

## *Viewpoint*

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# Securing Nuclear Capabilities in India and Pakistan: Reducing the Terrorist and Proliferation Risks

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Since September 11, 2001, concern about nuclear terrorism has intensified. In particular, much attention has been focused on South Asia, where both India and Pakistan have nuclear weapons and extensive civil and military nuclear infrastructure but provide little information about the security of their nuclear capabilities. This lack of information, coupled with fears about political instability in Pakistan, has led to numerous ideas about how the United States, other countries, and international organizations might assist in enhancing the security of nuclear capabilities in the region.<sup>2</sup> However, there is little consensus among key players about the nature of the terrorist threat, or about the goals of a comprehensive approach to security. Moreover, speculation about possible U.S. roles in securing nuclear assets has heightened regional distrust. In addition, there is an ongoing debate within the U.S. government about whether providing such security assistance would be consistent with obligations under the Treaty on the Nonproliferation of Nuclear Weapons (NPT) and associated U.S. legislation and policies.<sup>3</sup>

Concerns about the security of nuclear capabilities in South Asia are justified, but a massive bilateral assis-

tance program, modeled on the bilateral cooperative effort between the United States and Russia on nuclear weapon security, is unlikely to be either feasible or necessary. Rather, multiple approaches should be employed to build capabilities and implement solutions over the long term. The experience of the United States and Russia provides many relevant lessons, however. Lessons about the process of cooperation on highly sensitive security matters between two former adversaries are particularly germane. International organizations, such as the International Atomic Energy Agency (IAEA), can play a major role in training and providing assistance in the design and implementation of security systems. Unilateral actions on the part of India and Pakistan will also be important.

The purpose of this paper is to suggest ways that the United States and the international community can work cooperatively with India and Pakistan to prevent unauthorized acquisition of nuclear weapons, material, and related technology or expertise by terrorists or potential proliferating states. The goal is for India and Pakistan to be able to assure each other and the world that their nuclear capabilities are secure from unauthorized access.

## INDIA AND PAKISTAN: OVERVIEW OF THE SITUATION

### Nuclear Infrastructure

Both India and Pakistan possess nuclear weapons, weapon-useable nuclear material, and civilian and military nuclear infrastructure. India has far more extensive capabilities, especially on the civilian side. Its nuclear energy production is currently nearly ten times that of Pakistan and is comparable to that produced in China.<sup>4</sup> Plans are under way to quintuple nuclear energy production over the next fifteen years, which, if realized, could put India in a position of global leadership in the field.<sup>5</sup>

On the military side, both countries have a nuclear weapon production complex, and both have produced significant quantities of weapon-useable material. Upper estimates range from 100–500 warhead equivalents for India, and from 50–100 warhead equivalents for Pakistan.<sup>6</sup>

Neither India nor Pakistan is a member of the NPT, but both are members of the IAEA and parties to The Convention on the Physical Protection of Nuclear Material (CPPNM).<sup>7</sup> A minority of the facilities in each country is under voluntary IAEA safeguards, however. In the case of India, only 4 of 14 operating power reactors are under IAEA safeguards, and IAEA safeguards are intended for only 2 of 12 reactors in the planning or construction stage. None of the research reactors, breeder reactors, uranium enrichment facilities, reprocessing facilities, or uranium processing facilities is safeguarded by the IAEA. Both of Pakistan's operating power reactors are under IAEA safeguards, as are two of three research reactors; other facilities remain outside IAEA safeguards.<sup>8</sup>

Relatively little is known about how either India or Pakistan secures weapons and material from unauthorized access. However, the nuclear oversight infrastructure in India appears to be well developed. The Department of Atomic Energy (DAE) has overall responsibility for nuclear safety and regulation of civilian and military facilities. Security is provided by the Central Industrial Security Force, but little information is available about the details.<sup>9</sup> India's recent announcement of a chain of command for decisions about the use of nuclear weapons could reduce the chances of inadvertent or accidental use, but its role in securing nuclear weapons is not clear.<sup>10</sup> In Pakistan, the National Command Authority (NCA) oversees civilian nuclear operations; military nuclear facilities are under tight military control.<sup>11</sup> Little information is available about security procedures.

Although most facilities in the region are not under IAEA safeguards, membership in the IAEA has provided both countries with training in physical security for nuclear facilities. For example, in the last 15 years, 30 experts from India and Pakistan<sup>12</sup> have participated in the IAEA-sponsored International Training Course on the Physical Protection of Nuclear Facilities and Materials (ITC) conducted by Sandia National Laboratories in Albuquerque, New Mexico.<sup>13</sup>

### Threat Perception

Consensus is scant on the nature of the terrorist threat to India's and Pakistan's nuclear weapons and materials. In the United States, a general feeling pervades that security at civilian and military facilities in both countries may be insufficient. More specifically, U.S. officials are concerned that political turmoil increases the threat from both insiders and outsiders to nuclear facilities, material, and weapons and fear that nuclear weapons and facilities could fall into the hands of terrorists or a hostile government. Perceptions of greater political volatility and ambivalent attitudes toward terrorist organizations heighten the concern about nuclear security in Pakistan. In addition, Pakistan's lack of a "no-first-use" nuclear doctrine could imply greater dispersal of nuclear weapons and delegation of authority to field operations, both of which complicate the problem of providing security. However, even though India has disavowed first use of nuclear weapons, it threatens massive retaliation against nuclear attack, which implies a high degree of readiness.

India also has concerns about the security of Pakistani nuclear weapons and material. However, it does not acknowledge concerns about the security of its own assets, implying that the situation is under control. In the context of nuclear security, India sees itself as an equal partner with the West and seeks recognition as a responsible leader on nuclear matters.<sup>14</sup> It has not invited any cooperation with the United States or other countries that could compromise the secrecy of its nuclear program.

Pakistan claims that its nuclear facilities and materials are secure. It resents implications that it cannot secure its nuclear weapons and materials and objects to public statements made by both the United States and India about its political instability. It is deeply suspicious of U.S. offers of assistance, fearing that the United States wants access to its most sensitive sites to undermine its nuclear program. Suggestions that nuclear material and weapons should be removed from Pakistan in case of political instability raised serious concerns about U.S. intentions.<sup>15</sup>

## Options for Addressing Concerns about Nuclear Security

A number of options are feasible for addressing concerns about nuclear security in South Asia. These fall roughly into three categories: unilateral actions, bilateral cooperation, and international activities.

### *Unilateral Actions*

Either India or Pakistan could take unilateral actions independently of any other country. Evidence exists that Pakistan engaged in several such actions in the weeks following September 11, 2001—for instance, moving material and weapons to more secure locations.<sup>16</sup> If funding and knowledge were sufficient, the countries could take unilateral action to improve domestic capabilities, such as performing analyses of the threat to all nuclear facilities, investing in indigenous physical security technology development, performing system upgrades, and instituting more rigorous personnel reliability programs. However, without some form of transparency, unilateral actions will not reduce the concerns of other countries. Placing all civilian facilities under IAEA safeguards could be another consideration.

### *Bilateral Cooperation*

A number of potential bilateral avenues could address nuclear security, including: United States-India, United States-Pakistan, and India-Pakistan.

Where the United States is concerned, a frequently asked question is whether cooperation with India and Pakistan on nuclear security would violate U.S. obligations under the NPT and associated legislation. Here, an argument can be made that cooperation on security for civilian nuclear applications will be judged both legal and desirable. As noted earlier, Indian and Pakistani experts are among traditional participants in the IAEA-sponsored ITC that covers the basic principles of threat definition and the analysis and design of physical protection systems for nuclear facilities.

- **United States and India.** Relations between the United States and India are evolving: The United States is actively seeking a stronger partnership with India that would have strategic, technical, and trade components. India, although wary of U.S. hegemony, is interested in increased access to U.S. military hardware and technology. The two countries are actively engaged in cooperation on combating terrorism, an effort that could be expanded to include cooperation

on nuclear security. However, this topic remains very sensitive for both the United States and India.

- **United States and Pakistan.** The relationship between the United States and Pakistan has changed dramatically since September 11, 2001. Pakistan's support of U.S. anti-terrorism efforts has opened new opportunities for interaction and ended years of its inclusion on the U.S. list of countries that support terrorism. However, distrust between the two countries remains high, and nuclear security remains a very sensitive topic for public discussion.
- **India and Pakistan.** Although little recent evidence suggests that India and Pakistan are willing to cooperate on the issue of nuclear security, the Lahore Declaration of 1999 committed them to work together on a number of related issues, including reducing the risks of accidental or unauthorized use of nuclear weapons. This declaration provides a basis for the two countries to address the issue together in the future.

### *International Activities*

International organizations could provide a number of relevant security services to the region. For example, the IAEA sponsors training courses both in the United States and regionally on all aspects of physical security. These courses include in-country training on systematically analyzing the threat to a nuclear facility and designing a physical security system specific to that threat. Although the training is directed at civilian facilities, its methodologies are applicable to protecting all categories of "sensitive items." India and Pakistan have participated in a number of these training courses over the years.

The IAEA also provides International Physical Protection Advisory Service (IPPAS) missions to member states that request them. An IPPAS team of international physical protection experts first reviews and then makes recommendations and suggestions regarding existing national laws, regulations, and implementation.

The World Association of Nuclear Operators (WANO) could also play a role in the security of South Asia. WANO is a non-governmental association whose membership includes every organization in the world that operates a nuclear electricity generating plant. Its mission is "To maximise the safety and reliability of the operation of nuclear power plants by exchanging information and encouraging communication, comparison and emulation amongst its members."<sup>17</sup> WANO might be willing to play a similar role with respect to nuclear security, as best security practices are clearly in the interest of the

nuclear industry. Indian and Pakistani nuclear power facilities are already members of WANO.

### UNITED STATES-RUSSIA EXPERIENCE IN COOPERATIVE NUCLEAR THREAT REDUCTION

Precedents for bilateral or international cooperation to secure nuclear weapons or weapon-useable material are few. However, a leading example of a cooperative approach to such a sensitive problem is the experience of the United States, Russia, and the Newly Independent States (NIS) in cooperative threat reduction. Since this experience has been suggested as a possible model for a cooperative effort with India and Pakistan, it is worthwhile to identify similarities and differences between the two situations and to extract lessons that might apply to South Asia.

The collapse of the Soviet security infrastructure at the end of the Cold War resulted in inadequate security for thousands of nuclear weapons and hundreds of tons of weapon-useable material. Dire economic conditions left thousands of nuclear weapons scientists and engineers unpaid or unemployed. As the severity of the problems became apparent, the U.S. government recognized that the threat posed by unauthorized access to nuclear weapons or material exceeded the threat of nuclear war. It also became convinced of the need for radically different approaches to solve the problem; indeed, a massive cooperative effort would be required.

Although cooperation of this nature had not previously occurred, precedents existed for effective bilateral working relationships between the United States and the Soviet Union. The two countries had a long history of negotiating and implementing complex nuclear arms control agreements. They also shared a strong tradition of mutual respect among their scientific communities, due in part to the symmetry of their nuclear weapons establishments and their superpower status. In the early 1990s the Russians, in particular, were eager for international interaction and dialogue in the face of their deteriorating domestic situation.

Although most work was pursued under bilateral agreements between the United States and Russia and other NIS, international organizations, such as the IAEA and the International Science and Technology Center (ISTC) also played a role. For example, the ISTC established programs to provide research dollars to nuclear scientists from Russia and the other NIS in the hopes of preventing their emigration to countries illicitly seeking to develop nuclear weapons. The IAEA played a major role in establishing safeguards at nuclear facilities in the

NIS after they joined the NPT as non-nuclear weapon states. International donor states also funded physical protection system upgrades at numerous nuclear facilities in the NIS.

### Scope of the Cooperative Program

Cooperative efforts between the United States and Russia had a very broad scope. From the beginning, priority was given to the prevention of unauthorized diversion of nuclear weapons and weapon-useable material. To achieve this goal, the two governments agreed to cooperate on a broad range of activities, including:

- Safe and secure transport of weapons
- Warhead safety and security
- Nuclear material protection
- Nuclear detection at borders
- Cessation of plutonium (Pu) production
- Disposition and conversion of highly enriched uranium and plutonium
- Defense-complex conversion and non-defense job creation
- Establishment of a nuclear security infrastructure.

Although these areas of cooperation were agreed at the government-to-government level, the national laboratories in both countries generally were responsible for implementation. These lab-to-lab technical exchanges were essential to the success of the effort: Technical issues were dealt with by technical experts, rather than by government officials. Even in times of decreased official government-to-government interaction, cooperation at the technical level assured that options would be available when official talks resumed. These exchanges also enhanced mutual respect and understanding between the technical communities in both countries, which is critical for sustaining long-term relationships.

It is important to note, however, that the cooperative relationship evolved over time. It was several years before the Russians acknowledged the severity of the threat to their nuclear material, weapons, and facilities. In the area of material protection, engagement progressed from securing low-enriched uranium to weapon-useable material to, finally, warheads. On the other hand, improving the safety and security of rail transportation of nuclear weapons was one of the first cooperative projects.

### Issues and Constraints on Cooperation

Cooperation between the United States and Russia proceeded despite numerous challenges. Strong political will at high levels within each government was required to

maintain and grow the cooperation. Willingness to accept ambiguity, differences in approaches, and less-than-perfect solutions was essential. Several examples are discussed below.

- **Legal and policy issues.** Selected information had to be declassified to permit cooperation on warhead safety and security. This process involved lengthy review and approval by government agencies in both countries.
- **Transparency.** Balancing the need for access to sensitive information with the need to respect legitimate Russian national security requirements was a constant dilemma. The appropriate level of access continues to be an issue, with neither side completely satisfied.
- **Foreign policy disagreements.** The two countries agreed at a high level that their joint effort to protect nuclear material was too important to be affected by foreign policy disputes. Maintaining a low profile for the nuclear security cooperation helped keep it insulated. Nevertheless, the highest levels of political will were required in the face of serious disagreements, such as U.S. withdrawal from the Anti-Ballistic Missile (ABM) Treaty and Russian nuclear exports to Iran.
- **Other issues.** The financial asymmetry in the partnership also complicated matters: In the majority of cases, the United States controlled the money and the Russians did the work under contract to U.S. organizations. This opened Russian scientists to possible accusations of collaborating with the “enemy.” On the other hand, U.S. participants had to exercise caution to avoid being accused of strengthening Russia’s nuclear weapon infrastructure. These problems were largely resolved through honest communication at the technical level, and through willingness by both countries to be responsive (and sensitive) to specific concerns.

### Lessons Applicable to Other Regions

Although the U.S.-Russia experience is not a template for other regions, numerous lessons are widely applicable.

- **Historic opportunity calls for creativity and flexibility.** The move from a confrontational relationship with the Soviet Union to a cooperative relationship with Russia was a major shift in foreign policy for both the United States and Russia. Congressional decisions to appropriate hundreds of millions of dollars for cooperative efforts with Russia were politically very risky at the time. Similarly, acceptance of such massive U.S. financial assistance was not easy for a former

superpower. Nevertheless, the two sides recognized the critical importance of working together and persisted in developing innovative approaches to problems.

- **Mutual respect is critical for success.** Mutual respect can attenuate problems associated with issues such as one-sided control of resources, or technical superiority. It can be based on a number of attributes, including cultural or scientific contributions, technical capabilities, and economic or military power. All of these figured in the history of U.S.-Russia relations. In addition, the history of negotiation and implementation of arms control agreements helped establish a solid basis of understanding between the two countries.
- **With sufficient political will, cooperation can survive major disagreements.** In the case of the United States and Russia, both sides agreed not to let political disputes undermine the cooperation on nuclear security. Such strong political will is easier to maintain if both sides benefit tangibly. Both sides believed that their security was significantly enhanced by their mutual cooperation. In addition, Russia realized significant financial benefits, especially after the decision was made to use Russian security technology suppliers.
- **A step-by-step approach is needed to establish trust.** Even when two countries have made the decision to cooperate on security issues, trust can be slow to develop. A long-term view is essential. Cooperation on less-sensitive issues will happen first and provide the opportunity to develop productive working relationships. Cooperation on more sensitive topics will develop over time. In the case of the U.S.-Russia experience, cooperation among laboratory scientists was particularly successful. It is also important to accept that differences in opinion are natural and that not every problem will be solved to both parties’ satisfaction. Understanding priorities is essential.

### COMPARISON WITH SOUTH ASIA: DIFFERENCES AND SIMILARITIES

A consideration of how to apply lessons from the U.S.-Russia experience to South Asia requires an examination of the similarities and differences between the two situations. In many ways, the differences are most striking.

- Purely quantitatively, the total amount of material and weapons in South Asia subject to threat is much smaller than that in Russia.
- The scope of potential cooperation in South Asia is much smaller because India and Pakistan remain out-

side the NPT. Even in cases where cooperation would be permitted, neither India nor Pakistan has expressed interest in cooperating with the United States on weapons security issues. Nor have they expressed interest in downsizing their nuclear weapons complex, so efforts such as cessation of plutonium production, purchase of highly enriched uranium, and defense conversion are not likely to be considered.

- Although some history of scientific cooperation exists between India and Pakistan and with the United States, asymmetries in technical capabilities and economic resources are huge. Coupled with a history of political animosity and war, a dearth of respect and a high degree of suspicion prevail among all countries concerned.
- The asymmetry in military capability between the United States and both India and Pakistan is another major difference from the U.S.-Russia experience. The United States and Russia recognized their comparable military capabilities, which reduced (but did not eliminate) Russian fears that the United States would use the cooperative effort as a way to undermine Russia's defense nuclear programs. Conversely, power asymmetries, coupled with the international community's disapproval of the defense nuclear programs in both countries, raise the level of distrust in both India and Pakistan to very high levels.

Similarities are also worth noting.

- September 11, 2001, provided an historic opportunity for major changes in relationships. Although foreign policy disputes remain, cooperation on combating terrorism is recognized as a higher priority, at least in the case of bilateral relations between the United States and both countries.
- Even though consensus is lacking on the nature of the threat to nuclear assets, both India and Pakistan recognize the need for effective physical security for nuclear facilities, material, and weapons; both countries are engaged with the IAEA on the issue of physical security.
- India and Pakistan have successfully negotiated and implemented agreements concerning military activities and international waters. Examples of agreements that have not been abrogated even in times of war include the Indus Waters Treaty, the Agreement Prohibiting Airspace Violations, and the Agreement on the Prohibition of Attack Against Nuclear Installations and Facilities.

## INDIA AND PAKISTAN: RECOMMENDATIONS AND POTENTIAL FIRST STEPS

The following recommendations could guide an approach to nuclear security that takes account of the situation in the region, the obligations under the NPT, and lessons learned from the U.S.-Russia experience:

- Focus cooperative activities on civilian nuclear security applications
- Increase the role of the IAEA in promoting best practices in physical protection
- Work to establish common ground on nuclear security threats and approaches
- Develop tailored approaches for India and Pakistan individually.

### Focus on Civilian Nuclear Security Applications

Because neither country is eager to cooperate with the United States (or anyone else) on weapons security, and because such cooperation could enhance their military capabilities and be incompatible with the NPT, the focus should initially be solely on civilian issues. However, the methodologies for systematically analyzing threats and designing security systems for civilian nuclear facilities and material are relevant to military applications as well. Possible topics include:

- Transportation security for shipments of civilian nuclear material or spent fuel
- Security of civilian nuclear material and facilities
- Processes and procedures to enhance personnel reliability
- Deterrence of nuclear material smuggling at borders
- Development of specialized security expertise and technology.

If and when nuclear weapon security issues are addressed directly, they should be addressed by the NPT-recognized nuclear weapon states. For example, these states could develop weapons security guidelines and best practices, which could be made publicly available.

### Increase IAEA Involvement

Both Pakistan and India are members of the CPPNM and are willing to work with the IAEA on physical security: Pakistan has discussed the need for additional training, and India has expressed interest in hosting a regional training workshop on physical protection. However, funding increases will be necessary for the IAEA to make a sig-

nificant impact.<sup>18</sup> Because U.S. experts frequently participate in such training, this effort would provide a mechanism for developing relationships with regional nuclear experts. It would also help establish a common approach to nuclear security. Possible training classes include:

- General principles of physical security (modeled on the ITC, but given in the region)
- In-depth training on threat definition (given in-country, with participation from a spectrum of relevant government agencies)
- Security system design (as a follow-on to the training on threat definition)
- IPPAS missions to review existing systems and recommend improvements.

In addition, the possibility of placing all civilian nuclear facilities under IAEA safeguards could be explored.

### **Establish Common Ground**

Because there is little agreement on the nature of the threat to nuclear weapons and materials, the goals of nuclear material security, and the benefits of cooperation, establishing common ground should be an initial priority. Focused Track II discussions, with the participation of government officials (in an unofficial capacity), technical experts, and selected academics, could bridge this gap. Government involvement in selecting topics for discussion would enhance the value to all parties. Potential topics for discussions include:

- Perceptions of the terrorist threat to nuclear weapons, material, and facilities
- Goals for securing nuclear material: the desired end-state
- Lessons learned from the U.S.-Russia experience in cooperation on nuclear security (with Russian participation)
- The importance of personnel reliability
- Existing nuclear security practices and goals for improvement.

Participation of both Pakistan and India in the same discussions would not be required. A potential outcome of such discussions would be a series of white papers, to reflect either a common view or the view of individual countries. Exchanging papers on existing security practices would also be valuable.

### **Develop Tailored Approaches for India and Pakistan**

Nuclear security challenges in India and Pakistan appear to be different. In addition, their mutual animosity and the asymmetry in their technical expertise may complicate efforts to engage them jointly in discussions on nuclear security. For this reason, tailored approaches should be developed for the two countries individually, while encouragement for potential cooperation should continue. Potential first steps for each country are outlined below.

#### **India**

- Include the topic of civilian nuclear material security in U.S.-India counterterrorism working group discussions; use these discussions as a mechanism for exchanging information about existing practices.
- Encourage India to play a leadership role in efforts such as IAEA-sponsored training, development of regional training capabilities, or in potential WANO-sponsored discussions on nuclear security.

#### **Pakistan**

- Accelerate IAEA-sponsored training on threat definition, risk analysis, and physical security system design; possibly develop a U.S. bilateral assistance program under the auspices of IAEA.
- Provide specialized training on personnel reliability methods and procedures.
- Establish a physical protection demonstration center in Pakistan to assist with indigenous training.

Understanding the impact of individualized approaches on each country would be essential. For example, Pakistan could react negatively to overbearing Indian leadership on nuclear security; India could resist increased U.S. cooperation with Pakistan.

### **CONCLUSION**

Nuclear security in South Asia is a serious concern that deserves the attention of the region, the United States, and the international community. And despite restrictions on nuclear cooperation imposed by the NPT, cooperation on civilian security applications should be permitted. Cooperation on military nuclear material security applications is problematic, however, because of the NPT and because both India and Pakistan are concerned with protecting what they view as legitimate national security interests.

Advanced physical protection training by the IAEA, or by experts from countries like the United States, would provide a strong foundation for building an indigenous nuclear security culture in both countries. Such expertise also would be widely applicable to military security issues. Discussions, initially in a Track II setting, on threat perception, the goals of nuclear security, and the benefits of cooperation could also play a significant role in aligning regional and international approaches.

As capabilities develop, establishing regional demonstration and training facilities should be a priority. With the assistance of the IAEA and other international experts, security upgrades for safeguarded civilian nuclear facilities should be an early goal. Funding for such activities could come from a variety of sources, but should also be a national investment priority for each country. Appropriate measures for assuring the international community that nuclear capabilities were secure would also be needed.

The long-term goal is to enable India and Pakistan to assure each other and the world that their nuclear capabilities are secure. The two countries may take different paths to achieve this goal, and they may require different types of assistance from partners and the international community. In time, however, they may develop sufficient common interest to work toward solutions cooperatively, as part of a larger effort to reduce the risk of nuclear war.

<sup>1</sup> Sandia National Laboratories is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under Contract DE-AC04-94AL85000. The author is grateful to numerous colleagues and associates for stimulating discussions and insightful suggestions during the course of writing this paper.

<sup>2</sup> For example, David Albright, "Securing Pakistan's Nuclear Infrastructure" in "A New Equation: US Policy toward India and Pakistan after September 11," Carnegie Endowment Working Paper, Non-Proliferation Project, Global Policy Program, Number 27, May 2002; Robert Rebhein, "Managing Proliferation in South Asia: A Case for Assistance to Unsafe Arsenals," *Nonproliferation Review* 9 (Spring 2002), pp. 92–111; Rose Gottemoeller, "Enhancing Nuclear Security in the Counter-Terrorism Struggle," Carnegie Endowment Working Paper, Non-Proliferation Project, Global Policy Program, Number 29, August 2002.

<sup>3</sup> Under the NPT, each nuclear weapon state party "undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in

any way to assist, encourage, or induce any non-nuclear weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or to gain control over such weapons or explosive devices." For full treaty text see <<http://www.state.gov>>. The Nuclear Suppliers Group, of which the United States is a leading member, calls for "no nuclear trade" with countries with facilities outside international safeguards. Most nuclear facilities in India and Pakistan are outside safeguards. The 1978 Nuclear Nonproliferation Act prohibits nuclear cooperation with those states that do not accept IAEA safeguards on all of their nuclear facilities and materials. Nuclear safety assistance is allowed if assistance involves a safeguarded facility. Whether cooperation on nuclear security is allowed is not clear.

<sup>4</sup> World Nuclear Organization, "World Nuclear Power Reactors 2001–2002 and Uranium Requirements," *Information and Issue Briefs, December 2002*, <<http://www.world-nuclear.org/info/reactors.htm>>.

<sup>5</sup> Department of Atomic Energy, Government of India, "Nuclear Power in India," <<http://www.dae.gov.in/power.htm>>.

<sup>6</sup> For example, David Albright, "India's and Pakistan's Fissile Material and Nuclear Weapons Inventories, end of 1999," Institute for Science and International Security, October 11, 2000, <<http://www.isis-online.org/>>; Duncan Lennox, "Comparing India and Pakistan's Strategic Nuclear Weapon Capabilities," *Janes's Strategic Weapon Systems*, May 30, 2002, <[http://www.janes.com/security/international\\_security/news/jsws/jsws020530\\_1\\_n.shtml](http://www.janes.com/security/international_security/news/jsws/jsws020530_1_n.shtml)>.

<sup>7</sup> Pakistan acceded to the CPPNM in 2000, India in 2002.

<sup>8</sup> Joseph Cirincione, *Deadly Arsenals: Tracking Weapons of Mass Destruction* (Washington, DC: Carnegie Endowment for International Peace, 2002), pp. 201–209 and 217–218.

<sup>9</sup> Rajesh M. Basrur and Hasan-Askari Rizvi, "Nuclear Terrorism and South Asia," Cooperative Monitoring Center (CMC) Occasional Paper SAND98-0505/25, Sandia National Laboratories, 2003.

<sup>10</sup> Unni Krishnan, "India Sets up Nuclear Weapons Command Chain," *ABC-CBN.COM*, January 5, 2003, <<http://www.abc-cbnnews.com>>.

<sup>11</sup> AFP, "Pak tightens security at nuclear facilities," *Times of India*, January 22, 2003; David Albright, "Securing Pakistan's Nuclear Weapons Complex," paper delivered to 42nd Strategy for Peace Conference, Strategies for Regional Security (South Asia Working Group), Airlie Conference Center, Warrenton, Virginia, October 25–27, 2001.

<sup>12</sup> This includes 16 Indian and 14 Pakistani participants.

<sup>13</sup> See "Measures against illicit trafficking in nuclear materials and other radioactive sources," Report by the Director General to the General Conference, IAEA General Conference document GC(39)/19, August 21, 1995, <<http://www.iaea.or.at/worldatom/About/Policy/GC/GC39/Documents/gc3919.html>>.

<sup>14</sup> Pramit Chaudhuri, "Arrows and Exports: The new Indo-US nuclear agenda," *The Hindustan Times*, September 30, 2002; Jawed Naqvi, "Delhi sees no chance of N-weapons use," *Dawn*, June 4, 2002.

<sup>15</sup> Tahir Mirza, "US refutes report about plan to take out Pakistan's N-arms," *Dawn*, October 30, 2001 p. 7; "Nuclear arms security worries CIA," *Dawn*, February 16, 2001.

<sup>16</sup> "Pakistan's nuclear arsenal redeployed at new sites," *Dawn*, November 12, 2001.

<sup>17</sup> Mission statement, World Association of Nuclear Operators, <<http://www.wano.org.uk>>.

<sup>18</sup> The total IAEA budget for physical protection is less than \$15 million, although it has grown significantly since September 11, 2001, mostly because of U.S. contributions. Major U.S. contributors include the Nuclear Threat Initiative, a non-governmental organization, and the Office of International Material Protection at the U.S. Department of Energy.