

TERRORISM

INTRODUCTION

The U.S. Federal Bureau of Investigation (FBI) defines *terrorism* as “the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom,” and distinguishes between *international terrorism* (involving “groups or individuals whose terrorist activities are foreign-based and/or directed by countries or groups outside the United States or whose activities transcend national boundaries”) and *domestic terrorism* (involving “groups or individuals whose terrorist activities are directed at elements of our government or population without foreign direction”).

Emergency response services may become involved in terrorist acts in two ways: first (and most obvious), simply because they respond to any community emergency, whatever its cause; second (and too often ignored), because they themselves may become the object of terrorist acts or otherwise unwittingly become pawns in terrorist strategy.

To emphasize the difference in these two types of involvement, it is instructive to consider that, while “intimidation, coercion or ransom” may in fact be key motivational dimensions of documented terrorist acts, other emotions, volitions, and psychological states can as well serve to unleash wanton disregard for human life—including “revenge,” “anger and frustration,” and even (albeit perversely and pathologically misguided) a “sense of excitement or challenge.”

From this perspective, response services can become the objects of terrorist violence for several and diverse reasons:

- because they are high-profile targets of opportunity; or,
- because their dependable response to an emergency situation makes them predictable and therefore susceptible to the advanced planning of those intent on murder; or
- because they are so central to community safety and health and yet finite in number they become that first shield of defense to break apart before releasing a more concerted onslaught on the community proper; or
- because their field operations necessarily entail physical disruptions of normal traffic flows and so occupy the attention of other community services and the public that they can be used both as tactical bottlenecks and feints in a many-layered stratagem for city-wide destruction.

As these examples demonstrate, to focus on “intimidation, coercion or ransom” as the sole or even primary (or even necessary) motivations of terrorism is, perhaps, to define the risk presented by terrorism to emergency services (and, thence, to the public at large) too narrowly, essentially ignoring not only the range of human motivations for inventing horror, but also a basic corollary of any humanly contrived and directed violence—*that if you play a tactical role against the interests of an adversary, then you yourself become of special interest in that adversary’s strategy.*

It is important to be very clear here—the intent is not to derogate the FBI’s definition of terrorism but, rather, to argue as strongly as possible against automatically and uncritically extending that definition into the province of emergency response. Definitions, after all, are precisely whatever we choose them to be, and the FBI and other organizations define things as they do to meet the organizational and legal constraints of their activities. But the objectives, constraints, and activities of the FBI are not those of community response services, which should quickly come to understand that they are subject to the hazards imposed not only by their response to terrorist-caused incidents, but also by themselves becoming targets—that they are at risk not only of the physical, chemical, and biological agents wielded by terrorists, but also of strategies contrived by terrorists.

POTENTIAL TERRORIST WEAPONS

Regardless of underlying motivation, a terrorist act is most brutally characterized by the willful use of weapons of mass and indiscriminate murder and destruction. Historically, the typical terrorist weapon has been an explosive device. However, there is a wide range of weaponry that is increasingly available to terrorists. The U.S. Department of Justice and the Federal Emergency Management Agency (FEMA) use the acronym B-NICE to denote this range, the letters standing for: Biological, Nuclear, Incendiary, Chemical, and Explosive incidents.

Biological Incidents

Biological agents include microorganisms (i.e., bacteria, rickettsia, and viruses) and by-products of microbiota (e.g., *Botulinum* toxin) that can be disseminated within human populations by such means as atmospherically released aerosols and particulates, the contamination of food, water, and other common-use items (e.g., cosmetics, clothing), and the use of living carriers (humans and animals). Biological weaponry is not, as many think, a new development or the product of the “Cold War” rather, such weaponry has been used for hundreds of years with devastating effect.

Documented instances of the use of biological weapons in warfare include the use of plague-infested corpses as a means of disseminating the Bubonic plague throughout a besieged city (1346 AD), the use of virus-contaminated blankets to spread smallpox among American Indian loyalists to the French (1759 AD), and the long established use (from Roman times through the American Civil War) of both human and animal corpses to contaminate the water supplies of opposing armies (see Lt. Col. Terry Mayer, USAF, *The Biological Weapon: A Poor Nation's Weapon of Mass Destruction*; <http://www.cdsar.af.mil/battle/chpt8.html>).

Beginning with World War I and extending through all subsequent wars to the present, the potential for biological warfare resulted in concerted research and development regarding both the use of and the response to biological warfare agents. Despite the unilateral action of the U.S. in the early 1970s to destroy its offensive biological warfare capability, and despite subsequent actions by the world community of nations to remove the threat of biological warfare, the relevant technologies for the production, storage, and delivery of such agents are well developed and, because of their essential simplicity as well as low cost, are readily available.

While the World Health Organization (WHO) has estimated that a single incident involving a deadly biological agent could result in approximately 100,000 deaths and an even greater number of incapacitated victims, it is a mistake to assume that a terrorist incident involving biological agents would necessarily be directed against large populations. They can as easily be used against a small population—targeted, perhaps, as part of a more community-wide strategy or, perhaps, simply out of personal revenge.

For example, in the mid 1980s, 751 people in Oregon became severely ill after dining at several restaurants. Two years later, a member of a religious cult confessed that these illnesses were the direct result of a plot to contaminate the salad bars in these restaurants with the pathogenic bacterium *Salmonella*. The objective of the plot was to incapacitate enough of the local population to influence the results of an election in which one of the key issues was land-use disputes between the sect and local officials. Other similar incidents involving the purposeful use of biological agents (e.g., the bac-

terium *Shigella*) against relatively small numbers in a selected population have been more recently documented, including hospital and laboratory staff members (Texas) who evidently became targets of personal revenge rather than, as in the Oregon case, of political strategy.

Examples of microbial diseases that could be employed by terrorists include:

- Anthrax: Contagious disease of warm-blooded animals caused by *Bacillus anthracis* bacterium; characterized by fever, prostration, malignant pustules on exposed skin, and internal hemorrhage
- Cholera: infectious disease of the small intestine caused by *Vibrio cholerae* bacterium; characterized by profuse watery diarrhea, vomiting, muscle cramps, severe dehydration, and depletion of electrolytes
- Bubonic Plague: contagious, often fatal epidemic disease caused by *Yersinia pestis* bacterium; transmitted from person to person or by the bite of fleas from an infected host, especially a rat; characterized by chills, fever, vomiting, diarrhea, and the formation of buboes (i.e., inflamed, tender swellings of lymph nodes, especially in the area of the armpit or groin)
- Tularemia: infectious disease caused by *Francisella tularensis* bacterium; chiefly affects rodents but can also be transmitted to human beings by bite of various insects or contact with infected animals; characterized by intermittent fever and swelling of the lymph nodes
- Salmonellosis: infection caused by intestinal bacteria of the genus *Salmonella*; characterized by nausea, abdominal pains, diarrhea, and fever; it can lead to death, especially in people with impaired immune systems
- Staphylococcus infections: any of a number of infections caused by bacteria of the genus *Staphylococcus*; characterized by abscesses, boils, and other infections of the skin; can also produce infection in any organ of the body (e.g., staphylococcal pneumonia in the lungs)
- Q Fever: infectious disease caused by *Coxiella burnetii* rickettsia; characterized by fever, general malaise, and muscular pains
- Epidemic Typhus: Any of several infectious diseases caused by rickettsia (e.g., *Rickettsia prowasecki*); typically transmitted by fleas, lice, or mites; characterized by severe headache, sustained high fever, depression, delirium, and the eruption of red skin rashes
- Smallpox: highly contagious, sometimes fatal, viral disease; characterized by a high fever and successive stages of severe skin eruptions
- Lassa Fever: often fatal viral disease endemic to West Africa; characterized by high fever, headache, ulcers of the mucous membranes, and disturbances of the gastrointestinal tract
- Hemorrhagic Fever: Type of fever characterized by profuse bleeding from internal organs and rapid wasting and death; caused by variety of viruses (e.g., Ebola virus; Marburg virus)

- Venezuelan Equine Encephalitis: Viral infection of the central nervous system, with potentially fatal swelling of the brain
- Hanta Disease: viral infection due to any member of the genus *Hantavirus*; transmitted by rodents; characterized by flu-like symptoms and, in more severe cases, shock, kidney failure, internal bleeding, fluid accumulation in the lungs, and death.

Among the metabolic by-products of microbial growth are potent chemicals collectively known as toxins, which can also be used as biological weapons. Such toxins include bacterial toxins, plant toxins, and other molecules (i.e., bioregulators) which, though not (in a strict sense) toxins, can exert toxic-like effects on the body.

Examples of such substances include:

- Diphtheric toxin: potent toxin produced by the bacterium *Corynebacterium diphtheriae*, which causes tissue destruction and the formation of a gray membrane in the upper respiratory tract that can detach to cause asphyxiation; toxin may also enter into blood and subsequently damage tissues elsewhere in the body
- Botulin toxin: extremely potent toxins typically associated with food poisoning; produced by *Clostridium botulinum* bacterium; characterized by disturbances in vision, speech, and swallowing and, within a few days, paralysis of respiratory muscles and death by suffocation
- Clostridian toxin: toxin produced by the bacterium *Clostridium perfringens*, the causative agent of gas gangrene; characterized by slow asphyxiation and subsequent necrosis (cellular death) of living tissue
- Staphylococcus Enterotoxin Type B (SEB): toxin produced by bacterium *Staphylococcus aureus*; most commonly associated with food poisoning; characterized by stomach cramps, diarrhea, and vomiting.
- Saxitoxin: produced by marine blue-green alga (i.e., cyanobacterium), which serves as food supply for various shellfish that are immune to effects of the toxin, but pass it on to higher order consumers (e.g., humans); in humans, toxin acts on central nervous system to produce paralysis; at high doses, death can occur in less than 15 minutes
- Ricin: mixture of poisonous proteins produced by the castor oil plant; plant gene controlling the production of ricin has been successfully transferred to the bacterium *Escherichia coli*; ricin interferes with the body's normal synthesis of proteins; symptoms include decreased blood pressure, with death occurring most often through heart failure
- Substance P: a protein closely related to normally produced proteins in the body; may cause pain, or act as anaesthetic, or affect blood pressure; rapid loss of blood pressure in victim may cause unconsciousness

With regard to biological weapons, it is necessary to emphasize several facts that underscore the growing concern about their potential use by terrorists:

1. Many of the diseases of primary concern have long been recognized for their potency as human pathogens. Anthrax, for example, reached epidemic proportions in the Roman Empire, resulting in sharp reductions in human populations over a period of 5 years. Similar epidemic outbreaks have occurred throughout history and, even with the invention of effective vaccines for animals (Pasteur; 1861) and humans (Koch; 1883), modern outbreaks have occurred—most notably in the USSR in 1979, when there was an accidental release of dry anthrax spores at the Microbiology and Virology Institute, a Soviet biological warfare facility. This incident resulted in the contamination of an area with a radius of at least 3 kilometers. Despite strict Soviet censorship concerning this incident, it is estimated that from several hundred to several thousand people died after inhaling the spores and contracting pulmonary anthrax.

The decision of the U.S. government in 1997 to inoculate troops that could possibly be assigned to duty in the Persian Gulf in opposition to Iraq, which is considered to have developed anthrax as a biological weapon, underscores the potency of this ancient disease. However, as potent as the causative bacterial agent (*Bacillus anthracis*) of anthrax is, there can be no doubt that modern biotechnologies can be used to develop and mass-produce even more potent bacterial strains.

2. Whether the intent is to mass-produce known lethal microbial by-products (e.g., ricin), existing pathogens, or newly engineered pathogens, the relevant biotechnologies (e.g., fermentation techniques, DNA amplification, genetic engineering) are universally available and cheap, require little space, can be implemented without the use of highly sophisticated equipment, and are essentially impossible to detect or to distinguish from legitimate uses except through their lethal consequences.

3. As with any means of mass destruction, the delivery of the weapon to the intended target is a primary constraint on its actual use. At one extreme is thermonuclear weapons, which (at least, at a national level) require highly engineered, sophisticated rockets. Far less sophisticated engineering is required, of course, for the delivery of explosive devices, which can be efficiently delivered by means of home-made mortars, cars, and trucks, as well as by a single person harnessed to a bomb. With regard to biological weapons, the primary requisite sophistication for effective delivery is in planning and execution—not in engineering.

Whether the target is a large or small population, many biological agents can be effectively dispersed with minimum dependence on mechanical contrivance—in all probability, dependent more on simple access to a vul-

nerable population than anything else. Of course, in the case of viable pathogens (as opposed to toxins), access can be quite indirect because, once infected, even a single victim becomes a disease vector within the larger population.

4. Easily engineered to maximize potency, easily manufactured and hidden from detection, and easily dispersed into large and small target populations, biological agents are also highly cost-effective, with killing rates equivalent to those of conventional means at comparatively tiny fractional cost and with a manifold increase in certitude.

5. While modern terrorist incidents have been characterized essentially by a clearly defined instant of horror (e.g., as in an explosion or shooting), biological incidents (especially those involving the use of viable microbes) are much more likely to be discernible only after a period of several days or weeks—a period referred to as the *incubation period*, which is the time required for a disease to result in clinically defined symptoms. Depending on the length of the incubation period, as well as on the virulence and clinical severity of the disease, a terrorist incident involving biologicals would therefore tend to evolve through various distinct (though also overlapping) phases, most of which could impose profound restraints on normal social interactions.

The first phase would extend from the time of the release of the microbial agent to the time at which clinical symptoms become recognized and defined. During this period, the disease would spread surreptitiously and essentially unencumbered through the targeted population. Once clinical symptoms become obvious, a second phase would likely be characterized by a (possibly overwhelming) press on limited and most likely unprepared community hospitals and public health services, accompanied by growing public fear if not panic. Subsequent phases would be characterized by concerted effort to determine preventive and treatment alternatives; to contain the spread of disease and to manage secondary exposure; to secure or, as necessary, develop sufficient stockpiles of antidotes/vaccines; and, finally, to implement population-wide preventive/treatment methods.

Nuclear Incidents

Potential nuclear agents are of two basic types: actual thermonuclear devices, and conventional explosive devices that structurally incorporate nuclear materials (*radiological dispersal device*, or RDD) and which could therefore be used to disperse hazardous nuclear materials over an extended area. It is also possible to achieve the same effects of an RDD by detonating conventional explosives in the immediate vicinity of normal sources of nu-

clear materials, such as nuclear plants or transport vehicles carrying nuclear cargo. While the access of terrorists to thermonuclear devices cannot be ruled out as a possibility, by far the more likely possibility is the terrorist use of RDDs or, as described above, RDD-equivalent incidents involving normal sources of nuclear materials.

The health impact of nuclear materials is due to three types of radiation (or particles) characteristically emitted as a result of the natural radioactive decay of nuclear materials:

- Alpha particles, which are indistinguishable from the nuclei of helium atoms (2 protons and 2 neutrons): Being very heavy and relatively slow moving, alpha particles travel only small distances (e.g., few inches) before they become absorbed. They cannot penetrate human skin. They are dangerous, therefore, only when they enter the body through the ingestion of contaminated food or water, or the inhalation of dusts or other contaminated materials—either of which results in the direct exposure of internal body organs to alpha particles.

- Beta particles, which are fast moving electrons: Because they are much smaller than alpha particles and travel at very high velocity, beta particles can penetrate into human skin tissue. At high levels, they can cause skin burns. As with alpha particles, the danger of beta particles is through direct exposure of internal organs after ingestion and/or inhalation of contaminated materials.

- Gamma radiation (or rays), which is a form of high-energy (i.e., high-frequency) electromagnetic radiation that is indistinguishable from energetic X rays: Traveling at the speed of light, gamma radiation can penetrate through the human body as well as through most materials, causing severe and even fatal injury to tissues and organs. Early symptoms of high exposure include skin burns, nausea, vomiting, high fever, and hair loss; later symptoms include the development of various types of cancers, and diminished immunological capacity.

In an RDD-incident, first responders are at immediate risk from all three types of radiation. Where the incident involves the generation of large amounts of dust and smoke that can be wind-driven over great distances, large populations become subject to the risks attendant to the inhalation and ingestion of contaminated materials, resulting in significant, long-term interruption of normal daily life and consequent severe (and possibly overwhelming) strain on community resources and services.

Incendiary Incidents

An incendiary device is any mechanical, chemical, and/or electrical device specifically designed to start a fire. Whatever the arrangement of me-

chanical, chemical, and/or electrical components, any incendiary device consists of (a) an igniter or fuse, (b) a container, and (c) a flammable or combustible accelerator that, once ignited, serves as a source of fire for surrounding combustible materials. The igniter or fuse may be as simple as a lighted cigarette or a chemically impregnated fuse, or as complex as a sophisticated electrical circuit that incorporates pressure-, light-, or sound-detectors as well as radio-frequency components. Containers (for the accelerator) may be of any shape and any material and, therefore, easily camouflaged to appear as an ordinary item in any type of surrounding. Accelerators are typically liquid or solid, but may also be gaseous.

The range of possible designs of incendiary devices is essentially infinite, limited only by the inventiveness of the designer. Regardless of the sophistication of actual design, essential mechanical, chemical, and electrical components are readily available at low cost, being nondistinguishable from legitimate items in daily commerce. In fact, highly effective and reliable incendiary devices can easily be composed using materials and items typically found in any American home. Moreover, the knowledge needed to contrive such devices is commonplace in the printed and electronic libraries of both general and specialized references that are available to anyone.

Chemical Incidents

Chemical agents may be variously classified. For example, they may be classified on the basis of their volatility, with volatile agents being those that can be used to contaminate the atmosphere and, nonvolatile agents being those that can coat surfaces. They may also be classified on the basis of whether they are intended to result in death (i.e., lethal agents) or in incapacitation of victims (e.g., nausea, disorientation, visual problems). Most often, chemical agents are classified on the basis of the types of effects they cause in victims. This is the scheme commonly used by the U.S. Department of Justice and the Federal Emergency Management Agency—a scheme that recognizes five basic classes of chemical agents:

- Nerve agents (disruption of transmission of nerve impulses)
- Blister agents (cause severe burns to eyes, skin, and respiratory tract)
- Blood agents (interfere with capacity of blood to transport oxygen)
- Choking agents (cause severe stress on respiration)
- Irritating agents (causing sufficient respiratory distress, tearing, and/or skin pain to temporarily incapacitate victim)

The development of modern biotechnologies obscures historical distinctions between biological and chemical warfare agents that have been perpetuated by international law and convention as well as by military prac-

tice. For example, while certain toxins and bioregulators are several thousand times more potent than even the most lethal nerve gases, they are not classed as chemical warfare agents. Because the terminology related to warfare-armatoria is typically applied to the “weaponry” of terrorism, biologically derived toxins and bioregulators that may be used by terrorists are classified as biological agents despite their being chemicals in precisely the same physical sense as mustard gas. Also, similarly excluded from the above list of agents are pesticides that, whether they are directed against plants (i.e., herbicides) or animals (e.g., piscicides, molluscides), are also potential terrorist weapons.

On the basis of these considerations, it is imperative that emergency response personnel clearly understand that the five classes of chemical agents listed above represent selected categories from among a much larger number of types of chemical hazards imposed by terrorist activity—and that they have been selected because they represent, for the emergency responder as well as for military personnel, immediate personal risk.

I. Nerve Agents

In their pure form, nerve agents are colorless, odorless, and tasteless chemicals having a wide range of volatility. They enter into the body primarily through inhalation and/or absorption through the skin; however, nerve agents may also be consumed via contaminated food and water.

Poisoning is usually most rapid as a result of inhalation, which facilitates the blood’s distribution of the nerve agent to target organs throughout the body. Death can occur in a matter of minutes, although (depending on the specific agent and its ambient concentration) distinct symptoms may become evident prior to death, including:

Symptoms of Initial Poisoning

- Increased salivation
- Contraction of pupils, dim and blurred vision, pain in the eyes
- Runny nose and pressure in chest
- Headache and nausea
- Slurred speech
- Hallucinations
- Unexplained tiredness

Symptoms of Progressive Poisoning

- Uncontrollable salivation, lachrymation, urination, and defecation
- Involuntary contraction of muscles
- Excessive sweating
- Coughing and difficulty in breathing
- Abdominal pain, nausea, vomiting

- Giddiness, anxiety, difficulty in thinking

If the primary mechanism of entry into the body is absorption through the skin, the symptoms of poisoning may not become evident for 15–30 minutes after initial exposure. However, at high ambient concentrations, death typically occurs within a few moments after the first symptoms appear. It is therefore crucial that the earliest symptoms be immediately recognized (i.e., salivation, chest pressure, contraction of pupils, blurred vision) so that appropriate antidotes (e.g., atropine, oximes) can be administered.

Because of the extreme rapidity of the action of nerve agents, it is sometimes necessary to administer preventive antidotes. Preventive antidotes (pyridostigmine, diazepam) are given in the form of tablets, which require up to 30 minutes to begin having a protective effect, with maximum effect realized about 2 hours following ingestion. Preventive antidotes are therefore most effectively used when it is judged that there is a high likelihood of exposure to nerve agents and there is sufficient time (i.e., 2–3 hours) to take appropriate preventive action. One indication of a situation in which the use of preventive antidotes may be considered would be the on-site presence of many dead insects, birds, and other animals. Another would be the discovery of supplies of nerve gas ingredients during response operations.

Nerve agents are known by American alpha denomination (e.g., GA), common name (e.g., Tabun), and scientific name (e.g., *o*-ethyl dimethylamidophosphoryl cyanide). Except for the letter V, the first letter in alpha denominations designates the country that first developed the agent (e.g., G: Germany), and the second letter indicates the relative order in which the agent was developed (e.g., A: first). In V-designated agents, the V stands for venom, while X stands for one of the chemical components in the chemical compound.

The most important nerve agents are:

- GA or Tabun [*o*-ethyl dimethylamidophosphoryl cyanide]
- GB or Sarin [isopropyl methylphosphonofluoridate]
- GD or Soman [pinacolyl methylphosphonofluoridate]
- GF [cyclohexyl methylphosphonofluoridate]
- VX [*o*-ethyl *s*-diisopropylaminomethyl methylphosphonothiolate]

It should be noted that while Sarin was used by Iraq during the Iraq–Iran war (1984–1988), it was also used by Japanese Aum Shinrikyo Cult members against fellow civilians in a Tokyo subway (1995). In this incident, cult members punctured plastic bags containing Sarin in several different subway cars. Despite this primitive mode of release, the incident resulted in a dozen deaths and the serious injury of almost 6000 additional commuters.

Nerve agent devices may be manufactured in so called “ready to use” (unitary) form, in which state the agent is fully active and need only be

released, or in binary form, in which two or more ingredients must be mixed with one another to produce the active agent.

Because binary devices essentially contain inactive ingredients up to the moment of mixing, they are safer to manufacture, store, and transport than are fully activated, unitary devices. They are also likely to be less reliable, because the mixing of ingredients must be held within certain constraints of temperature and concentration in order to maximize the production of the active agent—a fact that is of primary concern regarding their military use, which requires a high level of dependability and efficiency for each of large numbers of devices. However, terrorists need not worry about quality control of large stockpiles of identical weapons, whereas the relative ease of storing and transporting could be of primary concern to terrorists in the planning and execution of a specific incident.

For example, if the objective is to kill and incapacitate a large number of people in an urban setting, it would make little sense to use an explosive device to release a nerve agent—the noise of the explosion and resultant panic and confusion would serve to disperse the target population away from lethal concentrations. The more insidious and efficient approach would be to activate strategically located devices so as to release the agent silently and otherwise as unobtrusively as possible. In such a scenario, the act of placing devices becomes of critical importance, requiring perhaps an extended period of time (e.g., months)—during which time it becomes necessary to ensure that there is no premature release that would serve as warning. Radio-controlled, nonexplosive binary devices installed and camouflaged into basic infrastructure (HVC components, sewer conduit, electrical conduit, building raceways, street culverts) could serve this purpose.

2. Blister Agents

Also known as mustard agents, blister agents are colorless and, while having a characteristic garlic or onion odor, they quickly dull the sense of smell. Readily penetrating clothing and skin, blister agents not only produce burn- and blister-like wounds, but also interfere with a large number of essential cellular processes in living tissue.

Examples of blister agents include:

- Mustard gas [bis-(2-chloroethyl)sulfide]
- O-Mustard [bis (2-chloroethylthioethyl)ether]
- Nitrogen mustard [bis(2-chloroethyl) ethylamine]
- Lewisite 1 [2-chlorovinyl]dichloroarsine]
- Lewisite 2 [bis (2-chlorovinyl) chloroarsine]
- Lewisite 3 [tris (2-chlorovinyl)arsine]

The timing of appearance of symptoms after exposure depends upon the specific agent, varying from immediate to delayed appearance (e.g., 2 to

24 hours after exposure). Depending upon exposure levels of specific agents, symptoms may include:

- Aching eyes and lachrymation
- Inflammation of skin
- Skin blisters and necrosis
- Irritation of mucous membranes
- Hoarseness, coughing, and sneezing
- Loss of sight
- Abdominal pain, nausea, blood-stained vomiting, and diarrhea
- Severe respiratory distress due to lung lesions; pulmonary edema
- Significant injury to bone marrow, spleen, and lymphatic tissue, with resultant diminution of immune response

Death of exposed persons is typically due to complications from agent-induced injury to lung tissue and, to a lesser extent, to secondary infections as a result of agent-mediated reduction in immunological capacity.

Nonlethal effects of low-dose exposures to blister agents are not known; however, at high, long-term doses, mustard gases and lewisites are known to increase the risk of cancer (skin, respiratory tract) as well as other dysfunctions, including chronic respiratory diseases, chronic psychological disorders, and suppression of the immunological system. While mustard gases are classified as mutagens on the basis of animal studies, it is unknown if they present significant mutagenic risk to humans.

There is no comprehensive antidote for blister agents. While dimer-captopropanol yields good protection against minor injuries to skin and mucous membranes, the primary form of treatment consists of removal of the victim from sources of additional exposure, decontamination of the body, and the treatment of symptoms, including the use of antibiotics against secondary infections.

3. Blood Agents

By interfering with the transfer of oxygen between red blood cells and body tissue, blood agents (e.g., hydrogen cyanide, cyanogen chloride) cause asphyxiation of living tissue (especially heart and brain tissue), resulting in rapid death. While the primary route of entry is primarily through inhalation, hydrogen cyanide as well as cyanide salts in solution can be absorbed through the skin.

At high concentrations of hydrogen cyanide (e.g., 300 mg/m³), death occurs within a matter of seconds. At low concentrations, distinct symptoms may progressively develop over a period of several hours and, depending upon exposure time, may include:

- Restlessness
- Increased rate of respiration
- Lachrymation
- Giddiness, headache
- Heart palpitation
- Irritation of lungs, respiratory difficulty
- Vomiting
- Convulsions
- Respiratory failure

Blood agents are typically generated by the mixture of cyanide salts (e.g., sodium cyanide, potassium cyanide) and acids (e.g., hydrochloric acid) that are readily available as common industrial chemicals. As with nerve gases, terrorist devices may easily be constructed in binary mode, with the mixing of precursors achieved by simple timing mechanisms or by radio-control devices. Because blood agents are liquids while under pressure but become gaseous at normal atmospheric pressure, unitary devices can be easily activated through simple mechanical or electrical means.

While low-level cyanide poisoning can be treated medically (e.g., sodium thiosulfate, sodium nitrite, demethylaminophenol), it is necessary—given the rapidity of toxic effects—that such treatment be quick. Antidotes that can be used for pretreatment are under active development.

4. Choking Agents

These agents (e.g., chlorine, phosgene) cause severe irritation of the lungs, with the consequence that lung tissue secretes large volumes of fluids. Because of the presence of these fluids in lung cavities (the condition known as pulmonary edema), the lung cannot function to exchange oxygen and carbon dioxide, and the victim asphyxiates—literally drowning in his own body fluid. In addition to severe respiratory stress, symptoms include extreme irritation of the eyes.

Choking agents are readily available as common industrial gases, and are easily stored and transported in variously sized gas bottles and cylinders.

5. Irritating Agents

Also called riot control agents or tear gas, irritating agents such as chloropicrin, MACE, tear gas, pepper spray, and dibenzoxazepine are used to cause respiratory distress and uncontrollable tearing of the eyes. They may also cause severe skin pain, nausea, and vomiting. Although irritating agents are designed to incapacitate rather than to kill, lethality is possible in certain

circumstances, such as extremely high ambient concentration, or victim hypersensitivity.

Most irritating agents are readily available from retail markets. Many may also be easily manufactured from common industrial chemicals or standard laboratory supplies.

INCIDENT SITE AS CRIME SCENE

In 1996, the U.S. Fire Administration (USFA) undertook the development of a series of training courses on emergency response to terrorism. The objective of these courses, which are offered through the USFA's National Fire Academy, is to introduce first responders to the consequences of emergency response to terrorist incidents. A self-study training program ("Emergency Response to Terrorism: Self-Study") is also available for **download**. One of the points given special emphasis in these excellent courses is the fact that *any response to an incident other than a natural disaster may be a response to a crime scene*. There are several necessary precautions that follow from this dictum:

I. Recognition of Warning Signs

It must be understood that a terrorist objective may be not simply to cause a particular incident (e.g., an explosion or fire), which will of course result in an emergency response, but also to lure responding community services into an ambush. Whether the target is the immediately involved population at the incident site or the responders to that incident, emergency personnel must be constantly alert to any warning signs of terrorist involvement.

The USFA identifies various signs or signals that may warn of the presence of lethal agents included in the five categories of incidents discussed above, including:

Biological Incidents

- Unusual numbers of sick or dying people or animals
- Dissemination of unscheduled and unusual sprays, especially outdoors and/or at night
- Abandoned spray devices with no distinct odors

Nuclear Incidents

- Ambient radiological monitoring data
- Presence of U.S. DOT placards/labels (e.g., in rubble, containers)

Incendiary Incidents

- Multiple fires in area
- Remains of incendiary device components
- Odors of accelerants
- Unusual heavy burning or fire volume

Chemical Incidents

- Hazardous materials or lab equipment that is not relevant to the occupancy
- Exposed individuals reporting unusual odors or tastes
- Explosions that disperse liquids, mists, or gases
- Explosions that seem only to destroy a package or bomb device
- Unscheduled dissemination of an unusual spray
- Abandoned spray devices
- Numerous dead animals, fish, and birds
- Absence of insect life in a warm climate
- Mass casualties without obvious trauma
- Distinct pattern of casualties and common symptoms
- Civilian panic in potential target areas

Explosive Incidents

- Obvious large-scale structural damage
- Blown-out windows and widely scattered debris
- Shrapnel-induced trauma
- Shock-like symptoms and/or damage to victims' eardrums

Of course, it must be emphasized that any combination of lethal agents may be employed by terrorists—as well as primed for release in sequenced fashion. Thus, for example, the absence of any indicator of a chemical device at the site of a fire does not mean that such a device is not present, or that one could not be activated by an internal or external trigger.

2. Entry Precautions

Given the potency of biological, chemical, and nuclear agents, and given the limited resources typically available to first responders, any suspicion of possible terrorist involvement in an incident is sufficient cause to delay entry into the incident area until additional and specialized resources are available.

The USFA has emphasized that, in the face of a determined terrorist effort, perhaps the single most important task is the decontamination of equipment, personnel, survivors, and casualties—a task that, depending on

the geographical extent of the incident and the nature of the hazardous agent, can easily overwhelm community and even state resources.

The on-site evaluation of needed resources (e.g., radiological monitoring, biological agent monitoring, decontamination equipment and supplies) cannot be conducted in the absence of extensive, preincident planning between local, state, regional, and federal services and authorities, as well as critical industrial and private sector facilities and organizations.

3. Crime Scene Precautions

Just as the possibility of arson requires fire fighters to conduct their operations in a manner consistent with the needs of a criminal investigation, so does terrorism require similar caution for all emergency response operations. While the rescue of victims and community safety are always critical objectives of on-site operations, the preservation of physical evidence of terrorism must be given equal priority. After all, until terrorists are apprehended, they are free to target additional victims—and they cannot be apprehended and successfully prosecuted if crucial evidence is lost or destroyed as a result of emergency response operations.

In order to ensure the preservation of critical criminal evidence, all response operations must be tightly coupled with law enforcement needs, which requires (a) extensive preincident liaison between response services and criminal investigative authorities, (b) the development of relevant SOPs by response services, and (c) intensive training of response personnel.

THREAT AND RISK TARGET ASSESSMENT

While much emphasis has been given to the need for extensive preincident operational planning by response services in close coordination with municipal, state, regional, and Federal authorities (e.g., items 2 and 3, above), equal emphasis must be given to two types of assessment that can provide crucial input not only to the formulation of operational response plans but also of preventive strategies: (a) Threat Assessment, which is the attempt to identify groups and organizations that may pose a terrorist threat to the community, and (b) Risk Target Assessment, which attempts to identify specific facilities, activities, organizations, and groups that might become targets of terrorists.

Examples of potential terrorist groups might include (but are not be limited to): ethnic separatist and émigré groups; left-wing radical organizations; right-wing racist, anti-authority, survivalist groups; foreign terrorist organizations; and issue-oriented groups, such as animal rights groups, extremist

environmental groups, extremist religious groups, and anti-abortionists. Potential community targets might include (but are not be limited to): military or governmental installations; industries that are part of the “military–industrial complex”; industries that manufacture environmentally sensitive products or operate in politically sensitive countries; major financial institutions; major components of social infrastructure (e.g., transportation, communication, utilities); sports arenas; shopping centers; special events (e.g., parades).

While both Threat and Risk Target Assessments should be coordinated through local, state, regional, and federal law enforcement authorities, perhaps the primary responsibility for conducting these assessments should be assumed by a local emergency planning and response authority, which is ideally situated to have detailed knowledge of potentially sensitive local targets and can take meaningful steps toward developing practical partnerships among both public and private resources, services, and organizations.

EMERGENCY OPERATIONS PLAN

Whenever a response service determines that the magnitude of an incident (whether a terrorist incident or a natural disaster) is beyond its routine response responsibility and capability, that response service must implement the community Emergency Operations Plan (EOP). The EOP is a written plan that:

- Assigns responsibility to organizations and individuals for carrying out specific actions at projected times and places
- Sets forth lines of authority and organizational relationships, and shows how all actions will be coordinated
- Describes how people and property will be protected in emergencies and disasters
- Identifies personnel, equipment, facilities, supplies, and other resources available—within the jurisdiction or by agreement with other jurisdictions—for use during response and recovery operations
- Identifies steps to address mitigation concerns during response and recovery activities

As a local plan, the EOP is intended to address specific needs to be provided to local authorities by state and federal authorities in order to ensure the protection of the public. While emergency response in the United States is the primary responsibility of local government, the EOP details precise procedures wherein the state provides essential assistance:

1. providing direct response assistance to local jurisdictions whose capabilities are overwhelmed by an emergency,

2. providing state response services as primary response authority in certain types of emergencies, and
3. coordinating with Federal authorities to secure additional assistance

Federal emergency response assistance to state and local governments is authorized by the federal Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended). This assistance is provided according to the provisions of the U.S. Federal Response Plan (FRP), which is activated when the state governor, having determined that emergency response needs exceed state resources, requests Federal assistance. Once activated, the FRP assigns Federal lead agencies to coordinate federal assistance in each of 12 functional areas, as follows:

- Transportation (U.S. Department of Transportation [DOT])
- Communications (National Communication System)
- Public Works and Engineering (U.S. Department of Defense, Army Corps of Engineers)
- Fire Fighting (U.S. Department of Agriculture, Forest Service)
- Information and Planning (Federal Emergency Management Agency [FEMA])
- Mass Care (American Red Cross)
- Resource Support (General Services Administration [GSA])
- Health and Medical Services (U.S. Department of Health and Human Services, Public Health Service)
- Urban Search and Rescue (Federal Emergency Management Agency [FEMA])
- Hazardous Materials (Environmental Protection Agency [EPA])
- Food (U.S. Department of Agriculture, Food and Nutrition Service)
- Energy (U.S. Department of Energy [DOE])

The FRP is amended by Presidential Decision Directive 39(PDD-39), “United States Policy on Counterterrorism.” Thus, if the FRP is activated in response to a state governor’s request (through FEMA) for assistance in a terrorist incident, Federal assistance will be provided in conformance with the provisions of the Terrorism Incident Annex to the FRP (see Appendix I). This annex to the RFP, reflecting the directives of PDD-39, assigns specific responsibility for two key aspects of operational response to any terrorist incident:

- Crisis management (law-enforcement efforts that focus on the criminal aspects of the incident)
- Consequence management (response efforts that focus on alleviating damage, loss, hardship, or suffering related to the incident)

Crisis management activities are the responsibility of the Federal Bureau of Investigation (FBI), which coordinates all relevant local, state, and Federal legal authorities. Consequence management activities are the responsibility of FEMA, which coordinates Federal, state, and local volunteer and private agencies.

Upon a state governor's request for assistance and a Presidential Declaration of Disaster, the sequence of events would be as follows:

1. FEMA would use its emergency authorities to notify appropriate Federal agencies, activate the FRP, begin coordinating the delivery of Federal assistance, and establish liaison operations with the FBI,
2. The FEMA Director would consult with the governor of the affected state to determine the scope and extent of the incident, and
3. An emergency response team, made up of representatives from each of the primary Federal agencies, would be assembled and deployed to the field to establish a disaster field office and initiate operations.