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Empirical Study on Development of Nuclear Energy in India and Its Impact on Indian Security

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Abstract – The reconciliation of the expansion of nuclear technology and the elimination of nuclear arms would demand that leaders, authorities and the nuclear industry are far more cautious regarding non-proliferation than they have to date. States should specifically be prepared, when the 'risk of proliferation' is perceived to be beyond economic gain, to abandon sensible nuclear technology. The long-term aim should be to prohibit the most critical nuclear technology multilaterally, without prejudice. In the meantime, states that have discarded fragile infrastructure are equipped with political instruments to limit the possibility of anyone searching for similar innovations. The instruments include the will to deal in innovations that are less responsive, the take-back of wasted fuel and the illustration of dumping responsive innovations.

Key Words: Nuclear, Energy, Security

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INTRODUCTION

In September 2008, the Nuclear Supplies Group (NSG) gave India a special waiver exempting it from its members' nuclear export guidelines. Under the provisions of the agreement, widely regarded as the U.S.-India arrangement, India was permitted into the Nuclear non-proliferation Treaties of 1968 to introduce nuclear reactors and other technical tools without being a party to them. Uranium has also been approved to be supplied for the fueling of the domestically developed reactors under foreign surveillance. It increased hopes that nuclear trade with India will increase drastically. This article gives a historical history and review of the Indian nuclear industry in order to appreciate these aspirations and the nuclear power opportunities in India. Like the NSG waiver, India has also been relatively exceptional in its nuclear trajectory. Since the nation became independent it has sought a future in which nuclear power plays a significant part in political leadership and technical bureaucracies. And if these proposals did not materialise, and six decades after their introduction, there are still plenty of expectations of a significant nuclear extension. The most notable achievements of the project, from extracting uranium and milling to the reprocessing of nuclear fuel to vitrifying to preserving waste, was the development of skills by the Department of Atomic Energy (DAE) for the whole "line" of nuclear fuel. However, different incidents and proof of inadequate protection procedures have impacted the software. In a developed world with many requirements of insufficient resources, nuclear power was, as elsewhere, costly, a big issue. The concept of nuclear expansion, focused on rapid breeder reactors, is also special in India. While several countries initially liked breeders, the majority gave up on them. In comparison, the DAE has shown impressive persistence, though potentially incorrect, partially because of a lack of inexpensive and easily extracted uranium domestic supplies. This study starts with the development of the Indian nuclear programme with a focus on the value of support from other nations, the consequences of trade sanctions placed since the nuclear test in 1974, their exemption from the nuclear agreement between the USA and India, the bureaucratic framework and the regulatory method, and the nuclear energy predictions produced in the past relative to the previous ones. The following is an overview of nuclear power economics in India, followed by a segment on nuclear power stability. The final portion on the prospects of nuclear power in India is followed by short parts on waste management and popular expectations.

NUCLEAR SECURITY IN INDIA

The protection of nuclear materials was an essential question. Which included the apprehension not only that nuclear material is stolen but that nuclear scientists in the former Soviet Union are illegal transfers1. Since the terrorist attacks of 11 September 2001, the topic received even more momentum. Fresh evaluations

of the protection of nuclear resources have been produced in all of their own nations in order to resolve possible situations in the possession of terrorists or some other disruptive groups. They have been carried out. Although there have been no other significant accidents, the risks remain active and are not taken lightly. This raising global interest as seen by the Nuclear Security Conference that has begun since 2010. The worldwide supply of nuclear bombs is believed to be about 2,000 metric tonnes, at least half of which are reportedly not well-secured. A total of 2,477 cases including fraud and other illegal nuclear and radioactive material practises were reported to the International Atomic Energy Agency (IAEA), in the Event and Trafficking database (ITDB) between January 1993 and December 2013. 146 3 confirmed cases have occurred in the IAEA database alone in 2013. In the Indian context, the danger of nuclear and radiologic materials also became acute, especially in the context of the 26 November 2008 attacks in Mumbai. New Delhi has reservations regarding attempting to target Indian nuclear assets and/or procure Indian nuclear material from some of the militant groups in the area, in particular those centred in Pakistan. The Indian government therefore prioritises nuclear protection. It is a testimony to this that the Indian premier attended the first two Summits on Nuclear Stability. India is also working hard to obtain stricter restrictions on commercial nuclear materials, at the national and international level. Those products include uranium-organic concentrates, low-to-high-enhanced uranium, uranium waste, plutonium used in power plants to research reactors, spent reactor fuel and any other radioactive or radiological products. In India and around the world, though, there is a propensity to see nuclear terror as a theoretical danger and a potential threat. Theoretically this is still questioned, despite the disastrous implications of that possibilities, since extremist organizations are considered to be unlike the individuals receiving that weapons. And if chemical or toxic technology was to be exploited by criminals, multiple measures would be taken before it would be transformed into a real bomb. These measures include the development of science and technological expertise, suitable workforce, installation facilities and transport vehicles for critical materials. But this streamlining is not exclusive to India. The protection of nuclear installations is normally strict and it is not straightforward to obtain nuclear materials or capability. This did not, however, lead India to light these menaces. Even if Indian strategies and traditions remain skeptical, it should also be pointed out that New Delhi has developed systems and mechanisms close to the best of global norms. Although several of them were set up in the 1960s and 1970s, they were periodically upgraded, especially in India, with the evolving security scenarios.

NUCLEAR SECURITY IN INDIA

The Indian Strategic community has voiced considerable public concern about the possibility of nuclear terrorism and the weaknesses which may exist in its nuclear security apparatus, considering India's geographical near proximity to Pakistan, the regional centre for terrorism. In the other side, like many other nations, nuclear proliferation is apparently regarded as a distant prospect by Indian security officers. Nonetheless, the terrorist attacks on 9/11[and 26/11] changed Indians' thought and had an effect on a study of nuclear protection policies. It is not straightforward to obtain access to chemical or conventional arms. The existence itself of the substance (or weapon) requires that trustworthy and competent people are closely monitored over it, and that strict measures are placed in place to guarantee its protection. For eg, in the Indian case the nuclear warheads are held in a de-armed state. Electronic codes banning the illegal usage or unintentional detonation of such guns often cover them. The nuclear centre, other warhead elements and supply vehicles are kept separately, requiring multi-agency measures to be taken before those arms are mounted. India would have to concentrate on the last two modes of nuclear terrorism mentioned in the first chapter: nuclear sabotage and the usage of radiological equipment. There is no proof that domestic extremist groups have the expertise or capacity to make a nuclear explosive apparatus. But India doesn't have the option of minimizing the likelihood of help from across the border to these militant organizations. Indeed, the terrorist attacks in November 2008 in Mumbai indicated that terrorist organizations sought and were capable of carrying out Commando-style attacks against main Indian goals. An assault on nuclear facilities cannot be ruled out with continuous aid from Rawalpindi. That is why India has improved protection in all vital infrastructures and is well conscious that they are prime priorities. Indeed, the use of dirty explosives is posing an much more immediate threat. The harm inflicted by a contaminated bomb would be massive considering the population density of Indian urban centers. Even if the direct effect on public morality is minimal, as stated in the previous chapter, the negative influence on public morals may be serious. These attacks may erode the past of India's economic development, render India less desirable for foreign investment and visitors, add to religious tensions, and at the same time decline popular support for nuclear power. The insider's vulnerability is another significant threat to India. It increases the value of this kind of danger because all contemporary nuclear robberies or casualties involved an individual who perpetrated or aided another person to commit the crime. The sabotage induced also fear by dissatisfied staff. A variety of events have demonstrated that these flaws have been present worldwide. One of the most alarming events occurred in South Africa's Koeberg nuclear power project in 1982, long before the facility became

active, in which 'an insider put the explosives directly on and exploded the head of the steel vessel of the nuclear reactor.' Comprehensive background investigations are carried out to address those attacks. These are therefore not foolproof steps, because the chance of an accidental violation cannot be assured. It is true that, in its decades of practice in operating civil nuclear power plants, India still faces a significant insider danger. But the capacity of disgruntled workers, as their nuclear arsenal progresses, often rises to become an insider's threat. In addition, India, like all other nations, has to worry about threats and effective reaction steps against its nuclear plant, in addition to the concerns of terrorism like the dirty bombing and the challenge of the insiders. However, the specialists from the Indian nuclear industry and the science institution have guaranteed that certain flaws are not accessible and that Indian nuclear systems are built to stand up to terrorist attacks. New reactors were often used to help assaults by utilizing double containment systems. In India, modern technology and procedures have also been used to shield reactors from incidents. Designers also focused upon the idea of in-depth security utilizing a multi-layered framework (barriers) to provide improved injury protection. The Indian nuclear facility is also increasing the protection and security of nuclear material via its closure fuel cycle. The definition of 'reprocess to use' is focused on which fissile material can be best managed. Although the origins of India's closed fuel cycle predate nuclear safety issues, there is no question about whether it leads substantially to nuclear safety in India. With fissile materials reused in Indian power plants, unused or available resources are minimized. In addition, India has built an Innovative Heavy Water Reactor with modern protection and proliferation-resistant features focused on low enriched uranium and thorium to reduce the hazard potential in this phase. Proliferation-resistant systems' performance relies on both inherent technological characteristics and external barriers. These include obstacles caused by technology as well as interventions dependent on technology, both of which mitigate proliferation risks.

CURRENT THREATS TO INDIA

The Indian Strategic Group is a significant contributor to the concern expressed in the debate on nuclear safety and protection in India, in particular as regards the danger of terrorism from Pakistan. Although India shares a long frontier with Pakistan, a nation that has remained a hotbed for extremism and has a prominent involvement in attacks such as 26/11, the Indian intelligence and security services have no currently any credible threat from Pakistan's militant organizations to its nuclear infrastructure. Furthermore, militant organizations based in India have so far been unable to conduct an assault on a nuclear plant. More than what Indigenous militant organizations such as Indian Mujahideen (IM) currently possesses, the making of nuclear explosives requires technological knowledge. This does not mean that certain classes will never learn the required expertise or skills. Their efforts to select nuclear bombs have also been announced by transnational militant groups, including Al Qaeda. The IM also considers the usage of nuclear weapons / devices from Pakistan, media recently said. Similarly, Indian security agencies must be vigorous against the danger faced by militant organizations like LeT in Pakistan. In general, Allow hires more wealthy terrorists with a greater degree of professional experience, raising the possibility of hiring young nuclear technicians and scientists. Some of these concerns have escalated in recent years after the two high-profile assaults in highly protected military bases in Pakistan by the Tehrik-e - Taliban Pakistan (TTP) and lashkar-e-Jhangvi. In October 2009 there were assaults on the Pakistan Army General Headquarters in Rawalpindi and in May 2011 at the naval aviation base in the PNS Mehran district of Karachi. This raised questions on the security and protection of Pakistan's nuclear arsenal internationally, especially in India. The obvious usage of secret maps of the grounds by attackers for targeting the general office further emphasizes the need for internal support to carry out the assault. In Pakistan, almost 70,000 citizens are able to reach or recognize any aspect of the manufacturing, storage, repair and deployment cycle of Pakistani nuclear weapons, this concern is aggravated by the growth in nuclear weapons development by Pakistan and by the increasing expansion of its development of splinter content. This is especially worrying. These high-profile attacks indicate the potential of Pakistani militant organizations to conduct operative strikes on high-security facilities. If cases of strikes by certain terrorist groups on Pakistani nuclear facilities are regarded, risks, especially against nuclear installations, are exacerbated further. These involve an attake on the Sargodha nuclear missile storage facility in November 2007, an assault in December of the same year on the Pakistan Kamra nuclear airbase, and an assault on the TTP suicides bombers by August 2008 that blocked many access points to one of the Wah canton 's arms installations, one of the key nuclear weapons assemblies locations. But these cases were often hyped unfairly. That is also real. None of these threats seem to have breached the perimeter of defense. A bus carrying school children, for example, was targeted in Sargodha, and employees were killed at Wah. Furthermore, it is not certain if the assailants assaulted these installations because of their suspected connection to Pakistan's nuclear arsenal instead of only because they were military. However, these incidents cannot be taken lightly, since they explicitly indicate the militant organizations' aim to target high-value objectives. It should also be remembered that, without permission from the Pakistani administration, Pakistani terrorist organizations will simply not execute an operation.

Paradoxically, this decreases the probability of an attack by Pakistan-supported parties on Indian nuclear facilities because Pakistani officials are conscious of the implications of this kind of involvement. This could be the explanation why the terrorists on 26/11 opted rather than a nuclear plant to target the commercial sites in Mumbai. In addition, the international costs of reacting to any such misadventure could dissuade Pakistan from promoting such attacks with global scrutiny of groups with an interest in obtaining nuclear weapon / materials and states that can theoretically help them. The possibility of infiltration by home-grown left activists, or as Naxals are referred to in India, is another danger. The common opinion is that the Naxals are suffering on an conceptual level and do not wish to obtain nuclear equipment. There have been many reports concerning the Naxalite attempts to target the nuclear facilities in India, but the authenticity of those claims is not certain. To reiterate, although the Naxalites have not seen any potential in finding or utilizing a nuclear weapon, they cannot completely condemn an assault on Indian nuclear installations. Furthermore, there have also been rumours of Naxals and jihadists colluding with one another under the umbrella of an 'anti-India' movement. The cyber attacks may contribute to one of the most possible challenges to Indian nuclear infrastructure. The capacity of terrorist groups to use cyber tools to attack a nuclear installation is far higher as compared to other attacks. A cyber assault may make obsolete many of the protection and safety measures integrated into the architecture of nuclear power plants. With more and more computer systems relying, cyber-attacks have become a significant challenge to India's nuclear facilities.

STRENGTHS AND WEAKNESSES IN INDIA'S NUCLEAR SECURITY

This thesis focuses mainly on the protection aspects of nuclear and radiological materials and installations in India, as stated before. Any safety-related concerns have however also been mentioned, which correlate with protection concerns. This is the first research which focuses solely on these aspects. One of the few publicly accessible publications that gives an overview into 44 India's nuclear safety architecture is a short brochure published by the Ministry of External Affairs (MEA). The paper notes that India has five main components as its nuclear security approach: government, nuclear protection policies, society, organizations, infrastructure and foreign co-operation. These are good guidelines for determining the protection and safety status of the nuclear materials of India, although there might be other forms to separate the study groups. These five components are analyzed and their strengths and shortcomings listed in these pages.

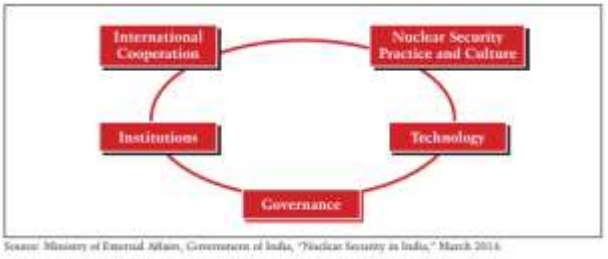

Fig. Indian Approach to Nuclear Security

CONCLUSION

Nuclear power would certainly continue to be an essential part of the energy programme of India. Although it has progressed in particular in gaining a certain amount of knowledge on most aspects of the nuclear fuel chain, India's nuclear energy programme's ambitions have not been recognized. The greatest disappointment was that nuclear plants accounted for only 3% of the nation's electricity generating potential after over 60 years. To a degree it was attributed, during its nuclear bomb experiments, to the foreign restrictions placed on India. An significant lesson from that experience is that while export controls and other trade restrictions do not fully shut down a nuclear programme, sanctions do limit its development.

REFERENCES

1. SA Bharadwaj (2014). DAE – Homi Bhabha Chair, “Nuclear Energy and Indian Society: Public Engagement, Risk Assessment and Legal Frameworks,” speech at the Third Nuclear Law Association (NLA) Meet, http://www.nlain.org/blog/inauguralllecturesabhardwajdae-homibhabhachairretireddirectortechnpcil.

2. Suvrat Raju and MV Ramana (2014). “Its Better to be Safe than Sorry,” The Hindustan Times, http://www.hindustantimes.com/comment/analysis/it-s-better-to-be-safethan-sorry/article1-1180454.aspx.

3. Matthew Bunn and Scott D Sagan (2014). A Worst Practices Guide to Insider Threats: Lessons from Past Mistakes, http://iis-db.stanford.edu/pubs/24609/insiderThreats.pdf.

4. Matthew Bunn and A Wier (2007). Securing the Bomb: An Agenda for Action (Cambridge, MA: Harvard University, 2004), cited in Edward George Bitzer III and Andrew Hoffman, “Psychology in the Study of Physical Security,” Journal of Physical Security, Vol. 2 no. 1, Paper 4,

http://jps.anl.gov/vol.2/4-Psychology_and_Security.pdf.

5. Rita Guenther, Micah Lowenthal, Rajaram Nagappa, and Nabeel Mancheri (2013). "India-United States Cooperation on Global Security: Summary of a Workshop on Technical Aspects of Civilian Nuclear Security," National Academy of Sciences.

6. Government of India, Ministry of External Affairs, "Nuclear Security in India," March 2014, http://www.mea.gov.in/Images/pdf/Brochure.pdf.

7. Matthew Bunn (2013). "Managing the Atom "Nuclear 101"," May 8, 2013, power point presentation available at http://belfercenter.ksg.harvard.edu/files/technologies-bunn-may-8-2013.pdf.

8. Dey AB, Mohanan S, Damodaran D, Soneja M, Jain N, Mohan A, Vikram NK, Sood R. (2010). "Radiation Accident at Mayapuri Scrap Market," Radiation Protection Dosimetry (2012), Vol. 151, No. 4, pp. 645-651, 10.1093/rpd/ncs162, Delhi, http://www.ncbi.nlm.nih.gov/pubmed/22914329.

9. Manash Pratim Gohain (2011). "Atomic board nod must for colleges: UGC," Times of India, http://timesofindia.indiatimes.com/india/Atomicboard-nod-must-for-colleges-UGC/articleshow/7300519.cms

10. PR Chari (2014). "Nuclear Materials Security: An Assessment of the NTI Index 2014," Issue Brief, Institute for Peace and Conflict Studies, http://www.ipcs.org/issue-brief/nuclear/nuclear-materials-security-anassessment-of-the-nti-index-2014-244.html.

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