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Issues, Threat and Consequence Management

ANIMESH ROUL

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About the Author

ANIMESH ROUL
Animesh Roul is the Executive Director of Research at the Society for the Study of Peace and Conflict, New Delhi

Please direct inquiries to:

Research Coordinator
Society for the Study of Peace and Conflict
Post Box No. 10560, JNU Old Campus, New Delhi
Pin-110067 (INDIA)
Officemail@sspconline.org
www.sspconline.org

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Nuclear Weapon: Issues, Threat and Consequence Management

ANIMESH ROUL

The invention of nuclear weapons, the ultimate among the three weapons of mass destruction, has given rise to completely novel conditions that have fundamentally affected the concept of war in the cotemporary human history. The nuclear bombing of Hiroshima and Nagasaki on August 1945 during World War II were the two most remarkable acts of war in recorded military history. Fortunately, there have been no uses of this deadly device after that, but thousands of nuclear testing have taken place and also many accidents due to human or technical error occurred with large scale environment and health related effects. The so called great and emerging powers have stockpiled thousands of nuclear weapons in their arsenals overtly and the non state actors, primarily translational terrorists groups may have stockpiled covertly, to unleash a catastrophic scenario hitherto witnessed or imagined. We have seen the restraint to use nuclear device against any rival nations within the state actors, but there is remote possibility of similar restraint from a terrorist group.

As a matter of fact, the so called nuclear genie is now out of the bottle and never will it go back to its cocoon. The international community has only restrained Libya, once a rouge regime from joining the nuclear club so far. North Korea's October 9, 2006 Nuclear test explosion made it a unwanted and volatile member of elite nuclear weapon club. North Korea is presently rubbing shoulder with the US, Russia, China, France, Britain, Israel (yet to test a weapon), India and Pakistan. Iran might join soon.

Among the Non state actors, Osama bin Laden's al Qaeda is heading the suspect list. Of course anybody can go for it with money and covert connection as the most vital element, technological know-how is available on the internet to make at least radiological device or a crude nuclear bomb.

Way back in 1993, cohorts of Osama bin Laden had reportedly tried to acquire weapons grade uranium colluding with Salah Abdel alMobruk, a Sudanese military officer and former government minister.[1] Again al Qaeda operatives tried to acquire and develop through Pakistani expertise in 2001.

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Considering these possible catastrophic scenarios, the vital question now gaining ground among the security establishments around the world: how to face the situation and how to manage the consequential effect of a nuclear disaster.[2] The Indian subcontinent during the last six years witnessed devastating natural calamities ranging from flood, earthquake and Cyclone storms. While the subcontinent is vulnerable to different types of natural disasters, it is equally susceptible to human–induced calamities, such as armed conflicts, conventional and non-conventional warfare involving nuclear, chemical and biological weapon and last but not the least mass- casualty WMD (weapons of mass destruction/disruption) terrorist strike. Faced with these two pronged challenge, the Indian government has initiated measures to mitigate disasters and has been on constant run to develop a comprehen-

sive consequence management apparatus to face any eventuality in future. The super cyclone in Orissa and the Gujarat and Jammu & Kashmir earthquake has made the government realize that importance of a multi-sector and multi-dimensional approach in the field of disaster management and the incorporation of disaster management elements in the mainstream developmental policies of the country. Also the spectacle of the tragic events of September 11 terrorist strike in the United States reinforced governments around the world to devise strategy to face similar kind of apocalyptic scenarios. This paper focuses on the threat scenarios during nuclear disasters primarily in a possible reactor accident and terrorist strike through radiological dispersal device. It also delves into the role of the Army in the overall ambit of the civil disaster response framework and consequence management.

Where is the Threat?

A revolution in terrorist activities (RTA) has occurred due to the proliferation of NBCR weapons or lethal materials and the advent of a new breed of terrorists called fidayeen. This has completely changed the threat emanating from various terrorist organizations in the present decade. With the advent of these suicide bombers, the dangers of WMD terrorism have become imminent with the improving capabilities of terrorists to develop or acquire these lethal weapons. The recent mortar attack by Baloch rebels on a Pakistani nuclear establishment near Dera Ghazi Khan reinstated the long perceived threat to nuclear installations by non state actors.[3] Fortunately the mortar attack sparked a conflagration in the forests surrounding the establishment, but the fire was extinguished before it could spread to the establishment. However, nobody knows the consequence if the conflagration spread to the nuclear establishment itself.

Before dealing with the kind of threat our civil society could face in a nuclear accident or attack, it would be imperative to discuss and understand various effects of nuclear weapon and material used in it, on human environment.

What Happens in Nuclear Emergency

The basic nuclear weapon is the fission bomb, generally called the 'atomic bomb'. The atomic bombs built so far have used two fissile materials, uranium-235 and plutonium-239. The maximum yield achievable by pure fission weapons is limited to a few tons of kilotons. The next significant advance in warhead design after the atomic bomb was the hydrogen bomb (H –Bomb) in which fusion is used to obtain high yields. As there is no critical mass of fissile material, which initiates the chain reaction for the fusion process, the explosive yield of the H-bomb is limitless.[4] With a yield of 100 to 10,000 kilotons, an H-bomb behaves like huge incendiary weapons capable of igniting a large city. While these two kinds of devices would not reach non state actors, there are other low yields enhanced radiation weapons deigned to maximise the lethal effects of radioactivity, could be a weapon of choice for any terrorist outfit or rogue nations.

The effects produced by nuclear weapon are divided into five major categories: mechanical effects, thermal effects, electromagnetic effects, radiological effects, and radioactive fallout. All nuclear explosions produce these five types of effects but in varying degrees depending on the type of bomb used. To some extent, the size of the bomb, the height at which it is detonated, and the atmospheric conditions also matter a good deal. The mechanical effects of a nuclear bomb include the blast effect or shock wave just after the detonation of a nuclear device. Upon detonation, a nuclear fission weapon disassembles and vaporises within one millionth

of a second. At that time about 70 to 80 percent of the energy has been converted into soft X-rays with an effective radiation temperature of several tens of millions of degrees Celsius. The other remaining energy comprises the kinetic energy of the bomb debris.[5] The X-radiation is absorbed by the air within several meters of the device, heating the air and forming a fireball. At this point, a shock wave form which produces very high pressures in the air through which it passes. Death can result from either direct or indirect injuries caused by that wave. Most deaths occur from indirect effects, from the collapse of concrete structures or falling debris. In addition to deaths, there would be many injuries, abrasions, and fractures. The thermal effect of the bomb comprises immense heat, fire, and firestorms which is about a third of the total energy released by a nuclear bomb.

Though there is uncertainty about the acute effects of radiation, under war conditions it is likely that the majority of persons exposed to radiation would die

With the formation and growth of the fireball, two pulses of thermal irradiation are emitted. The first pulse has little incendiary effect but can damage the retina of the eye. The second pulse is a true thermal pulse. It can cause fatal or severe burns, and start fires, over a large area. The destruction at which a given heat effect is produced depends on the yield of the bomb and atmospheric conditions. There are two ways in which fires can originate. First, as a direct result of the absorption of thermal radiation, thin kindling fuels can be ignited. Secondly, fires can be started by upset stoves, electrical short circuits, and broken gas lines.[6] Under certain circumstances, the individual fires may consolidate into one huge fire, covering a large area. These are firestorms and conflagrations. People may die through asphyxiation due to the lack of oxygen or be cremated live.

The Electromagnetic effects occur when nuclear explosion takes place above an altitude of 40 km. It can expose a large area of the earth to an intense pulse of electromagnetic radiation. The EMP is associated with the intense ionisation of the atmosphere by the radiation from the bomb. It results in a short but very powerful pulse. The EMP is not directly hazardous to man, but the electric surge produced may damage electric and electronic equipment, and disrupt electricity supplies as well as telephone and radio communications. It is unlikely that EMP would incapacitate all of the exposed communication systems, power networks and electronic equipment. But a small number of failures distributed through a large and complex system can disrupt the entire system and degrade its stability and performance. It could create confusion and isolation at a time when critical decisions would have to be made regarding the use of nuclear weapons.[7] The Radiological effect is the most devastating in long term among all the possible effects of nuclear detonation. Several types of energetic ionising radiation are produced during a detonation. The initial radiation consists of neutrons and gamma rays, most of which are emitted simultaneously with the explosion and within one minute after the detonation. The intensity of the radiation depends on factors like density and humidity of the air and the explosive yield of the bomb. More than half of all individuals subjected to the radiation doses would develop diarrhoea, malaise, and tensions of the mucous membranes.[8] Though there is uncertainty about the acute effects of radiation[9], under war conditions it is likely that the majority of persons exposed to radiation would die.

Nuclear Accidents

An emergency situation could occur during any nuclear accidents whether in the reactor, nuclear powered submarine or during the transportation of nuclear materials. This could be triggered by a technical failure, human error and some times natural calamities like earthquake and Tsunami too could cause damage to a nuclear facility.

The short history of nuclear power has already witnessed some of devastating accidents. The most infamous has been the Chernobyl disaster occurred exactly two decades before [on April 26, 1986] at the Chernobyl nuclear power plant near Pripyat, Ukraine. Since then the radiation caused some 100,000 people to flee their homes in Ukraine and Belarus. The accident has triggered a rise in cancer, neurological disorders and genetic mutations every year since. It is estimated that the disaster released as much as 300 times more radioactive fallout in comparison to the atomic bomb of detonated at Hiroshima. Last year a report prepared by the Chernobyl Forum indicated 56 direct deaths (47 accident workers, and nine children with thyroid cancer), and estimated that as many as 9000 people among the approximately 6.6 million most highly exposed, may die from some form of cancer.

In a worst scenario, terrorists could use this radiological device against civilian or military targets than other form of nuclear terrorism

The other noteworthy accidents were in the Three Mile Island in the US took place in March 1979 when the reactor suffered a partial core meltdown and fire at the British nuclear reactor in Windscale in October 1957.

Nuclear /Radiological Terrorism

Experts differ on the real threat nuclear terrorism, whether it is state (Rogue) sponsored or Terrorist groups procurement through the notorious black market. However, they are all unanimous on the threat of terrorist detonation of a dirty bomb (one type of radiological dispersal device-RDD). This scenario has refocused governmental attention on efforts to mitigate the effect.[10] Even an RDD attack could cause damage and could spread public panic and widespread chaos. Like all the effects discussed earlier in the paper, an RDD attack also depends on many variables like meteorological conditions, type and amount of radiological material, duration of exposure, and method of dispersal to cause extensive damage. While the resultant radioactive fallout is unpredictable and the danger is extended in time as well as in space. Again, Rad-material can contaminate vast areas with lethal levels of radioactivity depending on the winds, but it is very much unlikely that it could kill immediately. The lethality could vary depending upon the material used in the attack. A recent study underscores some radioactive sources such as cesium-137, strontium-90 and cobalt- 60 are highly lethal than earlier perceived Uranium and Plutonium. [11]

In a worst scenario, terrorists could use this radiological device against civilian or military targets than other form of nuclear terrorism. Although up till now no terrorist outfit used such device, couple of incidents came to light in the past involving RDD. In 1995, Chechen rebels placed an RDD in a Moscow park containing cesium-137. However, before anything dangerous could happen, the situation was defused after alerted from the rebel group itself. In May 2002, one arrested al-Qaeda terrorist, Jose Padilla confessed for plotting to build and use

a dirty bomb in the United States, though he never used it. Alarmists and counter terrorist experts believe that Osama bin Laden's al-Qaeda network has been trying hard to acquire radioactive materials from the nuclear waste lands of erstwhile Soviet Russia and "loose nukes" from Pakistan. In the aftermath of September 11, scenarios that have particularly worried homeland security officials include the detonation of a "dirty bomb"—an ordinary explosive laced with radioactive material—and the sabotage of a nuclear power plant with the intent to release radiation into the environment. Recently Dhiren Barot, an al Qaeda sympathiser from North London planned to kill civilians in the UK and US using a radioactive device and conspired to target underground car parks in and around vital installation of UK and the US.[12]

In an emergency situation for any country, Armed forces, especially the Army leading a number of civil organizations such as police, hospital, NGOs, volunteers and media has to play a vital role in the overall efforts to mitigate natural and man-made disasters

Consequence Management

Another vital question and the focus of the paper is how to manage the consequence of a nuclear accident or attack and what would be the emergency response in such situation? Consequence management constitutes actions taken in the aftermath of any disaster, irrespective of their scope, method and type of disasters that require it. Also encompasses coordination of international, national, regional, and local assets to deal with the effects of such eventualities. There are at least two ways identified to enhance the ability to manage the immediate aftermath a nuclear disaster, or for that matter any emergency situation: 1) de-conflict and delineate interagency roles, responsibilities, and plans; and 2) develop a streamlined, clearly defined response channel.[13] Unlike disaster management concept, the consequence management does not intend to prevent any coming danger or threat; rather it tries to mitigate the risk and severity. Of course there would be continuous and integrated process of planning, organising, coordination and implementation of appropriate measures. Important among them are ranging from capacity-building, preparedness, prompt assessment of the situation to evacuation, rescue and relief and last but not the least rehabilitation and reconstruction measures.

Preparedness is a core element in the overall disaster management mechanism. The Oxford Dictionary defines preparedness as making ready; equip both things and people or put together. In an emergency situation for any country, Armed forces, especially the Army leading a number of civil organizations such as police, hospital, NGOs, volunteers and media has to play a vital role in the overall efforts to mitigate natural and man-made disasters. Since they are well equipped, trained and a cohesive force, they are supposed to play a vital role in times of calamities in relief and immediate response. Generally, during natural disasters, Army responds at the request of the civil administration. But at the time of crisis like a nuclear attack or accidents, it has to mobilise its resources at short notice with support functions such as communications, search and rescue operations, health and medical facilities, transportation, power, food and civil supplies, public works and engineering.

The knowledge know-how to stop the exposure to radiation is a must for any first hand responders. Although the exact biological effects of radiation exposure are yet to be under-

stood, the immediate radiation sickness has to be taken care of by the agencies in the aftermath. To stop the exposure to radiation, victims would have to be decontaminated by removing irradiated clothing, washing the skin, and purging inhaled or ingested materials from inside the body. The surrounding area would also need to be decontaminated to remove radioactive material, keep radioactive dust and debris from spreading, and protect food and water supplies.

How India is Ready to Face Nuclear Emergency

The threats discussed above in the paper and growing concern over the nuclear danger, Indian government has been trying to enhance the domestic preparedness and response mechanisms to cope with NBCR attacks/fallout. In India the work of the Army is equally complemented by the para-military forces like the Central Industrial Security Force (CISF) and Indo-Tibetan Border Police (ITBP). Both have trained special units to respond to natural and man made disasters. THE Union Government has already declared the Basic Training Centre of the Indo Tibetan Border Police (ITBP) at Bhanu, Chandigarh as a national-level institute to conduct nuclear, biological and chemical first responder course and a nodal centre for training specialists who will be the first to take action in case of NBCR emergencies.

Recently constituted National Disaster Management Authority (NDMA)[14] has plan to set up a National Disaster Response Force (NDRF), comprising 8,000 specially trained personnel of the central paramilitary forces, for undertaking rescue and relief operations in times of natural calamities and other disasters.[15] The NDMA will be assisted by a National Executive Committee comprising secretaries of ministries/departments such as agriculture, atomic energy, defence, water resources, environment and forests, finance, health, power, rural development, science and technology, space, telecommunications etc, besides the chief of the integrated defence staff. The NDMA would be responsible for drawing up the disaster management plan, coordinating and monitoring its implementation. Likewise it will ensure measures by various wings of the government for prevention and mitigating the effects of disasters and for undertaking a holistic, coordinated and prompt response to any natural or man-made disasters.

The first among eight proposed NDRF battalion is going to be stationed in Pune while the other seven would be based in Greater Noida near Delhi, Arrankonam near Chennai, Barasat near Kolkata, Gandhinagar in Gujarat, Guwahati in Assam, Mundali in Orissa, and Chandigarh. There would be 15 regional response centres. However, it is yet to lay down plans and policies for disaster management and approve the national disaster management plans. Again, the question remains how far these bases would oversee India's nuclear installations during emergency. The government has to ensure prompt mobilisations and response. The task at hand is uphill since its not nuclear emergencies alone which can be taken care of by these forces.

Notes

1 Peter D. Zimmerman, Jeffrey G. Lewis "The Bomb in the Backyard", Foreign Policy, November/December 2006.

2 The term 'disaster" signifies a catastrophe, mishap, calamity or grave occurrence affecting any area, arising from natural or man made causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and

destruction of, property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area. The Disaster Management Bill, India, 2005.

3 "Mortar attack on Pak N-facility," *Rediff.com*, May 17, 2006

4 AMBIO, *Nuclear War: The Aftermath*, Pergaman Press, Oxford, 1983, p. 13.

5 A.B. Pittock, et al., *Environmental Consequences of Nuclear War*, vol. 1, John Wiley & Sons, New York, 1986, p. 5.

6 S. Glasstone and P.J. Dolan (eds.), *The Effects of Nuclear Weapons*, Castle House Publications, U.K., 1980, p. 296.

7 A.B. Pittock, et al., *Environmental Consequences of Nuclear War*, vol. 1, John Wiley & Sons, New York, 1986, p. 18.

8 Eric Chivian, et al., eds., *Last Aid: The Medical Dimensions of Nuclear War*, W.H. Freeman and Comp., San Francisco, 1982, p. 236.

9 Iraq suspected to have tested a one-ton radiological bomb in 1987 but gave up on the idea because the radiation levels it generated were not that deadly. See, Gary Milhollin, Comments on the "Al-Q'aq'a Bomb," May 17, 2001. URL< http://www.iraqwatch.org/wmd/rdd.htm>

10 For most lucid account of RDD, See, Council of Foreign Relation http://www.cfr.org/publication/9548/

11 Robin M Frost, "Nuclear Terrorism After 9/11", *Adelphi Paper*, No.378, 2005. p.9.

12 "Muslim was planning dirty bomb attack in UK", The Telegraph (UK), October 13, 2006. For a brief analysis, See, Robert Wesley, "British Terrorist Dhiren Barot's Research on Radiological Weapons", *Terrorism Focus*, Vol. 3 (44), November 14, 2006.

13 Scott R. Taylor, et al., "Consequence Management: In Need of a Timeout," *Joint Force Quarterly*, Summer 1999, p.79. Also See for a general outline, Chris Seiple, "Consequence Management: Domestic Response to Weapons of Mass Destruction," *Parameters*, Autumn 1997, pp. 119-34.

14 With the Prime Minster as Chairman and retired chief of staff of the Indian Army General N C Vij as the vice-chairman, the NDMA has been constituted by Indian Parliament under National Disaster Management Bill -2005.

15 The NDRF would comprise eight battalions from the Central Reserve Police Force, Central Industrial Security Force, Indo-Tibetan Border Police and the Border Security Force and the force would be positioned at eight locations in different parts of the country. See, "National Disaster Response Force soon," *The Hindu*, October 24, 2005.