RADIOLOGICAL DISPERSAL DEVICE – THE "DIRTY" BOMB

GENERAL

A Radiological Dispersal Device is one where conventional high explosive is detonated next to a source of radioactive material. The high explosive can be home made, commercial or military and ammunition items such as artillery shell, grenades, aircraft bombs or missile warheads could all be used. The radioactive material can be from normal medical or research materials or could be from radioactive waste by-products from nuclear generation facilities.

Radioactivity cannot be destroyed and can last, at dangerous levels for hundreds of years. All that can be done is to remove all contaminated material for disposal under normal radioactive waste disposal regulations. A badly contaminated area may not be habitable again. Clean up, where possible, may take many years.

It cannot be considered a weapon of mass destruction but could cause havoc and long-term detrimental effects regarding population, industry and commerce.

CHARACTERISTICS AND DESIGN PARAMETERS

The radiological material must be in a form that is safe for the terrorist to handle and transport to the detonation location. It must also be moved into position without alerting security services by causing casualties prior to the detonation time. This will mean that it would have to be shielded in some form of substantial container. This will affect how much material can be used and how it would be delivered to the detonation location. There is the possibility that suicide bombers may be prepared to dispense with some levels of shielding to facilitate transportation of the material. This is all dependent on the type, quantity and radioactive level of the material.

It can be a small device and the explosive is used to breach the shielding container and to disperse the radioactive material into the air. As the material is disseminated, fragmentation and dust caused by the explosion will become radioactive. The dust will rise and form a cloud, which will gradually drift down to ground depending on weather conditions.

The relative quantities of explosive versus radiological material, the shielding medium and detonation location will all dictate how efficient a dispersion of material and dust is achieved. Too much explosive and the dispersal will be too great and effectiveness reduced. Poor location may inhibit dispersion and limit effectiveness as regards area affected but levels of radioactivity in the small area will be greater and hence the possibility of greater lethality.

The explosion itself will cause the immediate casualties if detonated in a crowded area. Emergency services will be at risk from the radiation as they attempt to deal with these.

The radioactive material will not immediately kill people. Death will be dependent on dose received. This is a function of the type of radiation, radioactive level of the material and how long the person is subjected to the radiation. The worst case is where radioactive material is inhaled or forced into the body by fragmentation and is thus inside the body and not easily removed.

Radiation is cumulative. Repeated small doses over time are just as bad as a high level for a short time. This has implications for casualty handling, rescue and clean up operations. Radiation at high dose rates kills by penetrating the body and disrupting the electro-chemical balance of the body cells. This causes the cells to shut down and disrupts essential body functions. At lower levels, only cells particularly susceptible to radiation are affected (stomach/intestines). Vomiting and nausea are typical symptoms of such radiation poisoning. The body's immune system may also be severely inhibited. Even lower doses may not even be recognised at the time and not be evident for many years. They may only be evidenced by a susceptibility to various types of cancer.

Likely targets would be centres of population, in areas where people gather.

There is little technical expertise in the construction of a simple version of such a device but effectiveness may not be optimised. The skill is probably in sourcing, obtaining and handling the radioactive material.

PREVENTATIVE MEASURES

A detonation of a “dirty“ bomb will be confusing and it may not be evident, initially, that such a device was used. Explosions, of any type, could be associated with chemical, biological or radiological agents/materials. In the absence of any specific warning, initial reactions and procedures are likely to be the same for all such events. The situation will obviously be very difficult to control and deal with. Fear of the unknown will be a major factor in maintaining public order. Some measures that could be considered are given below. The reality is that there is the possibility that many people will be contaminated to a certain degree.

A simple, low cost dust mask, covering the mouth and nose, will prevent inhalation of the radioactive dust in the air. Handkerchiefs and clothing can be used in an emergency but care must be taken to keep the same side against the mouth/nose at all times. All must be discarded once out of the dust/fall out area.

As much skin as possible should be covered. This will allow outer, possibly contaminated layers to be discarded and removed for specialist disposal at a later stage. This minimises contact and prevents spread of contaminated dust.

The body can be showered to remove dust. Care must be taken to ensure that waste water is not too heavily contaminated. This may not be possible unless it is done centrally by rescue services or local authorities.

The building should be closed to prevent entry by persons whose clothing may be contaminated by the radioactive dust.

Air handling systems should be shut down to prevent contaminated air being sucked into a building and dispersed around it.

People, in buildings in the fall out area, and closest to the detonation location, should be advised to remain indoors until all dust has settled. They should congregate in the part of the building furthest from the detonation location and hence put as much shielding as possible between themselves and the source of highest radiation levels. They should then be evacuated as soon as possible to reduce exposure times. (see masks and clothing measures above) This would be best done under central control by emergency services.

People in buildings, in general, in the possible fall out area, should be advised to remain indoors. Once a degree of control is imposed and controlled evacuation and contamination reduction measures can be implemented, they should then be evacuated. Failing that, if they have to move, they should bear in mind the mask and clothing measures. They should at least strip off outer layers of clothing before entry into any other building.