Pakistani nuclear forces[1]

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Table. Pakistani nuclear forces, January 2003

Type/Designation	Range (km)[a]	Payload (kg)	Status
Aircraft			
F-16A/B	1 600	4 500	32 aircraft, deployed in 3 squadrons; most likely aircraft in the inventory to have a nuclear delivery role
Ballistic missiles[b]			
Ghaznavi (Hatf-3)	290	500	First flight test on 27 May 2002; expected to be operational by 2004
Shaheen I (Hatf-4)	600–800	750–1 000	Operational; entered service with Pakistani Army in Mar. 2003
Ghauri I (Hatf-5)	1 300–1 500	700–1 000	Operational; entered service with Pakistani Army in Jan. 2003
Ghauri II (Hatf-5A)	1 600–1 800	1 500	Flight-tested on 25 May 2002
Shaheen II (Hatf-6?)	>2 000	750–1 000	Under development; has not been flight-tested

[a] Missile payloads may have to be reduced in order to achieve maximum range. Aircraft range is for illustrative purposes only; actual mission range will vary according to flight profile and weapon loading.

[b] Pakistan acquired a number of M-11 ballistic missiles from China in the 1990s; however, it not known whether these missiles have a nuclear role.

Sources: Albright, D., 'India's and Pakistan's fissile material and nuclear weapons inventories, end of 1999', Background Paper, Institute for Science and International Security (ISIS), 11 Oct. 2000, URL <http://www.isis-online.org/publications/southasia/stocks1000.html>; Lennox, D. (ed.), *Jane's Strategic Weapon Systems* (Jane's Information Group, Ltd: Coulsdon, UK, 2003); PakistaniDefence.com (unofficial Internet site of the Pakistani armed forces), URL <http://www.pakistanidefence.com>; US Central Intelligence Agency, *Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions*, 1 January through 30 June 2002', Apr. 2003, URL <http://www.cia.gov/cia/publications/bian/bian_apr_2003.htm>; US National Intelligence Council, 'Foreign missile developments and the ballistic missile threat through 2015' (unclassified summary), Dec. 2001, URL <http://www.cia.gov/nic/pubs/other_products/Unclassifiedballisticmissilefinal.pdf>; World Nuclear Association, 'India and Pakistan', *Information and Issues Brief*, Nov. 2002, URL <http://www.world-nuclear.org/info/inf53.htm>; *Dawn* (Islamabad), various issues; and Author's estimates.

[1] Excerpt from Kristensen, H. and Kile, S., 'World nuclear forces', *SIPRI Yearbook 2003: Armaments, Disarmament and International Security*, (Oxford University Press: Oxford, 2003).

URL http://projects.sipri.se/nuclear/pakistan.pdf

It is difficult to estimate the size and composition of Pakistan's nuclear arsenal. As is the case with India, one of the key uncertainties is how much weapon-usable fissile material Pakistan has produced. It is known that Pakistan has pursued a gas centrifuge uranium-enrichment method to produce the material for its nuclear weapons, at the Abdul Qadeer Khan Research Laboratories in Kahuta. However, estimates vary as to how much weapon-grade uranium has been produced, in part because of conflicting reports about the number of centrifuges that Pakistan has in operation.

It is estimated here that Pakistan has manufactured 30–50 nuclear weapons. Some of these weapons are probably stored in unassembled form at dispersed locations. In February 2000, Pakistan's military government announced the establishment of a National Command Authority to manage the country's nuclear forces.

Pakistan is said to be working to increase the size of its nuclear arsenal. According to a leading Pakistani nuclear physicist who is not part of the country's military nuclear programme, scientists 'have been working in three shifts over the past three years since the Kargil crisis' [in 1999] to accelerate production of weapon-grade uranium.[2] If this and similar reports are true, Pakistan may have been able to manufacture more HEU cores for use in nuclear weapons than previously thought; the size of its overall arsenal may even exceed that of India.

Pakistan may also be developing a capability to build plutonium-based nuclear weapons. The unsafeguarded 50-MW(t) heavy water reactor in the Khushab district of Punjab, which became operational in the spring of 1998, has the capability to produce 10–15 kg of weapon-grade plutonium annually. It is also capable of producing tritium, which can be used to 'boost' the explosive yield of fission weapons.

There continues to be concern about the custodial security of Pakistan's nuclear arsenal. A senior Indian official claimed in early 2003 that Pakistan was hiding some of its nuclear weapons in 'tunnels and caves' in the Chagai hills of Baluchistan—an area in which al-Qaeda is reported to be regrouping.[3] There have also been allegations that some Pakistani nuclear scientists sympathetic to radical Islam have attempted to transfer nuclear weapon technology and weapon-usable material illicitly to radical groups in other countries.

Ballistic missiles

During 2002 Pakistan conducted flight tests of three types of nuclear-capable ballistic missiles. Pakistan's missile programmes have received considerable

[2] Pervez Hoodbhoy, quoted by Hussain, Z., 'Pakistan has secretly built up nuclear arsenal', *The Times* (London), 27 May 2002, p. 1.

[3] Indian National Security Advisor Brajesh Mishra, quoted in 'Pak hiding nukes in Chagai caves, tunnels: Brajesh', *Indian Express* (Internet edn), 10 Feb. 2003, URL <http://www.indianexpress.com/archive_full_story.php?content_id=18161>.

technical assistance from China and North Korea in the past; this cooperation is believed to be ongoing.

On 25 May 2002, against the background of mounting tensions with India, Pakistan test-launched a Ghauri II (Hatf-5A) medium-range ballistic missile from a mobile launcher near Basti Jarh. It was the third flight test carried out in the Ghauri programme. According to Pakistani officials, the missile carried a mock nuclear warhead which successfully hit its target in the Baluchistan desert.

The Ghauri II is very similar to the Ghauri I, possibly featuring an improved motor assembly. Both missiles are based on North Korea's No-dong 1/2 missile technology and reportedly have been developed with extensive design and engineering assistance from North Korea. A Ghauri III missile, with a design range of 3 000 km, is reportedly under development at the Khan Research Laboratories in Kahuta.

Pakistani defence sources indicate that the Ghauri I/II entered into serial production in late 2002. It was formally handed over to the Pakistani Army for 'full operational use' on 12 January 2003. Pakistan has announced that both versions can carry a nuclear warhead.

On 27 May 2002, Pakistan carried out the first flight test of the Ghaznavi (Hatf-3) short-range ballistic missile. The single-stage, solid-fuelled missile is believed to have been under development since 1997 and may have a nuclear role.

On 4 October 2002, Pakistan announced that it had carried out a 'routine' test launch of a Shaheen I (Hatf-4) ballistic missile at the Somiani test range. The test was followed by a second flight-test conducted four days later, on 8 October. The Shaheen I has been declared to be nuclear-capable and was formally inducted into Pakistani Army service at a ceremony in March 2003.

Analysts remain divided over whether the single-state solid-fueled Shaheen I is a version of the Chinese M-9 missile or an improved M-11 missile. It uses the same wheeled transporter–erector–launcher (TEL) as the Ghaznavi.

A follow-on Shaheen II ballistic missile, with a design range exceeding 2000 km, has yet to be flight-tested. The two-stage Shaheen II is believed to use the Shaheen I missile as its second stage. According to the CIA, the successful development of the missile will require continued assistance from Chinese entities or other sources.[4]

[4] US Central Intelligence Agency, 'Unclassified report to Congress on the acquisition of technology relating to weapons of mass destruction and advanced conventional munitions, 1 January through 30 June 2002', Apr. 2003, URL <http://www.cia.gov/cia/publications/bian/bian_apr_2003.htm>.