

## June 2003 Radioactive sources and 'dirty' bombs

### What is a 'dirty bomb'?

A 'dirty bomb' is the name given to a conventional bomb that is also packed with radioactive material. It does not produce a nuclear explosion, and would probably not immediately kill more people than a similar bomb that contained no radioactive material. However the radioactive material that would be scattered in the area of the explosion could cause severe disruption in a city because it could require a huge cleanup effort over months or years, and because of the panic that might affect people nearby. The contamination effects on people and the environment would vary enormously depending on the amount and type of nuclear material involved, the site of the explosion and the wind direction.

No specialised knowledge is needed to make a 'dirty' bomb; almost anyone who can build a 'clean' bomb could make one if they could get their hands on radioactive material. There are reports of small amounts of nuclear material going missing, and of illegal trade in such items. According to the BBC. "In the past decade, there have been over 175 cases of terrorist and criminal incidents involving the smuggling and attempted procurement of radioactive material".

<http://news.bbc.co.uk/2/hi/americas/2037056.stm>

'Dirty bombs' have never been used by a state or terrorist organisation, although the UN discovered that Iraq conducted 'dirty' bomb tests during their war with Iran in the 1980s. They were trying to build a weapon that would contaminate a wide area to stop attacking troops from going there - much like a minefield. The experiment was abandoned when Iraq found that it was an ineffective weapon for military operations.

<http://www.fas.org/nuke/guide/iraq/other/radiological.htm>

### More information on 'dirty' bombs:

See the International Atomic Energy Agency page on radioactive sources:

<http://www.iaea.org/worldatom/Press/Focus/RadSources/index.shtml>

### Radioactive sources and 'dirty' bombs

The term 'radioactive source' in this context refers to containers of radioactive materials that are used in machines used by industry, universities and medical establishments.

Many companies and institutions are licensed to use such machines. Iraq, for example, would have used many such sources for a range of uses such as medical x-rays and for checking the welding of steel pipes in the oil industry.

The International Atomic Energy Agency (IAEA) reported in 2002 that: "*The radioactive materials needed to build a 'dirty bomb' can be found in almost any country in the world, and more than 100 countries may have inadequate control and monitoring programs necessary to prevent or even detect the theft of these materials*".

Its report "Inadequate Control of World's Radioactive Sources", ([http://www.iaea.org/worldatom/Press/P\\_release/2002/prn0209.shtml](http://www.iaea.org/worldatom/Press/P_release/2002/prn0209.shtml)) states that, of the millions of radioactive sources around the world, many are not a great danger to health. However, of these, many are 'orphaned' or outside official regulatory control. Even the US authorities report that "*US companies have lost track of nearly 1500 radioactive sources since 1996, and more than half were never recovered*". It reports that orphaned sources are a 'widespread phenomenon' in the former Soviet Republics, and that some of the lost sources are quite large and highly radioactive.

Sealed sources or their containers can be attractive to scavengers for the scrap metal trade because they appear to be made of valuable metals and may not display a radiation warning label. Cases where unsuspecting people or even members of the public have tampered with sources have led to serious injury and, in some cases, death.

**Examples of accidents with industrial sources:**

- In China, 1992, a cobalt-60 source (which emits strong gamma radiation and has a half-life of five years) was lost and picked up by an unsuspecting individual. Three persons in the family died of resulting overexposure;
- In Georgia, 1997, a group of border frontier guards became ill and showed signs of radiation-induced skin disease. Eleven servicemen had to be transferred to specialized hospitals in France and Germany. The cause of the exposures was found to be several abandoned caesium-137 (half-life 30 years) and a cobalt-60 sources of varying activities, abandoned in a former military barracks that had been under the control of the former Soviet Union;
- In Istanbul, Turkey in 1998, two cobalt-60 sources in their shipping containers were sold as scrap metal and ten persons were inadvertently exposed to radiation and had to be treated for acute radiation syndrome;
- In Peru, 1999, a worker put an iridium-192 industrial source in his pocket and suffered severe radiation burns;
- The most serious of these accidents occurred in the south-central Brazilian city of Goiânia in September of 1987.

**The Goiânia Incident**

Authorities believe that scavengers dismantled a metal canister from a radiotherapy machine at an abandoned cancer clinic and left it in a junkyard. During the dismantling procedure, the metal capsule that contained the caesium-137 source was ruptured.

Over the next week, several hundred people in Goiânia were exposed to the caesium-137, but did not know it. Some children and adults, thinking the caesium powder was "pretty", even rubbed it over their bodies. Others inadvertently ate food that had been contaminated with the radioactive powder.

After one week, a public health worker correctly diagnosed radiation syndrome when a sufferer visited a clinic. The Brazilian Nuclear Energy Commission sent in a team and they discovered that over 240 persons were contaminated with caesium-137, four of whom later died. The accident also contaminated homes and businesses and this required a major clean-up operation.

[http://www.iaea.org/worldatom/Press/P\\_release/2002/prn0209.shtml](http://www.iaea.org/worldatom/Press/P_release/2002/prn0209.shtml)