

# Terrorist CBRN: Materials and Effects

## Background

Al-Qa'ida and associated extremist groups have a wide variety of potential agents and delivery means to choose from for chemical, biological, radiological, or nuclear (CBRN) attacks. Al-Qa'ida's end goal is the use of CBRN to cause mass casualties; however, most attacks by the group—and especially by associated extremists—probably will be small scale, incorporating relatively crude delivery means and easily produced or obtained chemicals, toxins, or radiological substances. The success of any al-Qa'ida attack and the number of ensuing casualties would depend on many factors, including the technical expertise of those involved, but most scenarios could cause panic and disruption.

- Several groups of mujahidin associated with al-Qa'ida have attempted to carry out “poison plot” attacks in Europe with easily produced chemicals and toxins best suited to assassination and small-scale scenarios. These agents could cause hundreds of casualties and widespread panic if used in multiple simultaneous attacks.
- Al-Qa'ida is interested in radiological dispersal devices (RDDs) or “dirty bombs.” Construction of an RDD is well within its capabilities as radiological materials are relatively easy to acquire from industrial or medical sources. Usama Bin Ladin's operatives may try to launch conventional attacks against the nuclear industrial infrastructure of the United States in a bid to cause contamination, disruption, and terror.
- A document recovered from an al-Qa'ida facility in Afghanistan contained a sketch of a crude nuclear device.
- Spray devices disseminating biological warfare (BW) agents have the highest potential impact. Both 11 September attack leader Mohammad Atta and Zacharias Moussaoui expressed interest in crop dusters, raising our concern that al-Qa'ida has considered using aircraft to disseminate BW agents.
- Analysis of an al-Qa'ida document recovered in Afghanistan in summer 2002 indicates the group has

crude procedures for making mustard agent, sarin, and VX.

This pamphlet contains a summary of typical agents and CBRN devices available to al-Qa'ida and other terrorist groups. It is not intended to be a summary of the overall threat from al-Qa'ida's CBRN program.

## Chemical Agents

Terrorists have considered a wide range of toxic chemicals for attacks. Typical plots focus on poisoning foods or spreading the agent on surfaces to poison via skin contact, but some also include broader dissemination techniques.

### Cyanides

Terrorists have considered using a number of toxic cyanide compounds.

Sodium or potassium cyanides are white-to-pale yellow salts that can be easily used to poison food or drinks. Cyanide salts can be disseminated as a contact poison when mixed with chemicals that enhance skin penetration, but may be detected since most people will notice if they touch wet or greasy surfaces contaminated with the mixture.

Hydrogen cyanide (HCN) and cyanogen chloride (CICN) are colorless-to-pale yellow liquids that will turn into a gas near room temperature. HCN has a characteristic odor of bitter almonds, and CICN has an acrid choking odor and causes burning pain in the victim's eyes. These signs may provide enough warning to enable evacuation or ventilation of the attack site before the agent reaches a lethal concentration.

- Both HCN and CICN need to be released at a high concentration—only practical in an enclosed area—to be effective, therefore, leaving the area or ventilating will significantly reduce the agent's lethality.

Exposure to cyanide may produce nausea, vomiting, palpitations, confusion, hyperventilation, anxiety, and vertigo that may progress to agitation, stupor, coma,

## Spectrum of Terrorist CBRN Threats (

**Image**

*Castor beans, which grow on a common ornamental plant, can be processed by terrorists using crude equipment and common chemicals to produce the toxin ricin.*

**Image**

*We believe that al-Qa'ida has explored the possibility of using agricultural aircraft for large-area dissemination of biological warfare agents such as anthrax.*

**Image**

*Training videos found in Afghanistan show al-Qa'ida tests of easily produced chemical agents based on cyanide.*

**Image**

*Documents found in Afghanistan highlight al-Qa'ida's interest in the production of more effective chemical agents such as mustard, sarin, and VX.*

**Image**

*Al-Qa'ida has openly expressed its desire to produce nuclear weapons. We know that the group could easily construct a radiological dispersal device, or "dirty bomb" like the one shown here, which, while incapable of causing mass radiation-related casualties, could result in panic and enormous economic damage.*

and death. At high doses, cyanides cause immediate collapse. Medical treatments are available, but they need to be used immediately for severely exposed victims.

### Mustard Agent

Mustard is a blister agent that poses a contact and vapor hazard. Its color ranges from clear to dark brown depending on purity, and it has a characteristic garliclike odor. Mustard is a viscous liquid at room temperature.

- Mustard is not commercially available, but its synthesis does not require significant expertise if a step-by-step procedure with diagrams is available.

Initial skin contact with mustard causes mild skin irritation, which develops into more severe yellow fluid-filled blisters. Inhalation of mustard damages the lungs, causes difficulty breathing, and death by suffocation in severe cases due to water in the lungs. For both skin contact and inhalation, symptoms appear within six to 24 hours. There are only limited medical treatments available for victims of mustard-agent poisoning.

### Nerve Agents

Sarin, tabun, and VX are highly toxic military agents that disrupt a victim's nervous system by blocking the transmission of nerve signals.

- These agents are not commercially available, and their synthesis requires significant chemical expertise.

Exposure to nerve agents causes pinpoint pupils, salivation, and convulsions that can lead to death. Medical treatments are available, but they need to be used immediately for severely exposed victims.

### Toxic Industrial Chemicals

There are a wide range of toxic industrial chemicals that—while not as toxic as cyanide, mustard, or nerve agents—can be used in much larger quantities to compensate for their lower toxicity.

Chlorine and phosgene are industrial chemicals that are transported in multiton shipments by road and rail. Rupturing the container can easily disseminate these gases. The effects of chlorine and phosgene are similar to those of mustard agent.

Organophosphate pesticides such as parathion are in the same chemical class as nerve agents. Although these pesticides are much less toxic, their effects and medical treatments are the same as for military-grade nerve agents.

## Biological Agents

### Anthrax

*Bacillus anthracis*, the bacterium that causes anthrax, is capable of causing mass casualties. Symptoms usually appear within one to six days after exposure and include fever, malaise, fatigue, and shortness of breath. The disease is usually fatal unless antibiotic treatment is started within hours of inhaling anthrax spores; however, it is not contagious. Few people are vaccinated against anthrax.

- Anthrax can be disseminated in an aerosol or used to contaminate food and water.
- Cutaneous anthrax can be caused by skin contact with *B. anthracis*. This form of the disease, which is easily treated with antibiotics, is rarely fatal.

### Botulinum toxin

Botulinum toxin is produced by the bacterium *Clostridium botulinum*, which occurs naturally in the soil. Crude but viable methods to produce small quantities of this lethal toxin have been found in terrorist training manuals.

- Symptoms usually occur 24 to 36 hours after exposure, but onset of illness may take several days if the toxin is present in low doses. They include vomiting, abdominal pain, muscular weakness, and visual disturbance.
- Botulinum toxin would be effective in small-scale poisonings or aerosol attacks in enclosed spaces, such as movie theaters. The toxin molecule is likely too large to penetrate intact skin.

### Ricin

Ricin is a plant toxin that is 30 times more potent than the nerve agent VX by weight and is readily obtainable by extraction from common castor beans.

There is no treatment for ricin poisoning after it has entered the bloodstream. Victims start to show symptoms within hours to days after exposure, depending on the dosage and route of administration.

- Terrorists have looked at delivering ricin in foods and as a contact poison, although we have no scientific data to indicate that ricin can penetrate intact skin.
- Ricin will remain stable in foods as long as they are not heated, and it will have few indicators because it does not have a strong taste and is off-white in color.

## Radiological and Nuclear Devices

### Radiological Dispersal Devices (RDD)

An RDD is a conventional bomb not a yield-producing nuclear device. RDDs are designed to disperse radioactive material to cause destruction, contamination, and injury from the radiation produced by the material. An RDD can be almost any size, defined only by the amount of radioactive material and explosives.

- A passive RDD is a system in which unshielded radioactive material is dispersed or placed manually at the target.
- An explosive RDD—often called a “dirty bomb”—is any system that uses the explosive force of detonation to disperse radioactive material. A simple explosive RDD consisting of a lead-shielded container—commonly called a “pig”—and a kilogram of explosive attached could easily fit into a backpack.
- An atmospheric RDD is any system in which radioactive material is converted into a form that is easily transported by air currents.

Use of an RDD by terrorists could result in health, environmental, and economic effects as well as political and social effects. It will cause fear, injury, and possibly lead to levels of contamination requiring costly and time-consuming cleanup efforts.

A variety of radioactive materials are commonly available and could be used in an RDD, including Cesium-137, Strontium-90, and Cobalt-60. Hospitals, universities, factories, construction companies, and laboratories are possible sources for these radioactive materials.

### Improvised Nuclear Device (IND)

An IND is intended to cause a yield-producing nuclear explosion. An IND could consist of diverted nuclear weapon components, a modified nuclear weapon, or indigenous-designed device.

- INDs can be categorized into two types: implosion and gun assembled. Unlike RDDs that can be made with almost any radioactive material, INDs require fissile material—highly enriched uranium or plutonium—to produce nuclear yield.

## Online Resources

More detailed information on the medical aspects of chemical, biological, and nuclear weapons threats can be found at the following Internet sites:

### The Medical NBC Information server:

[www.nbc-med.org](http://www.nbc-med.org) and <http://www.nbc-med.org>

### Medical Research and Material Command:

[mrmc-www.army.mil](http://mrmc-www.army.mil)

### Medical Research Institute of Chemical Defense:

[chemdef.apgea.army.mil](http://chemdef.apgea.army.mil)

### Medical Research Institute of Infectious Diseases:

[www.usamriid.army.mil](http://www.usamriid.army.mil)

**National Institute for Occupational Safety and Health:** [www.cdc.gov/niosh/topics/chemical-safety/default.html](http://www.cdc.gov/niosh/topics/chemical-safety/default.html)

### US Department of Homeland Security:

[www.ready.gov](http://www.ready.gov)

### Central Intelligence Agency:

CBR Incident Handbook [www.cia.gov/CIA/Publications/cbr-handbook/cbrbook.html](http://www.cia.gov/CIA/Publications/cbr-handbook/cbrbook.html)