

radiological terrorism

Delhi experienced what could have been a “dirty bomb attack” and an “orphan” device containing a radioactive component was sold to a *kabari* (junk dealer) and found its way to Mayapuri. All those who handled it suffered radioactive burns and radiation sickness and it took days to clean up the radiation in a crowded commercial district.

The world is facing a persistent threat from terrorists whose purpose is to intimidate a population of combatant military / paramilitary forces and / or the undefended civilian targets by causing serious bodily harm resulting in death, injury, disease and disability. Terrorists seeking to unleash massive violence and destruction may graduate from using conventional explosives to release an industrial chemical or a military chemical / biological agent, use of a ‘dirty’ bomb or climb the escalation ladder to the highest rungs by detonation of a nuclear weapon.

Health hazards

A terrorist attack involving toxic radioactive material (TRMs) differs from other attacks involving conventional or improvised ‘explosives’ as it presents specific health hazards to the people in the shortest possible period. The likely purpose is to create great panic / hysteria, kill, injure, incapacitate or destroy life and cause damage to critical infrastructure, contaminate men and material and pollute the environment.

Radiological weapons can be deployed by terrorists in several ways (e.g., dispersion of radioactive aerosol; detonating radioactive material with conventional explosives and as Radiological Exposure Device). In the event of the use of Radiation Explosive / Dispersal Device or a ‘dirty bomb’ also called as RDD, there shall be potential exposures to unknown amounts of radiation from unknown radioactive materials. Thus, radiological terrorism is a ‘typical’ type of terrorism that can

cause great disruption of society.

Today there is a high risk of radiation exposures due to terrorism. Terrorist attacks shall impact people in the form of acute illness and after such nuclear events, the health effects will not only affect the people but also shall have long term psychosocial implications.

Orphan sources

Some sources of radioactive materials lack adequate regulatory control, sufficient accountability and proper disposal. They possess sufficient radiological hazard but are not under regulatory control because they have never been so, or have been abandoned, lost, misplaced, stolen or transferred without any paper authorisation. Found or abandoned sources are described as “orphan” when their identifying marks have been removed or damaged. Sometimes vulnerable sources can be regarded as the orphan sources when its regulatory control becomes weak. Orphan sources can cause multiple serious injuries if it is ill perceived by the individuals who find them.

These ‘orphan’ sources are becoming a matter of concern to one and all as increased radiation monitoring has uncovered a growing number of them. These sources might be used for malevolent purposes as there is strong reason to believe that nuclear technology is being transferred from the rogue countries to either directly between State to State, State to non-State actor, non-State actor to State, or through clandestine and / or criminal supplier networks.

There are reports that A. Q. Khan the ‘father’ of the Pakistani nuclear bomb, was at the centre of two illicit supplier networks - one bringing sensitive technology into Pakistan and the other transferring it out of Pakistan to Iran, Libya, North Korea and elsewhere.

The spread of nuclear technologies and expertise is also generating concerns about the potential acquisition of nuclear materials by terrorist groups. There are equally important questions regarding the ability of terrorists to control and secure TRMs from vulnerable places / countries. These orphan sources are a constant fear for the future as they can be used by the terrorists.

Radiological dispersal device

An RDD or ‘dirty bomb’ is dispersed with conventional explosives or some other dispersal mechanism (like aerosol / aerial sprayer) to spread radioactive contamination. RDDs are frequently characterised as ‘weapons of mass disruption’ rather than weapons of mass destruction as normally they are likely to affect relatively small areas compared to a nuclear detonation.

Though an RDD would be designed to disperse TRMs over a large area, a bomb that uses conventional explosives would likely have more immediate lethal effect than the radioactive material. At levels created from most probable sources, not enough radiation would be present to cause severe illness or death. The immediate environment, materials and persons in the affected area, will become ‘contaminated’ as





the radioactive material is deposited on surfaces.

Human body

The TRMs may enter inside the body through mouth, nose and intact / broken skin. Thus, the radiation exposures are expected both from external and internal contamination including possible radioactive shrapnel. The radiation affected population would

Improvised nuclear device

Another area of concern is an Improvised Nuclear Device (IND) that incorporates nuclear materials designed to produce a nuclear explosion. Fallout besides blast and heat from these weapon detonations may lead to contamination of an even greater number of persons with significant levels of radiation exposure from radioactivity contamination.



Dr. Rakesh Kumar Sharma

large numbers (~1,00,000) of 'orphaned'



depend on the type of radioactive material used and dispersal technology adopted. It is highly unlikely that persons in the contaminated area will have medically significant levels of contamination, but fear and concern regarding personal safety will lead to psychological stress.

Sealed sources spread in the environment generally do not present a contamination hazard. These sources can result in low-level exposures to persons who come near an individual source and involve external exposure only. However, persons who handle these sources may suffer significant local radiation injury to the skin and underlying tissues.

A test explosion and subsequent calculations done by the United States Department of Energy found that assuming nothing is done to clean up the affected area and everyone stays in the affected area for one year, the radiation exposure would be 'fairly high', but not fatal.

Doses to person will likely be due to both internal and external exposures. Medical resources will be quickly overwhelmed as most survivors will be exhibiting combined injuries from blast and thermal burns. The impact of radiation exposure will be secondary to medical management of conventional trauma.

Access

The intelligence challenge posed by such a structure is daunting, particularly if further compartmentalisation on special weapon-related activities ensues. The sufficiency of finances and other resources available to terrorist organisations for Chemical, Biological, Radiological and Nuclear (CBRN) acquisition is not a big issue for terrorists. Many terrorist groups are well organised, technically sound, have well connected global networks and have demonstrated their reach to easily accessible methodologies for preparing explosive items and improvised explosives. There is an availability of

radioactive sources in the world, more than thousands of which are sufficiently strong to cause harm.

Al Qaeda's interest

Al Qaeda's plans for constructing radiological weapons are well established after arrest of suspected radiological terrorists. As per International Atomic Energy Agency's report, there have been nearly 300 attempted radioactive materials smuggling incidents during the last decade. All this indicates towards a very high level of threat perception of radiological attack in the near future.

There have only ever been two cases of cesium-containing bombs and neither was detonated. Both involved Chechnya. The first attempt at radiological terror was carried out in November 1995 by a group of Chechen separatists, who buried a cesium-137 source wrapped in explosives at the Izmaylovsky Park in Moscow.



In December 1998, a second attempt was announced by the Chechen Security Service, who discovered a container filled with radioactive materials attached to an explosive mine. The bomb was hidden near a railway line in the suburban area Argun, ten miles east of the Chechen capital of Grozny. The same Chechen separatist group was suspected to be involved.

India vulnerable

This modern era can also be characterised by the rising threat of indiscriminate terrorism. India is equally vulnerable to such threats as any other country in the world having extensive and varied programme for peaceful uses of nuclear energy in power generation, non-destructive testing in industry, agriculture, medicine, research etc.

Assured targets

In present scenario, there is a very likely possibility that terrorists can use the (TRMs) against important persons, densely populated and crowded locations such as marketplaces, religious congregations, public functions, convention centers, overcrowded mass transportation systems and during sport events. Important government institutions including key economic, military, scientific and other sensitive installations etc., are also preferred targets for terrorist attacks.

Heightened threat

A deep analysis of the organisational structures employed by terrorists using conventional weapons is that of loose networks of independently-operating, specialised cells which come together on an *ad hoc* basis to execute a specific attack is likely to be replicated in acts of radiological terrorism. Rogue countries like Korea and Pakistan are sources for terrorists to gain CBRN materials. Literature suggests that a nuclear black market emanating in the erstwhile USSR, provides access to radioactive material and perhaps even sufficient quantities of fissile materials. There can now be little doubt that if such terrorists could acquire weapons-usable nuclear material clandestinely and learn how to make nuclear weapons, they would like to employ them at appropriate time.

The major obstacle to terrorists

intending to use nuclear devices is the acquisition of nuclear materials. Training of security personnel at facilities handling TRMs shall be an important deterrent. The increasing availability of fissile material is a key factor and primary determinant as to whether or not a terrorist group will resort to nuclear terrorism. There could not be even a little doubt that if a terrorist group acquires weapons-usable nuclear material from thieves and learn how to make nuclear weapons, they would tap into the nuclear phobia of people without necessarily causing mass casualties, in order to employ them in their attention-seeking tactics.

Non-State players

Anti-national actors may possess sufficient technical and financial resources to develop an active terrorist organisation such as Iran provided financial support to Hezbollah and Hamas and Al Qaeda received assistance from Sudan and Taliban-ruled Afghanistan. Furthermore, each of these three groups is thought to be interested in CBRN weapons; certainly, evidence uncovered in Afghanistan and elsewhere has underscored Al Qaeda's CBRN efforts. A State sponsor of terrorism, may be happy to employ a terrorist group using conventional weapons for State purposes, providing a group, over which it might have only incomplete control, with CBRN weapons may be too great a risk for many States. The possibility that a truly massive attack could be traced back to the sponsor, or that the group might turn on its sponsor, could prove a deterrent to CBRN sponsorship.

State sponsorship

In the end, however, most experts would agree that if a group did receive significant assistance in developing CBRN weapons from a sponsor State, that group would have the best chance of acquiring real capability of radiological terrorism. State-supported groups are often assessed to have the greatest potential for successful acquisition and effective use of radiological material.

State players provide technical / professional skill set to succeed in CBRN development. Although there are numerous disagreements about what level of proficiency is needed or

what level of resources may suffice estimates of likelihood of success vary considerably.

Very real threat

The threat of nuclear terrorism has moved from hypothetical to reality in twenty-first century. Rising issue of the radiological terrorism scenario employing the Radiological Dispersal Device (RDD) / Radiological Exposure Device (RED) or Improvised Nuclear Device (IND) needs to be addressed.


What is a dirty bomb?

The term dirty bomb refers to a speculative radiological weapon that combines toxic radioactive material (TRM) with conventional explosives. When such a bomb is detonated, besides the deaths and damage caused by the initial blast, the explosion also creates a small plume of radioactive particulates around the explosion site that can 'contaminate' a wide area, hence the attribute 'dirty'.

Why is it a threat?

Even if a dirty bomb does not kill a large number of people, it can have a major impact on the society or community and economy. Depending upon the half-life of toxic radiological materials involved - a dirty bomb attack can do major damage to the global economy (if it is targeting, for example, a key port or major financial district). Moreover, analysts say even the fear of a dirty bomb attack can have a disproportionate psychological impact and panic. If militants manage to acquire radioactive material they can cause considerable disruption. Hoax bomb alerts may shut down major operation / business / cities for hours together.

Radiological emergencies

Any radiation incident results in or having a potential to result in exposure and / or contamination of the medical persons, responders and civilian domain in excess of the respective permissible limits can lead to a nuclear / radiological emergency. 

The writer is Scientist 'G', Additional Director and Head, Division of CBRN Defence, Institute of Nuclear Medicine and Allied Sciences, Delhi.

