAEA standards for material control and accountancy (MC&A). Until early 1992, there was no nuclear energy regulatory authority, analogous to the U.S. Nuclear Regulatory Commission, in any of the former Soviet states. Therefore, none of these republics had an agency with the practical political power and technical expertise to conduct independent assessments of system safety and of safeguards against material diversion. Most of the republics have minimal expertise in these matters; in fact, up to 90 percent of the technical nuclear expertise of the former Soviet Union resides in Russia.[9]

In Russia, an independent nuclear oversight organization, GOSATOMNADZOR, was created in 1992. In an April 1993 decree, President Boris Yeltsin reaffirmed GOSATOMNADZOR'S authority to inspect all nuclear facilities, including those of both the Ministry of Defense and MINATOM.[10] Nevertheless, MINATOM and the Ministry of Defense have resisted GOSATOMNADZOR'S efforts to inspect their facilities.[11] Some other republics, notably Belarus, have moved to set up similar oversight bodies, and Ukraine and Kazakhstan, along with others, have set up atomic energy authorities that at least may begin to monitor, control, or operate nuclear facilities on their territory.

There are potential problems, therefore, not only in Russia, but even more so in other republics with significant nuclear facilities. Lithuania has a nuclear power station with two RBMK (Chernobyl-type) reactors. Ukraine has many reactors of several types. Armenia has a two-reactor power station located in a seismically unstable zone. The Armenian reactors—although undamaged—were shut down following a major earthquake in 1989.

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[9] See W. Potter, "Nuclear Exports From the Former Soviet Union: What's New, What's True, ''Arms *Control Today*, Jan./Feb. 1993, pp. 3-10. Note especially the statement, "A problem common to all of the non-Russian states is the absence of virtually any export control structure or cadre of personnel trained in matters of export controls, material accounting, physical protection and international safeguards. ''The fact that the great majority of the Soviet Union's nuclear expertise resides in Russia is supported by the American Physical Society's discovery, in providing grants to aid physicists from the former Soviet Union, that 90 percent of the physicists were in Russia. Moreover, an analysis of surnames of known staff at the Arzamas-16 nuclear weapon laboratory, prepared by Lawrence Livermore National Laboratory, shows the great majority of them to be of ethnic Russian origin. This test is, of course, not definitive, but supports the conclusion that an overwhelming fraction of nuclear expertise in the Soviet Union was Russian.

[10] Currently, even though GOSATOMNADZOR has been given authority, it has not yet implemented oversight and control over safety and safeguards.

[11] "Russian Energy, Defense Ministries Oppose Nuclear Inspections," INTERFAX, Apr. 28, 1993, cited in FBIS, JPRS-TAC-93-O04-L, May 3, 1993, p. 2.

With Russian help, however, the government is trying to restart them. Several republics have research reactors, some with highly enriched uranium fuel. Most importantly, Kazakhstan has a large (350 megawatt thermal) breeder reactor, which is designed to produce plutonium for a civilian nuclear fuel cycle. Some experimental nuclear fuel, containing a large fraction of relatively easily separable plutonium mixed with uranium, may still be located near the site. This fuel was not heavily irradiated and therefore may be relatively easily transported, and its plutonium removed, without the severe radiation hazard that would face anyone seeking to recover plutonium from more heavily irradiated fuel. For that reason, it might prove especially attractive to a nuclear proliferant.

Although the Baltic States, Armenia, Azerbaijan, Belarus, Uzbekistan, Georgia, Kyrgyzstan, and Kazakhstan have ratified the Non-Proliferation Treaty, and other newly independent states have indicated that they will do so, only Lithuania has thus far implemented the agreements with the IAEA that would put international safeguards into practice.[12] Most of the facilities in these states do not have highly enriched uranium or plutonium directly suitable for weapons, but a few—as mentioned above--do. Therefore, until safeguards are put in place, civilian nuclear facilities in the former Soviet Union could, in principle, lose nuclear material suitable for weapons to the black market, or such material could fall into the hands of states seeking nuclear weapons, without the world being any the wiser. The situation is aggravated by:

- the lack of nuclear safeguards expertise in many of the republics;
- the inefficiency of border controls, as new states are just beginning to set up effective customs services;
- the nascent state of export control legislation and implementation in most of the new republics;
- the state of civil turmoil in some of them; and
- near-universal economic hardship.

In the resulting situation, the susceptibility of officials, technicians, and people at all levels of society to bribery and subornation is an inviting factor for those parties seeking to obtain nuclear materials illicitly.

U.S. ASSISTANCE FOR WEAPON AND MATERIAL MANAGEMENT IN THE FSU

It is in the United States' interest to ensure that nuclear weapons and nuclear materials in the former Soviet Union are kept under tight governmental control. A number of different programs have been instituted by the United States for this purpose.

The first involves weapons to be dismantled under parallel arms reduction initiatives announced in fall, 1991, by Presidents Bush and Gorbachev. Formally separate from the START arms control treaties, these initiatives called for thousands of nuclear weapons in the United States and the Soviet Union to be dismantled, including some now in Belarus, Ukraine, and Kazakhstan. (START I and START II call for reductions in deployed weapons, including missile, submarine, and aircraft delivery systems, but they do not address the disposition of the warheads themselves.) The security of the nuclear material removed from the weapons and placed into storage is a paramount issue.

On December 12, 1991, the Nunn-Lugar Amendment (sponsored by the Senators from Georgia and Indiana, respectively) to the Conventional Forces in Europe Treaty Support Act be-

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12 The IAEA is assisting many of the former Soviet republics in both nuclear safety and safeguards, trying to hasten the process Of putting the appropriate agreements and safeguards into place. The list of NPT parties is current as of July 31, 1994. In addition, Moldova ratified the NPT on April 24, 1994 but has not yet deposited its instrument of ratification, which is necessary for it to formally join the treaty.

13 The U.S. initiative, announced in President Bush's speech to the nation on Sept. 27, 1991, encouraged the Soviet Union to fallow suit. President Gorbachev then announced his initiative in a speech delivered on Oct. 5, 1991.

came law (Public Law 102-228). This authorizing legislation provided for the transfer of $400 million of Department of Defense (DOD) funds in fiscal year 1992 to help accomplish the safe destruction and secure storage of weapons of mass destruction in the Soviet Union and its inheritor states. In addition, the legislation provided for programs to establish verifiable safeguards against the proliferation of these weapons, create an International Science and Technology Center to provide research opportunities for Soviet weapon scientists, and increase military contacts between the United States and the Soviet nuclear inheritor states. On the same day, legislation actually appropriating these funds also became law (Public Law 102-229). Equal amounts were authorized in DOD authorization and appropriation bills in fiscal years 1993 and 1994, providing, in all, up to $1.2 billion in available funds. [14] In the fiscal year 1993 legislation, the mandate was broadened to include defense conversion. Moreover, for fiscal year 1994, the Nunn-Lugar funding has become an additional line item, *not* a reprogramming of existing DOD funds.

The program based on these funds has become known as the Cooperative Threat Reduction Program (CTR). Legislation requires that the funded programs:

> should, to the extent feasible, draw upon United States technology and United States technicians.[15]

This language was inserted since many Members of Congress were reluctant to spend money on foreign aid to a former adversary at the same time that domestic programs faced tight fiscal limitations. Nearly all of the funds that have so far been obligated will be used to purchase material support and equipment from U.S. firms or will be used to finance assistance by the U.S. government and its experts, as opposed to purchasing local equipment or funding local experts.

One problem with the program has been the extremely slow pace of implementation, leading many in the FSU to doubt the sincerity of the United States' commitment to assistance (see table 2). For example, of the $1.2 billion authorized for the CTR program, less than 10 percent—$1 17 million—had been obligated as of March 22, 1994.[16] Some of the delays had been due to difficulties in reaching agreements on implementation with the recipient states, but this aspect of the problem has now been generally resolved. An additional source of delay has been the slowness of the U.S. government to implement the program. Decisions by the Department of Defense on funding given projects have sometimes been slow. In fact, about $208 million in fiscal year 1992 Nunn-Lugar funds were lost (until replaced by fiscal year 1994 line item funds) because they were not spent in time. In addition to delays in the executive branch, the four congressional Appropriations and Armed Services committees must be notified 15 days in advance of any obligation of funds. The Department of Defense is reluctant to proceed with obligations against the preference of these committees.

The relative share of Nunn-Lugar funds spent in the FSU, compared to that share spent on U.S. consultants, is another topic of ongoing concern. Defense officials have been quoted as taking the

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[14] An excellent summary of the legislative history and its implementation may be found in Theodor Galdi, Congressional Research Service, "The Nunn-Lugar Cooperative Threat Reduction Program for Soviet Weapons Dismantlement: Background and Implementation," 93- 1057F (Washington, DC: The Library of Congress, Dec. 29, 1993). The related discussion in the text relies heavily on this report.

[15] Public Law 102-228, Sec. 212(b), Dec. 12, 1991. Section 1203 (c) of the Defense Authorization Act of 1993 later added language emphasizing the use of the U.S. private sector. *Congressional Record,* p. H9252, Nov. 10, 1993.

[16] Telefax communication from the office of the Assistant to the Secretary of Defense for Atomic Energy, Apr. 25, 1994.

TABLE 2: Cooperative Threat Reduction Programs by Country: Notifications to Congress and Obligations as of March 1994 ($ millions)

Country	Program	Notifications	Obligations
Belarus			
	Emergency response	5.00	3.70
	Export control	16.26	0.44
	Communications link	2.30	0.30
	Defense contacts	1.50	
	Site restoration	25.00	0.21
	Defense conversion	20.00	0.52
	Propellant elimination	6.00	
	Subtotal	76.06	5.17
Kazakhstan			
	Material control and accounting	5.00	
	Communication link	2.30	0.01
	Export control	2.26	
	Emergency response	5.00	
	Defense contacts	0.40	
	Defense conversion	15.00	
	Strategic arms elimination	70.00	0.11
	Subtotal	99.96	0.12
Russia			
	Emergency response	15.00	11.34
	Armored blankets	5.00	3.24
	Fissile material containers	50.00	42.90
	Railcar conversion	21.50	20.00
	International Science and Technology Center	25.00	1.42
	Material control and accounting	30.00	0.42
	Chemical demilitarization	25.00	0.05
	Pu storage facility design	15.00	14.95
	Export control	2.26	
	Storage facility equipment	75.00	
	Strategic arms elimination	130.00	4.20
	Arctic waste	20.00	7.37
	Defense contacts	9.20	
	Chemical weapon destruction laboratory	30.00	2.66
	Defense conversion	40.00	0.07
	Subtotal	492.96	108.62
Ukraine			
	Science and Technology Center	10.00	
	Material control and accounting	12,50	
	Emergency response	5.00	
	Communication link	2.40	0.01
	Export control	7.26	0.01
	Defense contacts	3.90	
	Strategic arms elimination	185.00	0.16
	Reactor safety	11.00	0.00
	Defense conversion	40.00	
	Subtotal	277.06	0.18
Other			3.35
	Total	946.04	117.44

SOURCE Department of Defense, Office of the Assistant to the Secretary of Defense for Atomic Energy, April 1994

word "feasible" in the authorizing legislation to provide a "guiding tenet" to spend Nunn-Lugar funds in the United States.[17] However, direct assistance would provide more of a boost to stabilize the local economy. Moreover, it would also generate far more good will in the recipient nation, which now sees U.S. funds going mainly to U.S. firms. Finally, in many cases, given the relative costs of goods and services procured in the FSU as opposed to the United States, the cost to the United States for a given project could be substantially cheaper if purchases were made locally.

The entire program of U.S. assistance in the area of dismantling weapons and safeguarding nuclear material in the FSU is known as the Safe and Secure Dismantlement (SSD) program. This program is directed by the Department of State, but funded by the Department of Defense, which is responsible for the details of its implementation.

The chief issues related to the dismantlement effort are whether and how to monitor the dismantlement process, how to monitor the amount and location of the nuclear material removed from weapons, and the ultimate disposition of the weapon plutonium. The United States would like to be sure that the weapons really are dismantled, and that the resulting nuclear material is placed in storage rather than diverted or recycled into other weapons. **The Russians, however, refuse to accept verification of dismantlement in Russia in the absence of reciprocity regarding monitoring and verification of similar dismantlement in the United States.** This matter is being addressed by the agreement between MINATOM and the U.S. Department of Energy, reached on March 16, 1994, which provides for reciprocal inspection of storage and, possibly, dismantlement facilities. However, many specific issues await resolution through discussions between the United States and the Russian governments.

There is also a question of whether the IAEA should have a role in monitoring the dismantlement or storage of the nuclear material from U.S. and Russian weapons. As an international organization, the IAEA might be considered a neutral and trustworthy third party, and therefore a logical partner in helping put into place a major arms control agreement. On the other hand, both the United States and Russia might feel more comfortable dealing only with inspectors from the other party, rather than with an inspectorate drawn from many different countries. Furthermore, the IAEA has experience in nuclear safeguards, not in verifying and monitoring arms control agreements. New expertise and perspectives would have to be attained by this agency for such a regime to work well. More importantly, if some of the stored nuclear material were in its original weapon form, IAEA involvement would give rise to concerns about keeping nuclear weapon design information secret from the inspectors, who might be nationals of would-be proliferant states. Finally, involving the IAEA would also considerably complicate the political issue, requiring a third party in implementation negotiations.

Another cooperative project between the United States and the nuclear inheritor states of the Soviet Union involves the purchase by the United States of 500 tonnes of highly enriched uranium (HEU) to be recovered from dismantled Soviet weapons, which will be diluted to low-enrichment levels and transferred to the United States.'* The Russians and the other inheritor states will receive much needed hard currency

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17 A description of the situation regarding both U.S. Agency for international Development projects and those under Nunn-Lugar (CTR) may be found in J. Fialka, "Helping Ourselves: U.S. Aid to Russia is Quite a Windfall—For U.S. Consultants," *The Wall Street Journal,* Feb. 24, 1994, p. Al.

18 Transfernng this fuel to the United States serves the purpose of getting it out of the FSU and removes the possibility of diversion. The United States preferred this option to having the Russians sell this fuel on the world market because such a large new supply of uranium would disrupt the market and make it more difficult for the United States, with its much higher-cost enrichment facilities, to compete. With this agreement, the United States can exert some control over the entry of this material into the market.

($11.9 billion over 20 years) .19 The distribution of the revenue among the four inheritor states has not yet been finally worked out, but there appears to bean understanding to that effect among the four states, reflected in the decisions by the three non-Russian governments to return all nuclear weapons on their soil to Russia for dismantlement and removal of the HEU. The purchase is meant to be revenue-neutral in the United States: the material would be resold to electric utilities to fuel their power reactors.

Even less tractable than dealing with HEU is the question of ultimate disposition of plutonium. The United States has yet to decide what to do with its own stores of plutonium recovered from weapons, and it is not in a position to urge any particular long-term solution upon the Russians. The United States is, however, helping design and pay for a plutonium storage facility in Russia.

The U.S. Department of Energy, through its newly created Office of Fissile Material Disposition, is currently examining various means of plutonium disposal, ranging from burning the material in various types of reactors to burial after vitrification with high-level nuclear waste. Proliferation resistance is but one of the criteria that will be used to select an ultimate disposition mechanism-others include health, safety, and environmental considerations. Regardless of the approach selected for ultimate disposition of plutonium, the bulk of the plutonium will be placed into storage for at least the next 10 years and probably longer.[20]

Besides the Nunn-Lugar legislation and the HEU purchase agreement, another vehicle for providing funds to the FSU is the FREEDOM Support Act of 1992 (Public Law 102-51 1), with its follow-on authorizing legislation for fiscal year 1994.[21] This law provides for technical and humanitarian assistance through the foreign aid budget to promote reform, democratization, and trade; help attract foreign investment to the FSU; and improve civilian nuclear reactor safety. Although this law does not directly affect DOD funds, it is linked to the Nunn-Lugar legislation: Title V of this act restates the Nunn-Lugar legislation as then pending before the armed services committees. Moreover, section 1441 of the fiscal year 1993 Defense Authorization Act authorizes DOD to participate in joint civilian R&D programs with the FSU states through a non-governmental foundation established by the FREEDOM Support Act.

Section 511 of the FREEDOM Support Act authorizes the establishment of a nongovernmental foundation intended to foster joint research projects between scientists from the United States and republics of the FSU. Unlike the International Science and Technology Center (ISTC), the project is not aimed at weapon scientists, but civilian ones. But like the ISTC, goals include defense conversion, stabilizing the economy of the states of the FSU, and providing R&D opportunities for scientists there. The director of the National Science Foundation is authorized to establish this foundation in consultation with the director of the National Institute of Standards and Technology. Further, within the Nunn-Lugar Amendment, reprogramming of up to $25 million was permitted for this purpose. Until recently, the Defense Department had not moved ahead with this program. However, in April 1994, there were indications

19 Press Release] Inited States Enrichment Corp., Jan. 1 4, 1994. This publicly owned corporation is acting as the "executive agent" for the United States in the transaction. The government intends to privatize it eventually.

20 A number of studies have looked at the dismantlement of nuclear weapons and the disposition of the resulting nuclear materials. See, for example, U.S. Congress, Office of Technology Assessment, *Disbanding the Bomb and Managing the Nuclear Materials*, OTA-O-572 (Washington, DC: U.S. Government Printing Office, September 1993), B. Chow and K. Solomon, *Limiting the Spread of Weapon-Usable Fissile Materials* (Santa Monica, CA: RAND, 1993), and National Academy of Sciences, "Management and Disposition of Excess Weapons Plutonium" (Washington, DC: National Academy Press, 1994).

21 FREEDOM is an acronym for Freedom for Russia and Emerging Eurasian Democracies and Open Markets.

that at least $10 million would be made available, thus starting a new mechanism for providing assistance to FSU scientists.[22]

A final major program of U.S. government scientific and technical cooperation with the FSU is contained in the fiscal year 1994 Foreign Operations Appropriations Act (Public Law 103-87), which appropriates $35 million for partnerships among U.S. industry, universities, Department of Energy (DOE) national laboratories, and major FSU institutes. The purpose of this program—known as the Laboratory-Industry Partnership Program (LIPP)—is to "stabilize the technology base in the cooperating [FSU] states" and "prevent and reduce the proliferation of weapons of mass destruction."

Ten national laboratories proposed joint projects involving themselves, U.S. industry, and U.S. universities, together with partners in the FSU.[23] Private industry is represented by a group of corporations (the membership is still open) called the United States Industry Coalition (USIC). The Department of Energy, working with the Department of State, set up LIPP to select which projects will be funded. The scope of projects is similar to those under Nunn-Lugar funding. At present, funding is only available for fiscal year 1994, and the funding mechanism is highly unusual in that money for DOE projects at DOE laboratories is taken from the Department of State's budget ($5.3 billion in fiscal year 1993), rather than DOE's budget (which, for comparison, was over three times larger than State's, at $17.7 billion in fiscal year 1993).

The LIPP is aimed at commercialization of products in collaboration with the private sector and does not emphasize basic research, presumably since such research is meant to be funded through the International Science and Technology Center. Some current lab-to-lab projects that are focused on basic research, including several run out of Los Alamos and Livermore laboratories, might thus not receive LIPP funding. **This situation could be resolved by providing separate line items in the DOE budget for lab-to-lab projects (selected and run by each laboratory individually) and for the LIPP program, or one line item for joint projects both within LIPP and outside it. The** amount of funding for such possible line items would have to be determined both by the demonstrated need of promising projects (which could be gleaned from the proposals already submitted to the ISTC and to be submitted to LIPP) and by a decision on the general availability of funds for joint research projects with scientists of the FSU.

NONPROLIFERATION EXPORT CONTROLS

Russia

Of all the newly independent republics of the former Soviet Union, only Russia has established a meaningful export control system. Nearly all the Soviet expertise, capability, databases, and other elements essential to export controls remain in Moscow.[24] Since the export control systems in all the republics are only in early stages of creation, the legal bases for these systems lie largely in presidential decrees, not legal statutes, with the exception of a single law passed in late May 1993 by the Russian parliament.[25] The United States has offered all four nuclear inheritor states techni-

22 Science Scope, *Science*, Apr. 29, 1994, p. 647.

23 The U.S. laboratories are Argonne National Laboratory, Brookhaven National Laboratory, Idaho National Engineering Laboratory, Lawrence Berkeley Laboratory, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Oak Ridge National Laboratory, the National Renewable Energy Laboratory, Pacific Northwest Laboratory, and Sandia National Laboratories.

24 This conclusion can be drawn from statements made by several representatives of former Soviet republics at a symposium on export control, sponsored by the U.S. Department of Energy and held at Airlie House, Warrenton, VA on June 14-16, 1993.

25 This law defines export control violations as criminal acts, punishable by three to eight years in detention.

cal aid in establishing export control systems, consisting of conferences for experts from those countries, training of officials, help in drafting legislation, and the transfer of technical equipment for border controls. These offers were contingent on reaching "umbrella" agreements for the Safe and Secure Dismantlement (SSD) program between the United States and each state. As noted in the previous chapter, the SSD program is designed to help the former Soviet republics dismantle those nuclear weapons to be eliminated under the Russian unilateral initiative of October 1991. By the end of 1993, all four nuclear inheritor states had signed those agreements and several subsidiary implementing accords. The only exception is the implementation agreement with Russia on export control assistance. Corresponding accords in this area have been signed with the other three.

In Russia, the most important presidential decree relating to export controls is Decree 388 (April 11, 1992) creating an interministerial commission to handle approvals for export licenses. Corresponding to U.S. practice, the relevant Russian Ministries (e.g., Defense, Foreign Economic Relations, and Foreign Affairs) participate in decisionmaking. Decisions on granting licenses are based in part on a set of developed lists, which the Russian government claims are consistent with the lists formulated by existing multilateral export control regimes: COCOM guidelines for high-technology conventional weapons,[26] the Nuclear Suppliers Group Guidelines for nuclear dual-use items, and the Australia Group guidelines restricting transfers of chemical and biological materials and equipment. The Russians also claim to adhere to Missile Technology Control Regime guidelines, even though Russia is not formally a member of that regime (see section below on Missile Technology). In summary, the Russian government has a mechanism in place for regulating exports of weapons of mass destruction and means of their delivery, and it has declared that it will comply with international norms in this area. However, the Russian system does not yet have an adequate legislative basis.

Even with an adequate set of export control laws, however, there is still the matter of implementation. Under the Soviet Union, the flow of goods had been controlled by highly intrusive and restrictive border police actions, and more directly by the fact that foreign trade was a state monopoly and that all major vendors were state owned. Customs services, as they are known in Western countries, did not really exist. Since the dissolution of the Soviet empire, the role of the border police in controlling flows of commodities and people has become considerably less draconian. At the same time, corruption has increased in all segments of society, including border control personnel. It is therefore essential for Russia to establish, train, motivate, and equip an effective customs service that is both competent and resistant to corruptibility. This latter requirement is difficult, given the current parlous state of economic affairs.

Other Newly Independent States

In Ukraine, Belarus, and Kazakhstan, the state of export controls is considerably more rudimentary than in Russia. Presidential decrees have set up governmental commissions to make policy and handle export licenses. Belarus and Kazakhstan apparently intend to follow the Russian model closely. The Minsk Accord on CIS Export Control Coordination, seeking to coordinate policies, facilitate communication, and establish common elements of an export control regime, was agreed to by Belarus, Kazakhstan, and Russia plus five other republics of the FSU (but not including Ukraine) on June 26, 1992. On February 9, 1993, these three states and three other CIS republics agreed to cooperate on controlling exports of items that could be used for weapons of mass destruction. On August 10, 1993, an agreement to

26 COCOM stands for the Coordinating Committee on Export Controls, an informal association of Western nations originally created to control the spread of Western high technology to the Eastern bloc. With the end of the Cold War, COCOM expired on Mar. 31, 1994.

deepen economic integration among Belarus, Russia, and Ukraine was reached in Moscow. The Belarusian government reportedly continues to advocate a single customs control system among the three countries.[27] Some level of coordination of export control systems among at least these nuclear inheritor participants is highly likely. All three republics plan to use export control lists similar to those indicated by Russian policymakers.

In Belarus, export licenses had been required since 1991 under Soviet law, and they continue to be required after independence. Licenses are controlled by the parliamentary Committee on Foreign Economic Relations. In August 1992, the Committee promulgated a decree that set procedures for obtaining export licenses for dual-use, advanced weapon technologies and for nuclear weapon-related items. The decree requires that importing countries be politically stable, that they have no known clandestine programs for developing weapons of mass destruction, and that they allow end-use inspections on the goods exported—criteria that are intended to be consistent with multilateral nonproliferation export control regimes. License decisions are made by the appropriate government agency (e.g., the Ministry of Defense for items related to conventional arms) and an export commission. Lists of controlled items are being developed in all areas, including dual-use technologies and nuclear, biological, chemical, missile, and advanced conventional weapon systems. The Belarusian government has asked for advice from the United States, Germany, Poland, and Sweden as well as from Russia on formulating laws and procedures for export control systems, and it intends to present a proposed law to parliament by the end of summer 1994. If adopted, it would be the first law of this kind passed by a parliament in any of the newly independent states of the FSU.

In Kazakhstan, a January 1992 presidential decree set the basis for an export-import licensing system. In the nuclear area, export control decisions apparently rest with the Atomic Energy Agency, the Ministry of Foreign Relations, and an export control committee. Licenses are provided by the Ministry of Foreign Economic Relations. The government has asked for help from Russia in setting up the rest of its system. It is interested in close export control coordination with Russia and other members of the Commonwealth of Independent States. Kazakhstan has not progressed very far beyond these initial steps.

In Ukraine, political instability provides an additional impediment to rapid establishment of controls and policies. A detailed export control list has been started, but has still not been completed. In January 1993, a presidential decree established an export control commission with representatives from six government agencies. The commission, chaired by the Deputy Prime Minister, is a consultative body. It has an attached, larger working group of about 40 technically qualified personnel. The commission's decisions can be overruled by the Cabinet.

Recently, Major General Volodymyr I. Tsimbalyuk was appointed as head of the Expert Technical Committee that advises the Ukrainian parliamentary consultative commission on export control. Earlier, General Tsimbalyuk had been Deputy Head of Armaments in the Ministry of Defense.[28] His appointment indicated that the Ukrainian export control system is likely to adopt policies that reflect Defense Ministry views and presumably will support arms exports.

In March 1993, a preliminary, incomplete list of items controlled for export was developed, including the usual categories of items (e.g., those included in the various international export con-

27 Radio Minsk, Aug. 11, 1993, FBIS-SOV-93-154, Aug. 12, 1993.

28 William potter, Director, Center for Russian and Eurasian Studies, Monterey Institute of International Studies, personal communication, January 1994.

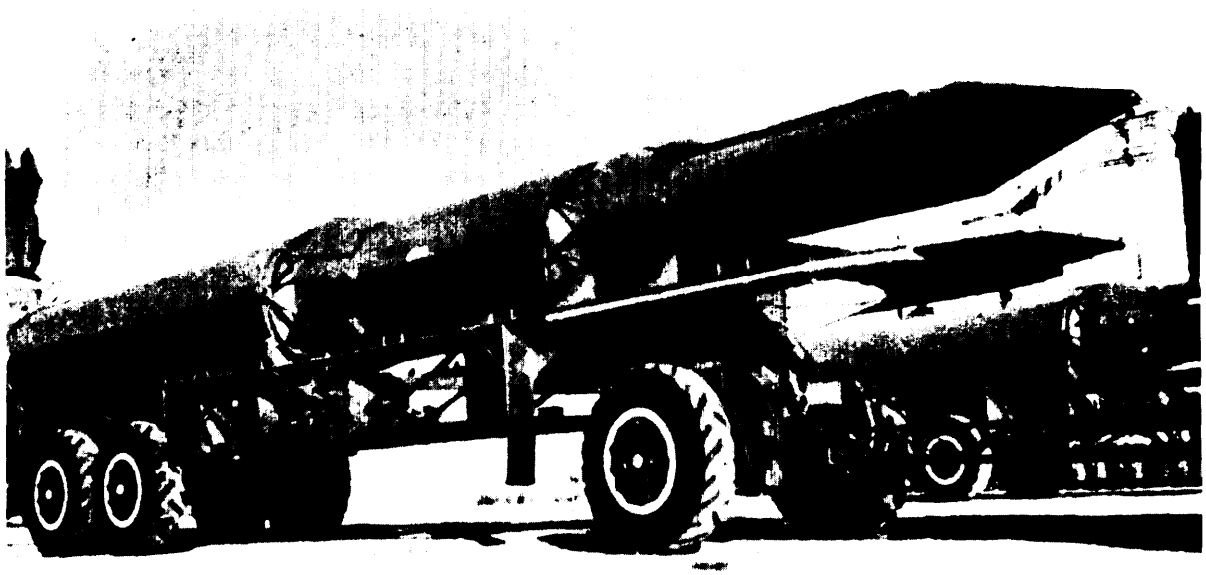
trol regimes mentioned above), plus strategic raw materials. Only two organizations (both governmental) are currently able even to apply for licenses to export items on the list. When an export control system is in place, it is likely that more organizations will be allowed to apply for licenses. Ukraine has asked for international help in setting up its system because of its lack of expertise.

In conclusion, outside Russia, export control systems in the FSU are, at best, emerging. Moreover, implementation is an even worse problem in the non-Russian states than it is in Russia, due to lack of expertise.

MISSILE TECHNOLOGY

Equipment or technology transfers from the former Soviet Union could promote the proliferation of systems to deliver weapons of mass destruction, in addition to fostering the spread of the weapons themselves. For example, Russia and Ukraine have well-developed missile systems and production facilities that, in some categories, are the most advanced in the world. They also possess extremely able rocket scientists and engineers.

Several recent events typify worries about this category of proliferation. The first, and best known, is the Russian-Indian agreement, concluded in 1992, which would have transferred cryogenic propellant technology and a number of liquid-fueled rockets from Russia to India. The agreement would have provided Russia with hundreds of millions of dollars. The United States interpreted this sale as violating the Missile Technology Control Regime (MTCR) by transferring proscribed technologies. Some Russians apparently also believed the sale violated the MTCR.[29] Russia, while not a member of the MTCR, had pledged to abide by its terms. More-



DEPARTMENT OF DEFENSE

The Soviet SS-13 intercontinental ballistic missile, capable of delivering a nuclear warhead over 5,000 miles.

29 See commentary by Sergey Goryachev on the agreement between the United States and Russia to modify the accord on rocket assistance to India on Moscow Ostankino Television, 1700 GMT, July 19, 1993: "For a year Russian spokesmen persistently argued that the contract with India did not contravene international rules. It is fortunate that in the end common sense got the upper hand..." This, and other articles in FBIS-SOV-93-137, July, 20, 1993, show a division of opinion in Russia on the outcome of the affair. Those sympathetic to the government's eventual decision to modify the agreement with India argued that it was, after all, in Russia's own interest m help prevent the spread of long-range missile technology that could have strategic implications.

over, U.S. law requires the imposition of sanctions for transfers that violate MTCR restrictions, even when the state involved had not agreed to abide by the MTCR.

The United States did not strongly object to the sale of the rockets themselves, but for several months it had pressured Russia to limit sharply the associated transfer of technology. U.S. efforts finally succeeded on July 17, 1993, when Russia agreed to modify its accord with India unilaterally, giving up a substantial part of its envisioned profits. Under the revised agreement, the Russians would transfer the missiles and engines, but not the technology and production facilities.[30] Apparently in return, the United States is inviting Russia to compete in the U.S. space launch market, and it is attempting to arrange a marriage between the Soviet/Russian MIR space station and the projected United States space station *Freedom,* being built in conjunction with Europe and Japan. This collaboration was later formalized in the accords reached by Vice President Gore and Russian Prime Minister Chernomyrdin during the former's trip to Moscow, in December 1993. Russia has also renewed its pledge to adhere to the MTCR. Given the Indian deal, the United States may be expected to monitor such adherence closely.

The second incident involves not Russia, but Ukraine. Last May, the *London* Observer reported British intelligence claims that Iran had purchased eight SS-N-22 "Sunburn" supersonic cruise missiles from Ukraine for deployment at the mouth of the Persian Gulf. Within a short time, the Ukrainian Ministry of Foreign Affairs denied the reports. However, a report in *Defense Week,* several months later, indirectly cited U.S. Navy sources in support of the allegations.[31] At this writing, it is unclear what the truth of the matter is.

"BRAIN DRAIN"

Scientists, engineers, and technicians who had worked in Soviet programs to develop and produce weapons of mass destruction could pose a significant proliferation risk if they sold their services or supplied vital information or technology to proliferant states seeking such weapons. The greater the economic stresses facing these workers, the more dangerous this threat becomes. Given the lack of analogous civilian applications, those working on nuclear weapons or ballistic missiles probably offer the greatest concerns. Chemical and biological weapon scientists might also be useful to a proliferant, but their skills also have more obvious civilian utility.

As is the case with smuggling nuclear materials, the unsuccessful attempts to smuggle missile expertise are more visible than the successful ones. One such case showed that this problem is not purely hypothetical. In December, 1992, over 50 Russian rocket scientists from the leading Makeyev Design Bureau were arrested at Moscow's Sheremetyevo Airport en route to North Korea, where they had been offered astronomical (to the Russians) salaries. The fact that the individuals had all been granted the necessary visas, and that they were apprehended just as they were

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[30] Several articles giving different Russian perspectives on the agreement with the United States on this issue are M. Ponomarev, "Moscow Yields to Unconcealed Pressure, " *Krasnaya Zvezda,* July 21, 1993; and commentaries on Moscow Mayak Radio, July 18, 1993 and on Moscow Radio, Moscow World Service, July 20, 1993, all three from FBIS, SOV-93-138, July 21, 1993; and V. Nadein, "First Serious Dispute Between Russia and the United States Ends in Beneficial Compromise," *Isvestiya,* July 20, 1993, from FBIS-SOV-93-137, July 20, 1993.

[31] See *Defense Week,* Oct. 4, 1993, The article claimed that an American defense contractor had been offered the same missiles in 1991, and had turned them down in a botched bargaining ploy. The same arms dealer reported that the Iranians had later told him of their purchase; he further claimed that U.S. Navy intelligence sources confirmed deployment of these missiles on the ground in Iran, although they were designed as sea- or air-launched cruise missiles.

about to leave, gives rise to some suspicion that the whole event may have been a "sting" operation.[32] In spite of the fact that the arrest has a positive aspect, reinforcing the belief that Russian authorities are alert to foreign efforts to recruit or corrupt their specialists, there is also a negative aspect: the event demonstrates an active, advanced effort by a state to gain technologies controlled by an international nonproliferation regime. Previously, there had only been rumors and vague statements by Russian officials that such efforts were being made, notably to gain nuclear information.

One potential solution to this "brain drain" problem being pursued with support from the United States and other countries is to provide weapon scientists and engineers with meaningful opportunities outside the realm of developing weapons of mass destruction. This would reduce any incentive that might exist for them to help proliferant states and at the same time permit Russia (where most of these professionals now live) to retain its valuable stock of human capital. This issue and some of the options available to address it are further discussed in chapter 6.

32 A long article on the episode, including interviews with several of the scientists, appeared in Moscow *News*, Apr. 2, 1993, from FBIS, JPRS-TND-93-013, May 10, 1993.

Part III: The Individual Nuclear Inheritor States

The following chapters examine each of the nuclear inheritor republics in turn, discussing their backgrounds, the nuclear material on the territory of each, and the unique problems each poses. The discussion focuses on nuclear proliferation. Each chapter presents findings and a series of options for U.S. policy makers regarding the individual state.

OVERVIEW

At a Lisbon conference in 1992, Russia, Ukraine, Belarus, and Kazakhstan, with the concurrence of the United States, designated themselves as the successor states to the former Soviet Union for the purposes of the START I arms reduction agreement that the United States and the Soviet Union had signed prior to the Soviet Union's demise in December 1991. Those four new republics had strategic nuclear weapons on their territory when the Soviet Union ceased to exist and are referred to in this report as nuclear inheritor states.[1] The great majority of these weapons are in Russia. Relatively few remain in Belarus (54 warheads on SS-25 missiles); about 1,400 are in Kazakhstan, and about 1,400 remain in Ukraine, mostly on intercontinental missiles but some deployed on cruise missiles. In a protocol signed at the Lisbon Conference on May 23, 1992, Ukraine, Belarus, and Kazakhstan agreed to accede to the Non-Proliferation Treaty (NPT) as non-nuclear-weapon states within the shortest possible time. Table 3 shows the number and type of strategic nuclear weapons on the

"Significant advances have been made over the past two years in arranging programs of assistance to the inheritor states."

[1] Some additional republics arising from the former Soviet Union had tactical nuclear weapons (short-range missiles, field artillery shells, nuclear mines, etc.) on their territories in December 1991, but by July 1992, all those weapons had been relocated to Russia.

TABLE 3: Strategic Nuclear Weapons on the Territories of the Nuclear Inheritor States

Country	Intercontinental missiles	Cruise missiles and gravity bombs
Belarus	Maximum (since MOU) was 81 SS-25s; now 54 (all single warhead missiles).	—
Kazakhstan	104 SS-18s (1 ,040 warheads) at MOU; now 92 missiles (920 warheads). All 1,040 warheads still in Kazakhstan.	370 air-launched cruise missiles (bombers returned to Russia, missiles and warheads still in Kazakhstan).
Russia	1,064 ICBMS with 4,278 warheads at MOU. Now 844-1112 ICBMS with 4,010-4,276 warheads. 940 SLBMS with 2,804 warheads at MOU; now 780-864 SLBMS with 2,640-2,728 warheads.	176+ at MOU; now 459.
Ukraine	176 ICBMS at MOU (130 SS-19s and 46 SS-24s). Now 126 (110 SS-19s and about 16 SS-24s). 1,240 warheads at MOU, now about 818.	324 declared in MOU; now 564. All probably in storage.

NOTE: Numbers are either as of START I memorandum of understanding (MOU) of September 1990, which provided declarations of numbers, or as of May 1994 Cruise missiles **and gravity bombs are tabulated according to the counting rules in the START I treaty, under which a single weapon can represent** more than one actual warhead

ICBM = Intercontinental Ballistic Missile; MOU = Memorandum of Understandmg; SLBM = Submarine-Launched Ballistic Missile.

SOURCES Carnegie Endowment for International Peace and the Monterey Institute of International Studies, May 1994

territory of each, according to a recent analysis by nongovernmental experts.

If the four nuclear inheritor states are to reassure the rest of the world that their custody over nuclear material is adequate, they need to improve their export control systems and establish effective safeguards over nuclear materials. Further, the states need to stabilize their economic, social, and political situations and establish cohesive social structures that would lessen the temptations to sell sensitive information, technology, or nuclear material.

The United States has a strong interest in helping these states address their problems. However, **there are clearly limitations on what external forces may accomplish.** In particular, for countries such as Russia and Ukraine, internal difficulties are so great and complex that U.S. efforts to improve the overall situation there may be expected to succeed only at the margins. As one example, converting defense to civilian production is proving difficult enough for the United States to accomplish at home. In the former Soviet Union (FSU), the problem is far more complicated. Not only had a far larger share of the economy there been devoted to defense, but converting it to civil production will require simultaneously reconstructing the nation's social, political, and economic infrastructure.

Nevertheless, the United States can make an important contribution in providing advice, targeted assistance, training programs, and political discussions. Indeed, **significant advances have been made over the past two years in arranging programs of assistance to the inheritor states.** The Safe and Secure Dismantlement program, for example, has made considerable progress helping control and protect nuclear materials and offering nonmilitary opportunities to former nuclear weapon scientists. Its extension to the area of defense conversion shows an awareness of the importance of this problem in stabilizing the economic situations in the nuclear inheritor states.

United States diplomacy has had a remarkable series of successes in obtaining ratifications of the two principal arms control agreements of concern to nuclear proliferation in the FSU: START I and

TABLE 4: Status of Ratification of the Non-Proliferation Treaty (NPT) and START I

Date	Belarus	Kazakhstan	Ukraine
February 1993	Neither	START	Neither
February 1994	NPT, START	NPT, START	START

SOURCE Office of Technology Assessment, 1994

the Non-Proliferation Treaty. In February 1993, Russia was the only nuclear inheritor state to have reaffirmed the ratifications of these treaties, and its ratification of START I was conditional on each of the other three states ratifying both. One year later, what had appeared to be a difficult problem was well on the way to solution (table 4); of the three non-Russian nuclear inheritor states of the Soviet Union, only Ukraine's ratification of the NPT remains, and this may be accomplished soon.

4 Belarus

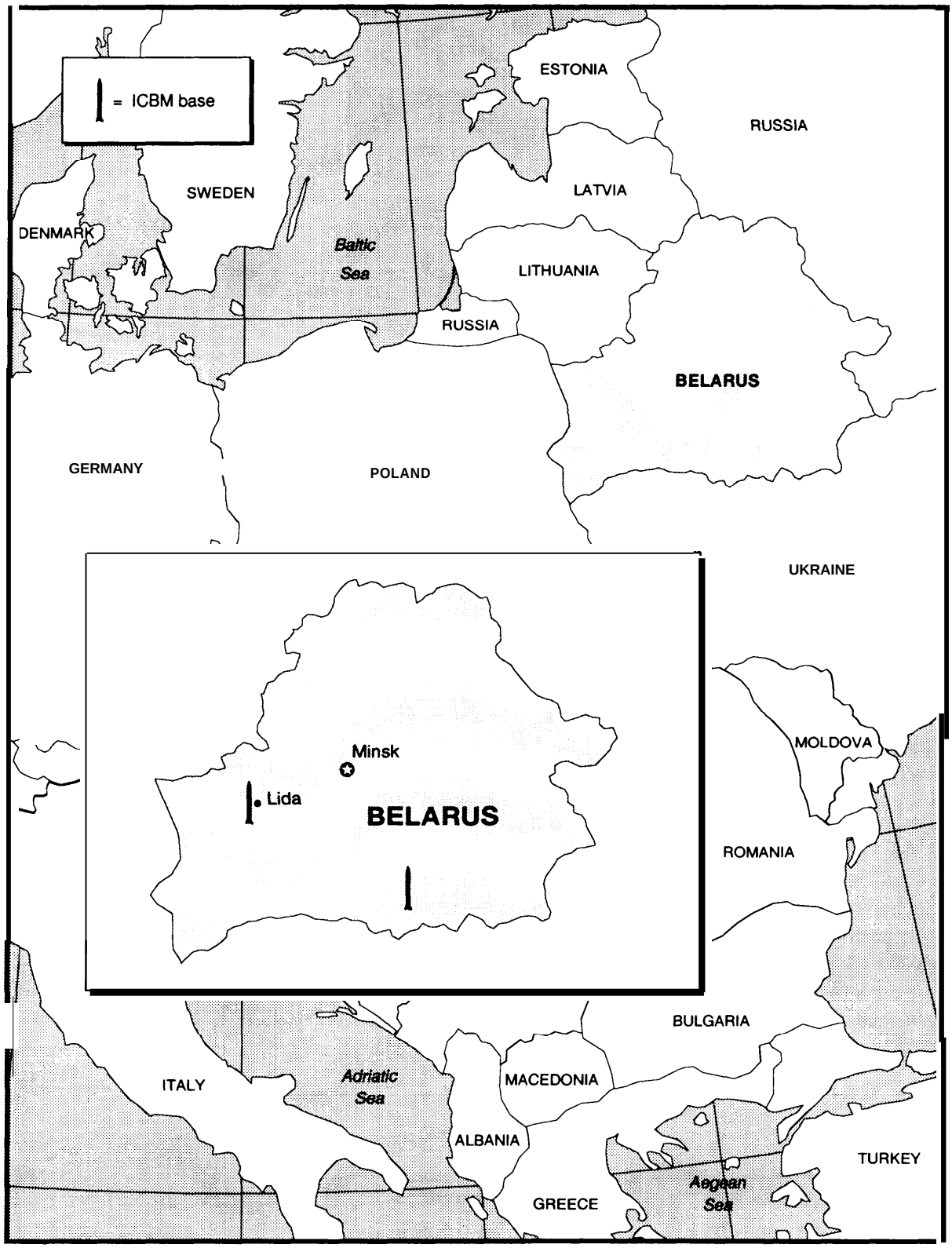
Until the break-up of the Soviet Union, Belarus, formerly the Belorussian Soviet Socialist Republic, had (with a brief exception just after the Russian Revolution) never before existed as an independent entity. In the past, it had been part of Poland, Lithuania, Russia, or Ukraine. It now borders on all these states as well as on Latvia. Belarus is known as White Russia (the translation of Belarus) because it is geographically situated beyond the influence of Mongol invasion and suzerainty from the 13th to the 15th centuries. Belarus has a relatively small population of about ten million, and a territory roughly the size of England and Scotland together. Figure 2 shows relevant facilities in Belarus.

Former Belarusian Supreme Soviet Chairman Shushkevich, Chairman of the Belarusian Supreme Soviet (parliament) since independence in late 1991, struggled for two years to promote political and economic reforms in the face of conservative inertia in the parliament. However, he was removed from office by a vote of the Soviet—which is dominated by conservative holdovers from the Communist era-on January 26, 1994. His successor, Mechyslaw Hryb, was also a reformer, but a more cautious and compromising one. Little economic or political reform has yet occurred in Belarus, although democratic forces have the freedom and capacity to argue actively for it.[1] Nevertheless, Belarus is calmer politically and less turbulent economically than many other of the former Soviet republics.



[1] However, the overwhelming election of a conservative pro-Russian figure, Alexander Lukashenka, as president in July 1994 has made economic reform less likely.

FIGURE 2: Selected Sites in Belarus



SOURCES: Carnegie Endowment for International Peace, Monterey Institute of International Studies, May 1994

On February 4, 1993, the Belarus Supreme Soviet recommended accession to both START I and the NPT, making Belarus the first of the three non-Russian nuclear inheritor states to do so. On October 26, 1992, Belarus, on instructions from Chairman Shushkevich, approved a schedule that would remove strategic nuclear weapons from its soil by the end of 1994; however, later indications are that the government will require until the end of 1996 to accomplish this.[2]

Belarus has a few civilian nuclear facilities with a small amount of nuclear material useful for weapons.[3] Belarusian and Western officials worry more about the transit through the country of contraband nuclear material from sources in Russia than they do about diversion from Belarusian nuclear facilities. Some cases of nuclear contraband passing through Belarus have been reported, but none of these involved plutonium or HEU.

The United States, after a few months delay, has begun to reward Belarus for its forthcoming behavior on the nuclear issue. In total, some $76 million were in the process of being obligated under the Nunn-Lugar program as of March 1994.[4] The money will go for purposes related to the nuclear weapon reductions, such as dismantling missiles, shipping nuclear warheads to Russia, and remediating environmental damage associated with missile deployment. In addition, some funds will go to training export control experts and providing assistance to improve Belarusian export control and customs capabilities.

Belarus has since requested an additional $210 million for aid related to nuclear disarmament. In a detailed memorandum to the State Department, the Belarusian government sought these funds for purposes such as establishing an effective customs system and providing housing for military personnel who will be retired once the nuclear-armed SS-25 missiles on Belarus' territory are dismantled.

The U.S. government has been interested in supporting Belarus to the maximum degree possible, both to encourage and reward its behavior thus far and also to indicate to Ukraine (and, until its ratification of the NPT, Kazakhstan) that significant benefits may follow the renunciation of nuclear weapons. U.S. Ambassador James Goodby, in charge of the Safe and Secure Dismantlement program, made it clear during a trip to Minsk and other parts of the former Soviet Union in April 1993 that Belarusian requests for aid related to the nuclear disarmament process would be looked upon favorably by the U .S. government. President Clinton made the same points during his January 15, 1994 visit to Belarus and announced the provision of an additional $50 million in assistance programs.[5]

Further, two non-governmental organizations, the Monterey Institute for International Studies and the Center for East-West Trade Policy at the University of Georgia, recently helped Belarusian counterparts establish the Center for Nonproliferation and Export Control in Minsk, Belarus, which provides training and advice for government officials in these fields.

U.S. POLICY OPTIONS REGARDING BELARUS

Since Belarus was the first of the non-Russian nuclear inheritor states to accede to the NPT and to

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[2] On the first point, see, for example, G. Allison et al., "Cooperative Denuclearization: From Pledges to Deeds" (Cambridge, MA: Center for Science and International Affairs, Harvard University, January 1993), p. 46, and, on the second point, "Twenty-seven Belarusian SS-25 Missiles to be Dismantled in Russia," Agence France Press, Dec. 22, 1993, in FBIS, JPRS-TND-93-003, Jan. 31, 1994, p. 18.

[3] Belarus has two so-called critical assemblies in addition to two small experimental research reactors in Minsk, and a store of spent fuel, all of which contain HEU; see W. Potter, "Nuclear Profiles of the Soviet Successor States" (Monterey, CA: Program for Nonproliferation Studies, Monterey Institute of International Studies, May 1993), pp. 7-8.

[4] U.S. Department of State Dispatch, Jan. 3, 1994, p. 6.

[5] Douglas Jehl, "Clinton Promises Help for Belarus Before Changing Focus to Mideast," *The New York Times*, Jan. 16, 1994, p. Al.

Findings Regarding Belarus

- Belarus has been the most forthcoming of the three non-Russian nuclear inheritor states of the FSU in terms of fulfilling its commitments to the international community in arms control and nonproliferation.
- Belarus presents the lowest proliferation threat of any of the nuclear inheritor states of the FSU because of the relatively small number of nuclear weapons on its territory, because of the small amount of other nuclear material there, and because the political situation is relatively calm, However, some smuggling has occurred through its territory.
- Belarus has asked the United States for a moderate amount of economic aid related to nuclear dismantlement and arms reductions. These requests appear intended to improve control over nuclear material on its territory, The United States government has begun to respond positively to these requests.

START I, and since it has relatively few warheads and little nuclear material apart from those warheads on its territory, Belarus is the least problematic of the nuclear inheritor states of the FSU. However, the United States could take steps that would further improve control over nuclear material in Belarus.

One option is to increase Nunn-Lugar assistance by granting all or part of the additional $210 million requested by the government of Belarus. Admittedly, arguing for increased expenditures on the FSU is difficult at a time when domestic budget constraints are severe. Moreover, the funds are no longer necessary to induce Belarus to accede to START I or the NPT, since it has already done so. Nevertheless, additional assistance might be desirable for several reasons. First, Belarus does not yet have adequate control over its borders, especially over the frontier with Russia.[6] The porosity of this border has permitted the smuggling of many commodities, including low-enriched uranium. Additional customs capability would be beneficial not only for Belarus, but also for Russia and the international community. U.S. assistance in this area, both in training and in helping fund the establishment of an effective customs system, could be productive. For example, Belarus currently lacks sufficient quantities of simple radiation detectors for customs use, which would be of great assistance. Further, Belarus also needs advice on setting up the institutional aspects of its export control system, as do all the other former Soviet republics.[7]

The material well-being of those in the FSU charged with the custody of nuclear weapons is very important, and not sufficiently appreciated in the West. The morale of the former Soviet Army is currently low, according to press reports and to academic and government experts who have traveled to the FSU. Part of the cause is a lack of housing for personnel, arising from the sudden return of hundreds of thousands of troops to Russia from the Soviet Union's former Warsaw Pact allies. In fact, beyond housing, there are problems of inadequate medical services, scant consumer goods, and other infrastructure deficiencies that render the quality of life poor. The request by Belarus for housing for the Russian (no longer Soviet) military nuclear custodians on its territory-included in its $210 million request for additional U.S. nuclear-related aid----confirms that the lack of amenities for these critical personnel is a serious concern in the FSU. It should be a serious concern for the United States as well.

A relatively small investment here would go a long way to restore morale among people in

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[6] If a customs union with Russia is achieved, this border will not need to be controlled to the same degree as Belarus' external borders.

[7] As noted above, the United States has, in fact, begun talks with many of the former Soviet states to this end. Through nongovernmental organizations, it has helped establish training in various ways, including a conference at Airlie House, Warrenton, VA, June 14-16, 1993, sponsored by the U.S. Department of Energy. Most of the republics were represented there, including all four of the nuclear inheritor states.

charge of a vital commodity, thereby serving to increase the integrity of the guard force. It would also allay the suspicions, widespread among the Russian military, that the United States is still acting as an enemy, trying to disarm and destroy it and, therefore, all of Russia.

In addition to assisting Belarus with housing for retired Russian officers, one possible option would be to provide some housing for active officers as well. However, it would be difficult politically and morally to justify paying for the maintenance of soldiers manning missiles that could be aimed at the United States.

The United States could provide advice in the area of privatization, which in Belarus has lagged behind Russia and some other FSU republics. It could also expand its assistance—beyond the $20 million or so that has already been obligated and earmarked for two factories in Lida—for converting Belarus's defense industry to peaceful purposes. For example, Belarus has large truck manufacturing facilities, some of which had been used to build mobile launchers for the SS-25 ICBM. It also has microelectronics manufacturing capabilities that might be modified for the civilian sector. Improving Belarus's economic performance, in part through successful defense conversion, would reduce economic stress and lessen the risk of widespread corruption that could threaten nuclear security and safeguards. Defense conversion assistance could also be used as a lever to persuade local authorities to implement economic reforms more rapidly. If the defense industry were shut down without civilian replacement, unemployment would increase considerably, stressing society still further and adding to proliferation dangers.

Improving Belarus's economic performance also has an importance for European stability that goes beyond nuclear proliferation, since instability in any of the former Soviet republics would have negative repercussions in Russia and in nearby parts of eastern Europe.

The question is, however, how useful more U.S. aid would be. As noted above, the Belarusian economy and political structure have remained largely in the hands of an old guard that has not, as yet, taken major steps in the direction of economic reform, decentralization, and privatization. The economic situation in Belarus is not much better than in Russia, although it is substantially better than in Ukraine. Giving large amounts of aid now would not be useful if it would tend to entrench the old guard, lend itself to corrupt and wasteful activities, or disappear into a system that has demonstrated considerable resistance to change.[8]

Another option, suggested by Allison et al. and by Potter,[9] is to establish a center for scientific and technical research similar to those being set up in Russia and Ukraine. Since there are not many weapon scientists in Belarus, such a center should not necessarily be focused on individuals with weapon expertise.[10] A1lison et al. suggested a center devoted to energy research, since Belarus is energy-poor, has no nuclear power (its two reactors are small and used only for research, not electricity production), and imports nearly all its fossil fuels. (Energy costs for Belarus have risen considerably now that Russia demands payment for its energy exports in hard currency.) In fact, despite the Chernobyl trauma, which actually affected more land in Belarus than in Ukraine, current governmental thinking is to reactivate plans for nuclear plants in the Minsk area.

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8 One suggestion for dealing with this issue, but not in a nonproliferation context, is to target assistance to those institutions or agencies that have demonstrated a commitment to reform. See U.S. Congress, Office of Technology Assessment, *Fueling Reform: Energy Technologies for the Former East Bloc*, OTA-ETI-599 (Washington, DC: U.S. Government Printing Office, July 1994), esp. ch. 8.

9 G. Allison, et al., "Denuclearization," op. cit., footnote 2 and W. Potter, "Nuclear Export Controls From the Former Soviet Union: What's New, What's True," *Arms Control Today*, Jan./Feb. 1993, pp. 3-10.

10 While the International Science and Technology Center is aimed at weapon scientists, it is not restrictive: civilian scientists may also participate. See chapter 6.

Another focus for such a center, suggested by a Belarusian official, would be to study the effects of the Chernobyl disaster on the people, animals, and plants in the southeast part of the country that was most affected by the fallout.[11] Such studies, including epidemiological ones, would be of interest to the rest of the world as well, where better information on the effects of radiation would be helpful in formulating civilian nuclear policy and in developing and revising nuclear safety standards. An additional variation of this option would be to research technologies for cleaning up, as well as monitoring, some of the consequences of the Chernobyl accident.

Either of these options could be accomplished within or outside the Nunn-Lugar framework. In January 1994, an umbrella agreement on scientific and technical cooperation was signed between the United States and Belarus. While no funds have yet been specifically identified for projects under this agreement, it provides a legal structure under which an international research center could be established.

Although political problems delayed agreements establishing such a center in Moscow and still impede one in Kiev, such difficulties are less likely to occur in Minsk. In both Russia and Ukraine, the centers became part of wider power struggles between the president and the parliament. Such tensions are far milder in Belarus. Further, both Russian and Ukrainian nationalists fear that the purpose of the centers is to steal Soviet nuclear secrets and to help dismantle research abilities by co-opting individual scientists. In Belarus, since there are few weapon scientists, this would be less of an issue. Moreover, even in the case of the weapon scientists, the purpose would not simply be to keep them occupied and "off the streets" so that their expertise would not be exported: it would be to keep many other technologies and scientific capabilities alive, since they are vital components of any strategy for economic revival. Joint research projects with Western scientists to this end could be a major component of a Belarus center. **Such a strategy would be valid not only in Belarus but in any of the other nuclear inheritor states, since a long-term solution to the danger of nuclear proliferation in the FSU must include economic development and political stability.**

Arguing against such a broader mandate for these research centers, however, is the fact that saving Belarusian science as a whole (and, by extension, science in the other former Soviet republics) is far beyond their limited capabilities. Such a wide mandate would absorb funds that might arguably better be targeted to the specific task of preventing weapon scientists and engineers from working for proliferant states.

A dedicated center for Belarusian scientists is not the only possibility. Plans are now being considered to establish a Minsk branch office of the Moscow-based International Science and Technology Center, which is now operational (see chapter 6 for details). If this does not come to fruition, an alternate proposal would be for the Moscow center to set aside some money for Belarus. Belarus has become a member of the International Science and Technology Center, although it is not clear what this will mean in terms of funding projects involving Belarus scientists. Either option might satisfy the needs of Belarus without giving rise to the administrative and political delays that a new center and new agreement might entail.

A different approach to expanding scientific cooperation with the FSU would be a civilian research and development foundation, such as is being proposed for Russia under the FREEDOM Support Act of 1992. As noted, since there are not so many weapon scientists in Belarus, this type of mechanism might be more appropriate than funds under the Nunn-Lugar amendment, which is aimed at weapon scientists. Another approach would be to rely on laboratory-to-laboratory projects among U.S. government laboratories, private industry, and their counterparts in Belarus as a

11 V. Gontcharenok, Embassy of Belarus, personal communication, May 1993.

mechanism for assisting in the scientific development of the country. Department of Energy laboratories have proposed to use the funding allocated in the fiscal year 1994 Department of State appropriations, among other funds, for this purpose (see discussion in chapter 3 on U.S. cooperative programs).

POLICY OPTIONS SUMMARIZED

- **Provide further funding (up to $210 million) for assistance to Belarus in nuclear-related areas:**

1. Export control
2. Customs equipment and training
3. Housing and possibly other infrastructure improvements for military custodians of nuclear weapons
4. Environmental research and cleanup related to the Chernobyl disaster and to the removal of nuclear weapons

Rationale For: Provides additional security for protection of nuclear material and discourages nuclear trafficking; strengthens morale, loyalty, integrity of units in charge of nuclear forces; aids in financing compliance with arms reduction agreements and initiatives; gives positive example of potential rewards for NPT accession to Ukraine.

Arguments Against: Such assistance would be expensive at a time of limited U.S. resources and unnecessary for exerting political leverage on Belarus, which has already acceded to START I and the NPT. Questions might be raised about the ability of the Belarusian government and economy to absorb such aid effectively. Assistance to active nuclear officers would be difficult to justify politically and otherwise. Money spent on environmental cleanup activities might be better spent to remedy inadequacies in Belarusian export control and customs systems or to help bolster the economy.

- **Provide Defense Conversion Assistance**

Rationale For: Helps establish economic stability, resulting in less pressure to export weapon technologies; gives positive example of potential rewards for NPT accession to recalcitrant states; has potential to help hasten reform process.

Arguments Against: Would help conservative elements who still control economy and actually might act as a brake on decentralization, privatization, and reform.

- **Establish formal program of cooperation in science and technology focused on the following areas:**

1. Energy research
2. Chernobyl-related epidemiology
3. Environmental research

Rationale For: This might be done either under the science and technology agreement or under the Nunn-Lugar program. It would help Belarusian science and technology survive a difficult transition period, give a positive example of potential rewards for NPT accession to recalcitrant states, and create goodwill with the government of Belarus; if targeted properly, it could provide work for weapon scientists. A key issue, however, would be how broadly to target assistance beyond the scientists and engineers with direct weapon expertise.

Arguments Against: As in the above cases, this policy would require funds in a time of fiscal constraint in the United States. Such a policy might aid a conservative regime that is slow to reform; moreover, funds are not needed to placate Belarus, since the country has already acceded to the NPT. Further, such aid might be more effective in the long run if focused on economic development rather than on energy or environmental topics.

Alternative possibilities to achieve similar goals:

1. Establish a Belarus center for joint scientific and technical research in Minsk (under Nunn-Lugar), analogous to the one in Moscow, to fund joint research projects between weapon scientists in Belarus and the United States.
2. Open a branch of the Moscow-based International Science and Technology Center in Minsk, which would be easier and cheaper than

creating an independent center for Belarus, although possibly less pleasing to Belarusians anxious to preserve their own identity.
3. Use FREEDOM Support Act funding for an R&D center aimed at civilians, under auspices of the umbrella science and technology agreement between the United States and Belarus.
4. Rely on laboratory-to-laboratory interactions, together with the participation of U.S. industry, for cooperative science R&D with Belarus.

The last two mechanisms may be used together and may be more appropriate than Nunn-Lugar funds because there are relatively fewer weapon scientists in Belarus than in other states eligible to receive Nunn-Lugar support. However, if U.S. officials decide to concentrate on weapon scientists, an international science center (under Nunn-Lugar funding) or a branch office of the Moscow center could be established as well.

5 Kazakhstan

Kazakhstan is located south of central Russia on the northern tier of Central Asia. Its territory includes the eastern shore of the Caspian Sea and half the Aral Sea. Its population of about 15 million is nearly evenly divided between ethnic Slavs and central Asians. The breakdown is 40 percent Kazakh, 38 percent Russian, 6 percent ethnic German, and 5 percent Ukrainian, with the rest mostly Uzbeks, Tatars, Uighurs, and Belarusians.[1] Kazakhstan is a large country, with an area only slightly smaller than western Europe, but a far lower population density. Figure 3 shows relevant installations in Kazakhstan.

When the Soviet Union dissolved, some 1,400 strategic nuclear warheads were present in Kazakhstan, including 108 nuclear-armed SS-18 ICBMS having 10 warheads each.[2] Twelve of the missiles and some 40 Bear H bombers capable of carrying nuclear cruise missiles were withdrawn in early 1994, but the associated warheads are thought to remain in Kazakhstan, stored near the city of Semipalatinsk.[3]

Kazakhstan is also the location of the Semipalatinsk nuclear test site, one of only two nuclear test sites in the former Soviet Union (the other is on the remote Russian island of Novaya Zem-



[1] FBIS-USR-92-016L, Nov. 27, 1992.

[2] W. Potter, "Nuclear Profiles of the Soviet Successor States" (Monterey, CA: Program for Nonproliferation Studies, Monterey Institute of International Studies, May 1993), p. 16.

[3] "Last Strategic Bombers Leave Kazakhstan," Radio Moscow, Mar. 1, 1994, in FBIS-SOV-94-041, Mar. 2, 1994. Also, see "Nuclear Successor States of the Soviet Union: Weapon and Sensitive Export Status Report" (Washington, DC; Monterey, CA; and Moscow: Carnegie Endowment for International Peace and the Monterey Institute of International Studies, May 1994).

FIGURE 3: Selected Sites in Kazakhstan



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



SEMIPALATINSK NUCLEAR TEST SITE

Nuclear explosion at the Semipalatinsk test site in Kazakhstan before 1963, when atmospheric testing ended,

lya, located in the Arctic Ocean). There is considerable concern in Kazakhstan over radiological pollution at and near the Semipalatinsk site, following over 100 atmospheric tests in the 1950s and early 1960s, and hundreds more underground tests. The situation is somewhat analogous to that near the U.S. Nevada Test Site, although contamination is probably much worse in Semipalatinsk. Aggravating the situation is that while the nuclear testing program was run by Russians, much of the surrounding population—which suffered the effects of the radiological releases—is Kazakh.

Kazakhstan President Nursultan Nazarbayev, a contemporary and long-time colleague of former Soviet President Mikhail Gorbachev, is a reformer in the Gorbachev mold (although the two had serious differences) who has permitted some opposition parties and movements to arise in the country. However, he has not yet designed a liberal democracy such as would be recognized in the West. President Nazarbayev has thus far managed to balance the various ethnic and political currents in Kazakhstan, resulting in a considerably greater degree of stability and political comity than exists in most of the other former Soviet republics. The political relations between the president and the opposition in parliament are relatively calm, certainly in comparison with Russia and Ukraine. In fact, unlike the case in those two countries, the president dominates the parliament.



ANTHONY FAINBERG

Cow roaming the Semipalatinsk nuclear test site in 1993.

Maintaining a relatively tranquil political order while permitting some opposition activity is particularly difficult in Kazakhstan because of the nearly even ethnic division between Slavs and central Asians. There is also the complication of strong environmental movements, many of which focus on the consequences of nuclear, chemical, and biological weapon testing or manufacture by the Soviet Union in what is now Kazakhstan. One such group-- 'Nevada-Semei," formerly "Nevada-Semipalatinsk''—is dedicated to achieving a universal nuclear test ban, and it succeeded in persuading President Nazarbayev to ban nuclear testing at Semipalatinsk on August 29, 1991, when

Kazakhstan was still part of the Soviet Union. Nazarbayev has called for a massive international aid program to cleanup the mess left from decades of activity by the Soviet military-industrial complex.

Kazakhstan ratified the START I arms control treaty in 1992, but Non-Proliferation Treaty (NPT) ratification came more than a year later despite various statements that it would follow soon behind START. It was not until December 13, 1993, during a visit by Vice President Gore, that the NPT was ratified, garnering a near-unanimous vote. During President Nazarbayev's visit to Washington in February 1994, when he deposited the instruments of ratification of the NPT with the U.S. government, President Clinton announced the provision of $311 million in aid to Kazakhstan. The money will be expended in programs including defense conversion, the dismantlement of the nuclear delivery systems eliminated by START I, and some other areas.

THE SEMIPALATINSK NUCLEAR TEST SITE

In addition to the strategic nuclear weapons located there, Kazakhstan has several facilities containing highly enriched uranium (HEU) and plutonium. On the Semipalatinsk nuclear testing site are three relatively small research reactors fueled with HEU. The reactors' fuel loadings vary from 2 kg to 9 kg. Including old loadings, which are not highly radioactive, up to 300 kg of HEU are located at the site.

Additionally, the test site contains a small nuclear explosive device, currently buried several hundred meters underground. It was apparently about to be detonated when the site was closed to nuclear weapon testing by the government of Kazakhstan in 1991. For reasons that are unclear (perhaps financial, safety-related, or both), it has not yet been removed. Although the device is said to be of very low yield, it still contains, by definition, enough nuclear material to make a nuclear explosion.[4]

In November 1993, during a period of particularly cold weather, public utilities (including heat and hot water) failed at Kurchatov City, the residential and administrative center of the test site. This problem was eventually repaired, but, **for a while, Russian press reports discussed the possibility of abandoning the site-a rather disturbing option, given the presence of a nuclear weapon there.**[5] Although the site has not been abandoned, the Russian military detachment that had provided security there was withdrawn in May 1994, leaving the security situation unsettled.

"BRAIN DRAIN"

Overshadowing the need to safeguard Kazakhstan reactors is the problem of what to do with Kurchatov City, located within the Semipalatinsk nuclear test site. Named for the first director of the Soviet nuclear weapon program, Kurchatov City



SEMIPALATINSK NUCLEAR TEST SITE

Kurchatov City a nuclear research city within the boundaries of the Semipalatinsk nuclear test site in Kazakhstan.

[4] For a report on the unexploded device, see, for exarnple, "Unexploded Nuclear Device Left Under Semipalatinsk Site," *Krasnaya Zvezda*, Jan. 14,1994, p. 3, in FBIS, JPRS-TND-94-004, Feb. 11,1994, p. 22. An earlier report may be found in W. Potter, "NuclearProfiles..." op. cit., footnote 2, p. 16.

5 For information on the utility failure at the Semipalatinsk site, see "Semipalatinsk Accident Makes Future Uncertain," *Nezavisimaya Gazeta, Nov. 24, 1993, FBIS-SOV-93-226, Nov. 26, 1993,* p. 58.

was part of the Soviet nuclear weapon complex. Reports currently indicate that the scientists and technicians there, nearly all of whom are ethnic Russians, are receiving minimal financial support (10 percent of their funding) from Moscow. The rest of their funding comes from Kazakhstan, which has very limited financial resources.

Scientists at Kurchatov City are trying hard to interest Western nations in joint research projects just to keep themselves employed. Although workers receive subsistence salaries, there is no funding at all for any new research projects, and current projects appear to be proceeding very slowly for lack of funds. Like the scientists at the Arzamas and Chelyabinsk laboratories and elsewhere in the Russian nuclear weapon complex, Kurchatov City residents spend a considerable amount of time raising crops in the summer to feed themselves in the winter.

In early 1993, President Nazarbayev announced the establishment of a Kazakhstan National Nuclear Center with one branch at Kurchatov City and the other at the Institute for Nuclear Physics in Almaty, the capital. This briefly raised hopes at Semipalatinsk. However, the government then could not find funds to pay for the enterprise. Following this, the scientific workers there threatened strikes. One recent press report states that only 20 percent of the original maintenance personnel remain on site, causing maintenance and security problems.[6]

One possible solution for dealing with the unsettled situation there would be to arrange joint research projects with Western scientists. However, it is not clear how appropriate most of the facilities at Semipalatinsk are for such joint work. One of three reactors there, built to produce high neutron intensities for material testing, can produce severe transients (rapid surges of activity, resulting in enormous bursts of neutrons and heat production). Such transients are useful for reactor safety studies. There is also a mothballed nuclear rocket propulsion facility which includes the other two reactors, now also used for material testing.

However, there is not much Western interest in pursuing nuclear rocket propulsion. A recent effort by two groups in the United States to revive such work at the Nevada Test Site was put on hold in 1992. Barring renewed interest in a joint U. S./Russia manned flight to Mars, nuclear rocket propulsion at present seems an unpromising area for collaboration. In addition, local environmentalists might oppose such a project in Kazakhstan, even if scientists promise to contain the radioactive effluent from the nuclear rockets.

Another suggestion, made by local scientists to visiting counterparts from the West, was to build an underground cavity at Mt. Degelen, an area of the test site where many underground nuclear explosions have taken place. Western clients would be invited to construct scale models of nuclear reactors in this cavity and force them to fail, creating catastrophic accidents for diagnosis. Understanding how the models failed could lead to improved techniques for preventing and mitigating nuclear accidents. However, even if interested clients from abroad could be found, this proposal is also likely to be regarded unfavorably by local environmentalists.

The Soviet nuclear testing program released a considerable amount of radioactivity in the region near Semipalatinsk. Apart from the atmospheric tests, many of the hundreds of underground explosions vented radiation (as has also occurred at the Nevada site, but, apparently, to a lesser extent than at Semipalatinsk). A possibly fertile field would be cooperative U.S.-Russian-Kazakh research aimed at devising effective methods for cleanup.[7] Such work could also have applications in dealing

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6 Moscow Television, Apr. 28, 1994, Vesti newscast. FBIS-SOV-94-090, May 10, 1994, p.25.

7 There is interest in Kazakhstan not only in cleaning up nuclear sites, but also sites that handled chemical or biological weapon work. For example, a biological agent test range was located on Vozrozhdenya Island in the Aral Sea in Uzbekistan, very close to Kazakhstan territory, and a facility existed in Aksu (Stepnogorsk) in northern Kazakhstan.

with high- and low-level waste disposal from civilian nuclear power industries.

An additional incentive for the United States to engage in joint work with experts at the Semipalatinsk site is that its own nuclear testing infrastructure and expertise (at the Nevada Test Site) is also likely to remain inactive given the current moratorium on nuclear testing, which may become permanent. Like their Kazakhstani counterparts, managers of the Nevada Test Site have been looking for alternate missions for their facility and its 8,000 employees.

OTHER SENSITIVE FACILITIES

Kazakhstan has several sensitive nuclear facilities outside the Semipalatinsk nuclear test site. One is the 350 MW civilian breeder reactor in Aqtau (formerly Shevchenko). By irradiating an unenriched uranium "blanket" around the core, a breeder reactor produces more nuclear fuel (plutonium) than it consumes. Some experimental core fuel loadings containing over 30 percent plutonium were produced and briefly irradiated in tests. There may be other experimental fuel at the site with similarly high plutonium content. The breeder blanket also contains plutonium, although its plutonium content is less than 1 percent.

The plutonium in these fuel loadings can, in principle, be relatively easily separated from the uranium that constitutes the rest of the material—particularly since, unlike usual spent reactor fuel, neither the blanket nor the test fuelings in the reactor have been irradiated enough to reach very high levels of radioactivity. Therefore, they are more vulnerable to unauthorized removal than they would be if they were highly radioactive. It is essential to maintain control over and keep precise accounting of such nuclear material, since it can be used to manufacture weapons. However, although the International Atomic Energy Agency (IAEA) and several countries, including the United States, are helping Kazakhstan establish its own system of material control and accountancy, no IAEA safeguards agreement was concluded with Kazakhstan until July 1994. Further, there is a lack of qualified nuclear safeguards experts there.[8]

Another unique site in Kazakhstan is the Ulba (formerly Ulbinsky) Metallurgy Plant in Ust-Kamenogorsk in the northeastern comer of the country. This large complex fabricates nearly all the fuel elements for the civilian nuclear reactors of the former Soviet Union (FSU). It is also the only major site in the FSU that produces beryllium, a light metal with unique neutron reflecting characteristics that make it a useful component in nuclear weapons as well as in nuclear reactors. Low-enriched uranium arrives from Russia in the form of UF_6 and is fabricated at the plant into pellets of $U0_2$, used in reactor fuel rods.

The NPT requires international safeguards to be placed on low-enriched uranium (LEU). Low-enriched uranium cannot be directly used to fabricate nuclear weapons. However, it can be used to fuel a plutonium-production reactor. Moreover, if a would-be proliferant already possessing some enrichment capability were to feed an enrichment process with low-enriched uranium, the amount of effort required to produce a given amount of weapon-grade HEU from it would be considerably reduced.

Since LEU would be of considerable use to a proliferant, press reports that Iranian representatives had purchased large quantities of both LEU and beryllium from the Ulba Plant in August 1992 would, if true, cause concern.[9] Had Kazakhstan been subject to IAEA safeguards at the time, any LEU sold from the Ulba plant would have to have been placed under safeguards as a condition of sale. Since no such safeguards were in place, the

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8 W. potter, "Nuclear Exports From the Former Soviet Union: What's New, What's True," *Arms Control Today,* Jan./Feb. 1993, pp. 3-10.

9 BBC-Panorama report on FRONTLINE, Public Broadcast Service Television, Apr. 13, 1993. Although, according to the BBC, government officials in Kazakhstan denied that the Iranians had even been present, factory officials conceded that Iranians had visited the facility but denied that they had been sold any LEU or beryllium. The difference in the two stories gives rise to some concern.

material (if indeed it was actually sold to Iran) could be used for purposes not known to or approved by the IAEA. Even if the reports of the sale of LEU are not accurate, the fact that the uncertainty exists (due to the absence of international safeguards) means that there may be real occurrences of this sort that have not been reported.

Further, Iran's presence and interest in Kazakhstan has been obvious and widely reported, both by journalists and by U.S. scientists visiting Kazakhstan. Iran has an understandable interest in cultivating relations with its neighbors, particularly states with Muslim populations, on all levels: commercial, cultural, and other. However, its interest in Kazakhstan may also have a nuclear component.

There are, as yet, no international safeguards on any nuclear facilities in Kazakhstan. There have, however, been many contacts between the IAEA and Kazakhstan, and IAEA officials have visited nuclear sites in Kazakhstan on several occasions with a view to preparing and concluding such agreements. In addition, a workshop was held in Kazakhstan during June 1993 with participants from the IAEA, Japan, the United States, the United Kingdom, and Sweden to help prepare Kazakhstan officials to apply safeguards to their nuclear facilities.

It would be wise, from the U.S. perspective and from the perspective of the international nuclear nonproliferation regime in general, to apply international safeguards to the Ulba Plant and to Kazakhstan's other nuclear facilities as soon as possible. **In addition to applying safeguards, international standards of physical security recommended by the IAEA should also be applied to these facilities as soon as possible.**[10] Any assistance that the United States can provide to the Kazakhstan government in these areas would be extremely useful.

U.S. POLICY OPTIONS REGARDING KAZAKHSTAN

It is not clear why Kazakhstan took so long to comply with its frequently stated intent to ratify the Lisbon Protocols and the NPT. Perhaps the Kazakhstan leadership decided to let Ukraine do

Findings Regarding Kazakhstan

- Kazakhstan has over 1,000 nuclear warheads on its territory, as well as considerable amounts of nuclear material that could be used in nuclear weapons
- After some delay, Kazakhstan ratified the NPT,
- Kazakhstan urgently needs to develop expertise in nuclear safeguards and physical security.
- None of Kazakhstan's nuclear facilities are yet under IAEA safeguards; this fact may be a threat to the international nuclear nonproliferation regime.
- Ethnic Russian scientists at the Semipalatinsk test site are in some economic distress, raising concerns about "brain drain" and about the security of the nuclear material at that site
- Kazakhstan is very interested in developing cooperative research aimed at cleaning up the environmental insults to its territory caused by years of various Soviet weapon programs,
- Due to its possession of a variety of nuclear materials under insufficient international controls, Kazakhstan poses significant proliferation risks There is at least the appearance of vulnerability to theft, diversion, or sale of nuclear material to foreign parties. However, Kazakhstani authorities appear eager to expand ties with industrialized states and are willing to improve their nuclear safeguards capacity
- **Of the four nuclear inheritor states to the FSU, Kazakhstan is probably the one in which U.S. efforts have the best chance of improving the situation significantly** Several of the most acute proliferation concerns seem amenable to outside assistance

[10] IAEA safeguards are intended to detect the diversion or misappropriation of nuclear materials; they do not deal with threats to capture such material through use of force. That possibility is addressed by physical security measures such as guards.

the fighting for it on the issue of whether to become a nuclear weapon-free state. More likely, Kazakhstan wanted to extract further economic benefits, rewards, and security guarantees before a final commitment was made to go non-nuclear. Kazakhstani officials have stated that the president's national security advisors debated at length the advisability of renouncing the nuclear option, given that the country borders directly on two declared nuclear powers: Russia and China.[11] Kazakhstan is also located near India and Pakistan, both widely thought to possess nuclear weapon capability.

Kazakhstani officials also made clear that they would like to see a universal norm of "no-first-use" established; that is, a commitment from each nuclear power never to be the first to use nuclear weapons.[12] In fact, the government may have held out on the NPT for this reason, among others. Current U.S. policy hedges this issue by offering its no-first-use pledge only to members of the Nonproliferation Treaty (or equivalent agreement) that are not nuclear powers or allies of nuclear powers. The Russian Federation recently changed its policy from the declared (although not necessarily believed) Soviet no-first-use pledge to one that mirrors the U.S. position.

On the one hand, since Kazakhstan-like Belarus—has now ratified the NPT, any further concessions, whether financial, policy, or aid-related, are unnecessary for persuasion on this issue. The policy approach of providing no further "carrots" to Kazakhstan has the attraction of not requiring any further action. It also would save money in a time of fiscal limitations. However, dealing in bad faith with Kazakhstan, after it had satisfied U.S. requests in the realm of nuclear nonproliferation, would make it more difficult to persuade other countries to comply with such requests in the future. The signal that such an act would send to Ukraine is obvious. Further, such behavior would increase world cynicism towards U.S. nonproliferation policy, seriously damaging the credibility of subsequent U.S. offers of assistance. Such a policy could also make it more difficult to achieve international consensus on related issues in the future (e.g., in dealing with North Korean intransigence on fulfilling its international obligations under the NPT). It could also poison the relationship between the United States and Kazakhstan, a nation where there are considerable U.S. commercial interests and which is located in a strategically important region.

It is useful to consider what other policy approaches towards Kazakhstan might address that state's legitimate concerns. For example, Kazakhstan would like financial help in dismantling the nuclear missile silos on its territory pursuant to U.S.-Soviet arms control agreements. It would like help in characterizing and dealing with the environmental insults due to former military programs on its territory and in monitoring health problems among populations exposed to effluents from the military programs. From the nonproliferation perspective, the United States would like Kazakhstan to exert improved control over nuclear material in the country.

Now that the Nunn-Lugar "umbrella" agreement with Kazakhstan has been completed, some of the promised money could be transferred as soon as possible, earmarked, for example, for aid in setting up an export control system, for cleaning up dismantled nuclear (or chemical or biological) weapon sites, or for monitoring the health of local populations. Nunn-Lugar assistance is being obligated, here and elsewhere, although imple-

11 E.g., O. Kasenov and K. Abuseitov, "The Future of Nuclear Weapons in the Kazakh Republic's National Security," (McLean, VA: The Potomac Foundation, February 1993). Kasenov is a senior advisor to President Nazarbayev on national security issues and director of Kazakhstan's International Institute of Strategic Studies.

12 O. Kasenov and K. Abuseitov, ibid.

mentation in general has been slow.[13] This assistance includes help in export control and nuclear material control and accountancy, but little is being done in terms of environmental cleanup or health monitoring beyond a quick initial survey of the Semipalatinsk site.

The establishment of an international research center, possibly at Kurchatov City, might be a viable option.[14] The political problems faced by similar projects in Moscow and Kiev would probably not impede such an agreement here. But the same arguments as in the Belarus case (see chapter 4) could be made against establishment of a new center—increased cost and less need to placate Kazakhstan, since it has already ratified the NPT. It might be easier either to set aside a certain fraction of funds from the Moscow-based International Science and Technology Center (ISTC) for use in Kazakhstan, or to establish a branch ISTC office in Almaty. Kazakhstan has become a member of the ISTC, along with Belarus, Armenia, and Georgia, and it may receive some funding for ISTC projects. However, it is not clear how much funding from such an arrangement would go to Kazakhstani scientists. In addition, Kazakhstani sensitivity to being treated by the United States as an appendage of Russia would argue for an independent center there. [15]

Also, the research perspective of a center in Kazakhstan would likely be quite different from one in Russia: Kazakhstani interests would probably be mostly focused on environmental cleanup of past military programs, and secondarily on energy research: the country, in spite of large fossil fuel resources, imports large amounts of electricity from its neighbors, Russia and Tadjikistan.

Another argument against working with the scientists at Kurchatov City is that the United States may be reluctant to spend resources to help preserve a former Soviet nuclear test site that could one day again be used for developing nuclear weapons to target the United States. However, this type of argument also applies to the Russian weapon design centers of Arzamas and Chelyabinsk, where it is generally thought that the greater danger would be of weapon scientists there contributing their expertise to states seeking weapons of mass destruction, thereby promoting proliferation.

The decision on whether to aid such facilities and personnel depends on several factors. It is not clear how valuable the facilities and resident expertise at the test site actually are. Once there is assurance that the nuclear material on the site is being properly protected, perhaps U.S. experts will decide that there are insufficient technical grounds to work on projects there. However, there is still the problem of potential "brain drain" from the personnel stranded at the site. Decisions on cooperation will depend, ultimately, on whether the United States feels that the risk of nuclear proliferation from these sites, where personnel are under severe economic and political stress, is greater than the risk that the laboratories—particularly Kazakhstani laboratories—will turn again to nuclear weapon development as part of a possibly resurgent imperialist power.

Joint research projects with Kazakhstani scientists, however structured, would address at least two concerns simultaneously: first, by involving scientists from all over Kazakhstan, such projects would assist the survival of science and technology in that nation and aid its transition to a market-based economy; second, they could bring much needed financial support to the nearly abandoned nuclear scientists at Kurchatov City. In addition, if it at least partially focused on environmental cleanup of military programs, it would address

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13 Theodor Galdi, Congressional Research Service (CRS), "The Nunn-Lugar Cooperative Threat Reduction Program for Soviet Weapons Dismantlement: Background and Implementation," CRS Report 93-1057F (Washington, DC: Congressional Research Service, Dec. 29, 1993).

14 This has been suggested by W. potter in *Arms Control Today*, op. cit., footnote 8, for both Belarus and Kazakhstan.

15 See Fred Hiatt, "Kazakh Leader Warns the West Not to Concentrate Aid on Russia," *The Washington Post*, Feb. 8, 1994, p. A11.

one of the major political issues in Kazakhstan, likely winning the support of both the president and the parliamentary opposition. [16]

Another option is for the United States to exercise its influence with the IAEA and Kazakhstan to hasten the establishment of safeguards agreements over that country's nuclear facilities. In addition, the U.S. could help Kazakhstan improve its nuclear safeguards and export control expertise by training Kazakhstani scientists, technicians, regulators, and customs agents, and by transferring nuclear detection equipment there. Moreover, the United States could transfer physical security technology and related systems analyses for use at sensitive Kazakhstani nuclear facilities.

The U.S. "no-first-use" pledge, with its reservations about non-nuclear-weapon states, is not likely to be the decisive factor in motivating major strategic decisions by Kazakhstan. However, the matter is an irritant, both for Kazakhstan and, for other reasons, for Ukraine. One option would be for the United States to consider strengthening its pledge not to use nuclear weapons first against any nonweapon state, even those aligned with a weapon state. At any rate, the rationale underlying the current version of the U.S. "no-first-use" pledge needs to be revisited, given the absence of the bipolar world that gave rise to it. A recent redefinition of Russian military doctrine took a "no-first-use" position that closely parallels U.S. policy. This will make it more difficult to implement a change in policy in the United States.

Finally, as in Belarus, aid could be used to house Russian forces maintaining custody of nuclear weapons on Kazakh territory, if it is determined that those personnel are in need of such help. The same issues apply as did to Belarus (see chapter 4): it would be difficult to help Russian forces who were aiming missiles at the United States. However, housing aid for those being retired because of arms control agreements may be more feasible.

POLICY OPTIONS SUMMARIZED

- **Accelerate transfer of Nunn-Lugar funds to Kazakhstan to aid compliance with arms control agreements and initiatives.**

Rationale For: Many urgent problems need addressing, especially the development of local expertise in safeguards and export control. This action would help reduce an immediate threat to the United States by aiding nuclear weapon dismantlement. It would also be a positive signal to Ukraine in trying to persuade it to accede to the NPT.

Arguments Against: In order to spend U.S. funds wisely, it is necessary to review programs carefully, which requires effort and time. Fraud may be of particular concern in a country undergoing major economic and political transitions and suffering economic difficulties.

- **Establish a formal program for science and technology cooperation with Kazakhstan by assisting in creation of a center for joint scientific and technical research, possibly at Kurchatov City. Focus could be on environmental cleanup of nuclear, chemical, and biological weapon facilities.**

Rationale For: This would satisfy various needs for Kazakhstan, including employment of scientists and technicians at Kurchatov City, aiding President Nazarbaev's initiative to create a research center there (as well as in Almaty), and bringing international help to the environmental problems of Kazakhstan. It would also aid in preserving the scientific and technological expertise of Kazakhstan during a difficult transition period, since a high level of technological capability and a good part of the technical expertise in Kazakhstan

16 Joint research on environmental cleanup of the Soviet nuclear weapon complex was suggested by G. Perkovich and W. Potter in "Cleaning Up Russia's Future: Scientists Could Deal With Its Nuclear Mess," *The Washington Post,* Jan. 5, *1992,* p. *C2.*

is there. The economic stresses on the scientists and the availability of nuclear material at the site may threaten the international nonproliferation regime. **In addition, programs focused on Kurchatov City might usefully employ U.S. counterparts from the Nevada Test Site.**

Arguments Against: There is now less need to placate Kazakhstan, since it has already acceded to NPT. Further, the United States may not want to help scientific staff at Kurchatov City, since it is connected with the old Soviet nuclear weapon program. Finally, resources might be more productively focused on aiding economic development, rather than on finding work for scientists.

Other possibilities:

1. Open a branch of the Moscow International Science and Technology Center in Almaty, which would be easier and cheaper than founding an independent center. However, this approach would probably be less pleasing to Kazakhstan leadership, who are annoyed at dealing with the United States through Russia. Pursuing this option implies support for the principle of working with Kurchatov City scientists.
2. Use the FREEDOM Support Act mechanism to establish a purely civilian R&D center (see chapter 3).
3. Rely on laboratory-to-laboratory interactions, together with the participation of U.S. industry, for cooperative science R&D with Kazakhstan.

The last two mechanisms could be used together. They would still be viable options, whether or not the United States decided to work with Kurchatov City scientists. A broad umbrella agreement between the U.S. and Kazakhstan has been reached for the general purpose of scientific collaboration.

- **Work with Kazakhstan and the IAEA to apply international safeguards to Kazakhstan nuclear facilities as soon as possible.**

Rationale For: The absence of nuclear safeguards and physical security measures at sensitive Kazakhstan sites constitutes a serious proliferation risk. The government of Kazakhstan appears to support the application of safeguards and is working with the IAEA to this end.

Arguments Against: None.

- **Offer U.S. aid insetting up and training personnel for application of nuclear safeguards, customs, and export control regimes.**

Rationale For: Kazakhstan urgently needs such aid to maintain proper control over nuclear material on its territory. Note that pending export control legislation creates the authority to help other states establish and implement their own export controls. [17] Since the IAEA is far more pressed financially than the U.S. government, it may not be feasible for the IAEA to fund these activities. Moreover, asking other countries, individually or though their IAEA assessments, to shoulder the responsibility for financing such efforts would be tantamount to abandoning U.S. leadership in nonproliferation.

Arguments Against: Because of fiscal limitations in the United States, the government should let the IAEA or other countries perform these tasks, notwithstanding the above arguments.

- **Apply U.S. Nunn-Lugar funds to housing and, possibly, other support for Russian personnel having custody of those nuclear weapons stationed in Kazakhstan.**

Rationale For: If such personnel are seriously stressed economically, they may become vulnerable to subornation by foreign or subnational groups attempting to gain access to nuclear materials or weapons.

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

[17] *Omnibus Export Administration Act of 1994,* H.R. 3937, sec. 114 (i); *Export Administration Act of 1994,* S. 2203, sec. 105 (b) (9).

- **Provide Defense Conversion Assistance**

Rationale For: Helps establish economic stability, resulting in less pressure to export weapon technologies; gives positive example of potential rewards for NPT accession to recalcitrant states; has potential to help hasten reform process. Kazakhstan provides a better climate than most other FSU states for foreign investment.

Arguments Against: Problem maybe too large to be addressed by any realistic amount of U.S. aid.

Russia 6

Few 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 toother 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-

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.[1] 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).[2,3]

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.[4] 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.[5] However, the persistence of many cases of smuggling of lesser amounts or of low-enriched

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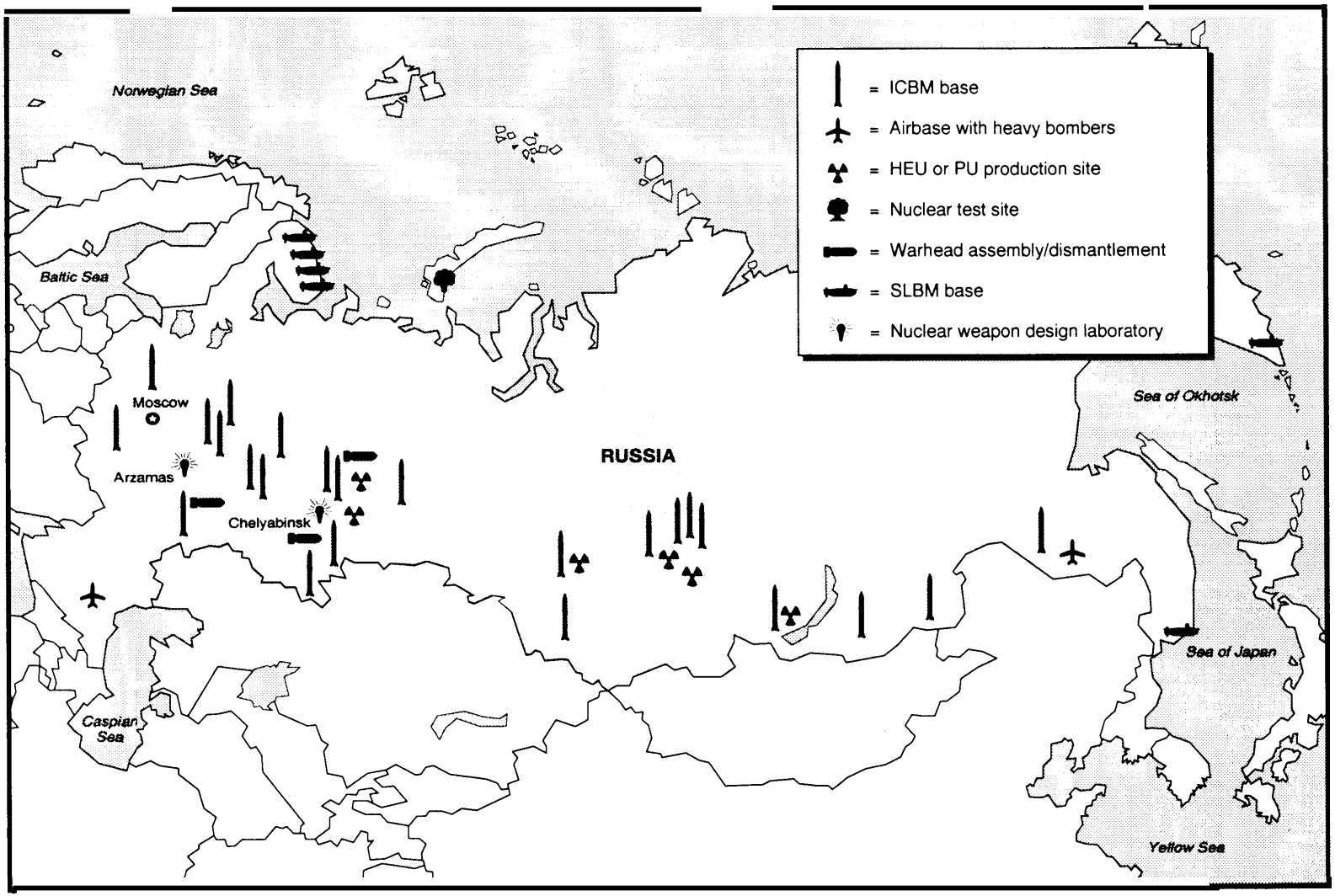
[1] See, for example, testimony by R. James Woolsey, Director, Central Intelligence Agency, before the Senate Committee on Governmental Affairs, Feb. 24, 1993, S. Hrg. 103-208, p. 12, forthe former figure. For the latter, see statement by Viktor Mikhailov, Minister of Atomic Energy of Russia, in W. Broad, "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.

[2] W. Potter, "Nuclear Profiles Of the Soviet Successor States" (Monterey, CA: Program for Nonproliferation Studies, Monterey Institute of International Studies, May 1993).

[3] 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.

[4] See *Literaturnaya Gazeta*, Jan. 20, 1993, p. 13, FBIS, TND-93-006, Mar. 5, 1993, p. 21.

[5] 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 onJune 30, 1994, and three naval officers arrested. *Segodnya*, July 2,1994, p.7, FB1S-SOV-94-128, July 5, 1994, p.27.



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

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.[6]

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.[7] 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.[8] 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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6 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.

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

8 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 FormerSoviet 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,''fVuc/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.[9] 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.[11] 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."[12] 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."13 On August 19, 1993, the Russian news-

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[9] See T. Beardsley, "Selling to Survive," *Scientific American*, February 1993, pp. 92-100.

10 Antenne 2, Paris, "F Comme Fiction," March 1993.

11 He did not provide any independent confirmation of this statement.

12 UPI, July 13, 1993, A. Kacherov, Moscow.

13 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.[14]

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."[15] In the same period, Nikolai Yegorov, Deputy Minister of MINATOM, likewise denied such problems.[16]

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 sc 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

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14 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.

15 *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.

16 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.[17,18]

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.[19]

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17 V. Trofimov in *Nezavisimaya Gazeta*, Dec. 29, 1993.

18 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.

19 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.[20]

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.[22] 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.**

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20 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.

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

22 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 maybe diverted from Russia to foreign parties. Similarly, expertise in areassuch 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 accountancy 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 accountancy 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.[23]

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 resolution 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 insist 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.

Ukraine 7

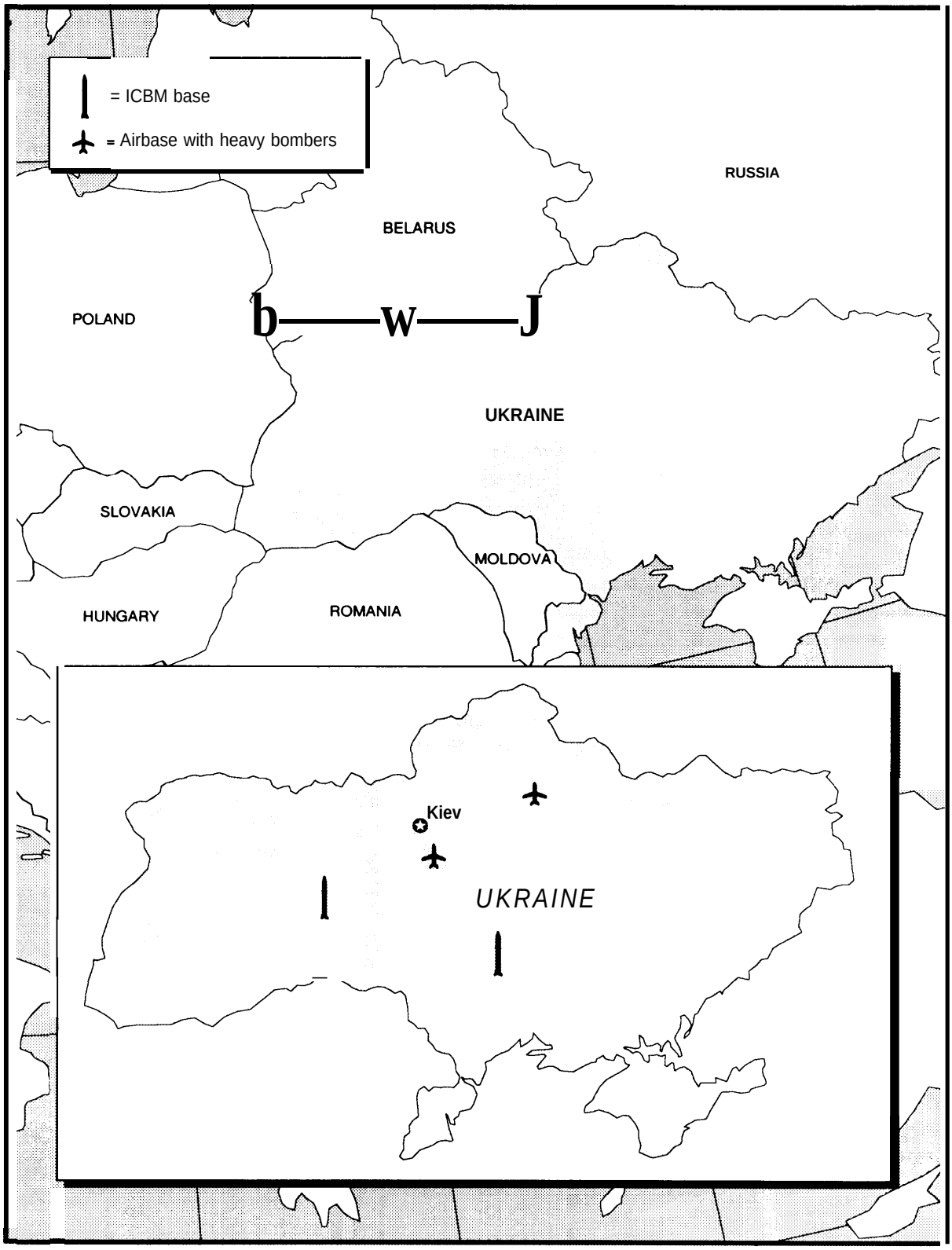
The Ukrainian component of the nonproliferation problem has two parts. The first is the contribution that exports of material, information, technology, or people from Ukraine might make to proliferation on the part of other countries. The second is whether Ukraine will seek its own nuclear weapon capability.

The first set of issues is shared with the other nuclear inheritor states: the need to apply safeguards to nuclear materials on Ukranian territory, to protect nuclear materials and weapons there, and to prevent the transfer of technology and expertise from Ukraine to non-nuclear-weapon states. Because of the severe economic stresses in Ukraine, the temptation to sell anything for hard currency is understandably strong. Economic disruption in Ukraine is, if anything, worse than in Russia and Kazakhstan; the Ukrainian currency (the carbovanets) is one of the few in the world that is losing value with respect to the Russian ruble. Further, Ukraine no longer has the strong central police control over commercial and other activities that it had had as part of the Soviet Union, and since much of the Soviet expertise in customs and export control is now in Russia, Ukraine does not yet have an effective export control system. Therefore, it is particularly vulnerable to loss of nuclear-related items as well as goods associated with other weapons of mass destruction and delivery systems. Figure 5 shows the locations of relevant facilities in Ukraine.



The second issue of concern is the reluctance of Ukraine to accede to the Non-Proliferation Treaty (NPT). In February 1994, the Ukrainian parliament endorsed the tripartite declaration that the presidents of Ukraine, Russia, and the United States signed on January 14, 1994, committing Ukraine to remove all nuclear weapons from its territory within seven years. The nuclear situation

FIGURE 5: Selected Sites in Ukraine



SOURCES: Carnegie Endowment for International Peace, Monterey Institute of International Studies, May 1994



Former Soviet Bear H intercontinental nuclear bombers such as this one are based in Ukraine.



Former Soviet Blackjack intercontinental bomber now displaying Ukranian Air Force markings.

there is still problematic, however, because many politicians-despite this decision—want Ukraine to seize the Soviet nuclear weapons on its territory and declare itself a nuclear-weapon state. This sentiment appears to have the support of a large segment, although probably still a minority, of the public, as well as of a significant proportion of the parliament. The parliament refused to ratify the NPT on the same day it finally ratified START I.

Ukraine is a relatively large European country with a size and population similar to France. At the time of the dissolution of the Soviet Union, it had on its territory 46 SS-24 ICBMS (10 warheads each, in silos), 130 older SS-19s (six warheads, silo-based), and about 30 Bear H and Blackjack bombers with air-launched nuclear cruise missiles (perhaps about 500 in total). [1]If these 1,700 to 1,800 warheads were to come under Ukrainian control, they would make Ukraine the world's third-largest nuclear power. In addition, in the civilian sector, Ukraine has 14 active nuclear power plants (including three remaining at the Chernobyl complex) with large inventories of spent fuel containing plutonium. At present, Ukraine does not possess a reprocessing capability for extracting the plutonium from the spent fuel, nor does it have means of enriching uranium. There are also some small research reactors with small quantities of highly enriched uranium. Beyond this, Ukraine has facilities that produce heavy water in large quantities.[2]

UKRAINE AND THE INTERNATIONAL NONPROLIFERATION REGIME

As of this writing, the Ukrainian parliament (or Rada) has not ratified the NPT, although on February 3, 1994, it ratified START I without the crippling reservations that it had attached the previous November. Over the past several years, government officials and politicians have retreated from an October 1991 statement by the Rada—predating the dissolution of the Soviet Union—that Ukraine would become a "nuclear-free zone" by 1995. Most of the recent revisionist pronouncements alleged that the 1991 statement was somehow coerced by the Soviet government and was

[1] The nuclear bombs for these planes are thought to have been returned to Russia.

[2] G. Allison et al., "Cooperative Denuclearization: From Pledges to Deeds" (Cambridge, MA: Center for Science and International Affairs, Harvard University, January 1993), and W. Potter, "Nuclear Profiles of the Soviet Successor States" (Monterey, CA: Monterey Institute for international Studies, May 1993). Heavy water is used in a class of nuclear reactors that is fueled with natural uranium, rather than low-enriched uranium. Such reactors can be used to produce plutonium.

not freely made. However, the October 1991 Rada statement was far from an isolated event. Other commitments by Ukraine to achieve non-nuclear status include:

- the Minsk statement, made during the organization of the Commonwealth of Independent States in December 1991, which promised that Ukraine would remove its strategic nuclear weapons by July 1994;
- President Kravchuk's signing of the Lisbon Protocol to START I on May 23, 1992, which committed Ukraine to accede to the NPT and to ratify START I, and
- statements by Kravchuk (May 7, 1992), Defense Minister Konstantin Morozov (April 14, 1992), and other high-ranking government officials.

Despite these positions, Ukraine did not ratify the Lisbon Protocol and START I until February 1994. The political reality is that, although the government of Ukraine appeared to want to see the NPT ratified, much of the parliament did not.[3] The issue has thus become inextricably intertwined in the power struggle between the president and the Rada.

While it is now likely that the newly-elected Rada will, in fact, finally ratify the NPT, that outcome is not yet certain.[4] It is, therefore, useful to outline some of the arguments in the Ukrainian debate to understand better the motivations of Ukrainians skeptical towards the NPT, and to review possible arguments that may make them more receptive.

THE ROLE OF RELATIONS WITH RUSSIA

Many arguments presented within Ukraine for becoming a nuclear-weapon state and for rejecting the NPT appeal to prevalent nationalist sentiments. Even some who do not necessarily advocate becoming a nuclear-weapon state are quite hesitant to ratify the NPT. Many Ukrainians feel that nuclear weapons are essential to national survival and that they have a vital role in deterring the Russians from reclaiming Ukraine as part of a new, greater Russia.

In fact, various nationalist Russian parliamentarians, and not only the most extreme among them, have made irredentist statements regarding much of the former Soviet Union, especially Ukraine. Ukraine is a special target of Russian nationalism because of the unique historical, ethnic, and linguistic links between Russia and Ukraine, because of Ukraine's size (50 million people), because of its agricultural and industrial wealth, and because of conflicting claims to the Crimea and the Soviet Black Sea Fleet.

The Crimean issue is a particularly thorny one. The Crimean peninsula, on the northern shore of the Black Sea, had never belonged to Ukraine before 1954, when Soviet Prime Minister Nikita Khrushchev made a gift of it to Ukraine for internal Soviet political reasons. At that time, it was part of Russia, having been annexed from the Ottoman Empire by Russian Empress Catherine the Great in the eighteenth century. A majority of the Crimean population (nearly 70 percent) is ethnic Russian.

Sevastopol, the Crimean home port of the Soviet Black Sea Fleet, is a powerful symbol for countless Russian nationalists, including the former vice president of Russia, Alexander Rutskoi. In July 1993, the Russian parliament, against the wishes of President Yeltsin, declared the city of Sevastopol to be under Russian jurisdiction. Both Yeltsin and Kravchuk denounced this action as

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[3] In September 1993, the American Association for the Advancement of Science held a seminar in Kiev that included U.S. experts in nuclear weapons and nuclear strategy. Many mid-level officials from the Ukrainian Defense and Foreign Affairs Ministries participated. It is possible that, after learning some of the negative aspects of maintaining a nuclear arsensal, these participants were able to affect positively the Rada's decision on START I and the tripartite accord.

[4] The election of Leonid Kuchma as president on July 10, 1994 may have changed the prospects slightly. Kuchma is somewhat less wedded to NPT ratification than was Kravchuk, and he has expressed the wish to proceed slowly, pending more financial aid from the West for dismantling weapons.

null and void, but this behavior, demonstrating the depth of feeling in Russia on the matter, greatly aggravated tensions between the two states.

The election of Yuri Meshkov as president of the Autonomous Republic of Crimea (within Ukraine) in January 1994 may further strain relations between Russia and Ukraine. Meshkov, a nationalist Russian candidate for president of Ukraine, had argued during the campaign for closer integration of Crimea with Russia. After his election, however, he softened this point of view and now argues for economic integration—rather than political assimilation—with Russia.

Most Russian politicians advocate closer cooperation with Ukraine, particularly economic cooperation, rather than annexation. However, the most extreme elements in Russia (such as Vladimir Zhirinovsky and his Liberal Democratic Party) would like to reabsorb Ukraine. Ukrainians fear that these elements may one day rise to power, or that events in a flashpoint such as Crimea could run out of control, causing open hostilities that neither side desires.

Given the mutual suspicions between Ukraine and Russia, the arrogation by Ukraine of the Soviet nuclear weapons on its territory could prove to be an exceptionally dangerous act. If Ukraine were on the threshold of seizing all the nuclear weapons on its soil, Russia could be strongly tempted to preempt this threat to its own security by launching a conventional attack upon Ukraine, attempting to disarm Ukraine's nascent nuclear capability. This would precipitate a major conflict in an already unstable region: several minor conflicts are now under way in Central Eurasia (Armenia-Azerbaijan, Abkhazia-Georgia, Tadjikistan) and several potential civil wars are still sputtering (Moldova-TransDniester, Chechnya). A major war in the area would have the potential for creating or widening other, related conflicts in its wake. Moreover, maintaining secure control of nuclear weapons in the midst of armed conflict would be difficult, increasing the chances of their diversion.

The disposal of the weapons to be removed from Ukrainian territory as part of the START I reductions also affects Ukraine's security concerns. START does not require any weapons to be removed specifically from Ukraine. However, Russia and the West wanted to take some of the START reductions from Ukrainian-based forces, with the eventual goal of reducing those forces to zero.[5]

Ukraine claimed it was worried that the weapons might really not be dismantled, as announced by Russia, but rather be kept for possible future use or threats against Ukraine. Attempting to defuse this issue, then-U.S. Ambassador-at-Large Strobe Talbott (whose portfolio included the broad scope of relations with the former Soviet republics) and then-Secretary of Defense Les Aspin suggested in May 1993 that Russia, Ukraine, and a third party (probably the United States, by implication) share custody of the weapons until their verified dismantlement in Russia. Ukraine was receptive to this suggestion (although the pro-nuclear element in the Rada was not satisfied, preferring dismantlement in Ukraine). However, Russian officials were distinctly negative on the idea of sharing custody over Soviet weapons with a party outside the FSU.

COST ISSUES

Another argument presented by advocates of nuclear-weapon status and opponents of the NPT (and even START I) is economic. Environment Minister Yuri Kostenko, in charge of the parliamentary committee considering nuclear arms control issues, has frequently argued that the cost to Ukraine of maintaining the nuclear weapons on its territory as a deterrent force is less than the cost of developing the conventional forces that Ukraine would otherwise require. Further, while initial

[5] In fact, this will be accomplished under the presidential tripartite declaration of Jan. 14, 1994.

Ukrainian cost estimates for complying with START I's rocket and silo dismantlement provisions totaled about $175 million, which the United States soon offered to supply as an incentive for START I ratification, recent Ukrainian estimates have increased by a factor of 20 to $3.5 billion. This number may not be a realistic estimate; some observers consider such a high figure to be tantamount to blackmail and others note it includes the cost of a large amount of infrastructure only peripherally associated with dismantlement. Nevertheless, the initial estimates were almost certainly too low.

Ambassador Talbott indicated U.S. willingness to be more forthcoming financially during his May 1993 visit to Kiev, and President Clinton announced in February 1994 that he would double the $175 million to $350 million.[6] In October 1993, the United States offered an additional $155 million for economic aid as part of a larger package of assistance to Ukraine, and in March 1994, during a visit to Washington by President Kravchuk, the total amount of aid for the current year was raised to $700 million.

The negotiations between Washington and Kiev over dollar figures probably can be resolved, and they are not central to the issue of whether Ukraine becomes a nuclear-weapon state. The other financial dispute, over the cost to Ukraine of maintaining adequate conventional armed forces versus that of making operational and maintaining the nuclear weapons on its territory, is still an issue in the minds of some Ukrainian political figures.[7] A convincing economic analysis by a respected outside party might usefully affect the debate within Ukraine. The experience of the United States is relevant. During the 1950s and later, the United States hoped that reliance on nuclear forces could permit substantial savings on conventional forces. However, the reduction in its conventional forces due to the presence of nuclear weapons was not as large as some originally claimed, and in the end, considerable forces of both types were developed.

Related to this issue is the ownership of the nuclear material in both the tactical weapons that Ukraine transferred to Russia in 1992 and the strategic weapons still on Ukrainian soil. Russia and the United States have agreed to the purchase by the United States of the highly enriched uranium (HEU) in Soviet weapons dismantled under the parallel Bush-Gorbachev dismantlement initiatives.[8] Arguments among the former Soviet republics regarding the distribution of profits from the sale of the HEU were a major roadblock holding up the finalization of the U.S.-Russia purchase agreement, but at least in the case of Ukraine these issues appear to be on the way to resolution. According to the January 14, 1994 agreement between Russia and the United States, up to 500 tonnes of HEU from Russian weapons will be sold to the United States over the course of 20 years, as well as up to 50 more tonnes of HEU originating in Ukrainian-based weapons.[9] This purchase will net the Russians roughly $12 billion and the Ukrainians some one-tenth that.

In addition to participating in the HEU deal, Ukraine originally sought reimbursement for the plutonium in the weapons and for nuclear material in the tactical weapons already removed from Ukrainian territory. The Russian position is that they would be willing to share the proceeds from

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[6] He also repeated that security guarantees would be given Ukraine after accession to the NPT, although the nature of these assurances has not been publicly specified. RFE/RL Military Notes, Feb. 11, 1994.

[7] Just what would be adequate in terms of size is subjective. Ukrainian nationalists would like to have a large standing army of several hundred thousand, due both to their suspicion of Russia and to the feeling that their military capabilities should be commensurate with those of other nations in Europe with similar sized populations (e.g., My, France, the United Kingdom). Other observers, both inside and outside Ukraine, consider that an army of that size is not necessary.

[8] Press Release, United States Enrichment Corp., Jan. 14, 1994.

[9] RFE/RL Notes, Feb. 11, 1994.

the uranium in strategic weapons, but that the tactical weapons' nuclear material is no longer an issue. Moreover, they assert that the market value of the plutonium is zero under current conditions. This last point is consistent with the valuation placed on plutonium by U.S. analysts (who, in fact, assign it considerable *negative* economic value[10]), but it conflicts with the Russian attitude expressed in other fora that plutonium recovered from weapons is a valuable resource to be stored for future use in energy generation.

INCENTIVES TO UKRAINE TO MAINTAIN NON-NUCLEAR STATUS

What might induce Ukrainian advocates of nuclear-weapon status to forgo this ambition? The foremost motive for keeping the weapons, as noted above, lies in Ukraine's concern for its survival as an independent state. Its desire for nationhood, having been suppressed by other powers and peoples (except for very brief intervals) for so long, is presently a major political imperative there. Following 300 years of Russian domination and a genocidal famine induced by Stalin in the 1930s, Ukraine's confidence in Russian security guarantees is understandably limited. The position consistently enunciated by President Kravchuk since 1992 has been that, as part of any agreement to get rid of the nuclear weapons on its territory, Ukraine must receive firm security guarantees from Russia and the other major powers.

But it is still not clear what guarantees would satisfy Ukrainian needs. Russia, the United States, Britain, and France provided letters containing guarantees to Ukraine during the course of 1992. The contents have not been made public, but reaction across the political spectrum in Ukraine indicates they were not satisfactory to any major faction. Reportedly, the U.S. guarantees only included a recognition of Ukraine's borders as guaranteed by the Conference on Security and Cooperation in Europe (CSCE); given the current situation in CSCE member Bosnia, it is understandable that Ukraine might question the effectiveness of such support. In 1993, the United States offered further assurances that included military cooperation agreements and, apparently, more specific security guarantees. Additional security guarantees are said to have been given (conditional upon Ukrainian accession to the NPT) as part of the tripartite declaration of January 14, *1994*, but their details are not yet clear and the issue is still a major focus of debate in Ukraine.

In summary, many in Ukraine consider nuclear weapons to be a vital deterrent to any possible Russian attempt to reassert sovereignty over any part of Ukrainian territory. Nevertheless, other elements might be satisfied with some form of security guarantees or assurances from the West.

Ukraine would welcome a bilateral mutual defense treaty with the United States. This is very unlikely to happen, as Ukrainian officials understand, since the United States would be extremely reluctant to risk nuclear war with Russia over a dispute in Russia's backyard. Further, any U.S. attempt to wage a conventional war in defense of Ukrainian sovereignty would be strongly disadvantaged by the obvious geographical and logistic considerations, as well as the low likelihood of achieving NATO agreement for military intervention. At most, a cutoff of economic aid and an attempt to organize a worldwide economic boycott might be expected.

Another possibility would be for Ukraine to join NATO, making it an integral military part of the Atlantic alliance. This poses several problems, not the least of which is Ukraine's professed intention to become a "neutral" state.[11] Further, NATO is undergoing its own identity crisis, and there is considerable ambiguity on its part regarding an

10 Plutonium's negative economic value derives from the fact that, even if the plutonium itself were free, processing it for use in nuclear reactors would cost more than purchasing and processing an equivalent amount of uranium fuel.

11 The principles of non-nuclear status, nonalignment, and nonmembership in military blocs are presented in the Ukrainian Rada's Declaration of State Sovereignty of July 16, 1990.

expansion of membership at this stage. Even if NATO were to decide to admit members from the East, several Eastern European states contiguous to NATO members would have a prior claim to membership (e.g., the Czech Republic, Hungary, Poland).

Russia would consider extension of NATO membership to Ukraine to be a provocative, if not hostile, act. Furthermore, by accepting Ukraine as a member, NATO might put itself in a position where a Russian-Ukrainian conflict could force NATO either to wage war on Russia or to dissolve in embarrassment and confusion. NATO membership for Ukraine does not appear to be a realistic near-term option.

A policy issue for Ukraine and the West is whether there is any set of security arrangements, agreements, or assurances, short of NATO membership, that would persuade a majority of the Rada to ratify the NPT. Attempting to satisfy the desire of many Eastern European states, including Ukraine, to join NATO, while at the same time trying not to inflame Russian nationalists or give rise to Russian fears of military encirclement, NATO has created the "Partnership for Peace." This mechanism allows for military contacts and coordination with NATO states, with the possibility of full NATO membership at some point in the future, but does not guarantee military intervention on NATO's part in the event of external aggression. Ukraine, along with Russia and many other Eastern European states, has already joined the Partnership. [12]

In addition to offering Ukraine some sort of security assurances, the United States could emphasize the costs and uncertainties to Ukraine of attempting to establish a nuclear deterrent, especially one that Ukraine had not created and probably could not adequately maintain, control, or operate for many years. Already mentioned is the risk that Russia may decide to preempt Ukrainian seizure of Soviet nuclear weapons by a military strike. Barring such an action, Ukraine also would have to consider the possibility that a very few nuclear weapons may not deter a Russian conventional attack. Even one nuclear weapon launched at Russia could stimulate a retaliatory strike, using only a small fraction of the Russian arsenal, that would destroy the entire Ukrainian nation. Even if Ukraine could break the launch codes on the strategic nuclear weapons on its soil (its Kharkov Institute, according to some reports, had a role in devising the Soviet weapon release codes* 3), it may not be possible to direct either the intercontinental ballistic missiles or the cruise missiles in its possession to most targets in Russia. The ballistic missiles have intercontinental range and could not be aimed at nearby targets without much revamping and testing. The guidance systems for the cruise missiles reportedly have been removed by the Russians. [14]

The United States could remind Ukraine that it would have to spend considerable sums to maintain the weapons and their delivery systems in safe

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12 All of the former Warsaw pact countries of Central and Eastern Europe have announced their intention to participate, as have Russia and most other states of the former Soviet Union. Seethe White House Fact Sheet on Partnership for Peace, Mar. 2, 1994. Most of these states, including Russia, have since joined.

13 See, for example, W. Potter, "Nuclear Profiles...,"op. cit., footnote 2, p. 84, and W. Kincade, "Nuclear Weapons in Ukraine: Hollow Threat, Wasting Asset," *Arms Control Today,* July/August 1993, p. 16. Further references are found in the latter work.

14 W. Kincade, ibid, p. 15, and T. Kuzio, "Nuclear Weapons and Military Policy in Independent Ukraine," *The Harriman Institute Forum,* vol. 6, No. 9, May 1993.

operating condition. [15] Although Ukraine has many rocket and nuclear weapon experts who participated in Soviet strategic weapon production and operation, it lacks the infrastructure for maintaining and operating the strategic nuclear weapon systems on its territory. In fact, a major argument made by President Kravchuk in urging the Rada to endorse the tripartite declaration was that the lack of maintenance was creating danger of an explosion that would scatter radioactive debris over a wide area.

The disadvantages of becoming a nuclear state could be, and presumably have been, explained to senior Ukrainian officials in detail, but such arguments have not yet been effectively brought to the attention of the Ukrainian public and many members of parliament. Support for declaring Ukraine a nuclear-weapon state appeared to rise during 1993, with different polls indicating different results. The Ukrainian government is still attempting to deal with the issue by floating various ideas and suggestions to mollify a majority of the Rada without alienating the international community.

On July 2, 1993, the Rada declared ownership over nuclear weapons on Ukrainian territory, but forswore their use operationally or as a deterrent. Although Ukrainian officials denied that they had plans to bring the weapons under their operational control, Russia still reacted negatively. [16] Later that same month, then-Defense Minister Morozov suggested that Ukraine might accede to the NPT, neither as a weapon state nor as a non-weapon state, but as one in transition (presumably to the latter) .17 However, the NPT makes no such distinction. The United States has not supported this viewpoint, both because of the precedent it would set and because it would allow future Ukrainian governments to reverse or freeze the direction of transition. But this proposal at least indicates that the Ukrainian government realizes that failure to resolve the nuclear weapon issue will isolate Ukraine from those international quarters it needs most for economic survival: Western Europe and the United States. Officials from both have noted frequently, sometimes in a heavy-handed and possibly counterproductive fashion, that large-scale economic aid is contingent upon accession to the NPT.

More recent U.S. statements and policies have been rather more flexible, emphasizing carrots rather than sticks. For example, Ukraine has begun to dismantle 10 of the 130 old SS-19s on its territory; in response, the United States agreed to obligate the $175 million of Nunn-Lugar money intended for this purpose. These funds previously had been declared to be contingent on Ukraine's accession to START I and the NPT. [18] In November 1993, Ukraine began to dismantle some SS-24s as well, in part because of safety concerns related to maintenance and storage of the missiles, as well as the refusal of Russian experts to provide all necessary assistance subsequent to Ukraine's assertion of administrative control over the weapons.

U.S. POLICY OPTIONS REGARDING UKRAINE

The Ukrainian case is more difficult for U.S. policy to affect than those of Belarus and Kazakhstan. Ukraine is the only state of the three that still

15 Of course, Ukraine could simply seize the nuclear weapons, disassemble them, mine them for plutonium and highly enriched uranium, and embark on its own independent weapon program. Such a strategy, however, would also entail significant cost, as well as a long period during which Ukraine would not have a nuclear deterrent against any Russian military attempt to neutralize the seizure of the weapons (assureing, as appears to be the case and as Ukrainian officials repeat, that Ukraine does not now have operational control over the nuclear weapons on its territory).

16 Interview with Prime Minister Kuchma in INTERFAX, Aug. 10, 1993, cited in FBIS-SOV-93-153-A, Aug. 11,1993.

17 See J. Perlez, "Ukraine May Ask Special Status in Atom Pact," *The* New York *Times*, July 26, 1993, p. A8.

18 See M Gordon, ● *u.S. Says Ukraine Has Been Dismantling Nuclear Missiles," The *New York Times*, July 28, 1993, p. A8. Contingencies on $200 million for economic aid have similarly been relaxed by the United States.

Findings Regarding Ukraine

- There are about 1,800 nuclear warheads in Ukraine, making it potentially the world's third-largest nuclear power. Many elements within Ukraine advocated retaining these weapons. However, the president and senior cabinet officials resisted this position, and the tripartite declaration apparently has decided the issue in favor of getting rid of the weapons. The final decision on the NPT probably will be made by the new Rada.
- Many civilian nuclear facilities are located in Ukraine, as well as a heavy water production facility
- Economic stresses in Ukraine are even more severe than in Russia.
- In addition to the contribution to proliferation that Ukrainian weapons, nuclear materials, information, technology, and expertise might make if transferred elsewhere in the world, Ukraine's failure to ratify the NPT makes it a proliferation risk in its own right
- No Ukrainian nuclear facilities are yet under international safeguards, although Ukraine and the International Atomic Energy Agency (IAEA) have negotiated a draft agreement to place all Ukrainian nuclear facilities under safegaurds.
- The Ukrainian export control system is rudimentary and in need of effective development and implementation.

has not ratified the NPT, and the Ukrainian political and economic situation is more chaotic than that of the other states. Even so, some policies introduced in the chapters on Belarus and Kazakhstan could also apply here. Such policies are restated at the end of this chapter, along with policies specific to Ukraine.

Outlined below are four approaches to dealing with Ukraine's hesitation to give up nuclear weapons. They are intended for consideration if the Rada does not ratify the NPT.

Balanced Policy

One U.S. strategy to promote Ukrainian accession to the NPT as a non-weapon state would employ both carrots and sticks. This approach is essentially the one the United States has pursued since mid- 1993. Through it, the United States would assure Ukraine that NPT adherence would bring the maximum possible in the way of security guarantees, economic aid for implementing START I, and other economic help.

Even without NPT accession, however, under this approach the United States would develop political relations and contacts on many different issues of interest to both governments, promising to develop them further and to increase economic aid and cooperation upon accession to the NPT. Maintaining some contact with Ukraine even in the absence of NPT accession would have the effect of diminishing the apparent importance of the nuclear issue, removing the impetus on Ukrainian politicians to become more obdurate on the matter in order to attract the attention of the United States. Fully developed economic relations, on the other hand, would be contingent upon NPT adherence. The United States could make it clear to Ukraine that refusal to accede to the NPT would be met by U.S. and Western refusal to give any security assurances or economic aid.

Under this approach, the United States would continue and intensify current diplomatic and other pressures on Ukraine to give up ownership of the nuclear weapons. **The United States would also continue its diplomatic efforts to foster a more positive relationship between Russia and Ukraine, as it already has done in helping mediate the tripartite presidential declaration of January 14, 1994.** It is unlikely that any other state is as well positioned as the United States to mediate between the two. The largely unanticipated achievement of the tripartite agreement is a measure of the usefulness of these efforts.

In light of Ukraine's economic difficulties, it is possible, although by no means certain, that diplomatic and economic pressure could carry the day. However, they could also cause a strong backlash. In addition to these promises and pressures, the

United States could continue to try to persuade the Ukrainian government, legislature, and public in general of the disadvantages of Ukrainian nuclear possession. Finally, under this approach, the United States would continue its current policy of helping Ukraine to meet international standards of material control and accountancy over its nuclear materials and to augment its body of expertise in nuclear safeguards.

Aid to this end, provided under the Nunn-Lugar Amendment, would be expanded. The United States would work to assure that nuclear safeguards agreements with the International Atomic Energy Agency are expedited and implemented as soon as possible to prevent diversion of nuclear materials from Ukraine. In addition, the United States could work to persuade Ukraine to ratify the agreement to open the Ukraine Science and Technology Center, which has been formally agreed to by the Ukrainian government but lacks formal executive authorization. The center could be made more attractive for Ukraine by broadening its scope, allowing for involvement of more civilian scientists, and including topics of immediate interest to Ukraine. Some of these might be securing the safety of the Chernobyl site, monitoring and dealing with the radioactive pollution in the region, and engaging in epidemiological research among the victims of Chernobyl, both to improve dose-response knowledge of the effects of radioactive exposure on humans and to assist in providing clinical help to those exposed.

The United States participated in an international extension of this "balanced policy," combining it with cooperation with Russia on the issue. The policy appears to have had a measure of success, resulting in the presidential tripartite agreement on nuclear weapons in Ukraine. The advantage of this policy is that it has apparently succeeded in eliciting reasonable compromises from all parties involved, and it appears to be on the verge of securing Ukraine's accession to the NPT. However, if the Rada fails to ratify the NPT within a reasonable period of time, other options may need to be considered.

Confrontational Policy

A second, much different policy line would be for the United States to eschew persuasion by no longer overtly pressing Ukraine on the nuclear weapon issue. However, no further aid of any sort (except humanitarian, if needed) would be offered until Ukraine acceeded to the NPT. The United States would rely on internal economic disincentives and external (chiefly Russian) pressure to prevent the Ukrainian seizure of the nuclear weapons. Under this approach, the United States would make clear to Ukraine that the United States chooses not to bargain for Ukrainian NPT accession and is unimpressed by Ukrainian attempts to assert itself as a nuclear power.

The primary drawback of this approach is that much of the assistance that would be denied by the United States would address issues such as the establishment of a nuclear material accounting and control system and the implementation of export controls. Helping Ukraine in these areas is in the direct self-interest of the United States and the global nonproliferation regime, and it should not be considered as a gift or reward to Ukraine.

Conciliatory Policy

A third option would be for the United States to accept Ukrainian nuclear armament, despite the adverse consequences that such an action would have for the nuclear nonproliferation regime and for the prospects of gaining an indefinite continuation of the NPT at the NPT Extension Conference in 1995. The United States, for example, could offer to install a hot line from the White House to Kiev, like the one to Moscow. It could attempt to bring Ukraine into the European community of nations as an active member (although not as a member of the European Union or NATO). It could attempt to prop up the Ukrainian economy in order to keep the internal social and political situation stable.

If Ukraine's emergence as a nuclear power were deemed inevitable, this approach might permit such a transition to occur more smoothly that it

would if one of the other approaches had been pursued. On the other hand, it could alienate Russia to the degree of possibly risking a major realignment of Russian foreign policy vis-à-vis the United States, and it would risk a preemptive Russian attack to prevent the nuclearization of Ukraine. Moreover, it would seriously endanger the international nuclear nonproliferation regime. As an added complication, the NPT prohibits the United States (and the other nuclear-weapon states) from assisting, encouraging, or inducing "any non-nuclear-weapon State to manufacture or otherwise acquire" nuclear weapons. Even if Ukraine declared itself to be a nuclear-weapon state, it would remain a non-nuclear-weapon state under the NPT's definition of that term (i.e., a state that had not exploded a nuclear device before January 1, 1967). Therefore, any U.S. assistance that might be interpreted as supporting Ukraine's nuclear weapon capacity would be questionable.

Develop Good Relations

This approach would be to treat Ukraine as a normal state with which the United States wishes to maintain good relations. Concern over the nuclear weapon issue would remain, but would constitute only one matter of discussion between the countries. The United States would focus instead on developing economic and political relations; easing the transitions from a centrally planned to a market economy and from an authoritarian regime to a democratic one; assisting in defense conversion; and the like.

The emphasis on developing relations on several planes with Ukraine would be aimed at a general improvement in political relations and at making Ukraine more receptive to U.S. suggestions in the nuclear field. Those suggestions, in turn, would be presented in a more restrained fashion than they would be under some of the other approaches. This approach would make Ukrainian leaders and parliamentarians feel that the interests of the United States in Ukraine are not dependent on Ukraine's nuclear weapon status, thereby devaluing the importance of nuclear weapons as a path to political power. The impression would be fostered that good relations with Ukraine are a fundamental part of U.S. policy, one that would not disappear shortly after a resolution of the nuclear issue.

This policy approach would be politically positioned between the "Balanced" and the "Conciliatory" approaches listed above. The disadvantage would be that the Ukrainian reaction might be to take the improved relations with the United States but to ignore minor U.S. carping about nuclear weapons.

POLICY OPTIONS SUMMARIZED

In addition to following one of the above approaches to promote Ukrainian ratification of the NPT, a number of additional policies might be pursued.

- **Work intensively with Ukraine and the** IAEA **to apply IAEA safeguards to Ukrainian nuclear facilities as soon as possible.**

Rationale For: The absence of international nuclear safeguards and international standards for physical security at the many Ukrainian nuclear sites constitutes a proliferation risk. Ukraine and the IAEA have negotiated a draft agreement that would place all Ukrainian nuclear facilities under safeguards,[19] but implementing this agreement will require resources and time.

Arguments Against: None.

- **Offer increased U.S. aid in setting up and training personnel for application of nuclear safeguards, customs, and export control regimes. Expedite Nunn-Lugar assistance to these ends.**

Rationale For: Ukraine urgently needs such aid to maintain proper control over nuclear material

[19] IAEA Division of Public Information, Media Talking Points 94/ 11, "Ukraine Negotiates Safeguards Agreement With the IAEA," June 28, 1994.

on its territory. Such aid already has been extended under Safe and Secure Dismantlement (SSD) agreements. Because of the urgency of the problem, the effort needs to be applied as soon as possible.

Arguments Against Because of fiscal limitations in the United States, the government might choose to let the IAEA or other countries provide such support.

- **Apply U.S. Nunn-Lugar funds to housing and perhaps other aid for personnel having custody of those nuclear weapons located in Ukraine.**

Rationale For: If such personnel are seriously stressed economically, they may become vulnerable to subornation by foreign or subnational parties attempting to gain access to nuclear weapons or materials.

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

- **Offer aid in defense conversion, as in the other nuclear successor republics.**

Rationale For: Economic stability will be increased by successful transition of defense industries to civilian uses. The economic situation in Ukraine is even more serious than in many other FSU republics, and the issue is therefore more acute here. Increased economic stability also will 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 Ukraine are so enormous and complex that U.S. efforts to help may only have marginal effects at best. Further, thus far, minimal efforts at economic reform have occurred. Opponents of this policy would argue that aiding Ukraine in the economic area should come only after more positive actions by the government there.

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