

# PAKISTAN'S NUCLEAR WEAPONS

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*Introduction by*

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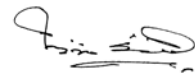
# INTRODUCTION

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I feel privileged to introduce the reader to this series of **New Delhi Papers** which contain focused research on one or two issues concerning India's national security and interests. It is also a matter of satisfaction that these objective studies have been carried out mostly by young academic and military scholars (normally below 30 years age) affiliated to this Centre on a 9-month "Non-Resident Fellowship" programme. The details of this programme are to be found at the end of this paper.

National security is a multidisciplinary subject ranging from core values, theory, security interests, challenges, options for management and other aspects covering almost all areas of national enterprise like defence, internal security, economic and technological security etc. all linked in a holistic manner. But unfortunately this is absent in our education system at the hundreds of universities and other teaching establishments. Without adequate education and understanding of national security India's multi-cultural diversity within the liberal democratic freedoms, therefore, tends to only progressively strengthen regionalism and parochialism with far reaching consequences. Hence this modest attempt to fill a serious vacuum in our education system which for three centuries has remained mired in Lord Macaulay's educational model leading to narrowly conceived approach to national imperatives which, by definition, require a broader *national* approach.

I am confident you will enjoy reading this paper and you are welcome to raise comments and critique so that we can improve future efforts. The views expressed in the study are those of the author and do not necessarily reflect those of the Centre or any other institution.



**Jasjit Singh**

Director General

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# 1. EVOLUTION OF PAKISTAN'S NUCLEAR PROGRAMME

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*The Nuclear Programme of Pakistan was created through a philosophy of 'beg, borrow or steal.'*

—Major General Mahmud Ali Durani (retd)<sup>1</sup>

## **Theoretical Framework**

International politics has always revolved around the concept of Balance of Power. Although it has been defined in various different ways, essentially the term indicates the relative distribution of power among nations into proportional or disproportional shares. Traditionally, it refers to a state of affairs in which no one state predominates over the others. In this context, prudent states that are at a disadvantage in the Balance of Power, will form an alliance against the potentially hegemonic state or take other measures to enhance their capability, which will deter the aggressor.<sup>2</sup> According to Kenneth Waltz, both these types of balances, whether internal or external in nature, will incur costs.<sup>3</sup> Joining an alliance will not mean taking up a lot of the shared commitments but it could also lead to unnecessary entanglements. Similarly, taking internal measures such as increasing military preparedness will divert scarce resources from other more important issues.

India and Pakistan have a very complicated and sensitive history. Balance of Power between the two was and continues to be tilted in India's favour. As the weaker state Pakistan has always been wary of India's intentions. From the Pakistani perspective, the threat India poses is not only military but also political, territorial and even ideological in nature. Just as the theory of International Relations propagates, in this context, being the weaker state Pakistan took both internal and external measures to counter this apparent weakness.

In 1954, it formed alliances with the US by signing the Mutual Defense Assistance Agreement, and later, became a member of SEATO along with Britain, France, Thailand, the Philippines, Australia and New Zealand.<sup>4</sup> In 1955, it joined another mutual defense organisation called the Baghdad Pact

with Britain, Turkey, Iran and Iraq, which was renamed CENTO (Central Treaty Organisation) after Iraq left the pact. The purpose of CENTO was reinforced when Pakistan, Turkey and Iran signed a bilateral agreement with the US.<sup>5</sup> Thus, by aligning itself with a superpower through four security arrangements, Pakistan had managed to balance itself externally. In addition to this, Pakistan found in China an 'all-weather friend' on whom it could depend during a conflict with India.

In contemporary times, the ultimate balancer that weaker states can rely on is nuclear weapons. States can either depend on the larger countries that are established nuclear weapon states to provide security or they can construct their own weapons, but various factors such as resources and technical knowhow will make this a challenging task. In this context, Michael Handel explains that while some of the weaker states in the international system resort to 'defensive nihilism' (desertion of any expectation that they can build an effective defense), some others become self-reliant and seek to meet security challenges without outside help.<sup>6</sup>

Although Pakistan did not resort to defensive nihilism, it did, however, develop its own nuclear weapons as an internally balancing measure. However, it did not develop its weapons without outside help. Pakistan, as will be discussed in detail later in the paper, received significant aid from China in the form of weapons designs, fissile material, technological knowhow and even funding. It also received substantial aid from the Arab world. In an interview to Kuldip Nayyar in January 1987, A.Q Khan, who is often referred to as the 'father of Pakistan's nuclear weapons', admitted that even the US had knowledge about the fact that Pakistan possessed the bomb. In the course of the interview he said, America knows it. What the CIA has been saying about our possessing the bomb is correct and so is the speculation of some foreign newspapers. They told us Pakistan could never produce the bomb and they doubted my capabilities. But they know we have it.<sup>7</sup> When he was asked, since that was the case, why Pakistan had not announced it officially, he replied, Is it necessary? America has threatened to cut off all its aid.<sup>8</sup>

Gaullist and Kenneth Waltz contend that the development of nuclear weapons has changed the traditional functional relationship between the military force and the political behaviour of a state. According to Gaullist, states are on high alert and behave with utmost suspicion when faced with even a small degree of nuclear risk.<sup>9</sup> Waltz, on the other hand, states that 'the measured spread of nuclear weapons is more to be welcomed than feared'.<sup>10</sup>



He believes that ‘the gradual spread of nuclear weapons will promote peace and reinforce international stability because nuclear weapons induce caution between adversaries who possess them or more may be better’.<sup>11</sup> However, since Pakistan acquired the weapon, there has been a high degree of tension in South Asia. With its record to proliferation, the rise in non-state actors and terrorist activities and with security of its fissile material questioned, the stability in South Asia has decreased and nuclear weapons are yet to bring about the peace that Waltz propounds.

### **Pakistan’s Need for the Nuclear Weapon**

There is no doubt that developing nuclear weapons in Pakistan was to achieve some sort of parity with India. There is no other way by which Pakistan could catapult itself to that position in such a short period of time. The weapons also had a clear cut military purpose – to offset India’s conventional superiority and its nuclear potential. On a political level, by raising itself to a nuclear weapon state, Pakistan hoped to counter Indian dominance in the region.<sup>12</sup> This achievement would also garner it a significant amount of prestige. It would also increase its standing in the Muslim world. By becoming the most technologically advanced Islamic state Pakistan hoped for easier access to the energy resources in the Persian Gulf region and not to mention military ties with them. Domestic politics would also be affected, as the military used the weapon ‘as a trump card’ to retain its all important position in the Pakistani society.<sup>13</sup>

Additionally, although Pakistan had its security assured from its allies, it decided that it could not solely depend on them. This was evident when neither the US nor China supported Pakistan during the 1965 war with India or even during the 1971 war, which led to the breaking up of Pakistan to form present-day Bangladesh. This realisation resulted in Pakistan’s shifting its policy from one of external balancing to one of internal balancing – through the development of a nuclear weapon.

### **Development of the Nuclear Weapon**

#### ***Stage I – 1950-70***

Newly formed Pakistan had several issues plaguing it. There were quite a few challenges that faced its ambitious nuclear programme. For one, the political system was not stable and the inefficient bureaucracy had no coherent long-

term plans for the country, let alone for a nuclear programme. Secondly, there was a lack of industrial infrastructure and scientific awareness about the use of atom in the fields of energy, medicine and food and finally they lacked 'nuclear enthusiasts' such as Nehru and Homi Bhabha in India.<sup>14</sup>

The 'atoms for peace' proposal initiated by President Eisenhower in December 1953, received a very positive response from the Pakistani state. Following this by October 1954, it was decided that a national atomic research unit would be formed as part of a new body for scientific and industrial research in Pakistan.<sup>15</sup> It was decided that Dr. Nazir Ahmed would head a twelve member Atomic Energy Committee, which would plan for the launch of a nuclear programme. The committee was expected to formulate an atomic energy programme and estimate and identify the requirements of its organisation including financial assistance provided to it in the form of loans from foreign nations.<sup>16</sup> An atomic energy council was set up in March 1956 as per the recommendations of the Atomic energy committee; it consisted of two bodies: A governing organ and an Atomic Energy Commission. The primary responsibility of Pakistan's Atomic Energy Commission (PAEC) was to implement goals outlined for the Atomic Energy Council. Its primary objectives were:

*Planning and developing peaceful uses of atomic energy and with special reference to survey, procurement and disposal in radioactive materials, planning and establishment of Atomic energy and Nuclear research Institute, installation of research and power reactors, negotiations with International Atomic energy bodies, selection and training of personnel, application of radio-isotopes to agriculture, health, industry etc.*<sup>17</sup>

The US-sponsored atoms for peace exhibition toured several Pakistani cities propagating the use of atomic energy from 1954 to 1956 in an effort to boost the 'atomic energy constituency in Pakistan' by providing them 'about 70,000 items of information about atomic energy'.<sup>18</sup> Nevertheless the initial attempts made by Pakistan to establish a nuclear infrastructure had failed. This was due to the lack of adequate funding, bureaucratic holdups, shortage of skilled workers and lack of sufficient training facilities. In order to solve the issue of shortage of workers, Pakistan sent its most promising scientists to train in countries such as the US, Soviet Union, Britain and even the IAEA headquarters in Vienna between 1955 and 1974. However, due to better job prospects abroad most of them did not return to Pakistan after their training

and this was a great setback for its nuclear programme.<sup>19</sup> It was only in 1969 when the Centre for Nuclear Studies was established, could Pakistani scientists and engineers be trained in Pakistan.<sup>20</sup>

Despite these constraints, the Pakistani nuclear programme acquired some momentum when Ishrat Usmani replaced Nazir Ahmad as the chairperson of PAEC in 1960. Under his able leadership, the government passed an atomic energy law which made the PAEC an autonomous statutory body. By the end of the decade, eight medical and agricultural centres were established and over 300 nuclear scientists and engineers were trained by the PAEC.<sup>21</sup>

The Ayub Khan government increased funding and resources to the nuclear sector as he fully supported the Commissions activities for civilian use of nuclear technology. The international community especially the US encouraged and remained committed to Pakistan's nuclear sector. This was mainly due to the fact that by the late 1950s, Pakistan had entered into US military alliance SEATO and CENTO to counter the communist expansion.<sup>22</sup> A sum of Rs. 46.5 million was allocated under the second national five year plan (1960-65), which specified how the funds had to be used for the training of personnel, for exploration of radioactive materials, for the establishment of an Institute of Nuclear research and Reactor technology with a swimming-pool type research reactor and for the establishment of a number of medical and agricultural centres that were using isotopes techniques.<sup>23</sup>

From 1960-68, the Pakistani government spent 400 million rupees for the construction of the Karachi Nuclear power Plant in addition to the 324 million rupees spent on the development of nuclear technology. Besides this they also decided to set up a 300 MW nuclear power plant in West Pakistan and a 400 MW nuclear plant in east Pakistan, both of which, however, never materialised.<sup>24</sup>

The Pakistan Institute for Nuclear Science and Technology (PINSTECH) was established in 1963 at Nilore near Islamabad with 2 main facilities: A research reactor and a reprocessing plant. The research reactor, which was supplied by the US, as part of the promotion of 'atoms for peace' programme, was a 5 megawatt light water reactor known as the Pakistan Atomic Research Reactor (PARR-1).<sup>25</sup> Later on in 1965, Pakistan received Canadian assistance to built KANUPP, a 137 megawatt heavy water reactor. They also provided the technical assistance and supplied natural uranium and heavy water for the operation of the plant.

From 1950s to 1960s, although the nuclear programme in Pakistan had begun, it was not the top priority for its leadership. The only objective of the

nuclear programme at this point was to use atoms for peaceful purposes. The need to construct reactors and develop its nuclear infrastructure for military purposes was not part of the plan.

A change in perception, however, began to slowly surface during this period. Reports questioning India's nuclear motivations started to emerge. By the end of the decade intellectuals and politicians came out with stronger views on how India's Nuclear Programme was focused on building nuclear weapons. For instance the President of the Pakistan Institute of International Affairs, Sarwar Hasan, wrote in 1960 that he believed that India was developing atomic bombs.<sup>26</sup> After China tested its nuclear device in 1964, Homi Bhabha's statement that India could detonate a nuclear bomb in 18 months had a significant impact on the Pakistani leadership as well.<sup>27</sup> Public discourses on the matter began to highlight these concerns. Pakistani newspapers such as the Pakistan Observer reported that India would certainly produce an atomic bomb in the future.<sup>28</sup> The Pakistan military too seemed convinced about this and viewed this as a serious security risk for their country.<sup>29</sup> The fact that India acquired plutonium-based reprocessing plant in 1965 only added to the apprehension. The assistance India was receiving from countries such as the US and Canada was also a matter of serious concern for Pakistani authorities.

The 1965 India-Pakistan war was another turning point. Pakistan's defeat in the 1965 war was a setback; especially, their failure in Operation Gibraltar led to major alterations in their thinking, and the realisation of the fact that India has a superior conventional force was deepened. The apprehension that their conventional forces were no match for India's, turned out to be true. The US, which was their military ally, did not support them in the war and even imposed an arms embargo over them. This led Islamabad to reconsider their security and defense policies.

Since 1967, when NPT was drafted and opened for signature, Pakistan's position on the NPT was that they would not do it as India had refused to sign the Treaty. Pakistan is aware that India will not sign the treaty as a non-nuclear weapon state. Additionally, they cannot accept a treaty that bans future production of fissile materials, as nuclear weapons is the only way they can bridge the asymmetry with India's conventional forces. They wanted to keep the option of developing a nuclear weapon open as they were certain that India would acquire them in a few years. This decision reinforced an already known fact that Pakistan's nuclear policy was solely India-centric.

### ***Stage II – 1970-90***

The 1970 general elections in Pakistan saw the nuclear issue become an important factor. While Zulfikar Ali Bhutto advocated for the need for Pakistan to build nuclear weapons to defend themselves from the nuclear weapon India would soon built as well as their conventional superiority, a large part of the Pakistan government headed by President Ayub Khan felt that India did not possess the technology to acquire its own weapons and hence the threat was not as real. Interestingly, as this perception began to change by the end of the decade, Pakistan was in no place to think of weaponising its peaceful nuclear programme as they lacked technical knowhow and their nuclear infrastructure was under developed.

Another event during this time period that caused a paradigm shift in Pakistani perceptions was the 1971 War. It was triggered due to domestic unrest that began to brew between East and West Pakistan after their first elections in December 1970. Until then, the military and political power had been concentrated in the hands of a few in West Pakistan but in the elections, the dominant party of East Pakistan won majority seats. The opposition in West Pakistan responded by ignoring the election results, arresting the winner – Mujibur Rahman – and launching a series of campaigns repressing the Bengali's of East Pakistan. This resulted in millions of refugees pouring into India and India's subsequent involvement in the war. Although a ceasefire was soon announced, the war resulted in the dismemberment of the Pakistani state. Like the previous wars, this war proved yet again that Pakistan was inferior to India in conventional military capabilities. Due to this, it not only lost its eastern part but also lost the strategic advantage it had over India up until that point. This called for drastic changes in the countries security policy.

On January 20, 1972, Bhutto convened a secret meeting in Multan with the nation's top scientists where they were asked if they could build the atomic bomb.<sup>30</sup> The Chief of Pakistani Atomic Energy Commission is said to have replied: Oh it's not an easy thing. It will take us fifteen may be twenty years. To this rather unsatisfactory statement, Bhutto's response was, You're fired. Munir Ahman Khan, who assured him that they could make a nuclear weapon in three years, was given the job instead.<sup>31</sup>

It was soon after this that Pakistan approached the Democratic People's Republic of Korea (DPRK) to obtain weapons and other military equipment. Soon after, it established diplomatic relations with North Korea.

### **Role of China**

Although China and Pakistan began diplomatic relations in 1950s, which strengthened with the Shakasgam Valley agreement in 1965,<sup>32</sup> nuclear cooperation between the two countries started in the 1970s. Statements of Zulfikar Ali Bhutto reveal that nuclear cooperation between the two countries formally began in 1976.<sup>33</sup> A formal agreement, however, was signed in 1986; although letters written by A.Q. Khan suggest cooperation as early as 1982 when China provided Pakistan weapons grade uranium for two atomic bombs.<sup>34</sup> The yields of these weapons were estimated at 20-25 KT.<sup>35</sup> Cooperation between the two countries increased over the years. In addition to assisting with the Kahuta nuclear reactor, the Chinese also transferred tritium gas, which is used in the manufacture of hydrogen bombs.<sup>36</sup>

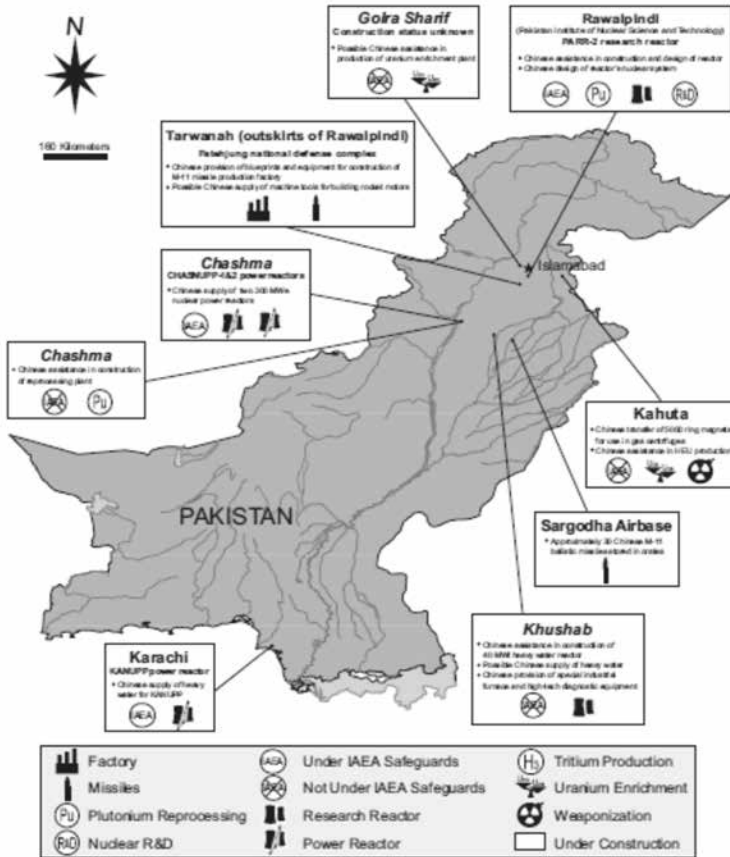
Beijing also supplied heavy water (D20) to the Kanupp reactor, which was originally supplied by Canada.<sup>37</sup> It is also believed that China provided Pakistan with test facilities in Lop Nor in 1989 to conduct a nuclear test.<sup>38</sup> China helped Pakistan build the Chashma 300 MW power reactor in 1991, although there was considerable international scrutiny. There have also been several reports regarding China's proliferation of nuclear material to Pakistan. China has violated several international obligations to provide Pakistan with necessary material. For instance, in 1995 five thousand specially designed ring magnets from the China Nuclear Energy Industry Corporation (CNEIC) were sold to an un-safeguarded Pakistani nuclear facility.<sup>39</sup> It also assisted in the construction of Khushab, a 50-70 MW unsafeguarded heavy water reactor producing plutonium.

The map below illustrates the assistance provided by China to Pakistan<sup>40</sup>

### **Role of the Arab countries**

As Zulfikar Ali Bhutto assumed power after Pakistan's disastrous defeat, the nuclear programme was given utmost importance. During 1973 and 1974, Bhutto held discussions with Libya's Colonel Qaddafi who provided assistance to the programme. In return, Pakistan shared nuclear data and expertise with Iran, Libya and Iraq. By 1976 five Arab countries and Iran had provided financial assistance worth \$ 1,000 million. Between 1973-74 and 1976-77, Muslim countries in West Asia provided loans and grants worth a \$1000 million thereby becoming Pakistan's highest donors.<sup>41</sup> President Zia Ul Huq, in a speech in 1978, outlined, China, India, the USSR and Israel in the Middle East possess the atomic arm. No muslim country has any. If Pakistan had such a weapon, it

## CHINESE ASSISTANCE TO PAKISTANI NUCLEAR AND MISSILE FACILITIES



Source: <http://www.nti.org/db/china/prcpak.pdf>

would reinforce the power of the Muslim world.<sup>42</sup> By becoming the only Islamic country equipped with the atomic bomb, Pakistan believed that the demand for technology and skilled man power would increase in the oil-rich Muslim countries, which could be met in return for easier access to the oil wealth of West Asian nations.

Under Bhutto's leadership, a new ministry of Science, Technology and Production was created to advance scientific development in the country and an inter-ministerial committee was set up to deal with the nuclear issues; additionally he also took charge of The Division of Nuclear Energy affairs.<sup>43</sup>

This was probably the most important decision in the history of Pakistan's nuclear programme, as soon after this, in 1974 PAEC set up a body to build the nuclear device called the 'Wah Group' which was code named 'Research'.<sup>44</sup> Thus, even before India conducted its first Nuclear Test in Pokhran in 1974 Pakistan kick started its programme to build Nuclear Weapons, with the ruling elite of Pakistan convinced that it was the only way they could match India's conventional superiority. This was evident from the statement made by foreign minister Agha Shahi who referred to India's conventional force as 'the sword of Damocles' hanging over Pakistan.<sup>45</sup>

India's Peaceful Nuclear Explosion (PNE) was carried out in Pokhran on May 18, 1974 and the device was code named 'Smiling Buddha'.<sup>46</sup> The Pakistani establishment, media and people refused to believe this statement. Therefore tremendous pressure was put on Bhutto to develop a weapon and finally match India's capability. Following this, he took up the leadership of the nuclear programme, made it more secret and abolished the inter-ministerial committee in charge of nuclear issues.<sup>47</sup> They aspired to set out in the same direction as India and extract waste materials from the KANNUP nuclear reactor and reprocess the waste into bomb grade plutonium after purchasing the reprocessing plant from France.<sup>48</sup> This, however, did not work out due to the US intervention. Although the Franco-Pakistani agreement was in compliance with the International safeguards, US opposed it on the grounds that Pakistan could redirect the plant to attain nuclear weapons capability. They put incredible pressure on both Islamabad and Paris to revert the deal, until finally France withdrew in 1979.<sup>49</sup>

### **The Uranium Programme**

As a result of this, the nuclear weapons programme seemed to be stalled for a while. This is when Pakistan decided to employ the uranium enrichment method under the guidance of Dr. A.Q. Khan who later became the Director of the Khan Research laboratory. He was a metallurgist by training who had specialised in strong steels. With a Ph.D from a Belgian university, he was offered a job at Fysisch Dynamisch Onderzoek, a subsidiary of Verenigde Machine Fabrieken, a company which worked closely with Ultra-Centrifuge Nederland (UCN), the Dutch member of the Urenco uranium enrichment consortium that specialises in enriching uranium for reactors using ultra-centrifuges.<sup>50</sup> As explained by Dr. Pervez Hoodbhoy, the idea is to mine uranium ore from the ground, convert it to gas and spin it around in a centrifuge. Then enriched uranium is taken out



in stages which finally give the material for the bomb. This method was not the highest of technologies but as the motors spin at very high speeds it would require very strong steel.<sup>51</sup>

He was also an ardent nationalist who wanted revenge for the 1971 incident and was also motivated by the restrictions on nuclear exports imposed by the western countries. On 17 September 1974, he wrote to Z.A Bhutto volunteering his services to help Pakistan with the enrichment route to developing fissile material. Although his offer was accepted he was asked to stay longer in order to observe more.<sup>52</sup> When he realized he was under suspicion by the Dutch government, he returned to Pakistan in December 1975 taking with him the stolen designs and centrifuge parts and reverse engineered the technology in Pakistan.<sup>53</sup> According to him, the uranium-enrichment programme began with the establishment of the Engineering Research laboratories on July 31, 1976,<sup>54</sup> although other sources have traced its beginnings to Project-706 that began in late 1974, which was the codeword for the enrichment project which was formally launched in October-November that year by Sultan Bashiruddin Mahmood under the supervision of M.A Khan. Installations were set up in Chaklala and Sihala, and Bhutto approved the enrichment programme and the building of the Kahuta centrifuge plant in February 1975.<sup>55</sup>

### **The Plutonium Programme**

The Plutonium route was initially chosen by the PAEC but it slowed down due to the sanctions imposed by the western suppliers who were anxious that the fuel was being diverted for military purposes. In 1976, Germany cancelled a agreement for a heavy water production plant and Canada terminated its supply of nuclear fuel. In 1978, France withdrew from the construction of a reprocessing plant at Chashma.<sup>56</sup>

The programme was reinvigorated in the late 80's with the CANDU type heavy water moderated 50 MWT reactor at Khushab, built with Chinese assistance which began operations in 1998. It had the capacity to produce 10-15 kg of Plutonium per year thereby significantly increasing Pakistan's fissile material production capabilities. There are reports that a second heavy water reactor is being built at Khushab, which resembles the original reactor and will have a capacity of 40-100 MWT. Other reports suggest that its design indicates a 1,000 MWt capacity which can produce upto 40-50 weapons a year. It is however believed that Pakistan could have possibly

produced Plutonium before building Khushab-1 by diverting fissile material from KANUPP.

### **The Last Phase**

By 1977 the leadership in Pakistan was taken over by General Zia-ul Haq through a military coup. He was persistent with the nuclear programme and Pakistan acquired nuclear capability during his tenure. He however had to face several obstacles in his quest for attaining nuclear weapons capability. One of the most important barriers came in the form of the Glenn-Symington Amendment which was passed by the US Congress in 1976-77 as concerns over nuclear proliferation grew. It essentially meant that those countries which traded in dangerous technologies would be cut off from US military and financial assistance. Due to this, Washington terminated all forms of aid to Pakistan in 1977, and again in 1979 in an effort to discourage it from continuing its nuclear weapons programme.<sup>57</sup>

The formation of the 'Nuclear Suppliers Group' or 'London Club' by the five nuclear weapons states as a result of India's nuclear weapons test in 1974, imposed tight export restrictions over nuclear materials and technology. As Pakistan did not have the indigenous capability, it was heavily dependent on other countries for them and this significantly affected their nuclear development programme.

Changes in the geopolitics of the region during this period worked as a catalyst in aiding General Zia attain his objectives. In 1979, as the Soviet forces invaded Afghanistan, Pakistan became a very important state for the US. The cold war rivalry between the two super powers ensured that the US could not only, not put pressure on Pakistan to disable its nuclear development programme, but it had to provide aid to Pakistan. The war had elevated Pakistan to a position of power. This was evident when Islamabad rejected the aid of US\$ 400 million offered by President Carter, with General Zia referring to it as 'peanuts'.<sup>58</sup> This was followed by the Reagan administration providing US\$ 3.2 billion in assistance in 1981 and a six year aid package of US\$ 4.02 billion in 1987. In addition to that, the war also helped Pakistan by-pass parts of non-proliferation legislations such as the Solarz Amendment enacted by the Congress in 1985, Pressler Amendment and certain provisions in the Glenn-Symington Amendment.

By the 1980s, although Pakistan has cold tested the device, it was not deliverable and there was little understanding among the army personnel

about its operational matters. Dr. Pervez Hoodbhoy refers to this period as 'the age of nuclear innocence' in Pakistan. This era, however, did not last long. Soon by the end of 1980s and the beginning of 1990s, the weapons became usable and their stockpiling began. The army that had almost complete control over the nuclear weapons began to understand the scope of the weapon. They realised that it was more than a mere tool to ward off India and that it had the potential to act as a shield; thereby, adding a new dimension to Pakistan's foreign policy.

In the post cold war world order, much of the leverage that Pakistan held had been lost. The Soviet Union had withdrawn from Afghanistan and Pakistan ceased to be a frontline state for the US. In addition to this, Washington had concrete evidence of Pakistan's nuclear weapons programme. Therefore it re-imposed several of the sanctions that it had overlooked in the past decade and cut off aid. Although there was tremendous international pressure on Pakistan to 'cap, reduce and roll back' its nuclear programme it did not succumb to the demands. This was because Pakistan was convinced that although the US and China had supported their activities in the past, when it came to a confrontation with India neither of these countries provided direct help. Therefore, its only possible defense from India was the fact that it had nuclear weapons capability. This was evident in the Kashmir Crisis in 1990, where New Delhi blamed Pakistan for supporting cross border terrorism. The war or words soon escalated to threats to use the weapon. The situation was tense until it was diffused by Secretary of State Robert Gates who visited both countries. This crisis was important as it proved to Pakistan that the nuclear weapon was perhaps the most powerful deterrent from India's conventional superiority and nuclear capability.

Although it was believed for a long time that Pakistan had indeed put together a nuclear device, it was made public when Prime Minister Nawaz Sharif announced it on August 1994.<sup>59</sup> In May 11, 1998, India carried out five nuclear tests. As a direct response, Islamabad carried out six nuclear tests on May 30, 1998.<sup>60</sup>

### **The Nuclear Programme Today**

The present state of Pakistan's nuclear programme has come under incredible scrutiny. Academicians, journalists and policy makers alike have all discussed and debated Pakistan's current capability. One thing that is agreed upon is that Pakistan has continued to expand its nuclear weapons programme, both in

terms of delivery vehicles, more effective warheads and expanding from highly enriched uranium based devices to plutonium based ones, probably in an attempt to increase its second strike capability.<sup>61</sup> In 1998, Pakistan had commissioned its first plutonium production reactor at Khushab which has the capacity to yield 10 to 15 kg of weapons-grade plutonium annually. In 2010, several analysts opined that a second plutonium production reactor is most likely to have started functioning by late 2009.<sup>62</sup> Construction of a third Plutonium production reactor at Khushab began in 2006. There is evidence in the form of satellite images taken in 2010 to show that construction is being carried on in a brisk pace which will probably be completed sometime this year.<sup>63</sup> Associated facilities are also being expanded, especially Plutonium Separation facilities at new labs, Pakistan Institute of Science and technology, to reprocess spent fuel from the new reactors at Khushab.<sup>64</sup>

Sino-Pakistani nexus dates back several decades and the existing nuclear cooperation agreement covers Chashma 1 and 2, with the first reactors completed in 2010 and the second to be completed in 2010.<sup>65</sup> In April 2010, reports surfaced that China National Nuclear Corporation (CNNC) had agreed to supply two 650-MW reactors to Pakistan as Chashma 3 and 4.<sup>66</sup> As China is part of the Nuclear Suppliers Group (NSG), it has not approved the transaction.<sup>67</sup> Although the Chinese justification was that it had signed the deal before it became a signatory to the NSG. The 'grand father' clause however was rejected by the US government, who stated in 2004 that it would not accept pre-2004 Sino-Pakistani nuclear agreements. In addition to that they also stated that deal had to be in accordance with NSG rules, and that China would be required to seek an exemption from the NSG regulations.<sup>68</sup>

Pakistan's stance on Global Nuclear disarmament, at least officially, has been that it will give up its nuclear weapons if India does. Now, this argument does not hold true in the light of the fact that the major objective of Pakistan's nuclear arsenal is to gain leverage in the otherwise lop-sided power symmetry that is tilted in India's favor. Pakistan is not a signatory to the treaty on the Non-Proliferation of Nuclear Weapons (NPT). It has opposed the Fissile Material Cut-Off treaty as it insists on reduction of existing stocks and because of its backing for a verification network.<sup>69</sup> Pakistan reiterated its position to commencement of negotiations at the Conference on Disarmament (CD) in January 2011. <sup>70</sup>At the same meeting although it declared its opposition it also made recommendations to the CD's agenda. For instance, it asked to consider aspects of regional conventional arms control as well as a regime on missile-

related issues.<sup>71</sup> It has also consistently refused to sign the CTBT, until India does so. Additionally, Pakistan is a member of some international multilateral programmes, including the Global Initiative to Combat Nuclear Terrorism. It has also been involved in the US government's Secure Freight Initiative through the stationing of systems at Port Qasim in Pakistan to scan containers for nuclear and radiological materials.<sup>72</sup>

Analysts point out that fissile material production provides the most direct link to outsiders to guess the scale of Pakistan's arsenal, as it's difficult to hide fissile material production completely, as its exact size and production capabilities are matters of debate. In 2008, the International Panel on Fissile Materials (IPFM) estimated that Pakistan had 'perhaps 65-80 weapons and may be increasing its stock by the equivalent of about six weapons worth per year'.<sup>73</sup> An assessment in 2009 by the Natural Resources Defense Council (NRDC) and the Federation of American Scientists (FAS) estimated that Pakistan may possess fissile material sufficient for 80-130 warheads, although the actual number was deemed to be less than 100.<sup>74</sup> Whereas media outlets such as the Washington post reported that Pakistan had over a 100 deployed weapons<sup>75</sup> quoting non-governmental sources and the New York Times suggested that the number of deployed weapons ranged from mid-90s to over 110.<sup>76</sup>

In order to correctly estimate the number of warheads, it's important to evaluate what portion of the fissile material has been converted into warheads.<sup>77</sup> As mentioned earlier, Pakistan has both plutonium and Highly Enriched Uranium (HEU) programmes to produce fissile material. IPFM estimates that Pakistan's HEU programme provides four weapons worth of material as it produces 100 kg per year and one weapon takes 20 kg worth of material. Its plutonium programme meanwhile provides 2 weapons worth of material as it produces 10 kg per year and one weapon requires 5 kg.<sup>78</sup> They also estimated that Pakistan's plutonium production capacity could increase by 20 kg a year or four warhead equivalents a year due to the two new reactors at the Khushab site.

## Notes

1. Mahmud Ali Durani, (Pakistan's Strategic Thinking and the role of Nuclear Weapons), *Cooperative Monitoring Centre Occasional Paper*, (California: Sandia National Laboratory, 2004), no. 3375, p.18, See: <http://www.cmc.sandia.gov/cmc-papers/sand2004-3375p.pdf>
2. Martin Griffiths and Terry O'Callaghan, "Key concepts in International Relations", (New York: Routledge, 2004), p. 12.

3. Kenneth Waltz, "The Theory of International Politics", (New York: McGraw Hill, 1979), p. 168.
4. Mohammed Ayub Khan, (The Pakistan-American Alliance), *Foreign Affairs*, January 1964, See: <http://www.foreignaffairs.com/articles/23567/mohammed-ayub-khan/the-pakistan-american-alliance>
5. Ibid.
6. Michael Handel, "Weak States in the International system", (London: Frank Cass, 1981), p. 77.
7. Kuldip Nayar, (A day with A.Q Khan), *The Indian Express*, February 16, 2004, See: [www.indianexpress.com/oldStory/41165](http://www.indianexpress.com/oldStory/41165)
8. Ibid.
9. Pierre Gallois, "The Balance of Terror: Strategy for the Nuclear Age", (Boston: Houghton Mifflin, 1961), p. 42.
10. Kenneth N. Waltz, (The spread of Nuclear weapons: More may be better), *Adelphi Paper*, (London: International Institute of Strategic Studies, 1981), no. 171, p. 30.
11. Ibid.
12. A.Z Hilali, (Pakistan's Nuclear Deterrence: Political and Strategic Dimensions), *Perception*, vol. 7, no. 3, (United Kingdom: Centre for Security Studies, Dec 2002-Feb 2003), See: <http://www.sam.gov.tr/perceptions/Volume7/Dec2002-Feb2003/PerceptionVolumeVII3AZHilali.pdf>
13. Ibid.
14. Bhumitra Chakma, "Pakistan's Nuclear Weapons", (New York: Routledge, 2009), p. 11.
15. Salimuzzaman Siddiqui, (The Pakistan Council of Scientific and Industrial Research: A review of its activities), *Pakistan Quarterly*, vol. 7, no. 4 (Winter 1957), pp. 42-45.
16. Ashok Kapur, "Pakistan's Nuclear Development", (London: Croom Helm, 1987), p. 35.
17. Nazir Ahmad, (The Atomic Energy Commission), *Pakistan Quarterly*, vol. 10, no. 3, (Autumn 1957), p. 14.
18. n.14, p. 36.
19. Shirin Tahir-Kheli, (Pakistan's Nuclear Option and US Policy), *Orbis*, vol. 22, no. 2, (Summer 1978), p. 358.
20. Ziba Moshaver, 'Nuclear Weapons Proliferation in the Indian subcontinent', (London: Macmillan, 1991), p. 100.
21. Ibid.
22. Shalini Chawla, 'Pakistan's Nuclear Weapons' in Satish Kumar (ed), *India's National Security Annual Review 2010*, (New York: Routledge, 2010), p. 371.
23. n. 14, p. 100.
24. S.B Guha, 'Pakistan's Atomic Energy Programme', *The Institute for Defense Studies*

- and Analysis Journal*, vol. 3, no. 1, (New Delhi: The Institute for Defense Studies and Analysis, July 1970), p. 120.
25. n. 22, p. 370.
  26. K. Sarwar Hasan, "*Pakistan and the United Nations*", (New York: Manhattan Publishing company, 1960), p. 5.
  27. A.G Noorani, "The nuclear guarantee episode", *Frontline*, vol. 18, no. 12, June 09-22, 2001, See: <http://www.hindu.com/fline/fl1812/18120940.htm>
  28. (India and the bomb), *The Pakistan Observer*, November 16, 1964.
  29. Hasan-Aksari Rizvi, (Pakistan's Nuclear Programme), *Defence Journal* vol. 19, no. 2, (Karachi, 1993), p. 12.
  30. Steve R. Weissman, Herbert Krosney, "The Islamic bomb", (New York: Times Book, 1981), p. 45.
  31. Presentation of Pervez Hoodbhoy, "Nuclear Policy and The Nation", New York City, 14 July 2009 See: [icnp.org/pubs/Pervez%20Hoodbhoy%20final2.pdf](http://icnp.org/pubs/Pervez%20Hoodbhoy%20final2.pdf)
  32. A.G Noorani, (China and Kashmir), *Frontline*, vol. 28, no. 7, March 26-April 08, 2011, See: <http://www.frontlineonnet.com/fl2807/stories/20110408280708300.htm>
  33. Yogesh Kumar Gupta, "Common Nuclear Doctrine for India Pakistan and China", Institute of Peace and Conflict Studies, <http://www.ipcs.org/article/india/commonnuclear-doctrine-for-india-pakistan-and-china-1413.html>
  34. R. Jeffrey Smith, Joby Warrick, (Pakistani nuclear scientist's accounts tell of Chinese proliferation), *The Washington Post*, November 13, 2009, See: <http://www.washingtonpost.com/wpdyn/content/article/2009/11/12/AR2009111211060.html?sid=ST2009111300578>
  35. Deepak V Ganpathy, "Hissing Dragon, squirming Tiger China's Successful Strategic Encirclement of India", *South Asia Analysis Group*, no. 682, May 2003, See: <http://www.southasiaanalysis.org/%5Cpapers7%5Cpaper682.html>
  36. William Van Kemenade, "The Fragile Pakistani State Ally of the US and China", *Netherlands Institute of International Relations*, p. 15 , See: [http://www.clingendael.nl/publications/2008/20080300\\_cdsp\\_paper\\_kemenade.pdf](http://www.clingendael.nl/publications/2008/20080300_cdsp_paper_kemenade.pdf)
  37. Monica Chansori, (Role of China as Pakistan's Nuclear and Missile Patron), *Indian Defense Review*, vol. 24, no. 4, October-December 2009, See: <http://www.indiandefencereview.com/geopolitics/Role-of-China-as-Pakistans-nuclear-and-missile-patron.html>
  38. "China's Nuclear Exports and Assistance to Pakistan", *Nuclear Threat Initiative, Research Library*, November 14, 2003, See: <http://www.nti.org/db/china/npakpos.htm>
  39. "China Nuclear Energy Industry Corporation (CNEIC)", *Nuclear Threat Initiative, Databases*, See: <http://www.nti.org/db/china/cneic.htm>
  40. *Map of Chinese Assistance To Pakistani Nuclear and Missile Facilities*, See: <http://www.nti.org/db/china/prepak.pdf>

41. D.K. Palit and P.K.S. Namboodiri, "Pakistan's Islamic bomb", (New Delhi: Vikas Publishing house Pvt Ltd, 1979), p. 17.
42. See, <http://www.fas.org/news/Pakistan/1994/940912.htm>
43. n. 14, p. 20.
44. Mark Fitzpatrick (ed), 'Nuclear Black markets: Pakistan, A Q Khan and the Rise of the Proliferation Networks: A Net Assessment', (London: International Institute for Strategic Studies, 2007), p. 16.
45. n. 22, p. 372.
46. George Perkovich, "*India's Nuclear Bomb*", (Berkeley: University of California Press, 1999), pp. 161-189.
47. Farhatullah Babar, (Bhutto's footprint's on Nuclear Pakistan), *The News*, April 04, 2006.
48. n. 23.
49. Charles K. Ebinger, 'US Nuclear Non Proliferation Policy: The Pakistan Controversy', (*The Fletcher Forum*, 1979), vol. 3, no. 2, pp. 1-21.
50. 'Pakistan's Nuclear Programme and Imports', Nuclear Black Market Dossier: A Net Assessment, The International Institute for Strategic Studies, See: <http://www.iiss.org/publications/strategic-dossiers/nbm/nuclear-black-market-dossier-a-net-assesment/>
51. n. 30.
52. n. 50.
53. n. 23.
54. A.Q. Khan, (A decade of Pak Experience in Nuclear enrichment), *The Dawn*, August 01, 1986.
55. Hafiz R Khan, 'The Kahuta Story', *Defence Journal*, August 1986, vol. 12, no. 8, pp. 11-20.
56. Carey Sublette, 'Pakistan Nuclear Weapons Programme the Beginning', January 2002, See: <http://nuclearweaponarchive.org/Pakistan/PakOrigin.html>
57. n. 14, p. 25.
58. n. 14, p. 26.
59. Howad Diamond, "India Conducts Nuclear Tests: Pakistan follows suit", May 1998, See: <http://www.armscontrol.org/print/349>
60. Volhra Charnysh, 'Pakistan's Nuclear Programme', Nuclear Age Peace Foundation, See: [http://nuclearfiles.org/menu/key-issues/nuclear-weapons/issues/proliferation/pakistan/charnysh\\_pakistan\\_analysis.pdf](http://nuclearfiles.org/menu/key-issues/nuclear-weapons/issues/proliferation/pakistan/charnysh_pakistan_analysis.pdf), p. 5.
61. Robert S. Norris and Hans Kristensen, "Nuclear Notebook: Pakistani Nuclear Forces, 2009", "*Bulletin of the Atomic Scientists*", September/October 2009, <http://thebulletin.metapress.com>.
62. Zia Mian, "Pakistan May Have Completed New Plutonium Production Reactor, Khushab-II" International Panel on Fissile Materials, February 28, 2010.



63. David Albright and Paul Brannan, "Pakistan Expanding Plutonium Separation Facility Near Rawalpindi", Institute for Science and International Security, May 19, 2009.
64. Ibid.
65. Mark Hibbs, "Pakistan Deal Signals China's Growing Nuclear Assertiveness," Nuclear Energy Brief, April 27, 2010, Carnegie Endowment for International Peace, [www.carnegieendowment.org](http://www.carnegieendowment.org).
66. Ibid.
67. Mark Hibbs, "No New Sino-Pakistan Agreement Reached for Export of Chinese PWRs," *Nucleonics Week*, November 06, 2008.
68. "US 'Favours' China-Pak Nuke Deal," *The Indian Express*, May 25, 2010, [www.indianexpress.com](http://www.indianexpress.com); Ananth Krishnan, "China Must Seek NSG Exemption, Says US," *The Hindu*, May 05, 2010, <http://beta.thehindu.com>.
69. Shireen M. Mazari, "The FMCT Threat," *The News*, August 08, 2007.
70. Narayan Lakshman, "Top US official says Pakistan holding up FMCT negotiations," *The Hindu*, February 01, 2011.
71. "Pakistan Blocks Agenda at UN Disarmament Conference," *The Daily Times*, January 20, 2010.
72. "Radiation Detection Testing Underway at Two Foreign Sea Ports," Press Release, Department of Homeland Security, April 11, 2007.
73. Zia Mian , A.H nayyar, "Banning the Production of Fissile Materials for Nuclear Weapons: Country Perspectives on the Challenges to a Fissile Material (cut off) Treaty", International Panel on Fissile materials, 2008, p. 38, See, [www.ipfmlibrary.org/gfmr08cv.pdf](http://www.ipfmlibrary.org/gfmr08cv.pdf)
74. Robert S Norris, Hans Kristensen, "Nuclear Notebook: Pakistan Nuclear Forces, 2009", Bulletin of Atomic Scientists, September/October 2009, p. 82.
75. Karen De Young, (Pakistan doubles its nuclear arsenal), *The Washington Post*, January 31, 2011, See, <http://www.washingtonpost.com/wp-dyn/content/article/2011/01/30/AR2011013004682.html>
76. David E sanger and Eric Schmitt, (Pakistani nuclear arms pose Challenge to US policy), *The New York Times*, January 31, 2011, See, <http://www.nytimes.com/2011/02/01/world/asia/01policy.html?pagewanted=all>
77. Christopher Clary, *Thinking About Pakistan's Nuclear Security in Peacetime, Crisis and War* (New Delhi: Institute for Defence Studies and Analyses, 2010) , p. 7.
78. Zia Mian, et al, "Fissile Materials in South Asia: the Implications of the US-India Nuclear Deal", International Panel on Fissile materials, September 2006, pp. 14-15, See [http://www.fissilematerials.org/ipfm/site\\_down/tr01.pdf](http://www.fissilematerials.org/ipfm/site_down/tr01.pdf)



## 2. PAKISTAN'S NUCLEAR DOCTRINE AND STRATEGY

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*“All wars of our age have become total wars...and our plan should, therefore, include the nuclear deterrent.”*

—Zulfikar Ali Bhutto<sup>1</sup>

A country, which possesses nuclear weapons, is guided by a set of rules, principles or instructions that further determine the manner in which their weapons should be employed. These rules or guidelines are referred as doctrine. The nuclear doctrine of a country is created by taking into account its threat perceptions, its political structure, its leadership, available resources among other factors.

Until the nuclear tests conducted by India on May 11-13, 1998, Pakistan's nuclear policy was that of ambiguity. In the early part of the 1970s, Pakistan did not admit their growing capabilities, and kept asserting that they had no plans of building nuclear weapons and that the nuclear programme was meant for peaceful purposes alone. This was, however, proved wrong. By the next decade, this stance was modified when they admitted that although they had the capability to build a bomb, they had no intention to do so. The end of that decade saw them take a view that although they still lacked the intention, Pakistan would build a nuclear weapon – but only if their national security interest was threatened by an adversary.<sup>2</sup> It was forced to desert this stance when it decided to react to India's nuclear tests with a series of its own tests; thereby, contradicting all their previous statements that they were not pursuing a nuclear weapons programme. Although Pakistan has overtly announced its capabilities to the world, it has not yet formally declared a nuclear doctrine.

### **The Objectives of Pakistan's Nuclear Weapons**

The rationale to acquire nuclear weapons by Pakistan was not a direct response to one or two factors. It was driven by a mix of political and military motivations:

**To Offset India's Superiority:** Compared to Pakistan, India has several advantages in terms of military capability, inherent political structure and even geography. Pakistan has been acutely aware of this fact and views the nuclear weapon as a power equaliser.

**To Deter a War:** The 1971 war, in which Pakistan suffered defeat, came at a huge cost. Not only was the inability to maintain its territorial integrity a blow to its prestige but it also resulted in Pakistan losing strategic depth; thereby, increasing its insecurity. By holding out a threat of nuclear weapons, Pakistan neutralised the possibility of an attack.

**Carry Out Low Intensity Conflict:** Pakistan has been pursuing a proxy war against India under the protection of a nuclear umbrella. The nuclear weapons, therefore, provide it with immunity while also keeping the Indian military engaged.

**Guarantee Security:** Under the March 05, 1959 US-Pakistan Cooperation Agreement, the US had guaranteed Pakistan's safety but only against a communist attack. Pakistan wanted the agreement to be more comprehensive and was surprised when the US supported India in the war against China. A few weeks after the war, President John F Kennedy provided a secret guarantee that would apply in case of an Indian aggression.<sup>3</sup> However, in 1965 and 1971, the US did not come to the support of Pakistan. In the words of General Musharraf, they knew that they 'could not count on American protection alone'. China on the other hand, is considered an all-weather ally, but like the US, it did not support Pakistan during the war(s) with India. Therefore, Pakistan came to the conclusion that it needed to protect itself from India without being dependent on a greater power.

**Islamic Bomb:** In order to garner support and funding from the countries in West Asia, General Zia brought up the concept of an Islamic bomb. This bomb, according to him, would not only boost the prestige of the Islamic world but will also make Pakistan a leader in its own right.

**Prestige and Pride:** Pakistan believed in redeeming its lost pride after the defeat of 1971 that cost Pakistan severely. In addition to this, acquiring nuclear weapons gives a country a certain amount of stature in the international level. This gives Pakistan a certain amount of diplomatic leverage that allows it to be assertive. This was evident recently during Islamabad's war of words with the US when Chief of Army Staff (COAS) Kayani asserted that Pakistan was not like Iraq or Afghanistan. It was a nuclear weapon state and the US had to 'think ten times' before launching a unilateral attack on Pakistan.<sup>4</sup> There is no doubt

that Pakistan could not afford to be this assertive devoid of a nuclear weapon. Therefore, it can be construed that the weapon is used as a diplomatic and most importantly a political tool to further the state's interest.

### **Features of Pakistan's Nuclear Doctrine**

Unlike India, Pakistan does not have an officially announced doctrine. The Pakistani defence establishment had been rather opaque about their operations while creating its nuclear posture unlike India, which put up its doctrine for public debate. The features of their nuclear policy have been made clear over time. The statements of top Pakistani officials and their policy responses to certain issues have helped highlight the central features.

It's evident that its nuclear weapons programme and doctrine is entirely India-centric. Pakistan's nuclear strategy also aims to maintain credible minimum deterrence against India and threatens first use in the event of a conventional attack or a probable nuclear threat by India.<sup>5</sup>

### **Indo-Centricity**

Perhaps the most important component of Pakistan's doctrine and strategy is that it is entirely India-centric. The rationale for acquiring nuclear weapons in the first place was because of a perceived Indian threat. This complete lack of trust and immense doubt over India's intentions began with the events that led to the partition in 1947. The Pakistani ruling elites remain convinced, or rather legitimise their existence<sup>6</sup> by reiterating the view that India not only opposed the formation of Pakistan, but to this day, is looking to integrate Pakistan with the Indian Union.

The primary objective of Pakistan's deterrence and the ultimate aim of its nuclear weapons are to offset India's conventional superiority. Without a well defined doctrine and major tenants of its nuclear posturing left to assumptions, they leave a lot of questions unanswered, and this also helps to deter an Indian nuclear aggression.

Z.A Bhutto persistently argued that the only rationale for acquiring nuclear weapons was due to the looming Indian threat. He based his argument on the fact that the very existence of Pakistan was threatened by India's nuclear intentions. In the same context, Lt. General Kidwai explained that Pakistan did not go nuclear for aggressive purposes, but was forced to develop nuclear weapons to 'protect itself from India following the 1971 Bangladesh war and India's 'peaceful' nuclear explosion'.<sup>7</sup>

### **Credible Minimum Deterrence**

The term 'minimum deterrence' is used generously while trying to explain the nuclear strategy of Pakistan or India. Without any of the other complexities attached to it, a common definition of the term is: 'An attempt to prevent enemy attack through reliance on a small nuclear retaliatory force capable of destroying a limited number of key targets'.<sup>8</sup> Several countries like China and India have resorted to using minimum deterrence.

Even the British Prime Minister Margaret Thatcher famously said, Nuclear deterrence is the only means allowing small countries to stand up to big countries.<sup>9</sup> History holds evidence of this. For instance, in the late 1960s, the Chinese had about 20 ICBMs that had the capacity to target the major US cities. Although numerically the US and the Soviet Union had many more nuclear warheads as compared to the Chinese, the fact that the Chinese had enough to retaliate and cause sufficient damage deterred both the superpowers.<sup>10</sup>

The amount required for minimum deterrence however is not a constant number. It is dynamic in nature which means that it is subject to change. There are several factors that could influence this number. For one, it could depend on the number of nuclear weapons estimated with the adversary, the manner of their deployment and the survivability of the force. If the survivability of the force is greater the size of deterrence force could be smaller and vice versa. Additionally the force configuration of the adversary also needs to be considered as it can have direct effect on the survivability of the force.<sup>11</sup> In their book 'Securing Nuclear Peace', Agha Shahi, Zulfiqar Khan and Abdul Sattar explain that Pakistan's deterrent can be maintained only by keeping the size of the force flexible.

Minimum deterrence has been and should continue to be the guiding principle of Pakistan's nuclear pursuit. Of course minimum cannot be defined in static numbers. In the absence of mutual restraints, the size of Pakistan's arsenal and its deployment pattern have to be adjusted to ward off dangers of pre-emption and interception. Only then can deterrence remain efficacious.<sup>12</sup>

In an article written by A Q Khan in Newsweek magazine, he states that it was the Indian Nuclear test in May 1974 that motivated him to return to Pakistan and create a 'credible nuclear deterrent' to save his country from 'Indian Nuclear blackmail'.<sup>13</sup> He explains that a country like Pakistan that could not produce bicycle chains, had achieved credible nuclear capacity by the second half of the 1980s and the delivery systems had been perfected by the 1990s.<sup>14</sup> The question

of how many weapons will be required to maintain credible deterrence is not answered. However, he goes on to state: India doesn't need more than five weapons to hurt us badly, and we wouldn't need more than ten to return the favour.

Although credible 'minimum' deterrence has not been quantified exactly and is open to subjective evaluation, the generally accepted understanding is that Pakistan should have a force strong enough to inflict unacceptable damage on India. The extent of this 'unacceptable damage' again is subject to debate. This principle however, applies to not only the weapons but the delivery systems and other nuclear arsenal which will collectively provide Pakistan this deterrent capability. On one of his visits to China, former President of Pakistan General Pervez Musharraf commented:

The rationale behind our nuclear policy is purely security and we only want to maintain a minimum credible deterrence to deter any aggression against our homeland. Pakistan unlike India does not harbour any ambitions or regional and global status. We fully support the creation of a strategic self restraint regime in the subcontinent and expect a positive response from our neighbour.<sup>15</sup>

Likewise, during the launch ceremony of JF-17, the multi-role fighter plane that was jointly developed by Pakistan and China, he asserted that Pakistan would maintain 'minimum level of defensive deterrence' in both conventional and unconventional fields as it wants peace with dignity and honour.<sup>16</sup> Neither has the exact meaning of the term 'defensive deterrence' been established nor has its difference as compared to India's 'minimum credible deterrence' been identified.

Pakistani analysts attribute Pakistan's logic to adopt a minimum nuclear deterrence posture to economic factors. According to them, the fact that Pakistan faces several socio-economic issues internally, which results in severe economic constraints, mean that minimum deterrence will not only be the most effective strategy but it is also the only affordable one.

In theoretical terms, although this logic can be justified, in the case of Pakistan this validation is seriously flawed. The international community is aware that Pakistan has a huge weapons stockpile that is said to have surpassed both Britain and France.<sup>17</sup> Even while developing the bomb Pakistan had several financial constraints, but the lack of sufficient funds has not stopped Pakistan from developing the bomb, or increasing its number.

### **First Use**

Nuclear armed Pakistan contributes significantly in making the South Asian region one of the most sensitive and hence dangerous areas in the world. The fear of nuclear instability in the region is growing and the risk of a nuclear war cannot be taken lightly. From the Pakistani point of view, the major threat lies in India's conventional military superiority. Indian nuclear forces are also far more advanced as compared to Pakistan's when it comes to delivery systems, nuclear warhead stockpile capacity, and probably even design experience with early generation devices of thermonuclear yield.<sup>18</sup>

India is also far ahead of Pakistan when it comes to Space surveillance. Although India built its own space launch systems in the 1990s, it had started to launch observation satellites on Soviet launch vehicles from the late 1980s.<sup>19</sup> India also enjoys the advantage of having a large variety of long range airborne reconnaissance assets in comparison to which Pakistan's surveillance and early warning capabilities are far less advanced.<sup>20</sup>

In addition to this, Pakistan lost a major strategic advantage over India when it lost present day Bangladesh to war. While India enjoys sufficient strategic depth, Pakistan's current geographical location makes it vulnerable to conventional air strikes and rapid invasion by the Indian forces.<sup>21</sup> This overwhelming asymmetry has led the Pakistani establishment to adopt the Nuclear First Use policy. However, it has been argued that although Pakistan highlights its first use option, it does not mean the early use of the weapon in the event of a conflict. It only means that it is using nuclear weapons as a very effective shield against any form of aggression by India.<sup>22</sup>

India's offer to enter into a no-first use pledge after both countries tested their nuclear devices was out rightly rejected by Pakistan as it views its first use as an 'option enhancing policy'.<sup>23</sup> By painting a picture that Pakistan would not hesitate to use the weapon during an aggression, they have managed to successfully dissuade India.

Pakistan's perception of the Nuclear Weapons is entirely different from that of India's. Whilst India perceives nuclear weapons as a special and distinct weapon that is capable of immense destructive potential, Pakistan seeks to systematically integrate it as just another weapon into its military.<sup>24</sup> This point is emphasised by Ashley Tellis, according to whom, the impact of nuclear weapons for India is politico-psychological in nature, while for Pakistan it's military-operational.<sup>25</sup>



Pragmatic or not, Pakistan considers its nuclear weapons as not only its most strategic asset but also as the ultimate guarantor of the nation's sovereignty. This belief among the Pakistani decision makers was voiced by General Mirza Aslam Beg who wrote, Some safety against extinction is the inalienable right of an individual or a nation. Oxygen is basic to life, and one does not debate its desirability, nuclear deterrence has assumed that life saving property for Pakistan.<sup>26</sup>

In this context, Manpreet Sethi argues that Pakistan's nuclear doctrine is not very different from its military doctrine of offensive defence. By projecting nuclear weapons as an offensive instrument, they successfully prevent the perceived Indian threat. Likewise they deem it as a defensive instrument that will protect them from India's retaliation.<sup>27</sup>

### **Conditions Under Which the Nuclear Weapon Could Be Used**

Despite having a first use policy, the conditions during which Pakistan will resort to using the weapon, remains ambiguous. According to a retired Pakistani Air force officer, for example, Islamabad will resort to using the weapon if:

- Indian forces penetrate beyond a certain defined line or crossing of a river.
- there is an imminent capture of an important Pakistani city like Lahore and Sialkot.
- Pakistan's conventional armed forces or other assets are destroyed beyond an unacceptable level
- there is an attack on any of Pakistan's strategic targets such as dams or nuclear installations like Tarbela, Mangla, Kahuta, Chashma, etc.
- a blockade is imposed on Pakistan which blocks its supply lines and affects the war-waging stamina of the country.
- India crosses the line of control to a level that it threatens Pakistan's control over Kashmir.<sup>28</sup>

These explanations are vague in nature and leave a lot of questions unanswered. The closest to an official statement on this issue is the statements of the Director General of Pakistan's Strategic Plans Division (SPD), Lt. General Khalid Kidwai, in an interview to two Italian scholars. In this interview not only did he famously stat that Pakistan's nuclear weapons were 'aimed solely at India'<sup>29</sup> but he went on to explain that Pakistan's nuclear threshold was premised on four benchmarks. Pakistan would contemplate using nuclear weapons if:

- India attacks and occupies a large part of Pakistan (space threshold).
- India manages to destroy a large part of Pakistan's land or air forces (military threshold), India economically strangulates Pakistan (economic threshold).
- India causes any political destabilization or internal unrest through subversive measures (political threshold).<sup>30</sup>

By articulating these thresholds, Pakistan has been successful in not only deterring Indian forces, but also continuing with their strategy of 'bleeding India through a thousand cuts'. This puts India in a very difficult position as any response by the Indian forces would be seen as an escalation of crisis which would justify the use of the nuclear weapon.

Pakistan's civilian leadership also echo the views of its military leaders. In a jointly authored article in *The Dawn* by Abdul Sattar, Agha Sahi and Zulfiqar Ali Khan, they wrote<sup>31</sup>: The exigency under which Pakistan may use nuclear weapons is spelt out as: Although the precise contingencies in which Pakistan may use nuclear weapons have not been articulated or even defined by the government, the assumption has been that if the enemy launches a war and undertakes a piercing attack to occupy large territories or communications junctions, the weapon of last resort would have to be invoked.

This statement is rather contradictory in nature. By projecting that it has a low nuclear threshold, members of Pakistan's strategic community have been keeping the threat of a nuclear attack open. According to them even a conventional attack by Indian forces or departure by India from the Indus water treaty could trigger a nuclear attack from Pakistan. In this context terming it as a 'weapon of last resort' is indeed conflicting with their other claims.

These views, however, leave several questions unanswered. The assumption that Pakistan will actually use the weapons against India is flawed as it is basically suicidal. A full-scale retaliation from India would wipe out Pakistan from the map, and any rational state cannot possibly have that as a carefully thought out policy option. The belief that India will not have the political will to carry out such an attack does not hold true. Several members of the Indian strategic and political community strongly will strongly advocate it. One such individual, General Sunderji, wrote in 1992, If damage suffered by Indian forces (due to a Pakistani Nuclear strike) is substantial, national and troop morale would demand at least a quid pro quo response. There might even be a demand in some quarters for a quid pro quo plus response.<sup>32</sup> The more important question, however, is whether India will call Pakistan's bluff before it reaches this level and if so, how they would respond.

Bringing in the nationalistic dimension, the wars Pakistan fought seriously undermined its sovereignty and it questioned the Pakistani states ability to protect its own territory. This created a strong sense of resentment within the ruling elites who decided that any attack on Pakistan, which would be perceived as threatening, would be responded to with nuclear weapons. Moreover, from an economic perspective it would be immensely expensive to maintain a second-strike retaliatory force. Therefore, in order to convert this apparent weakness into strength they resorted to the principle of first use.

Although the rationale is severely lacking, several members of the Pakistani strategic community have repeatedly indicated that Pakistan has a policy of massive retaliation. It was used for the first time hours after the nuclear tests on May 28, 1998, when Islamabad, responding to a report of an imminent preemptive attack by India, sent a warning to New Delhi stating that a strike by India would 'warrant a swift and massive retaliation with unforeseen consequences'.<sup>33</sup> Since then, several statements of officials, political and military leaders have indicated the same. For instance, in an address to the nation in 2001-02, General Musharraf had said, We do not want war. But if war is thrust upon us, we would respond with full might.<sup>34</sup>

However, the credibility of such statements is highly questionable. As the weaker state in the Indo-Pak power equation, it needs to project a very aggressive stance in order to ward off the perceived Indian threat. Such an approach was necessary to make the nuclear threat seem real. There is however no strong basis for Pakistan's adoption of this principle. They have not clearly stated what would trigger such a response other than a conventional attack by India or a preemptive strike on select Pakistani targets.

### **Delivery Vehicles**

Alongside plans to build the bomb, the Pakistani leadership also began work on the delivery systems. Their nuclear force consists of nuclear capable combat aircraft and solid and liquid fuel rockets for short and long range ballistic missiles. Broadly speaking Pakistan's nuclear delivery systems can be put into three categories, land based missiles, aircraft and cruise missiles.<sup>35</sup> The aircraft is controlled by the Pakistan Air force and surface to surface missiles controlled by the Pakistan army.<sup>36</sup> Although the US played an important role in Pakistan's acquisition of these systems, Chinese assistance and to a certain extent the North Korean support cannot be ignored. This fact has

been acknowledged by Pakistani officials such as Lt. Gen. Talat Masood, the Chairman of Pakistan's Ordnance Factories (POF) Board from 1981-88, who in an interview in 1989 recognised the role of the Chinese.<sup>37</sup> It was reiterated by the US Assistant Secretary of State, Winston Lord, when he stated in a letter to Senator Robert F. Bennett: The entire strategic weapons program should be stamped 'Made in China'.<sup>38</sup>

### **Ballistic Missiles**

After India Tested Prithvi ballistic missile in 1988, Pakistan kick started its own ballistic missiles programme. They are:

#### **The Hatf 1**

The development of this missile, with evidences pointing towards Chinese assistance, was revealed in early 1989. Unconfirmed reports also suggest that the design of this missile was based on Eridan, a French sounding rocket design<sup>39</sup>; others suggest that it resembles the Chinese N series.

#### **The Hatf 2/Abdali Missiles**

The Hatf 2 or Abdali was the product of a programme in 1997 conducted by the Pakistan National Development Complex, although the production is said to have started in 1987. An upgraded two stage version of the Hatf 1 missile, it has a range of 180 km with a 500 kg payload.<sup>40</sup> The first launching took place on February 07, 2002 and was found to be similar in shape and size to certain Chinese rockets. However, due to their limited range, it is unlikely that they can carry nuclear warheads.<sup>41</sup>

### **Nuclear Capable Missiles**

#### **Ghaznavi Missile**

The original programme for the development of Hatf 3 or the Ghaznavi missile began in 1987, which was terminated when M-11s were transferred from China. Simply said, the Ghaznavi is a shortened version of the Chinese M11 missile. This solid fuel missile has a 269 km range with a payload of 1,000 kg. The range with a 700 kg payload is 347 km.<sup>42</sup> These are well tested operational missiles and nuclear capable. The first test flight was held in May 2002.

### **Ghauri Missile**

The creation of the Ghauri Missile was the result of the coordinated effort of North Korea and China. In this context, B. Raman has stated, North Korea's assistance to Pakistan in the development of its missile capability has been as a quid pro quo for the latter's assistance to North Korea in the development of its military nuclear capability.<sup>43</sup>

Its development took place in the Khan research Laboratories in 1993. However reports suggest that there was a trilateral agreement of sorts between China, North Korea and Pakistan where China would provide the soft technology and engineering for Ghauri and North Korea would act as the agent and aid in the transfer of technology and provide hardware from its Nodong missile.<sup>44</sup>

The first flight of this missile took place in April 1998 with a range of 800-1,200 km. An improved version Ghauri-2 was first flight tested in 1998 with a range of 1,500 to 1,800 km and the Ghauri-3 programme has been under development since 1994.<sup>45</sup>

### **Shaheen 1**

According to reports Shaheen 1 or Hatf 4 was developed by the Pakistan National Development Complex (PNDC), with assistance from SUPARCO and the PAEC.<sup>46</sup> The maximum range of Shaheen 1 is 750 km.<sup>47</sup> It was officially handed over to the Pakistan Army Strategic Missile Group in March 2003.<sup>48</sup> This missile has several similarities to the Chinese M-9 missiles; therefore, a comparison of the two warheads confirms a common origin.<sup>49</sup>

### **Shaheen 2**

Hatf-6 or Shaheen 2 is a two stage solid propellant ballistic missile. Two Shaheen missiles were displayed during the Pakistan Day parade in Islamabad on March 23, 2000 and four years later on March 9 it was test fired. It is believed to be based on the earlier Chinese two-stage solid propellant missile M-18. It is an MRBM that is capable of targeting India as its range is over 2000 km.<sup>50</sup> Shaheen 1 and 2 are developed by the PNDC with the assistance of SUPARCO and Atomic Energy Commission.<sup>51</sup>

### **Cruise Missiles**

In addition to ballistic missiles and combat aircrafts, Pakistan is also in possession of cruise missiles. These missiles, whose effectiveness was

understood during the Persian Gulf War, are designed to deliver a large warhead over long distances with great accuracy. Modern cruise missiles travel at high speeds and can fly on a non ballistic, very low altitude trajectory. The fact that it is of a comparatively smaller size and has greater survivability and is unmanned gives it an advantage over other weapons. Additionally, the technology utilised for its production is fundamental in nature and therefore its acquisition was imperative to the Pakistani leadership and it was accomplished with aid from North Korea.

### **Hatf 7 (Babur)**

It's an air, ground, ship and submarine launched short range, turbojet powered, single warhead cruise missile. It was test fired when Pakistani president Asif Ali Zardari was visiting Washington to meet President Obama in May 2009.<sup>52</sup> Reports suggest that its creation can be attributed to various sources including the an American Tomahawk cruise missile that was found almost intact in Pakistan to the Chinese Hong Niao-3 and also to the Russian SS-N-27 Club (3M14 version) cruise missiles.<sup>53</sup> With a payload of 450 kg, it has a range of 500 km and the warheads can be nuclear with a yield between 10 and 35 KT.<sup>54</sup>

### **Hatf 8 (Ra'ad)**

It's a nuclear capable, air launched cruise missile with a range of 350 km. It was tested on 8 May 2008. The rationale behind its development was to increase Pakistan's strategic capability on land and at sea as this missile could be launched from aerial platforms.<sup>55</sup> Various reports put forward highlight that Hatf 8 has special stealth capabilities, high manoeuvrability, and high accuracy, and can deliver a range of warheads.<sup>56</sup>

### **Aircraft**

With the nuclear programme well underway, the US made plans to develop aircrafts as its principal delivery system. Its main suppliers were the US, France and China.

### **F-16s**

By the early 1980s, Pakistan had become the US's ally in the War against Communism, and under General Zia's leadership, had become a benefactor of generous US aid of \$3.2 billion, of which \$1.6 billion was allocated to the military. This assistance programme included the purchase of very advanced

military aircraft such F-16s Falcon fighters/interceptors from the US. It also entered into an agreement that included the purchase of 40 F-16s in December 1981.<sup>57</sup> In 1987, the next aid package of \$4.02 billion was provided although it was suspended three years later in 1990 due to the arms embargo under the Pressler amendment. However post September 11 when Pakistan yet again became the US's front line ally in the war against terror, all sanctions were lifted and the aid packages were resumed. This not only led to the revival of the crumbling Pakistani economy, it also resumed the supply of defence equipment from the US to Pakistan, which included the F-16s.

### **JF-17s and J-10s**

While the US had imposed the arms embargo on Pakistan, it turned to China to meet its defence needs. The JF-17 is developed jointly by China and Pakistan and it is built in China's Chengdu Aircraft Industry Corporation (CAC) and Pakistan Aeronautical Complex (PAC) in Kamra. It is designed to be a low cost, high multi-role combat aircraft that will be able to meet the strategic and tactical requirements of the Pakistan Air Force.<sup>58</sup> Although initially it was decided that Pakistan would acquire 150 JF-17s, it has increased this number to 250. In addition to this, Pakistan also plans to purchase up to two squadrons of the Chinese J-10, which is defined as an all-weather multi-role fighter aircraft that is designed for both air-to-air and air-to-ground missions.<sup>59</sup> This along with the J-17s would tremendously increase the capabilities of the Pakistan Air Force (PAF).

### **A-5s and French Mirage V's**

The A-5s that Pakistan acquired from China and the Mirage Vs from the French can potentially be used for nuclear strike missions.

### **Requirements of Pakistan's Nuclear Deterrence**

There are certain requirements that Pakistan's nuclear deterrent must possess if it has to offset an attack from a superior conventional force.<sup>60</sup>

For one, a nuclear force that is not too small. If the Pakistani nuclear weapons have to gain credibility as a deterrent, they cannot afford to be a small force. This goes beyond the weapons themselves, and applies to their defence and offense systems. They should be able to absorb and not be wiped out by a single Indian strike. In this context Islamabad's aggressive attempts to increase its nuclear weapons can be seen as an attempt to build a second strike force.

Secondly, they should also be capable of Quick Assembly. Several top Pakistani leaders have suggested that Pakistan's nuclear weapons are in a disassembled state. As Pakistan has a first use doctrine it's imperative that it can quickly assemble the frame, fissile core and delivery vehicles which are believed to be stored in different locations. Therefore Pakistani forces should be on low alert at all times.

Thirdly, there is a need to diversify its weapons designs. Pakistan's attempts to use Plutonium were blocked early in its programme. Since then it has relied mostly on the highly enriched uranium to build its weapons. However, with the Khushab reactor, Pakistan is seeking to increase its production capacity.

Pakistan also needs to have credible delivery systems. For launching nuclear weapons, Pakistan has two types of Delivery Vehicles – aircrafts controlled by the Pakistan Air force and surface to surface missiles controlled by the Pakistan army.<sup>61</sup> Pakistan could also use the F-16's purchased from the US provided its modified, as well as A 5s, Mirage III and V.<sup>62</sup> Pakistan also has four nuclear capable missiles – Ghaznavi, Ghauri, Shaheen 1 and 2.

Although Pakistani authorities consider the nuclear weapon absolutely crucial in deterring India, Peter Lavoy, the Director of the Center for Contemporary Conflict explains that Pakistani defence planners still consider the conventional armed forces the backbone of the country's overall deterrence posture as they will be the first line of defence against a conventional military attack. He substantiates this with the help of a few recent examples. He points out that shortly after the December 13, 2001 terrorist attack on the Indian parliament, India mobilized its armed forces and Pakistan's response to this by immediately putting its own armed forces on a war footing. General Musharraf recorded this in his memoir, We went through a period of extreme tension throughout 2002 when Indian troops amassed on our borders during a hair-trigger, eyeball-to-eyeball confrontation. We responded by moving all our forces forward. The standoff lasted ten months.<sup>63</sup>

While making an attempt to understand Pakistan's Nuclear Doctrine, one natural question that arises is whether Pakistan has been successful in deterring India. As mentioned earlier, Pakistan's nuclear weapons have provided it with the shield to involve itself in low intensity conflicts in Kashmir. Its nuclear capability, therefore, not only helped deter a conventional attack by India, it also allowed Pakistan to pursue its foreign policy objectives in Kashmir, by sending in government backed militants with an aim to create instability in India.



As the military asymmetry has been and will continue to be shifted in India's favour, Pakistani defence establishment remains convinced that its nuclear deterrence worked. They believe that the only reason that is keeping India from expanding the conflict to a full-fledged war is the fact that Pakistan is keeping its nuclear option open. A counter argument for this is provided by a group of researchers who do not believe in the deterrence value of the Nuclear weapon. They assert that it was the US involvement that prevented the escalation of the crisis between the two countries.

However, it can be agreed upon that Pakistan has been attempting to increase the credibility of its nuclear deterrence. They believe that one way to strengthen this ability is to behave recklessly during a crisis. President Nixon referred to this as the madman theory of deterrence or the 'principle of the threat of excessive force'. He was convinced that his power would be greatly advanced if his adversaries thought that he might go to the extent of using excessive force—maybe even nuclear force.<sup>64</sup> Pakistani military leaders can fully comprehend this theory. Its reputation as an unpredictable, reckless state (which can be substantiated by its record of nuclear proliferation as well as its behaviour in Kashmir and during the Kargil crisis) is therefore used to its advantage.

So, what makes this time period excessively sensitive is that not only is Pakistan's economy crumbling, it is entirely dependent upon foreign aid, which mostly comes from the US—its ally on the Global War on terror. In addition to that there has been friction between the allies with severe allegations thrown at each other which threaten to affect their relationship. At this juncture India has been successful in mobilizing international public opinion in its favour. An interesting dimension here that is often not explored is the Chinese factor. China has aided Pakistan's nuclear programme since its inception. This all weather friend of Pakistan has provided it with all forms of aid including delivery systems and therefore holds a certain degree of responsibility in its behaviour and actions.

These things said, Pakistan will continue to view the Nuclear Weapon as a guarantee of its existence. The military has been very successful in creating the image of the persistent threat that is India, and the image that India is ready to attack and take over Pakistan territory at all times. Building up this idea not only helped the Pakistan army to legitimise its role in their governance but it also managed to garner incredible support for the nuclear weapon. According to one scholar, Workers and peasants, maulvis, white collars and intellectuals worship the bomb, and perceive it as a 'great comfort, giving them spiritual strength to endure the hardships of life'.<sup>65</sup>

## Notes

1. Z.A. Bhutto, *"The myth of Independence"*, (Karachi: Oxford University Press, 1969), p. 153.
2. Bhumitra Chakma, *"Pakistan's Nuclear Weapons"*, (New York: Routledge, 2009), p. 41.
3. 'Pakistan's Nuclear Programme and Imports', The International Institute for Strategic Studies, See: <http://www.iiss.org/publications/strategic-dossiers/nbm/nuclear-black-market-dossier-a-net-assessment/pakistans-nuclear-programme-and-imports-/#chapter>
4. Anita Joshua, (Pakistan is not like Iraq or Afghanistan, Kayani tells Washington), The Hindu, October 19 2011, See: <http://www.thehindu.com/news/international/article2551586.ece>
5. Satish Kumar (ed.), Shalini Chawla, 'Pakistan's Nuclear Weapons', *India's National Security Annual Review 2010*, (New York: Routledge, 2010), p. 364.
6. Shalini Chawla, 'Pakistan's Military and its Strategy', (New Delhi: Centre for Air Power Studies, 2009), p. x.
7. Robin Walker, Lt. Gen. Khalid Kidwai's Address, "Pakistan's Evolution as a Nuclear Weapons State", U.S. Naval Postgraduate School, 2006, See: <http://www.nps.edu/academics/centers/ccc/news/kidwaiNov06.html>.
8. John Baylis, Ken Booth et al (eds.), *"Contemporary Strategy"*, (London: Croom Helm, 1987), vol. 1, p. 312.
9. Gerardv J. Degroot, *"The Bomb: A History of Hell on Earth"*, (London: Pimilico, 2004), p. 188.
10. Gurmeet Kanwal, 'Nuclear Defence – Shaping the Arsenal', (New Delhi: IDSA, 2001), pp. 110-111.
11. Naeem Salik, "Minimum deterrence and India Pakistan Nuclear Dialogue: Case study on Pakistan", LNCV South Asia Security Project, March 2006, p. 5, See: <http://www.centrovolta.it/landau/content/binary/01.%20Naeem%20Salik-Minimum%20deterrence%20and%20India%20Pakistan%20dialogie,%20PAKISTAN.%20Case%20Study%202006.pdf> ,
12. PR Chari et al(eds.), Agha Shahi, Zulfiqar Khan and Abdul Sattar, 'Securing Nuclear Peace', in "Nuclear Stability in Southern Asia", October 05, 1999, pp. 190-192.
13. A. Q Khan, (I saved my country), Newsweek, vol. CLVII, no. 21 &22, May 23 & 30, 2011, p. 20.
14. Ibid.
15. "Pakistan not to enter into Arms race with India: Musharraf", Associated Press of Pakistan, June 2000, See, <http://www.fas.org/news/pakistan/2000/000627-pak-app1.htm>
16. B. Muralidhar Reddy, (Pakistan will maintain minimum deterrence), *The Hindu*, April 06, 2005, See <http://www.hindu.com/2005/04/06/stories/2005040605241200.htm>
17. Karen De Young, (Pakistan doubles its nuclear arsenal), *The Washington Post*, January 31, 2011, See: <http://www.washingtonpost.com/wp-dyn/content/article/2011/01/30/AR2011013004682.html>
18. "Joint Statement by Department of Atomic Energy and Defence Research and Development

- Organization,” New Delhi, May 17, 1998, See, <http://www.fas.org/news/india/1998/05/prmay1798.htm>
19. R. Prasannan, “War Games,” *The Week Magazine*, December 13, 1998. See: <http://www.fas.org/spp/guide/india/earth/irs.htm> and <http://www.the-week.com/98dec13/events1.htm>.
  20. “Experimental Satteline Badr-B to be launched next year: Tarar”, *Associated Press of Pakistan* (Islamabad), November 25, 1999, See: <http://www.fas.org/spp/guide/pakistan/earth/991125-pak-app1.htm>
  21. Rodney W. Jones, ‘Minimum Nuclear Deterrence Postures in South Asia : An Overview’, Defence Threat Reduction Agency Advanced Systems and Concepts Office, October 01, 2001, p. 31, See: <http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA460305>
  22. n. 5, p. 91.
  23. Stephen Cohen, “*The Pakistan Army*”, (London: Oxford University Press, 1998)
  24. Manpreeth Sethi, (Pakistan’s Nuclear Doctrine and Strategy), *AIR POWER journal*, vol. 2, no. 3, Monsoon 2007 (July-September), pp. 92-93.
  25. Ashley Tellis, ‘India’s Emerging Nuclear Posture: Between recessed deterrence and ready Arsenal’, (RAND: Santa Monica, 2001), p. 301.
  26. Mirza Aslam Beg, “Pakistan’s Nuclear Imperatives”, *National Development and Security*, vol. 3, no. 10, November 1994, pp. 29-41.
  27. n. 5, p. 93.
  28. T.M. Ashraf, “Aerospace Power: The emerging Strategic dimension”, (Peshawar: PAF Book Club, 2003), p. 148.
  29. G. Parthasarathy, “Islamic Nukes: Global Implications,” *Defence and Security Alert* , 2011, See: <http://www.dsalert.org/pakistan-special/215-islamic-nukes-global-implications>
  30. Zulfikar Khan, ‘India-Pakistani Nuclear Rivalry: Perceptions, Misperceptions, and Mutual Deterrence’, Islamabad Policy Research Institute, IPRI Paper 9, January 2005, See [http://ipripak.org/papers/india-pakistan.shtml#\\_ftnref145](http://ipripak.org/papers/india-pakistan.shtml#_ftnref145)
  31. Dawn, Karachi, October 05, 1999.
  32. K. Sunderji, (Nuclear Deterrence Doctrine for India), *Trishul*, vol. 5, no. 2, December 1992.
  33. “Pakistan warns India of swift retaliation”, *The Dawn*, May 29, 1998.
  34. President’s address to the nation: [http://www.infopakgov.pk/President\\_Adresses/presidentaddresses-27-5-2002.htm](http://www.infopakgov.pk/President_Adresses/presidentaddresses-27-5-2002.htm)
  35. Shalini Chawla, “Pakistan’s Nuclear Delivery Systems”, *Air Power Journal*, vol. 5, no. 4, Winter 2010 (October-December), p. 133.
  36. Pual K Kerr, Mary Beth Nikitin, ‘Pakistans Nuclear Weapons: Proliferation and Security Issues’, Congressional Research Service, February 2010, p. 6, See: [www.fas.org/spp/crs/nuke/RL34248.pdf](http://www.fas.org/spp/crs/nuke/RL34248.pdf)

37. Roger Frost, "Pakistan's Procurement Chief on New Programs", *International Defence Review*, June 1989, p. 765.
38. Bill Gertz, "China Plays a Major Role in Expanding the Nuclear Club", *Washington Times*, May 29, 1998.
39. Jane's Strategic Weapon Systems, Issue 48, 2008, p. 108.
40. n. 39, p. 109.
41. S.Chandrashekhar, Arvind Kumar and Rajaram Nagappa, (An assessment of Pakistan's Ballistic Missile Programme: Technical and Strategic Capability), International Strategic and Security Studies Programme, (National Institute of Advanced Studies: Bangalore, 2006), n. R5-06, p. 9.
42. Ibid.
43. "Pakistan and the North Korea Connection", *Asia Times Online*, See: [http://www.atimes.com/atimes/South\\_Asia/DJ22Df01.html](http://www.atimes.com/atimes/South_Asia/DJ22Df01.html)
44. Joseph Bermudez, "A Salient Partner", *Janes Defence Weekly* (Coulsdon, Surrey), vol. 2, no. 5, May 1998, pp. 1-2.
45. n. 35, p. 144.
46. n. 39, p. 112.
47. n. 45.
48. "Pakistan Conducts Third Missile Test in 3 Weeks", Rediff NEWS, at <http://in.rediff.com/news/2006/dec/09hatf.htm>
49. n. 41, p. 7.
50. n. 39, p. 115.
51. n. 35, p. 146.
52. "Pakistan Test-fires Babur Cruise Missile" at <http://forum.pakistanidefence.com/lofiversion/index.php/t82549.html>
53. n. 39, p. 117.
54. Ibid.
55. "Cruise Missile Fired from Aerial Platform", Iftikar A. Khan, *Dawn*, May 09, 2008, at <http://www.dawn.com/2008/05/09/top4.htm>
56. Ibid.
57. "Pakistan Fiza'ya Pakistan Air Force-PAF", *F-16.net The Ultimate F-16 Reference*, See: [http://www.f-16\\_users\\_articles14html](http://www.f-16_users_articles14html)
58. n. 35, p. 153.
59. "Jian-10 Multirole Fighter Aircraft", See: <http://www.sinodefence.com/airforce/fighter/j10.asp>
60. n. 57.
61. Pual K Kerr, Mary Beth Nikitin, 'Pakistans Nuclear Weapons: Proliferation and Security issues', Congressional Research Service, Feb 2010, p. 6, See: [www.fas.org/sgp/crs/nuke/RL34248.pdf](http://www.fas.org/sgp/crs/nuke/RL34248.pdf)

62. Alan Kronstadt, "Nuclear Weapons and Ballistic Missile Proliferation in India and Pakistan: Issues for Congress", Congressional Research Service, n. RL30623.
63. Pervez Musharraf, "*In the Line of Fire*" (New York: Free Press, 2006), p. 301.
64. Maia Juel Giorgio, Tina Sondergaard Madsen, Jakob Wigersma and Mark Westh, "Nuclear Deterrence in South Asia-An assessment of Deterrence and Stability in the Indian-Pakistan Conflict", Autumn 2010, p.44, See <http://rudar.ruc.dk/bitstream/1800/6041/1/Project%20GS-BA,%20Autumn%202010.pdf>
65. Artem Rudentsky, (Understanding Nuclear Pakistan: Global, Regional, and Domestic Dimensions), *World Affairs*, vol. 9, no. 3, Autumn 2005, p. 51.



### 3. PAKISTAN'S NUCLEAR WEAPONS' COMMAND AND CONTROL STRUCTURE

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*When you map (weapons of mass destruction) and terrorism, all roads intersect in Pakistan.*

— Graham Allison<sup>1</sup>

#### **Significance of a Command and Control Structure**

There has been a raging debate about the type of command and control system of small countries. Realists such as Kenneth Waltz, whose famous work 'More May Be Better' posit that since small countries have a small nuclear arsenal, they can build a simple command and control architecture that can work efficiently to maintain nuclear deterrence.<sup>2</sup> Contrary to this, some others question the ability of small countries in building proper command and control structures, thereby, increasing the possibility of nuclear mishaps.<sup>3</sup>

Countries that possess nuclear weapons also need an effective mechanism in place that will manage all the nuclear forces. Taking into consideration their threat perceptions, geo-strategic compulsions and national security strategies, they have to develop an appropriate alert posture, and to ensure authorized use of the weapon, they will also have to set up a chain of command. More importantly, preventive mechanisms will have to be put in place so that accidental or unauthorized use of the weapon does not take place.<sup>4</sup> By setting up a Command and Control system, what a country does is to essentially institutionalize its approach regarding employment, deployment of its nuclear forces, elaborating on the mechanisms, which will prevent unauthorized, inadvertent or accidental use of nuclear weapons, and thereby, ensuring authorized and verified use of nuclear weapons if and when the need arises.<sup>5</sup>

Depending on its strategic priorities, a state can institute an 'assertive control system', which emphasizes on the prevention of unwanted use of nuclear weapons, by putting into place a mechanism by which the decision to launch the nuclear weapon remains in the hands of a few top level officials. It could also

be a 'delegative' control system, which emphasizes the certainty of deliberate nuclear use under a certain set of previously determined circumstances, in which, subordinate commanders are authorised to launch nuclear weapons.<sup>6</sup>

Of the two types of control systems – assertive or delegative, it is unclear which one Pakistan is willing to adopt, as there is no official word on the subject. In either of the choices, there are risks as Peter Feaver explains that certain dilemmas are universal to both large and smaller nuclear weapon states. For instance, if the control over nuclear weapons is lax, it can increase chances of accidental launch, or deterrence can 'fail deadly', or if the control is too tight, deterrence can 'fail impotent'; it cannot prevent, in time, attack against the nuclear command and control system, and eliminates the chances of a retaliatory strike.<sup>7</sup> He also brings to light the concepts of negative and positive control. This essentially means that leaders have to choose between preventing unwanted use or assuring wanted use. If it is the former then power to launch a nuclear weapon will be in the hands of an elite few but if it is the latter, then power will be entrusted to a string of individuals.

However, based on the Pakistani conditions, several analysts argue that they will prefer a delegative control system. This is attributed to many factors – (1) Lack of geographical depth makes its nuclear assets and command structure vulnerable to an Indian attack.<sup>8</sup> Their fear is that India, with its superior strike capability, may attack the major control centres, which would reduce Pakistan's ability to retaliate; in such a situation, Pakistan would want to ensure authorised nuclear use, and a mobile nuclear command and control system.<sup>9</sup> (2) Islamabad's strategic posturing is quite aggressive in order to make up for its power asymmetry with India; therefore, Pakistan has adopted the policy of nuclear first use. (3) It is likely that with an aim to strengthen its nuclear deterrence, Pakistan will pursue an aggressive and risky posture, and adopt a delegative control system, and (4) The role of the army in Pakistan's nuclear decision-making body cannot be ignored. It plays an important role in managing the country's security forces and its command structure. A leading Pakistani analyst Z.I Cheema concluded, Even corps commanders would be involved in the decision to use nuclear weapons.<sup>10</sup> But delegative control system has risks of its own, such as the geographical proximity between the two countries, and the short flight time of delivicles. Extremist officers in the military conducting a coup and taking possession of the weapons, and the danger that field commanders could panic under stress, increases the likelihood of nuclear use.<sup>11</sup>



### **Pakistan's Case:**

Christopher Clary echoes the sentiments of many in the international community when he defines a normal day in Pakistan as one with a high level of terrorist threat, high levels of radicalism in society, and insurgencies in Pakistan's periphery (the federally administered tribal areas, the northwest frontier province and Baluchistan).<sup>12</sup> This simple yet precise definition explains the amount of threats that face Pakistan state on a normal day let alone a conflict situation, which in turn, reflects the high degree of threat to its nuclear complex.

It is, therefore, imperative that the command and control system at all times is robust and equipped to deal with any dangerous scenario. An effective command and control system is one, which contributes to the deterrent stability and exercises escalation control during a conflict situation. It also has to have built in buffers to review and confirm intelligence assessments, redundant and hardened communication channels, protection against communication interruptions, techniques to make sure communications are functioning throughout the system and procedures to ensure safe and secure nuclear weapon custody and operation of delivery systems.<sup>13</sup> It could also be defined as 'an arrangement of facilities, personnel, procedures and means of information acquisition, processing and dissemination used by a commander in planning, directing and controlling military operations'.<sup>14</sup>

Pakistan's command and control system is based on 'C4I2SR' (Command, Control, Communication, Computers, Intelligence, Information, Surveillance and Reconnaissance).<sup>15</sup> The strategic command organisation is essentially a three-tiered structure, consisting of National Command Authority (NCA), the Strategic Plans Division, and the Strategic Force Commands. The survivability of the command and control is very important as it increases stability during a crisis, additionally a more durable command and control system would go a long way toward reducing pressures on policy makers to pre-empt. Better and stronger command and control system also raises the prospect of greater integration of the services and tighter civilian control over them.<sup>16</sup>

### **Background**

In the pre-test era, as Pakistan pursued a policy of nuclear ambiguity, it is possible that it did not have a concrete command and control system in place. Its priority then was to protect Pakistan's programme from external interference. There are no authentic government source materials to indicate Islamabad's attempt to build a robust command and control structure during this period.

However, the former Army Chief of staff General Mirza Aslam Beg claimed that the Pakistani leadership realised the necessity of establishing a command structure: Given the tension, mutual mistrust and suspicion between India and Pakistan, it is dangerously tempting for each to launch an attack before being attacked, which could escalate to a nuclear level.<sup>17</sup>

However, post the test, Pakistan as an overt nuclear power began to take steps toward building a strong and efficient command structure. In 1998, the then General Jehangir Karamat appointed Maj. General Khalid Kidwai to administer the Evaluation and Research (E&R) cell and asked him to provide recommendations for a nuclear command and control system.<sup>18</sup> The E&R recommendations were complete by 1998 but their implementation was delayed due to the shift in leadership from General Karamat to General Musharraf.

However, Musharraf approved the scheme and the Army Chief submitted a draft plan to the civilian government in 1999, in which he suggested combining the Combat Development Directorate, the Operations and Plans directorate, and the command and control and intelligence directorate to form a new body called the 'Strategic Plans Division' (SPD). This new body would exercise operational, financial and security control over all other organisations and would co-ordinate all nuclear activities.<sup>19</sup> However, negotiations regarding the composition of the NCA and other bodies continued for over a year.<sup>20</sup> It was in 2000 that the National Security Council approved the creation of the NCA and SPD, and Kidwai was selected the head of the SPD and was promoted to a three star rank.<sup>21</sup> Broadly speaking, the Strategic Command Organisation in Pakistan consists of NCA, SPD and SFC.

### **National Command Authority**

The NCA consists of members from the civilian leadership as well as the army. The Chairman of the NCA is the President. The Vice Chairman is the Prime Minister, who forms a part of the civilian leadership. Before the formation of the NCA, the national military command structure had an nuclear command structure for all practical purposes.<sup>22</sup>

The NCA can be broadly divided into the 'Employment control committee' (ECC) made up of civilian members, the SPD and the 'Development Control Committee' (DCC) both under the army.<sup>23</sup> The SPD acts as the secretariat for the NCA. With NCA designated as the apex body in February 2002, Pakistan refined its Command and Control mechanism. The duties assigned were:<sup>24</sup>

- Formulating doctrine and policy regarding Pakistan's nuclear weapons and strategic assets
- Exercising development and employment overall strategic nuclear forces strategic organisations
- Safeguarding, protecting and securing Pakistan's nuclear assets
- Supervising, commanding and controlling Pakistan's nuclear assets
- Minimising and preventing any accidental or unauthorised launch of Pakistan's nuclear weapons
- Establishing a foolproof security and safety web around Pakistan's nuclear assets
- Being the sole and exclusive entity to authorise the use of Pakistan's nuclear weapons in the defence of Pakistan
- Endeavouring to improve the safety, protection and security of Pakistan's nuclear weapons
- Overseeing the organisation, management and regulation of Pakistan's nuclear assets
- Making recommendations to the government regarding any matter that may concern Pakistan's nuclear assets

It is evident, therefore, that even though there are civilian leaders involved in the system, the nuclear weapons of Pakistan are firmly under the control of the military leaders. Since the system is highly centralised, it will be very effective during a crisis as decision-making can be quick and the response time will be very low. However, in the case of a real national security threat, there will not be enough time for detailed deliberations and with the army firmly in control, there is no scope for multiple points of view to be discussed – in such a situation, the current system could easily lead to faulty decision making, which could result in heavy casualties.

Since its announcement in February 2000, the membership of the ECC has undergone significant change. The first time Musharraf talked openly about the NCA, he indicated that the head of the government would chair the NCA, when he himself was the Chief Executive. Post the 2002 October elections, however, when Zafarullah Khan Jamali became the Prime Minister, he announced that the Chair of the NCA would become the President (a post he occupied) and the vice chair would be the Prime Minister.<sup>25</sup>

It was in December 13, 2007 that Musharraf formalised these authorities and structure in the 'National Command Authority Ordinance, 2007'.<sup>26</sup> The NCA

was initially established as an administrative order, but now it has a legal basis. Analysts opine that the timing of the ordinance is in such a way that it will help to preserve the armies strong control over the system and withstand political transitions. This ordinance also addresses the issues of personnel reliability and proliferation of technical know-how. More importantly, however, it outlines the offenses that are punishable related to breach of confidentiality of leaking 'secured information' and it gives SPD the authority to investigate suspicious conduct. It also states that the punishment for these offenses can be up to 25 years imprisonment and applies to both serving and retired personnel, including the military personnel. This ordinance therefore gives Pakistani authorities more control over the strategic organisations.<sup>27</sup>

### **Employment Control Committee**

The apex ECC is chaired by the head of the government and the deputy chair of the ECC is the foreign minister. The other members include the minister for defense, minister of interior and minister of finance. It also consists of the Chairman of Joint Chiefs of Staff Committee (CJCSC), Chief of Army Staff/Vice Chief of Army Staff (COAS/VCOAS), Chief of Naval Staff (CNS), Chief of Air Staff (CAS), Secretary Director General SPD and other invited members.

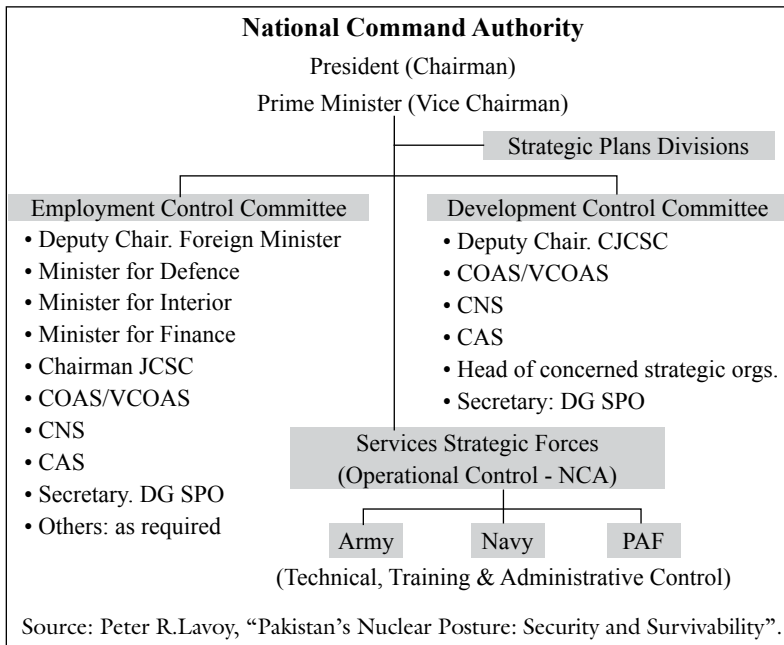
With nine members, the major responsibility of the ECC is to evaluate the existing threats to the country, decides stages of weaponisation, and makes the decision to authorise the use of nuclear weapons when the need arises. The authority of the EEC surpasses the Defence Committee of the Cabinet (DCC).<sup>28</sup>

### **Development Control Committee**

The DCC is chaired by the head of the government and the Deputy Chair of the Development Control Committee is the Chairman of CJCSC. Other members include the Chief of Army Staff, Vice Chief of Army Staff, Chief of Naval Staff, Chief of Air Staff, Heads of concerned strategic organisations, members of the scientific community and the secretary Director General SPD. The difference between the DCC and the ECC is the exclusion of the Finance Minister and inclusion of the three service chiefs.

While the ECC sets the strategic goals of the country, the DCC works towards developing and upgrading the existing nuclear forces and other strategic assets in order to meet them. The DCC also oversees the financial, administrative and technical workings of all the strategic organisations in Pakistan.<sup>29</sup>

### A flowchart representing the structure of the NCA<sup>30</sup>



### Strategic Plans Division

It comes under the purview of the JSHQ, which is headed by the CJCS. As it acts as the secretary for the NCA, it performs functions of planning and coordination in particular.

The other functions of SPD takes up on behalf of the NCA include:<sup>31</sup>

- Formulation of the country's nuclear policy, strategy and doctrine
- Formulates short and long term goals

The SPD has four primary directorates as well as a security division. The security division, which is the largest component of the SPD, consists of 9,000-10,000 personnel reporting to a two star general, and provides internal and external security for nuclear related sites. It mainly looks to protect the weapons from theft or loss of nuclear material and against infiltration of the strategic organisations by non-state actors or their sympathisers. It manages to do this through a combination of secrecy, physical security, counter intelligence teams, personnel screening programmes, procedural and technical controls.<sup>32</sup> The information about the location of the nuclear warheads and their delivery

systems are closely guarded by the SPD and is not shared with regular members of the military or intelligence services.

Although the Pakistani military relies extensively on 'secrecy' to protect their nuclear weapons against external threats, it also relies heavily on the physical security of these warheads.<sup>33</sup> These two factors often challenge each other. For instance, if a complex security system is put in place, it would be difficult to hide it from outside view. A former head of the US Department of Energy's intelligence and counter intelligence efforts, Rolf Mowatt-Larsen, explained Another precaution taken by the Pakistani military is to maintain strict secrecy over the location of storage sites and to transport and deploy weapons clandestinely rather than in convoy's that have a stronger, highly visible security profile. These security precautions produce few visible signs of movements, thereby lowering the risks associated with possible theft of or attack on weapons at their most vulnerable point, in transit.<sup>34</sup>

Kenneth Luongo and Brig. (ret'd) Naeem Salik have described a three-tier security perimeter for Pakistan's nuclear complex, all of which come under the purview of the SPD. Until the A.Q. Khan scandal, the security of the inner perimeter rested with the concerned strategic organisations, but Khan's oversight of the Khan Research Laboratory security staff was seen as a serious deficiency, and the SPD was given the responsibility of the innermost circle. The second circle of security consists of electronic sensors, fencing, cameras and security personnel. Counter intelligence teams also work to identify threats.<sup>35</sup>

Peter R Lavoy explains that a one star SPD Brigadier General oversees the counter-intelligence teams. He goes on to add, This organisation essentially coordinates with all intelligence agencies about any external threats. The Inter-Services Intelligence Directorate (ISID) forms the outermost ring of security and works closely with the security division. Prior to this, there was no formal role for the ISID in nuclear matters. Even now, the ISID director general is not a formal member of the NCA. (Reportedly, he is a regularly invited member)<sup>36</sup>

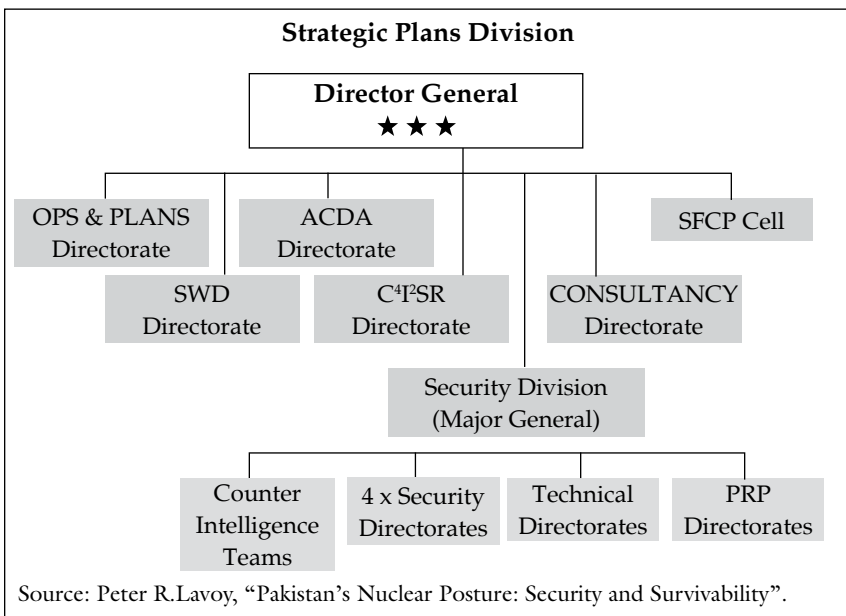
Lt. General Kidwai estimated that there are over 70,000 people who work in Pakistan's nuclear complex including 7000 to 8000 scientists among which 2,000 have 'critical knowledge'.<sup>37</sup> Even though there are rigorous measures in place to ensure security, Pakistan has to make sure that all these people are reliable. In order to filter out the unreliable from the reliable and screen members of the civilian and military forces Pakistan has established Personnel and Human reliability Programmes (PRP and HRP).<sup>38</sup> These programmes are repeated regularly every couple of years for all officials, and sometimes

randomly, and examines factors such as political views, lifestyle, friends, family, etc. The intensity of this process was evident in 2002 when all the lower-level military officers were put through this rigorous process and only five percent of them passed.<sup>39</sup>

The SPD works with the three intelligence units of Pakistan – ISID, military intelligence and the Intelligence bureau. The other directorates are:

- The operations and planning directorate
- The C4I2SR directorate
- The strategic weapons development directorate, which interfaces with and provides budgetary oversight for the nuclear weapons research and development organisations
- The arms control and disarmament affairs directorate, which provides military advice on arms control and non-proliferation negotiations

**The structure of the SPD <sup>40</sup>**



**Effectiveness of Pakistan's Command and Control architecture**

An effective robust command and control system is needed in Pakistan to maintain its credible deterrent. Pakistan's power asymmetry with India is a huge factor here, not just in terms of nuclear infrastructure but in terms of India's military and conventional forces, which are much more powerful than Pakistan.

India's thriving economy adds to this factor. With a consistently high growth, India can afford to spend more on its defence needs, whereas a country like Pakistan, faces severe financial constraints. Before the Global war on terror, Pakistani economy was in shambles. Academicians and policy makers had even begun to discuss the strategic implications for the international community of a failed Pakistani state. However, with the war Pakistan turned into a frontline state and an ally of the United States. This meant that it had also become the beneficiary of billions of dollars in the form of aid.

Despite this asymmetry, Pakistan has taken several steps to increase the credibility of their deterrent. Such as the physical dispersion of nuclear elements, command decentralization and so on. Although several structural changes have been made, especially during the post-Musharraf period, it is still not clear about how effective the system will be during a crisis and especially how sound these decisions will be, given its blurred sense of national priorities.

After a decade of the war, it is still unclear the role Pakistan would play once the US troops leave Afghanistan. Therefore, for a country with severe financial constraints, a complicated domestic political system, and above all, a wide variety of internal issues, building and more importantly, maintaining a robust nuclear complex would definitely be a challenge. Not having the capability to fund, scientists and researchers of various research organisations will also result in serious indigenous, and therefore, low cost technological constraints. Additionally, Pakistan will have to depend on other countries to acquire technology.

According to Peter Lavoy, Director of the Centre for Contemporary Conflict, the A.Q Khan Proliferation roused Pakistani command and control system in several ways. He explains that out of a strange combination of necessity and desire, the military quickly increased its influence on the country's strategic and scientific organisations, with an aim to increase coherence among the military planners, operators and scientific bodies. In the meantime, the three armed forces continued to build and train strategic forces with a great deal of secrecy and compartmentalisation.<sup>41</sup>

One of the biggest flaws in the system until then was the lack of formal oversight over the scientific organisations and the security system was arranged in such a way that it was designed to protect it from outside interference, spying and physical threats including sabotage. There was no formal apparatus that had the ability to account for shipments that came in or went out, personal travels, etc.<sup>42</sup> There was also no procedure for nuclear



material protection, control and accounting (MPC&A).<sup>43</sup> One of the fatal flaws in the system was that nuclear security and safety was considered as a highly classified national secret because it revealed the capacity and capability of the country.<sup>44</sup>

Post the A.Q Khan debacle, the security division of the SPD was enhanced. The two-star general appointed by Lt. Gen. Kidwai to head the SPD is aided by 8,000 military personnel. The separate security directorate for counter intelligence was formed, which was headed by a one-star brigadier general.

## Notes

1. David E. Sanger, (What to do about Pakistan's nuclear arsenal?), *The New York Times Magazine*, January 08, 2009
2. Kenneth Waltz, 'The Spread of Nuclear Weapons: More May Be Better,' Adelphi paper, (London: International Institute of Strategic Studies, 1981), no. 171; Jordon Seng, (Less is more: Command and Control advantages of minor nuclear states), *Security Studies*, (Philadelphia: Routledge, summer 1997), vol. 6, no. 4, pp. 50-92; David J Karl, (Proliferation Pessimism and Emerging Nuclear Powers), *International Security*, vol. 21, no. 3, (Boston: MIT Press, Winter 1996-97), pp. 87-119.
3. Peter D. Feaver, 'Proliferation Optimism and Theories of Nuclear operations', *Security Studies*, vol. 2, no. 3 & 4, (Routledge: Philadelphia, Spring/Summer 1993), pp. 159-189.
4. Bhumitra Chakma, "Pakistan's Nuclear Weapons", (New York: Routledge, 2009), p. 76.
5. Bhumitra Chakma, (Pakistan's Nuclear doctrine and command and control system: dilemmas of small nuclear forces in the second atomic age), *Security Challenges*, vol. 2, no. 2, (Australia: Kokoda Foundation, July 2006), See: <http://www.securitychallenges.org.au/ArticlePDFs/vol2no2Chakma.pdf>
6. P.D Feaver, 'Command and Control in Emerging Nuclear Nations', *International Security*, vol. 17, no. 3, (Boston: MIT Press, 1992-93), pp. 168-169.
7. n. 5, p. 160.
8. E. Emmett, 'Nuclear Stability and Arms Sales to India: Implications for US Policy', *Arms Control today*, vol. 27, no. 5, (Arms Control Association: Washington D.C, 1997), p. 7-11.
9. T.D. Hoyt, 'Pakistani Nuclear Doctrine and the Dangers of Strategic Myopia', *Asian Survey*, vol. XLI, no. 6, (University of California Press: Berkley, 2001), p. 966.
10. P. R lavoy, S. D Sagan and J. J Wirtz(eds.), "Planning the Unthinkable: How New Powers will Use Nuclear, Biological and Chemical Weapons" in Z. I. Cheema, "Pakistan's Nuclear Use Doctrine and Command and Control", (Ithaca: Cornell University Press, 2000), p. 174.

11. Pervez Hoodbhoy, (Living with the Bomb), *The Dawn*, June 06, 1998.
12. Christopher Clary, *Thinking About Pakistan's Nuclear Security in Peacetime, Crisis and War* (New Delhi: Institute for Defence Studies and Analyses, 2010), p.6
13. Rodney W Jones, "Nuclear Stability and Escalation Control in South Asia: Structural Factors", in Michael Krepons "Escalation control in south Asia", Stimson Centre, See <http://www.stimson.org/images/uploads/research-pdfs/ESCCONTROLCHAPTER2.pdf>
14. Paul Bracken, "The Command and Control of Nuclear Forces", (New Haven: Yale press, 1983), p. 3.
15. Pual K Kerr, Mary Beth Nikitin, 'Pakistans Nuclear Weapons: Proliferation and Security issues', Congressional Research Service, Feb 2010, p. 6, See: [www.fas.org/sgp/crs/nuke/RL34248.pdf](http://www.fas.org/sgp/crs/nuke/RL34248.pdf)
16. A.Z Hilali, (Pakistan's Nuclear Deterrence: Political and Strategic Dimensions), *Perception*, vol. 7, no. 3, (United Kingdom: Centre for Security Studies, Dec 2002-Feb 2003), See: <http://www.sam.gov.tr/perceptions/Volume7/Dec2002-Feb2003/PerceptionVolumeVII3AZHilali.pdf>
17. M.A. Beg, "Development and Security: Thoughts and Reflections", FRIENDS, Rawalpindi, 1994, pp. 156-157.
18. n.11, p. 11.
19. Pervez Musharraf, 'In the Line of Fire: a Memoir', (New York: Simon and Schuster, 2006), pp. 288-289.
20. n.17
21. Kenneth N.Luongo and Brig (ret'd) Naeem Salik, "Building Confidence in Pakistan's Nuclear Security," *Arms control today*, (Washington D.C.: Arms Control Association, 2007).
22. Peter R.Lavoy, Presentation on 'Pakistan's Nuclear Posture: Security and Survivability' at Non-Proliferation Policy Education Centre (NPEC) on April 28, 2006, Washington D.C., p. 12, See: [http://www.npolicy.org/article\\_file/Pakistans\\_Nuclear\\_Posture-Conference\\_on\\_Pakistans\\_Nuclear\\_Future.pdf](http://www.npolicy.org/article_file/Pakistans_Nuclear_Posture-Conference_on_Pakistans_Nuclear_Future.pdf)
23. S Chandrashekhar, Arvind Kumar and Rajaram Nagappa, "An Assessment of Pakistan's Ballistic Missile Programme: Technical and Strategic Capability", International Strategic and Security Studies Programme, (Bangalore: National Institute of Advanced Studies, 2006), p. 43.
24. "Whose hand is on the Nuclear Button in South Asia", Stimson Centre, December 2009, <http://www.stimson.org/spotlight/whose-hand-is-on-the-nuclear-button-in-south-asia/>
25. n. 21, p. 13.
26. 'President Promulgated national Command Authority Ordinance', *The Associated Press of Pakistan*, December 13, 2003.

27. n. 15.
28. M.A Naizi, "National Command Authority has Military Tinge", *Nation*, February 04, 2000.
29. n. 3, p. 76.
30. n. 24.
31. S. Chandrashekar, Arvind Kumar and Rajaram Nagappa, 'An Assessment of Pakistan's Ballistic Missile Programme, Technical and Strategic Capability', NIAS Study -2006, p. 38.
32. n.17, p. 13.
33. n.31.
34. Rolf Mowatt Larssen, (Nuclear Security in Pakistan: Reducing the Risks of Nuclear Terrorism), *Arms Control today*, (Washington D.C.:Arms Control Association, July-August 2009), See: [http://www.armscontrol.org/act/2009\\_07-08/Mowatt-Larssen](http://www.armscontrol.org/act/2009_07-08/Mowatt-Larssen)
35. Luongo and Salik, "Building confidence in Pakistan's Nuclear Security", *Arms Control today*, (Washington D.C.:Arms Control Association, December 2007), See: [http://www.armscontrol.org/act/2007\\_12/Luongo](http://www.armscontrol.org/act/2007_12/Luongo)
36. n. 21, p. 152.
37. David E. Sagner, "What to do about Pakistan's Nuclear Arsenal", *New York Times Magazine*, January 8, 2009
38. n.17, p. 14.
39. "Nuclear Safety, Nuclear Stability and Nuclear Strategy in Pakistan", *Landau Network*, Centro Volta, Como, Italy, January 2002, See, <http://www.centrovolta.it/landau/content/binary/pakistan%20Januray%202002.pdf>
40. n.21, p. 15.
41. n.21, p. 14.
42. Ibid.
43. Nathan E. Busch, *No End in Sight: the Continuing Menace of Nuclear Proliferation*, (Lexington: University of Kentucky Press, 2004).
44. Peter R lavoy and Feroz Hassan Khan, "Rogue or Responsible Nuclear Power? Making Sense of Pakistan's Nuclear Practices", *Strategic Insights*, vol. 3, no. 2, February 2004, See <http://www.nps.edu/Academics/Centers/CCC/publications/OnlineJournal/index.html>



## 4. SECURITY CONCERNS / THREATS

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*(Pakistan) It has more terrorists per square mile than anyplace else on earth, and it has a nuclear weapons programme that is growing faster than anyplace else on earth*

— Bruce Riedel<sup>1</sup>

In 2009, the international community especially the west, feared that nuclear-armed Pakistan could cave to jihadist pressures, which would result in complete state failure. It was in this context that counter insurgency expert David Kilcullen had stated, We're now reaching the point where within one to six months we could see the collapse of the Pakistani state.<sup>2</sup> He also added that the collapse of the Pakistani state would dwarf anything the world has seen so far, including the ongoing global war on terrorism.<sup>3</sup> Bruce Reidel also stressed that this threat was a real possibility; he pointed out that it would also be a 'real strategic nightmare for the US'.<sup>4</sup> Although Pakistan has become a victim of its own state's policy and faces almost daily assault, it did not collapse or fall into the hands on fundamental groups in 2009.

The A.Q. Khan network did little to restore the lost trust in Pakistan. The international community views Pakistan not as a responsible nuclear power, but as an irresponsible, untrustworthy country that not only created weapons using clandestine methods and illicit means, but transferred the technology to other states with questionable records themselves. This sentiment was echoed by Leonard Weiss, Pakistan lied, stole, and conned its way to becoming a nuclear weapons power. Now it's doing the same as a nuclear broker.<sup>5</sup>

US officials have often been questioned about their role in keeping the weapons safe and their responses have been rather similar. The president Barack Obama for one, has said that he was confident that the Pakistani military was capable of keeping the extremist elements from taking over the arsenal.<sup>6</sup> Former head of US Central Command General David Patraeus stated, With respect to the nuclear weapons and sites that are controlled by Pakistan. We have confidence in their security procedures and elements and believe that the security of those sites is adequate.<sup>7</sup> Similarly, Admiral Mike Mullen said that although the safety of Pakistan's weapons is a 'strategic concern', he was certain that with help

from the US, the military establishment of Pakistan was equipped to deal with their safety.<sup>8</sup>

Before making an attempt to understand the various security concerns and possible threats that may arise for the Nuclear Weapons in Pakistan, it is imperative to understand the sensitive locations in the country. This includes the major fuel fabrication plants, enrichment plants, reprocessing plants and the various reactors. It is also important to understand the significance of the regulatory and research and development commissions in the country and their locations.

This section provides an overview of all the important locations and their primary function. The map provided highlights some of these locations in Pakistan.

### **Nuclear Sites**

This section highlights various sites that may be deemed as sensitive to attacks. They include the locations that house various reactors and plants. In addition, it also comprises of the regulatory bodies and the research and development body that form the crux of Pakistan's nuclear programme.

### **Power reactors**

- **KANUPP:** Karachi Nuclear Power Plant is Pakistan's first nuclear power plant. It was built by Canada's General Electric in 1965, and went into operation in 1972.<sup>9</sup> It is a 137 MWE Canadian Deuterium Uranium (CANDU) Pressurised Heavy Water Reactor (PHWR) that is fuelled by natural uranium.<sup>10</sup> The facility is under the safeguards of the IAEA.<sup>11</sup> Recently, there were reports of leak in the reactor, and it has been shut indefinitely.<sup>12</sup>
- **CHASNUPP-1:** It was built by China National Nuclear Corporation (CNNC) and Pakistan Atomic Energy Commission (PAEC) in 1991. It's a 300 MWE Pressurised Water Reactor (PWR) which uses Low enriched uranium as fuel.<sup>13</sup>
- **CHASNUPP-2:** It is modelled after Chasnupp 1; CNNC and PAEC built it adjacent to the original.<sup>14</sup> This reactor is part of Pakistan's attempt to produce nuclear power for civilian purposes.<sup>15</sup>

### **Research Reactors**

- **PARR-1:** The US Supplied Pakistan Research Reactor-1 went critical in

1965<sup>16</sup>, and is a 10 MW swimming pool type research reactor that utilises low-enriched uranium.<sup>17</sup> It's located at and operated by PINSTECH.<sup>18</sup>

- **PARR-2:** The Pakistan Research Reactor 2 is a 30 KW tank in pool type research reactor<sup>19</sup> supplied by China in 1989. It's fuelled by 1 kg of highly enriched uranium, and is located at PINSTECH.<sup>20</sup>

## Fuel Fabrication

**Chashma Fuel Fabrication Plant (Kundian Nuclear Complex – 1)-KNC -1** is located near CHASNUPP-1 and CHASNUPP-2.<sup>21</sup> Ever since the Canadians stopped supplying heavy water and fuel for KANUPP, KNC-1 has been manufacturing its fuel.<sup>22</sup> The IAEA suggests that the Chashma plant has a 20-ton capacity.<sup>23</sup>

## Enrichment

**Kahuta Research Laboratories (KRL):** It's Pakistan's important uranium enrichment facility but it is not under IAEA safeguards. It was originally called the Engineering Research Laboratories (ERL) but in 1976, A.Q. Khan took control of it and renamed it as the Khan Research Laboratories in 1981.<sup>24</sup> In early 1990s, KRL was expected to be working with P-2 centrifuges and it's assumed to have produced 45-75 kg of HEU per year. Its exact enrichment capacity is unknown although it's speculated that they have been using P-3, P-4 centrifuges that would have catapulted its enrichment capacity. However, as of 2010, Pakistan is believed to have produced 2.7 tonnes of HEU from all its enrichment facilities.<sup>25</sup>

**Gadwal Uranium Enrichment Plant:** It's a secondary enrichment plant located 30 km from Islamabad where the final enrichment of uranium weapons fuel is said to take place. The facility is not under IAEA safeguards, and no further information is available. However, close to Gadwal is the Karma Air weapons complex, which designs and produces aircrafts and conventional bombs, but is also thought to have connections to nuclear arms. A suicide bomber blew himself up outside the complex injuring 5 children.<sup>26</sup> The other enrichment plants include the Golra Sharif enrichment facility, Sihala enrichment plant, and Chaklala enrichment plant.

## Heavy Water Production

- **Multan facility:** Located 400 km from Islamabad, this facility is said to have been built by the Belgian firm, Belgonucleare, in 1980.<sup>27</sup>

- **Khushab Heavy Water production facility:** This facility reportedly began operations in 1998,<sup>28</sup> and has a production capacity between 50 and 100 tons of heavy water per year.<sup>29</sup> The Khushab complex also houses Khushab-1 and Khushab-2 plutonium producing reactors. Like them, the heavy water facility is not under safeguards either.<sup>30</sup>

### **Plutonium Production**

Khushab 1, 2 and 3 produce around 50 MW Plutonium production reactor. While Khushab 1 is operated by using heavy water

### **Reprocessing Plants**

New Laboratories Reprocessing facility, Experimental reprocessing facility, and Kundian Nuclear Complex-2.

### **Regulatory Bodies**

**Pakistan Atomic Energy Commission:** Owns and operates nuclear reactors in Pakistan and oversees its research institutes. Established in 1956 its original purpose was to build nuclear energy for peaceful purposes. In 1972, President Z.A. Bhutto ordered it to produce a weapon in 5 years. PAEC conducted Pakistan's first nuclear tests in Chaghai hills in May 1998. In 2000, however, the National Command Authority and its Nuclear development complex and Pakistan national regulatory authority were created to handle nuclear policy, procurement and use. Since then the PAEC has returned to focusing on the peaceful uses of nuclear energy.<sup>31</sup>

**Pakistan Nuclear Regulatory Authority:** It was established in 2001 to replace the Pakistan Nuclear Regulatory Board. Officially, its objective is stated as, To ensure safe operation of nuclear facilities and to protect radiation workers, [the] general public and the environment from the harmful effects of radiation by formulating and implementing effective regulations and building a relationship of trust with the licensees and maintain transparency in its actions and decisions.<sup>32</sup>

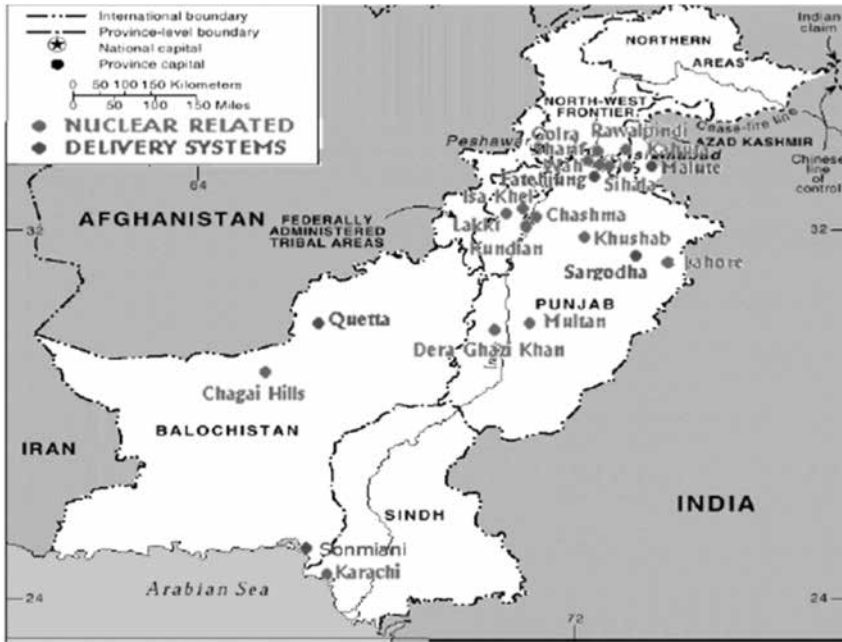
### **Research and Development**

**Pakistan's Institute of Nuclear Science and Technology (PINSTECH):** This is Pakistan's leading research and development institute; it was established mainly to address Pakistan's lack of trained manpower and scientific infrastructure.<sup>33</sup> Pakistan's PARR-1 and PARR-2 research reactors are located here.<sup>34</sup>



## Possible Targets

The maps below illustrate the locations of all the nuclear-related facilities and their delivery systems.<sup>35</sup>



## Threats to the Nuclear Arsenal

**Threat from Within the Organisation:** Employee in Pakistan's nuclear complex with access to critical knowledge abets Terrorists

The nuclear complex in Pakistan has over 70,000 personnel working in it. This includes over 8000 scientists, security personnel and administrative officials. The possibility for non-state actors to infiltrate into the complex through any of these people is not too farfetched. A US official said that various extremist groups were attempting to infiltrate the labs, and place sleepers in there.<sup>36</sup>

Another challenge is when it's time for people in the nuclear complex who had access to 'critical knowledge' to retire or leave the establishment.<sup>37</sup> Because of the sheer number of people, it becomes difficult for the state to keep track of all of them. There have been several reports of Pakistani scientists suspected of aiding or working with terrorist organisations and their leaders. One such report appeared in the New York Times. According to this report, two retired scientists from the Pakistan Atomic Energy Commission – Chaudry Abdul Majeed and

Sultan Bashiruddin Mahmood – met with al Qaeda leader Osama Bin Laden in 2001.<sup>38</sup>

Rajesh M. Basrur, a specialist in international security relations and Hasan-Askari Rizvi, a political and defense analyst, co-authors of 'Nuclear Terrorism and South Asia', responded to this by arguing that it is not possible for radical groups to overwhelm the Pakistan military or intelligence authorities by infiltrating the system. They point out that radical Islamic groups are not a united or monolithic movement. Rather, these groups diverge significantly because of 'denominational differences and personality clashes'.<sup>39</sup> They assert that the internal structure within the Pakistani military is such that its workers are taken care of after they retire, thereby weeding out any links with extremist elements. They claim that the military strictly monitors the reliability of senior officers, and they are forbidden from developing links to leaders or political groups who engage in religio-political activism.<sup>40</sup>

### **Terrorists Attempting to Steal Nuclear Material or Technology**

The nuclear weapons also face serious threats from external forces. There is concern over the fact that terrorists groups could attempt to penetrate the security and seize sensitive material. Recent events such as the attack on Pakistan's Naval base in May 2011 where two naval maritime surveillance aircrafts P3-C Orion were destroyed by non-state actors only legitimises the concern.<sup>41</sup> In November 2007, a suicide bomber attacked a bus carrying personnel to the Sargodha Air force (which houses nuclear weapon deliverable F-16s), killing seven PAF officers and three civilians.<sup>42</sup>

Several other attacks have been carried out in the periphery of the complexes, outside the purview of security. The most worrisome attack however took place outside the Pakistan Ordnance factories compound at Wah on August 2008 where two militants walked on foot of the facility and detonated their devices at the entrances to the facility, which employs over 20,000 people. The fact that the Wah facility is one of most important sites for assembling nuclear weapons<sup>43</sup> and Pakistani Taliban claimed responsibility<sup>44</sup> for the attack makes it a serious issue.

### **Loss of Control Over Nuclear Weapons Due to Political Instability (Increased Tensions Between Power Between Military and Political Leadership)**

Pakistan unlike other countries does not have one power centre. It has multiple power centres, which are all fighting against each other to gain

legitimacy and come to power. There have been coups orchestrated by the army to oust a political leader. There are fears that extremists within the establishment can seize control of the nuclear arsenal by staging another coup. There is also fear of infighting within the military and the political infrastructure. In a report issued by the Pakistan Policy Working Group, an independent bipartisan group of American experts on US-Pakistan relations, titled 'The next chapter: The US and Pakistan', suggested that there was an urgent need to strengthen Pakistan's democratic process and empower the people because a disillusioned public will create opportunities for extremist groups to flourish. This, however, would lead to political fragmentation within the military, which would result in the security of Pakistan's nuclear arsenal being seriously undermined.<sup>45</sup>

However, Zafar Ali, a Lieutenant Colonel with the Pakistan Army who works in SPD, explains why it is unlikely that extremists in the military establishment will seize control of Pakistan's nuclear arsenal in a coup. Ali argues that even if a coup overthrew the current government, it would be over-throwing the regime to gain power, not to seize nuclear weapons. Therefore, the institutional mechanisms already established will continue to be relevant irrespective of who is in power.<sup>46</sup> He goes on to add that there have been no reports or attempts made by the terrorists to steal any nuclear or radioactive materials in Pakistan. This is however not true. As Professor Matthew Bunn of Harvard University's John F. Kennedy School of Government explains, there have been attacks near the Sargodha air base and the Wah cantonment, which are believed to be storage sites for the nuclear arsenal.<sup>47</sup>

Another fear along the same lines is Islamist takeover when the government in power collapses or if they themselves stand for elections and wins them through a democratic electoral process. According to the International Crisis Group, Poll after poll has found that if fair and free elections were held under constitutional protections and monitors by national and international observers, the result would be a moderate, pro-western, anti-extremists government in Pakistan.<sup>48</sup> Extremist Islamist parties have never won more than 11 per cent of the total votes in a Pakistani election.<sup>49</sup> There is also serious doubt regarding the reliability of the Pakistani military, given the ethnic diversity that exists within the structure of the military. In recent decades the military in Pakistan has become ethnically diverse over the years, with Baluch, Pashtuns, Punjabis and Sindhis joining the forces. This raises the doubt about the growing factionalism among them.<sup>50</sup>

Although the command and control system is designed in such a way that the control over the nuclear assets is distributed among various members of the military and political establishment, it has been speculated that the assassination of top leaders could lead to a temporary loss of control. For instance, President Musharraf was targeted multiple times, although all the attempts were unsuccessful.

### **Non-State Actors and the Threat to Nuclear Weapons**

The threat posed by non-state actors is no longer local, but global in nature. The rise of non-state actors over the past few decades however can be traced back to the assistance they received from states. It is a well known fact that during the 1980s Afghan war the US and Saudi Arabia were arming and aiding the anti – soviet fighters through Pakistan's ISI (Inter-Service Intelligence) agency. Although these fighters carried out the holy war against the Soviets, now they have directed themselves towards the west and other issues such as Jammu and Kashmir. LeT was established as a Pakistan based Islamic fundamentalist organisation that characterizes itself as fighters of the holy war. They have tremendous support and like other Islamic groups, receive funds through criminal activities, charity organisations, donations via the internet<sup>51</sup> and in some cases even legitimate businesses. These organisations not only create havoc in other countries, but they create instability within Pakistan.

Another major concern is that these groups look to expand their influence and recruit more youngsters for the cause. The terrorists therefore have infiltrated into the mainstream Pakistani society and this complicates the nature of terrorism itself. This was evident in the aftermath of the August 2010 floods in Pakistan, which caused widespread devastation. Marisa Porges, a *former fellow at the Council on Foreign Relations and policy adviser in both the US Defense and Treasury departments, cited how Pakistani terrorist groups were: All too eager to aid flood victims in an effort to use social services to expand their influence.*<sup>52</sup> Porges also quoted a Pakistani Interior Minister remarking that the charities run by Islamic militant groups were the 'lifeline of [Pakistani] rescue and relief work'.<sup>53</sup> The most influential militant groups in Pakistan have charity and political wings, such as LeT's Falah-i-Insaniat and Jamaat-ud-Dawa. These charities of extremists have undertaken relief efforts in areas where government support has been lacking.<sup>54</sup> The US Congressional Research Service noted

that by ‘providing food, shelter, and other benefits to desperate victims, such organisations [LeT] may win sympathy and even (additional) future support from affected residents’.<sup>55</sup>

The level of infiltration of the Pakistani establishment itself is a matter of debate. According to many, there are sympathisers of the fundamentalist causes even in the higher rungs of the army. This concern was amplified when it was seen that Pakistan was providing refuge to Osama Bin Laden in the elite town outside of Abbottabad. Though the Pakistani government denies knowledge of Bin Laden’s existence, only the military had a right to occupy the town he was captured in. The military was extremely protective of this land, and is even known to be reluctant to allow Pakistani air force officers to live in the area. Therefore, the decision to give Osama bin Laden a compound was not casual.<sup>56</sup>

Today, there are over 40 terrorist groups operating within Pakistan that have challenged and weakened the Pakistani State. Studies show that there has been a significant upsurge in violence in Pakistan – suicide bombings have increased from two in 2002 to eighty nine in 2009. In addition to this, The Taliban, Al-qa’ida and foreign Jihadis have effective control over the mountainous, semi-autonomous Federally Administered Tribal Areas (FATA).<sup>57</sup>

As the previous chapter pointed out, fundamentalist organisations have attempted to target various nuclear related facilities, which prove that they are looking to acquire fissile material. Although they will not be able to launch a full scale nuclear attack, as it requires a lot of other factors other than just fissile material such as missiles and delivery systems, the nuclear material could be used for the manufacture of ‘dirty bombs’.

A dirty bomb is a radiological dispersal device or a conventional explosive, which disperses radioactive material when detonated. This is entirely different from a nuclear bomb, as it does not involve a nuclear explosion. This type of bomb is often said to be more plausible in case of nuclear terrorism as low level radioactive sources are easily available. There are various radioactive sources for medical and industrial uses, however most of them decay fast and are low level. Attacks on nuclear facilities, such as nuclear reactors, could bring about serious disruptions, large economic loss and adverse health impacts. An attack on one of these facilities could lead to a massive release of radioactive material.<sup>58</sup>

According to Chamn Braun of Stanford University, there are several security threats associated with Pakistan’s nuclear plants expansion plans. These

plants are a symbol of national prestige and therefore make excellent targets. Additionally, an attack on these plants can stop the generation of power, which will inflict damage on national electricity supply which can lead to large scale economic repercussions. The threats highlighted are:<sup>59</sup>

- **Protection of Spent Fuel Storage Pools:** There is going to be significant spent fuel accumulation in power reactors such as CHASNUPP and KANNUP. These need to be very closely monitored and protected.
- **Fissile Material Diversion from Nuclear Power Stations:** A multi-unit nuclear power station will include large stocks of spent fuel in storage pools, fresh fuel supplies, radioactive sources, shielded containers etc. Therefore, these stations pose as attractive targets to prospective attackers. Additionally, Staff working in these stations could possibly be coerced or may abet terrorist plans to attack the station.
- **Terrorists Could Attack, Seize, and Take Over These Nuclear Stations:** Analysts opine that terrorists' motivation to attack these stations could possibly be stronger than the motivation of the force protecting it. Terrorists may like to take over the plant during a period of political instability or regime change or to use as a bargaining tool in order to blackmail the government.
- **Using a Means of Transport to Attack Station:** An airplane or truck bombs can be used as weapons to attack these stations as it will cause considerable damage to property and life due to huge radioactive releases.

A large part of the Pakistani population, including members of the armed forces, is hostile to the US, and they sympathise with the fundamentalists causes. A former Clinton administration Energy Department official had said that before September 11, Pakistan had requested assistance from the US to improve the physical protection of both its military and civilian nuclear facilities.<sup>60</sup>

### Attacks So Far

Year	Target	Nuclear safety compromised?	Type of attack
<b>November 2007</b>	Pakistan Air Force facility- Sargodha Air Force	Yes – home to 2 Pakistani F-16 squadrons	Suicide Bomber
<b>December 2007</b>	Kamra Air Force Base	Yes-Possible storage site for nuclear material – Houses Mirage V	Suicide bomber
<b>August 2008</b>	Pakistan Ordnance Factory - Wah	Yes-Considered to be an assembly site for Pakistan’s nuclear weapons	Suicide Bombers
<b>July 2009</b>	Khan Research Laboratories personnel	Possible- lab focuses on Uranium enrichment- But attack was not on KRL but its personnel	Suicide Bomber
<b>October 2009</b>	Pakistan Army General HQ	No – but proved that determined militants were able to breach GHQ security	Gunmen penetrated security using deceptive means – Took hostages
<b>May 2011</b>	PNS Mehran	Possibly - 15 miles away from Masroor Air Base- believed to be a depot of nuclear weapons	Group of militants – resulted in gun battle that lasted several hours

### Security Arrangements for the Protection of Nuclear Arsenal

Malik Qasim Mustafa, a research fellow at the Institute of Strategic Studies explains the physical security of Pakistan’s nuclear arsenal. It is protected by a multi-layered system, which includes no fly zones, fencing of structures, close circuit cameras, sensors, check posts, and counter-intelligence teams to identify any threat to nuclear installations; all warheads are equipped with Permissive Action Links (PALs).<sup>61</sup>

In addition to these, the other measures adopted are:

#### Nuclear Warheads are Disassembled

Pakistan’s delivery systems comprise of aircrafts or surface-to-surface missiles. The weapons are believed to be kept separate from their delivery systems, with

the nuclear cores removed from their detonators. It has also been claimed by many analysts that the weapons themselves have been scattered at up to six separate locations. Therefore, the exact number of weapons storage sites cannot confidently be ascertained.

As they have been disassembled, questions were raised about the credibility of deterrence. At this point Gen. Khalid Kidwai who is the head of SPD has stated that the weapons could be assembled very quickly. In the words of Harvard expert Matthew Bunn in an event of threat by an outside force they would have to 'knock over two buildings to get a complete bomb'. This essentially means that triggers and warheads are stored separately.

It is unclear whether Pakistan applies the two man rule or the three man rule, in reference to the number of people in the line of command during a crisis. It is also unclear how these people receive their information. Some Pakistani analysts have suggested a two man rule which could turn into a three man rule in the event of a crisis. Brig. Feroz Hassan Khan suggests that the 'three men' could refer to the missile launch team commander, a representative from the Strategic Plans Division and the head technician from the strategic organisations.<sup>62</sup> In 2006 Lt. General Kidwai stated that Pakistan employed 'the functional equivalent of a two man rule and permissive action links'.<sup>63</sup>

### **Material Protection, Control and Accounting (MPC&A)**

Since 1998 the SPD has been responsible for conducting external audits on all nuclear inventories. In addition to the systematic processes in place, it also conducts surprise inspections at these facilities. Four of Pakistan's nuclear facilities, the Karachi and Chashma-1 and the Pakistan Atomic Research Reactors I and II (PARR I & II), operate under IAEA safeguards. However, several key nuclear weapons related facilities are not subject to the safeguards such as the Khan Research Laboratory, which produces weapons grade Uranium and other enrichment plants situated at Golra, Sihala and Gadwal.<sup>64</sup>

However, the Pakistani government has not officially acknowledged the existence of these facilities, and it does not provide them on the list they provide to India on a yearly basis. Plutonium producing facilities such as the Khushab research reactor which is estimated to have a capacity of about 50-megawatts are not subject to safeguards, although analysts suggest that the amount of Plutonium it produces is sufficient for a few nuclear weapons every year.<sup>65</sup>



The A.Q. Khan proliferation episode also brought up the issue of lack of MPC&A, which the SPD has addressed with regular and surprise checks which help keep the system more transparent.<sup>66</sup>

### **Personnel Reliability Program (PRP)**

Although a security and screening process existed earlier for individuals employed in the strategic organisations, it has now been made very comprehensive with the introduction of the personnel reliability programme. This programme covers all the individuals who have access to critical knowledge and work in the sensitive areas of the complex. Since 2001, the personnel system has been strengthened and integrated into the establishment. Individuals assigned to a sensitive task have to undergo a rigorous security process which requires clearance by the Inter services intelligence, intelligence bureau, military intelligence and the Strategic Plans Division. After the initial screening there are also periodic and random checks, not only on the individual but his family, acquaintances etc. The key concern, however, is the status of the retired scientific personnel who need to be monitored or reemployed in other areas of their expertise.<sup>67</sup>

### **Sensitive Facility Perimeter Security**

Perimeter security is vital for all kinds of nuclear installations whether civilian or military in nature. The central responsibility of the physical protection of the nuclear facilities is with the Strategic Plans Division. There is a multi-layered approach to securing the perimeter:<sup>68</sup>

**Inner Perimeter:** The security of the inner perimeter is usually taken care of by the respective organisations, but their security is now overseen by the elements of the Strategic Plans Division. The forces of the SPD receive special training as compared to the normal forces. Certain facilities which are very important are also protected by air defence elements. In some cases the area is guarded off completely and designated as no-fly zones.

**Outer Perimeter:** There are new technologies such as electronic sensors, close circuit camera's guarding the outside. There is also heavy fencing along the perimeter. There is also a third tier of security. This is made up of counter-intelligence teams that work on identifying external threats to the facilities.

### **Security During Transportation**

Another risk that has been identified is during the transportation of the warheads. Although warheads are highly protected while transporting from one location to another, they are still open to threats and an attack en route. A recent media report on a leading Indian daily showed that Pakistan was transporting nuclear material and weapons in unsafe vans. According to the report, as the Pakistani establishment was fearful of a surprise US raid, following the Abbottabad incident, Pakistan has been 'shuffling its nuclear arsenal frequently in low security vans on congested roads', thereby, making them more vulnerable to theft.<sup>69</sup>

The task of defending and protecting nuclear material is very complex, but it is even trickier when materials such as spent nuclear fuel and high activity radioactive sources are in transit. The key concern is that armour-piercing weapons could be used to penetrate transportation containers, which will result in a large amount of radioactive materials released into the environment. As a solution to this, Pakistani officials are planning to acquire specialised vehicles that can protect the material in the time of a sabotage attack. It is perhaps for this reason that Pakistan has signed the Convention on the Physical Protection of Nuclear Materials (CPPNM) in October 2000. This convention essentially covers domestic and international transportation of nuclear materials.

### **Permissive Action Links (PAL's)**

Although Pakistan has put in place very stringent personnel screening mechanisms it has adopted certain procedural safeguards which ensures that access to sensitive nuclear materials is restricted.

Earlier known as 'Prohibited Action Link' refers to a cryptographic combination lock on nuclear weapons which will prevent unauthorised use by ill-intending terrorists or other actors. Originally PALs were electromechanical in nature. The newer models are microprocessor based, although they still contain a mechanical component.<sup>70</sup> The codes usually consist of six to twelve digits and if too many codes are entered, the weapon will disable by itself.<sup>71</sup>

Originally Pakistani nuclear weapons were not equipped with PALs but in an interview to a private TV channel, Samar Mubarakmand, one of Pakistan's top nuclear officials claimed that each Pakistani warhead is now fitted with a code-lock device. General Kidwai has also gone on record to officially confirm the employment of PALs in November 2006.<sup>72</sup>

## Role of the US

Hillary Clinton's recent statement that 'Pakistan cannot keep a mad animal in its backyard and expect it to only attack its neighbour' – highlights how Pakistan's nuclear weapons are a question of national security concern to not only countries in the region but also the US. The role of the US in securing Pakistan's weapons is elaborate. The US officials have often talked about this, for instance Admiral Mike Mullen in 2009 stated that the US had invested a fairly large amount and has worked with Pakistani officials to improve the security of nuclear weapons and that he was satisfied with its progress.<sup>73</sup>

The New York Times reported that the US had transferred around \$100 million to Pakistan – the amount hidden in the depths of the federal budget was spent on training Pakistani personnel in the United States, providing equipment from night vision goggles to nuclear detention equipment and the construction of a nuclear security training centre in Pakistan.<sup>74</sup> The same article mentions that the US did not share PALs with Pakistan due to legal limitations and the Pakistanis themselves were open to help from the US in the training front but were apprehensive about using US technology as it may include a 'kill switch', which could give the Americans the power to disable the weapon.

Pakistan has been voicing its disagreement with the Indo-US nuclear deal from the time of its inception. It has also been signalling to the US for a similar deal, a demand that Washington has turned down.<sup>75</sup> In 2008 it pushed for a criteria-based exemption in the rules of the NSG instead of a country-based exception, so as to enable itself to a similar deal. Pakistan sought 'non-discriminatory access' to civilian nuclear technology, while also offering nuclear fuel cycle services under IAEA safeguards to the international community, during the nuclear Security Summit in Washington in April 2010.<sup>76</sup>

## Conclusion

The debate on the safety and security of Pakistan's nuclear arsenal is not new. Academicians and policy makers worldwide have been intrigued by the subject and have been offering very differing views on it. None of these views can however be completely accurate as the amount of information made available is very little and therefore a lot of factors are open to speculation. For instance Bruce Riedel, a senior fellow at the Caban Center for Middle East Policy in the Brookings Institution, argues that the extent of oversight administered by authorities is unclear to outsiders.<sup>77</sup> He emphasises this point by highlighting how Pakistan military's personnel assessments are a critical factor in determining

the security of nuclear arsenal but the process of selection of these personnel remain vague and unclear.<sup>78</sup>

Therefore, it's not possible to come to a definite conclusion. Although a lot of structural changes have been made, including the introduction of the personnel reliability programmes, one has to differentiate between Pakistani claims and the truth. For instance one study pointed out that the rigorous PRP method was employed in 2005 but only 5 per cent of the personnel in the complex passed the test. With the public opinion strongly turning against the army and political leadership, due to corruption, inefficiency among other factors – loyalty from its people cannot be counted upon. Instead they may choose to abet fundamental organisations who seem to provide better solutions.

This point of view is highlighted by Prof. Mathew Bunn of Harvard, who challenges the view that Pakistan's nuclear arsenal is secure, by referring to the pervasive and deeply ingrained corruption that exists in Pakistan society, which according to him, could create prospects for insider recruitment. This view is shared by Graham. T Allison, a professor at Harvard and former Pentagon assistant defense secretary, who refers to Pakistan as a 'nuclear time bomb'. He explains this point by referring to the fact that there was two assassination attempts on Musharraf by members of his own security unit some of who had cooperated with members of al-Qaida. Allison raises the question as to why he should believe that nuclear weapons in Pakistan are more secure then the president himself.<sup>79</sup>

To add to the internal disorder, there exists sectarian violence between Punjabi's and Sindhi's, Sunni's and Shia (particularly in Karachi) and violence among armed insurgents in Baluchistan. Large scale drugs production and their use coupled with large scale unregistered weapons supplies do not make the internal security situation look promising. Given that there are a large number of non-state actors operating in the region, that are influencing larger amounts of people, there is a very serious threat to Pakistan's nuclear arsenal.

Pakistan's nuclear weapons face several challenges during Peacetime. The most easily perceivable of them are nuclear accidents, whereby an individual inadvertently or accidentally launches a nuclear device. Although such an event is highly unlikely, it cannot be completely ignored. Christopher Clary, a Fellow of the Council on Foreign Relations, explains that the risks that face during a period of unrest or peace are very high. He argues that there is evidence to prove that during peacetime storage sites have separated the warheads from their delivery vehicles.<sup>80</sup> Conversely, as Paul K. Kerr and Mary Beth Nikitin, both analysts

in the field of non-proliferation, pointed out in their US Congressional report Pakistan's Nuclear Weapons: Proliferation and Security Issues, whether the nuclear warheads are stored separately from delivery vehicles remain unclear.<sup>81</sup> While Kerr and Nikitin recognise that separate storage may protect against accidental launch or theft of a fully assembled weapon, it could also be even easier for unauthorized people to remove a weapon's fissile material core when it is disassembled.<sup>82</sup>

It may be argued that every country that possesses nuclear weapons faces threats of a unique nature. In the case of Pakistan however, there exists a variety of such threat in an environment that is conducive for them to thrive. These consist of a complicated and dangerous mix of a very high threat level (one of the highest in the world), inexperienced military and army personnel who all risk being influenced by an ideology, coupled with the lack of resources to maintain a high alert and a robust security system at all times. As a state, the lack of morality in its national psyche is another factor. Two instances from modern history add credibility to this statement. Firstly, the A.Q. Khan proliferation scandal is an important example of the irresponsible behaviour of many top people in the state. Secondly, housing Osama Bin Laden in a military compound, one of the most high profile and secured areas in the country, deeply questions the true intentions of Pakistan's leaders. The explanation that 'they were not aware' only takes away any remaining confidence in their system. As Pakistan is a state that lacks a national consciousness, is driven by a questionable set of priorities and is riddled with several deep socio-economic, political and economic issues of varying degrees, it is safe to assume that the security of Pakistan's nuclear weapons is a matter of international concern.

## Notes

1. Bruce Reidel, "Armageddon in Islamabad," *The National Interest*, (United States: Routledge, July-August 2009), See: <http://nationalinterest.org/article/armageddon-in-islamabad-3148>
2. Carlos Lozada, (A conversation with David Kilcullen), *The Washington Post*, March 22, 2009, See: <http://www.cnas.org/node/793>
3. Paul McGeough, (Warning that Pakistan is in danger of collapse within months), *Sydney Morning Herald*, April 13, 2009, See: <http://www.smh.com.au/world/warning-that-pakistan-is-in-danger-of-collapse-within-months-20090412-a40u.html>
4. David E Sagner, (Pakistan Overshadows Afghanistan on US agenda), *The New York Times*, May 06, 2009, See: <http://www.nytimes.com/2009/05/06/us/politics/05web-sanger.html>

5. Leonard Weiss, "Pakistan: Its Déjà Vu all over again", *Bulletin of the Atomic Scientists*, vol. 60, no. 3, May/June 2004, pp. 52-59.
6. John Meacham, (A highly logical approach: A conversation with Barack Obama), *Newsweek*, May 16, 2009, <http://www.newsweek.com/id/197891>
7. General David Patraeus, "Interview with Chris Wallace", *Fox news*, Sunday, May 10, 2009.
8. Admiral Mike Mullen, "Defense Department Briefing transcript", *Federal News Service*, May 04, 2009.
9. International Atomic Energy Agency, "Pakistan," *IAEA Country Nuclear Profiles*, 2009 Edition, <http://pub.iaea.org>
10. Pakistan Atomic Energy Commission, "Karachi Nuclear Power Plant (KANUPP)," [www.paec.gov.pk](http://www.paec.gov.pk)
11. International Atomic Energy Agency, "Status List: Conclusion of Safeguards Agreements, Additional Protocols and Small Quantities Protocols," March 04, 2011, [www.iaea.org](http://www.iaea.org).
12. (Kanupp's fate), *The Dawn*, October 22, 2011, See: <http://www.dawn.com/2011/10/22/kanupps-fate.html>
13. Pakistan Atomic Energy Commission, "Chashma Nuclear Power Plant-1 (CHASNUPP-1)," [www.paec.gov.pk](http://www.paec.gov.pk)
14. Pakistan Nuclear Regulatory Authority, "CHASNUPP-2," [www.pnra.org](http://www.pnra.org)
15. Chris Schneidmiller, (IAEA Board Sets Plan for Monitoring New Pakistani Nuclear Reactors), NTI Global Security Newswire, (Washington D.C.: Nuclear Threat Initiative, March 09, 2011), See: [http://gsn.nti.org/gsn/nw\\_20110309\\_3024.php](http://gsn.nti.org/gsn/nw_20110309_3024.php)
16. P.L. Bholra, *Pakistan's Nuclear Policy* (New Delhi: Sterling Publishers Private Limited, 1993), p. 27.
17. *Global Fissile Material Report 2010*, International Panel on Fissile Materials, December 2010, See: [http://www.fissilematerials.org/ipfm/site\\_down/gfmr10.pdf](http://www.fissilematerials.org/ipfm/site_down/gfmr10.pdf)
18. Pakistan Atomic Energy Commission, "PINSTECH Facility: Irradiation Facilities," [www.paec.gov.pk/pinstech](http://www.paec.gov.pk/pinstech)
19. Pakistan Nuclear Regulatory Authority, "PARR-1," [www.pnra.org](http://www.pnra.org)
20. David Albright, Mark Hibbs, "China and Pakistan Collaborate on PARR-2," *Nuclear Engineering International*, December 1990, pp. 46-47.
21. David Albright, Paul Brannan, "Chashma Nuclear Site in Pakistan with Possible Reprocessing Plant," Institute for Science and International Security, 18 January 2007, See <http://www.isis-online.org/publications/southasia/chashma.pdf>
22. n.18.
23. International Atomic Energy Agency, *Country Nuclear Fuel Cycle Profiles*, Second Edition, IAEA Technical Reports Series, no. 425, 2005, pp. 63-65.

24. Discussion with Mark Fitzpatrick in Council on Foreign Relations, May 2007 on *Nuclear Black Markets: Pakistan, A.Q. Khan and the Rise of Proliferation Networks*, (London: International Institute for Strategic Studies, 2007), See: <http://www.cfr.org/pakistan/nuclear-black-markets-pakistan-q-khan-rise-proliferation-networks-rush-transcript-federal-news-service/p13308>
25. Ibid.
26. Jonathan S. Landay, (Despite Taliban turmoil, Pakistan expands nuke plants), *McClatchy Newspapers*, May 01, 2009, See <http://www.mcclatchydc.com/2009/05/01/67379/despite-taliban-turmoil-pakistan.html>
27. n. 25.
28. n. 25.
29. Simon Beck, (Chinese heavy water linked to military plutonium-processing plant), *South China Morning Post* (Hong Kong), May 16, 1998.
30. "Analysis of IKONOS Imagery of the Newly-Identified Heavy Water Plant at Khushab, Pakistan," Institute for Science and International Security, 16 March 2000, See: <http://isis-online.org/isis-reports/detail/analysis-of-ikonos-imagery-of-the-newly-identified-heavy-water-plant-at-khu/12>
31. n. 25.
32. Pakistan Nuclear Regulatory Authority, [www.pnra.org](http://www.pnra.org)
33. Pakistan Atomic Energy Commission, "Pakistan Institute of Nuclear Sciences and Technology," [www.paec.gov.pk/pinotech](http://www.paec.gov.pk/pinotech)
34. David Albright and Paul Brannan, "Pakistan Expanding Plutonium Separation Facility Near Rawalpindi," Institute for Science and International Security, May 19, 2009, See [http://isis-online.org/uploads/isis-reports/documents/PakistanExpandingNewLabs\\_19May2009.pdf](http://isis-online.org/uploads/isis-reports/documents/PakistanExpandingNewLabs_19May2009.pdf)
35. Chaim Braun, Presentation on: 'The Pakistan Nuclear Power Program-Security and Safety Issues', Washington D.C, April 2006, See: [http://www.npolicy.org/article\\_file/The\\_Pakistani\\_Nuclear\\_Power\\_Program-Security\\_and\\_Safety\\_Issues.pdf](http://www.npolicy.org/article_file/The_Pakistani_Nuclear_Power_Program-Security_and_Safety_Issues.pdf)
36. David E.Sanger, (Obama's worst Pakistan nightmare), *The New York Times*, January 08, 2009, See: <http://www.nytimes.com/2009/01/11/magazine/11pakistan-t.html?pagewanted=all>
37. Luongo and Salik, "Building confidence in Pakistan's Nuclear Security", *Arms Control Today*, (Washington D.C.: Arms Control Association, 2007), See: [http://www.armscontrol.org/act/2007\\_12/Luongo](http://www.armscontrol.org/act/2007_12/Luongo)
38. Douglas Frantz, David Rohde, (2 Pakistanis linked to Papers on Anthrax Weapons), *The New York Times*, November 28, 2001, See: <http://www.nytimes.com/2001/11/28/international/asia/28BALL.html?todayshdlines>

39. Rajesh M. Basrur, Hasan-Askari Rizvi, Nuclear Terrorism and South Asia, (United States: Sandia National Laboratories, 2003) , no. 25, See: <http://www.cmc.sandia.gov/cmcpapers/sand98-050525.pdf>
40. Ibid.
41. (Ten Pakistani troops killed in gun battle at naval base), *CNN World Report*, [http://articles.cnn.com/2011-05-23/world/pakistan.base.attack\\_1\\_pakistani-troops-pakistani-security-forces-naval-base?\\_s=PM:WORLD](http://articles.cnn.com/2011-05-23/world/pakistan.base.attack_1_pakistani-troops-pakistani-security-forces-naval-base?_s=PM:WORLD)
42. Sajjad Abbas Niazi, (Seven PAF officers among 11 dead in suicide attack), *The Dawn*, November 2007, See <http://archives.dawn.com/2007/11/02/top2.htm>
43. “Wah – Pakistan Special weapons facilities”, Global Security, See <http://www.globalsecurity.org/wmd/world/pakistan/wah.htm>
44. Shakeel Anjum, (70 killed as suicide bombers [attack wah]), *The News International*, Pakistan, August 22, 2008.
45. Policy Working Group, The Next Chapter: The United States and Pakistan (2008).See: [www.cfr.org/content/.../PakistanPolicyWorkingGroupReport.pdf](http://www.cfr.org/content/.../PakistanPolicyWorkingGroupReport.pdf)
46. Ali Zafar, Pakistan’s Nuclear Assets and Threats of Terrorism: How Grave Is the Danger? (Columbia: The Henry L. Stimson Center, 2007).
47. Matthew Bunn, Securing the Bomb 2010 (Columbia: Harvard Kennedy School, 2010). See: [www.nti.org/e\\_research/securing\\_the\\_bomb08.pdf](http://www.nti.org/e_research/securing_the_bomb08.pdf)
48. Thomas R. Pickering, Carla Hills and Morton Abramowitz, (The Answer in Pakistan), *The Washington Post*, November 14, 2007.
49. Trudy Rubin, (Worldview: Musharraf’s Dangerous Aim), *The Philadelphia Inquirer*, November 07, 2007.
50. n. 52.
51. Jessica Stern, (Pakistan’s Jihad Culture), *Foreign Affairs*, (United States: Council on foreign relations, 2000), vol. 79, no. 6, See <http://www.foreignaffairs.com/articles/56633/jessica-stern/pakistans-jihad-culture>
52. Marisa Porges, (Terrorists Capitalize on Pakistan’s Floods), *The Wall Street Journal*, August 18, 2010.
53. Ibid.
54. K. Alan Kronstadt; Pervaze Sheikh; Bruce Vaughn, Flooding in Pakistan: Overview and Issues for Congress (Congressional Research Service, 2010)., See: <http://www.fas.org/sgp/crs/row/R41424.pdf>
55. Ibid.
56. Jasjit Singh, Indian Air Commodore and Director of Centre for Air power Studies, lecture at Manipal University, May 2011.
57. Ryan Costello, ‘Threat Convergence in Pakistan: Countering Terrorist Aspirations



- and Improving Nuclear Security', The Fund for Peace, 2006, p. 12, See: <http://www.fundforpeace.org/global/library/cr-11-01-tc-threatconvergence-pakistan-1104a.pdf>
58. 'Understanding nuclear terrorism', Center for International Security and Cooperation, Institute of International Studies, Stanford university, See: <http://cisac.stanford.edu/nuclearterrorism/index.html>
59. n. 40.
60. "Pakistan's Nuclear Dilemma", Carnegie Endowment for International Peace, Non-Proliferation Project Roundtable, October 02, 2001
61. Malik Qasim Mustafa, Are Pakistan's Nuclear Weapons Safe? (Islamabad: Institute of Strategic Studies), See: [http://www.issi.org.pk/old-site/ss\\_Detail.php?dataId=510](http://www.issi.org.pk/old-site/ss_Detail.php?dataId=510)
62. Martin Schram, (*Avoiding Armagaddon: Our Future Our Choice*), (New York: Basic books, 2003), p. 54.
63. n. 69.
64. Ibid.
65. Joseph Cirincione, Jon B. Wolfsthal and Miriam Rajkumar, "Deadly Arsenals: Tracking Weapons of Mass Destruction", (Washington D.C.: Carnegie Endowment for International Peace, 2002).
66. Pervez Hoodbhoy, (A state of denial: Pakistan's nuclear threat), International Herald Tribune, January 17, 2008.
67. n. 52.
68. n. 52.
69. (Pakistan shifting nukes in 'unsafe' vans), *The Times of India*, November 06, 2011, See: <http://timesofindia.indiatimes.com/world/pakistan/Pakistan-shifting-nukes-in-unsafe-vans/articleshow/10626412.cms>
70. Steven M. Bellovin, "Permissive action Links, Nuclear Weapons and the Prehistory of Public Key Cryptography", Columbia University, See <https://www.cs.columbia.edu/~smb/classes/f08/122.pdf>
71. Ibid.
72. Robin Walker, Speech by Khalid Kidwai, "Pakistan's Evolution as a Nuclear Weapons State," Center for Contemporary Conflict, November 01, 2006, See: <http://www.nps.edu/academics/centers/ccc/news/kidwaiNov06.html>
73. Mike Mullen, US Department of Defense transcript, May 04, 2009, <http://www.defense.gov/transcripts/transcript.aspx?transcriptid=4413>
74. David Sanger, William Broad, "US Secretly Aids Pakistan in Guarding Nuclear Arms", *The New York Times*, November 18, 2007, See <http://www.nytimes.com/2007/11/18/washington/18nuke.html?pagewanted=all>
75. Baqir Sajjad Syed, (Expectations for civilian nuclear deal dampened by US), *The Dawn*,

- April 09, 2010.
76. "Pakistan Seeks Equal Access to Civil Nuclear Technology", *The Dawn*, April 12, 2010.
  77. Bruce Riedel, *Pakistan and the Bomb*, February 21, 2011, Yale, Available: <http://www.yaleglobal.yale.edu/content/pakistan-and-bomb> .
  78. Ibid.
  79. "Graham T. Allison: The Congenital Optimist," *Bulletin of the Atomic Scientists* (2010).  
See: [http://belfercenter.ksg.harvard.edu/publication/20341/graham\\_t\\_allison.html](http://belfercenter.ksg.harvard.edu/publication/20341/graham_t_allison.html)[http://belfercenter.ksg.harvard.edu/publication/20341/graham\\_t\\_allison.html](http://belfercenter.ksg.harvard.edu/publication/20341/graham_t_allison.html)
  80. Christopher Clary, *Thinking About Pakistan's Nuclear Security in Peacetime, Crisis and War* (New Delhi: Institute for Defence Studies and Analyses, 2010).
  81. Paul K., Nikitin Kerr and Mary Beth *Pakistan's Nuclear Weapons: Proliferation and Security Issues* (Congressional Research Service, 2010).
  82. Ibid.

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