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The Future of Nuclear South Asia: A Global Peace Perspective

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Since the dawn of nuclear age on December 2, 1942 when Enrico Fermi made a chain reaction in a pile of uranium in the University of Chicago, the nations around the world have been utilising nuclear energy for both destructive and constructive purposes. As a matter of fact, the history of nuclear energy began with the history of nuclear weapon test on July16, 1945 when the United States exploded the first nuclear bomb, codenamed 'Trinity' at Alamogordo, New Mexico. The Former Soviet Union was the next country to explode a bomb on August 29, 1949. After the Soviet test, other countries followed: Britain on October 3, 1952; France on December 3, 1960; and China on October 16, 1964. In continuation of its exploration into the field of nuclear energy, the US exploded another thermonuclear bomb—code named 'Mike'— at Eniwetok atoll in the Pacific on November 1, 1952, which was 500 times more powerful than the Trinity test.[1] milar tests were also conducted by the former Soviet Union on November 22, 1955; the UK on March 8, 1957; China on June 17, 1967 and by France on August 24, 1968. Thus, more than 2000 tests were conducted world wide— US with more than 1000, Russia more than 700, France more than 200, UK more than 40 and China more than 40.

Nuclear tests are carried out in different types of environment: above the ground, under ground and under water. The different test sites are located all over the world, for example in the Pacific— Bikini Atoll (US); Christmas Island (US/UK); Eniwetok Atoll (US); Fangataufa Atoll (France); Johnston Atoll (US); Malden Island (UK); Mororua Atoll (France); Monte Bello Island in Australia; Emu Fields (UK); Maralinga (UK). Apart from the island test sites there are many other test sites located in different countries. Nevada, Alamogordo, Carl bad, Hattiesburg, Grand Valley, Colorado, Rifle, Farmington, Hot Creek Valley, Central Nevada, Fallon, and Amchitka in US; Novaya Zemlya, Semipalatinsk in eastern Kazakhstan; Azgir and Astrakhan in western Kazakhstan; near Oren burg between the Volga River and the Ural mountains in the Ukraine, Uzbekistan and in Turkmenistan in former Soviet Union; Reggane in Algeria and Hoggar Massif at In Ecker (for the French tests); Lop Nor test site in Xingjian Province in China; Pokhran in Rajasthan in India and Chagai Hill in Pakistan.

The United Kingdom was the first country to establish a nuclear power plant for the generation of electricity on February 21, 1956, and was followed by many other countries. Nuclear power plant requires less fuel for the generation of electricity. For example, one ton of uranium produces more energy than the one produced by several million tons of coal or several million barrels of oil. Till date, there are about 435 nuclear power plants operating all over the world generating about 345000 MW of electricity in 32 countries, it accounts for about one-sixth of the world's electricity supply. For instance, France generates 76% of its electricity from nuclear power plants; Belgium- 56%, South Korea-36%, Switzerland-40%, Sweden-47%, Finland-30%, Japan-33% and the United Kingdom-25%, Bulgaria-46%, Hungary-42%, and the Czech Republic and Slovakia together- 20%.

Although the US is not the leading country in terms of the production of power but it has the largest total electricity output from nuclear power: 98000 MWe from105 plants, generating around 20% of its electric power.[2] The Americans confer two important reasons for initiating a new material programme in the nuclear field. The first is to overcome a projected threat and the second is to incorporate new technology. Overcoming a projected threat is a battlefield imperative, if not achieved, the adversary's capabilities in the field would jeopardise the ability of the US to fight and win the war. The second reason, according to them, is that incorporating newer technology into an existing one increases the operational capability, enhances system reliability, or reduces costs that takes care of competing with enemy in the nuclear field by exploring a new avenue. Such activities, as they argue, not only help develop the field alone but also reduce the logistics burden.[3] It should be noted here that the process of incorporating new technology into existing or future systems is commonly referred to as, research and development (R&D).

Moreover, coal and oil burning plants pollute the air, whereas a well-maintained nuclear power plant does not release contaminants into the environment. It was reported that due to underground tests, approximately 3900 Kg of plutonium has been left under the ground and due to atmospheric tests 4200 Kg of plutonium has been discharged into the atmosphere of the world.[4] The other advantages of nuclear energy are, it is used for digging channel, preservation of food, and for X-ray.

Understanding Nuclear Energy

For the generation of nuclear energy, two different methods— fission and fusion are adopted. In fission large nuclei are split to release energy and in fusion method, small nuclei are combined to release energy. Uranium is mainly used for nuclear fission because its shooting neutrons can easily split its nuclei. In addition, once a uranium nucleus is split, multiple neutrons are released which split other uranium nuclei. This phenomenon is known as a chain reaction.[5] The fission reactors are also used for powering the ships and spacecrafts.

In nuclear fusion, as stated above, the nuclei of atoms combine or fuse together similar to the energy-producing process in the sun and stars. The most suitable reaction occurs between the nuclei of the two heavy isotopes of Hydrogen—deuterium and tritium. Through fusion method hydrogen bombs, known as thermonuclear bombs, are produced. Hydrogen bombs are thousand times more powerful than the atomic bomb.[6]

The Case of South Asia

In South Asia, only India and Pakistan are involved in nuclear activities for both constructive and destructive purposes. India established its Atomic Energy Commission in 1948 and built a research reactor, Apsara, with a thermal output of 8,000 KWs, under the supervision of Dr. Homi J. Bhabha. Apsara was the first nuclear reactor in Asia.[7] Another milestone was Plutonium production reactor, Cirius, built at Bhabha Atomic Research Centre (BARC) in 1960. The commissioning of Dhruva reactor in 1985, reprocessing plants at Trombay, Tarapur in 1980's, and at Kalpakkam in 1999 carried the initiative forward. A nuclear plant is also under construction at Koodamkulam in Tamilnadu with the help of Russia.

India successfully carried out its first underground nuclear test in 1974 at Pokharan in Rajasthan. Again on 11 and 13 May 1998 five well-planned tests were carried out. India claimed that the five well-planned tests had yielded the desired results. According to India, it tested a low yield device (0.2kt), a fission device (12Kt), a fusion device (43Kt), and 2 devices with the yield of below 1kt (0.3-0.5kt).[8] The Indian claims however, have been disputed by the American observers. According to them, India had demonstrated high-level nuclear technology but not the one
needed for thermonuclear bomb. Nevertheless, Indian government reported that tests of hydrogen bomb with the yield of 45Kt and a fission bomb with the yield of 15Kt were successful based on thermonuclear technology. In response to India's nuclear test, Pakistan tested its first bomb at Chagai Hills, on May 28, 1998. The test was followed by the declaration of emergency throughout the country on May 29, and on May 30, Pakistan carried out another test.[9]

Nuclear Interest of India

The National Security Advisory Board (NSAB) of India also noted on August 17, 1999 that Indian nuclear doctrine was aimed at pursuing an effective and reliable deterrent.[10] The Indian National Defense Report (INDR) of 1998-1999 had stated that India would develop deterrent only against the countries threatening to use weapons of mass destruction and it would never use its nuclear weapons first against any country in the world. However, it is not yet clear, how many weapons India would need in the future for deterrence and how many of them it has already produced. The Washington based National Resources Defense Council (NRDC) estimates that India has about fifty bombs with the yield of ten to fifteen Kiloton.[11]

Nuclear Interest of Pakistan

Pakistan built its first nuclear reactor PARR-T at Islamabad in 1965 and its second one, PARR-U at Karachi in 1970, both the reactors are covered under the safeguard agreement signed with the International Atomic Energy Agency (IAEA). In 1972, Zulfikar Ali Butto, then Prime Minister of Pakistan, decided to develop nuclear weapon. Mr. Bhutto was desperate about the nuclear weapon, once he stated "Pakistan will go nuclear even if the people of Pakistan were forced to eat grass."[12] Pakistan was successful in mustering the support from China especially for the constructing of a reprocessing facility at Chashma near the Indus River. The enrichment facility at Kahuta was constructed under the direction of Dr. Abdul Qadeer Khan a mettalurgist by training, but during his career in a German firm which was a subsidiary of the URENCO(a Dutch-British-German joint venture for Uranium Enrichment) in Netherlands, he obtained the blue-prints of high-speed centrifuge that was being used there to enrich uranium.

He was also able to establish firm links with many European companies which supplied critical material to URENCO. During 1980s, Pakistan was very active in pursuing its nuclear ambition. In 1984 it was reported that Pakistan had possibly manufactured a uranium type atomic bomb and tested it. Continuing its pursuit, plutonium production reactor PARR-V was built at Khushab in 1995.

Pakistan tested Ghauri missile in 1998 and same year, in response to India's nuclear tests, carried out tests on May 28 and 30. Dr.A.Q.Khan, the father of Pakistani nuclear bomb, after the test stated, "one of five devices yielded 30-35 Kt, about twice the yield of the Hiroshima bomb. The other four devices were of low yield"[13]. He also said Pakistan used an advanced enrichment technology. The efficiency and the reliability of this technology are very high.

Dr. Khan's views, however, were contested by many countries of the world. For example, according to US, the largest yield was of 10Kt, and the rest were of 8Kt in total. However, the fact of the matter is that Pakistan has demonstrated its capacity for producing number of small size nuclear weapons and its possession of free-fall atomic bombs made of U-235.[14] It has sufficient technology and facilities for acquiring weapon-grade enriched uranium (WEU). It is also reported that Pakistan has the capability to produce 110 Kg of WEU Kg per year. According to one report Pakistani production capability of WEU is estimated about 5-10 bombs per year. Pakistan is also reportedly involved in developing a thermonuclear weapon and a Pu type atomic bomb. Its capability for acquiring Plutonium through Khushab reactor is estimated to be of 10-15 Kg per year. Pakistan's missile programs include IRBM Ghauri, AIRBM Ghauri, BSRBM Shaheen and CSRBM Shaheen.[15] Pakistan constituted National Command Headquarter (NCH) on 3 February 2000 for looking after Pakistan's nuclear policy, nuclear force management and developments. However, its nuclear policy is not yet clearly codified.[16]

Recently, the father of the Pakistani bomb, Dr. A. Q. Khan, was under close scrutiny nationally and internationally. Western intelligence experts alleged that Pakistan's A.Q. Khan's Research Laboratory (KRL) near Rawalpindi provided the designs for centrifuge plant to North Korea in exchange for help in developing the medium range Ghauri missile, which is identical to North Korea's Nodong missile.[17] As has been said earlier, the uranium enrichment plant at Kahuta was built on the basis of technical information stolen from Holland where A.Q. Khan was working during 1970s. In the later stages Pakistan received from China the design as well as the trigger devices for nuclear weapon. According to a distinguished American foreign policy analyst, Selig Harrison, in his article published in *International Herald Tribune*, Pakistan has now 48 nuclear weapons and enough fissile material in storage to make 52 more, thus making a total of 100.

Critical Lessons

Nuclear explosion emits radiation, and a person exposed to it undergoes a long-term suffering. In addition, it affects the person even after twenty years without showing any symptom in the initial period of his exposure to radiation. People get exposed to such radiation due to a reactor disaster, known as "meltdown". In such an accident, the fission reaction goes out of control, leading to a nuclear explosion and the emission of great amounts of radiation.[18] In 1979, due to the failure of the cooling system of a nuclear reactor at the Three Mile Island, near Harrisburg, Pennsylvania, US, radiation caused a great deal of human suffering. In 1986, a disaster struck Russia's Chernobyl nuclear power plant where several dozen died and thousands of people exposed to radiation are reportedly still suffering from cancer. Another problem with the nuclear reactor is the disposal of end products produced in the process of the generation of nuclear energy.[19] As a precautionary measure the end products are stored in special cooling pools near the nuclear reactors and are managed properly. The United States has a plan to move its nuclear waste to a remote underground dump by the year 2010. However, the dumped nuclear waste material can explode like bombs because of under ground pressure. Such incident occurred in the former Soviet Union in 1957 at a dump site of Ural Mountains killing many people.[20]

A New Nuclear Order: Prolife-ration Security Initiative (PSI)

It is necessary to look at the historical routes for managing nuclear energy crisis before understanding the new initiative. During early 50s, countries made an attempt to formulate a global treaty, under the aegis of UN, to restrict the spread of nuclear energy especially with reference to the usage of nuclear energy for production of weapons. To this effect, in1958, Ireland, proposed specific resolutions in the United Nations General Assembly (UNGA) with an objective to prevent the misuse of nuclear energy. In 1961, Sweden introduced a new resolution with an intention of defining the nuclear weapon countries as well as countries striving genuinely for energy. Netherlands objected to the Swedish initiative. However, this initiative was supported by the former Soviet Union, which was objecting to stationing of nuclear weapons in Europe, particularly in Germany by NATO. With the involvement of Soviet Union coupled with intensification of cold war, the non-proliferation issues became the dominant agenda item at the Eighteen Nations Disarmament Committee (ENDC) in 1965.[21]

In 1966, when negotiations came to an end the non-aligned countries appealed to the nuclear countries for the moratorium on the nuclear tests. India spearheading the appeal on behalf of non-aligned countries, stated that a good non-proliferation treaty should contain a prohibition on the production of nuclear weapons for all states, including the nuclear weapon states. India also demanded that the treaty should contain a binding agreement on nuclear disarmament. Other countries did not agree with the Indian position. Canada, for example, argued in favour of practical measures in line with the US. However, India’s position received due attention in the draft of January 18, 1968. An article was included in which the nuclear weapon states promised to negotiate in good faith on effective measures relating to the cessation of the nuclear arms race at an early date.[22] Subsequently, the Non Proliferation Treaty was opened for signature on July 1, 1968. In the review conferences of 1975,1985,1990 and 1995 the signatories of the treaty failed to reach an agreement on a final text due to disagreements relating to nuclear disarmament in general and a comprehensive treaty to ban nuclear testing in particular. Despite the incongruity on the issue of ban on nuclear tests it was decided that the treaty has to be in force indefinitely after its extension conferences, as stipulated under Article X of the NPT.[23]

To stress the importance of the unilateral measures regarding tactical nuclear weapons President Bush, in August 1991 announced that all nuclear artillery and all short-range missiles on land and all tactical weapons deployed in ships and submarines must be withdrawn. Then President of Soviet Union, Gorbachev too reciprocated with a comparable package. After the disintegration of Soviet Union, President Bush (Sr.) made an important unilateral measure with regard to the downsizing of strategic nuclear weapons, including freezing the development of the Midget man ICBM. It was followed by the signing of signing of START II, in January 1993, with an objective of reducing the number of strategic nuclear weapons to 3,000 and 3,500 respectively.[24]

The US, one of the proponents of Nuclear Non-proliferation Treaty (NPT), once hailed NPT as the 'nerve-centre' of all the arms control agreements and the only means for managing the crisis of nuclear energy both constructive and destructive. However, it has been found that now US has been disputing the treaty and in 2003, it proposed a Proliferation Security Initiative (PSI). The PSI calls for prohibition of international traffic in sensitive nuclear materials through cooperative actions by the naval and air forces of friendly nations. In support of PSI, President George Bush (Jr.) has proposed in February 2004 a seven-point nuclear agenda that highlights the inadequacy of the present NPT regime and supports the principle of effective non-proliferation. His agenda aims at drawing in law enforcement agencies to crack down on networks of nuclear smuggling of the type developed by Dr. A.Q. Khan in Pakistan.[25]

Conclusion

Since India and Pakistan have become nuclear weapon powers managing energy as well as political crises between nations in the region has been of paramount importance in recent days. So far, India and Pakistan have declared their interests for minimum deterrence. As far as as using nuclear energy is concerned, both of them are not too ambitious, as they have no such plans for producing huge energy based on nuclear sources. Their dreams in the nuclear field, however, have to be realized in the light of the development of globalization process that influences the security and economic environ-ment of the world community. Nonetheless, they should play very responsible roles to protect not only their interests but also the interests of all other countries in this region. One hopes that the ongoing Indo-Pak dialogue that has started working on nuclear CBMs will dispel the concerns of international community regarding a nuclear South Asia which has been characterised as a 'nuclear flash-point', as a region on 'a short fuse'.

Endnotes

1. See Frank G. Dawson, *Nuclear Power Development and Management of a Technology,* Seattle: University of Washington Press, 1976, pp. 162-170

2. See http://www.i-b-r.org/

3. In this process, the Americans introduced new technology transfer methods, dual use technology, accelerated transition, horizontal technology integration, technology insertion, modeling and simulation and advanced technology demonstration. They also introduced methods of displaying information with regard to advanced concepts and technology program, concept experimentation program, advanced war fighting experiment, technology demonstrations, small business innovation research program, fast track program, limited objective experiments, product improvement programs, funding categories for research and development programs and strategic research objectives war fighting capability. Ibid, pp.9-10
4. See http://www.i-b-r.org/.

5. See Harvey W. Graves Jr., *Nuclear Fuel Management,* John Wiley Press, New York, 1979, pp.28-33.

6. Deuterium is abundant as it is available in all forms of water. Its supply would last for millions of years. Tritium does not occur naturally. It is manufactured from Lithium, the light metal, which is plentiful in the earth's crust. It will last for at least 1000 years. Ten grams of deuterium, which can be extracted from 500 litres of water and 15g of tritium produced from 30g of extracted of lithium, would produce enough fuel for the lifetime electricity needs of an average person. See *Nuclear Fuel Management*, n.6, pp.8-10.

7. See India and the Atom, *Birla Institute of Scientific Research,* Allied Publishers, New Delhi, 1982, pp. 60-70.

8. Ibid.

9. *The Hindu,* Chennai, May 31, 1998.

10. *The Hindu*, Chennai, August 18, 1999.

11. http://www.i-b-r.org/.

12. For detailed study on Pakistan nuclear programme, see Sinha and Subramanian, *Nuclear Pakistan,* Vision Books, New Delhi, 1980, pp.49-56.

13. *The Hindu*, Chennai, May 31, 1998.

14. See P.K. Ghosh, *India Pakistan Nuclear Parity: Is it Feasible or Necessary*, n.12, pp. 522-524.

15. Ibid.

16. *The Hindu*, Chennai, February. 4, 2000.

17. Nucleonic Week, November 6, cited in *Strategic Digest*, New Delhi, Vol. 33, No. 12, December 2003, p.1456.

18. See Harvey W. Graves Jr., *Nuclear Fuel Management*, n.6, pp.30-32.

19. Ibid.

20. Ibid.

21. See Frank G. Dawson, *Nuclear Power Development and Management of a Technology*, n. 1, pp.162-170.

22. Ibid.

23. Ibid.

24. Ibid.

25. See *New Indian Express,* Chennai, February 19, 2004.