



Pakistan's Nuclear Weapons: Proliferation and Security Issues

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Summary

Pakistan's nuclear arsenal consists of approximately 60 nuclear warheads. Pakistan continues fissile material production for weapons, and is adding to its weapons production facilities and delivery vehicles. Pakistan reportedly stores its warheads unassembled with the fissile core separate from non-nuclear explosives, and these are stored separately from their delivery vehicles. Pakistan does not have a stated nuclear policy, but its "minimum credible deterrent" is thought to be primarily a deterrent to Indian military action. Command and control structures have been dramatically overhauled since September 11, 2001 and export controls and personnel security programs have been put in place since the 2004 revelations about Pakistan's top nuclear scientists, A.Q. Khan's international proliferation network.

Pakistani and some U.S. officials argue that Islamabad has taken a number of steps to prevent further proliferation of nuclear-related technologies and materials and improve its nuclear security. A number of important initiatives such as strengthened export control laws, improved personnel security, and international nuclear security cooperation programs have improved the security situation in recent years.

Instability in Pakistan has called the extent and durability of these reforms into question. Some observers fear radical takeover of a government that possesses a nuclear bomb, or proliferation by radical sympathizers within Pakistan's nuclear complex in case of a breakdown of controls. While U.S. and Pakistani officials express confidence in controls over Pakistan's nuclear weapons, continued instability in the country could impact these safeguards. For a broader discussion, see CRS Report RL33498, *Pakistan-U.S. Relations*, by K. Alan Kronstadt. This report will be updated.

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Background

Chronic political instability in Pakistan has called attention to the issue of the security of the country's nuclear weapons. Some observers fear that Pakistan's strategic nuclear assets could be obtained by terrorists, or used by elements in the Pakistani government. Indeed, Director of National Intelligence Dennis Blair told the Senate Select Committee on Intelligence January 22, 2009, that the security of Islamabad's nuclear arsenal is one of several "near-term issues of concern" to the United States. Chair of the Joint Chiefs of Staff Admiral Michael Mullen stated described U.S. concern about the matter during a September 22, 2008 speech:

To the best of my ability to understand it—and that is with some ability—the weapons there are secure. And that even in the change of government, the controls of those weapons haven't changed. That said, they are their weapons. They're not my weapons. And there are limits to what I know. Certainly at a worst-case scenario with respect to Pakistan, I worry a great deal about those weapons falling into the hands of terrorists and either being proliferated or potentially used. And so, control of those, stability, stable control of those weapons is a key concern. And I think certainly the Pakistani leadership that I've spoken with on both the military and civilian side understand that.

U.S. military commanders continue to be concerned about the existential threat posed by nuclear weapons in a destabilized Pakistan. General David H. Petraeus, Commander, U.S. Central Command, testified March 31, 2009, that "Pakistani state failure would provide transnational terrorist groups and other extremist organizations an opportunity to acquire nuclear weapons and a safe haven from which to plan and launch attacks."

Pakistani efforts to improve the security of the country's nuclear weapons have been on-going and include some cooperation with the United States. Since the 1998 Pakistani and Indian nuclear tests, the international community has increased attention to reducing the risk of nuclear war in South Asia. The two countries most recently came to the brink of full-scale war in 1999 and 2002, and, realizing the dangers, have developed some risk reduction measures to prevent accidental nuclear war. Islamabad has also developed its command and control systems and improved security of military and civilian nuclear facilities. Since the 2004 revelations of an extensive international nuclear proliferation network run by Pakistani nuclear official Abdul Qadeer Khan, as well as possible connections between Pakistani nuclear scientists and Al Qaeda, Islamabad has made additional efforts to improve export controls and monitor nuclear personnel. The main security challenges for Pakistan's nuclear arsenal are keeping the integrity of the command structure, ensuring physical security, and preventing illicit proliferation from insiders.

Nuclear Weapons

Pakistan's nuclear energy program dates back to the 1950s, but it was the loss of East Pakistan (now Bangladesh) in a bloody war with India that probably triggered a political decision in January 1972 (just one month later) to begin a secret nuclear weapons program. Defense against India is said to be the primary motivation for Pakistan's nuclear deterrent. Observers point to the peaceful nuclear explosion by India in 1974 as the pivotal moment which gave additional urgency to the program. Pakistan's path to the bomb was through uranium enrichment technology, mastered by the mid-1980s. Islamabad gained technology from many sources. This extensive assistance is reported to have included, among other things, uranium enrichment technology from Europe, blueprints for a small nuclear weapon from China, and missile technology from China. In

1989, the United States learned that Pakistan had assembled a nuclear warhead,¹ which then led to a cut-off in military and financial aid under the Pressler Amendment.² When India conducted nuclear weapon tests on May 12, 1998, Pakistan's government responded two weeks later on May 28 and May 30 with six tests at the Chagai Hills test site in western Pakistan. Test yields were about 10 kilotons and 5 kilotons, according to seismic analysis.³ The United States imposed additional sanctions after the tests, but these were lifted after the September 11th, 2001 terrorist attacks on the United States.

Most observers estimate that Pakistan has enough nuclear material (highly enriched uranium and a small amount of plutonium) for about 60 nuclear weapons.⁴ Pakistan's nuclear warheads use an implosion design with a solid core of highly enriched uranium (HEU), approximately 15-20 kg per warhead.⁵ Islamabad reportedly continues to produce highly-enriched uranium for weapons at a rate of at least 100 kg per year.⁶

Pakistan has also pursued plutonium-based warheads since the 1990s and continues to produce plutonium for weapons. Pakistan has received Chinese assistance for its plutonium program. The 40-50 megawatt heavy water Khushab plutonium production reactor has been operating since 1998. A second heavy water reactor is being built at Khushab, which will at least double Pakistan's plutonium production capacity.⁷ The continued expansion of the complex⁸ and production of weapons materials could indicate plans to increase its nuclear weapons arsenal in the near future.

Delivery Vehicles

Pakistan has two types of delivery vehicles for nuclear weapons: aircraft controlled by the Pakistan Air Force and surface-to-surface missiles controlled by the Pakistan Army. Pakistan could deliver its nuclear weapons using F-16s purchased from the United States, provided

¹ A 1985 National Intelligence Council report stated that Pakistan "probably has a workable design for a nuclear explosive device" and was "probably ... a year or two away from a capacity to produce enough" highly enriched uranium for such a device.

² The Pressler Amendment (August 1985) linked aid and military sales to two certification conditions: (1) that Pakistan not possess a nuclear explosive device; and (2) that new aid 'will reduce significantly the risk' that Pakistan will possess such a device. For background summary of sanctions legislation, see CRS Report 98-486, *Nuclear Sanctions: Section 102(b) of the Arms Export Control Act and Its Application to India and Pakistan*, by Jeanne J. Grimmett, and CRS Report RS22757, *U.S. Arms Sales to Pakistan*, by Richard F. Grimmett.

³ Seismic data showed yields less than what was officially announced by Pakistan and India. See Gregory van der Vink, Jeffrey Park, Richard Allen, Terry Wallace and Christel Hennet, "False Accusations, Undetected Tests and Implications for the CTB Treaty," *Arms Control Today*, May 1998 http://www.armscontrol.org/act/1998_05/vimy98.asp.

⁴ "Nuclear Notebook: Pakistan's nuclear forces, 2007," *Bulletin of the Atomic Scientists*, vol. 63, no.3, May/June 2007; Arms Control Association Fact Sheet, <http://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat.asp>; "Global Fissile Material Report 2007," *ibid.*; SIPRI Yearbook 2007.

⁵ "Nuclear Notebook," *ibid.*

⁶ "Global Fissile Material Report 2007," International Panel on Fissile Materials http://www.fissilematerials.org/ipfm/site_down/gfmr07.pdf.

⁷ David Albright and Paul Brannan, "Commercial Satellite Imagery Suggests Pakistan is Building a Second, Much Larger Plutonium Production Reactor: Is South Asia Headed for a Dramatic Buildup in Nuclear Arsenals?," *ISIS*, July 24, 2006.

⁸ See chart of facilities in Pakistan chapter of Joseph Cirincione, Jon B. Wolfsthal, and Miriam Rajkumar, *Deadly Arsenals*, Carnegie Endowment for International Peace, 2005.

modifications are made. It is widely believed that Pakistan has made modifications to the F-16s previously sold to them.⁹ Although concerns have been raised about the impact of these sales on the strategic balance in South Asia,¹⁰ the U.S. government maintains that the sale of additional F-16s to Pakistan will not alter the regional balance of power.¹¹ The contract for provision of an additional 36 aircraft was signed on September 30, 2006, as was the contract for the weapons for those aircraft and a contract to perform the mid-life upgrade on Pakistan's F-16A/B model aircraft. Pakistan's F-16 fleet will therefore be expanded, but it is unclear what portion of the fleet will be capable of a nuclear mission. Mirage III and V aircraft could also be used, although would have limited range. A-5's may have been modified to carry a nuclear payload.¹²

After India's first test of its *Prithvi* ballistic missile in 1988, Pakistan jump-started its own missile program and has three types of ballistic missiles thought to be nuclear-capable: the solid fuel *Hatf-III* (*Ghaznavi*) and *Hatf-IV* (*Shaheen*) with a range of 100-290 and 200-650 km respectively; and the medium-range *Hatf-V* (*Ghauri*) with a 1200 km range. The *Hatf-VI* (*Shaheen-2*) is under development.¹³ Reports also indicate that Pakistan may be developing a nuclear-capable cruise missile, the *Hatf-7* (*Babur*), with ground, sea and air-launched versions. Pakistan continues to carry out ballistic missile tests, but notifies India in advance in accordance with an October 2005 bilateral missile pre-notification pact.¹⁴

Nuclear Doctrine

Pakistan's strategic doctrine is undeclared, and will probably remain so, but prominent officials and analysts have offered insights concerning its basic tenets.¹⁵ Describing the guiding principle as minimum credible nuclear deterrence, high level officials' statements point to four policy objectives for Islamabad's nuclear weapons: deter all forms of external aggression; deter through a combination of conventional and strategic forces; deter counterforce strategies by securing strategic assets and threatening nuclear retaliation; and stabilize strategic deterrence in South

⁹ A 1993 National Security Council report to Congress indicated that Pakistan would use these aircraft to deliver nuclear weapons. See National Security Council, *Report to Congress on Status of China, India and Pakistan Nuclear and Ballistic Missile Programs*, 1993. <http://www.fas.org/irp/threat/930728-wmd.htm>.

¹⁰ CRS Report RL33515, *Combat Aircraft Sales to South Asia: Potential Implications*, by Christopher Bolkcom, Richard F. Grimmett, and K. Alan Kronstadt; Zachary Ginsburg, "US Renews Fighter Exports to Pakistan," *Arms Control Today*, September 2007. http://www.armscontrol.org/act/2007_09/USPakistan.asp.

¹¹ "Release of these systems would not significantly reduce India's quantitative or qualitative military advantage. Release of these modifications to Pakistan will neither affect the regional balance of power nor introduce a new technology as this level of capability or higher already exists in other countries in the region." Defense Security and Cooperation Agency news release, June 28, 2006. http://www.dsca.mil/PressReleases/36-b/2006/Pakistan_06-11.pdf.

¹² CRS Report RL30623, *Nuclear Weapons and Ballistic Missile Proliferation in India and Pakistan: Issues for Congress*, by K. Alan Kronstadt.

¹³ Nuclear Notebook, *ibid.*; "Worldwide Ballistic Missile Inventories," *Arms Control Today Fact Sheet*, <http://www.armscontrol.org/factsheets/missiles.asp>; and Mahmud Ali Durrani, "Pakistan's Strategic Thinking and the Role of Nuclear Weapons," *Cooperative Monitoring Center Occasional Paper 37*, July 2004. <http://www.cmc.sandia.gov/cmc-papers/sand2004-3375p.pdf>.

¹⁴ "Agreement Between the Republic of India and the Islamic Republic of Pakistan on Pre-Notification of Flight Testing of Ballistic Missiles." Full text on the Henry L. Stimson Center website: <http://www.stimson.org/?SN=SA20060207949>.

¹⁵ Peter Lavoy, "Pakistan's Nuclear Posture: Security and Survivability," Paper presented to the Conference on Pakistan's Nuclear Future, Nonproliferation Education Center, Washington, DC, April 28, 2006: <http://www.npec-web.org/Frameset.asp?PageType=Single&PDFFile=20070121-Lavoy-PakistanNuclearPosture&PDFFolder=Essays>.

Asia.¹⁶ Pakistani officials have also indicated that this nuclear posture is designed to preserve territorial integrity against Indian attack, prevent military escalation, and counter its main rival's conventional superiority.¹⁷

Pakistani officials have stated that they have already determined the arsenal size needed for a minimum nuclear deterrent and they will not engage in an arms race with India. However, Pakistan's Permanent Representative to the International Atomic Energy Agency (IAEA) wrote in July 2008 that the U.S.-India nuclear cooperation agreement, which entered into force in December 2008, could cause a nuclear arms race between Pakistan and India.¹⁸

Pakistan has also pledged no-first-use against non-nuclear-weapon states, but has not ruled out first-use against a nuclear-armed aggressor that attacks Pakistan—for example, India.¹⁹ Analysts say this ambiguity serves to maintain deterrence against India's conventional superiority. Others argue that keeping the first-use option against New Delhi allows Islamabad to conduct sub-conventional operations, such as support for low intensity conflict or proxy war in Kashmir, while effectively deterring India at the strategic level.²⁰ Pakistan has reportedly addressed issues of survivability through second strike capability, possible hard and deeply buried storage and launch facilities, road-mobile missiles, air defenses around strategic sites, and concealment measures.²¹

Command and Control

Pakistan's command and control over its nuclear weapons is compartmentalized and includes strict operational security. The government's command and control system is based on "C4I2SR" (command, control, communication, computers, intelligence, information, surveillance and reconnaissance). Islamabad's Strategic Command Organization has a three-tiered structure, consisting of the National Command Authority (NCA), the Strategic Plans Division (SPD), and the Strategic Forces Commands.

The NCA supervises the functions and administration of all of Pakistan's organizations involved in nuclear weapons research, development, and employment, as well as the military services that operate the strategic forces.²² The President is Chairperson of the NCA; the Prime Minister is the

¹⁶ Mahmud Ali Durrani, "Pakistan's Strategic Thinking and the Role of Nuclear Weapons," *Cooperative Monitoring Center Occasional Paper 37*, July 2004. <http://www.cmc.sandia.gov/cmc-papers/sand2004-3375p.pdf>.

¹⁷ For an in-depth discussion of minimum deterrence, see Naeem Salik, "Minimum Deterrence and India Pakistan Nuclear Dialogue: Case Study on Pakistan," Landau Network Centro Volta South Asia Security Project Case Study, January 2006. http://www.centrovolta.it/landau/South%20Asia%20Security%20Program_file%5CDocumenti%5CCase%20Studies%5CSalik%20-%20S.A.%20Case%20Study%202006.pdf.

¹⁸ Available at [<http://verificationthoughts.blogspot.com/2008/07/indian-separation-plan.html>].

¹⁹ It is worth noting that President Zardari stated in late 2008 that Pakistan will not be the first to use nuclear weapons against India. See James Lamont and Farhan Bokhari, "Pakistan In Trade And Arms Offer To India," *Financial Times*, November 23, 2008; "Pakistan Against Use Of Nuclear Weapons: Zardari," *Associated Press of Pakistan*, November 22, 2008; "Interview with President Asif Ali Zardari," CNN Larry King Live, December 2, 2008.

²⁰ Kanti Bajpai, "No First Use in the India-Pakistan Context," *Pugwash Workshop No. 279*, November 2002. <http://www.pugwash.org/reports/nw/bajpai.htm>.

²¹ Lavoy, *ibid*.

²² December 2007 Ordinance To Provide For The Constitution And Establishment Of National Command Authority.

Vice-Chairperson. The NCA also includes the chair of the joint chiefs of staff, the Ministers of Defense, Interior, and Finance, the Director-General of the SPD, and the Commanders of the Army, Air Force, and Navy. The final authority to launch a nuclear strike requires consensus within the NCA; the Chairperson must cast the final vote. The NCA is comprised of two committees, the Employment Control Committee (ECC) and the Development Control Committee (DCC), each of which includes a mix of civilian and military officials. The ECC's functions include establishing a command and control system over the use of nuclear weapons. The DCC "exercises technical, financial and administrative control over all strategic organisations, including national laboratories and research and development organisations associated with the development and modernisation of nuclear weapons."²³

The SPD is headed by a Director General from the Army and acts as the secretariat for the NCA. The SPD's functions include formulating Islamabad's nuclear policy, strategy, and doctrine; developing the nuclear chain of command; and formulating operational plans at the service level for the movement, deployment, and use of nuclear weapons. The Army, Air Force, and Navy each have their own strategic force command, but operational planning and control remains with the NCA. The SPD coordinates operational plans with the strategic forces commands. According to current and former Pakistani officials, Islamabad employs a system which requires that at least two, and perhaps three, people authenticate launch codes for nuclear weapons.²⁴

On December 13, 2007, President Musharraf formalized these authorities and structure in the "National Command Authority Ordinance, 2007."²⁵ The NCA was established by administrative order, but now has a legal basis. Analysts point out that the timing of this ordinance was meant to help the command and control system weather political transitions and potentially preserve the military's strong control over the system. The ordinance also addresses the problems of the proliferation of nuclear expertise and personnel reliability. It outlines punishable offenses related to breach of confidentiality or leakage of "secured information," gives the SPD authority to investigate suspicious conduct, states that punishment for these offenses can be up to 25 years imprisonment, and applies to both serving and retired personnel, including military personnel, notwithstanding any other laws. As a result, Pakistani authorities say that the ordinance should strengthen their control over strategic organizations and their personnel.

Security Concerns

Pakistan's nuclear weapons are reportedly stored unassembled, with the fissile core separated from the non-nuclear explosives. These components are stored separately from delivery vehicles. A 2001 Department of Defense report says that Pakistan can probably assemble the weapons

²³ *Nuclear Black Markets: Pakistan, A.Q. Khan and the Rise of Proliferation Networks*, (London: The International Institute of Strategic Studies), 2007. p. 111; Pakistan Announcement of Nuclear-Weapons Command-and-Control Mechanism, *Associated Press of Pakistan*, February 3, 2000. *Nuclear Black Markets*, pp. 110-111, has organization charts of the NCA and SPD.

²⁴ See P. Cotta-Ramusino and M. Martellini, "Nuclear Safety, Nuclear Stability And Nuclear Strategy In Pakistan: A Concise Report Of A Visit By Landau Network - Centro Volta," January 14, 2002. Available at <http://www.pugwash.org/september11/pakistan-nuclear.htm>; Kenneth N. Luongo and Brig. Gen. (Ret.) Naeem Salik, "Building Confidence in Pakistan's Nuclear Security," *Arms Control Today*, December 2007; Robin Walker, "Pakistan's Evolution as a Nuclear Weapons State: Lt. Gen. Khalid Kidwai's CCC Address," *Strategic Insights*, November 1, 2006.

²⁵ "President Promulgated National Command Authority Ordinance," *Associated Press of Pakistan*, December 13, 2007.

fairly quickly.²⁶ Nevertheless, separate storage may provide a layer of protection against accidental launch or prevent theft of an assembled weapon.²⁷

As the United States prepared to launch an attack on the Afghan Taliban after September 11, 2001, President Musharraf reportedly ordered that Pakistan's nuclear arsenal be redeployed to "at least six secret new locations."²⁸ This action came at a time of uncertainty about the future of the region, including the direction of U.S.-Pakistan relations. Islamabad's leadership was uncertain whether the U.S. would decide to conduct military strikes against Pakistan's nuclear assets if Islamabad did not assist the United States against the Taliban. Indeed, President Musharraf cited protection of Pakistan's nuclear and missile assets as one of the reasons for Islamabad's dramatic policy shift.²⁹

These events, in combination with the 1999 Kargil crisis, the 2002 conflict with India at the Line of Control, and revelations about the A.Q. Khan proliferation network, inspired a variety of reforms to secure the nuclear complex. Risk of nuclear war in South Asia ran high in the 1999 Kargil crisis, when the Pakistani military is believed to have begun preparing nuclear-tipped missiles.³⁰ It should be noted that, even at the high alert levels of 2001 and 2002, there were no reports of Pakistan mating the warheads with delivery systems.³¹

In the fall of 2007 and early 2008, Pakistan faced another crucial moment in its history and some observers expressed concern about the security of the country's arsenal if political instability were to persist.³² Former Prime Minister Benazir Bhutto said in an interview on November 5, 2007, that while President Musharraf says he is in firm control of the nuclear arsenal, she is afraid this control could weaken due to instability in the country.³³ Similarly, Michael Krepon of the Henry L. Stimson Center has argued that "a prolonged period of turbulence and infighting among the country's President, Prime Minister, and Army Chief" could jeopardize the army's unity of command, which "is essential for nuclear security."³⁴ During that time, U.S. military officials also expressed concern about the security of Pakistan's nuclear weapons.³⁵ Director General of the International Atomic Energy Agency (IAEA), Mohamed ElBaradei, also has expressed fears that

²⁶ U.S. Department of Defense, *Proliferation: Threat and Response*, January 2001, p. 28.

²⁷ Some experts take the opposite view—that disbursing assets increases the risk of diversion. See Graham Allison, "What About the Nukes?" *Newsweek Web*, December 28, 2007. <http://www.newsweek.com/id/82259>

²⁸ Molly Moore and Kamran Khan, "Pakistan Moves Nuclear Weapons - Musharraf Says Arsenal Is Now Secure," *Washington Post*, November 11, 2001.

²⁹ "Partial transcript of Pakistan President Musharraf's televised speech asking the people of Pakistan to support his course of action," September 19, 2001. http://www.washingtonpost.com/wp-srv/nation/specials/attacked/transcripts/pakistantext_091901.html.

³⁰ Bruce Riedel, "American Diplomacy and the 1999 Kargil Summit at Blair House," Center for the Advanced Study of India, Policy Paper Series, 2002. <http://www.ccc.nps.navy.mil/research/kargil/reidel.pdf>.

³¹ Lavoy, *ibid*.

³² "Opinions Mixed on Pakistani Nuclear Security," *Global Security Newswire*, November 6, 2007. http://www.nti.org/d_newswire/issues/recent_stories.asp?category=nuclear#6783E660.

³³ Also see comments by David Albright in the same interview. "Pakistan in Crisis: Interview with Benazir Bhutto," *CNN*, November 5, 2007.

³⁴ "U.S.-Pakistan Strategic Relations," Statement before the Committee on Senate Homeland Security and Governmental Affairs Subcommittee on Federal Financial Management, Government Information, Federal Services, and International Security June 12, 2008.

³⁵ "Lieutenant General Carter Ham Holds a Defense Department Briefing," *CQ Transcripts*, November 7, 2007.

a radical regime could take power in Pakistan, and thereby acquire nuclear weapons.³⁶ Experts also worry that while nuclear weapons are currently under firm control, with warheads disassembled, technology could be sold off by insiders during a worsened crisis.³⁷

However, U.S. intelligence officials have expressed greater confidence regarding the security of Islamabad's nuclear weapons. Deputy Secretary of State John D. Negroponte in testimony to Congress on November 7, 2007 said he believed that there is "plenty of succession planning that's going on in the Pakistani military" and that Pakistan's nuclear weapons are under "effective technical control."³⁸ Similarly, Donald Kerr, Principal Deputy Director of National Intelligence, told a Washington audience May 29, 2008, that the Pakistani military's control of the country's nuclear weapons is "a good thing because that's an institution in Pakistan that has, in fact, withstood many of the political changes over the years." More recently, a Department of Defense spokesperson told reporters December 9, 2008, that Washington has "no reason at this point to have any concern with regards to the security" of Islamabad's nuclear arsenal.

Other governments have also voiced opinions regarding the security of Pakistan's nuclear arsenal. For example, Indian National Security Adviser M. K. Narayanan said that the arsenal is safe and has adequate checks and balances.³⁹ Similarly, Secretary of State for Foreign and Commonwealth Affairs David Miliband told the *Charlie Rose Show* December 15, 2008, that Islamabad's nuclear weapons "are under pretty close lock and key." Russian Deputy Prime Minister Sergei Ivanov sounded somewhat less optimistic in a March 24, 2009, television interview, stating that Moscow is "very much concerned" about the security of Pakistan's arsenal.⁴⁰

Pakistani officials have consistently expressed confidence in the security of the country's nuclear arsenal. Then-President Musharraf stated in November 2007 that Pakistan's nuclear weapons are under "total custodial controls."⁴¹ More recently, President Asif Ali Zardari told CNN December 2, 2008, that the country's nuclear command and control system "is working well." Additionally, a Pakistani Foreign Office spokesperson stated March 12, 2009, that "Pakistan's nuclear assets are in safe hands and under a strong multi-layered, institutionalized mechanism."⁴²

In addition to the above scenarios, the security of Pakistan's nuclear weapons could also be jeopardized by another conflict between India and Pakistan, Michael Krepon argued, explaining that an "escalating war with nuclear forces in the field would increase the probability of accidents, miscalculations, and the use of nuclear weapons." This is because when tensions rise precipitously with India, the readiness level of Pakistan's nuclear deterrent also rises. Because the geographical coordinates of Pakistan's main nuclear weapon storage sites, missile, and air bases can be readily identified from satellites—and therefore targeted by opposing forces—the dictates

³⁶ "Al Baradei to Al Hayat," *Dar Al Hayat*, English Edition on-line, January 10, 2008, <http://english.daralhayat.com/Spec/01-2008/Article-20080110-639032eb-c0a8-10ed-01ae-81ab2ea588db/story.html>.

³⁷ Also see comments by David Albright in "Pakistan in Crisis: Interview with Benazir Bhutto," *CNN*, November 5, 2007.

³⁸ House Foreign Affairs Committee Hearing on Democracy, Authoritarianism and Terrorism in Contemporary Pakistan, November 7, 2007.

³⁹ "Pak Nukes Safely Guarded, Says Narayanan," *The Press Trust of India*, December 16, 2007.

⁴⁰ Lyubov Pronina and Ellen Pinchuk, "Russia 'Concerned' About Security of Pakistan's Nuclear Arsenal," *Bloomberg*, March 25, 2009.

⁴¹ "Pakistan Nukes Under Control: Musharraf," *Agence France Presse*, November 13, 2007.

⁴² "Pakistan's Nuclear Assets In 'Safe Hands,'" *Associated Press of Pakistan*, March 12, 2009.

of deterrence mandate some movement of launchers and weapons from fixed locations during crises. Nuclear weapons on the move are inherently less secure than nuclear weapons at heavily-guarded storage sites. Weapons and launchers in motion are also more susceptible to “insider” threats and accidents.⁴³ Such a war would also place stress on the army’s unity of command, Krepon added.

U.S. plans to secure Pakistani nuclear weapons in case of a loss of control by the Pakistani government were famously addressed in Secretary of State Condoleezza Rice’s confirmation hearing in January 2005. In response to a question from Senator John Kerry asking what would happen to Pakistan’s nuclear weapons in the event of a radical Islamic coup in Islamabad, Secretary Rice answered, “We have noted this problem, and we are prepared to try to deal with it.”⁴⁴ On November 12, 2007, responding to press reports about this contingency, a Pakistan Foreign Office spokesperson said, “Pakistan possesses adequate retaliatory capacity to defend its strategic assets and sovereignty,” emphasizing that Islamabad’s nuclear weapons have been under “strong multi-layered, institutionalized decision-making, organizational, administrative and command and control structures since 1998.”⁴⁵ The issue of U.S. contingency plans to take over Pakistani strategic assets was raised again in the press following Benazir Bhutto’s assassination, and was met with similar assurances by Pakistan’s government.⁴⁶

The United States reportedly offered Pakistan nuclear security assistance soon after September 11th, 2001.⁴⁷ U.S. assistance to Islamabad, which must comply with nonproliferation guidelines, has reportedly included the sharing of best practices and technical measures to prevent unauthorized or accidental use of nuclear weapons, as well as contribute to physical security of storage facilities and personnel reliability.⁴⁸ Some press reports say that the United States provided Pakistan with Permissive Action Links (PALs) in 2003, although former Pakistani military officials have said Pakistan has developed PALs for their warheads without assistance.⁴⁹ PALs require a code to be entered before a weapon can be detonated. As noted above, Islamabad employs a system that requires that at least two, and perhaps three, people authenticate launch codes for nuclear weapons. Security at nuclear sites in Islamabad is the responsibility of a 10,000-member security force, commanded by a two-star general.

⁴³ Krepon, June, 12, 2008.

⁴⁴ “The Nomination of Dr. Condoleezza Rice to be Secretary of State,” Hearings before the Senate Foreign Relations Committee, January 18 and 19, 2005. The concept of a contingency plan to take over Pakistan’s nuclear assets was first written about by Seymour Hersh, “Watching the Warheads,” *The New Yorker*, November 5, 2001.

⁴⁵ “Strategic Assets Are Safe, Says FO,” *Dawn*, November 12, 2007.

⁴⁶ “Pentagon Readies Plan for Pakistan’s Nuclear Arsenal,” *The Guardian*, December 28, 2007. For a discussion of the difficulties of such a scenario, see Shaun Gregory, “The Security of Nuclear Weapons in Pakistan,” Pakistan Security Research Unit Brief Number 22, University of Bradford, November 18, 2007. Available at http://spaces.brad.ac.uk:8080/download/attachments/748/Brief_22finalised.pdf

⁴⁷ Alex Wagner, “U.S. Offers Nuclear Security Assistance to Pakistan,” *Arms Control Today*, December 2001. http://www.armscontrol.org/act/2001_12/paknucsecdec01.asp.

⁴⁸ Joby Warrick, “U.S. Has Concerns Over Security of Pakistan’s Nuclear Weapons,” *The Washington Post*, November 11, 2007; David Sanger and William Broad, “U.S. Secretly Aids Pakistan in Guarding Nuclear Arms,” *The New York Times*, November 17, 2007.

⁴⁹ Kaushik Kapisthaham, “Guarding Pakistan’s Nuclear Estate,” *Asia Times*, April 6, 2005. http://www.atimes.com/atimes/South_Asia/GD06Df04.html; Robert Windrem, “Pakistan’s Nuclear History Worries Insiders,” *NBC News*, November 6, 2007. <http://www.msnbc.msn.com/id/21660667/>.

Former Deputy Secretary of State Richard Armitage confirmed in a November 2007 interview that there has been U.S. assistance in this area, explaining that the United States was unlikely to intervene militarily in a crisis in Pakistan because “we have spent considerable time with the Pakistani military, talking with them and working with them on the security of their nuclear weapons. I think most observers would say that they are fairly secure. They have pretty sophisticated mechanisms to guard the security of those.”⁵⁰

Proliferation Threat⁵¹

Many observers are concerned that other states or terrorist organizations could obtain material or expertise related to nuclear weapons from Pakistan.⁵² Beginning in the 1970s, Pakistan used clandestine procurement networks to develop its nuclear weapons program. Former Pakistani nuclear official A.Q. Khan subsequently used a similar network to supply Libya, North Korea, and Iran with materials related to uranium enrichment.⁵³

Al-Qaeda has also sought assistance from the Khan network. According to former Director of Central Intelligence George Tenet, the United States “received fragmentary information from an intelligence service” that in 1998 Osama bin Laden had “sent emissaries to establish contact” with the network.⁵⁴ Other Pakistani sources could also provide nuclear material to terrorist organizations. According to a 2005 report by the Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction, al-Qaeda “had established contact with Pakistani scientists who discussed development of nuclear devices that would require hard-to-obtain materials like uranium to create a nuclear explosion.”⁵⁵ Tenet explains that these scientists were affiliated with a different organization than the Khan network.

The current status of Pakistan’s nuclear export network is unclear, although most official U.S. reports indicate that, at the least, it has been damaged considerably. Director of National Intelligence John D. Negroponte implied that the network had been dismantled when he asserted in a January 11, 2007, statement to the Senate Select Committee on Intelligence that “Pakistan had been a major source of nuclear proliferation until the disruption of the A.Q. Khan network.”⁵⁶ More recently, a January 12, 2009, State Department press release said that the network “is no longer operating.” For its part, Pakistan’s Foreign Office stated February 7, 2009, that Pakistan “has dismantled the nuclear black market network.”

⁵⁰ “A Conversation With Former Deputy Secretary of State Richard Armitage,” *PBS: The Charlie Rose Show*, November 6, 2007.

⁵¹ This section was prepared by Paul Kerr.

⁵² For more information on Pakistani proliferation, see CRS Report RL32745, *Pakistan's Nuclear Proliferation Activities and the Recommendations of the 9/11 Commission: U.S. Policy Constraints and Options*, by Richard P. Cronin, K. Alan Kronstadt, and Sharon Squassoni. Also see CRS Report RL33498, *Pakistan-U.S. Relations*, by K. Alan Kronstadt.

⁵³ Libya obtained uranium enrichment technology and nuclear weapons designs that could support a nuclear weapons program. North Korea currently has a plutonium-based nuclear weapons program, but it is unclear whether it also has a uranium-based one. Iran is suspected of pursuing both plutonium- and uranium-based nuclear weapons programs.

⁵⁴ Tenet, George and Harlow, Bill, *At the Center of the Storm: My Years at the CIA*, HarperCollins: New York, 2007. p. 261.

⁵⁵ The report can be found at <http://www.wmd.gov/report/index.html>.

⁵⁶ Unclassified Statement for the Record Annual Threat Assessment, Senate Select Committee on Intelligence, January 11, 2007.

However, when asked about the network's current status during a July 25, 2007, Senate Foreign Relations Committee hearing, Undersecretary for Political Affairs Nicholas Burns replied that:

I cannot assert that no part of that network exists, but it's my understanding based on our conversations with the Pakistanis that the network has been fundamentally dismantled. But to say that there are no elements in Pakistan, I'm not sure I could say that.

Similarly, the London-based International Institute for Strategic Studies found in a May 2007 report that "at least some of Khan's associates appear to have escaped law enforcement attention and could ... resume their black-market business."⁵⁷

Asked about Pakistan's cooperation in investigating the network, Burns acknowledged that the United States has not had "personal, consistent access" to Khan, but added that he did not "have all the details of everything we've done." Similarly, the IAEA has not yet been able to interview Khan directly, according to an agency official. However, Islamabad has responded to written questions from the IAEA and has been cooperative in its investigation of Iran's nuclear program.⁵⁸ Khan himself told *Dawn News TV* May 29, 2008, that he would not cooperate with U.S. or IAEA investigators. A Pakistani Foreign Office spokesperson told reporters in May 2006 that the government considered the Khan investigation "closed"—a position an Office spokesperson reiterated February 6, 2009.

The State Department announced January 12, 2009, that it was imposing sanctions on 13 individuals and three companies for their involvement in the Khan network. The sanctions were imposed under the Export-Import Bank Act, the Nuclear Proliferation Prevention Act, and Executive Orders 12938 and 13382.

Pakistan's Response to the Proliferation Threat

Undersecretary Burns testified in July 2007 that the Bush administration has "told the Pakistani government that it is its responsibility ... to make sure" that neither the Khan network nor a "similar organization" resurfaces in the country. Since the revelations about the Khan network, Pakistan appears to have increased its efforts to prevent nuclear proliferation. But whether and to what extent these efforts have been successful is not yet clear. It is worth noting that, because Khan conducted his proliferation activities as a government official, they do not necessarily indicate a failure of Islamabad's export controls.

Pakistani officials argue that Islamabad has taken a number of steps to prevent further proliferation of nuclear-related technologies and materials.⁵⁹ For example, Islamabad adopted in September 2004 new national export controls legislation which includes a requirement that the government issue control lists for "goods, technologies, material, and equipment which may contribute to designing, development, stockpiling, [and] use" of nuclear weapons and related delivery systems. According to a February 2008 presentation by Zafar Ali, Director of Pakistan's Strategic Export Controls Division (SECDIV),⁶⁰ the lists, which were issued in October 2005 and

⁵⁷ See <http://www.iiss.org/publications/strategic-dossiers/nbm>.

⁵⁸ Personal communication, November 9, 2007.

⁵⁹ Details of Pakistan's nuclear-related legislation can be found in the country's reports to the UN 1540 Committee. Both can be found at <http://daccessdds.un.org/doc/UNDOC/GEN/N04/597/46/PDF/N0459746.pdf?OpenElement>.

⁶⁰ Presentation given to Partnership for Global Security Workshop, "Meeting the Nuclear Security Challenge in (continued...)"

are to be periodically updated, include items controlled by multilateral export control regimes, such as the Nuclear Suppliers Group, the Australia Group, and the Missile Technology Control Regime.⁶¹ The export controls legislation also includes a catch-all clause, which requires exporters to notify the government if they are aware or suspect that goods or technology are intended by the end-user for use in nuclear or biological weapons, or missiles capable of delivering such weapons.⁶²

The legislation includes several other important elements, such as end-use and end-user certification requirements and new penalties for violators. Since its adoption, Pakistan has established the SECDIV and an associated Oversight Board. The SECDIV is responsible for formulating rules and regulations for implementing the legislation. The board is comprised of officials from multiple agencies and is headed by Pakistan's Foreign Secretary.

Islamabad says that it has also taken several other steps to improve its nuclear security. For example, the government announced in June 2007 that it is "implementing a National Security Action Plan with the [IAEA's] assistance." That same month, Pakistan also joined the U.S.—and Russian-led Global Initiative to Combat Nuclear Terrorism. As noted above, the December 2007 National Command Authority Ordinance also includes measures to prevent the spread of nuclear-related materials and expertise.

Pakistani officials participating in an April 2007 Partnership for Global Security workshop argued that Islamabad has improved the reliability of its nuclear personnel by, for example, making its security clearance procedures more stringent. However, the officials also acknowledged that Islamabad still needs to do more to control its nuclear expertise.⁶³

The United States has also provided export control assistance to Pakistan. Burns described several such efforts in his July 2007 testimony.⁶⁴ And according to an October 2007 U.S. Government Accountability Office report, Islamabad was during fiscal years 2003-2006 the second-largest recipient of bilateral U.S. assistance designed to improve target countries' export controls.

(...continued)

Pakistan," February 21-22, 2008. http://www.partnershipforglobalsecurity.org/documents/zafar_export.pdf.

⁶¹ The Nuclear Suppliers Group is a multilateral, voluntary group of nuclear supplier states which have agreed to coordinate their exports of civilian nuclear technology and materials in order to prevent importers from using them to produce nuclear weapons. The Australia Group is a voluntary, informal, export-control arrangement through which participating countries coordinate their national export controls to limit the supply of chemicals and biological agents, as well as related equipment, technologies, and knowledge, to countries and nonstate entities suspected of pursuing chemical or biological weapons capabilities. The Missile Technology Control Regime is an informal, voluntary arrangement in which participants agree to adhere to common export policy guidelines applied to an "annex" that lists items related to the proliferation of ballistic and cruise missiles, rockets, and unmanned air vehicles capable of delivering weapons of mass destruction.

⁶² The Chemical Weapons Convention Implementation Ordinance of 2000 regulates the import and export of chemicals in accordance with the convention.

⁶³ Building Confidence in Pakistan's Nuclear Security: Workshop Synopsis. April 30, 2007.

⁶⁴ Burns mentioned Pakistan's participation in the Container Security Initiative and the Secure Freight Initiative. Under these programs, "the United States and Pakistan worked together to install screening and radiation detection equipment to scan U.S.-bound cargo." He also stated that the Department of Energy "is working with Pakistan on radiation source security and is in the process of finalizing an agreement to install radiation detection equipment at Pakistani ports and border crossings."

Pakistan received such assistance from the Departments of State, Energy, and Homeland Security.⁶⁵

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⁶⁵ GAO Report, *Nonproliferation: U.S. Efforts to Combat Nuclear Networks Need Better Data on Proliferation Risks and Program Results*, October 31, 2007.