

TerranearPMC Safety Share

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Week of February 11, 2019 – Dirty Bombs

In recent years, a new term in warfare has emerged: Dirty Bombs. This term made notoriety in America in June 2002, when an al-Qaida terrorist named José Padilla was arrested at O'Hare International Airport in Chicago and charged with assisting in the construction of such a device. A dirty bomb or radiological dispersal device (RDD) combines radioactive material with conventional explosives. The design of such a device is to spread radioactive material and contaminate the immediate area, thereby creating fear and intimidation to civilians. So while RDDs require radioisotopes as a major component, the activation sequence should not be confused with a nuclear explosion, such as a fission bomb as what occurred in Hiroshima and Nagasaki.

Though an RDD would be designed to disperse radioactive material over a specified area, a bomb that uses conventional explosives and produces a blast wave could be far more lethal than the hazard posed by radioactive material that may be mixed with conventional explosives. The fact is, when appropriate actions are taken, the levels created from the radioactive materials used in a dirty bomb, would not cause enough radiation to result in severe illness or death. A test explosion and subsequent calculations performed by the United States Department of Energy found that, assuming nothing is done to clean up an affected area where persons remain in the area for one year, while radiation exposures would be "fairly high" but not fatal, such potential health effects would be due to - not the immediate exposure - but rather to the continuous exposure as a result of a lack of decontamination. Recent analysis of the nuclear fallout from the Chernobyl disaster confirms this, showing that the effect on many people in the surrounding area – with the exception of those in close proximity to the event - was almost negligible.

The radioactive material typically associated with dirty bombs include one of the following radioisotopes: cobalt-60, strontium-90 or cesium-137; although other materials can be used. Yes, these materials are radioisotopes and therefore can cause serious health effects to humans when an exposure is considerable (close contact and actual physical interaction for extended periods of time). These materials are typically the *result* of a fission reaction as opposed to *creating* a fission reaction. The main purpose of dirty bombs or RDDs, is to generate public fear; specifically, due to the physical release of these radioisotopes. This fear is the result of the public having very little knowledge of radioactivity, in conjunction with negative perceptions of such materials that have developed over the years.

Nevertheless, like many other things in our world, radioactive materials can be harmful when improperly handled or used. An example occurred Goiânia, Brazil, in the late 1980s when two metal scavengers broke into an abandoned radiotherapy clinic and removed a teletherapy source capsule containing powdered cesium-137 with an activity of 50 terabecquerels (a terabecquerel is equal to 1 trillion decays per second or 27 curies). They brought the radioactive source back to the home of one of the men to take it apart and sell as scrap metal. Later that day both men were showing acute signs of radiation illness with vomiting and diarrhea while one of the men had a swollen hand. A few days later one of the men punctured the 1 mm thick window of the capsule, allowing the cesium chloride powder to leak out and when realizing the powder glowed blue in the dark, he brought it back home to his family and friends to show it off. After 2 weeks of showing this



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material to the community, several people exhibited adverse health effects due to the apparent contamination, resulting in 20 people becoming seriously ill including 5 fatalities.

So while non-fissile radioactive material can cause severe illness, by understanding the characteristics of radionuclides and employing the simple controls of reducing exposure time, increasing distance and the use of shielding, the effects of a dirty bomb would be unlikely to cause the devastation as what occurred in Goiânia, Brazil. Therefore without proper community knowledge, a dirty bomb can create an alarming degree of chaos through mass panic. For this reason, dirty bombs are sometimes called "weapons of mass disruption."

Dirty bombs have been used in recent history; most notably in Chechnya during the separatist movement in the 1990's. During this conflict there were two cases of cesium-containing bombs. One involved a buried cesium-137 source that was wrapped in explosives and another involved a container filled with radioactive materials attached to an explosive mine. In both cases, the mandatory initial detonation by conventional explosive devices were never initiated.

One way to mitigate the effects of RDDs (i.e. panic and terror) is to educate the public on the nature of radioactive materials. As with many hazards, education on radiation is one of the most effective, yet most neglected mitigating factor related to radiological terrorism.

The Dirty Bomb Fact Sheet from FEMA states that the main danger of a dirty bomb comes from the initial blast rather than the radioactive materials. FEMA suggests the following guidelines to mitigate the risk of radiation exposure:

- Covering the mouth/nose with cloth to reduce risk of breathing in radioactive materials.
- Avoiding touching materials touched by the explosion.
- Quickly relocating inside to shield from radiation.
- Remove and pack up clothes. Keep clothes until instructed by authorities how to dispose of them.
- Keep radioactive dust outside.
- Remove all dust possible by showering with soap and water.
- Avoid taking potassium iodide, as it only prevents effects from radioactive iodine (I-131) and may instead cause a dangerous reaction.

Because RDDs contain radionuclides, they can be detected by any number of current monitoring technologies. For instance, radioactive materials that are being shipped into our ports of entry can be detected with Radiation Portal Monitors while unshielded radioactive sources may be detected by Geiger Counters, gamma-ray detectors, and even pager-sized radiation detectors. In addition to these measures, once deployed, their effectiveness can be drastically reduced through increased public awareness and the understanding that their true intent to cause chaos. Persons need to remain calm while using the techniques of reducing time of exposure, increasing distance and employing shielding methods.

Peace is not absence of conflict, it is the ability to handle conflict by peaceful means - Ronald Reagan

