

Introduction to CBRNE Terrorism

An Awareness Primer and Preparedness Guide for Emergency Responders

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By
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INTRODUCTION

As demonstrated recently, even small groups of individuals have the ability to cause massive damage and extensive human suffering with little or no warning. Predictably, firefighters, police officers, EMS personnel, and civilian volunteers will respond and be on the scene moments after any attack occurs. For such events in the future, however, rescue and treatment of victims and control or containment of fire and other hazards will be greatly complicated by the fact that the site may also be contaminated with nuclear, chemical, biological or radiological substances that pose an immediate threat to the health and safety of the emergency responders.

Also, the immediate impact of such attacks may reach much further than the scene of the disaster. Thousands of injured and potentially contaminated victims may depart the scene, returning to the suburbs and satellite cities where they reside, or privately seeking medical assistance.

Emergency responders in metropolitan areas and far beyond will need to move quickly to deal with this predictable exodus from cities following any attack.

This primer is an introduction to the types of weapons first responders may be exposed to in a terrorist attack. Responders need to be ready to deal with any possible situation quickly, efficiently and professionally. Knowledge of Chemical, Biological, Radiological, nuclear and Explosive weapons (CBRNE) is needed for every first responder.

This paper is intended to provide an awareness-level introduction to the subject for first responders and community officials. The intention of this paper is to give responders and those managing community emergency programs enough basic information to safeguard themselves and those for whom they are responsible. This material should also be suitable for use as talking points for public information officers and those training or educating volunteer organizations or the general public.

This information in this paper is not sufficient to prepare responders to work in contaminated areas. Those workers require training at the Operations, Technician and higher levels.

With proper awareness and preparedness, we can save lives and reduce the impact of any potential terrorist attack.

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What types of weapons might be used?

Terrorists potentially have a wide range of available weapons, ranging from very simple to exceedingly complex. With knowledge, preparation and training, first responders can safely deal with the consequences of each.

In general, terrorist weapons can be categorized into four major types. It is important to remember that different types of weapons can be combined or used sequentially. Terrorist weapons are often referred to as weapons of mass destruction (WMD) because of the ability to kill large numbers of people.

The four categories of weapons are:

1. Conventional Weapons & Explosives.
2. Nuclear and Radioactive Weapons.
3. Chemical Weapons.
4. Biological Weapons.

Conventional Weapons and Explosives

The most likely type of terrorist weapon is a conventional explosive device. Some of these conventional weapons pack a very powerful punch and can bring down large buildings. The casualties could number in the hundreds in this type of attack. One example of this type weapon was the fuel oil-fertilizer bomb used to attack the Murrah Federal Building in Oklahoma City.

First responders should be alert to the potential for structure collapse as well as secondary explosive devices in the area.

Great caution should be used if the explosion seems to do little damage. A small explosive device might be used to disperse chemical, biological or even radioactive agents. Another purpose of a small device might be to bring large numbers of first responders, who are then subjected to a larger secondary device.

Another immediate problem for responders and victims is the potential for asbestos exposure. Older buildings may contain asbestos as insulation, pipe coverings, siding or roofing, flooring, adhesives, floor or ceiling tile and wall panels. Any explosion or collapse may cause this asbestos to become airborne in hazardous levels.

Immediately, the primary inhalation threat and decontamination problem will be dust. Any expedient breathing protection should be used--masks, wet towels, handkerchiefs, etc.--while exiting the area immediately. Footbaths and wash-downs are most effect for decontamination of normal conventional incidents if asbestos exposure is suspected. Eye washing with clean water is usually needed immediately as well.

Terrorists recently utilized a new type of conventional weapon, the airplane. Quantities of residual, unburned fuel may remain when an aircraft is used as the weapon of attack. In addition to the resultant fire hazard, aviation gasoline and jet fuel are hazardous substances, and decontamination efforts may need to include removal of fuel contaminant.

As with all hazardous materials incidents, refer to the Emergency Response Guidebook for evacuation, protection and decontamination procedures.

Nuclear and Radiological Weapons

It is very unlikely that terrorists will have access to a functional nuclear weapon in the near future. Nevertheless, it should be remembered that suitcase-sized nuclear devices have been reported missing from military storage areas in the former Soviet Union. This does lead to the possibility of these devices becoming available to terrorist organizations. Therefore, response and planning agencies cannot totally rule out the possibility that terrorists will attempt to transport and use nuclear devices.

It is much more likely that terrorists may attempt to use conventional weapons to attack nuclear power plants or radioactive waste storage or processing facilities. Another potential is that a conventional explosive might be used to spread radioactive materials over a large area.

Radiation comes from the decay of radioactive isotopes of certain elements and compounds. Radiation can be in the form of alpha, beta, or gamma rays. All three are odorless and colorless and can be detected only with radiation detectors.

The primary hazard will be from dust contaminated with radioactive sources. It will be very important for the first responder to use respiratory protection to avoid breathing in the radioactive dust. Footbaths and wash-downs will be a useful in the decontamination of victims. Detergent can be added to the water to remove the radioactive dust. It is very important to collect all water and contain the runoff, as it will also be radioactive.

First responders who are not properly trained and adequately equipped should not enter radioactive areas or make contact with people or items that are contaminated.

Chemical Weapons

Terrorists have used chemical weapons in the recent past and it is likely to happen again. A very large number of casualties could be expected in a successful chemical attack.

Chemical agents can enter the body by inhalation of the chemical agents, absorption through the skin or eyes, injection into the body by flying glass or shrapnel, or by ingesting with food or water. A likely delivery method is in the form of a gas or as an aerosol spray.

There are numerous chemical agents each with different symptoms and effects. Please see Appendix A for more detailed information on the more common types of agents. The most common families of chemical agents are:

- ◆ **Nerve Agents**: Nerve agents attack the victim's nervous system. Most belong to the family of chemicals known as organophosphates. Many common pesticides belong to this family of chemicals.
- ◆ **Blister Agents**: Blister agents also known as vesicants attack the skin of the victim resulting in blisters and skin burns. Mustard gas and Lewisite are common blister agents.
- ◆ **Blood Agents**: Blood agents attack the ability of the blood to hold and deliver oxygen. The victim suffocates. Cyanide gases and compounds are the most common types of these agents.
- ◆ **Choking Agents**: These chemicals attack the lungs causing them to fill with fluid. Chlorine gas and phosgene are typical choking agents.
- ◆ **Incapacitating Agents**: These agents usually irritate the skin, mucous membranes, eyes, nose, lips and mouth. They may cause vomiting or intolerable pain. While they may lead to serious medical situations such as seizures or heart attacks, they are not designed to kill or cause permanent harm. Used alone, the intention is to temporarily incapacitate or harass the target, or force them to evacuate the area. However, incapacitating agents may be used in combination with other agents to force responders to remove their gas masks and other protective gear, so that they will be exposed to lethal doses of the other agent. Examples of incapacitating agents are pepper spray, tear gas, riot control agents and several military chemicals from different nations.

Biological Weapons

Biological weapons present a serious challenge for response planning. There is risk that a biological attack may not be detected until days or even weeks after it happens. First responder resources, therefore, may be of little use at a bioterrorism incident unless it is detected promptly.

Basically, there are two types of biological weapons:

- ◆ **Pathogens**: These are disease-causing organisms, some of which can reproduce and keep spreading long after the attack. The potential for many thousands of casualties is possible but the more likely number is much less because of the difficulty of efficiently delivering the pathogenic agents to large numbers of people.
 - Pathogens can be bacteria such as anthrax, viruses such as smallpox, or fungi like yeast and molds, mycoplasmas that cause pneumonia and similar problems, or rickettsiae. Plague, smallpox, anthrax, hemorrhagic fever, and rabbit fever are known to be probable biological weapons.
 - Not all diseases are contagious, and many have a low mortality rate when properly treated.

- ◆ **Toxins**: Toxins are poisonous substances produced by living things. Many toxins are extremely lethal and small quantities can kill very large numbers of people. In many ways a toxin attack is more like a chemical attack than a biological one. Some possible toxin weapons are ricin, botulism toxin, and aflatoxin. Again, the difficulty for the terrorist is in finding an effective way to disperse or distribute the toxin.

Handling Suspicious Mail

What makes a piece of mail suspicious?

- It's unexpected or from someone you don't know.
- It's addressed to someone no longer at your address.
- It's handwritten and has no return address, or bears one that you can't confirm as legitimate.
- It's lopsided or lumpy in appearance, or contains inappropriate powders or liquids.
- It's sealed with excessive amounts of tape.
- It's marked with restrictive endorsements such as "Personal" or "Confidential."
- It has excessive postage.
- It seems to have traces of a suspicious powder or liquid, with or without odors.

SUSPICIOUS MAIL

- **Do not handle a letter or package that you suspect is contaminated.**
- **Do not shake it, bump it, or sniff it.**
- **Cover the suspicious item with paper, plastic or cloth, if handy.**
- **Turn off fans. Get away.**
- **Wash your hands thoroughly with soap and water.**
- **Notify local law enforcement authorities.**

Emergency Decontamination

Decontamination of victims is critical within 1-2 minutes if a nerve, blood, blister, or choking agent has been encountered. Do not delay.

- ◆ Use water from any uncontaminated source to spray or douse victims. *Do not delay to obtain soap or to remove clothing.*
- ◆ Immediately and repeatedly flush the eyes with large amounts of clean water.
- ◆ **FLUSH-STRIP-FLUSH-RUN:** *Have victims discard all clothing and go through another water spray, using soap if available: Move them upwind immediately. Avoid contact with the victims or anything they touched if you are not wearing appropriate protective gear.*
- ◆ If standard decontamination capability is not available after the above flush-strip-flush-run, have victims quickly get to a safe area and shower with large amounts of warm water, vigorously using detergent soap (such as dishwashing liquid or strong bath soap) and using scrub brushes if available. Avoid contaminated water streaming into the eyes, especially from the hair.
 - ◆ If standard decontamination solution is still not available, start expedient decontamination using a 0.5% hypochlorite solution (1 part household bleach mixed with 9 parts water).
 - Spray or pour over the victims. *Ordinary spray bottles or plant misters may be used. Do not mix this solution with glass cleaners, such as Windex®*
 - The solution can be used on soft tissue wounds, but must not contact the eyes or enter open wounds of the abdomen, chest, brain, or spine.
 - ◆ If biological agents are suspected, leave the hypochlorite solution in contact for 10-15 minutes before rinsing. Less time is needed for chemical agents.
 - ◆ Isolate the victims and keep them warm and hydrated until standard decontamination can be performed.

(Decontamination, Cont'd)

Assume that this situation is at least a HAZMAT Level A emergency involving Toxic-by-Inhalation-Hazards (TIH).

Lacking other guidance, implement isolation and evacuation distances in accordance with Green Pages Section of the Emergency Response Guidebook, for release of a TIH of best-guess quantity.

Unless responders are properly trained and equipped, do not send them into the area for rescue or treatment of victims. Ill-prepared, heroic rescue attempts may only worsen the emergency by creating additional victims and seriously reducing response capability.

All chemical weapons have the potential for secondary contamination of ambulances, police, fire and medical equipment, hospitals, busses, private vehicles, homes, and other people encountered by victims as they leave the scene.

Proper decontamination of victims is necessary before they leave the area and spread the contamination. Ideally, decontamination stations should be set up at all mass transportation sites serving the area in the event of a chemical attack.

Self Protection for Responders

Barrier protection, reducing the time of exposure and distancing yourself from the hazard are the keys to survival for all first responders.

- ◆ **The best available barrier should be put between you and the nuclear, chemical, or biological agent. The only way to protect yourself is to keep the hazard from entering or coming in contact with your body. For most situations, your eyes and all of your skin must be covered quickly before you become contaminated, and you must adequately filter the air you breath.**
- ◆ **In some cases, respirator filters will not fully protect you from all chemical or biological hazards, and supplied-air breathing apparatus must be used if you are in the contaminated area. If you are using a filter respirator, you must make certain that you have installed the correct filter type and that it is certified to protect you from the specific NBC hazard.**
- ◆ **Reduce the time you are exposed to the agent as much as possible. If you are not properly trained and equipped to deal with a hazardous substance, you should not be in a contaminated area.**
- ◆ **If you are caught without a mask or other protective equipment, move out of the contamination as quickly as possible, using any expedient means of creating a barrier between yourself and the hazard. Layers of clothing, rain slickers, hats, ski goggles, wet towels or handkerchiefs over the face may help. Get away quickly and decontaminate immediately.**

After working in the incident area, proper decontamination of you and your equipment will probably be required for your own protection as well as that of others. If in doubt, confirm the need for decontamination with the Incident Commander, safety officer, or chief of your local HAZMAT team before leaving the evacuation assembly area. If you suspect that you or others are contaminated, and you cannot get prompt guidance, you should perform expedient decontamination without delay.

How can you establish a safe command post for the incident?

Preplanning, training and exercises are essential if you are going to be able to make decisions in a crisis.

The following guide is intended to assist planning and preparedness, but local conditions and technical considerations may become overriding factors. Use the following outline as a guide only.

Unless there is other guidance, assume that any NBC terrorist attack creates at least a HAZMAT Level A situation involving Toxic-by-Inhalation- Hazards (TIH).

Lacking other guidance or specific information, implement evacuation, isolation and protection distances in accordance with Green Pages Section of the Emergency Response Guidebook, for release of a TIH of best-guess quantity.

Establish the Incident Command Center and all staging areas well outside the most pessimistic danger zone. *With specialized equipment and highly trained teams, it would be possible to deliberately establish operating facilities within the zone of contamination, when no other practical solution exists. If you have the need for this capability, contact your regional Civil Support Team for advice and guidance.*

If, however, emergency response teams or command officers find themselves suddenly and unexpectedly in an area from which they cannot escape, or if there is no choice but to establish a command post close to the incident site, there are expedient defensive measures that will reduce--but not eliminate--risk. The following precautions may be helpful when forced to operate inside or near the hazard area.

- ◆ **Locate the command post upwind from the hazard hot zone.**
- ◆ **Locate the emergency refuge or command center inside a building as opposed to using a vehicle. Buildings provide greater physical protection and are much easier to seal against chemical and biological hazards.**
- ◆ **Select the most protected interior room available. As many hazardous fumes are heavier than air, an interior room on a middle floor of the building might be advisable.**
- ◆ **Shut off central fans and air handling equipment.**
- ◆ **Establish a decontamination station at the entrance to the facility to prevent contamination from being carried inside.**
- ◆ **Windows and doors should be covered with plastic and sealed with duct tape.**
- ◆ **If possible, a HEPA filter should be placed in the temporary field station and a positive room pressure generated.**
- ◆ **The room should remain sealed until after the chemical or biological plume has totally passed the area.**
- ◆ **If possible, keep escape vehicles in a nearby garage or other protected area in case emergency evacuation is needed. Cover with plastic or blankets if left outdoors.**
- ◆ **Establish a site evacuation and rescue plan**

Sealing windows and doors to make a safe room may also be desirable for anyone trapped in the danger area when there is no time to evacuate them to a safer area. It is important to ensure that occupants will have enough air to prevent suffocation.

General Safety Procedures at Terrorist Incidents.

1. Suspect the worst at all terrorist incidents until the air is tested.
2. Use barrier protection until the area is tested to be safe.
3. Establish decontamination stations as soon as possible.
4. Contain all run off from decontamination activities.
5. Be on the alert for structural collapses.
6. Be on the alert for secondary explosive devices.
7. Remember you are part of a crime scene and preserve all evidence when possible.

What are the early indicators of a possible CBRNE attack?

There are many early-warning indicators of a CBRNE attack. *In all but the large cities detection equipment may not be available. All first responders should consider whether an attack might have taken place if any of the following are noticed.*

- ◆ Unusual numbers of people dying in an area, or from strange causes
- ◆ Unusual numbers of sick or dying animals, birds or fish
- ◆ Lack of insect life where it should be seen
- ◆ Unusual numbers of people in an area complaining of blisters/rashes, nausea, disorientation, difficulty in breathing, convulsions, localized sweating, conjunctivitis (reddening of the eyes), erythema (reddening of the skin), or any irregular symptoms
- ◆ Strange colored smoke coming from the area of a detonation
- ◆ Explosions that seem to do very little damage or which release an unusual amount of smoke, or leave droplets of liquid in the area, or fragments covered with liquid or droplets
- ◆ Unusual appearance of any liquid droplets, particularly where there should be none
- ◆ Abandoned aerosol sprayers in the area of sick people
- ◆ People reporting unusual odors or tastes
- ◆ Unexplained mists or hazes in urban area
- ◆ Sudden or unexplained appearance of low-lying clouds
- ◆ Unidentified, low-flying aircraft--particularly crop dusters--over a populated area

What are the more likely targets for a CBRNE attack?

- ◆ Government offices
- ◆ Military installations
- ◆ Landmark buildings
- ◆ Events with high populations
- ◆ Abortion clinics
- ◆ Post offices
- ◆ Power facilities
- ◆ Water supplies
- ◆ Corporate Headquarters
- ◆ Police stations
- ◆ Train terminals
- ◆ Bus terminals
- ◆ Airports
- ◆ Tunnels
- ◆ Bridges
- ◆ Fuel depots
- ◆ Cruise ships

In Conclusion

When approaching a scene that may involve CBRNE agents, the most critical consideration is the safety of oneself and other responders. Protective clothing and respiratory protection at the appropriate level of safety must be used. Be aware that the presence and identification of NBC agents may not be verifiable, especially in the case of biological agents.

Whenever a CBRNE incident is suspected, immediately put on your protective equipment. Remember the time-distance-shielding rule for protection: Spend as little time as possible in the hazard zone, and keep your distance from the area. Shield yourself from the hazard at all times. Decontaminate as soon and as thoroughly as possible.

Remember, your effectiveness as a first responder is compromised when you become a casualty yourself. In addition you take resources away from the incident to care for you if you fall victim to the incident.

The advice in this publication is general in nature, is not all encompassing, and may not be applicable in every specific case. Please notify the publisher immediately of any changes needed.



QUICK REFERENCE GUIDE FOR PLANNING AND EXERCISES

Chemical Agents

Type	Symbol	Physical State	Stability	LT50 (mg-min/m3)	ICT50 (mq-min/m3)	Detox Rate	Persistence	Decon
Nerve	GA	Liquid	Stable	400 ■	300 ■	Low	1-2 Days	DS2, STB / HTH, or Dilute Alkali
	GB	Liquid	Fairly Stable	70-100 ■	35-75 ■	Low	Like Water	
	GD	Liquid	< GA or GB	70 ■	50-300 ■	Low	1-2 Days	
	VX	Liquid	Stable	30-100 ■	24-50 ■	Low	Like Oil	
Blister	H/HD	Liquid >14.5°C	Stable	1500 ■	150 ●	Cumulative	1-2 Days	DS2, STB, or Fire
	HN-1	Liquid	Fairly Stable	1500 ■	200 ●	Cumulative	<HD	
	HN-2	Liquid	Unstable	3000 ■	100 ●	Cumulative	<HD	
	HN-3	Liquid	Fairly Stable	1500 ■	200 ●	Cumulative	>HD	
	HT	Liquid	Stable	1500 ■	200 ●	Cumulative	>HD	
	L	Liquid > 0° C	Stable	1200-1500 ■	<300●	Cumulative	<HD	DS2, STB, Caustic Soda Water
	HL	Liquid	Fairly Stable	1500 ■	200 ●	Cumulative	<HD	
CX	Solid/Liquid	Unstable	3200 ■	> 3 ●	Cumulative	Hours	Water	
Blood	AC	Vapor or Liquid	Unstable	2000-4000 ■	Varied ●	Rapid	Minutes	None Required
	CK		30 Days	11,000 ■	7000 ●			

■Respiratory (Breathing) ●Ocular (Eyes)
 LCT50 = Lethal Exposure for 50% Population ICT50 = Incapacitation Exposure for 50% Population

Biological Agents

Disease / Agent	Infection Routes	Untreated Mortality Estimate	Incubation Period	Infective Dose	Best Treatment
Anthrax (Bacillus anthracis)	S, D, R	S: 25% D: 50% R: 100%	1-4 Days Sometimes 60 Days	10 ³ - 10 ⁴ Spores per Person	Antibiotics Ciprofloxacin preferred. Limited effectiveness after symptoms develop. Cremate remains.
Cholera (Vibrio cholerae)	D	50%	1-5 Days	10 ⁹ Organisms per Person	Oral Rehydration Antibiotics
Hemorrhagic Fevers Denge, Ebola, Lassa, Marburg, Rift Valley, etc.	DC, Uncertain	< 90%	2-7 Days	Unknown	Symptomatic
Plague (Yersinia pestis)	V, R	Bubonic - 50% Pneumonic - 100%	2-3 Days	10 Organisms per Person	Antibiotics
Q Fever (Coxiella burnetii)	V, R	< 1%	2-5 Days	1 Organism per Person	Antibiotics
Smallpox (Variola Major)	DC, R, S	Varies by strain and immunity 30-60% Anticipated 10-90% World History	12-14 Days Typical (7 - 17 Extended Range)	Unknown Suspect: 1-100 Viral Organisms <small>Extremely Infectious 7-10 days after rash</small>	No Primary Treatment Treat secondary infections as symptoms occur Incinerate, Autoclave or Chlorine-disinfect everything in contact with patient. Cremate remains.
Tularemia (Rabbit Fever) (Francisella Tularensis)	V, S, R	30-40%	2-4 Days	25 Organisms per Person	Antibiotics
VEE (Venezuelan Equine Encephalitis)	V, R	About 1%	2-5 Days	25 Viral Particles per Person	Symptomatic

D=Digestive System R=Respiratory System S=Skin V=Vector DC=Direct Contact

References: USPHS; Centers for Disease Control; U.S. Army SCBD COM; US-DPO.
Information is presented for planning and exercise purposes only.

For response, treatment or decontamination, refer to official US Surgeon General publications, state/local health department orders, and approved medical protocols.

Membership Invitation



MISSION

Preparedness - Response - Education

DERA is a Nonprofit Disaster Service and Professional Organization.

Our members work together as a world-wide professional network of disaster researchers, response and recovery specialists, trainers, consultants, technical experts, and project managers.

We help disaster victims by improving communications and logistics, reducing risks and mitigating hazards, conducting community preparedness workshops, and by sponsoring preparedness and response projects.

We sponsor a school awards program that encourages students to study the effects of disasters and conduct projects to reduce hazards and improve community preparedness.

As a prominent international professional association, our membership is composed of key leaders in the field of emergency management from around the world, including government officials, volunteers, consultants, business managers, researchers, educators, students and charitable groups.

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We sponsor research projects and the publication of emergency management guides, case studies, technical assessments, and preparedness materials.

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