

NATIONAL SECURITY STUDIES PROGRAM POLICY PAPER

MANAGING THE DANGER FROM PAKISTAN'S NUCLEAR STOCKPILE

JEFFREY LEWIS

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Pakistan has a large and growing nuclear arsenal. The United States has provided substantial assistance to improve the security of Pakistan's arsenal, such that today it is largely safe and secure during peacetime. The greater danger, however, is Pakistan might place its nuclear forces on alert during a crisis with India. Such a move would disrupt many carefully designed security procedures and expose Pakistan's nuclear weapons to much greater risks of theft or unauthorized use.

Perversely, US security assistance to Pakistan's nuclear program could exacerbate the very fears that would push Islamabad, in a crisis, to alert its forces.

As a result, the United States should take care to ensure that security assistance does not reinforce Pakistani fears that such assistance is a "Trojan horse" intended to compromise the security of Pakistan's arsenal. Moreover, Washington should avoid creating the impression that it cares more about the security of Pakistan's nuclear arsenal than does Islamabad.

Moving forward, a sensible agenda for US-Pakistan nuclear security cooperation would focus on defining an end-game for US security assistance to the Pakistani nuclear program, respect for Pakistani "red lines" regarding intrusiveness, and a renewed emphasis on building strategic stability in South Asia.

Pakistan's Nuclear Arsenal

We know relatively little about the precise size and composition of Pakistan's nuclear arsenal. Probably the best that can be said is that Pakistan has enough fissile material for a small nuclear arsenal numbering in the hundreds – as opposed to tens or thousands – of nuclear weapons.

It is an open secret in Washington that the United States intelligence community believes that Pakistan's nuclear arsenal is larger than that of India. Open-source estimates usually simply take the size of Pakistan and India's large – and growing – stockpiles of fissile material and divide by the amount of plutonium or highly enriched uranium necessary to make a nuclear weapon. Such a method is

crude – the number of weapons inferred by this method can vary by a factor of three or four depending on assumptions about the production of enriched uranium and plutonium, as well as how much material is required for each nuclear device. This almost certainly overstates the size India’s arsenal.

What it says about Pakistan’s is less clear. Unlike India, Pakistan does appear to fabricate most or all of its fissile material into the form of weapons. Estimates of the amount of fissile material in each nuclear weapon can vary dramatically, and Pakistan appears to have investigated significant effort in reducing the amount of fissile material needed for each device. By most measures, Pakistan has enough fissile material for a hundred or more nuclear weapons.

So, for example, despite commonly cited open source estimates that Pakistan has approximately 60 deployed nuclear warheads¹, other plausible sources suggest Pakistan could have twice that number. Feroz Khan, a retired brigadier general from Pakistan’s Strategic Plans Division, estimated that Pakistan’s current arsenal “now contains about 80 to 120 genuine warheads, roughly double the figure usually cited by outside experts.”²

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Khan’s higher estimate should be treated with caution, but it is plausible in light of Pakistan’s inventory of nuclear-capable aircraft and ballistic missiles, which would suggest a force of roughly one hundred warheads.³

It is important to understand the United States intelligence community probably does not know with great confidence or precision the number and location of Pakistan’s nuclear weapons. And for good reason: Pakistan relies on secrecy surrounding the number, status and location of its nuclear weapons to enhance survivability. Pakistan almost certainly engages in concealment and deception regarding the number and location of its strategic forces.

Pakistan is now dramatically increasing its capabilities to produce fissile material. In essence, Pakistan has two nuclear weapons programs that exist as bureaucratic rivals – one centered on the use of enriched uranium (initially under the leadership of AQ Khan) and another emphasizing the production of plutonium under the Pakistan Atomic Energy Commission.

Khan’s enrichment program was first and remains the larger of the two. Although the size of Pakistan’s centrifuge facility at Kahuta is usually given as 3,000 centrifuges, the facility itself could house more than 10,000 centrifuges. Pakistan also continues to improve the performance of the centrifuges. It is difficult to know how much enriched uranium Pakistan is actually producing at Kahuta, but it appears more than capable of producing enough material for dozens of nuclear weapons a year if Pakistan chose to do so.

At the same time Pakistan has completed two, and has constructed a third, nuclear reactor near Khushab to produce plutonium for Pakistan’s nuclear weapons stockpile.⁴

The size of the third reactor is disputed, but taking into account the range of possibilities for the third reactor, Pakistan’s three reactors are capable of producing enough plutonium for a dozen weapons per year, possibly many more.

Whether this augers a significant increase in the size of Pakistan’s nuclear arsenal is anyone’s guess, but this much

is clear: There is a nuclear arms race in South Asia, and Pakistan is winning it.

U.S. Nuclear Security Assistance to Pakistan Since 2001

Following the terrorist attacks on New York and Washington on September 11, 2001, the United States undertook a significant program to assist Pakistan in improving the safety and security of its nuclear arsenal against theft or terrorism.

Although US law and Pakistani sensitivities constrain the scope of this cooperation, the United States has provided approximately \$100 million to Pakistan in the form of training and equipment.⁵ Overall, the classified program of US nuclear security assistance to Pakistan accounts for about one percent of the total US assistance to Pakistan over the same period.

Public descriptions of this effort are fragmentary and, on occasional sensationalistic, but the broad outlines of the US effort since 2001 is clear. U.S. assistance to Pakistan largely takes the form of security equipment and training of personnel – what is often called guns, guards and gates.

Equipment: Some of the U.S. assistance takes the form of equipment to improve the physical security of sites, including intrusion detectors, portal monitors, and material-accounting equipment. The Strategic Plans Division (SPD) is reportedly the end-user for US-supplied equipment, meaning that the United States does not know the ultimate destination of equipment provided under this program.⁶ Many press reports also mention equipment such as night-vision goggles and helicopters that the United States provides openly.⁷ It is unclear whether the approximately \$100 million figure cited in press reports includes material that has provided openly, or only material for which the SPD is the end-user.

Training: The Departments of State and Energy developed a training program that is modeled on US-Russia Cooperative Threat Reduction Program.⁸ Sandia National Laboratories in Albuquerque, New Mexico conducts the majority of such training. Since 2001, Sandia has trained approximately 200 Pakistanis, who, in turn, return to Pakistan and train local personnel. According to some reports, Sandia is also assisting Pakistan in standing up a training facility in Pakistan, probably similar to the CTR program's joint Security Assessment Training Center (SATC) at Sergiev Posad, Russia.⁹ However, the Pakistani center is not yet operational. US training also helped Pakistan to develop a personnel reliability program (PRP) similar to the one the United States uses for persons with duties associated with nuclear weapons and critical components. It seems like that Sandia provided assistance similar to that provided through the SATC to Russia in the late 1990s.¹⁰

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Pakistan does not provide the United States direct access to either the actual sites in Pakistan or personnel who work in them.¹¹

The United States did not provide Pakistan with so-called “permissive actions links” or other technical safeguards that would be integrated into the warheads. The reasons for withholding such assistance are numerous. Some accounts suggest that the Bush Administration concluded that such assistance would violate US obligations under the 1970 *Nuclear Nonproliferation Treaty*, as well as the 1954 *Atomic Energy Act*.¹² Although the legal restrictions appear daunting, willful Administrations have successfully evaded

them. In particular, the Nixon Administration provided general assistance to France – which at the time was not a signatory to the Nuclear Nonproliferation Treaty – in the 1970s that included the exchange of information on safety and security of nuclear warheads.

On the other hand, the manner in which such information might be conveyed would almost certainly alarm Pakistani officials. Although much of the public discussion about Pakistani reticence focused on the possibility that US devices might contain a “kill switch” or other Trojan-horse like features, Pakistani officials may have had more quotidian concerns related to the disclosure of sensitive national security information.

For example, in the case of U.S.-France cooperation, “French experts would describe what they were they were thinking of doing and then their American interlocutors would let them know, in general terms, whether they were on the right track.”¹³ Pakistan’s leadership is presumably reluctant to make available either the personnel for such discussions or to provide detailed design information as a basis on which the conversation might proceed. French experts apparently disclosed significant design information in exchanges on safety and security.

Safety and Security

On a day-to-day basis Pakistan’s stockpile of nuclear weapons is probably safe and secure. Pakistan substantially reorganized of its nuclear forces following its nuclear tests in 1998 and the 1999 coup that brought Pervez Musharaf to power. Pakistan created a National Command Authority, staffed by a new Strategic Plans Division, as well as Strategic Commands in the Army, Navy and Air Force.¹⁴ The SPD comprises four main directorates, as well as a security division of approximately 10,000 troops for guarding nuclear facilities.¹⁵ The SPD has overseen a significant reorganization of the procedures for securing Pakistan’s bomb, including the aforementioned creation of the Personnel Reliability Program.

Pakistan currently renders most of its fissile material into weapons that are then stored in a form of disassembly, with the “cores” of fissile material stored separately from the rest of the nuclear weapons.¹⁶ In 2001, for example, a U.S. Defense Department report described Pakistan’s weapons as being stored in “component form.”

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These components are under SPD guard at perhaps a half-dozen facilities in Pakistan. The weapons components would also be stored separately from aircraft or missiles, which would not normally be on “alert” in the sense of keeping armed-aircraft out on the tarmac or sending armed-missiles into Pakistani hinterland.

Pakistan also appears to have installed coded-control devices that require the entry of a secret an alpha-numeric code to arm an assembled weapon. Since the early 2000s, Pakistani officials, such as General Khalid Kidwai, have described the Pakistani system as the “functional equivalent” of permissive action links on Pakistan’s nuclear weapons – leading journalist David Sanger to dub them PakPALS.¹⁷

In the United States, PALS are integrated into the design of nuclear weapons in order to prevent unauthorized users from bypassing the system. It seems plausible, however, that Pakistani officials use “PALS” more loosely to include a range of security features beyond tamper-resistant permissive action links, to include environmental sensing devices and coded use-control features.¹⁸ Just as people use Kleenex, Xerox and Coke to refer to facial tissue, photocopying and soda pop, so “permissive action link” has lost much of its specificity.

Published descriptions of Pakistan’s use control devices describe them as “installed at the time of the manufacture

of these weapons” and that authorities issue the codes shortly before use, presumably to a pilot or missileer, in order to arm the weapon.¹⁹ In all likelihood, then, PakPALS are not PALS at all. Rather Pakistan has installed coded-control devices that allow the arming of a nuclear weapon from either the cockpit of an aircraft or a missile launcher. (The weapons may also include environmental sensing devices that, once the weapon is armed, must sense a specific environment before the weapon can detonate.)

Such use-control devices are an important safeguard, but codes (which are typically assigned to large groups or classes of weapons) can be exposed and external devices bypassed. “Tamper resistance” is a distinguishing feature of the modern Permissive Action Links, which are designed to resist efforts to bypass them and remain secure during maintenance activities such as replacing batteries.

The greater danger is that, in a crisis, Pakistan might assemble its nuclear weapons and, with the case of mobile ballistic missiles, put them in the field under the control of relatively low-level commanders.

Although there has been some concern about the day-to-day security of Pakistan’s nuclear weapons following a series of terrorist attacks on Pakistani facilities that are believed to be associated with the nuclear weapons program, Pakistan’s nuclear components are probably as secure as human fallibility allows. It remains unclear if terrorists understood that the targets contained nuclear weapons, or were simply attracted by the heavy security presence.²⁰ Moreover, suicide bombings at the gates of a munitions facility, such as occurred at Wah in 2008, is not comparable to planning either a penetrating attack on heavily guarded facilities or infiltrating a nuclear weapons organization. Pakistan’s simple security precautions appear sufficient for most threats.

The greater danger is that, in a crisis, Pakistan might assemble its nuclear weapons and, with the case of mobile ballistic missiles, put them in the field under the control of relatively low-level commanders. The ability to assemble and deploy Pakistani’s nuclear weapons relatively quickly is an important aspect of the Pakistani planning to preserve the survivability of Pakistan’s nuclear weapons in a crisis. “Whether separated by a yards or miles,” Kidwai told a journalist, “the weapons will be ready to go in no time.”²¹

Once the weapons are, in Kidwai’s phrase, “ready to go,” they are also considerably more vulnerable. The weapons would be assembled and normal security procedures would be suspended. It is possible that authorization codes would be given to commanders to guard against a breakdown in communications or perhaps widely known throughout units.²² With the usual routine disrupted, the possibility of unexpected interactions or cascading errors must be a real concern. Under such conditions, Pakistan’s nuclear weapons would be much more vulnerable to theft, accident or unauthorized use.

Perverse Incentives

Today, the greater threat is that Pakistan will place its forces on alert. Many of Pakistan’s security procedures appear to also compromise the survivability of Pakistan’s nuclear weapons, creating adverse incentives for Pakistani policy-makers in a crisis. It was precisely the prospect that “Pakistan was preparing its arsenal for nuclear use” that prompted the Clinton Administration to press then-Prime Minister Nawaz Sharif to de-escalate the 1999 Kargil crisis.²³

The United States has a substantial interest in keeping Pakistan’s nuclear forces in their hardened bunkers. US security assistance to Pakistan’s nuclear program could, however, create incentives for Pakistani leaders to bring those weapons out. It is important to understand that American and Pakistani policymakers view Islamabad’s nuclear arsenal very differently. While Americans

understandably focus on the risk from Pakistan's nuclear weapons, Pakistani officials view their nuclear weapons primarily as a deterrent to India.

This difference in perception can create perverse incentives. If Pakistani officials, for example, believed that the consultations with the U.S. had compromised the location of Pakistan's nuclear weapons, they might feel pressured early in a crisis to put those weapons on alert – either to guard against a US effort to seize the weapons or an Indian preemptive strike. An extreme possibility is that Pakistani officials might routinely keep a small number of nuclear weapons assembled and “out of the count” as a hedge against a surprise attack, undermining much of the effort to improve security throughout the force.

Reports that the United States has a special unit, or plans, to attempt to seize Pakistan's nuclear stockpile are distinctly not helpful in this regard. The United States does have Nuclear Emergency Search Teams that train for rapid deployments in the event of a lost nuclear weapon or a radiological event. (Some exercises have been declassified.) It is important that Pakistani officials believe that units like this would not be used in a non-permissive environment.

More broadly, there is a danger that arises when Washington sounds more concerned than Islamabad about the security of Pakistan's arsenal.

More broadly, there is a danger that arises when Washington sounds more concerned than Islamabad about the security of Pakistan's arsenal. Pakistani officials justifiably feel some confidence in the security of their arsenal. From time to time, U.S. policymakers let the sentiment that we care more than they do slip into their remarks. Secretary of State Clinton, for instance, recently complained “I don't hear that kind of outrage or concern ...

within the highest echelons of the civilian and military leadership of Pakistan” about the possibility of Pakistan's nuclear weapons falling into the hands of jihadists.

Such statements reinforce the perception that, ultimately, the United States will not simply settle for assisting Pakistan, but will also seek to “to extend our own axis of security to their nuclear stockpile.”

Moreover, Pakistani leaders may conclude that an insatiable U.S. demands for better security provide leverage in other areas of foreign policy. To some extent, it is precisely the danger of the Pakistan's nuclear weapons falling into the wrong hands that ensure the United States is ready to provide significant amounts of assistance to Pakistan, as well as to mediate its disputes with India.

Recommendations

By most anecdotal measures, U.S. security assistance to Pakistan's nuclear weapons program has been successful. Pakistan appears to have substantially reduced the risk of the theft or unauthorized use of a nuclear weapon.

At the same time, Pakistan is greatly expanding its ability to produce fissile material and continued to posture its forces in a way that detracts from crisis stability. Ultimately, a long-term strategy for minimizing the risk of theft or unauthorized use of Pakistan's nuclear arsenal will have to address these concerns.

Develop an endgame for security assistance to Pakistan's nuclear program. At some point, assistance to Pakistan's nuclear program will experience diminishing returns. There are only so many guns, guards and gates that are needed. At some point, continued U.S. involvement will only serve to deepen suspicions that the United States real goal is to somehow seize Pakistan's nuclear weapons.

Respect Pakistan's limits on cooperation. In 2009, press reports suggested that the United States was pressing

Pakistan to expand cooperation to include a joint program to secure or destroy radioactive materials and to ship some highly enriched uranium to the United States.²⁴ Although it is easy to understand the U.S. desire to bring some highly enriched uranium to the United States, the story provoked outraged editorials in the Pakistani press about the United States “all-consuming fear” and Pakistan’s potential “nuclear surrender.” Similarly, there is no need to provide Pakistan with detailed design information on Permissive Actions Links.²⁵ The current constraints on cooperation reflect the realities of Pakistani politics, for better or for worse.

Shift US efforts to building strategic stability in South Asia.

At this point, the most significant dangers in South Asia are posed by Pakistan’s rapidly expanding nuclear stockpile and the possibility that it may place its forces on alert. Over the long term, managing the terrorist threat to Pakistan’s nuclear weapons will require addressing these two problems. Moreover, focusing on strategic stability will help address Pakistani concerns that the United States has ulterior motives in assisting Pakistan.



1 2010 SIPRI Yearbook, “Chapter Eight, Section VIII, Pakistani Nuclear Forces,”

June, 2, 2010. Available at <http://www.sipri.org/yearbook/2010/08>

2 Thomas Ricks, “Calculating the Risks in Pakistan,” *Washington Post*, December 2, 2007, [http://www.washingtonpost.com/wp-](http://www.washingtonpost.com/wp-dyn/content/article/2007/12/01/AR2007120101618.html)

[dyn/content/article/2007/12/01/AR2007120101618.html](http://www.washingtonpost.com/wp-dyn/content/article/2007/12/01/AR2007120101618.html)

3 Pakistan’s strategic forces may include approximately 32 F-16 sold by the United States in the 1980s, as well as Pakistan’s stockpile of short- and medium-range ballistic missiles.

4 Paul Brannan, “Construction of Third Heavy Water Reactor at Khusab Nuclear Site in Pakistan Progressing,” *ISIS Reports*, October 5, 2010, <http://isis-online.org/isis-reports/detail/construction-of-third-heavy-water-reactor-at-khushab-nuclear-site-in-pakistan/>

5 David Sanger and William Broad, “U.S. Secretly Aids Pakistan in Guarding Nuclear Arms,” *New York Times*, November 18, 2007,

<http://www.nytimes.com/2007/11/18/washington/18nuke.html>

6 See Mark Fitzpatrick, ed. “Nuclear Blackmarkets: Pakistan, A.Q. Khan and the rise of proliferation networks, A Net Assessment,” IISS, May, 2007,

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

7 For example, a US Embassy press release states: “Assistance provided and delivered has included support for medical aid, school refurbishment, bridge and well reconstruction, food distribution, agricultural and education projects, 14 F-16 fighter aircraft, 10 Mi-17 helicopters, more than 450 vehicles for Pakistan’s Frontier Corps, hundreds of night vision goggles, day/night scopes, radios, and thousands of protective vests and first-aid items for Pakistan’s security forces.”

<http://islamabad.usembassy.gov/pr-10051803.html>

8 For a comparison of CTR with a notional US-Pakistan bilateral arrangement by a senior scientist at Sandia, see Arian Pregoner, “Securing Nuclear Capabilities in India and Pakistan: Reducing the Terrorist and Proliferation Risks”, *The Nonproliferation Review* (2003), 124-131.

9 Leppingwell, John W., and Nikolai Sokov. “Strategic Offensive Arms Limitations and Weapons Protection, Control and Accounting.” *The Nonproliferation Review* (2000)

10 Assistance to Russia included polygraphs, drug and alcohol test kits, as well as analytic equipment. The Pakistani program appears to differ in emphasis, focusing less on drinking, for example, and more on personal finances and religious attitudes.

11 According to Mark Fitzpatrick, Pakistan imposed three conditions on the assistance program – Pakistan would not accept any intrusion it deemed unwarranted; Pakistan would select the technologies to be provided; the SPD would be the end-user -- that prevented such access.

12 David Sanger, “Obama’s Worst Pakistan Nightmare,” *New York Times Magazine*, January 8, 2009, <http://www.nytimes.com/2009/01/11/magazine/npakistan-t.html?pagewanted=all>

13 Ullman, *Covert French Connection*, 15.

14 The National Command Authority arrangements were adjusted again in 2009, after Pakistan returned to democracy.

15 Kenneth N. Luongo and Brig. Gen (Ret.) Naeem Salik, “Building Confidence in Pakistan’s Nuclear Security,” *Arms Control Today*, December, 2007, http://www.armscontrol.org/act/2007_12/Luongo

16 Large stockpiles of highly enriched uranium not rendered into weapons would be a source of concern if protection and accounting were inadequate.

17 David Sanger, *The Inheritance: The World Obama Confronts and the Challenges to American Power*, Crown Publishing Group, New York, January, 2009, 528pp.

18 David Albright, “Securing Pakistan’s Nuclear Weapons Complex,” 42nd Strategy for Peace Conference, Strategies for Regional Security (South Asia Working Group), October 25-27, 2001, Airlie Conference Center, Warrenton, Virginia.

- 19 Dr. Samar Mubarakmand, who is the chairman of National Engineering and Scientific Commission (NESCOM)
- 20 “These are large facilities. It’s not clear that the attackers knew what these bases might have contained. In addition, the mode of attack was curious. If they were after something specific, or were truly seeking entry, you’d think they might use a different tactic, one that’s been employed elsewhere — such as a bomb followed by a small-arms assault. Simply touching off an explosive outside the gate of a base — with no follow-up — doesn’t get you inside. For those reasons, I wouldn’t extrapolate from these incidents any kind of downgrade in the security of the Pakistani nuclear arsenal.” Anonymous US official quoted in Robert Mackey, “Have Pakistani Nuclear Facilities Already Been Attacked?” *The Lede*, August 11, 2009.
- 21 Ron Moreau, “Pakistan’s Nukes,” *Newsweek*, January 26, 2008, <http://www.newsweek.com/2008/01/25/pakistan-s-nukes.html>
- 22 Bruce Blair has argued that US “unlock” codes for ICBMs were set to 00000000 during much of the Cold War. Bruce Blair, “Keeping President’s in the Nuclear Dark,” *CDI*, February 11, 2004, <http://www.cdi.org/blair/permissive-action-links.cfm>
- 23 There is a second, disputed account that a similar mobilization prompted the Bush Administration in 1990.
- 24 Bryan Bender, “Pakistan, US In Talks On Nuclear Security,” *The Boston Globe*, May 5, 2009.
- 25 Two options that might be pursued, however, would be to declassify addition design information about safety and security features, as well as sharing that information with third parties such as China or France on the understanding that it would be made available to Pakistan.



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	 NEW AMERICA FOUNDATION WWW.NEWAMERICA.NET
<p>MAIN OFFICE 1899 L Street, NW Suite 400 Washington, DC 20036 Phone 202 986 2700 Fax 202 986 3696</p>	<p>CALIFORNIA OFFICE 921 11th Street Suite 901 Sacramento, CA 95814 Phone 916 448 5189</p>