



Chapter five

PAKISTAN'S NUCLEAR OVERSIGHT REFORMS

A.Q. Khan's proliferation activities were not the only source of international concern about the security of Pakistan's nuclear assets. In October 2001, shortly after the terrorist attacks on the World Trade Center and the Pentagon, the standard of security requirements for Pakistan's nuclear weapons became a matter of grave concern to the US. Early that month, Washington learned that two retired Pakistani nuclear scientists, Sultan Bashirudin Mahmood and Abdul Majid, had been meeting with al-Qaeda leaders in Afghanistan as recently as mid-August. Majid was a nuclear fuels expert at the Pakistan Institute of Nuclear Science and Technology (PINSTECH), from which he retired in 2000. Mahmood, until he resigned in 1999, was director for nuclear power at the Pakistan Atomic Energy Commission (PAEC) and the self-professed chief designer and director of Pakistan's Khushab atomic reactor. Mahmood had also been a pioneer in setting up Pakistan's uranium enrichment programme (see page 18) before A.Q. Khan took it over. Upon leaving PAEC (having been demoted for supporting militant Islamic groups and opposing Pakistan arms control policy), Mahmood founded the Ummah Tameer-e-Nau (UTN, a loose translation of which is 'Islamic revival') charity relief agency, which he used as a front to help the Taliban. UTN included a number of Pakistan's radicalised elite, including engineers, physicists, chemists, military officers and ISI members. In several meetings with Osama bin Laden, his Egyptian deputy Ayman al-Zawahiri and other al-Qaeda members, Mahmood and Majid discussed nuclear weapons technology.

According to the head of Libyan intelligence Musa Kousa, UTN also approached Libya to offer help in 'building a nuclear bomb'.¹ Mahmood made clear in public speeches his view that Pakistan's nuclear capability was the property of the global Muslim community. Shortly after receiving intelligence

information from the US, the ISI arrested Mahmood and Majid on 23 October 2001 on suspicion of a 'violation of the code of conduct' (stipulating that retired scientists should not work for foreign organisations) and called in several other members of the UTN for questioning. In late January 2002, the scientists were released from detention (although placed under house arrest) on the grounds that a trial would cause embarrassment for the government and risk the disclosure of nuclear secrets.² Mahmood and Majid were not weapons experts, and by themselves could not have provided al-Qaeda with the ability to build a nuclear weapon. They would have had knowledge useful for making radioactive bombs, but whether they discussed such so-called 'dirty bombs' with al-Qaeda is unknown. Mahmood, who failed several polygraph tests, said he explained to bin Laden the difficulty of setting up a uranium-enrichment plant, whereupon bin Laden asked, 'what if you already have the enriched uranium?'³ When senior US officials read the debriefing, they became convinced that the US needed to do what it could to help Pakistan keep its nuclear assets from falling into terrorist hands.

Command and control

In fact, Pakistan had been taking steps to strengthen nuclear controls since May 1998, when the nuclear tests fundamentally altered the nation's external and internal security environment. Since then, Pakistan's nuclear control infrastructure has gone through four phases. In the immediate post-test period, broadly from 1998–99, the government began to consider a formal command-and-control system for the first time. In the second phase, General Pervez Musharraf, in his role as chief of army staff, implemented his initial reforms between 1999 and 2001. This phase was facilitated by the absence of any further need to keep the nuclear programme strictly clandestine. The

compartmentalisation that had contributed to the lack of oversight also made it easier to reorganise the military bureaucracy. Revelations about A.Q. Khan's onward proliferation galvanised Pakistani authorities to erect a series of accountability and oversight measures, some of which were already under way. The officials responsible for KRL security, who had previously enjoyed unquestioned authority and been paid by Khan himself, were now required to report to the military, not just to the head of their own organisation.⁴ The permissive environment that Khan and his associates had enjoyed also began to change, and for the first time they were asked to account for their financial dealings and foreign travel plans. Although he was alerted by these very same security officials, Khan's growing recklessness finally led to his dismissal. The attacks of 11 September fundamentally changed Pakistan's security relationships, launching a third phase (2001–03) in Pakistan's new security structure. Musharraf, now as president, further consolidated nuclear oversight and control. In response to US pressure a fourth phase began at the end of 2003 with the exposure and unravelling of Khan's network, prompted by Iran's acknowledgement that August of the foreign origin of its centrifuge equipment and Libya's shocking announcement about its nuclear and chemical weapons programmes in December. Khan's house arrest and confession followed, along with the new export control legislation.

Early arrangements

The exact shape of the Pakistani nuclear policy-making organisation prior to the 1998 tests is unclear. One Pakistani report states that Z.A. Bhutto took direct charge of the nuclear programme after the 1974 Indian test (abolishing the inter-ministerial committee in charge of nuclear issues).⁵

During Zia's time (July 1977 to 18 August 1988), the office of the president and chief of army staff (COAS) was one and the same as far as nuclear matters were concerned. Upon Zia's death, the civilian G.I. Khan took over as president and assumed the formal decision-making responsibilities, but brought COAS Beg into the nuclear loop to handle weaponisation aspects. G.I. Khan was still the final authority on all financial and nuclear development matters. In 1993, when the president and prime minister both left simultaneously and there was an interim government, G.I. Khan transferred all responsibilities and relevant documents to COAS Waheed, who lengthened the chain of command, appointing a major-general as Director General

of Combat Development to be the nuclear policy contact point. Even then, however, the chief of army staff was not formally considered the authority over all nuclear organisations, especially KRL.

Several authoritative sources have reported that a nuclear decision-making committee has existed since 1975. One source is Mushahid Hussain, a senator close to Musharraf, who stated that from 1975 to 1991 the nuclear programme was supervised by a committee headed by G.I. Khan, who became president in 1988.⁶ There is some confusion on the nature of this committee: it may be a reference to the three-person body created in 1976 to oversee KRL and possibly PAEC activities; or alternatively to the 'troika' which after 1988 oversaw the nuclear programme. The latter included the president (G.I. Khan), the chief of army staff (Beg), and the prime minister (B. Bhutto).⁷ Another source is General Beg, who has stated that there was a 'National Nuclear Command Authority' from 1975, headed by the 'chief executive'. This was clearly the predecessor to the National Command Authority, which Pakistan says was created only in 2000 (see below). According to Beg, the predecessor body included a 'Nuclear Command Committee' which took the main decisions; this committee comprised six individuals, including the prime minister, the president, and the chief of army staff.⁸ Others have referred to the nuclear committee as an ad hoc body with varying membership, created by Zia in 1977. In any case, by as late as 1990, Pakistan's 'nuclear club' was limited to six or seven people.⁹ The committee was always nominally headed by the president, but was in practice chaired by the chief of army staff (who, in the cases of Zia and later Musharraf, were identical).

Hussain has stated that the committee that existed since 1975 later 'evolved into a broader body, conceived and planned since 1991'.¹⁰ The date 1991 indicates that the reorganisation of the NNCA may have been decided by G.I. Khan and Beg. In 1993, after G.I. Khan's resignation, the role of the president became weaker (an evolution later sanctioned by the 1997 constitutional amendment), and G.I. Khan's successors were probably not directly involved in all key nuclear decisions. Prime ministers had only a limited knowledge of nuclear matters and were only involved in some policy decisions through the Defence Committee of the Cabinet. It was in this body that, for instance, the decision to test was taken in 1998.

Although nuclear decision-making arrangements until 1999 changed over time, depending on

Nuclear command and control reforms and other steps

1998

- **May:** Pakistan tests six nuclear devices
- **October:** General Pervez Musharraf appointed chief of army staff
- **December:** Strategic Plans Division (SPD) informally commences activity

1999

- Musharraf submits plan for a national command authority (NCA), with the SPD as secretariat, to take charge of operational, financial and security controls over all strategic organisations
- **October:** Musharraf deposes Prime Minister Sharif in a military coup
- Musharraf formalises military's role in Pakistan's policymaking process through creation of National Security Council (NSC)

2000

- **February:** NSC consolidates nuclear command-and-control structure and establishes full accountability for all nuclear laboratories

- **November:** All organisations in nuclear and missile programmes put under NCA control

2001

- **January:** The National Engineering and Scientific Commission, headed by a PAEC official, created on top of the National Development Complex (NDC); new division of labour makes PAEC responsible for mining and reprocessing, KRL for enrichment, and NDC for weaponisation issues
- **January:** Pakistan Nuclear Regulatory Authority begins to oversee safety procedures and radiation protection in civilian nuclear facilities
- **June:** Musharraf declares himself president of Pakistan
- **September:** Pakistan agrees to join US-led effort against al-Qaeda and supporters in Afghanistan
- **October:** US learns two retired Pakistani nuclear scientists had been meeting with al-Qaeda leaders; ISI detains the scientists for three months

2004

- Exposure of Khan network
- **April:** UNSCR 1540 mandates all countries to develop effective measures to prevent illicit trafficking of sensitive nuclear materials
- **September:** Pakistan's parliament adopts 'Export Control on Goods, Technologies, Material and Equipment Related to Nuclear and Biological Weapons and their Delivery Systems Act'
- **October:** Pakistan provides 11-page report on national measures to implement UNSCR 1540

2005

- **August:** Pakistan observes a Proliferation Security Initiative (PSI) exercise for the first time
- **September:** Pakistan provides 125-page follow-up matrix of national compliance to UNSCR 1540

2006

- **March:** Pakistan joins Container Security Initiative (CSI)

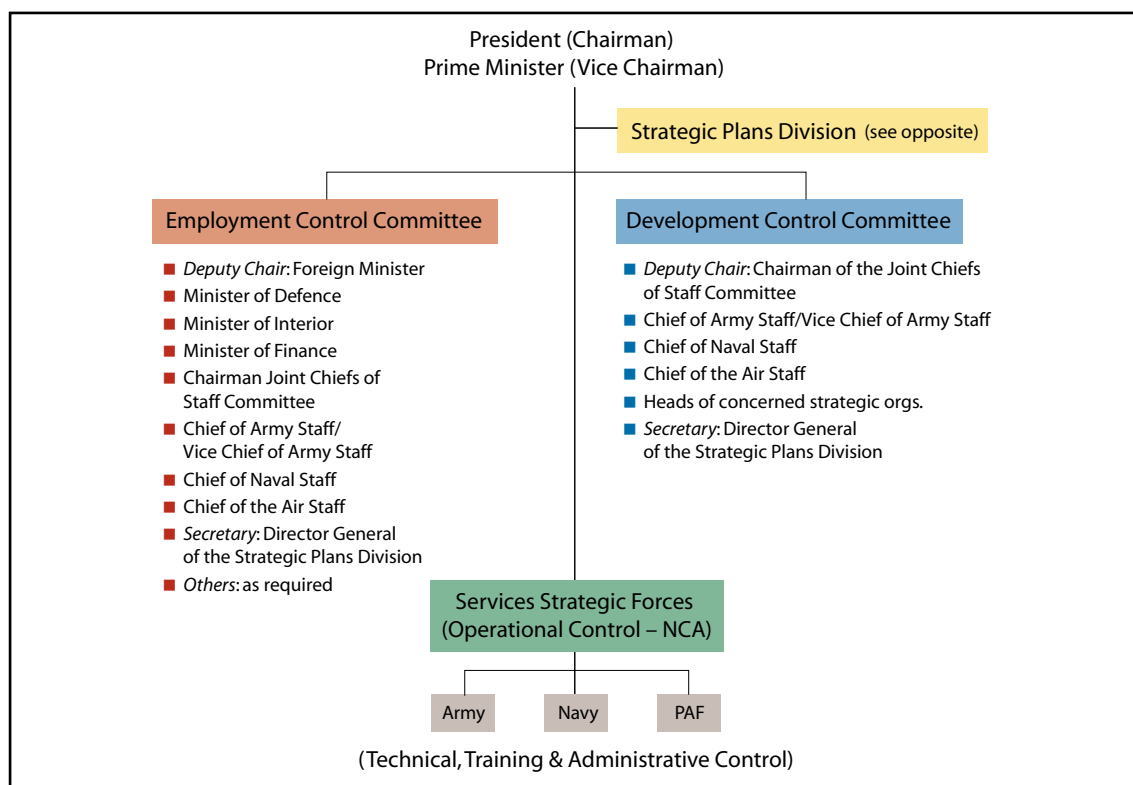
the structure of power, they were always under the control of a very small number of individuals. From 1975 until 1988, nuclear decision-making was under the tight control of one man (Bhutto, Zia); from 1988 until 1993, it was shared between the president and the chief of army staff; from 1993 until 1999, the latter became the central figure, while prime ministers were involved in a limited way.

The 1999–2001 reforms¹¹

Pakistan's nuclear command-and-control apparatus was completely restructured between 1999 and 2001. As the first army chief to assume power after Pakistan had become an overt nuclear weapons state, Musharraf had both the motivation and the means to carry this out. One of his first acts was to order a reorganisation of the military bureaucracy within the army's General Headquarters (GHQ). Specifically, he ordered the creation of a Strategic Plans Division (SPD), which commenced activity in December 1998, although not formally under that name until the next spring. The Sharif government had previously tasked the army to prepare a

new command-and-control arrangement. In April 1999, Musharraf submitted a written plan, under study since the nuclear test the previous year, for a national command authority, with SPD as the secretariat, to take charge of operational, financial and security controls over all strategic organisations. One of Musharraf's primary concerns was to establish harmony between Pakistan's poorly coordinated and competitive nuclear establishments. His plan merged the two existing directorates of the Combat Development Directorate (CD Directorate), along with two new ones – the Operations and Plans Directorate and the Command and Control and Intelligence Directorate – into the now officially designated Strategic Plans Division within GHQ.¹² Sharif approved the plan with minor modifications.

After Musharraf seized chief executive power in October 1999, he created a National Security Council (NSC), a reform that Nawaz Sharif had previously refused COAS General Jehangir Karamat. The NSC for the first time formalised the role of the military in Pakistan's policymaking machinery, serving as 'a forum for consultation on strategic matters



National Command Authority (courtesy of SPD)

pertaining to the sovereignty, the integrity and security of the State'. It is convened and chaired by the president, and comprises all the main civilian and military leaders – a total of 13 members.¹³ But the NSC as such is not involved in nuclear decision-making; given that its members include the leader of the opposition in the national assembly and the elected chief ministers of all four provinces, it is not a forum in which particularly sensitive strategic matters can be discussed.

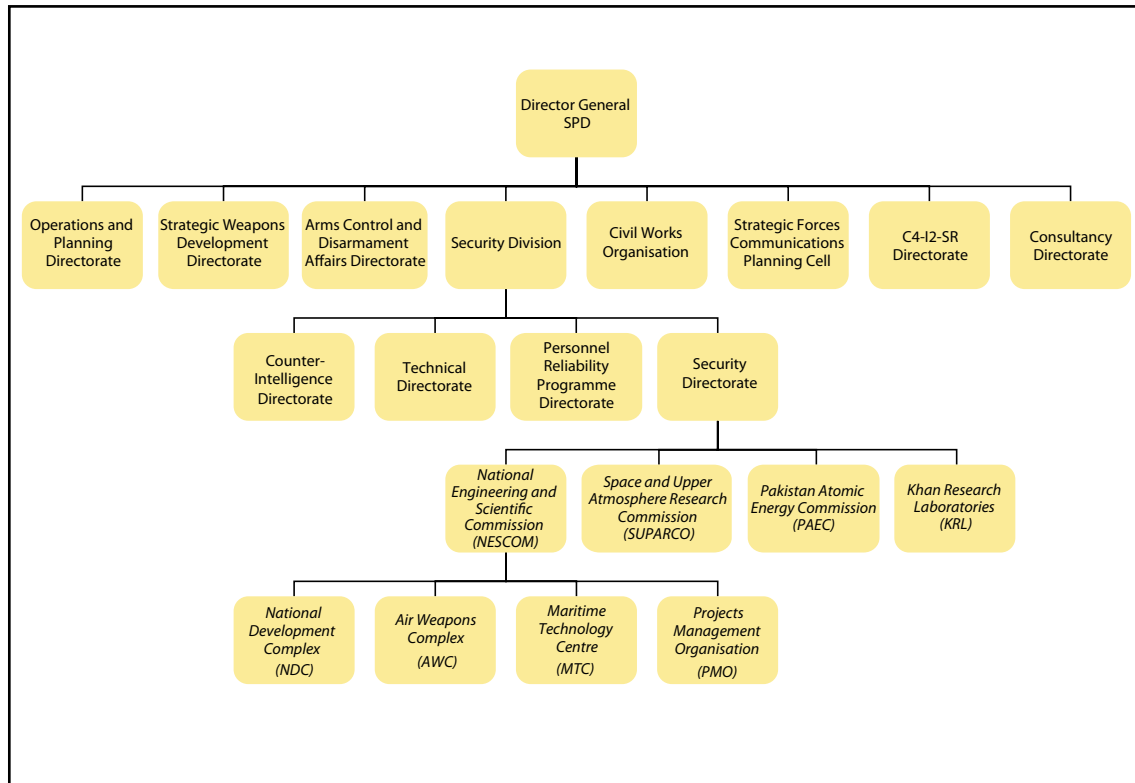
In February 2000, the NSC announced a consolidation of nuclear command-and-control structures, which for the first time brought KRL under *de jure* military control (in order, *inter alia*, to prevent potential freelance nuclear-related activities) and established full accountability for all nuclear laboratories. The command-and-control structure, sometimes referred to as the Strategic Command Organisation, is comprised of three tiers: a National Command Authority (NCA); the Strategic Plans Division, and the strategic force commands of the three military services. In November 2000, all organisations participating in the nuclear and missile programmes were put under the control of the NCA. Two months later a new body, the National Engineering and Scientific Commission (NESCOM), was created on top of the

National Development Complex (NDC) and other strategic programmes organisations, under the leadership of a key PAEC official, Samar Mubarakmand, as NESCOM chairman. The nuclear and conventional programmes of institutions such as the NDC were separated.¹⁴ A new division of labour was instituted: PAEC became solely responsible for mining and reprocessing, KRL for enrichment, and NDC for all weaponisation issues.¹⁵ The new organisation became fully operational in 2001.

National Command Authority

The NCA is composed of the top civilian and military officials, and is meant to make all major decisions regarding nuclear policy, procurement, planning and use. It is chaired by the president, with the prime minister as vice chairman (when first established these positions were not filled and it was chaired by Musharraf in his role as chief executive until he assumed the title of president in June 2001).

The NCA is the highest decision-making authority in the country and was reportedly designed to ensure that in time of crisis all of Pakistan's leaders would have a complete picture of the military situation, encompassing both conventional operations



Organisation of Strategic Plans Division (courtesy of SPD)

and nuclear planning. On paper, civilians have a major share of responsibility in the NCA, an authority Prime Minister Jamali exercised at a 31 January 2004 NCA meeting in which he argued against a trial for A.Q. Khan on political grounds. In practice, the military would probably prevail on nuclear decision-making during wartime or a military crisis. According to a respected Pakistani strategist, 'the final authority to launch a nuclear strike is dependent upon consensus within the NCA, with the chairman casting the final vote'.¹⁶

The NCA consists of the Employment Control Committee (ECC) and the Development Control Committee (DCC), both chaired by the president. The foreign minister is deputy chairman of the ECC, the body which defines nuclear strategy, including the deployment and employment of strategic forces, and would decide on nuclear use. The committee includes key ministers as well as the respective military chiefs. The ECC reviews presentations on strategic threat perceptions, monitors the progress of weapons development, and decides on responses to emerging threats. It also establishes guidelines for effective command-and-control practices to safeguard against the accidental or unauthorised use of nuclear weapons.

The chairman of the Joint Chiefs of Staff Committee is deputy chairman of the DCC, the body responsible for weapons development and oversight which includes the nation's military and scientific, but not its political, leadership. 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 and their delivery systems. Functioning through the SPD, the DCC oversees the systematic progress of weapon systems to fulfil the force goals set by the committee.

Strategic Plans Division

The SPD, which has evolved into a true 'nuclear enclave', is the key to Pakistan's nuclear management. It was the evolution of SPD that led to the establishment of systematic control over the varying strategic organisations and gave strategic direction to the nuclear programme. The SPD functions under the chairman of the Joint Chiefs of Staff Committee and reports to the president and the prime minister directly. Headed by an army three-star general (a reflection of the army's dominant position in the hierarchy), it acts on behalf of the NCA and assists the

president and prime minister in exercising control over the strategic organisations. Pakistan lacked an entity dedicated to the oversight of these organisations while its nuclear programme remained covert. Previously, they were directly controlled only by the office of the president or prime minister; this was a key factor contributing to the loss of control over A.Q. Khan.

SPD organisation: In addition to functioning as the secretariat to the National Command Authority, the 50-officer-strong SPD also performs the role of developing nuclear policy, an arms-control agency and a nuclear-security watchdog. Observers generally agree that the SPD, headed by Lt-Gen. Khalid Kidwai, has taken firm control of Pakistani nuclear organisation and policy. With the SPD, the military for the first time had an organisation that could develop organisational competency and authority over the sizeable nuclear programme.

An immediate problem faced by SPD investigators in 1999 was the professional risk associated with confronting a man of A.Q. Khan's stature. SPD therefore turned its attention to formulating standard operating procedures for the regulation of, and a code of conduct for, strategic organisations. Firstly, SPD created operational procedures for scientific organisations concerning contact with the media and for obtaining clearance for any publication activity. Secondly, clearances now became necessary for all travel abroad by members of the relevant scientific organisations. Finally, reporting on all financial expenditures became a requirement. These three requirements placed pressure on A.Q. Khan, who clashed with SPD over travel, media appearances and the unauthorised sale of conventional military equipment to foreign governments.

Strategic force commands

At the third tier, separate strategic force commands were created in each of the services: the Army Strategic Force Command; the Air Force Strategic Command; and the Naval Strategic Force Command. The three services retain training, technical and administrative control over their respective forces, but operational control is under the jurisdiction of the NCA, which provides military direction through the chairman of the Joint Chiefs of Staff Committee, which is housed in the National Command Centre.

Nuclear security

A.Q. Khan's revelations accelerated the changes to the SPD's command-and-control infrastructure that had

been ongoing since 1999. One of the greatest flaws in the system was the lack of any formal oversight of the strategic organisations. Security arrangements since the inception of the nuclear programme were designed to protect it from outside interference, espionage and physical threats, including sabotage. There was no formal reporting channel within the security apparatus to account for imports and exports, personal travel and other details which may have revealed suspicious activity. In addition, material protection, control and accounting procedures were rudimentary. Nuclear security and safety were always considered highly classified national secrets, while the process of ensuring safety and security requires access to and inspections of facilities, as well as nuclear material accounting. By implication, this would reveal locations, capacities and overall stockpiles. This was a serious defect in the system, which SPD has had to grapple with since its formation.

Since the 1999–2001 reforms, three levels of nuclear security are said to exist. The first is the laboratories' own procedures. The second, and probably the most important, is the SPD, which controls between 8,000 and 10,000 personnel overall. The SPD has a special unit that is in charge of nuclear security; this group – reportedly 1,000 strong – is endowed with its own intelligence capability, and led by a two-star general. It has adopted a concept of 'perimeter multilayered security'. This organisation coordinates with all intelligence agencies about any external military or espionage threat to Pakistan's nuclear infrastructure.

The ISI, Pakistan's premier intelligence agency, forms the third, 'outer ring' of security. It operates in conjunction with the security division, reporting directly to Musharraf. Before these reforms, there was no formal role for the ISI in nuclear matters. The Director General of the ISI is only an invited, not a full, member of the Pakistani National Command Authority. The security operations of all major organisations are coordinated by four separate security directorates that report directly to the Director General of the Security Division, who in turn reports to the head of the SPD, and finally to the chairman of the Joint Chiefs of Staff Committee. This committee is the highest level of joint military integration; it also houses the National Military Command Centre and is the focal point of integrated intelligence and the nuclear command authority.

In addition, the security division has a Technical Directorate headed by a brigadier-general. This

directorates examines a wide range of possible technical upgrades including, *inter alia*, infrared and motion sensors, locks, video cameras and communication devices.¹⁷ The directorate has worked closely with other countries, including the US, in purchasing necessary equipment.

Personnel reliability

The SPD asserts that it has established a system that requires approval, reporting and monitoring of travel for all scientific personnel and especially those that possess sensitive information or expertise. This body now scrutinises all prospective visits abroad by such personnel, including visits to IAEA functions in Vienna, which require specific travel clearances. Retired scientists are retained within the country in post-retirement positions to preclude potential recruitment by foreign entities, but also to allow the nation to continue to benefit from their expertise. Revelations that the two senior retired Pakistan nuclear scientists had discussed nuclear weapons with Osama bin Laden made Islamabad realise that it had to keep a close watch not just over scientists and officials currently serving in sensitive posts, but also those who had retired. SPD claims to have improved the Personnel Reliability Programme (PRP) for all scientists and officials working on sensitive projects and has introduced a Human Reliability Programme for all military personnel involved with the nuclear forces. The PRP maintains separate reliability programmes for civilians and defence personnel. The data relating to defence personnel are essentially the responsibility of the parent service, whose security clearance and service records are given to the PRP Directorate, which then scrutinises each individual before assigning strategic roles.

This is a new experience for Pakistan, although concerned Pakistani officials had been interested in establishing such a programme since early 2001.¹⁸ In the United States, 'personnel reliability' includes those measures that ensure that all people responsible for handling or guarding nuclear materials or weapons are reliable, trustworthy, psychologically stable and sober.¹⁹ Over the past five years, the SPD has reportedly screened all relevant personnel, granted levels of security clearances and determined the requisite degree of access for those handling sensitive nuclear materials. As described in a report by Italian experts, 'key people are screened and controlled by four agencies (the ISI, Military Intelligence, Intelligence Bureau, and the

SPD). Every aspect of each person's life is reportedly controlled (sic), including families and relatives. Such screenings are repeated every two years.'²⁰ According to the SPD, the Counter-Intelligence Directorate in the Security Division has established Counter Intelligence Teams that conduct security checks and reports on a daily, weekly and quarterly basis. The security directorates within each strategic organisation and strategic force command also produce weekly, monthly and quarterly reports for the division, reporting all security- and intelligence-related events.

The operations of the Security Division remain classified, so it is not clear whether the PRP Directorate carries out psychological testing on civilians and scientists. All military officers undergo these tests at the beginning of their service. It is also not known whether the PRP Directorate has any polygraph systems, nor whether those carrying out reliability clearance are themselves trained as security personnel. The exact criteria for security clearances are not publicly disclosed. However, it is known that anyone with religious extremist proclivities or any other extremist tendencies is kept away from policymaking and operational involvement in sensitive areas.

Pakistan has faced two fundamental challenges in establishing its personnel reliability requirements. Firstly, religious extremism is increasing in Pakistani society as a whole. Therefore, the reliability programme must distinguish between those who are merely pious and those with tendencies towards religious extremism. Secondly, because Pakistan's nuclear management system does not have sophisticated technology, it must rely more upon the rationality and loyalty of individuals who are thoroughly screened before assuming sensitive nuclear responsibilities. Generally, a middle course balancing a reliance on personnel and on technology is practised to exercise assertive control over strategic assets.²¹ There is some uncertainty about the exact nature of the authorisation procedures to prevent unauthorised or inadvertent launch. Several sources refer to a system of two separate codes; one of them would be civilian and the other military, amounting to a 'dual-key' system.²² However, other authoritative accounts mention a *three-man rule*.²³ In particular, the code to arm a weapon is reportedly divided among three persons. It is possible that a two-man rule is adopted for movement of warheads and a three-man rule is adopted for employment authorisation. According to Pakistani planners, the number

of persons involved varies 'for technical reasons': three at some points of the chain of command; two at other points.

Pakistan is not explicit about its arrangements for weapons security, but it has developed physical safety mechanisms and firewalls both in the weapon systems themselves and in the chain of command. No single individual can operate a weapon system, nor can one individual issue the command for nuclear weapons use. The evolution of the NCA command-and-control system ensures that unauthorised use never takes place, yet the weapon can be operationally ready on short notice. Pakistan does not keep its nuclear weapons on hair-trigger alert. The nuclear weapons are small in number and probably kept in a disassembled form; their components are reportedly stored separately. Fissile materials are likely to be stored near installations such as Kahuta or Khushab, close to Rawalpindi.

Naturally enough, there is considerable uncertainty about the location of Pakistan's nuclear weapons and about procedures for their actual use. After 11 September 2001, Pakistan ordered the country's nuclear arsenal redeployed to at least six secret new locations, according to one account.²⁴ Dummy locations are also reportedly employed to minimise the risks of destruction or capture.²⁵ SPD head Lt-Gen. Khalid Kidwai told visiting researchers in late 2001 that 'no delegation of authority concerning nuclear weapons is planned'.²⁶ According to another source, Pakistani officials say that the SPD has drawn up contingency delegation procedures – in the event, for instance, of the president's death in wartime – but these will not be publicised.²⁷ It is possible that the prime minister, as the vice chairman of the NCA, would then become its chairman; however, this presumably would not alter the presumed pre-eminence of the military in any decision to use nuclear weapons. Operational control plans remain a national security secret, as was the case with the United States during the Cold War.

In every nuclear weapons state there is a natural tension between protecting the nuclear arsenal against a first strike and ensuring against unauthorised use. Many outside observers believe that in Pakistan this difficulty is exacerbated by the politicisation of the army and that the deep sense of grievance among the officer corps over Kashmir increases the probability that weapons will be used if firing authority is delegated beyond the top leadership.

Security and safety of nuclear assets

Pakistan is cautious about any international cooperation that could compromise its weapon designs, secret locations and command-and-control structures; this includes cooperation with the United States. As the US–Pakistan security relationship assumed new dimensions after 11 September 2001, US Secretary of State Colin Powell told Musharraf that the United States was prepared to assist Pakistan in improving its nuclear safety and security, given America's previous experience in this field. Musharraf assured Powell that Pakistan's strategic assets were completely secure. Nevertheless, Pakistan sent a team to the United States to assess the offer. The Pakistani team found that the US offer was rudimentary and the hardware being discussed was available within Pakistan or on the open market. However, Pakistan agreed to receive US transfers on three conditions. Firstly, it would not allow any intrusions it perceived as unwarranted. Secondly, Pakistan would select technologies it viewed as compatible with its national interests. Finally, the SPD would be the signatory authority for the end-user certifications required by Washington. In other words, Pakistan did not want the exact location or details of the technology's final destination to be revealed. Since then, there have been several training courses for officers, technicians and engineers at various US labs where they have been instructed on nuclear safety and security issues.

The exposure of A.Q. Khan's onward proliferation made clear the need to overhaul the elementary nature of the existing material control and accounting procedures in Pakistan's nuclear laboratories. The SPD selected and sent personnel to the United States and elsewhere for training, and learned sophisticated and scientifically foolproof methods of accounting. It is unclear how much assistance the United States provided, because both sides keep such procedures classified. Currently, Pakistan is judged to have in place a strict system of tallying sensitive material production, accounting and nuclear waste management. The SPD also organises both regular and surprise inspections. Furthermore, and although not publicly disclosed, Pakistan apparently has an emergency-response team for enhanced safety and security analogous to the US Nuclear Emergency Search Team. This team includes a Special Service Group, whose job would be to instantly respond to a theft or forceful sabotage of a nuclear weapon or its material.

Pakistan keeps its nuclear weapons as disassembled components, which implies that safety is inherent in the system. Even though the various arsenals could be susceptible to natural or artificial disasters, Pakistan is most probably considering developing 'enhanced nuclear detonation safety' in order to make its arsenal safer and more secure. It also appears to be interested in developing indigenous technologies using permissive action links (PALs) and environmental sensing devices (ESDs). (PALs block arming systems unless the proper code is entered. ESDs block arming systems unless a prescribed environmental profile is achieved. For instance, a warhead mounted on a ballistic missile would have to experience the severe acceleration of launch before it could detonate.) In these two technologies, Pakistan is unlikely to seek assistance from outside powers. Keeping the weapons in a disassembled form, along with the use of authorisation codes, reduces the risk of capture or unauthorised use. Although Pakistan's equivalent is not as sophisticated as US PALs, it is deemed reliable enough to preclude unauthorised arming or launching of its nuclear weapons.

International concerns have also been raised about the possibility of theft and sabotage during the transportation of sensitive nuclear materials. Effective measures to guard against such losses became an international obligation under UN Security Council Resolution 1540, passed in April 2004 (see pages 141–3). Under the new SPD arrangements, specialist vehicles and tamper-proof containers are provided to all laboratories for the transits of materials, while military personnel escort each of the containers.

Export controls

Pakistan's steps to strengthen control over its nuclear infrastructure included legislative measures. Before 2004, Pakistan purportedly enforced prohibitions through Statutory Regulatory Orders and various government ordinances. These administrative steps were designed in principle to prevent the export of sensitive materials, and they indicated the authority whose approval was required for any dual-use item or material to be exported. This, however, was no substitute for proper export control legislation that allowed for legal penalties. In any case, there is no private sector involvement in the nuclear field and the state controls over 99% of all sensitive materials normally on the international nuclear trigger lists.

Embarrassed by the revelations about A.Q. Khan, and wanting to be in compliance with the UNSCR 1540 requirement for all countries to enact export controls conforming to international standards, the Foreign Ministry and SPD accelerated work to prepare and push through parliament a relatively thorough export control law. The new law, entitled 'Export Control on Goods, Technologies, Material and Equipment Related to Nuclear and Biological Weapons and their Delivery Systems Act, 2004', entered into force on 23 September 2004. The law controls any material, equipment and services that could contribute to the design, development, production, stockpiling, maintenance or use of nuclear and biological weapons and their delivery systems. The new law does not include chemical weapons, apparently on the grounds that they already were controlled as a result of Pakistan's ratification of the Chemical Weapons Convention. The national control list was initially adopted from the lists kept by the Nuclear Suppliers Group, the Australia Group and the Missile Technology Control Regime, as well as European Union guidelines. Pakistan hopes to be consulted when those lists are updated so that it can keep its national list in conformity. The law also includes a catch-all clause requiring exporters to notify authorities of any suspicions that a proposed export is intended for use in a nuclear weapon, biological weapon, or missile. The Export Control Act covers re-export, transshipment and transit of all sensitive goods and technologies. The latter is defined to include any documents, including blueprints and plans, as well as on-the-job training, expert advice and services – all of which fall into the category of intangible technology. However, the law does not necessarily provide the government with the legal means to control the transfer of such knowledge through all intangible means, which might include e-mail and internet sites.

The jurisdiction of the act extends to all Pakistani citizens at home or abroad, persons in the service of Pakistan and foreign nationals in Pakistan. It does

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not appear to apply to the state entities in charge of Pakistan's sensitive technologies, but Pakistani government spokesmen insist it would apply to any person acting on behalf of the state. The act has a punitive provision of up to 14 years' imprisonment but is not retroactive and therefore not applicable to A.Q. Khan and his criminal associates. The law has not yet been applied in practice. In sum, the legal edifice is ample, but implementation, as always, will be the limiting factor in the effectiveness of these laws. Such implementation has yet to be seen. An inter-agency process for reviewing export licence applications is only at an early stage. Pakistan has taken pains to explain the new law in international forums, but as of the end of 2006 has not allowed any independent assessment of its export control system.

International cooperation

Although Pakistan, like India, remains outside the NPT, it has contributed in other ways to international efforts to control the proliferation of nuclear weapons and other weapons of mass destruction. It is a party to the Biological Weapons Convention (signed in 1974), the Chemical Weapons Convention (1997) and the Outer Space Treaty (1968). Pakistan promptly responded to the reporting requirement of UNSCR 1540 by providing an 11-page report in October 2004 about national measures to implement the resolution and a 125-page follow-up matrix of national compliance in September 2005. Pakistan joined the US-sponsored Container Security Initiative (CSI) in March 2006, signing the CSI declaration of principles, and was selected as a model state by the US Customs and Border Protection agency for the Pilot Programme of the CSI. Pakistan says it supports the spirit of the Proliferation Security Initiative (PSI) and since 2005 it has attended three PSI exercises as an observer, although it is wary about signing up to the notion of interdicting the cargo of other states.²⁸

Nuclear Regulatory Authority

Among the nuclear oversight steps the country has taken, Pakistani officials also count the establishment in 2001 of the autonomous Pakistan Nuclear Regulatory Authority to ensure the safety of civilian nuclear facilities and prevent accidental radiation exposure, including from sources in medical, agricultural and industrial use. A predecessor body, the Nuclear Regulatory Board, had functioned under the Pakistan Atomic Energy Commission, but PAEC is now independent. Pakistani officials express pride

that, of the 827 confirmed incidents worldwide of illicit trafficking in nuclear (radioactive) materials compiled by the IAEA from 1993 to 2005, none are attributed to Pakistan. As explained in chapter six, however, the IAEA Illicit Trafficking Database only includes incidents reported or confirmed by governments, so it is not a wholly accurate picture, given that governments unwilling to draw attention to smuggling incidents will not be inclined to report everything. (Pakistan signed an Illicit Trafficking Database agreement with the IAEA in 2005 to share data on seizures.) A wider search of all open-source data about nuclear material trafficking reveals just one case – but a very significant one – in which Pakistan was involved in the UF₆ transfer to Libya in 2000–01. The data reveal only two actual seizures of nuclear material in Pakistan. In Peshawar in 1998, police confiscated 8–10kg of uranium of unconfirmed grade from two Afghan nationals, reportedly brought from Kazakhstan;²⁹ while in 1997 an international narcotics and arms trafficker was arrested in Rawalpindi with 2kg of heroin and samples of uranium.³⁰ Other reports have claimed that enriched uranium from the former Soviet republics was offered for sale in Peshawar, although no HEU was confiscated. There were also a few incidents reported in Afghanistan, India and Bangladesh in which nuclear material confiscated from smugglers was purportedly bound for Pakistan (see chapter six).

Conclusions

A robust command-and-control system is now in place to protect Pakistan's nuclear assets from diversion, theft and accidental misuse. For the most part, these measures have been transparent and appear to have worked well. Indeed, Pakistan's openness in explaining its command-and-control structure goes beyond the practice adopted by most other nuclear-capable states. A.Q. Khan and his known cohorts are out of business and KRL is now confined exclusively to enrichment work. Responsibility for nuclear weapons is now clearly in the hands of the National Command Authority and its constituent bodies. General Kidwai and the Strategic Plans Division he commands have gained national and international respect for their professionalism and competency. These steps go a long way toward overcoming the international opprobrium and label of irresponsibility that Pakistan earned thanks to the Khan saga.

There are still too many unanswered questions about the role Pakistani technology played in aiding nuclear programmes in Iran and North Korea,

however, for other countries to conclude that Pakistan has done all it can to account for Khan's transgressions. International conclusions about whether the Khan case is truly closed will depend on the world seeing a sustained record of responsible nuclear stewardship that transcends the current leadership. Musharraf and Kidwai are lauded for their efforts to protect Pakistan's nuclear technology, and probably rightly so, although each has given assurances in the past that have later been gainsaid.³¹ When they leave office, will their successors be as capable? In Pakistan's personality-dominated political system, patronage systems have always overridden weak institutions and the rule of law. The organisational changes since 1999 are designed to institutionalise a system of oversight, and Pakistani authorities are confident about it surviving a leadership change. The outside world may be more inclined to wait and see, and to press for further transparency and the imposition of real penalties for any transgression of the new regulations.

The outside world's conclusions will also depend on Pakistan's ongoing struggle against the monumental challenges posed to the nation's stability by ethnic tension, poverty, high birth rates, lack of adequate education, and the rising influence of Islamic fundamentalism. Pakistan won praise for the steps it took to purge militarist Islamist supporters from ISI ranks, but militant Islamist groups in Pakistan continue to give cause for concern, including the movement of Taliban forces across the border areas in northwest Pakistan.³² The light punishment meted out to nuclear scientists who met with Osama bin Laden reflect a disturbing pattern reminiscent of the secrecy in which the Pakistani authorities dealt with Khan. In all these cases, secrecy was justified on the grounds that greater transparency would cause embarrassment and risk the disclosure of nuclear secrets. The understandable need to protect national security secrets works against the government's desire to dispel hints of lingering corruption in the nuclear programme, notwithstanding the

multilayered internal security system that Pakistan has implemented.

The most disquieting note, however, comes from unconfirmed reports of Pakistani citizens remaining connected with sales of nuclear- or missile-related goods to countries of proliferation concern. Western intelligence agencies will not disclose details, but say the lid on Pakistan's strategic technology is not yet airtight. One reason for this slippage is Pakistan's need to rely on black market procurement for its own nuclear weapons programme. Given that it already has nuclear weapons, stopping Pakistan's continued procurement is not a top priority for Western governments. However, this procurement is problematic in that it helps sustain black market operations that the Western countries are trying to stamp out.

If Pakistan were to conclude that it already has a sufficient credible nuclear deterrent and if India capped its own fissile material production – perhaps as part of an international treaty or an independent decision flowing from the US–India nuclear cooperation agreement – then Pakistan would have no further reason to continue enriching uranium and producing weapons-usable plutonium. An end to Pakistan's own enrichment-related foreign procurement and the evasion of foreign export controls that this entails would remove one obstacle blocking Pakistan's receipt of the same exemption to nuclear supplier rules that the US offered India. In Pakistan's eyes, the causality and sequencing of this suggestion is actually the reverse. Pakistani officials say they cannot be a partner and a target at the same time. By that, they mean that if they were taken into nuclear partnership with the United States and other nuclear suppliers, they would be better disposed toward greater transparency and would have less need to be left to their own devices regarding their nuclear programme. Yet, despite Pakistan's reforms, the damage caused by A.Q. Khan makes any nuclear cooperation with Pakistan in the near future politically impossible for any Western country.

Notes

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Security, 30 August 2002, <http://www.exportcontrols.org/pakscientists.html>.

- 3 Suskind, *The One Percent Doctrine*, p. 70.
- 4 Douglas Frantz, 'Pakistan's Role in Scientist's Nuclear Trafficking Debated', *Los Angeles Times*, 16 May 2005.

- 5 Farhatullah Babar, 'Bhutto's Footprints on Nuclear Pakistan', *The News*, Pakistan, 4 April 2006.
- 6 Mushahid Hussain, 'Media Off Target with Pakistan Nuclear Scare', *Asia Times*, 7 November 2001.
- 7 Gordon Corera, *Shopping for Bombs: Nuclear Proliferation, Global Insecurity, and the Rise and Fall of the A.Q. Khan Network* (New York: Oxford University Press, 2006), p. 50.
- 8 Interview with General Beg reported in Owen Bennett Jones, *Pakistan: Eye of the Storm* (New Haven, CT: Yale University Press, 2003), p. 210; and Ahmed Rashid, 'Bare All and Be Damned: Ex-Army Chief Reveals Nuclear Secrets', *Far Eastern Economic Review*, 5 May 1994, p. 23.
- 9 Former defence minister General Naseerullah Babar, quoted in Mary Ann Weaver, *Pakistan: In the Shadow of Jihad and Afghanistan* (New York: Farrar, Straus and Giroux, 2003), p. 206.
- 10 Hussain, 'Media Off Target with Pakistan Nuclear Scare'.
- 11 This section is based in part on briefings by Strategic Plans Division officials, including Lt-Gen. Khalid Kidwai, at the Naval Postgraduate School in Monterey, California on 27 October 2006.
- 12 Pervez Musharraf, *In the Line of Fire: A Memoir* (New York: Simon and Schuster, 2006), pp. 288–9.
- 13 Legal Framework Order 2002 (Chief Executive's Order no. 24 of 2002). In December 2003, as a concession to the opposition, Musharraf agreed to drop his demand that the NSC be recognised by the constitution.
- 14 Andrew Koch and Christopher F. Foss, 'Pakistan Country Briefing: Walking the Tight Rope', *Jane's Defence Weekly*, 9 October 2002, p. 25.
- 15 Paul Guinnessy, 'Pakistan Reshuffles Weapons Programme', *Physics Today*, May 2001. Peter Lavoy, 'Pakistan's Nuclear Posture: Security and Survivability', paper presented to the 'Conference on Pakistan's Nuclear Future', Nonproliferation Policy Education Center, Washington DC, 28 April 2006, p. 17.
- 16 Major General Mahmud Ali Durrani, 'Pakistan's Strategic Thinking and the Role of Nuclear Weapons', Cooperative Monitoring Center Occasional Paper, SAND 2004 3375P, Sandia National Laboratories, July 2004, p. 24, <http://www.cmc.sandia.gov/links/cmc-papers/sand2004-3375P.pdf>.
- 17 For details of security and physical protection at nuclear sites see *ibid.*, pp. 52–4.
- 18 At a Carnegie Endowment non-proliferation conference in June 2001, Pakistan's foreign minister Abdul Sattar expressed his country's interest in learning about these concepts.
- 19 Herbert L. Abrams, 'Human Reliability and Safety in the Handling of Nuclear Weapons', *Science and Global Security*, vol. 2, 1991, pp. 325–49.
- 20 'Nuclear Safety, Nuclear Stability, and Nuclear Strategy in Pakistan: A Concise Report of a Visit by Landau Network – Centro Volta', Landau Network, January 2002, p. 4, <http://lxmi.mi.infn.it/~landnet/Doc/pakistan.pdf>.
- 21 Feroz Hassan Khan, 'Challenges to Nuclear Stability in South Asia', *The Nonproliferation Review*, vol. 10, no. 1, Spring 2003, p. 69.
- 22 Bennett Jones, *Pakistan: Eye of the Storm*, p. 209.
- 23 The three-man rule was originally revealed by the SPD in 2001 (see 'Nuclear Safety, Nuclear Stability and Nuclear Strategy in Pakistan', p. 4.).
- 24 Molly Moore and Kamran Khan, 'Pakistan Moves Nuclear Weapons; Musharraf Says Arsenal is Now Secure', *Washington Post*, 11 November 2001. The move was confirmed by the director of the SPD (Koch and Foss, 'Pakistan Country Briefing').
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- 28 Zulfiqar Khan, 'Safeguards against Illicit Transfers: Pakistan's Institutional Response', unpublished paper presented to South Asian Strategic Stability Institute–London International Conference on Strengthening Export Controls, Brussels, Belgium, 17 November 2006.
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- 31 Kidwai told Pentagon officials in January 2001, 'Our command and control is safe and under institutional controls ... There are no loose cannons.' Steve Coll, 'The Stand-Off; How Jihadi Groups Helped Provide the Twenty-First Century's First Nuclear Crisis', *The New Yorker*, 13 and 20 February 2006, p. 135.
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