Pakistan's Nuclear Weapons: Proliferation and Security Issues

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Summary

Pakistan's nuclear arsenal consists of approximately 60 nuclear warheads, although it could be larger. Islamabad is producing fissile material, adding to related production facilities, and deploying additional delivery vehicles. These steps will enable Pakistan to undertake both quantitative and qualitative improvements to its nuclear arsenal. Whether and to what extent Pakistan's current expansion of its nuclear weapons-related facilities is a response to the 2008 U.S.-India nuclear cooperation agreement is unclear. Islamabad does not have a public, detailed nuclear doctrine, but its "minimum credible deterrent" is widely regarded as primarily a deterrent to Indian military action.

Pakistan has in recent years taken a number of steps to increase international confidence in the security of its nuclear arsenal. In addition to dramatically overhauling nuclear command and control structures since September 11, 2001, Islamabad has implemented new personnel security programs. Moreover, Pakistani and some U.S. officials argue that, since the 2004 revelations about a procurement network run by former Pakistani nuclear official A.Q. Khan, Islamabad has taken a number of steps to improve its nuclear security and to prevent further proliferation of nuclear-related technologies and materials. A number of important initiatives, such as strengthened export control laws, improved personnel security, and international nuclear security cooperation programs have improved Pakistan's 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 continue to 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 and the current offensive against the Taliban in the northwest of the country have 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. Chair of the Joint Chiefs of Staff Admiral Michael Mullen 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. officials 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."

Nevertheless, U.S. officials have generally expressed confidence in the security of Pakistan's nuclear weapons. President Obama addressed this issue in an April 29, 2009, press conference, stating, "I'm confident that we can make sure that Pakistan's nuclear arsenal is secure, primarily, initially, because the Pakistani army, I think, recognizes the hazards of those weapons falling into the wrong hands. We've got strong military-to-military consultation and cooperation." He also recognized the sensitivity of the issue for Pakistan, saying, "We want to respect their sovereignty, but we also recognize that we have huge strategic interests, huge national security interests in making sure that Pakistan is stable and that you don't end up having a nuclear-armed militant state."[1] Declining to engage in "hypotheticals" when asked if the United States is ready to secure the nuclear arsenal if the Pakistani government could not do so, President Obama said he felt "confident that that nuclear arsenal will remain out of militant hands."

General Petraeus reaffirmed this confidence on May 10: "With respect to the—the nuclear weapons and—and sites that are controlled by Pakistan … we have confidence in their security procedures and elements and believe that the security of those sites is adequate."[2] Admiral Mullen echoed this assessment during a May 14, 2009, hearing before the Senate Armed Services Committee. Former Pakistani President Pervez Musharraf told a journalist that Islamabad has "given State Department nonproliferation experts insight into the command and control of the Pakistani arsenal and its on-site safety and security procedures,"[3] but U.S. knowledge of

[1] President Obama's 100th-Day Press Briefing transcript, April 29, 2009, accessed at http://www.nytimes.com/2009/04/29/us/politics/29text-obama.html?_r=1&pagewanted=print.

[2] Interview with General David H. Petraeus, FOX News Sunday, May 10, 2009. http://www.foxnews.com/story/0,2933,519696,00.html.

[3] Seymour M. Hersh, "Defending the Arsenal: In an Unstable Pakistan, Can Nuclear Warheads be Kept Safe?" *The New Yorker*, November 16, 2009.

Pakistan's arsenal remains limited, according to U.S. officials. Mullen stated that "we're limited in what we actually know" about Islamabad's nuclear arsenal. Leon Panetta, Director of the Central Intelligence Agency, similarly acknowledged in a May 18 speech that the United States does not possess the intelligence to locate all of Pakistan's nuclear weapons-related sites.

Pakistani efforts to improve the security of its 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.

Pakistan continues to produce fissile material for weapons and appears to be augmenting its weapons production facilities, as well as deploying additional delivery vehicles—steps that will enable both quantitative and qualitative improvements in Islamabad's nuclear arsenal.

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.[4] Deterring India's nuclear weapons and augmenting Pakistan's inferior conventional forces are widely believed to be the primary missions for Islamabad's nuclear arsenal. Observers point to India's 1974 "peaceful" nuclear explosion as the pivotal moment that gave additional urgency to the program. Pakistan produced fissile material for its nuclear weapons using gas-centrifuge-based uranium enrichment technology, which it mastered by the mid-1980s. Highly-enriched uranium (HEU) is one of two types of fissile material used in nuclear weapons; the other is plutonium. The country's main enrichment facility is a centrifuge plant located at Kahuta; Pakistan may have other enrichment sites.[5]

Islamabad gained technology from many sources. This extensive assistance is reported to have included uranium enrichment technology from Europe, blueprints for a small nuclear weapon from China, and missile technology from China.

[4] See, for example, U.S. Department of Defense, *Proliferation: Threat and Response,* April 1996, p. 37.

[5] Zia Mian, A.H. Nayyar, R. Rajaraman and M.V. Ramana, "Fissile Materials in South Asia: The Implications of the U.S.-India Nuclear Deal," International Panel on Fissile Materials, September 2006 and David Albright, "Securing Pakistan's Nuclear Infrastructure," in *A New Equation: U.S. Policy toward India and Pakistan after September 11* (Washington: Carnegie Endowment for International Peace) May 2002. For a list of Pakistani nuclear facilities, see chart in Pakistan chapter of Joseph Cirincione, Jon B. Wolfsthal, and Miriam Rajkumar, *Deadly Arsenals*, Carnegie Endowment for International Peace, 2005.

The United States had information during the 1970s and early 1980s that Pakistan was pursuing nuclear weapons designs,[6] but exactly when Pakistan produced a workable nuclear explosive device is unclear. 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. A 1993 National Security Council report to Congress stated that Islamabad's nuclear weapons efforts "culminated with the capability to rapidly assemble a nuclear device if necessary by the end of the 1980s."[7] A.Q. Khan stated in an interview published in May 1998 that Islamabad "attained" the capability to detonate such a device "at the end of 1984."[8] In any case, President Bush's failure to certify in 1990 that Pakistan did not "possess a nuclear explosive device" led to a cut-off in military and financial aid under the Pressler Amendment.[9]

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 in western Pakistan. Test yields were about 10 kilotons and 5 kilotons, according to seismic analysis.[10] The United States imposed additional sanctions after the tests, but these were lifted after the September 11, 2001, terrorist attacks on the United States. According to most public estimates, Pakistan has about 60 nuclear weapons, though it could have more;[11] a recent public estimate from two prominent experts on the subject stated that the country has between 70 and 90 nuclear weapons.[12] Pakistan's nuclear warheads use an implosion design with a solid core of approximately 15-20 kilograms of HEU.[13] Islamabad reportedly continues to produce HEU for weapons at a rate of at least 100 kilograms per year.[14]

Pakistan has also pursued plutonium-based warheads and continues to produce plutonium for weapons. Islamabad has received Chinese and European assistance for at least some of its

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[6] See, for example, a 1978 Central Intelligence Agency report, available at http://www.faqs.org/cia/docs/44/0000107983/(UNTITLED)-RE.html, as well as a 1983 State Department document, available at http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB114/chipak-11.pdf.

[7] National Security Council, *Report to Congress on Status of China, India and Pakistan Nuclear and Ballistic Missile Programs*, 1993. Available at http://www.fas.org/irp/threat/930728-wmd.htm.

[8] "Pakistan: Qadeer Khan Interviewed on Pakistan N-Test," *The News*, May 30, 1998.

[9] 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.

[10] Seismic data showed yields less than those 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.

[11] Arms Control Association Fact Sheet, http://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat.asp; "Global Fissile Material Report 2007," International Panel on Fissile Materials http://www.fissilematerials.org/ipfm/site_down/gfmr07.pdf; SIPRI Yearbook 2007. The International Panel on Fissile Materials estimates that Pakistan has enough fissile material (highly enriched uranium and plutonium) for 65-80 nuclear weapons; this estimate assumes 25 kilograms of HEU per weapon and 4.5-6 kilograms of plutonium per weapon ("Banning the Production of Fissile Materials for Nuclear Weapons: Country Perspectives on the Challenges to a Fissile Material (Cutoff) Treaty," International Panel on Fissile Materials, 2008. http://www.fissilematerials.org/ipfm/site_down/gfmr08cv.pdf).

[12] Robert Norris and Hans Kristensen, "Nuclear Notebook: Pakistan's Nuclear Forces, 2009," *Bulletin of the Atomic Scientists*, September/October 2009.

[13] Robert Norris and Hans Kristensen, "Nuclear Notebook: Pakistan's Nuclear Forces, 2007," *Bulletin of the Atomic Scientists*, May/June 2007.

[14] "Global Fissile Material Report 2007."

plutonium program. The 40-50 megawatt heavy-water Khushab plutonium production reactor has been operating since 1998.[15] It appears that Islamabad is constructing two additional heavy-water reactors, which will expand considerably Pakistan's plutonium production capacity, at the same site.[16] Additionally, Pakistan has a reprocessing facility[17] at the Pakistan Institute of Science and Technology (PINSTECH) and is apparently constructing other such facilities. *Nuclear Fuel* reported in 2000 that, according to "senior U.S. government officials," Islamabad had begun operating a "pilot-scale" reprocessing facility at the New Laboratories facility at PINSTECH.[18] Pakistan also appears to be constructing a second reprocessing facility at the site [19] and may be completing a reprocessing facility located at Chasma.[20]

Islamabad's construction of additional nuclear reactors and expansion of its reprocessing capabilities could indicate plans to increase and improve Pakistan's nuclear weapons arsenal in the near future. Indeed, Defense Intelligence Agency Director Michael Maples told the Senate Armed Services Committee on March 10, 2009, that "Pakistan continues to develop its nuclear infrastructure, expand nuclear weapon stockpiles and seek more advanced warheads and delivery systems."[21] Similarly, Admiral Mullen confirmed during the May 14 hearing that the United States has "evidence" that Pakistan is expanding its nuclear arsenal.

Responding to India?

Pakistani officials have indicated that they have already determined the arsenal size needed for a minimum nuclear deterrent and that they will not engage in an arms race with India. Nevertheless, Pakistan appears to be increasing its fissile production capability and improving its delivery vehicles in order to hedge against possible increases in India's nuclear arsenal. Islamabad may also accelerate its current nuclear weapons efforts.

India has stated that it needs only a "credible minimum deterrent," but New Delhi has never defined what it means by such a deterrent and has refused to sign the Comprehensive Test Ban

[15] A Pakistani newspaper reported in April 1998 that, according to a "top government source," the reactor had begun operating ("Pakistan's Indigenous Nuclear Reactor Starts Up," *The Nation*, April 13, 1998). A June 15, 2000 article cited "U.S. officials" who indicated that the reactor had begun operating two years earlier (Mark Hibbs, "After 30 Years, PAEC Fulfills Munir Khan's Plutonium Ambition," *Nucleonics Week*, June 15, 2000). A 2001 Department of Defense report stated that the reactor "will produce plutonium," but did not say whether it was operating (U.S. Department of Defense, *Proliferation: Threat and Response*, January 2001, p. 27).

[16] David Albright and Paul Brannan, "Update on Khushab Plutonium Production Reactor Construction Projects in Pakistan," Institute for Science and International Security, April 23, 2009; Mark Hibbs and Shahid-ur-Rehman, "Pakistan Civilian Fuel Cycle Plan Linked To NSG Trade Exception," *Nuclear Fuels*, August 27, 2007.

[17] "Reprocessing" refers to the process of separating plutonium from spent nuclear fuel.

[18] Hibbs, June 15, 2000. According to a 1983 State Department document, the New Laboratories facility was "capable of extracting small quantities of plutonium," but large enough to "allow for expansion of reprocessing capacity." Available at http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB114/chipak-11.pdf.

[19] David Albright and Paul Brannan, "Pakistan Expanding Plutonium Separation Facility Near Rawalpindi," Institute for Science and International Security, May 19, 2009. The 2001 Defense Department report stated that reprocessing facilities "are under construction," but did not identify any sites (*Proliferation: Threat and Response*, p. 27).

[20] David Albright and Paul Brannan, "Chashma Nuclear Site in Pakistan with Possible Reprocessing Plant," Institute for Science and International Security, January 18, 2007. Construction on the facility was begun during the 1970s with French assistance, but France cancelled its assistance for the project later that decade.

[21] Norris and Kristensen explain that plutonium reactors "provide the Pakistani military with several options: fabricating weapons that use plutonium cores, mixing plutonium with HEU to make composite cores, or using tritium to 'boost' the warheads' yield." (Norris and Kristensen, 2007).

Treaty. Furthermore, both the agreement and associated 2008 decision by the Nuclear Suppliers Group to exempt India from some of its export guidelines will renew New Delhi's access to the international uranium market. This access will result in more indigenous Indian uranium available for weapons because it will not be consumed by India's newly safeguarded reactors.[22]

Pakistani officials have stated that the government may need to increase significantly its nuclear arsenal in response to possible Indian plans to do the same. According to an April 2006 television broadcast, Pakistani officials from the government's National Command Authority expressed "concern" that the 2008 U.S.-India nuclear cooperation agreement could tilt the strategic balance between India and Pakistan in favor of the former. The officials suggested that Islamabad may need to increase or improve its nuclear arsenal in order to "to meet all requirements of minimum credible defence deterrence."[23] (See the "Nuclear Doctrine" section for more on Pakistan's deterrence concept.) Similarly, Pakistan's Permanent Representative to the International Atomic Energy Agency (IAEA) wrote in July 2008 that the agreement could cause a nuclear arms race between Pakistan and India.[24] Moreover, a Foreign Ministry spokesperson indicated during a May 21, 2009, press briefing that, despite the government's continued opposition to a "nuclear or conventional arms race in South Asia," Pakistan may need to increase its nuclear arsenal in response to Indian conventional and nuclear arms expansion.

Illustrating this point, a Pakistani Foreign Office spokesperson reacted to India's July 26, 2009, launch of its first indigenously built nuclear-powered submarine by asserting that "continued induction of new lethal weapon systems by India is detrimental to regional peace and stability," adding that "[w]ithout entering into an arms race with India, Pakistan will take all appropriate steps to safeguard its security and maintain strategic balance in South Asia." The submarine, which has not yet been deployed, will reportedly be capable of carrying nuclear-armed ballistic missiles.[25]

Whether and to what extent Pakistan's current expansion of its nuclear weapons-related facilities is a response to the U.S.-India agreement is unclear, partly because the government's decisions regarding those facilities are not publicly available.

In addition to making qualitative and quantitative improvements to its nuclear arsenal, Pakistan could increase the number of circumstances under which it would be willing to use nuclear weapons. For example, Peter Lavoy has argued that India's efforts to improve its conventional military capabilities could enable New Delhi to achieve "technical superiority" in intelligence, surveillance, and reconnaissance, as well as precision targeting, providing India with "the capability to effectively locate and efficiently destroy strategically important targets in Pakistan."[26] Islamabad could respond by lowering the threshold for using nuclear weapons, according to Lavoy. Indeed, a Pakistan Foreign Ministry spokesperson warned in May 2009 that Islamabad could take this step. (See the "Nuclear Doctrine" section.)

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[22] See CRS Report RL33016, *U.S. Nuclear Cooperation with India: Issues for Congress*, by Paul K. Kerr.

[23] "Pakistan Command Meeting Voices Concern Over Indo-US Nuclear Deal," Pakistan TV, April 12, 2006.

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

[25] Bappa Majumdar, "India Launches Its First Nuclear-Powered Submarine," *Reuters*, July 26, 2009; Nasir Jaffry, "Pakistan Hits Out At 'Detrimental' Indian Nuclear Sub," *Agence France Presse*, July 28, 2009; "Induction Of Indigenous Nuke Sub Into Navy Longway Off: Experts," *The Press Trust of India*, July 26, 2009; "N-Submarine Still Wrapped In Secrecy," *Indo-Asian News Service*, July 27, 2009.

[26] Peter Lavoy, "Islamabad's Nuclear Posture: Its Premises and Implementation," in *Pakistan's Nuclear Future: Worries Beyond War*, Henry Sokolski, Ed. (Carlisle, PA: Strategic Studies Institute) January 2008. p. 158.

Nevertheless, Islamabad's nuclear weapons program apparently faces some budget constraints. Maples testified that "the economic decline will likely slow" the government's progress in improving its nuclear and conventional military forces. Furthermore, Pakistan's nuclear weapons program is reportedly facing "severe financial cuts."[27]

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 that modifications are made. It is widely believed that Islamabad has made modifications to the F-16s previously sold to them.[28] Although concerns have been raised about the impact of these sales on the strategic balance in South Asia,[29] the U.S. government maintains that the sale of additional F-16s to Pakistan will not alter the regional balance of power.[30] 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.[31]

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*), with a range of about 400 kilometers; the solid-fuel *Hatf-IV* (*Shaheen*), with a range of over 450 kilometers[32]; and the liquid-fuel *Hatf-V* (*Ghauri*), with an approximate range of almost 1,300 kilometers.[33] [34] The solid-fuel *Hatf-VI* (*Shaheen-2*) missile, when deployed, will be "capable of reaching targets out to 2,000 kilometers," Maples stated March 10,[35] adding that Islamabad has made "significant progress" on the missile. A 2009 National Air and Space Intelligence Center report appears to support this conclusion, stating that the missile "probably

[27] "Pak Nuclear Program Faces 35% Cut," *The News*, May 1, 2009.

[28] The 1993 National Security Council report indicated that Pakistan would use these aircraft to deliver nuclear weapons. See National Security Council, *Report to Congress*.

[29] 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.

[30] "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.

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

[32] Dr. Samar Mubarakmand, Chairman of Pakistan's National Engineering and Scientific Commission, gave the missile's range as 700 kilometers during a 2004 television interview ("Capital Talk Special," GEO-TV, May 3, 2004).

[33] National Air and Space Intelligence Center, *Ballistic and Cruise Missile Threat*, 2009.

[34] All ballistic missiles described in this paragraph are road-mobile.

[35] See also, 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. Mubarakmand gave the missile's range as 2,500 kilometers in the 2004 interview.

will soon be deployed." Islamabad continues to carry out ballistic missile tests, but notifies India in advance in accordance with an October 2005 bilateral missile pre-notification pact.[36] Maples also indicated that Pakistan is developing nuclear-capable cruise missiles; the *Babur* (ground-launched) and the *Ra'ad* (air-launched), both of which will have estimated ranges of 320 kilometers.[37]

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.[38] 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 Asia.[39] 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.[40]

Pakistan has pledged no-first-use against non-nuclear-weapon states, but has not ruled out first-use against a nuclear-armed aggressor, such as India.[41] Some analysts say this ambiguity serves to maintain deterrence against India's conventional superiority; the Foreign Ministry spokesperson stated May 21 that "there are acquisitions of sophisticated weaponry by our neighbour which will disturb the conventional balance between our two countries and hence, lower the nuclear threshold." Other analysts 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.[42] Pakistan has reportedly addressed issues of survivability through pursuing a second strike capability, possibly building hard and deeply buried storage and launch facilities, deploying road-mobile missiles, deploying air defenses around strategic sites, and utilizing concealment measures.[43]

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[36]"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.

[37] National Air and Space Intelligence Center, 2009.

[38] 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.

[39] Durrani, 2004.

[40] 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.

[41] It is worth noting, however, that President Zardari stated in late 2008 that Pakistan would 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.

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

[43] Lavoy, 2006.

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, established in 2000, 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.[44] The Prime Minister, as Head of Government, is Chairperson of the NCA.[45] 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."[46]

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. [47]

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[44] December 2007 Ordinance To Provide For The Constitution And Establishment Of National Command Authority.

[45] When the NCA was established in 2000, the government's announcement designated the Head of Government, or Prime Minister, as Chairperson. At that time, General Musharraf, as Chief Executive, became Chairperson and stayed in that position after becoming President in 2002. He appointed the Prime Minister as Vice Chairman. However, President Zardari returned the NCA to its original structure when, in a November 2009 re-promulgation of the 2007 NCA Ordinance, he specified that the Prime Minister would be Chairperson, removing himself from that position (this re-promulgation also abolished the position of Vice Chairman). Zardari may have done this in reaction to Parliamentary pressure, and perhaps to boost his waning political support. According to Brigadier General (Ret.) Naeem Salik, the change in Chairmanship may have only a symbolic impact on nuclear policy-making, since no changes were made to the Strategic Plans Division itself. The Pakistani Parliament is now considering a bill, the National Command Bill of 2009, which includes these provisions, and could add reporting requirements on the safety and security of Pakistan's nuclear assets. A July 2009 Supreme Court decision required that the Ordinances from the Musharraf era be made law.

[46] *Nuclear Black Markets: Pakistan, A.Q. Khan and the Rise of Proliferation Networks*, (London: The International Institute for 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.

[47] 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, (continued...)

On December 13, 2007, then-President Musharraf formalized these authorities and structure in the "National Command Authority Ordinance, 2007."[48] 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

According to a 2001 Department of Defense report, Islamabad's nuclear weapons "are probably stored in component form,"[49] which suggests that the nuclear warheads are stored separately from delivery vehicles. According to some reports, the fissile cores of the weapons are separated from the non-nuclear explosives.[50] But whether this is actually the case is unclear; one report states that the warheads and delivery vehicles are probably stored separately in facilities close to one another, but says nothing about the fissile cores.[51] And, according to an account of a 2008 experts' group visit to Pakistan, Lt. Gen. Khalid Kidwai, the head of the SPD, suggested that the nuclear warheads (containing the fissile cores) may be mated with their delivery vehicles.[52] According to Kidwai, the report says, the SPD's official position is that the weapons "will be ready when required, at the shortest notice; [but] the Pakistani doctrine is not endorsing a US-USSR model with weapons on hair trigger alert." The 2001 Defense Department report says that Pakistan can probably assemble its weapons fairly quickly.[53]

It warrants mention that, although separate storage may provide a layer of protection against accidental launch or prevent theft of an assembled weapon, it may be easier for unauthorized people to remove a weapon's fissile material core if it is not assembled. Dispersal of the assets

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"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.

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

[49] *Proliferation: Threat and Response*, p. 27.

[50] Joby Warrick, "Pakistan Nuclear Security Questioned; Lack of Knowledge About Arsenal May Limit U.S. Options," *Washington Post*, November 11, 2007; Peter Wonacott, "Inside Pakistan's Drive To Guard Its A-Bombs," *Wall Street Journal*, November 29, 2007; David E. Sanger, "Trust Us: So, What About Those Nukes?," *New York Times*, November 11, 2007; *Nuclear Black Markets*, 2007, p.33; Cotta-Ramusino and Martellini, 2002. See also, George Perkovich of the Carnegie Endowment for International Peace quoted in Nigel Hawkes, "Pakistan Could Lose Control of its Arsenal," *The Times (London*), September 20, 2001.

[51] Lavoy, "Islamabad's Nuclear Posture: Its Premises and Implementation." p. 141.

[52] Maurizio Martellini, "Security and Safety Issues about the Nuclear Complex: Pakistan's Standpoints. A Concise Report Of A Visit To Islamabad By Landau Network Centro Volta (LNCV) Mission Carried Out On February 9-13 2008."

[53] *Proliferation: Threat and Response*, p. 28.

may also create more potential access points for acquisition and may increase the risk of diversion.[54]

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."[55] This action came at a time of uncertainly about the future of the region, including the direction of U.S.-Pakistan relations. Islamabad's leadership was uncertain whether the United States would decide to conduct military strikes against Pakistan's nuclear assets if the government 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.[56]

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.[57] 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.[58]

In the fall of 2007 and early 2008, some observers expressed concern about the security of the country's arsenal if political instability were to persist.[59] Former Prime Minister Benazir Bhutto said in a November 5, 2007, interview that, although then-President Musharraf claimed to be in firm control of the nuclear arsenal, she feared this control could weaken due to instability in the country.[60] 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."[61] During that time, U.S. military officials also expressed concern about the security of Pakistan's nuclear weapons.[62] Director General of the International Atomic Energy Agency (IAEA), Mohamed ElBaradei, also has expressed fears that a radical regime could take power in Pakistan, and thereby acquire nuclear weapons.[63] Experts also worry that while nuclear weapons

[54] See Graham Allison, "What About the Nukes?" *Newsweek Web*, December 28, 2007. http://www.newsweek.com/id/82259

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

[56] "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.

[57] 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.

[58] Lavoy, 2006.

[59] "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.

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

[61] "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.

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

[63] "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.

are currently under firm control, with warheads disassembled, technology could be sold off by insiders during a worsened crisis.[64]

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."[65] Similarly, Donald Kerr, Principal Deputy Director of National Intelligence, told a Washington audience May 29, 2008, that the Pakistani military's control of the 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." 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. More recently, Maples stated March 10, 2009, that Islamabad "has taken important steps to safeguard its nuclear weapons," although he pointed out that "vulnerabilities exist."

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.[66] 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, however, 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.[67]

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."[68] 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 Ministry spokesperson stated May 21, 2009, that "there is simply no question of our strategic assets falling into the wrong hands. We have full confidence in our procedures, mechanisms and command and control systems."

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

> [w]hen 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 of deterrence mandate some movement of launchers and weapons from fixed locations during crises. Nuclear weapons on the move are

[64] Also see comments by David Albright in "Pakistan in Crisis," 2007.

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

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

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

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

> 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.[69]

Such a war, Krepon added, would also place stress on the army's unity of command. Krepon has also pointed out that Islamabad faces a dilemma, because less-dispersed nuclear weapons may be more vulnerable to a disarming military strike from India.[70]

U.S. Assistance and Pakistani Nuclear Security

U.S. plans to secure Pakistani nuclear weapons in case of a loss of control by the Pakistani government were famously addressed during 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."[71] 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." [72] 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.[73]

More recently, a Pakistan Foreign Office spokesperson, responding to a report detailing alleged U.S.-Pakistani discussions regarding contingency plans for U.S. forces to help secure Islamabad's nuclear weapons, stated November 8, 2009, that Pakistan "does not require any foreign assistance in this regard." Pakistan will never "allow any country to have direct or indirect access to its nuclear and strategic facilities," the spokesperson said, adding that "no talks have ever taken place on the issue of the security of Pakistan's nuclear arsenal with US officials."[74] U.S. Ambassador to Pakistan Anne Patterson stated the same day that the United States "has no intention to seize Pakistani nuclear weapons or material."

The United States reportedly offered Pakistan nuclear security assistance soon after September 11, 2001.[75] 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

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[69] Krepon, June 12, 2008.

[70] Michael Krepon, "Complexities Of Nuclear Risk Reduction In South Asia," *The Hindu*, May 29, 2009.

[71] "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.

[72] "Strategic Assets Are Safe, Says FO," *Dawn*, November 12, 2007.

[73] "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

[74] "Pakistan Foreign Office Rejects U.S. Media Report on Nuclear Arsenal," *Associated Press of Pakistan*, November 9, 2009.

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

storage facilities and personnel reliability.[76] 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 its warheads without assistance.[77] PALs require a code to be entered before a weapon can be detonated. As noted above, Islamabad employs a system requiring that at least two, and perhaps three, people authenticate launch codes for nuclear weapons.[78] Security at nuclear sites in Islamabad is the responsibility of a 10,000-member security force, commanded by a two-star general.

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."[79] Rolf Mowatt-Larssen, former Director of the Office of Intelligence and Counterintelligence at the U.S. Department of Energy, pointed out in May 2009 that "there's not a lot of transparency into" how Islamabad spends the U.S. funds, but he nevertheless characterized them as "money well spent."[80] A Pakistani official said in November 2009 that Pakistan reserves the right to "pick and choose" the nuclear security measures it will undertake, adding that Islamabad will only accept such measures that are "non-intrusive."[81]

The extent to which Pakistan has shared information about its nuclear arsenal with the United States is unclear. Although, as noted, former President Musharraf has acknowledged Islamabad's sharing of some information, General Tariq Majid, Chair of Pakistan's Joint Chiefs of Staff Committee, stated November 9, 2009, that "there is absolutely no question of sharing or allowing any foreign individual, entity or a state, any access to sensitive information about our nuclear assets."[82]

The U.S. government has also reportedly offered assistance to secure or destroy radioactive materials that could be used to make a radioactive dispersal device, and to ship highly enriched uranium used in the Pakistani civilian nuclear sector out of the country.[83] Pakistan's response to these proposals is unclear.

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[76] 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.

[77] Kaushik Kapisthalam, "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/. General Kidwai has stated that "if a country can make complex nuclear weapons and ballistic cruise missiles grant it that PALs is a far simpler technology." (Cited in Martellini, 2008).

[78] Mubarakmand provided some details about Pakistan's use of such codes in the 2004 interview.

[79] "A Conversation With Former Deputy Secretary of State Richard Armitage," *PBS: The Charlie Rose Show*, November 6, 2007.

[80] Ben Arnoldy, "Could Taliban Get Keys To Pakistan's A-Bomb? Experts See The Islamic Fighters As Less Of A Risk Than Radical Insiders Gaining Access To Nuclear Materials," *The Christian Science Monitor*, May 15, 2009.

[81] Mariana Baabar, "Pak N-safety Plan," *The News International*, November 10, 2009.

[82] *Ibid.*

[83] Bryan Bender, "Pakistan, US In Talks On Nuclear Security," *The Boston Globe*, May 5, 2009.

It is worth noting that, according to some observers, spent fuel from Pakistan's Karachi and Chasma nuclear power plants could be vulnerable to theft or attack.[84] Pakistani officials have expressed confidence in the security of its facilities, however.[85]

Proliferation Threat

Many observers are concerned that other states or terrorist organizations could obtain material or expertise related to nuclear weapons from Pakistan.[86] 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.[87]

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.[88] 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."[89] 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."[90] 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." Asked during a July 20, 2009, interview whether North Korea was transferring "nuclear weapons" or related advice to North Korea, Secretary of State Hillary Clinton replied that there is "no evidence" that Pakistan is doing so.

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[84] Abdul Mannan, "Preventing Nuclear Terrorism in Pakistan: Sabotage of a Spent Fuel Cask or a Commercial Irradiation Source in Transport," in *Pakistan's Nuclear Future*, 2008; Martellini, 2008.

[85] Martellini, 2008.

[86] 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.

[87] 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 and may also have a uranium-based program. Iran is suspected of pursuing both plutonium- and uranium-based nuclear weapons programs.

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

[89] The report is available at http://www.wmd.gov/report/index.html.

[90] 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."[91]

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 with the agency's investigation of Iran's nuclear program.[92] 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.[93] 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),[94] the lists, which were issued in October 2005 and

[91] *Nuclear Black Markets*, 2007, p. 159.

[92] Personal communication, November 9, 2007.

[93] 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.

[94] 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.[95] 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.[96]

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 security clearance procedures more stringent. However, the officials also acknowledged that Islamabad still needs to do more to control its nuclear expertise.[97] Similarly, Admiral Mullen stated May 14, 2009, that the country's personnel reliability system must "continue to improve."

The United States has also provided export control assistance to Pakistan. Burns described several such efforts in his July 2007 testimony.[98] And according to an October 2007 U.S. Government Accountability Office report, Islamabad was during FY2003-FY2006 the second-largest recipient

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

[95] 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.

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

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

[98] 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."

of bilateral U.S. assistance designed to improve target countries' export controls. Pakistan received such assistance from the Departments of State, Energy, and Homeland Security.[99]

Under Secretary of State for Arms Control and International Security-Designate Ellen Tauscher told the Senate Foreign Relations Committee that the Obama administration does not support conditioning aid to Pakistan on permitting direct U.S. access to Khan, arguing, in part, that the United States has "obtained a great deal of information about the Khan network without having direct access to A.Q. Khan."[100]

Issues for Congress

Members of Congress have also expressed concerns regarding the security of Pakistan's nuclear weapons and related material. Senator Richard Lugar has spoken out in favor of using the cooperative threat reduction tools in Pakistan to help with the security of nuclear, biological, and chemical materials and weapons in the country.[101]

Additionally, a number of pieces of legislation appear designed to influence Islamabad's policies regarding the Khan network. Section 2 of H.R. 1463, which was introduced March 12, 2009, and referred to the House Foreign Affairs Committee the same day, states that U.S. military assistance may be provided to Pakistan only if the President certifies that Islamabad is both making A.Q. Khan available to the United States for questioning and "providing adequate assurances to the United States Government that it will monitor Khan's movements and activities in such a manner as to prevent his participation in any efforts to disseminate nuclear technology or know-how." This section allows the President to waive restrictions on U.S. assistance imposed pursuant to the proposed legislation if the President "certifies to Congress that it is in the national interests of the United States to do so."

H.R. 2481, the United States-Pakistan Security and Stability Act, which was introduced May 19, 2009, and referred the same day to the House Foreign Affairs Committee, the House Armed Services Committee, and the House Intelligence Committee, would require the President to "develop and transmit to the appropriate congressional committees a comprehensive interagency strategy and implementation plan for long-term security and stability in Pakistan." The strategy is to include a "description of how United States assistance" authorized by the bill "will be used to achieve the objectives of United States policy toward Pakistan," one of which is "to empower and enable" Islamabad to "maintain robust command and control over its nuclear weapons technology." The bill would authorize foreign assistance for Pakistan, including funds for improving the government's counter-insurgency capability.

H.R. 1886, the Pakistan Enduring Assistance and Cooperation Enhancement Act of 2009, would authorize U.S. assistance to Pakistan for a variety of purposes. These include strengthening

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

[100] Question #54, Pre-Hearing Questions for the Record by Senator Richard Lugar Senate Foreign Relations Committee, Nomination of Ellen M. Tauscher to be Under Secretary of State for Arms Control and International Security. http://lugar.senate.gov/sfrc/pdf/TauscherQFR.pdf.

[101] "Statement by Sen. Lugar on Nunn-Lugar and Pakistan," May 6, 2009, http://lugar.senate.gov/record.cfm?id=312588&

democratic institutions and law enforcement, as well as supporting economic development, education, human rights, and heath care. The bill would also authorize additional U.S. security assistance for Islamabad. However, Section 206 of the bill places conditions on some of this assistance; it states that no U.S. military assistance shall be provided to Pakistan if the President has not made a series of determinations, one of which is that the government "is continuing to cooperate with the United States in efforts to dismantle supplier networks relating to the acquisition of nuclear weapons related materials, including, as necessary, providing access to Pakistani nationals associated with such networks." The section includes a national security waiver. The bill also requires a report to Congress that includes a "description of Pakistan's efforts to prevent proliferation of nuclear-related material and expertise" and an "assessment of whether assistance provided to Pakistan pursuant to this Act has directly or indirectly aided the expansion of Pakistan's nuclear weapons program." The committee report underlines continuing concerns about getting full information about the activities of the Khan network and development of Pakistan's own nuclear arsenal:

> Pakistan's history of nuclear development and Dr. Abdul Qadeer Khan's establishment of a nuclear proliferation network remain a source for concern to many in the United States, particularly since the Committee understands that representatives of the United States have not interviewed certain individuals involved in the network. The Committee believes the United States should continue to engage the Government of Pakistan on the network, and should, as necessary, obtain direct access to the individuals covered by this subsection, including Dr. Khan. The Committee also maintains strong concerns regarding recent reports of Pakistan expansion of its nuclear arsenal. Given the expanding threat of Pakistan's domestic insurgency, the Government of Pakistan's further development of nuclear materials appears inconsistent with its immediate security threats and is unhelpful in the context of efforts to strengthen U.S.-Pakistani relations.

H.R. 1886 was introduced April 2, 2009, and referred the same day to both the House Foreign Affairs Committee and Rules Committee. The Foreign Affairs Committee reported the bill May 22, and the Rules Committee discharged it the same day. The bill was referred to the House Armed Services Committee May 22 and discharged June 2. On June 11, the House passed H.R. 1886, which was appended to H.R. 2410, the Foreign Relations Authorization Act, Fiscal Years 2010 and 2011. H.R. 2410 has been received by the Senate and referred to the Senate Foreign Relations Committee.

The Senate passed the Enhanced Partnership with Pakistan Act of 2009 (S. 962) unanimously on June 24, 2009. This bill would provide aid to Pakistan but does not include conditions regarding the nuclear nonproliferation or nuclear weapons activities. The Senate report (S.Rept. 111-33) says that "Any use of funds contained in this legislation for the purpose of augmenting Pakistan's nuclear weapons program would be directly contrary to Congressional intent."

S. 1707, the Enhanced Partnership with Pakistan Act of 2009 represents a compromise between H.R. 1886 and S. 962. It passed the Senate by unanimous consent on September 24, 2009. The House passed the bill on September 30. It became public law (P.L. 111-73, 123 Stat. 2060) on October 15, 2009.

Section 203 (c) of S. 1707 requires that the President certifies that Pakistan is "continuing to cooperate with the United States in efforts to dismantle supplier networks relating to the acquisition of nuclear weapons-related materials, such as providing relevant information from or direct access to Pakistani nationals associated with such networks." It also requires a Semi-Annual Monitoring Report that would include a detailed description of Pakistan's nuclear non-

proliferation efforts and an assessment of whether assistance has "directly or indirectly aided the expansion of Pakistan's nuclear weapons program, whether by the diversion of United States assistance or the reallocation of Pakistan's financial resources that would otherwise be spent for programs and activities unrelated to its nuclear weapons program."

In response to concerns expressed in Pakistan over the intent of the bill, a "Joint Explanatory Statement" was submitted for the *Congressional Record* by Senate Foreign Relations Committee Chairman John Kerry and House Foreign Affairs Committee Chairman Howard Berman. The statement emphasizes that "the legislation does not seek in any way to compromise Pakistan's sovereignty, impinge on Pakistan's national security interests, or micromanage any aspect of Pakistani military or civilian operations." Regarding reporting requirements on nuclear nonproliferation cooperation, the statement says:

> The many requirements of this report are intended as a way for Congress to assess how effectively U.S. funds are being spent, shortfalls in U.S. resources that hinder the use of such funds, and steps the Government of Pakistan has taken to advance our mutual interests in countering extremism and nuclear proliferation and strengthening democratic institutions.
>
> There is no intent to, and nothing in this Act in any way suggests that there should be, any U.S. role in micromanaging internal Pakistani affairs, including the promotion of Pakistani military officers or the internal operations of the Pakistani military.[102]

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[102] See *Congressional Record* S10429-S10431.