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Trilateral Nuclear Proliferation Pakistan's Euro-Chinese Bomb

Arvind Virmani



Institute for Defence Studies and Analyses, New Delhi

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He has researched on Macroeconomics and Growth, International Trade and Tariffs and Credit markets. He has advised and written extensively on all aspects of economic reforms including the book, *Accelerating Growth and Poverty Reduction—A Policy Framework for India's Development* (Academic Foundation, New Delhi, January 2004) and *Propelling India From Socialist Stagnation To Global Power, Vols. I & II* (Academic Foundation, 2006).

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Introduction

1

In 1964, China carried out its first atmospheric test of an atomic weapon and proudly announced to the world that it had developed atomic weapons. Secret US communications, now declassified, prior to and after the Chinese test clearly predicted that India would react to China's test by taking steps to accelerate its nuclear programme. Elements in the US government even suggested that the US should consider assisting India in this endeavour. Given Indian sensitivities about Chinese occupation of Indian territory in 1962, the Indian Prime Minister authorised theoretical work on the Subterranean Nuclear Explosion for Peaceful Purposes (SNEPP) in November 1964. China's test of a thermonuclear weapon in 1967, clearly accentuated India's insecurity. The Non-Proliferation Treaty (NPT) was introduced in 1968 and came into effect on 6 March 1970, when the three Nuclear Weapon States (NWS)—USA, USSR and Great Britain—deposited their instruments of ratification. Initially, half a dozen Non-Nuclear Weapon States (NNWS) including Germany, Japan, Sweden and India, expressed reservations on the treaty.¹ The first three signed the NPT after getting nuclear guarantees from the USA. Such guarantees were refused to India and consequently it did not sign the NPT as an NNWS. Three other NNWS, Israel, Pakistan and Cuba also never signed the NPT.

The nature of the Western dominated discourse began to change in 1971 with US President Richard Nixon's opening to China, his encouragement to the Chinese leadership to attack

¹ Germany, Japan and India had clear recognisable nuclear threats to their security, while all four countries had nuclear capabilities.

India in support of Pakistan and the sending of the nuclear powered aircraft carrier *Enterprise* to the Indian Ocean to threaten India during the Bangladesh War. China, a NWS under the NPT, refused to accept treaty obligations for over a decade, did not accept IAEA safeguards till 1984 and did not ratify the NPT till 1992. Despite its transfer of nuclear technology to Pakistan and other countries, the non-proliferation crusaders repeatedly discounted the proliferation threat from China.²

Three years after Nixon's threat, India carried out an underground nuclear test or Peaceful Nuclear Explosion (PNE), justifying the categorisation by reference to the US Ploughshares programme and Russian tests of PNE devices. India did not follow the 1974 test with subsequent tests, nor did it immediately weaponise the device that was tested. Even the research programme was put on hold during 1977–79, when the government discussed with the US the possibility of signing the NPT. After analysing the Indian research and development programme the only international violation that the non-proliferation crusaders could discover (and have ever discovered) was the use of spent fuel from a Canadian provided research reactor.³ Logically, either India carried out a PNE in May 1974 and therefore did not violate its agreement with Canada, or it carried out a weapons test and became a nuclear weapons state *four years after the ratification of the NPT (by the USA and USSR) and ten years before China formally acceded to the NPT.*⁴ No Western non-proliferation expert has gone on record to assert the latter, while all have, by classifying the Indian PNE as proliferation activity, asserted that the former is wrong.

² There was no discussion among other NPT member states or the non-proliferation experts about denying China access to nuclear-missile related technology/ equipment/ materials until it agreed to (and implemented) its NPT obligations.

³ And use of US/China supplied heavy water to India's indigenously produced commercial heavy water reactors. However, vague, non-specific and totally unsubstantiated allegations continue to be made by the non-proliferation crusaders/ ayotollahs till today, to the extent that domestic procurement/ production is labelled as proliferation.

⁴ China's designation as an NWS in the NPT was based on the fact that it had carried out nuclear tests before 1968.

The Western countries, their governments and their non-proliferation experts, instead of stemming the leaks in the NPT, focussed their attention and ire on India. An elaborate system of denial regimes was set up—London Group/Nuclear Suppliers Group, Missile Technology Control Regime, Wassaner Group, Zanger list. In the following decades, every independent, indigenous achievement of India's nuclear and space research complexes was labelled and derided as 'proliferation' despite the fact that India did not violate any international law that it had accepted as a sovereign country.⁵ At the same time Western astigmatism overlooked and even justified European and North American proliferation to Pakistan as legally consistent with these new regimes.

From 1980, Pakistan felt free to train, finance, arm and send religious terrorists across the border into India without fear of retaliatory attacks, while Western media reports constantly regurgitated the bogey of an Indian threat to Pakistan.⁶ With every nuclear-missile action of Pakistan justified as a reaction to Indian research achievement by a slew of Western experts and government spokespersons, the Pakistan military establishment was encouraged and emboldened to continue its clandestine programme.⁷ The labelling of Pakistan's transfer of Chinese bomb designs and uranium enrichment technology to Libya, North Korea and Iran, as the private enterprise of Dr A.Q. Khan, is yet another example of the tacit encouragement of Pakistani proliferation.⁸ With the eagle (astigmatic) eyes of non-proliferation crusaders focussed on India, Pakistan

⁵ Under the UN charter all Nation States have the right to voluntarily decide which treaty they will accept/ accede to. This is the quid –pro quo for giving the (United Nations Security Council) UNSC the right to initiate military action against States for violations of the UN charter and the treaties that they have voluntarily accepted.

⁶ I am not aware of any two countries in history with the relative size of India and Pakistan where the smaller country was responsible for killing so many citizens of the larger country without being attacked by the latter.

⁷ Pakistan was therefore encouraged to either time its own tests to follow such Indian actions or to run to the Chinese after every Indian development, for technology/designs/materials to obtain a counter.

⁸ Such illogic in the interest of ideology no longer surprises.

surreptitiously obtained designs, parts and equipment for uranium enrichment, plutonium generation and extraction and atomic bombs from NPT weapons states (France, UK, USA and China) and NPT NWS (Germany, Netherlands, Switzerland, Canada). In this process these countries continuously violated the spirit and often the letter of the non-proliferation rules and regulations they themselves had enacted, on the plea that, 'it did not violate the law,' or that the specific item, 'was not on the restricted/banned list'. Occasionally Pakistan was caught, publicly rapped on the knuckles and then let off to pursue its clandestine import programme, on the excuse of more pressing imperatives. Eventually and inevitably it felt emboldened by this indulgence to get into the nuclear import-export business. The current paper (re-) documents these proliferation activities of Pakistan and its European, Chinese and other collaborators.⁹ It suggests that if the Ayatollahs had focussed on the real problems of proliferation (to and from NPT signatories and among them),¹⁰ Pakistan would still be in approximately the same position as North Korea and Iran are reportedly in and these two NPT signatories would be of little concern. Paradoxically, this would have increased the probability of India capping or rolling back its independent nuclear programme during the Janata Governments of 1977–80 and 1989–91.

⁹ Based on country chronologies produced by NTI and other open sources.

¹⁰ This is not just a matter of hindsight. Indian security expert K. Subrahmanyam has for decades written about these issues, brought out the real facts and analysed their implications.

Background and Origins

2

Zulfiqar Ali Bhutto was a passionate believer in nuclear weapons from the late 1950s. Despite being a minister in several governments he was unable to persuade the leaders of Pakistan to initiate a nuclear weapons programme. It was only after the elections in Pakistan and the formation of Bangladesh that he had the power to order the development of nuclear weapons, which he promptly proceeded to do. Till the war the Pakistani scientific establishment clearly recognised that it did not have the economic or scientific capability to build an atomic weapons programme. The separation of East Pakistan into the independent state of Bangladesh and a mis-understanding of the relative role of the Pakistani state and the Indian state created fear of and hatred against the latter. This along with the desire to pay the Indians back was a strong motivating factor in the entire Pakistani elites support for the quest for atomic bombs.

2.1 Genocide or Perfidy?¹¹

The story of Pakistan's bomb starts from one of the few free and democratic elections in Pakistan, the 1970 election called by President General Yahya Khan. This election resulted in the Awami League of East Pakistan winning a clear majority of 160 seats in the 300 seat house. The leader of the Awami League, Shiekh Mujibur Rehman, therefore, had the democratic right to form the government. This was such a shock to the ruling West Pakistan elite and to Zulfiqar Ali Bhutto, the leader of the party with the largest number of seats in West Pakistan,

¹¹ This section is based largely on the Wikipedia, supplemented by material in references.

that it was not difficult for the latter to get the support of the former to thwart the mandate of the elections. On 22 February 1971 the ruling generals of Pakistan took a decision to crush the Awami League and its supporters. President Gen. Yahya Khan reportedly declared at the February conference, 'Kill three million of them and the rest will eat out of our hands.'¹²

On 3 March 1971, in a meeting between Yahya Khan, Z. A. Bhutto and Mujibur Rehman, the latter was offered a compromise solution. This was sought to be done by redefining the government system so that Mujibur Rehman's writ would run only in East Pakistan, while Bhutto and the West Pakistan elite would continue to rule the western part of the country as well as control all national instruments of power such as the army. Shiekh Mujibur Rehman, backed by the Bengali citizens of East Pakistan (through a nationwide strike), refused to become a second-class leader of Pakistan, restricted to leading what were considered by the elites as second-class citizens of Pakistan.

After a month of preparation, the decision of 22 February 1971 was implemented with an attack on Dacca University on 25 March. 'Within a week, half the population of Dacca had fled, and at least 30,000 people had been killed. Chittagong, too, had lost half its population.'¹³ Within a period of 267 days, an estimated 1.5 million people (mostly young men) were killed, about 200,000 women raped and about 10 million refugees fled to India, overwhelming that country's resources and spurring the eventual Indian military intervention.¹⁴

This genocide, carefully hidden from the rest of the world and from the Pakistani public, led inevitably to the creation of Bangladesh.¹⁵ On 16 December 1971, the Indian Army entered

¹² Payne[1973],p. 50.

¹³ Payne[1973],p. 48.

¹⁴ Totten et al. (1997), Rummel (1997), Brownmiller (1993). The population of Bangladesh/East Pakistan at the time was about 75 million.

¹⁵ All foreign journalists were expelled before 25 March 1971.

Dacca and more than 93,000 Pakistani soldiers and their abettors surrendered to joint forces (Mitro Bahini) and were taken as prisoners of war by the Indian Army, the largest surrender since World War II.

An enquiry commission headed by Justice Hamood Ur Rahman was set up, but its report was suppressed by Bhutto as it showed the military in poor light. It was leaked out of the country during the tenure of General Musharaf. Among its (supplementary report's) conclusions were the following:

Para 15. Lt. Col. Mansoorul Haq, GSO-I, Division, appearing as Witness No 260, has made detailed and specific allegations as follows:

‘A Bengali, who was alleged to be a Mukti Bahini or Awami Leaguer, was being sent to Bangladesh—a code name for death without trial, without detailed investigations and without any written order by any authorised authority.’

Indiscriminate killing and looting could only serve the cause of the enemies of Pakistan. In the harshness, we lost the support of the silent majority of the people of East Pakistan.... The Comilla Cantt. massacre (on 27/28 of March, 1971) under the orders of CO 53 Field Regiment, Lt. Gen. Yakub Malik, in which 17 Bengali Officers and 915 men were just slain by a flick of one Officer's fingers should suffice as an example. There was a general feeling of hatred against Bengalis amongst the soldiers and officers including Generals. There were verbal instructions to eliminate Hindus.

When the army moved to clear the rural areas and small towns, it moved in a ruthless manner, destroying, burning and killing.

Para 17. About the attitude of senior officers in this behalf, Brigadier Iqbalur Rehman Shariff (Witness no. 269), has alleged that during his visit to formations in East Pakistan General Gul Hassan used to ask the soldiers 'how many Bengalis have you shot.'

Para 18. The statements appearing in the evidence of Lt. Col. Aziz Ahmed Khan (Witness no 276) who was Commanding Officer 8 Baluch and then CO 86 Mujahid Battalion are also directly relevant. 'Brigadier Arbbab also told me to destroy all houses in Joydepur. To a great extent I executed this order. General Niazi visited my unit at Thakurgaon and Bogra. He asked us how many Hindus we had killed. In May, there was an order in writing to kill Hindus. This order was from Brigadier Abdullah Malik of 2 3 Brigade.'

Para 36. At the same time there is some evidence to suggest that the words and personal actions of Lt. Gen. Niazi were calculated to encourage the killings and rape.

Para 38. From what we have said in the preceding Paragraphs it is clear that there is substance in the allegations that during and after the military action excesses were indeed committed on the people of East Pakistan...

'It confirmed the rapes and the killings by the Pakistan Army and their local agents (mostly Jamaati-i-Islami followers) although the figures are far lower than the one quoted by Bangladesh (200,000 women raped, over 3 million people killed). A large section of the intellectual community of Bangladesh were murdered mostly by the Al-Shams and Al-Badr forces, at the instruction of the Pakistani Army.¹⁶ There are many mass graves in Bangladesh and continue to be discovered,

¹⁶ Asadullah Khan 'The loss continues to haunt us' in *The Bangladesh Observer* December 14, 2005.

such as one in an old well near a mosque in Dhaka discovered in August 1999.¹⁷ The first night of war on Bengalis, which is documented in telegrams from the American Consulate in Dhaka to the United States State Department, saw indiscriminate killings of students of Dhaka University and other civilians.¹⁸

President Bhutto and the military elite, hid the truth about the election results and its political aftermath from the Pakistani public for decades. Because of the US and Chinese veto at the UN, the atrocities perpetrated by the Pakistani army against its own citizens were never discussed at the UN or investigated by any UN body.¹⁹ Thus the genocidal actions of the Pakistani Army that were responsible for alienating the population were not only completely hidden from the public but could be ignored or swept under the carpet by even those in the elite who had an inkling of them from their army relatives. Thus it was easy for the elite to convince itself and the public that the perfidious Indians were solely to blame for the formation of Bangladesh. This fostered a feeling of hatred for India. Added to this was the sense of humiliation at the defeat and surrender of its army. The army and the elites of Pakistan, who were traumatised by the defeat and felt most deeply humiliated, both reflected and fostered this hatred to divert the blame from themselves to the ‘enemy.’ This led the Pakistani Army and elites to formulate a two-pronged strategy against India. One, attain nuclear capability to deter India against any conventional response, and two, train and support religious fundamentalists in India to fight against the state. The Bangladesh defeat strengthened the elites in their conclusion that Pakistan needed a nuclear weapon to deter India from any future conventional attack on it.

¹⁷ *DPA* report ‘Mass grave found in Bangladesh’ in *The Chandigarh Tribune* August 8, 1999.

¹⁸ Sajit Gandhi, ‘The Tilt: The U.S. and the South Asian Crisis of 1971,’ National Security Archive Electronic Briefing Book No. 79 December 16, 2002.

¹⁹ An outcome of the Nixon-Mao Bonhomie and the role of Pakistan in intermediating the breakthrough in US-China relations and facilitating the Nixon trip to China.

2.2 Motivation and Origins

Zulfikar Ali Bhutto, became President of Pakistan on 20 December 1971. His record, statements and writings since he became a minister in 1958, indicate his obsession with nuclear weapons. 'In March 1965, President Ayub Khan, and his Foreign Minister, Z. A. Bhutto met with Chou En-lai in Beijing, a meeting both felt had very positive results and developed Chinese support for Pakistan. It was shortly after this, in mid-1965, that Bhutto stated that, "If India builds the bomb, we will eat grass or leaves, even go hungry, but we will get one of our own. We have no other choice"²⁰.' Pakistani Senator Babar has written that, 'As a minister Bhutto tried to persuade President General Ayub Khan to acquire advanced nuclear technologies. In December 1965 Ayub was on an official visit to the UK. Bhutto planned a meeting of some nuclear experts with him and persuaded Ayub Khan to meet late Munir Ahmed Khan former Chairman of the Pakistan Atomic Energy Commission (PAEC) who at the time was working in the IAEA. Late Munir Khan had recalled that when he was told that these technologies could eventually place in the hands of Pakistan a nuclear option, *'the General simply smiled and said that if needed, Pakistan could get it from China.'*²¹ One of the theses of Bhutto's book *The Myth of Independence*, finished in 1967 but published in 1969 was the necessity for Pakistan to acquire nuclear weapons to be able to stand against the industrialised states, and against a nuclear armed India. But Bhutto, who was set on pursuing nuclear weapons, did not have the means to put his views into practice then. That would have to wait until he became Prime Minister.²² In the book he had written, 'If Pakistan restricts or suspends her nuclear programme, it would impose a crippling limitation on the development of Pakistan's science and technology... our problem in its essence, is how to obtain such a weapon in time *before* the crisis begins.'²³

²⁰ Sublette (2002b).

²¹ Babar (2004).

²² Sublette (2002b).

²³ Bhutto (1969).

Consequently, soon after the end of the Bangladesh War, ‘Zulfikar Ali Bhutto called a meeting on 20 January 1972 with senior Pakistani nuclear scientists to discuss the possibility of embarking on a nuclear weapons programme. The meeting was held at the residence of the Punjab Chief Minister Nawab Sadiq Qureshi in Multan. Key invitees included scientists from the Pakistan Institute for Nuclear Science & Technology (PINSTECH), the Pakistan Atomic Energy Commission (PAEC), Quaid-e-Azam University, Islamabad, Government College, Lahore, and the Defence Science & Technology Organization (DESTO). Nobel laureate and former scientific advisor to the Pakistani government Dr Abdus Salam also attended the meeting. During the meeting, several scientists enthusiastically support the idea of a nuclear weapons programme. Bhutto approved the idea and promised that his government will spare “no facilities and finances” for a weapons programme. He also set a deadline of three years for the scientists to produce a fission device. Toward the end of the meeting, Bhutto announced that Munir Ahmad Khan would replace Dr Usmani as Chairman of the PAEC.²⁴

Two Pakistani nuclear scientists, Dr Riazuddin and Dr Masud temporarily working at the International Center for Theoretical Physics (ICTP), Italy, returned to Pakistan in October 1972 to begin theoretical work on a fission explosive device. The duo were posted to Quaid-e-Azam University PINSTECH respectively. As computers were not available, they used the mainframe computers at Quaid-e-Azam University for work related to the theoretical physics of a nuclear explosive device.²⁵

‘A team of three Pakistani nuclear scientists and engineers, Khalil Qureshi, Zafarullah, and Abdul Majid were sent to the headquarters of the Belgo Nucleaire at Mol in March 1973 to

²⁴ Rehman(1999), pp. 17-18.

²⁵ Rehman(1999), pp. 38-39.

participate in the designing of a pilot nuclear fuel reprocessing facility as well as to gain training in reprocessing spent fuel. Chairman of Pakistan Atomic Energy Commission (PAEC) Dr. Munir Ahmad Khan was in favour of the Belgian pilot reprocessing plant over a British facility on the grounds that it would be difficult for Pakistan to upgrade the downgraded reprocessing plant on offer from the United Kingdom Atomic Energy Agency (UKAEA).²⁶

By December 1973 the decision was taken by Pakistani scientists to develop an “implosion” over the “gun” type of nuclear fission device citing economy in the use of fissile material. Subsequently Dr. Zaman Shaikh, an explosives expert at the Defense Science Laboratories, was assigned the task of developing explosive lenses for the proposed device.²⁷

In 1973, Dr Riazuddin travelled to the ICTP, Italy, and from there to the US to obtain open-source information on the ‘Manhattan Project’ from the Library of Congress and the National Information Center, Maryland. After his return from the US, Riazuddin was inducted into the PAEC as member (technical). Dr Riazuddin later disclosed that he was a member of the team that worked on designs for Pakistan’s nuclear explosive device. As he explained, ‘we were the designers of the bomb, like the tailor who tells you how much of the material is required to stitch a suit. We had to identify the fissile material, whether to use plutonium or...enriched uranium, which method of detonation, which explosive, which type of tampers and lenses to use, how material will be compressed, how shock waves will be created, what would be the yield.’ Riazuddin also disclosed that since Pakistan found it difficult to manufacture beryllium reflectors, the first nuclear explosive device designed by the ‘Theoretical Group’ used Uranium-238 as a reflector.²⁸

²⁶ Rehman(1999), pp. 36-37.

²⁷ Rehman(1999), p. 40.

²⁸ Rehman (1999), pp. 39-40.

Senior Pakistani nuclear scientists Dr Salam, Munir Ahmad Khan, Dr Riazuddin, and Hafeez Qureshi convened a meeting on 25 March 1974, with the head of the Pakistan Ordnance Factory at Wah cantonment, Lt General Qamar Ali Mirza, to set up a plant to manufacture His Majesty's Explosive (HMX) for use in the explosive lenses of the proposed implosion-design fission device. The project is codenamed 'Research.'²⁹ In March 1974 the chairman of the PAEC Dr Munir Ahmed Khan constituted a small team of scientists, physicists, and engineers to begin work on a nuclear explosive device. The team's office was located at Wah near Rawalpindi; and because of its location came to be referred to as the 'Wah Group.' The Wah Group began research on conventional explosives used to trigger a nuclear fission device. The original team members included Hafeez Qureshi, head of Radiation and Isotope Applications Division, PINSTECH and Dr Zaman Sheikh, Defence Science and Technology Organization (DESTO). The group was later expanded to include chemical, mechanical, explosive, and precision engineers.³⁰

'As soon as he had come to power Bhutto had reached out to the rest of the Islamic world, particularly the nouveau riche oil states of the Middle East, for financial support. During 1973 and 1974 Bhutto held discussions with Libya and other states such as Saudi Arabia to line up financing for a nuclear weapons programme. Bhutto and Libya's Colonel Qaddafi finally met and reached an agreement for a Libyan financed Pakistani weapons programme in February 1974.³¹ In the early seventies billions of dollars also flowed from Iran and Saudi Arabia to Pakistan, most of it for purposes other than the nuclear weapons programme, but some of these funds were probably also diverted to support the pursuit of nuclear weapons.'³²

²⁹ Rehman (1999), p.41.

³⁰ Rehman (1999), pp. 3-4.

³¹ Weissman and Krosney 1981; pp. 59-62.

³² Sublette (2002b).

*The Pakistan weapons programme was therefore well under way when India carried out its first test of a PNE on 18 May 1974.*³³ Following India's test, Pakistani Prime Minister Zulfikar Ali Bhutto met senior Pakistani officials to discuss the implications of India's nuclear tests. A statement by the Pakistani foreign ministry, released after the meeting, stated that India's pronouncements of peaceful intentions did not satisfy Pakistan's security concerns. The statement also noted that nuclear programmes often incorporate both peaceful and military ends.³⁴ The next day in a news conference, Pakistani Prime Minister Zulfikar Ali Bhutto indicated that Pakistan would not be threatened by India's 'nuclear blackmail'. He also stated that Pakistan would not alter its current policies.³⁵ Three weeks later he asserted that India's nuclear programme was designed to intimidate Pakistan and establish 'hegemony in the subcontinent' and Pakistan would develop a nuclear programme in response to India's nuclear testing of an atomic device. However, he insisted that Pakistan's programme would be limited to peaceful purposes.³⁶

³³ According to P R Chari, India's Nuclear Explosion Project was started in 1965, impelled by a trilogy of China-related events -India's traumatic defeat in the 1962 India-China border conflict; China's first nuclear explosion in 1964; and China's support to Pakistan during the Indo-Pak conflict of 1965. Carnegie Endowment for Peace web site: www.ceip.org/Programs/npp/chari2000.htm.

³⁴ Information Bank Abstracts, *New York Times*, 19 May 1974, in Lexis-Nexis Academic Universe, May 19, 1974, <http://web.lexis-nexis.com/>.

³⁵ Information Bank Abstracts, *New York Times*, 20 May 1974; in Lexis-Nexis Academic Universe, 20 May 1974, <http://web.lexis-nexis.com/>.

³⁶ Information Bank Abstracts, *New York Times*, 8 June 1974; in Lexis-Nexis Academic Universe, 8 June 1974, <http://web.lexis-nexis.com/>.

Economic Capability

3

What was Pakistan's economic and technological capability relative to other countries that have developed a nuclear industry or atomic weapons? An objective measure of inherent capability is essential for judging to what extent the development of nuclear weapons is an indigenous achievement and to what extent it is based on proliferation. We define nuclear proliferation as either (a) the breaking of international law by either the source or the destination country; or (b) the breaking of the national law of the source country by the destination country.

Virmani (2004) developed a simple measure of the economic and general technical capability of a country. This was used to define an index of relative power VIP^2 where the denominator is the economic and technical capability of the US.³⁷ Countries can then be ranked in terms of this index. Table 1 shows the index (columns 6 to 9) and the ranking (columns 2 to 5) of various countries from 1980 to 2003. For our current purpose it is more useful to compare the economic/general technical capability of different countries relative to South Africa, a country that was ranked twentieth in 2000 and 2003. The reason is that South Africa developed an atomic weapons capability while it was subject to a world-wide embargo that was relatively rigorous (though far from perfect).³⁸ It can therefore be taken as a reasonable benchmark for the general economic/technological capability needed for indigenous/autonomous development of an atomic weapon. Therefore, the VIP^2 index is recalculated relative to South Africa (instead of the US) and presented in columns 10 to 13 of Table 1.

³⁷ VIP^2 is the Virmani Index of Power Potential.

³⁸ Nazi connections and German help was rumoured to have played a role.

3.1 Destination Countries

The Pakistan economy is ranked around fiftieth in terms of relative economic/technical capability, over the past 25 years or more. Its relative position has improved very marginally from fifty-first in 1980 to forty-eighth in 2003. In fact Bangladesh at fiftieth was ranked higher than Pakistan in 1980 and is only four ranks below Pakistan in 2003 nine at fifty-second.³⁹ Even the Vietnam economy is only a little behind Pakistan today.

Even starker is the comparison with the benchmark, South Africa. In 1980 the Pakistan economy had only 9 per cent of the economic-technological capability of South Africa. As South Africa was on a declining trend at that point while Pakistan was on a rising trend, it can safely be concluded that Pakistan's inherent technological capability was miniscule relative to South Africa during the 1970s. By 1990, the capability of the Pakistan economy had grown to 19 per cent of South Africa's. A decade later it was 29 per cent of South Africa and is still less than one-third of that of South Africa. Besides the declared NWS (US, Russia UK, France, China, India), 42 other economies, still have a stronger economic and technological base than Pakistan for the development of nuclear weapons.

The contrast with Iran, a country that is currently suspected of trying to attain a nuclear capability is equally striking. Iran's economic-technical capability was 40 per cent of that of South Africa in 1980 (rank 24), 48 per cent in 1990 (rank 32) and 62 per cent in 2000 (rank 31) and is currently more than 80 per cent of that of South Africa (rank 28).⁴⁰ It can also be seen from Table 1 that countries like Egypt (35 per cent of South Africa), Philippines (48 per cent of South Africa) and Malaysia

³⁹ Bangladesh/East Pakistan had a longer history of higher education and academic work than West Pakistan, and probably had much greater scientific capability than the latter.

⁴⁰ The variation of GDP with oil prices creates some problems of comparability in the case of oil rich, oil exporting countries like Saudi Arabia, UAE and Iran.

(48 per cent of South Africa) always had and still have, greater economic-technological capability than Pakistan. This is also true of twenty-third ranked Indonesia (87 per cent of South Africa) and twenty-fifth ranked Turkey (82 per cent of South Africa), which currently have a higher ranking than the Philippines, though they were ranked lower than the latter in 1980. Even in 1980, however, Turkey had much closer economic relations with Europe, particularly Germany, and consequently better access to nuclear technology.

3.2 Source Countries

It is also useful to record the relative capability of countries that were the actual or potential sources of clandestine technology transfer for Pakistan. Table 2 presents the capabilities of the most advanced countries ordered by their ranking in 1980. Among the important potential sources of technology, equipment and materials during the 1970s were the US, Germany, France, UK, Canada, Netherlands and Switzerland. In 1980, Switzerland had only 3.2 per cent of the economic-technological capability of the US and was ranked seventeenth, behind South Africa at rank fourteenth with 4.3 per cent of the US capability. It is also worth noting that India with 3.6 per cent of US capability was ranked sixteenth ahead of both Switzerland and China at nineteenth position. In fact, throughout the 1970s and till the mid-1980s, the overall economic and general technical capability of China's economy was inferior to that of India's. It is only during the second half of the 1980s that China overtook India, so that by 1990 it ranked eleventh, one position above India at twelfth. At that time both had higher capability than The Netherlands.

Table 1: Inherent Economic and General Technological Capability:

1	Ranking of Power: VIP ²				Index of Power: VIP ²				Relative to S.Africa			
	2	3	4	5	6	7	8	9	10	11	12	13
	1980	1990	2000	2003	1980	1990	2000	2003	1980	1990	2000	2003
South Africa	14	18	20	20	4.3%	3.0%	2.3%	2.3%	100%	100%	100%	100%
Poland		25	21	21		2.0%	2.2%	2.2%		68%	95%	96%
Austria	20	23	22	22	2.4%	2.2%	2.1%	2.0%	57%	74%	93%	88%
Indonesia	36	29	23	23	1.1%	1.6%	2.0%	2.0%	25%	54%	86%	87%
Switzerland	17	20	24	26	3.2%	2.7%	1.9%	1.9%	75%	93%	86%	81%
Sweden	21	24	25	27	2.4%	2.2%	1.9%	1.9%	56%	74%	84%	81%
Turkey	28	26	26	25	1.4%	1.8%	1.9%	1.9%	34%	60%	83%	82%
Thailand	41	33	27	24	0.7%	1.4%	1.7%	1.9%	17%	47%	76%	85%
Norway	26	30	28	30	1.6%	1.5%	1.7%	1.6%	38%	51%	73%	69%
Saudi Arabia	15	27	29	29	4.1%	1.7%	1.6%	1.6%	96%	57%	72%	71%
Hong Kong	39	35	30	32	0.9%	1.3%	1.6%	1.4%	20%	45%	68%	63%
Denmark	23	28	31	33	1.9%	1.6%	1.5%	1.4%	45%	55%	67%	62%
Iran (IIR)	24	31	32	28	1.7%	1.4%	1.5%	1.8%	40%	48%	66%	81%
Greece	22	32	33	31	2.0%	1.4%	1.3%	1.5%	46%	47%	59%	64%
Portugal	32	37	34	35	1.3%	1.3%	1.3%	1.2%	30%	44%	58%	53%
Finland	29	34	35	37	1.3%	1.4%	1.2%	1.1%	31%	46%	51%	50%
Colombia	34	36	36	36	1.2%	1.3%	1.1%	1.2%	29%	45%	50%	51%
Ireland	48	51	37	34	0.4%	0.6%	1.1%	1.4%	11%	19%	49%	61%
Malaysia	46	45	38	39	0.5%	0.6%	1.1%	1.1%	11%	21%	49%	48%
Philippines	25	38	39	38	1.7%	1.2%	1.1%	1.1%	39%	42%	48%	48%
Israel	40	42	40	42	0.8%	0.8%	1.0%	0.9%	18%	26%	46%	39%
Czech Rep			41	40			1.0%	1.0%			42%	44%
Singapore	54	55	42	46	0.3%	0.4%	0.8%	0.8%	7%	15%	36%	34%
Hungary	33	40	43	43	1.3%	1.0%	0.8%	0.8%	29%	35%	36%	37%
Egypt (EAR)	43	44	44	44	0.6%	0.7%	0.8%	0.8%	13%	23%	33%	35%
Chile	47	53	45	45	0.5%	0.5%	0.8%	0.8%	11%	16%	33%	34%
Ukraine		16	46	41		3.4%	0.7%	0.9%		116%	32%	41%
Puerto Rico	45	49	47		0.5%	0.6%	0.7%		11%	19%	31%	
Algeria	37	41	48	47	1.0%	0.8%	0.7%	0.7%	23%	28%	30%	31%
Pakistan	51	50	49	48	0.4%	0.6%	0.7%	0.7%	9%	19%	29%	30%
New Zealand	42	46	50	49	0.7%	0.6%	0.6%	0.6%	17%	21%	27%	28%
Venezuela	35	43	51	54	1.1%	0.7%	0.6%	0.4%	25%	25%	25%	18%
Romania		39	52	50		1.0%	0.5%	0.6%		35%	24%	28%
Peru	38	56	53	51	0.9%	0.4%	0.5%	0.5%	20%	15%	21%	21%
Bangladesh	50	60	54	52	0.4%	0.4%	0.4%	0.5%	9%	12%	20%	21%
Vietnam		62	55	53		0.2%	0.4%	0.5%		8%	18%	21%

Source: Virmani (2005) and authors calculations based on WDI, World Bank data on per capita GDP/GDP at PPP.

Because of the extremely rapid growth of China since the mid-1980s, within a decade i.e., by 2000, China's economic-technological capability became 2.5 times that of India and in 2003 it was 2.8 times that of India. Though China's general industrial capabilities were inferior to India's from 1960 to 1980, they are now clearly superior to India's.

Table 2: Economic-Technological Capability (VIP²) of Source Countries:

	<u>Ranking of Power:</u>				<u>Index of Power: VIP²</u>			
	1980	1990	2000	2003	1980	1990	2000	2003
United States	1	1	1	1	100%	100%	100%	100%
Japan	2	2	2	2	33%	36%	30%	28%
Germany	3	3	3	4	24%	22%	19%	18%
France	4	4	5	5	17%	16%	13%	13%
Italy	5	5	7	7	16%	15%	13%	12%
United Kingdom	6	6	6	6	15%	14%	13%	13%
Canada	7	8	8	8	8.9%	8.3%	8.1%	8.0%
Brazil	8	10	11	12	8.8%	6.4%	6.0%	5.7%
Spain	9	9	10	10	6.6%	6.5%	6.4%	6.5%
Mexico	10	13	14	15	5.9%	4.5%	4.6%	4.2%
Netherlands	11	15	17	17	4.5%	4.1%	4.0%	3.9%
Australia	12	14	15	14	4.4%	4.4%	4.6%	4.8%
Argentina	13	22	18	19	4.4%	2.3%	2.7%	2.3%
South Africa	14	18	20	20	4.3%	3.0%	2.3%	2.3%
India	16	12	9	9	3.6%	5.0%	6.8%	7.8%
Switzerland	17	20	24	26	3.2%	2.7%	1.9%	1.9%

3.3 Strategic Technology

As noted in Virmani (2005) strategic technological capability is different from general technological capability, though the latter along with economic strength, provide the foundation on which the former is built. Within a certain range an obsession with strategic technology and the strong will to acquire it, can

result in a relative strategic capability that is much higher than the relative economic strength and general technological capability (as measured by VIP²). Historically, the USSR/ Russia and Maoist China, represent such cases. Therefore, even when China's economic strength and general technological capability was inferior to India's (1960 to 1980) its strategic technology and assets were far superior. Pakistan's relative strategic capability also appears to be above its relative economic strength, though the means adopted were quite different from those of the USSR. Pakistan seems to have learnt from China to use a mixture of diplomatic strategy and covert means to obtain what was otherwise beyond its economic-technological capability.

3.4 Foreign Aid and Military Expenditure

The internal economic capabilities of a country can also be supplemented by financial aid received from other countries. This is particularly so if the aid is driven by geo-political/ strategic considerations of the donors. This is patently true of US and related western aid to Israel and Egypt (after the Sinai accord and diplomatic recognition). As financial aid is fungible, such aid ostensibly given for economic uplift can allow a country to sustain a higher level of expenditure on building strategic assets, than would otherwise be sustainable. The ratio of financial aid to Gross National Income (GNI) can be obtained from the World Development Indicators (WDI) of the World Bank (WB) and used to rank the large-medium countries. Table 3 shows the countries that lie above Pakistan in Table 2.

Pakistan was the fourth highest recipient of aid in the 1960s and the tenth highest in the 1970s. In 1980, 50 countries had greater economic capability than Pakistan. Of these 50, less

than half were developed countries/aid donors, while 23 countries were poor countries/aid recipients. Among the latter, Pakistan was the third highest aid recipient in the 1970s and the fourth highest during the 1980s (Table 3). Two countries for which strategic/geo-political considerations were the prime reason for large aid during both the 1970s and 1980s were Egypt and Israel. Pakistan remained the fourth largest receiver of aid (among this set) in the 1990s though Israel's aid ranking dropped below Pakistan's. Pakistan was therefore the third most important country from the strategic perspective of the USA/West. This indulgence acted not just as a signal to the military rulers of the country, but also allowed and encouraged it to spend more on strategic assets including the military, than it could sustain on the basis of its own economic capabilities.

Military expenditures, which are a major component of strategic expenditures, can be used as an indicator of the latter. The ratio of military expenditures to total government expenditures is an indication of the government's priorities. We use these to rank all medium-large countries (for which data is available in the WDI of the WB) as we have done for economic capabilities and for foreign economic aid received. Table 4 shows this ranking for the set of countries that we have been considering. Pakistan is ranked fifth in 1990 and seventh in 2000.⁴¹ This compares with economic ranking of fiftieth and forty-eighth in 1990 and 2000 respectively. Further, all the countries with higher economic ranking, are ranked much lower than it with respect to military expenditures. Thus, the high level of economic aid received by Pakistan, made it possible to spend more on acquisition of strategic assets including military, nuclear and space equipment.

⁴¹ For Pakistan the ratio has been on a declining trend during the 1990s. It was therefore, higher in the past. The military expenditure ranking was probably as high in the past.

Table 3: Foreign Economic Aid Recipients' Ranking in terms of Aid/GNI:

	Ranking of Aid received				Aid (% of GNI): Decade Average				
	1960s	1970s	1980s	1990s	1960s	1970s	1980s	1990s	2000s
United States									
Japan									
Germany									
China		56	45	61		0.0	0.4	0.5	0.1
France									
United Kingdom									
Italy									
Canada									
India	20	33	42	57	2.2	1.2	0.8	0.6	0.3
Spain									
Brazil	36	44	56	77	0.9	0.2	0.1	0.0	0.1
Russia				63				0.4	0.4
Korea, Rep.	5	26	55	84	6.2	1.6	0.1	0.0	0.0
Mexico	47	46	53	75	0.2	0.1	0.1	0.1	0.0
Australia									
Taiwan									
Netherlands									
Argentina	48	48	52	74	0.1	0.1	0.1	0.1	0.1
Belgium									
South Africa				67				0.3	0.4
Poland				37				1.6	0.6
Austria									
Indonesia	9	18	38	42	4.0	2.9	1.2	1.2	1.0
Switzerland									
Sweden									
Turkey	37	40	44	69	0.9	0.5	0.6	0.3	0.1
Thailand	33	36	40	55	1.0	0.8	1.1	0.6	0.1
Norway									
Saudi Arabia	49	53	63	79	0.0	0.0	0.0	0.0	0.0
Hong Kong	45	54	58	81	0.2	0.0	0.0	0.0	0.0
Denmark									
Iran (IR)		52	62	73		0.0	0.0	0.2	0.1
Greece									
Portugal									
Finland									
Colombia	29	35	49	71	1.3	1.0	0.2	0.2	0.6
Ireland									
Malaysia	40	38	43	72	0.7	0.7	0.7	0.2	0.1
Philippines	38	30	33	34	0.8	1.2	1.7	1.7	0.8
Israel	14	14	21	33	2.8	3.6	4.6	1.8	0.5

Contd.

Contd.

Czech Rep				64				0.4	0.5
Singapore	44	39	51	80	0.2	0.6	0.2	0.0	0.0
Hungary				59				0.5	0.5
Egypt (EAR)	17	3	18	20	2.5	10.4	5.4	5.9	1.3
Chile	25	43	54	68	1.8	0.4	0.1	0.3	0.1
Ukraine				53				0.8	1.2
Puerto Rico									
Algeria	2	31	48	58	8.0	1.2	0.3	0.6	0.4
Pakistan	4	10	25	32	7.0	4.4	2.9	1.9	2.1

Table 4: Ranking of Countries by Ratio of Military to Total Government Expenditures:

	<u>Rank</u>		<u>Ratio</u>		<u>(%)</u>		<u>VIP²</u>		<u>Rank</u>	
	<u>1990</u>	<u>2000</u>	<u>1990</u>	<u>2000</u>	<u>1990</u>	<u>2000</u>	<u>1990</u>	<u>2000</u>	<u>1990</u>	<u>2000</u>
United States		18				15.6	1		1	
Japan	34		6.4				2		2	
Germany		67				4.7	3		3	
France		57				5.6	4		5	
Italy		61				5.3	5		7	
United Kingdom		43				6.8	6		6	
Russia		13				18.0	7		12	
Canada	30	49	7.8			6.0	8		8	
Spain		75				3.8	9		10	
Brazil	38	60	5.2			5.3	10		11	
China							11		4	
India	16	21	17.1			14.9	12		9	
Mexico	42	79	2.5			3.3	13		14	
Australia		40				7.5	14		15	
Netherlands		74				4.0	15		17	
Ukraine		26				13.5	16		46	
Korea, Rep.	8	23	25.0			14.4	17		13	
South Africa	22	62	13.3			5.1	18		20	
Belgium		80				3.2	19		19	
Switzerland	31	73	7.7			4.2	20		24	
Taiwan, China							21		16	
Argentina		47				6.2	22		18	
Austria		83				2.1	23		22	
Sweden		56				5.6	24		25	
Poland	37	53	5.6			5.7	25		21	

Contd.

Contd.

Turkey	9	22	23.1	14.6	28	26
Saudi Arabia					27	29
Denmark		72		4.2	28	31
Indonesia	18	55	15.4	5.7	29	23
Norway		59		5.3	30	28
Iran (IIR)	14	9	18.1	22.4	31	32
Greece		31		10.7	32	33
Thailand		36		8.4	33	27
Finland		77		3.6	34	35
Hong Kong					35	30
Colombia		16		16.2	36	36
Portugal		64		5.1	37	34
Philippines	29	46	8.1	6.2	38	39
Romania	20	38	13.7	7.8	39	52
Hungary		70		4.3	40	43
Algeria	23	15	12.4	16.5	41	48
Israel		17		16.0	42	40
Venezuela	26	42	9.7	7.1	43	51
Egypt (EAR)	13	27	18.7	12.4	44	44
Malaysia	25	32	11.0	10.5	45	38
New Zealand		78		3.5	48	50
Puerto Rico					49	47
Pakistan	5	7	34.5	23.4	50	49

European Foundations

4

In the decade and a half from the start of Pakistan's weapons programme, It clandestinely obtained from Europe, Canada and the US, the complete designs, equipment and materials necessary to enrich uranium to weapons grade, extract bomb grade plutonium and manufacture a nuclear explosive device. Despite this, in the 1980s Pakistan was still not confident of manufacturing an atomic weapon and testing it successfully, given its economic and general technological capability. The designs and equipment so obtained would remain with Pakistan till they were converted into concrete strategic assets with the direct help of a more economically powerful and technologically capable state with a high degree of strategic capability. One difference between the European and North American supplies to Pakistan was that when they were exposed, the latter lead to prosecution, while the former were often ignored on the plea that they were not legally prohibited.

4.1 Uranium Enrichment

By a quirk of history, Pakistan's uranium enrichment programme originated in late April-early May 1972, with Pakistani metallurgist Dr A. Q. Khan taking up a job with the specialized Dutch engineering company—Physical Dynamics Laboratory or FDO, at its metallurgical section in the Dutch town of Almelo. FDO was a subsidiary of the Dutch company Verenigde Machine-Fabrieken and was a consultant and subcontractor to Ultra-Centrifuge Nederland (UCN)—the Dutch

partner of the tri-national European uranium enrichment centrifuge consortium URENCO for the ultracentrifuge process being developed by Britain, West Germany, and The Netherlands to enrich uranium. The Dutch secret service (BVD) ran a cursory background check on Khan and granted him a security clearance, 'secret inclusive'. Elementary principals of security were not, it seems, observed by any part of the URENCO establishment. Routine procedures, such as wearing identification badges marked with the level of clearance appear to have been unknown. Once someone gained access to a part of a facility with one level of clearance, there seem to have been few if any barriers to moving to higher level areas. The customary practice of checking the security clearance level of a person before signing out classified documents to them appears to have been ignored. Within a week of starting with FDO, A. Q. Khan was sent to the UCN enrichment facility in Almelo, The Netherlands, which he visited on 8–9 May.⁴² A visit to an external facility would normally require the transmittal of security paperwork to be granted access. This procedure was ignored by both FDO and UCN. Though Khan was not cleared to visit the UCN facility, he did so repeatedly during his employment. In his first two years Khan worked with two early centrifuge designs, the CNOR and SNOR machines.⁴³

On 17 September 1974, Abdul Qadeer Khan wrote a letter to Prime Minister Zulfikar Ali Bhutto, through the Pakistani ambassador in Belgium, explaining his expertise in centrifuge-based uranium enrichment technologies at URENCO in Belgium. Khan offered help and urged the prime minister to take the uranium route to a nuclear weapons programme. Bhutto responded favourably to Khan's suggestion and directed Dr Munir Ahmad Khan to meet A.Q. Khan.⁴⁴ By late 1974, Dr A.

⁴² Weissman & Krosney (1981), pp. 176-177, 178.

⁴³ Sublette (2002a).

⁴⁴ Rehman(1999), p.47.

Q. Khan started working with the Pakistani government to help develop plans for setting up an ultracentrifuge uranium enrichment plant. In the fall of 1974, Khan translated secret German documents on a technical breakthrough concerning the ultracentrifuge uranium enrichment process for the FDO. Khan shared this classified information with the Pakistani government.⁴⁵

The chairman of the PAEC Dr Munir Ahmad Khan directed Bashiraddin Mahmood (in October 1974) to prepare a feasibility report on the proposed uranium enrichment programme.⁴⁶ After studying the various technical approaches to enriching uranium, Bashiraddin Mahmood recommended (in November 1974) that Pakistan build a uranium enrichment facility based on centrifuge technology. Mahmood's report envisaged the completion of the facility by 1979.⁴⁷ On 15 February 1975, Dr Munir Ahmed Khan, met Prime Minister Zulfikar Ali Bhutto and sought government's approval for a \$450 million nuclear weapons programme that involved among other things, the building of a centrifuge plant for the enrichment of uranium.⁴⁸

Simultaneously action was initiated for setting up a clandestine nuclear procurement network across Europe so as to beat the various non-proliferation regimes such as the NSG and Wassaner. For this purpose, Pakistani nuclear scientist S.A. Butt was appointed to the Pakistani embassy in The Netherlands in July 1975. Later Butt was shifted to Paris where he became the Pakistani government's chief purchasing agent in Europe for uranium and plutonium enrichment technologies. Butt was one of the scientists who had attended the January 1972 meeting called by Prime Minister Zulfikar Ali Bhutto to discuss the possibility of Pakistan developing a nuclear bomb.⁴⁹

⁴⁵ Weissman & Krosney(1981), pp. 178.

⁴⁶ Rehman(1999), p. 48.

⁴⁷ Rehman (1999), p. 50.

⁴⁸ Rehman(1999), p. 50.

⁴⁹ Weissman & Krosney (1981), p. 182.

In the fall of 1975, Dr A. Q. Khan (still at FDO) was asked to translate sensitive documents concerning a German technical breakthrough in the ultracentrifuge uranium enrichment process the G-1 and G-2, from German into Dutch. For this purpose Khan spent 16 days at URENCO's facility in the town of Almelo. Security arrangements at the facility were lax and a colleague later reported seeing Khan making notes at his desk in a foreign script. Khan also used the opportunity to repeatedly tour the Almelo plant.⁵⁰ Dr A. Q. Khan then used S. A. Butt at the Pakistani embassy in The Netherlands as a conduit for supplying centrifuge-related technical literature, *blueprints, plans for plant design, and lists of equipment and material suppliers* to the Pakistan Atomic Energy Commission (PAEC).⁵¹ Thus, even though Pakistan did not possess the critical disembodied technology of uranium enrichment, it was now in possession virtually complete knowledge of elements of the technology that could be reduced to pieces of paper.

In late 1975, Pakistan launched Project 706 (according to another source—Project 726) to produce enriched uranium using the centrifuge enrichment process.⁵² The project involved the construction of a *pilot facility at Sihala*, to be followed by the construction of an industrial-scale plant housing 10,000 centrifuges at the village of *Kabuta*. Dr A.Q. Khan took charge of the new *Engineering Research Laboratory (ERL)*, tasked with designing the centrifuges for the proposed facilities. The PAEC led by Dr Munir Ahmed Khan retained overall charge of the project, while *the military's Special Works Commission was asked to help with purchases from abroad* and construction of the top-secret facilities.⁵³

In August 1975 Pakistan began buying components for its domestic uranium enrichment programme from European

⁵⁰ Weissman & Krosney (1981), pp. 179-80.

⁵¹ Rehman(1999), p. 51.

⁵² For details see Namboodri's article in Subrahmanyam (1981).

⁵³ Weissman & Krosney (1981), p. 182; Rehman(1999), p. 56.

Urenco suppliers. S.A. Butt, a physicist in the Pakistani embassy in Belgium, contacted a Dutch company to obtain high frequency inverters, which are used to control centrifuge motors. Purchases accelerated in the following years and many components were secured from companies in the Netherlands that Khan was familiar with.⁵⁴

In 1976, Pakistan began a major purchasing drive in Western Europe for its uranium enrichment project. During 1976, government agents placed orders with Swiss and Dutch firms. Specific purchases included highly specialised valves for centrifuges (VAT-Switzerland), a gasification and solidification unit to feed uranium hexafluoride gas into centrifuges (CORA Engineering, Switzerland), and 6,500 specially hardened steel tubes (Van Doorne Transmissie—The Netherlands). Other Dutch manufacturers received orders for large numbers of high strength aluminum and extremely strong martensitic steel, the for the crucial centrifuge rotors. Critical support components and subsystems were purchased from Switzerland (high vacuum valves from Vakuum Apparat Technik of Haag, Switzerland; and Germany (vacuum pumps and gas purification equipment from Leybold Heraeus of Hanau, Germany; plus thousands of specially formed aluminum parts).⁵⁵ As these items were not explicitly covered under the London Group's 'Nuclear Suppliers List,' the firms treated these as legal exports. Although the Swiss and Dutch governments learned about these purchases and knew that they related to Pakistan's planned centrifuge facility, they consciously chose to stick with a narrow interpretation of nuclear export control regulations and did not interfere with the sales.⁵⁶

The next year, in 1977, orders were placed in France for 10,000 metal bellows, whose only use was to stabilize the gas centrifuge rotor. France prohibited the sale, but the company

⁵⁴ Sublette (2002b).

⁵⁵ Sublette (2002b) and Weismann & Krosney (1981).

⁵⁶ Weissman & Krosney (1981), pp. 182-184.

shipped part of the order through a subcontractor in Belgium, which did not interfere, along with the dies, so that Pakistan could make the bellows themselves.

As part of the acquisition programme Pakistan also attempted to purchase 10–15 tons of uranium hexafluoride gas from the West German company Rohstoff-Einfuhr, but this particular attempt proved unsuccessful.⁵⁷ This minor obstacle was overcome by November 1976, when Pakistan signed, through a Pakistani textile plant, a \$2 million deal with Albrecht Migule, owner of the West German firm Ces Kalthof to supply a fluoride plant.⁵⁸ By the summer of 1978, the Swiss firm CORA Engineering completed fabrication of a uranium gasification and solidification unit for the Kahuta gas centrifuge uranium enrichment facility. The entire plant was airlifted to Pakistan using chartered C-130 Hercules transport aircraft. CORA Engineering also provided engineers and other technical personnel to help with the post-sales servicing. This was the first of the two gasification and solidification units at Kahuta.⁵⁹

By 1978, ERL at Kahuta reportedly developed a working prototypes of P-1 centrifuges, adapted from the German G-1 design Khan worked with at Urenco and enriched uranium for the first time on 4 April 1978.⁶⁰

Frank Allaun, a British Labour Party MP, asked a question in the House of Commons in July 1978, regarding certain components being exported by a British company that would enable Pakistan to build nuclear weapons. Allaun pointed out that the high-frequency electric equipment exactly matched the components used by British Nuclear Fuels Ltd. The British company, Emerson Electric Industrial Controls, was a subsidiary of the US firm Emerson Electric.⁶¹ The British government

⁵⁷ Weissman & Krosney (1981), p. 218.

⁵⁸ Nuclear Fuel (July 1981), p. 3.

⁵⁹ Weissman & Krosney (1981).

⁶⁰ Sublette (2002b).

reported back that the items specified in Allaun's question were not included in the British export control list. The order was placed by a firm called Weargate based in Swansea, Wales, which was operated by two Pakistanis.⁶² During July to September 1978, the British firm, Emerson Electric Industrial Controls, exported 31 complete inverter systems to Pakistan. The inverter systems can be used to regulate a large number of centrifuge machines in a uranium enrichment plant. The inverters were routed through Weargate Ltd. operated by Abdus Salam and Peter Griffin.⁶³ By October 1978, the British government changed its mind and imposed tighter export control laws after Labour Party Member of Parliament Frank Allaun revealed that Pakistan had placed further orders with the British company for inverters that could be used in a uranium fuel enrichment plant. The British company, Emerson Electric Industrial Controls, was working on 100 more inverters to be supplied to Pakistan when the government imposed further restrictions to stop the export of such components.⁶⁴

The Pakistani nuclear procurement was not, however, limited to Europe, but stretched all the way to North America. In the fall of 1978, a California-based firm exported about half a dozen inverters to Pakistan.⁶⁵

In the late 1970s and early 1980s, American intelligence officials convinced Dutch authorities on two occasions not to arrest Khan for the purposes of monitoring his activities further.⁶⁶

In early 1979, Indian scientists were reported to have learned from European commercial sources about Pakistan's recent acquisition of large quantities of *maraging steel*, an extremely hard variety of steel used to make critical components of a gas

⁶¹ Allaun says he received information about the order from "a friend who had a friend."

⁶² Oberdorfer, Gatier & Schwartz (1979), *Economist* (14 April 1979), Willis (1981).

⁶³ Oberdorfer, Gatier & Schwartz (1979), Weissman & Krosney (1981), p. 186.

⁶⁴ Oberdorfer, Gatier and Schwartz (1979).

⁶⁵ Oberdorfer, Gatier and Schwartz (1979).

⁶⁶ Broad and Sanger (2004b).

centrifuge uranium enrichment system. India's pacifist and anti-nuclear weapons Prime Minister Morarji Desai therefore wrote a letter to Pakistani President General Zia ul-Haq in mid-February 1979, expressing concern over Pakistan's nuclear weapons programme.⁶⁷

On 6 April 1979, the US informed Pakistan of its decision to cut off economic and military aid as a result of Pakistan's efforts to secretly build a uranium enrichment facility that could produce weapons grade uranium. The aid cut-off was imposed after the Central Intelligence Agency (CIA) confirmed reports from European intelligence services that Pakistan had acquired *most of the equipment needed* to operate the plant. The US also believed that Pakistan's ability to procure the equipment from European companies reinforced the inadequacy of existing export control mechanisms regarding sensitive technology. US State Department officials insisted that the construction of the facility had been continuing for quite some time and revealed that high-level talks had been held between the United States and Pakistan on the issue.⁶⁸

In April 1980, the West German engineering firm Ces Kalthof handed over the plans for producing UF₆ and UF₄ to Pakistan. Pakistan failed to make the final payments for the plants.⁶⁹ On 1 July 1980, Ces Kalthof, admitted that it sold Pakistan equipment for making uranium-hexafluoride (UF₆), the basic raw material input for producing enriched uranium in the gas centrifuge. Albrecht Migule, the firm's Director, however denied a news report in the German magazine Stern that the laboratory equipment could be used to make nuclear weapons.⁷⁰ On 20 July 1981, the firm was charged for violating the West German Foreign Trade Act by shipping a plant capable of producing uranium-hexafluoride to Pakistan. In responding to

⁶⁷ Oberdorfer (1979).

⁶⁸ Oberdorfer (1979), Xinhua (1979), World Affairs (1979).

⁶⁹ Nuclear Fuel (20 July 1981).

⁷⁰ Washington Post (1981).

a Parliamentary question, the German government said that the delivery of the plant required an export license which would not have been granted by the government. The question regarding the deal was raised in the parliament after a German magazine, *Der Stern* announced that it possessed contracts and other documents regarding the deals between the German firm and a Pakistani textile company. A spokesperson for the German Economics Ministry said that German authorities had collected enough evidence to charge the German firm with violating the German Foreign Trade Act. The spokesperson further said that investigations were being carried out since early 1981 long before the firm's activities were published in the German magazine *Der Stern*. The outcome of the investigation will determine if the firm will be tried in a court or be handled by tax authorities.⁷¹

In July 1980, two PAEC scientists Anwar Ali and LA. Bhatti went to Montreal with a list of items needed for a high-speed inverter. Export of inverters is prohibited by the US and other countries since it is used for spinning gases in a centrifuge for enriching uranium.⁷² Over the next two months (July-August) Pakistan bought parts for high speed inverters from American firms like General Electric Co., Westinghouse Electric Corp., RCA Corp. and Motorola Inc. The purchases were made by two small electrical-equipment stores in Montreal. The parts were repackaged and shipped to the *Middle East* and eventually to Pakistan. The operation was assisted by several highly educated Pakistani expatriates in Canada and the US. Some of the expatriates were recruited through newspaper advertisements and later persuaded to work for sometime in Pakistan with Dr Abdul Qadeer Khan. Dr Khan was in charge of the uranium enrichment programme.⁷³ At the end of August Canadian Police, acting on a tip from British Customs Service, seized 19 boxes

⁷¹ Nuclear Fuel (1981).

⁷² Fialka/WSJ (1984).

⁷³ Fialka/WSJ (1984).

of equipment at the Montreal Mirabel Airport. The boxes were being shipped to Pakistan. The police arrested Abdul Aziz Khan (a Canadian electrical engineer), Salam Elmenyawy (owner of an electrical equipment store in Montreal), and Mohammad Ahmad (a mechanical engineer working in Quebec). Seized records indicate that 10 other shipments of inverters were sent to Pakistan.⁷⁴ The next day Canadian police released Abdul Aziz Khan and followed him to a railroad station where he retrieved a suitcase and several documents. Abdul Aziz Khan then shredded the documents, dropped them in a trash can, and proceeded to the airport to catch a flight to Pakistan. He was then rearrested at the airport. The documents, retrieved and pieced together by the Canadian police, include a paper by an American scientist on using high-speed gas centrifuges for uranium enrichment.⁷⁵

In September 1980, US experts confirmed that Pakistan was buying components from Switzerland, the United States, Britain, West Germany, and other countries. Pointing to intelligence reports, photographs of construction of the uranium enrichment plant at Kahuta, and statements by the former Prime Minister Zulfikar Ali Bhutto these experts however believed that Pakistan would need several years to finish the enrichment plant and produce weapons grade uranium for nuclear bombs.⁷⁶ In September 1981, western sources indicated that Pakistan's uranium enrichment plant, located 30 miles southeast of Islamabad at Kahuta, was expected to start operating by the end of this year. The plant uses gas centrifuge technology allegedly stolen from The Netherlands.⁷⁷

On 31 October 1981, a 5,000 lb shipment of *zirconium* metal worth \$153,000 was seized at the Kennedy International Airport prior to its loading onto a passenger plane. Zirconium is used in

⁷⁴ Fialka, WSJ (26 November 1984).

⁷⁵ Fialka, WSJ (26 November 1984).

⁷⁶ Downie, Washington Post (21 September 1980).

⁷⁷ Manchester Guardian Weekly (6 September 1981).

the construction of nuclear reactors and its export requires an export license. The zirconium shipment was labelled as mountain-climbing equipment and the passenger accompanying the shipment was Dr Sarfraz Mir, *a retired Pakistani Army officer, believed to be a close friend of Pakistan's President Zia ul-Haq*. After the seizure of the shipment, US customs officials searched the Pakistan Airlines flight to locate Dr Mir but were unable to locate him. The Assistant General Manager of Pakistan Airlines said that he would investigate the issue. Agents from the compliance division of the Commerce Department's Office of Export Administration, headed by Sharon R. Connelly, had tracked the shipment from its production plant in Oregon to the Kennedy Airport. Pakistan Airlines officials were questioned about the shipment since it was too heavy to be classified as check-in baggage.⁷⁸

The Commerce Department ruled on 21 November 1981, that the Manhattan-based exporter Albert A. Goldberg and the Pakistani company S.J. Enterprises could not export goods until the charges against them involving the shipment of zirconium were resolved. Mr Goldberg and several of his companies were charged with violating export regulations by attempting to export zirconium to Pakistan. The Pakistani company S.J. Enterprises was penalised for attempting to procure zirconium in the United States and export the metal to Pakistan. The shipment of zirconium was seized by US officials at the Kennedy Airport on 31 October.⁷⁹

In 1981 the Dutch authorities started to close the barn door. On 11 February 1981, that Netherlands' Justice Minister Job De Ruiter, in a letter to a parliamentary commission, informed that legal proceedings were being taken against two Dutch engineering companies that were believed to have supplied sensitive equipment to Pakistan's uranium enrichment effort.

⁷⁸ Maitland (1981b), New York Times, 20 November 1981.

⁷⁹ Maitland (1981b), New York Times, 21 November 1981.

Dutch sources indicated that one of the companies exported at least nine shipments of sensitive equipment that could be used in the construction of the enrichment plant. The sources indicated that at least one of the shipments was made without a required export license. The Justice Minister added that Abdul Qadeer Khan would be investigated under the terms of a law on the unlawful acquisition of state secrets. Mr Ruiters further said that the trial would be held in absentia since A.Q. Khan could not be extradited to The Netherlands to face charges.⁸⁰

A court in Amsterdam sentenced A. Q. Khan in absentia in 1983 to four years in prison. An appeals court two years later upheld his appeal against the conviction and quashed the sentence for failure to properly deliver a summons to him. The prosecution had the option to renew the charges and issue a fresh summons for trial, but given the impossibility of serving him a summons behind the curtain of Pakistani security (and on the advice of the CIA) the Dutch government decided against pursuing the case any further. Munir Ahmad Khan, the former head of the PAEC has said of A. Q. Khan, 'Most of the scientists who work on weapons are serious. They are sobered by the weight of what they don't know,' 'Khan is a showman.'⁸¹

'It has been reported that a CIA analyses of Pakistan's huge purchasing programme showed that they had succeeded in obtaining at least one of almost every component needed to build a centrifuge enrichment plant?'⁸² It was however only in mid-1980 that Pakistan had produced enough highly enriched uranium (HEU) for a nuclear weapon.⁸³

Der Stern reported on March 21, 1989 that more than 70 German firms helped Pakistan get materials and equipment needed to manufacture the bomb.⁸⁴

⁸⁰ United Press International, 11 February 1981.

⁸¹ Sublette (2002a).

⁸² Weissman and Krosney (1981); pp. 190, in Sublette (2002).

⁸³ Clary, 'Dr. Khan's Nuclear WalMart.'

⁸⁴ Weiss (2004).

4.2 Plutonium Extraction

Pakistan's plutonium connection with Europe was more formal and earlier than its enrichment one. In the late 1960s, the French nuclear engineering firm Societe Generate pour les Techniques Nouvelles (SGN) offered to supply a 100-ton nuclear fuel reprocessing plant to PAEC. However, the proposal did not find favour within the Pakistani government and was not pursued.⁸⁵

In 1969, Pakistan therefore turned to Britain. The United Kingdom Atomic Energy Agency (UKAEA) agreed to supply a downscaled version of a nuclear fuel reprocessing plant in operation at Windscale in Britain to Pakistan. The proposed plant had the capacity for extracting 360g of weapons-grade plutonium annually. Subsequently, five Pakistani nuclear scientists: Dr S.M. Bhutta, M.T. Ahmad, Abdul Majid, Dr Mohammad Afzal, and Dr Ehsan Mubarak were sent to Britain for training. The Pakistani scientists recommended to PAEC that instead of obtaining the entire plant from Britain on a turnkey basis, Pakistan should purchase key parts and manufacture other parts indigenously. The scientists also believed that it would be possible to upgrade the plant indigenously to produce weapons-grade plutonium.⁸⁶ For various reasons the UK deal was never consummated.

“The first Pakistani facility for plutonium extraction from spent nuclear fuel was a pilot reprocessing facility called the “New Labs” at PINSTECH. This facility was a larger and more ambitious project than the original BNFL plan. It was built in the early 1970s by Belgonucleaire and the French corporation Saint-Gobain Techniques Nouvelles (SGN).

⁸⁵ Rehman (1999), p.31.

⁸⁶ Rehman (1999), pp. 35-36.

The pilot plant was followed by a contract signed with SGN in March 1973 to prepare the basic design for a large-scale (100-ton) fuel reprocessing plant, considerably more than (safeguarded) KANUPP power reactor would generate. SGN was the world's chief exporter of reprocessing technology and had previously built military plutonium facilities for France, the secret plutonium plant at Dimona in Israel, and contracted to provide similar plants to Taiwan, South Korea, and (later) Iraq. The Chashma plant, as it was known, would have the capability to produce 200 kg of weapons grade plutonium a year, if sufficient fuel were available to feed it.⁸⁷

In April 1974, Pakistan signed a contract with France for the design of a nuclear fuel reprocessing plant, to be constructed at Chashma on the banks of Indus River.⁸⁸ The initial design contract was followed by one for the final detailed design on 18 October 1974.⁸⁹ A contract for the sale of equipment and construction of the nuclear fuel reprocessing plant was signed in March 1976.⁹⁰

On 9 August 1976, the French foreign minister indicated to US charge d'affaires Sam Gammon that France would proceed with the sale of the reprocessing plant and also informed of France's displeasure over US efforts to hinder the sale of a fuel reprocessing plant to Pakistan. French foreign ministry officials revealed that the sale of the reprocessing plant was approved on 18 March under an agreement reached between France, Pakistan, and the International Atomic Energy Agency (IAEA). The French government released a statement indicating that it was in compliance with all international agreements regarding the sale, including an agreement with the IAEA to ensure that the plant was only used for peaceful activities.⁹¹ On 26 August 1976 the French cabinet indicated its intention to proceed with

⁸⁷ Sublette (2002b) and Weissman and Krosney (1981), pp. 75, 171.

⁸⁸ Economist (1974).

⁸⁹ Sublette (2002b) and Weissman and Krosney (1981), pp. 75, 171.

⁹⁰ Oberdorfer, Gatier and Schwartz (1979).

⁹¹ Information Bank Abstracts, New York Times, 10 August 1976, World News Digest (1976).

the sale of the nuclear reprocessing plant to Pakistan despite objections raised by the United States.⁹² On 13 October 1976, France again reaffirmed its decision to supply Pakistan with the nuclear reprocessing plant despite its recent assertions to prevent the spread of nuclear weapons.⁹³

The US State Department withheld nuclear licences for 12 countries including Pakistan. According to the State Department (20 May 1978), the licenses were being withheld because of Pakistan's attempts to acquire nuclear fuel reprocessing capacity. The US export licence withheld was for the export of less than one pound of plutonium. The plutonium was intended for a Pakistani research reactor in which the plutonium was to be irradiated with alpha particles.⁹⁴

In October 1978, Pakistan's imprisoned former Prime Minister Zulfikar Ali Bhutto claimed that Pakistan was near to attaining 'full nuclear capability' prior to his overthrow in 1977. Bhutto claims that 'All we [Pakistanis] needed was the nuclear reprocessing plant.' In a 319-page document smuggled out of his prison cell, Mr Bhutto took credit for developing Pakistan's nuclear energy programme and indicated that Pakistan only needed a reprocessing facility to attain nuclear capability.⁹⁵

Top US officials in the Carter Administration *considered Pakistan to be the biggest proliferation threat*. US officials pointed (December 8, 1978) to the document written by deposed Pakistani Prime Minister Zulfikar Ali Bhutto as evidence of Pakistan's intentions to develop a nuclear weapons programme. US officials believed that despite France's withdrawal from the nuclear fuel-reprocessing contract, Pakistan possessed the *complete blueprints for the reprocessing facility since France provided Pakistan with those blueprints in 1976*. A top US official said "The

⁹² Information Bank Abstracts, New York Times, 26 August 1976.

⁹³ Information Bank Abstracts, New York Times, 13 October 1976.

⁹⁴ OToole (1978).

⁹⁵ World News Digest (1978), Benjamin (1978).

French have nipped in the bud the short route to proliferation, but the Pakistanis will probably explore a variety of other avenues.⁹⁶

The French Nuclear Export Council, chaired by President Giscard d'Estaing, stated on 16 December 1976, that France would not supply any fuel reprocessing plants in the future. The decision is taken to prevent the proliferation of nuclear weapons. According to the French Nuclear Export Council, the sale of the reprocessing plant to Pakistan would be completed as planned. French officials, however, indicated their willingness to cancel the deal, but refrained from doing so owing to domestic political pressure. French officials indicated that France would be happy if Pakistan decided to cancel the contract. The French President Valéry Giscard d'Estaing was hopeful that Pakistan would cancel the agreement.⁹⁷ Despite the decision by France to terminate the contract for the supply of the reprocessing plant, *French technicians continued to work at the plant's construction site in Chashma* as of late December.⁹⁸

In late 1977, the French proposed to Pakistan to alter the design of the plant so that it would produce a mixture of uranium and plutonium rather than pure plutonium. This modification would not affect the plant's suitability for its declared purpose—producing mixed oxide fuel for power reactors—but would prevent its direct use for producing plutonium for weapons. Pakistan refused to accept the modification. But by that time Pakistan had received 95 per cent of the detailed plans for the plant, and was thus in a position to secure components and build the plant itself.⁹⁹ France's approval for SGN to complete the building for the plant, enabled Pakistan to work on outfitting

⁹⁶ Benjamin (1978).

⁹⁷ Information Bank Abstracts, *New York Times*, 17 December 1976; in Lexis-Nexis Academic Universe, 17 December 1976, <http://web.lexis-nexis.com>; Information Bank Abstracts, *New York Times*, 31 December 1976; in Lexis-Nexis Academic Universe, 31 December 1976, <http://web.lexis-nexis.com>.

⁹⁸ *Economist* (1974).

⁹⁹ Weissman and Krosney (1981); pp. 166-169.

the plant for production without the work being externally observable. Some of the components had already been delivered to Pakistan, and Pakistan had complete detailed plans for the plant.

In November 1977, the CEA (the French atomic energy agency) decided to buy controlling interest in SGN, which had a long history of aggressively pushing international sales of its technology, thus able to dictate its policies. On 15 June 1978 the Council on Foreign Nuclear Policy formally decided to abrogate the contract.¹⁰⁰ After the contract cancellation S.A. Butt continued dealing directly with subcontractors, staying on good terms, and attempting to arrange delivery of the materials, even though what he was asking for would now be a violation of French law to provide. One company that made vessels for the chemical processes, Bignier Schmid-Laurent (BSL), attempted to fill an order for 26 vessels by having them made by an Italian subsidiary called Alcom, though the deal was uncovered and quashed before they could be delivered.¹⁰¹

In the spring of 1979, the US government queried its Swiss counterpart on the sales of high-vacuum valves and the gasification and solidification unit that the Swiss companies VAT and CORA Engineering had sold to Pakistan. The US also complained that another Swiss company Sulzer Brothers was likely to be helping Pakistan with plutonium reprocessing technology. On investigating the sales, the Swiss government concluded that the companies had acted legally as the aforementioned items were not on Switzerland's export control list.¹⁰²

US officials confirmed on 2 May 1979 that Pakistan had started to build a plutonium plant that would provide an

¹⁰⁰ Weissman and Krosney (1981); pp. 169-171.

¹⁰¹ Weissman and Krosney 1981; pp. 190; 195-208.

¹⁰² Weissman & Krosney (1981); pp. 190-191.

alternative to using weapons grade uranium for its nuclear weapons.¹⁰³

The French Atomic Energy Chief Michel Pecqueur wrote to President of CEA-owned industrial affiliate Cogema Georges Besse on 28 May 1979, inquiring whether the company SGN was continuing technical assistance for the plutonium reprocessing facility in Pakistan, despite the cancellation of the contract by the French government. Pecqueur wrote that, 'it is hardly necessary for me to stress the seriousness of the facts, should they be in any way confirmed, as transactions of this kind would call into question the national policy on non-proliferation at the very highest level.'¹⁰⁴ Georges Besse in turn wrote to SGN President F. X. Poincet on 31 May 1979, inquiring whether SGN was continuing nuclear-related transfers to Pakistan. In his reply, Poincet denied that SGN was selling any contraband materials to Pakistan. He admitted however that SGN was continuing with limited involvement in relation to 'preparation of orders' for some Pakistanis who were still 'resident' at SGN. However, Poincet hinted that Pakistan may have gone behind their backs to procure equipment specified in documents supplied by SGN earlier. The nuclear industry's trade journal *Nucleonics Week* alleged that Pakistan had access to 95 per cent of the design plans for the plutonium reprocessing facility and these would likely enable Pakistan to finish the plant despite the termination of French assistance.¹⁰⁵

Going in to the 1980s Pakistan was still evidently trying to complete the Chashma plant.¹⁰⁶ It is not known that the plant has ever reached operational status (as of 2002), although in the intervening two decades Pakistan presumably could have developed the capabilities to manufacture any components they

¹⁰³ Burt (1979a,b).

¹⁰⁴ Weissman & Krosney (1981), p. 196.

¹⁰⁵ Weissman & Krosney (1981), p. 196.

¹⁰⁶ Weissman and Krosney (1981); pp. 195-208.

lacked, and US intelligence agencies have believed that they are working on this.¹⁰⁷

In an interview during the second week of December 1982, Pakistan's President Zia ul-Haq denied the existence of the New Labs reprocessing plant and insisted that 'we have no reprocessing facility whatsoever. Pakistani scientists are experimenting with how to reprocess one ounce of plutonium as scientists.' US analysts, however, believed that the New Labs reprocessing facility was not (currently) reprocessing plutonium but believed the facility possessed greater capacity than admitted by Pakistan. US analysts noted that the chairman of the PAEC Munir Ahmad Khan had indicated to European scientists that the New Labs facility could reprocess about 6 kg of plutonium. President Zia Ul Haq also stated that the enrichment facility in Kahuta was 'a humble, modest programme.' US sources, however, insisted that the Kahuta facility was built to house 10,000 ultracentrifuges. US intelligence sources also pointed out that the reprocessing and enrichment facilities were handled by the PAEC and *the procurement of equipment and construction of nuclear plants was supervised by the Pakistani military*.¹⁰⁸

4.3 NPT Proliferation: Weapon Material

On 9 April 1975, the Director of the US Arms Control and Disarmament Agency (ACDA), Fred C. Ikle, warned that several countries were pursuing efforts to acquire nuclear weapons. He stated that such countries were acquiring the means to produce nuclear weapons under the guise of obtaining nuclear technology for peaceful purposes. Although Ikle did not reveal the names of countries believed to be pursuing nuclear weapons, the *New York Times* claimed that it had learned from 'authoritative'

¹⁰⁷ Koch and Topping (1997).

¹⁰⁸ Benjamin, Washington Post 20 December 1982.

sources that the list included Pakistan, Argentina, Brazil, Libya, Israel, Taiwan, and South Korea.¹⁰⁹

On 3 January 1980, Michel Pecquer, Director of the French Atomic Commission, denied France's involvement in the *sale of Niger-mined uranium to Pakistan and Libya*. He also denied reports that uranium shipments from the mines in Niger were stolen. He clarified that the sale of uranium to Libya and Pakistan was made by the government of Niger and involved only those portions of the mines that were controlled by the Niger government. He added that the sale of 258 tons of uranium yellow cake to Libya and 110 tons to Pakistan was in conformance with IAEA regulations. The sale of uranium to Libya and Pakistan was confirmed by a Niger government spokesperson. *The two uranium mines in question are owned by the Niger government, COGEMA*—a French company owned by the French Atomic Commission, and a number of other French and foreign enterprises. Pecquer indicated that each shareholder controlled only a portion of the mine and had no control over the production activities of other parts of the mine controlled by other participants.¹¹⁰

Pakistani scientists were reported in September 1980 to be working on a clandestine plutonium reprocessing facility near Rawalpindi. The completion of the reprocessing facility would advance Pakistan's ability to test a nuclear device by about two years. According to intelligence experts, the plutonium reprocessing facility would supply Pakistan with sufficient fissile material to conduct a test in the fall of 1981.¹¹¹

The US informed Turkey in 1980 about *Turkish firms' assistance to Pakistan's nuclear explosives programme* by supplying inverters. The US also requested the Turkish government to

¹⁰⁹ 'Ikle Warns Against Nuclear Spread,' Facts on File World News Digest, 12 April 1975; in Lexis-Nexis Academic Universe, 6 February 1975, <http://web.lexis-nexis.com>.

¹¹⁰ Associated Press 3 January 1980.

¹¹¹ Weintraub and Whittington, Washington Post 7 December 1980.

halt the transfer of such electric equipment. The Turkish government did not act on the US's requests and insisted that the inverters, which cost \$100,000 a piece, were not covered under existing export control regulations.¹¹² On 20–21 June 1981, the US State Department, in a secret cable sent to the US Embassy in Ankara, asked the Turkish government to end its secret shipments of sensitive equipment to Pakistan that could be used to develop nuclear weapons. According to the cable, *Turkish companies were re-routing American-made electric equipment, known as inverters, from Europe to Pakistan*. Inverters transform electrical current to charge batteries and operate instruments and are used in nuclear plants. The cable termed the operation as a 'covert purchasing network' and claimed that Turkish companies had circumvented US and European export controls while conducting these trans-shipments. The cable also suggested that Pakistan's ruler General Haq might have offered nuclear technology to Turkey in exchange for these trans-shipments. The cable informed the US embassy in Turkey to tell the Turkish government that continuation of these trans-shipments would jeopardise Turkey's own aid programme. Apart from the secret purchasing network, the cable also warned that Pakistan was seeking technology and material to produce fuel for explosive devices. The cable said that 'we [United States] also have information that Pakistan is conducting a programme for the design and development of the *triggering package for nuclear explosive devices*.' The cable also warned that a nuclear test by Pakistan would lead to the cancellation of the proposed military and economic aid to Pakistan.¹¹³

During March–December 1982, the US found evidence to conclude that Pakistan was attempting to acquire components that could be used to produce several nuclear bombs. The

¹¹² Schweid (1981).

¹¹³ Schweid (1981).

components sought by Pakistan were identified as finely machined *hollow steel spheres measuring approximately 13 inches in diameter, and concave metal plates*. Pakistan was believed to have sought these metal spheres from *Britain and Argentina*. The spheres were important components of an implosion-type nuclear device in which uniformly placed explosives compress a sphere of highly-enriched uranium or plutonium to produce a fission reaction. The concave metal plates, known as *driver plates* are attached to the explosives and are used to produce a powerful blast. The shipments of these spheres was stopped using US diplomatic interventions. Pakistan's pursuit of these components forced the US President to send a special envoy, General Vernon Walters, to Pakistan on two occasions. During General Walter's visit to Pakistan in October, Pakistan's President Zia ul-Haq rejected the report that Pakistan was pursuing the nuclear weapons option.¹¹⁴

A 1983 US State Department analysis of the effort declared that there was 'unambiguous evidence that Pakistan is actively pursuing a nuclear weapons development programme.' The report highlighted Pakistan's progress in key areas of weapons manufacture, its *critical dependence on clandestine efforts to procure nuclear equipment* from private western firms, and its receipt of nuclear assistance from *China*, including assistance 'in the area of fissile material production and possibly also *nuclear device design*.' 'The Pakistan nuclear weapons programme relied on a *massive smuggling programme*.'¹¹⁵

'In February 1985, There were reports of Krytron switches used in triggering devices being smuggled to Pakistan from Western sources (Nazr Ahamad Vaid case).¹¹⁶ In August 1985 there were reports of Pakistan making attempts to purchase

¹¹⁴ Henderson, Financial Times 8 December 1982, Rogal, Cook & Whitmore, Newsweek 20 December 1982.

¹¹⁵ McDonough/CEIP (1998); Spector and Smith (1990), chapters 4 and 7

¹¹⁶ New York Times February 25 1985.

flash X-ray devices (used to picture the characteristics of high explosives during detonation) from Sweden.¹¹⁷ In July 1987 Arshad Pervez was arrested by US customs agents in Philadelphia on charges that he tried to export beryllium and maraging steel to Pakistan. Berriliym is used as neutron reflector in nuclear weapons.¹¹⁸ Parveez was indicted by a Federal Grand Jury for this act in December 1987.¹¹⁹

In January 1987, A. Q. Khan gave an interview to Kuldip Nayyar, an Indian journalist, in which he claimed that ‘...they (the whole world) told us that Pakistan could never produce the bomb and they doubted my capabilities; but now they know we have done it.’¹²⁰

‘Two related West German firms provided Pakistan with *test quantities of Tritium gas, a tritium purification and storage plant, tritium precursor materials, the design for a reactor that could be used for tritium production, and material and equipment for fabricating fuel for that reactor, including special American made welding lasers.*’¹²¹

In early 1996, Great Britain expelled an employee of the Pakistan Embassy in London for attempting to export illegally, *specialised laser instruments used in the manufacture of nuclear weapons.*¹²²

¹¹⁷ Financial Times, August 17 1985.

¹¹⁸ Nucleonics Week (1987).

¹¹⁹ Nucleonics Week (1988). The foregoing paragraph is taken from Kargil (2000), pp. 189-190.

¹²⁰ The Observer (London), March 1 1987. Kargil (2000), pp. 191.

¹²¹ McDonough/CIEP (1998), ‘Pakistan’ fn 25; *Der Spiegel* (1989), Hibbs (1989a,b,c,d,e), News India (1989).

¹²² *Washington Times* (February 1996).

5 Chinese Weapons Designs

Despite covertly obtaining industrial scale plants from Europe, Canada and the US for the manufacture of highly enriched uranium and bomb grade plutonium, Pakistan was still not in a position at the end of the 1970s, to produce highly enriched uranium and bomb grade plutonium on a sustained basis without outside help. Nor was it in a position to build and test an atomic bomb and build reliable weapons by itself.

It therefore turned to China at the end of 1970s to obtain all the elements needed to put together an atomic bomb. China supplied the designs, the HEU and other material for manufacturing an atomic bomb. As China was not in a position to supply a gas centrifuge plant for enriching uranium (having chosen the diffusion route) Pakistan was forced to change from the uranium to the plutonium route, to put its nuclear capability on a sustained and credible footing. It therefore persuaded China to supply a prototype reactor that would produce spent fuel containing plutonium and a pilot scale plant to extract bomb grade plutonium.

It is only after obtaining from China, complete (small scale) un-safeguarded duplicates of all the processes/plants that it had earlier obtained from Europe, the critical missing parts for an atomic bomb and guaranteed-to-be-effective nuclear weapons, did it institute an aggressive policy of large scale training, arming and infiltration of terrorists into India (Jammu and Kashmir) followed by Kargil and the rest of India).

5.1 Chinese Capability¹²³

The Soviet Union basically designed and built the fledgling nuclear industry in China until 1960. In the words of Jonathan Pollack, a prominent China expert, ‘In scale and scope Soviet assistance to the Chinese weapons programme is without parallel in the history of nuclear proliferation.’ Hundreds of Chinese technicians and scientists received training in the USSR and thousands more were trained by Soviet technicians in China. On 17 January 1955, just two days after the Chinese leadership decided to develop its own nuclear weapons, the Soviet Union announced that it would assist China with peaceful nuclear energy research, including the supply of a research reactor and a cyclotron (operational in Tuoli, June 1958). Six Sino-Soviet nuclear accords were signed between 1955 and 1958, ranging from joint uranium prospecting to the transfer of Soviet nuclear weapons technology.’

‘In The New Defence Technical Accord of 15 October 1957, the Soviet Union promised, among other things, to supply China with nuclear weapons design information and a prototype atomic bomb.’ Before the USSR transferred the actual weapon, however, it cancelled the agreement in mid-1959.

The Baotou Nuclear Fuels complex was designed and built (starting 1958) with the help of the Soviets (until they withdrew in 1960). This included the industrial manufacture of uranium tetra fluoride, nuclear fuel rods and the Lithium-6 Deutride workshop (begun in 1959 based on soviet design), to produce materials for the hydrogen bomb. Nuclear reactors were jointly built by the USSR and China at Chongqing, Shenyang and Xian. The Lanzhou gaseous diffusion uranium enrichment plant, based on Soviet design was started in 1958.

¹²³ This sub-section is based largely on Norris, Burrows and Fieldhouse (1994), pp. 324, 330; 338, 340.

After the break with the USSR, China launched a crash weapons programme, led ironically by scientists and engineers trained in the West, particularly at US universities and research facilities. The weapons development programmes were extremely successful. China successfully tested its first hydrogen bomb 32 months after its first atomic test. The corresponding time gap for the US was 86 months, USSR 75 months, UK 66 months and France 105 months.

In China, 'research on enriching uranium using the centrifuge method began in a serious way in 1977. In 1981, China's first separator prototype was successfully tested. Between 1983 and 1986, work was completed on other models, but apparently as of early 1993 China still did not enrich uranium using the centrifuge method. Certain Russian officials have visited China in an effort to sell them centrifuge technologies.'¹²⁴ The lack of progress till 1980, is consistent with reports that Pakistan had traded centrifuge designs stolen by A. Q. Khan from The Netherlands for atomic weapons designs and materials (highly enriched uranium and triggers; tritium).¹²⁵ Developments till mid-1990s suggested, that either China's industry was still not capable of manufacturing the relatively sophisticated equipment and parts needed to implement the German centrifuge designs or the benefit-cost ratio was not favourable to a technology switch.

China's commercial nuclear power reactors, similarly reflected its relative economic and general technological level. A commercial reactor was first proposed in February 1985 as a joint venture at Daya Bay. The first commercial reactor (Qinshan 1) was connected to the grid in 1991. The dichotomy between commercial and industrial nuclear technology is also reflected in the Russian assistance for a three-phase gas centrifuge uranium enrichment facility in Hanzun, Shanxi province (1993+) and

¹²⁴ Norris, Burrows and Fieldhouse (1994), pp 345. See also Wang Chengshu and Qian Gaoyun, 'Problems with Uranium Isotope Separation Discussed,' pp. 213-215.

¹²⁵ The Acorn, 4 January 2004. <http://acom.nationalinterestin/?p=207>.

possible assistance for a Heping facility and joint venture at Xian and Japanese technical assistance for a modern plutonium reprocessing plant (1995+).¹²⁶

‘One figure who played an important role throughout the Chinese nuclear weapons programme deserves special mention: Deng Xiaoping. As Communist Party General-Secretary in 1956 he decided that Nie should play the leading role in the development of China’s scientific, military and nuclear industry, in 1958 he personally approved the sites for the nuclear weapons facilities and till 1989 was the Chairman of the CMC, whose personal approval would be necessary for the use of nuclear weapons, after returning to power in 1978.’

5.2 Pakistan’s Diplomacy

In 1965, Zulfikar Ali Bhutto, Foreign Minister in the Cabinet of President General Muhammad Ayub Khan stated that, ‘All wars of our age have become total wars and it will have to be assumed that a war waged against Pakistan is capable of becoming a total war... and our plan should, therefore, include the nuclear deterrent.’¹²⁷ He asserted that, ‘If India developed an atomic bomb, we too will develop one ‘even if we have to eat grass or leaves or to remain hungry’ because there is no conventional alternative to the atomic bomb.’¹²⁸ President Ayub made an ultra secret overnight visit to China on 19–20 September 1965, to discuss the war situation with Premier Chou en Lai of China, who reportedly reassured Pakistan of support if the war was prolonged.¹²⁹ Thus began Pakistan’s efforts to persuade China to supply nuclear weapons-related technology to it. This effort ended successfully 11 years later.

¹²⁶ NTI and Center for Nonproliferation Studies at the Monterey Institute of International Studies, www.nti.org/db/china/wmwmdat.htm.

¹²⁷ Bhutto (1969), ppl 53.

¹²⁸ Jalal and Hasan (1970)

¹²⁹ <http://pakistanspace.tripod.com/65.htm>.

Zulfikar Ali Bhutto became Pakistan's Prime Minister in 1971 and visited China in 1972, 1974 and 26–30 May 1976. In his memoirs he wrote (in jail) that, 'My single most important achievement, which, I believe, will dominate the portrait of my public life, is *an agreement* which I arrived at after assiduous and tenacious endeavours, spanning *11 years of negotiations...*¹³⁰ The agreement of mine concluded in *June, 1976*, will perhaps be my greatest achievement and contribution to the survival of our people and our nation'.¹³¹ Bhutto was in Beijing on June 1, 1976.¹³²

General Mirza Aslam Beg was vice chief of army staff in General Zia ul-Haq's military administration, and after Zia's death in a plane crash, was immediately made chief in August 1988. After Zia's death, Beg helped Pakistan to a peaceful transition of power through general elections after which the Pakistan People's Party's (PPP's) Benazir Bhutto became premier. Beg remained a powerful chief of army staff until 1991, a period in which Pakistan developed nuclear weapons. He stated in an interview, 'The programme that we *started in 1976* achieved its purpose in about 12 years' time.'

On 27 April 1978, the Marxist People's Democratic Party of Afghanistan (PDPA) overthrew and executed Daoud along with members of his family. Nur Muhammad Taraki, Secretary General of the PDPA, became President of the Revolutionary Council and Prime Minister of the newly established Democratic Republic of Afghanistan. In May 1978, up to 400 Soviet military advisers were dispatched to Afghanistan. On 3 July 1979, US

¹³⁰ India-Pakistan War took place 11 years before in 1965. According to the Library of congress country study, "Iran, Indonesia, and especially China gave political support to Pakistan during the war, thus suggesting new directions in Pakistan that might translate into support for its security concerns.

After 1965 China became Pakistan's principal military supplier, providing materiel to all three services in substantial quantity and at attractive prices." [http://lcweb2.loc.gov/cgi-bin/querv/r?frd/cstdv:\(a\),field\(DOCID+pk0152\)](http://lcweb2.loc.gov/cgi-bin/querv/r?frd/cstdv:(a),field(DOCID+pk0152)).

¹³¹ Economist (14 July 1979).

¹³² Kargill (2000), p. 85.

President Jimmy Carter signed a directive authorising the CIA to conduct covert propaganda operations against the revolutionary regime. On 7 July 1979, the USSR sent an airborne battalion with crews in response to a request from the Afghan government for such a delivery.

In June-July 1979, sources indicated that Pakistan was attempting to explode a nuclear bomb in October (1979). Pakistan's security forces were reported to be working around Hoshab, a small desert town located 60 miles inland from the Makran coast in southwestern Pakistan. The region is inhospitable and a few nomads living there are reported to have been re-located to different areas. Reliable reports suggested the presence of military construction activity in the area. Experts indicated that *Pakistan might test a nuclear bomb in 1979 only if it received sufficient weapons-grade material from another source*, since its reprocessing plant and its uranium enrichment plant were still far from operating at full capacity. *Experts suspected that source to be China.*¹³³

Soviet deployment of the 40th Army into Afghanistan started on 25 December 1979. On 27 December 1979, 700 troops, including 54 KGB spetsnaz Special Forces troops from the Alpha Group and *Zenith Group*, deposed President Hafizullah Amin. Soviet ground forces entered Afghanistan from the north on 27 December and the Vitebsk parachute division landed at Bagram airport. The invasion transformed the attitude of the US (government, academics, media) and China towards Pakistan and towards each other. 'U.S.-China relations entered a "Golden Age" in the 1980s. Both nations continued to feel threatened by the Soviet Union (what Deng termed the "polar bear") and a new spirit of cooperation marked relations.'¹³⁴

¹³³ Economist (14 July 1979).

¹³⁴ Program Brief, vol. 7, #22, The Nixon Center, Washington, DC, December 12, 2001, "September 11 and U.S.-China Ties: A Chance for a New Strategic Partnership?" A Nixon Center seminar featuring Richard Solomon. [www.nixoncenter.org/Program%20Briefs/vol7no22Solomon\(China\).htm](http://www.nixoncenter.org/Program%20Briefs/vol7no22Solomon(China).htm).

Pakistan seems to have convinced the Chinese that Russia, with the tacit support of India, would break through Afghanistan into the Indian Ocean and thereafter explicitly link up with India. This would put China's access to Middle-East oil as well as its ties to Pakistan under risk. China was apparently persuaded that it was therefore, necessary for Pakistan to get nuclear weapons from China to deter both India and the Russians in Afghanistan. This would provide Pakistan with a shield to train jihadis to fight the Soviets in Afghanistan and India in Kashmir. China under Deng Xiaping (1978+), who played a leadership role in China's nuclear weapons programme from its start, was apparently convinced of the need to supply nuclear weapons to Pakistan, just as the USSR had promised to supply to China (but reneged on) 20 years earlier.

5.3 Strategic Proliferation

On 12 February 1980, reports indicated that Chinese nuclear experts were assisting Pakistan in its efforts to enrich uranium.¹³⁵ On 4 May 1980, Pakistani official sources denounced reports from Kabul and Moscow that President Zia ul-Haq would discuss the question of testing Pakistan's nuclear weapons in China with the Chinese leaders. Sources indicated that Pakistan's nuclear programme was geared towards peaceful purposes and also mentioned that Pakistan had no intention to produce nuclear weapons.¹³⁶ Following Pakistani President Zia ul-Haq's conclusion of his visit to China, reports suggested (6–18 May 1980) that the Chinese leaders had promised to permit the testing of Pakistan's nuclear devices on Chinese territory. According to these reports, the tests would be supervised by Chinese and Pakistani scientists.¹³⁷

¹³⁵ BBC 14 February 1980.

¹³⁶ Xinhua 6 May 1980.

¹³⁷ BBC 22 May 1980.

On 19 August 1982, US Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs, James Malone, indicated that one of the factors obstructing the completion of a bilateral nuclear accord between China and the US was China's relationship with Pakistan regarding nuclear issues. Malone indicated that *China supplied Pakistan with material other than fuel-related items*. However, he declined to name the specific items. Malone also indicated that the US was making progress in restricting the supply of nuclear components to Pakistan's nuclear facilities.¹³⁸ On 8 September 1982, the US placed a hold on bilateral nuclear cooperation with China because of intelligence reports suggesting that China helped Pakistan in its efforts to produce weapons-grade uranium. Some US officials believed that China provided assistance to Pakistan in its efforts to enrich uranium.¹³⁹ This was followed on 6 December 1982 by a briefing to the Senate Foreign Relations Committee, in which Reagan administration officials indicated that Pakistan was continuing its nuclear weapons programme. Administration officials informed the Foreign Relations Committee that *China was assisting Pakistan to build a nuclear bomb* and estimated that Pakistan was about a year away from producing fissile material that could be used to make a bomb.¹⁴⁰

By 1982, Pakistan was also subject to sanctions under the reprocessing sanctions provisions of the 1977 Glenn-Symington Amendment. Arms Export Control Act, op. cit. These provisions specified that U.S. economic and military aid were to be terminated to any state that imported reprocessing technology (i.e., technology for separating plutonium from spent reactor fuel) after 1977 when the law was enacted. Presumably, this sanctions law was triggered by Pakistan's acquisition of equipment to complete a pilot-scale reprocessing plant, known

¹³⁸ Laufer (1982).

¹³⁹ Miller (1982b), New York Times 19 September 1982.

¹⁴⁰ Weinraub, New York Times 8 December 1982.

as the “New Labs” at the Pakistan Institute of Nuclear Technology (PINSTECH), and by its continued work on a larger reprocessing plant at Chasma, which France had originally agreed to design and build in the early 1970s.¹⁴¹

By 1983 it was known publicly that *China supplied the complete design of a 25 kT nuclear bomb; possibly a Chic-4 design along with enough highly enriched uranium for one or two nuclear weapons.*¹⁴² Dr Samar Mubarakmund, who was responsible for weaponisation of Pakistan’s capability, said in an interview to a newspaper that, ‘1983 was an important milestone in the history of Pakistan’s nuclear programme, when the first atomic device was manufactured and tested.’¹⁴³ In 1983, a US State Department analysis of the effort declared that there was ‘unambiguous evidence that Pakistan is actively pursuing a nuclear weapons development programme.’ The report highlighted Pakistan’s progress in key areas of weapons manufacture, its critical dependence on clandestine efforts to procure nuclear equipment from private Western firms, and its receipt of nuclear assistance *from China*, including assistance ‘in the area of fissile material production and possibly also nuclear device design.’¹⁴⁴

This was followed by the supply by China to Pakistan of enough tritium, used to achieve fusion in hydrogen bombs and boost the yield of atomic bombs, *for 10 thermo-nuclear bombs* (by 1986).¹⁴⁵ ‘Pakistan was reported (in 1995) to have conducted a cold test based on Chinese Design—i.e. a fully instrumented test of a dummy weapon, using a core of natural (unenriched)

¹⁴¹ McDonough/CIEP (1998), ‘Pakistan’ fn 11.

¹⁴² Millhollin and White (1991) p. 17; Millhollin and White (1991a), p. C1, C4, Shuey and Kan 29 September 1995, p. 9; Spector and Smith, *Nuclear Ambitions*, p. 101-102. The Chinese design transfer was first reported by *The Financial Times* of August 14 1984.

¹⁴³ *The Gulf Today*, May 19 1999.

¹⁴⁴ McDonough/CIEP (1998), *Pakistan* p. 131-2; US State Dept (1991).

¹⁴⁵ *Asia-Pacific Defense Reporter* (September 1991), p. 19; Millhollin and White(1991) p. 17; Millhollin and White(1991a), p. C1, C4; *The Risk Report*, May 1995, p. 8; <http://cns.miis.edu/research/india/china/npakpos.htm>.

uranium. The event is said to have taken place in September 1986, near Chagai.¹⁴⁶

It is not till 1985 (or perhaps 1986), however, that Pakistan managed to produce weapons-grade uranium (highly enriched uranium) in its own facilities.¹⁴⁷ Chinese scientists assisted with the production of weapons-grade uranium at Kahuta. The Kahuta lab, centre of Pakistani nuclear weapons research and production facility for weapons-grade fissile material.¹⁴⁸ Pakistan reportedly produced enough 'Weapons grade uranium for its first nuclear device.'¹⁴⁹ 'By this time Pakistan was also believed to have tested the non-nuclear "triggering package" of a nuclear device'.¹⁵⁰

The US government believed that 1987 was the year when Pakistan, for practical purposes, first 'possessed' a nuclear explosive device has been an issue of some dispute. Some observers (e.g, CIA analyst Richard Barlow) believed that this threshold was crossed by 1987 and that the Reagan and Bush administrations in 1987, 1988, and 1989 improperly certified that Pakistan did not possess this capability, in order to avoid the imposition of sanctions under the Pressler Amendment.¹⁵¹ 'In late 1989 and early 1990, Pakistan apparently ended this freeze and fabricated cores for several nuclear weapons from pre-existing stocks of weapons-grade uranium.'¹⁵²

In 1986 a comprehensive nuclear cooperation agreement was signed between China and Pakistan. Document 18 of the US Department of State, Office of Non-Proliferation and Export

¹⁴⁶ McDonough/CIEP(1998); Hughes (1995) p. 270.

¹⁴⁷ 'Pakistan crosses HEU threshold' for Weapons Grade Uranium [McDonough/CIEP(1998), Pakistan, fnl3, Smith (1988). The Pressler Amendment was introduced in 1985 to avoid imposing sanctions on Pakistan.

¹⁴⁸ Shuey and Kan (1995), p. 9; Asia Pulse 26 March 2003.

¹⁴⁹ McDonough/CIEP(1998), Pakistan fnl4; Woodward & Oberdorfer (1986), Boyd (1986), Oberdorfer (1986), Smith(1988), Woodward(1986).

¹⁵⁰ McDonough/CIEP (1998), Pakistan fnl4; Scali (1985).

¹⁵¹ Hersh (1993), Reuters (1993).

¹⁵² McDonough/CIEP (1998), Pakistan p. 132.

Technology, 'US Interaction with the PRC concerning the PRC's Nuclear Relationship with Pakistan,' marked Secret, whose heavily excised copy was made available on 28 November 1989 provides some information.¹⁵³ This heavily excised paper provides some background on the negotiation of the nuclear cooperation agreement although the material relating to its implementation and any specifics on Pakistan is withheld. Whatever this paper may have concluded, the Bush Administration determined in the following year that it could not certify that Pakistan was in compliance with Pressler Amendment requirements. In the light of Pakistani decisions to assemble several nuclear cores and an intelligence establishment consensus that this had indeed happened, President Bush withheld the necessary certification, thus triggering a suspension of military and economic aid. Facilitating this decision was the Soviet withdrawal from Afghanistan, which seemingly reduced Pakistan's strategic importance. This action produced an angry reaction in Pakistan, where authorities continued the drive toward a nuclear capability.

In 1989, the PARR-2 research reactor (27 kW) at Rawalpindi was designed and built with Chinese assistance. It is under IAEA safeguards with no known connection to the weapons programme.¹⁵⁴ 'China was also believed to have assisted Pakistan with building an un-safeguarded 50-70-MWt plutonium production reactor at *Khushab* and to have helped Pakistan develop an un-safeguarded *plutonium reprocessing facility* (for separating plutonium from the *Khusab* reactors spent fuel) at *Chasma* that was left unfinished when earlier French assistance was terminated in the late 1970s.'¹⁵⁵

'According to U.S. officials, Pakistan continued work on its 40-MWt, unsafeguarded, heavy-water research reactor at

¹⁵³ Source: State Department FOIA release (D Kux, pp. 309-311).

¹⁵⁴ *Nucleonics Week* 9 August 1990, p. 4.

¹⁵⁵ McDonough/CIEP (1998), p 50; Gertz (1996b), Albright et al. (1997), p283.

Khushab, with Chinese assistance, although Washington was apparently unable to discern the precise nature of this assistance.¹⁵⁶ The Khushab reactor (40-100 MW, built between 1994 and 1996 with Chinese assistance, could produce weapons-grade plutonium. The reactor had reportedly gone critical but could not produce power because it lacked the heavy water needed to moderate the chain reaction. It was reportedly built with Chinese assistance.¹⁵⁷ During the same period China reportedly reached a deal to supply heavy water to nearby safeguarded Kanupp facility, but the deal was delayed by concerns that the heavy water might be diverted to the Khushab facility (Excess D2O supply has been diverted).¹⁵⁸

‘Reports on the Chasma reprocessing facility in the early 1990s suggested that, it was progressing, but probably still several years from completion. According to an analysis by the CIA quoted in the press, as of April 1996, China was providing technicians and equipment to help finish the facility. According to reports of August 1997, however, US officials believed that, while some Chinese assistance and equipment may have trickled into the Chasma reprocessing project, the reprocessing complex at Chasma “is an empty shell”.¹⁵⁹ The unsafeguarded Chasma plutonium reprocessing facility, can extract weapons-grade plutonium from spent fuel. Under construction, reportedly near completion. China reportedly provided assistance to the construction of the reprocessing facility.¹⁶⁰

In 1994–95, the China Nuclear Energy Industry Corporation (CNEIC) supplied 5,000 ring magnets to the A.Q. Khan Research Lab at Kahuta, to be used in gas centrifuges that could make weapons-grade enriched uranium.¹⁶¹

¹⁵⁶ McDonough/CIEP (1998), p 134; Hibbs (1996a), Hibbs (1996b).

¹⁵⁷ PTI News Agency 21 May 1996.

¹⁵⁸ Hibbs (1997), p. 15. Leventhall (1998).

¹⁵⁹ McDonough/CIEP (1998), p 134;; Gertz (1996b), Smith and Lipmann (1995).

¹⁶⁰ Gertz (1996b), p. A 4.

¹⁶¹ Chen (1996), p. B 6.

In 1996, a special industrial furnace, that could be used to melt plutonium or enriched uranium into the shape of a nuclear bomb core, was sold by China to Pakistan, apparently for the Khushab facility.¹⁶² Chinese scientists reportedly in Pakistan helped to install the furnace.¹⁶³ The same year China also supplied, high-tech diagnostic equipment, apparently for the Khushab facility.¹⁶⁴ Khushab was apparently the destination of the furnace and diagnostic equipment sold in 1996.¹⁶⁵ In a 1997 report by the Director of Central Intelligence, it stated that China 'was the primary source of nuclear-related equipment and technology to Pakistan' during the second half of 1996. (During the Clinton years the *Washington Times* correspondent Bill Gertz published a highly damaging communications intercepts on Chinese-Pakistan nuclear transactions in 1996).¹⁶⁶

'By conservative estimates, Pakistan by 1995 would have been able to deploy about 10 nuclear weapons; by other estimates, the number could have been as high as 15–25. Pakistan's bombs in the basement were presumed credible because of reports that they were based on design supplied by sources in China in the 1980s.'¹⁶⁷

'China's assistance to Pakistan's nuclear programme over the last 15 years may have been crucial to Pakistan's nuclear weapons breakthroughs in the 1980s. It is widely believed that in the early 1980s China supplied Pakistan with design information for one of its own earlier atomic weapons, and there has also been speculation that China may have provided Pakistan with enough highly enriched uranium (HEU) for two such weapons.'¹⁶⁸

¹⁶² Schwied (1996), p. A 11; Smith (1996c), p. A 38.

¹⁶³ Schwied (1996), p. A 11.

¹⁶⁴ Gertz (1996c), p. A 1; Strobel and Gertz (1996d), p. A 1.

¹⁶⁵ Schwied (1996), p. A 11; Smith (1996c), p. A 38.

¹⁶⁶ Director of Central Intelligence, June 1997 (Gertz, Bill (1999), pp. 206-207.

¹⁶⁷ McDonough/CIEP (1998); Gelb (1984a), Gelb (1984b), Smith (1996b), Foreign Report (1989) p.1.

¹⁶⁸ McDonough/CIEP (1998), p50; Gelb (1984a), Gelb (1984b), Milhollin and White (1991a); Albright, Berkhout and Walker (1997).

‘According to an August 1997 report by the U.S. Arms Control and Disarmament Agency, “Prior to China’s [1992] accession [to the NPT], the United States concluded that China had assisted Pakistan in developing nuclear explosives...” Questions remain about contacts between Chinese entities and elements associated with Pakistan’s nuclear weapons programme.’¹⁶⁹

On the basis of the history of China’s assistance to Pakistan’s nuclear weapons and ballistic missile programmes, some observers, especially in India, have come to believe that China perceives Pakistan to be a strategic ally and partner with which it is working to keep India in check. If China does have such an objective, it is doubtful that it will stop all assistance to Pakistan’s nuclear and missile programmes—notwithstanding any pledges Beijing may have given the US.¹⁷⁰

¹⁶⁹ McDonough/CIEP (1998), p50; USacda (1997), p80.

¹⁷⁰ McDonough/CIEP (1998).

6 Pakistani Proliferation¹⁷¹

Pakistan ‘(Khan) acquired the blueprints for the Chinese bomb that was tested in China’s fourth nuclear explosion in 1966.¹⁷² In the mid-1980s, Khan, reportedly, began to develop his export network and ordered twice the number of components necessary for the indigenous Pakistani programme. This transition from importer to exporter of centrifuge components was, apparently, completely missed by western intelligence services who believe Khan is only working on Pakistan’s domestic nuclear weapons programme.’¹⁷³

Pakistan’s success with its uranium enrichment programme, ‘was followed by the more advanced design and technologies of the P-2 centrifuge, an adapted version of the German G-2 that can spin twice as fast as the previous P-1 design’. Pakistan was ‘left with an excess inventory of P-1 components and Khan began purchasing additional P-2 components that he would export through many of the same channels he had used to import centrifuge components. Khan made nuclear sales during the mid 1980s to mid 1990s to Iran and offered technologies to Iraq and possibly others.’

‘From mid-1990s, after initial nuclear transfers to Iran, A.Q. Khan appeared to have expanded his network of customers to include Libya and North Korea. Khan’s network was based on a complex structure of international suppliers that shipped components unimpeded by ineffective controls. Details of Libya’s acquisition trace the network to Malaysia, Singapore,

¹⁷¹ This section is based largely on CEIP Chronology by Michael Laufer (2005) and Squassoni (2004b).

¹⁷² Broad and Sanger (2004b).

¹⁷³ Broad, Sanger and Bonner (2004).

Turkey, South Africa, Switzerland, South Korea, Dubai, and possibly others. Many details of the sales to Libya have been uncovered since late 2003, when it decided to come clean about its nuclear programme. However many aspects of the network remain mysterious, including network sources for some necessary centrifuge components and details about suspected transfers to North Korea.’

On 4 February 2004, Dr Abdul Qadeer Khan, self-styled father of the Pakistani nuclear bomb, appeared on Pakistani television to apologise to his nation. Pakistani officials a few days earlier claimed that Khan provided technology to Iran, Libya, and North Korea.¹⁷⁴ Khan’s uniqueness lay in his apparent ability to provide ‘one-stop shopping,’ what Clary has called a ‘Nuclear Walmart.’ Khan sold blueprints; components; full centrifuge assemblies; uranium hexafluoride feedstock; and, from some accounts, a nuclear-weapon design.¹⁷⁵ The Pakistan government and all those connected with the government during this proliferation effort routinely denied any knowledge of Pakistan’s nuclear trade, and launched a pro-forma investigation to identify the ‘culprits.’ Those purportedly investigated by the Pakistan government, on suspicion of involvement in the Nuclear Walmart, ‘included Mohammed Farooq, who supervised the KRL’s contacts with foreign suppliers; Yasin Chohan, a KRL metallurgist; Major Islam ul-Haq, a personal staff officer; Nazeer Ahmed, a KRL director; and Saeed Ahmed, head of centrifuge design. Between 11 and 25 KRL employees were questioned, as well as the generals in charge of KRL security, Generals Beg and Karamat.’¹⁷⁶

¹⁷⁴ Rhode and Sanger(2004).

¹⁷⁵ Yourish and D’Souza(2004).

¹⁷⁶ Henderson(2004).

6.1 Iran

'Khan's assistance to Iran in centrifuge uranium-enrichment apparently began in the late 1980s and continued at least until the mid-1990s. Iran told the IAEA its centrifuge enrichment programme began in 1987; Lieutenant General Khalid Kidwai, who briefed journalists on February 1, 2004, on Khan's confession, reportedly stated that cooperation began in 1989 and Khan transferred technology from 1989 to 1991.'¹⁷⁷

Pakistan and Iran are suspected of signing, in 1986 or 1987, a secret agreement on peaceful nuclear cooperation. Allegedly, the deal included a provision for at least six Iranians to be trained in Pakistan at the Institute of Nuclear Science and Technology in Islamabad and the Nuclear Studies Institute. Iranian scientists might also receive centrifuge training at KRL.¹⁷⁸ Khan is suspected of visiting the Iranian reactor at Bushehr in February 1986 and again in January 1987. These early interactions may have led directly to Khan's assistance to Iran, but the content of the visits is unknown.¹⁷⁹ Khan is suspected of having made an offer to Iran in 1987 to provide a package of nuclear technologies, including assistance for the difficult process of casting uranium metal. The price for the package is reported to be from the tens of millions to the hundreds of millions.¹⁸⁰ Khan is believed to have made a centrifuge deal with Iran to help build a cascade of 50,000 P-1 centrifuges.¹⁸¹ In addition, Iran may have received centrifuge drawings through an unknown foreign intermediary around this time.¹⁸²

Khan and his network of international suppliers reportedly began nuclear transfers to Iran in the late 1980s. The period of cooperation is thought to continue through 1995 when P-2

¹⁷⁷ New York Times (2004).

¹⁷⁸ Boureston and Ferguson(2004).

¹⁷⁹ Ibid.

¹⁸⁰ Sciolino and Sanger (2005).

¹⁸¹ Broad, Sanger, and Bonner (2004).

¹⁸² Clary, 'Dr. Khan's Nuclear WalMart.'

centrifuge components were transferred. The Pakistani government claimed no transfers occurred after the shipments of P-1 components and sub-assemblies from 1989 to 1991.¹⁸³ In 1988, Iranian scientists were suspected of having received nuclear training in Pakistan.¹⁸⁴ Iran was suspected of receiving its first centrifuge assemblies and components in 1989. The shipped components were likely older P-1 centrifuge components that Khan no longer had use for in Pakistan. Through 1995, Khan is reported to have shipped over 2,000 components and sub-assemblies for P-1, and later P-2, centrifuges to Iran.¹⁸⁵ More advanced components for P-2 centrifuges were suspected to have arrived in Iran in 1994 or 1995. B.S.A. Tahir, a Sri Lankan businessman and Khan's chief lieutenant, told Malaysian police that Iran paid approximately \$3 million for these centrifuge parts.¹⁸⁶ An IAEA report states that Iran received P-2 drawings from 'foreign sources' in 1994.¹⁸⁷ Iran has claimed that it received P-2 plans, but no centrifuge components, and tried to develop a carbon-composite rotor on its own, with no success.¹⁸⁸

6.2 Libya

Assistance to Libya began in the early 1990s and may have continued into 2002. Beyond blueprints, components, full assemblies of centrifuges, and low-enriched uranium, Libya also received—startlingly—a nuclear weapons design. An IAEA report states that in 1997 foreign manufacturers provided 20 pre-assembled L-1 (equivalent to P-1) centrifuges and components for an additional 200 L-1 centrifuges, including process gas feeding and withdrawal systems, UF₆ cylinders, and

¹⁸³ Congressional Research Service (2005).

¹⁸⁴ Weiss, Leonard (2005).

¹⁸⁵ Kampani (2004).

¹⁸⁶ Sanger (2004).

¹⁸⁷ IAEA (2004a).

¹⁸⁸ IAEA (2004a) & IAEA (2004b).

¹⁸⁹ IAEA (2004b).

frequency converters.¹⁸⁹ In both cases, it is clear that Khan provided technology for an advanced centrifuge design (the P-2). Libya received two of the P-2-type centrifuges in 2000 and placed an order for 10,000 more. Libya received two of the P-2-type centrifuges in 2000 and placed an order for 10,000 more.¹⁹⁰ There is no confirmation that the nuclear-weapon design Libya received in 2001 or 2002 is from Pakistan, but some sources have reported that the design contained Chinese text and step-by-step instructions for assembling a vintage 1960s, highly enriched uranium implosion device, which could indicate that Khan passed on a design that Pakistan is long rumoured to have received from China.¹⁹¹

Khan began to transfer centrifuges and centrifuge components to Libya in 1997. Libya received 20 assembled P-1 centrifuges and components for 200 additional units for a pilot enrichment facility. Khan's network continued to supply with centrifuge components until late 2003.¹⁹² In June 2000, Peter Griffin set up Gulf Technical Industries in Dubai, which serves as a front company for Khan's network. B.S.A. Tahir used Gulf Technical Industries as one of his front companies to order centrifuge components from Malaysia.¹⁹³ In September 2000, Libya received two P-2 centrifuges as demonstrator models and placed an order for components for 10,000 more to build a cascade. Each centrifuge contains around 100 parts, implying approximately 1 million parts total for the entire P-2 centrifuge cascade.¹⁹⁴ In 2001, Libya obtained 1.87 tons of uranium hexafluoride, the gas that is used to feed enrichment centrifuges. The amount is consistent with that required for a small pilot enrichment facility.¹⁹⁵ The source of the uranium hexafluoride remains uncertain. In 2004, evidence emerged that North Korea

¹⁹⁰ IAEA (2004a) & IAEA (2004b).

¹⁹¹ Broad and Sanger (2004) and Warrick and Slevin (2004).

¹⁹² Kampani (2004).

¹⁹³ Broad, Sanger and Bonner(2004).

¹⁹⁴ Salama (2005).

¹⁹⁵ Kampani (2004).

might have supplied Libya with the material, which would be the first discovered transfer of nuclear material from North Korea to an A.Q. Khan network recipient. The evidence remains inconclusive, however, and authorities continue to suspect that the uranium hexafluoride came from Pakistan.¹⁹⁶ In December 2001, B.S.A. Tahir signed a \$13 million contract with Scuomi Precision Engineering (SCOPE) in Malaysia for 25,000 aluminum centrifuge components. The components would be shipped to front companies in Dubai, including Gulf Technical Industries and SMB Computers. SCOPE representatives later acknowledge manufacturing parts for Tahir, but believed that they would be used in Dubai oil and gas industries.¹⁹⁷ In December 2002, shipments begin from SCOPE of aluminum centrifuge components. Four shipments are believed to have been sent from Malaysia to Dubai before August 2003, en route to Libya.¹⁹⁸

In late 2001 or early 2002, Libya received the blueprints for nuclear weapons plans. The plans are reported to be of Chinese origin with Chinese notes in the margins. There is reported to be a note on the blueprints that ‘Munir’s bomb would be bigger,’ possibly a reference to Munir Ahmad Khan of the PAEC, who was in competition with A.Q. Khan to develop a Pakistani bomb.¹⁹⁹

In October 2003, the German cargo ship *BBC China* was intercepted en route to Libya with components for 1,000 centrifuges. The parts were manufactured in Malaysia by SCOPE and shipped through Dubai.²⁰⁰ In December 2003, Libya renounced its nuclear weapons programme and began the process of full disclosure to the IAEA, including the declaration of all foreign procurements.²⁰¹ In March 2004, a container aboard the

¹⁹⁶ Sanger and Broad (2004).

¹⁹⁷ Salama (2004).

¹⁹⁸ Salama (2004).

¹⁹⁹ Broad and Sanger (2004).

²⁰⁰ Sanger (1995).

²⁰¹ Broad and Sanger (2004).

BBC China (the ship that was previously intercepted) arrived in Libya with one additional container of P-2 centrifuge components. Colonel Qaddafi reported the arrival to American intelligence and the IAEA. The Libyans warned American officials that not all of the components from Libya's orders had arrived and some might still show up in the future.²⁰²

6.3 North Korea

'During mid-1971 Bhutto approached North Korea in an effort to obtain critically needed weapons. An agreement was quickly reached and on 18 September 1971 the first arms shipment from the DPRK arrived in Karachi. On 9 November 1972, only one day after withdrawing from SEATO, Pakistan announced that it was establishing formal diplomatic relations with the DPRK. Military assistance to Pakistan continued through the late 1970s, with the DPRK providing artillery, multiple rocket launchers, ammunition, and a variety of spare parts.'²⁰³

Whether Khan gave North Korea nuclear-weapon-related technology or equipment is still disputed. US officials and sources close to Khan have said he did; the Pakistani and North Korean governments have denied any technology transfers. Asked by Senator Chuck Hagel (R-NE) what the United States knows about Pakistan's involvement in helping North Korea, Deputy Secretary of State Richard Armitage replied that '[w]e know it's both ways and we know a good bit about a North Korean-Pakistan relationship.'²⁰⁴ One popular theory is that Pakistan bartered uranium-enrichment technology for missile technology from North Korea, but Musharraf has stated that 'whatever we bought from North Korea is with money.'²⁰⁵

²⁰² Broad and Sanger (2004).

²⁰³ Bermudez (1998b).

²⁰⁴ Richard Armitage, testimony before the Senate Foreign Relations Committee, February 4 2003.

²⁰⁵ Bokhari, Fidler, and Luce (2004) and Squassoni (2004a).

A Pakistani official involved in Khan's investigation reportedly said North Korea ordered P-1 centrifuge components from 1997 to 2000.²⁰⁶ Separately, other evidence points to Pakistani nuclear assistance. Reportedly, a competition was encouraged between the plutonium team (PAEC), working toward Chinese-derived nuclear-capable missiles, and the highly enriched uranium team (KRL), collaborating with North Korea on a Scud derivative.²⁰⁷ Khan's frequent trips abroad for 'legitimate' missile cooperation with North Korea might have provided cover for his nuclear deals.

'Pakistan began missile cooperation with North Korea in 1992. Within Pakistan, KRL is one of the laboratories responsible for missile research and will develop the Ghauri missile with North Korean assistance. This cooperation probably established the connections that Khan could have used to transfer nuclear technologies. However, very little is known about when any nuclear transfers began, what nuclear components might have been obtained by North Korea, and whether or not the Pakistani government was privy to Khan's activities.'²⁰⁸

Khan started travelling to North Korea in mid 1990s, where he received technical assistance for the development of the Ghauri missile, an adaptation of the North Korean No Dong design. Khan made at least 13 visits before his public confession in 2004 and is suspected of arranging a barter deal to exchange nuclear and missile technologies, though the details of any nuclear transfers remain unknown. Khan travels with military personnel from KRL. These officials could have helped with the transfer of nuclear technology because programmes under the Ministry of Defence were exempt from normal export controls.²⁰⁹ The military presence at KRL, including personnel

²⁰⁶ Zaidi (2004).

²⁰⁷ Broad and Sanger (2004) and Warrick and Slevin (2004).

²⁰⁸ Congressional Research Service (2004).

²⁰⁹ Weiss (2005).

who traveled to North Korea, suggests that the Pakistani government might have been aware of Khan's activities. President Musharraf denies this claim.²¹⁰ The Pakistani currency reserve crunch in 1996 may have motivated Khan to expand his nuclear network with sales to North Korea. The crisis might have made a barter agreement attractive to Pakistan to avoid defaulting on external debt. Visits of North Korean and Pakistani officials accelerate following the crisis, but it is not known if these meetings include discussions of nuclear transfers or deal exclusively with missile technologies.²¹¹

'Khan is suspected of beginning nuclear transfers to North Korea around 1997, though the dates of the first transfers are highly uncertain.²¹² Transfers to North Korea are believed to have continued through 2003, but the Pakistani government claims these transfers ceased in 2001. Over this period, Khan may have supplied North Korea with old and discarded centrifuge and enrichment machines together with sets of drawings, sketches, technical data, and depleted uranium hexafluoride.²¹³ In December 1997, several reports stated that Pakistan's then Chief of Army Staff General Jehangir Karamat secretly visited Pyongyang.²¹⁴ Khan has claimed that Karamat was aware of the deal between Pakistan and North Korea to exchange enrichment assistance for missile technologies (Ibid). Karamat, now Pakistan's Ambassador to the United States, says that this information is incorrect. He says that he never visited North Korea and did not have any knowledge of the proliferation activity.

During the summer of 2001, American spy satellites detected missile components being loaded into a Pakistani cargo plane outside of Pyongyang. Intelligence services assume the cargo to be missile technology traded in direct exchange for

²¹⁰ Kampani (2004).

²¹¹ Congressional Research Service (2004).

²¹² Pinkston (2002).

²¹³ Clary, 'Dr. Khan's Nuclear WalMart.'

²¹⁴ Armstrong (2004).

nuclear technology, but no hard evidence exists.²¹⁵ In April 2003, German authorities intercepted a ship in the Suez Canal with a large cargo of strong aluminum tubing en route to North Korea. The tube specifications suggest that they are intended for use as outer casings for P-2 centrifuges.

6.4 Others

Khan was, reportedly, approached in the early 1980s by an unknown Arab country (possibly Saudi Arabia or Syria) requesting nuclear assistance.²¹⁶ Khan is suspected to have met with a top Syrian official in Beirut in the mid-1990s to offer assistance with a centrifuge enrichment facility.²¹⁷

As far back as the late 1980s, German intelligence investigated potential Pakistani assistance to Iraq, and possibly Iran and North Korea, with processes related to melting uranium.²¹⁸

An Iraqi memo, found during inspections in 1995, indicates that Khan may have offered significant nuclear assistance to Iraq in late 1990. He offered to sell Iraq a nuclear bomb design and guarantee material support from Western Europe for a uranium enrichment programme. Khan stated that any materials needed from Europe could be routed through a company he owned in Dubai and that a meeting with a friendly intermediary could take place in Greece. However, Iraq is believed to have turned down the offer, suspecting it to be a sting and no known follow-ups were made after the 1991 Gulf War. The investigation in the 1990s was inconclusive in its efforts to determine the authenticity of the memo.²¹⁹

In 1991, a German intelligence investigation concluded that Iraq, and possibly Iran and North Korea, obtained uranium-melting information from Pakistan in the late 1980s.²²⁰

²¹⁵ Sanger (1995).

²¹⁶ Clary, 'Dr. Khan's Nuclear WalMart.'

²¹⁷ Kampani (2004).

²¹⁸ Congressional Research Service (2005).

²¹⁹ Albright and Hinderstein (2004).

²²⁰ Hibbs (1991) and Hibbs (2002).

6.5 Pakistani Deniability

‘On 5 July 1977, Army General Mohammed Zia ul-Haq launched a coup against Bhutto and took over the government. The military quickly took control of the nuclear weapons programme, control it has maintained to the present day—placing Pakistan’s nuclear arms outside of the authority of the civilian government (when it has had one).’²²¹

‘The structure of the nuclear establishment in Pakistan and the key role of the military, as well as long-standing ties between Pakistan and all three countries, raise doubts that Khan acted completely without government knowledge. Pakistan’s military is widely believed to control the Pakistani nuclear weapons programme. Musharraf has taken pains to clarify that Pakistan established civilian control of the nuclear weapons programme (embodied in himself) under the National Command Authority, but until Musharraf steps down as army chief of staff, this distinction may be irrelevant. Moreover, a key feature of Pakistan’s export control regulations allows for an explicit exemption for Ministry of Defence agencies, which suggests that weapons programmes under military leadership could skirt domestic export control laws.’²²²

Khan has alleged that military officials, including former Chiefs of Army Staff (COAS), knew of the transfers. One account claims that equipment to Iran was transferred at the request of the late General Imtiaz Ali between 1988 and 1990.²²³ Another states that Musharraf was aware of aid to North Korea, that General Mirza Aslam Beg knew about aid to Iran, and that two other COAS (Generals Jehangir Karamat and Abdul Waheed) knew of aid to North Korea.²²⁴ General Beg long has had a reputation for being an Islamist and an admirer of the

²²¹ Sublette (2002b).

²²² Srivastava and Gahlaut (2003).

²²³ Times of India (2004).

²²⁴ Lancaster and Khan (2004).

Iranian revolution. Beg officially denied knowledge of aid to Iran, although former Prime Minister Benazir Bhutto said she was approached several times from 1988 to 1990 (the period when Beg was COAS) by military officials and scientists who wanted to export nuclear technology. According to Bhutto, 'it certainly was their (scientists') belief that they could earn tons of money if they did this.' She asserted that as PM she had established a policy in December 1988 not to export nuclear technology.²²⁵ She also said, however, that 'no Pakistani thought Mr. Khan was acting alone'. On the other hand, she also said that she did not think it probable that centrifuge parts were exported from Pakistan to Iran from 1994 to 1995 (while she was prime minister), despite revelations of exactly that in a Malaysian police report connected to the Iran investigation. Pinning the blame on individuals is a time-tested and obvious circumvention (*a la* 1996 provision of Chinese ring magnets to Pakistan, which was not deemed a sanctionable offence).

Reports of extensive official cooperation between Pakistan and the three countries lend credence to claims that Pakistan's government might have known of transfers. Pakistan reportedly signed a nuclear cooperation agreement with Iran in 1986, although the terms of that agreement are unknown, and Iranian scientists received training in Pakistan in 1988. Libyan funding of the Pakistani nuclear weapons programme in the early years long has been alleged.²²⁶ Pakistan's well-documented missile cooperation with North Korea beginning in the early 1990s may have provided either a convenient excuse for rogue nuclear scientists to ply their trade or sparked the plan for a barter arrangement as Pakistani foreign currency reserves fell dangerously low in 1996.²²⁷

²²⁵ Rohde (2004) and Fidler (2004).

²²⁶ Weissman and Krosney (1981).

²²⁷ Pinkston (2002).

Khan reportedly told investigators he hoped to deflect attention from Pakistan's nuclear programme and support other Muslim countries (i.e., Iran and Libya) by providing nuclear assistance.²²⁸ In the late 1980s, when cooperation with Iran allegedly began, the argument for deflecting attention from Pakistan could have been plausible, particularly as pressure from the United States grew with each new revelation of Pakistan's nuclear progress.

KRL began in 1987 to publish publicly available technical papers that outline some of the more advanced design features Khan had developed. The papers include information that would normally be classified in the US and Europe and show that KRL was competent in many aspects of centrifuge design and operation. The papers also include specifications for centrifuges with maraging steel that can spin faster than earlier aluminium designs. Later, in 1991, KRL published details on how to etch grooves around the bottom bearing to incorporate lubricants. These technical developments were important for Khan's P-2 centrifuges.²²⁹

In 1999, the Pakistani government released an advertisement of procedures for the export of nuclear equipment and components. The ad lists equipment for sale, including gas centrifuges and magnet baffles for enriching uranium.²³⁰ Other advertisements from KRL are reported to include an 'unsubtle drawing' of a mushroom cloud and vacuum devices that attach to centrifuge casings.²³¹

6.6 US Interest

The former Dutch Prime Minister Ruud Lubbers has revealed how the CIA protected A. Q. Khan and saved him

²²⁸ Lancaster and Khan (2004).

²²⁹ Clary, 'Dr. Khan's Nuclear WalMart.' pp. 176-177.

²³⁰ Weiss (2005).

²³¹ Sanger (1995).

from going to prison after he was caught stealing secret designs from a Dutch uranium plant in 1975. Mr Lubbers, who was Minister of Economic Affairs at the time, told a Dutch radio station, Radio Argus in a 35-minute programme on Tuesday 9 August 2005, that because of pressure from the CIA no action was taken against Dr Khan and he was quietly allowed to return to Pakistan. In 1985, Dr Khan appealed against the judgement and the court ordered a retrial but, according to Mr Lubbers, Dr Khan was not put on trial a second time—again because of pressure from the CIA.²³²

US officials have intimated they knew about Khan's network for several years, and the U.S. government seems to have been quietly working with the Pakistani government to limit the damage from Khan's nuclear network.²³³ Shortly after Khan's dismissal in 2001, Deputy Secretary of State Richard Armitage reportedly stated that 'people who were employed by the nuclear agency and have retired' could be spreading nuclear technology to other states, including North Korea.²³⁴ Nonetheless, after U.S. intelligence officials leaked the news in 2002 that Pakistani enrichment technology was transferred to North Korea.²³⁵

Leonard Weiss, a consultant to the Center for Global Security Research at the Lawrence Livermore National Laboratory and Former Staff Director of the Senate Governmental Affairs Committee, in his testimony stated:

'Mr. Chairman, one cannot separate the success of the Khan network in the 1980s from the policies toward Pakistan pursued by the United States. The Glenn and Symington Amendments were both waived by administrative and Congressional action

²³² Broad & Sanger (2004b), Hasan Suroor, 'How CIA "protected" A.Q. Khan' International, in Hindu of 10 August 2005, Gerard Legebeke, editor-in-chief of the programme in which Mr Lubbers was interviewed, confirmed this to the *The Hindu*, www.thehindu.com/2005/08/10/stories/2005081000711600.htm.

²³³ Tenet (2004), CIA Director.

²³⁴ Fidler and Luce (2001).

²³⁵ Robbins (2002).

respectively after the Soviet invasion of Afghanistan. The lifting of sanctions against the Pakistanis coupled with a \$3.2 billion aid package sent them the message that they could continue their nuclear weapon acquisition activities with the U.S. government doing little to stand in their way. That message helped embolden Pakistan to widen the Khan network and set off a new round of attempts on their part to get nuclear-related materials and components from other countries, including those with relatively tight export controls like the United States and Canada. In 1981, while the aid package was going through the legislative process, Pakistan attempted to smuggle 5,000 lbs. of zirconium, used for nuclear reactor fuel rods, out of the U.S. The shipment, marked as “mountaineering equipment”, was stopped by U.S. Customs agents. It had no effect on Congressional passage of the aid package. In 1984, a man named Nazir Ahmed Vaid was arrested for illegally attempting to export krytrons, which are used for nuclear triggers. Although the known intended recipient was the Pakistan Atomic Energy Commission, the indictment was rewritten to exclude any mention of the nuclear use of Krytrons. Vaid was permitted to plea bargain to a reduced offense, thus avoiding a jury trial, and a gag order on the case was issued by the judge. He was found guilty of one count of export violation and quietly deported three weeks later.’

Although this case had no effect on U.S. aid to Pakistan, it did cause the Congress to pass, in 1985, the Solarz Amendment to the Foreign Assistance Act, which prohibited military and economic assistance to any country that illegally exports or attempts to export U.S. items that would contribute significantly to the ability of that country to make a nuclear explosive device. On the same day the Solarz Amendment was enacted, the Pressler Amendment was signed into law. The Pressler

Amendment made continued military assistance to Pakistan contingent on an annual certification by the President that Pakistan did not possess a nuclear explosive device. It also required the President to certify that the U.S. assistance being given to Pakistan would significantly reduce the risk of Pakistan's possession of such a device, but the Reagan Administration ignored this requirement, realizing that the clear evidence of Pakistan's ongoing drive for the bomb meant they would have to halt assistance. This misfeasance was explained by falsely claiming that there was no difference in the two requirements in the Pressler Amendment.

'Pakistan's nuclear tests in 1998, triggered additional and severe economic sanctions, which were removed via Congressional action in order to prevent what some predicted would be an economic collapse and serious political instability. The removal of the additional sanctions were unaccompanied by any demand that Pakistan's nuclear activity be cut back. The military embargo on Pakistan lasted until after the 9/11 attack. We seem to have sold our souls to the Pakistanis again, this time to help us with Al Qaeda instead of the Soviets, and I fear we are once again getting the bad end of the deal. Pakistan violated the terms of the sale of F-16s in the 80s when it allowed China to examine the plane, and when it altered the plane's configuration in order to allow the carrying of nuclear warheads. There is no reason to assume the same thing won't happen again. Providing more incentives for Pakistan to make more weapons does not seem to me to make logical sense.'²³⁶

6.7 Proliferation Incorporated

Though the so-called A.Q. Khan network was verbally closed down in 2002, Pakistan's international procurement

²³⁶ Weiss (2006).

network is, not very surprisingly, alive and well, metamorphosing and evolving in response to the new situation.

‘The key to the success of Khan’s network was its virtual library of centrifuge designs, detailed manufacturing manuals, and nuclear weapon designs. An important task for investigators is to retrieve as much of this information as possible. Key participants may not yet have been identified out of an estimated total of 50 people who were actively involved in the network. The fact that no prosecutions appear to be planned serves to increase suspicions that the Pakistani government is hiding information about the network’s activities, particularly information that could further embarrass itself or its military. The United States has ignored multiple requests from Swiss prosecutors for cooperation that have extended over a year.’²³⁷

‘German national police, in March 2006 raided dozens of business locations suspected of being connected with illicit sales of nuclear-related goods in 2004 and 2005 and German authorities are currently prosecuting a number of cases. Some of these are part of Pakistani attempts to rebuild a network for supplying the needs of its own nuclear weapons programme. This heightened procurement activity by Pakistani agents has been ongoing since at least 2004. What troubles European investigators, is that Pakistan appears to be buying more nuclear bits and pieces than they need. An explanation, offered privately by several Pakistani officials, is that the new found nuclear procurement push could be part of an effort to quietly rebuild parts of Islamabad’s own uranium enrichment programme at KRL in Kahuta if damage was done to the facility in last October’s devastating earthquake. Swiss police, say they interrupted a plot in March 2004 to illegally ship 60 tons of specialized aluminium tubes—used for building parts of a

²³⁷ Albright (2006).

centrifuge cascade to enrich uranium—from a Russian supplier through intermediaries in Western Europe and Dubai to Pakistan.²³⁸

In 2004, a South African electronics salesman and former Israeli army major named Asher Kami was arrested for violating export control laws in the illegal shipment of oscilloscopes and spark gap triggers to Pakistan from the U.S. via South Africa. The ultimate destination was a company, headed by Humayun Khan, described by U.S. officials as a front for Pakistan's nuclear weapon programme. Humayun Khan, who has been linked with several militant Islamic groups, is still free in Pakistan, while Asher Kami was ultimately convicted and is serving a three year prison sentence. *The Guardian* of Britain reported (during the week ending 24 May 2006) on the existence of a July, 2005 document prepared by British, French, German, and Belgian intelligence agencies for the European Union, that said the Pakistanis were still shopping in Europe for such things as high-grade aluminum tubing for centrifuges, ring magnets for centrifuge rotors, and machine tools, chemicals, and equipment for producing liquid- and solid-fuelled missiles. The document lists 20 Pakistani government offices, laboratories, companies, and trading organizations active in the procurement effort for the bomb programme, and hundreds of companies around the world that are said to be involved in some aspect of the production of weapons of mass destruction. An educated guess based on the unclassified literature is that a good part of the network is still intact, and that additions to it are being actively sought.²³⁹

²³⁸ Koch (2006).

²³⁹ Weiss (2006).

7 Conclusion

Pakistan's economic strength and general technological capabilities are close to those of Bangladesh and below those of 40 other developing countries. They are far below those of South Africa, which acquired nuclear weapons capability while facing global sanctions because of Apartheid. Egypt, Malaysia, Iran, Turkey and Indonesia are among 40 countries with greater economic strengths and general technological capabilities than Pakistan. Given this relative economic weakness, Pakistan was able to acquire nuclear weapons capability because of two reasons. One is its very strong 'will to power' and a fierce determination to acquire nuclear weapons and their delivery systems. This objective overrode virtually any other objective that it had. The second was its willingness and agility in using every possible means (alliances, diplomatic friendship, espionage, untruths) in achieving this objective. The normal rules of international relations or diplomacy did not matter, only the objectives did.

A substantial section of the elite in Pakistan has been driven since independence by its antipathy to India. After decades of military rule, much of this elite is either military or has close family ties with persons in the military. The break-up of Pakistan resulting from the Pakistani genocide in Bangladesh and the entry of the Indian army into Bangladesh/East Pakistan turned this antipathy into hatred. The humiliation of the largest military surrender of any army since the Second World War and the refusal of the elite to reveal the military's genocide accentuated this hatred among the general public. This led to a two-pronged

strategy: acquire nuclear weapons to deter India's conventional military superiority (and any future nuclear capability) and recruit and train religious minorities in India to foment strife and insurgency.

Pakistan's nuclear weapons programme began immediately after the Bangladesh war, three years before India's test of a nuclear explosive device (PNE). However, it suited Pakistan to have the non-proliferation lobby do the diplomatic heavy lifting for it by linking every Pakistani transgression to the need to counter some specific or general action of India. Pakistan made full use of the non-proliferation lobby's labelling of each achievement of India's independent (since 1966) nuclear programme as proliferation. Pakistan used this non-proliferation theology to justify its own proliferation activities across the world and to extract weapons technology and materials from countries not so favourably disposed to India.

Pakistan's first real breakthrough came with the employment of Dr A.Q. Khan by the Dutch company FDO in April-May 1972. Because of the laxity of the Dutch security procedures and its secret service, over the next three and a half years Dr Khan obtained copies of the complete and comprehensive design information on the existing and latest/newly designed uranium centrifuge enrichment process. He also obtained comprehensive information on the suppliers of sub-systems, equipment, parts and materials that went into the construction of these centrifuges as well as in running them and producing enriched uranium. Most of these firms were located in The Netherlands, Germany, Switzerland and the UK, as the overall project was a trilateral one. While working at the Dutch firm, Dr Khan passed on these details to the Pakistan government. The Pakistan government set up a procurement system in

Europe in 1975 under a physicist familiar with Pakistan's weapons plans, with the intention of getting around the NPT and the new restrictions imposed in 1974. The same year, Dr Khan returned to Pakistan and took charge of the construction of the uranium enrichment centrifuge facility. Though he was overall in charge of the entire centrifuge facility, the operational aspects of clandestine procurement of nuclear equipment and material was supervised by the military.

By the early to mid-1980s Pakistan had procured from Europe and North America, every single sub-system, part and material needed for the centrifuge plant and for uranium enrichment. Hundreds of companies from Europe and North America, of which 70 from Germany alone, participated in this gigantic proliferation effort as suppliers, intermediaries and trainers. Pakistan obtained in the late 1980s test quantities of tritium gas, a tritium purification and storage plant, tritium precursor materials, the design for a reactor that could be used for tritium production, and material and equipment for fabricating fuel for that reactor, including special American-made welding lasers from two related West German firms.

In parallel, Pakistan entered into a formal contract with France in 1974 to procure a full-scale spent fuel reprocessing/plutonium extraction plant from France. This was at a time when its only commercial power reactor (KANUPP 125 MW) had been in operation for two years. US pressure on France forced cancellation of the deal between 1976 and 1978. Design information, equipment and training of technicians, however continued till much later and Pakistan had started construction of the plant by 1979. By the time the flow of designs and equipment tapered off, Pakistan had obtained more than 95 per cent of the complete design for the plutonium extraction plant.

Some of the procured equipment was probably diverted to the pilot enrichment plant called the New Lab facility, which was sufficient for the amount of spent fuel generated by the small research reactors.

Pakistan's clandestine procurement efforts were not limited to the generation of bomb grade fissile materials, highly enriched uranium and bomb grade plutonium. It procured uranium from a Niger-French joint venture in Niger. It procured from Turkey, material for explosives needed to detonate a nuclear bomb and routed through Turkey inverters imported from the US and other material needed to implement a triggering package for the atomic bomb. It procured hollow steel spheres and driver plates needed for the bomb trigger from Argentina and the UK.

Despite this incredibly successful clandestine procurement effort, Pakistan was not able, because the level of its technological capability of its economy and the skills available in the country, to produce an atomic weapon. It therefore turned to China to fill the gap in these and other areas. A secret agreement was signed with China in 1976 for nuclear cooperation/assistance. Initially, Chinese assistance grew slowly because of the transition from a Maoist regime to the Deng era at the end of the 1970s. The Soviet intervention in Afghanistan in 1978–79 was the turning point, a virtual a gift from heaven. Given the fears aroused in the US and China of USSR's possible thrust to the Indian Ocean, China's leadership was now more amenable to Pakistan's traditional Indian bogey. By 1983, China had supplied a complete design of a 25 KT nuclear bomb, possibly a Chic-4 design (from China's fourth test) along with enough highly enriched uranium for one or two nuclear weapons. Chinese scientists assisted with the production of weapons-grade uranium at Kahuta. This was followed by the supply of

enough *tritium*, used to achieve fusion in hydrogen bombs and boost the yield of atomic bombs, *for 10 thermo-nuclear bombs*. China also assisted Pakistan in conducting a cold test based on the Chinese design—i.e., a fully instrumented test of a dummy weapon, using a core of natural (un-enriched) uranium.

In 1986, a comprehensive nuclear cooperation agreement was signed between China and Pakistan, accelerating the proliferation of technology, skills and equipment to the latter. In pursuance of this agreement, China designed and built the safeguarded PARR-2 research reactor (27 kW) at Rawalpindi. It also assisted Pakistan in building an un-safeguarded 40 to 100 MW research reactor at Khushab to produce weapons grade plutonium and an un-safeguarded *plutonium reprocessing facility at Chasma*. During the same period China reportedly reached a deal to supply heavy water to nearby safeguarded Kanupp facility, but the deal was delayed by concerns that the heavy water might be diverted to the Khushab facility (Excess D2O supply has been diverted). This was followed by supply of critical equipment (ring magnets) for the gas centrifuges at the Khan Research Lab (KRL) at Kahuta, special industrial furnace for melting plutonium or enriched uranium into the shape of a nuclear bomb core and high-tech diagnostic equipment. Chinese scientists helped to install the furnace in Pakistan.

With Zia-Ul Haq's and A. Q. Khan's confidence bolstered by the 1986 Sino-Pakistan agreement, the latter started setting up the nuclear and missile trading (import-export) business by signing a supply agreement with Iran. These activities widened and expanded to Libya, North Korea and other countries in step with Chinese strategic support to Pakistan. Despite the deterioration in its economy from 1993, Pakistan felt confident enough to take on the US and European countries which were

finally becoming worried about nuclear proliferation from and to NPT signatory states.

Over this entire period of European and Chinese proliferation to Pakistan, the US vacillated between controlling this proliferation and ensuring Pakistan's support for and participation in its own strategic initiatives. Yet another turn in the cycle occurred in 2001 with the event of 9/11 and the US need for Pakistan's help in Afghanistan. Pakistan has clearly demonstrated its superior diplomatic skills in turning every event to its advantage. On the basis of history there is a high probability that Pakistan will successfully use this new opportunity to make another quantum jump in its clandestine nuclear weapons and missile procurement programme.

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