

Hattiesburg Police Department

CBRNE Awareness

As demonstrated in recent years, small groups or even individuals have the ability to cause massive damage and extensive suffering with little or no warning. Law enforcement, firefighters, EMS personnel, and private responders will respond and be on scene after any such event. Rescue and treatment of victims and control or containment of the scene could be greatly complicated by the fact that the site may be contaminated with chemical, biological or nuclear/radiological substances that pose an immediate threat to the health and safety of the emergency responders. The impact of such events may reach further than the scene of the disaster. Injured and potentially contaminated victims may depart the scene returning to their residences or seeking private medical attention.

This primer is an introduction and is intended to provide an awareness-level informational overview to give first responders enough basic information to safeguard themselves and those for whom they are responsible.

Definitions:

The following are terms commonly used at a CBRNE or other Hazardous Materials event. First responders need to be familiar with general protocols and terminology that will be used over the course of managing the incident.

ARP – Air Purification Respirator

Biological Agents – Living organisms that cause disease, sickness and mortality in humans.

Blister Agents – Substances that cause blistering of the skin.

Blood Agents – Substances that interfere with the exchange of oxygen and carbon dioxide between blood and tissues.

CBRNE – Chemical, Biological, Radiological, nuclear or explosive agent or event.

CDC – Center of Disease Control

Choking Agents – Substances that cause physical injury to the lungs

Cold Zone – Clean area outside the inner perimeter where command and support functions take place.

CP – Command Post

CST – National Guard WMD Civil Support Team

Decon – Decontamination removal

DHS	–	Department of Homeland Security
DMAT	–	Disaster Medical Assistance Team
DMORT	–	Disaster Mortuary Response Team
EOC	–	Emergency Operations Center (locally, Emergency Management)
EOD	–	Explosive Ordinance Disposal
FEMA	-	Federal Emergency Management
HMRT or HazMat	–	Hazardous Material Response Team
Hot Zone	–	Area immediately around the incident where serious threat of harm exists. Entry to this area is controlled and limited to trained personnel in appropriate equipment.
HVAC	–	Heating, Ventilation and Air Conditioning
ICS	–	Incident Command System
Inner perimeter	–	Secured inner area of operations
Mass Decon	–	Decontamination process used on large numbers of contaminated victims.
MEMA	–	Mississippi Emergency Management
Nerve Agents	–	Substances that interfere with the central nervous system.
NIMS	–	National Incident Management System
Outer Perimeter	–	Outermost area from the hazard that is contained or secured.
PSA	–	Patient Staging Area
Persistent Agent	–	An agent upon release retains its casualty producing effects for an extended time.
POC	–	Point of Contact
Point Source	–	Letter, package, container or dispersal area of the agent

PPE – Personal Protective Equipment that consist of an ensemble that provides respiratory and skin protection rated for the zone where they are allowed to work.

Level A – Hot zone rated consisting of a SCBA worn tithing a totally sealed garment.

Level B – Warm Zone rated consisting of a chemical resistant suit with hood, gloves, boots and a SCBA.

Level C – Rated for all other functions consisting of a chemical resistant suit, gloves and boots worn with an APR. Level C is the normal level of PPE for law enforcement.

Rally Point – Pre-determined location(s) to where persons evacuate in an emergency.

SCBA – Self Contained Breathing Apparatus (air pack)

Symptomatic – Person exhibiting signs or symptoms of exposure

Unified Command – The team effort by all agency representatives who are responsible for establishing a common set of objectives and strategies to resolve the incident.

Warm Zone – Area between the Hot and Cold zones where personnel and equipment decontamination and hot zone support take place.

WMD – Weapons of Mass Destruction. Any explosive, incendiary, poison, disease organism or device designed to release a level of radiation dangerous to humans, all of which are intended to cause mass casualties.

Types of weapons

A wide range of weapons are available ranging from very simple to exceedingly complex that can be deployed singularly or in combination. With knowledge preparation and training first responders can safely deal with the consequences of each. In general weapons can be categorized into four major types.

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 structures creating a large number of casualties. First responders should be alert to the potential for structure collapse as well as secondary devices. Caution should be used if the device used seems to cause little damage. A small device may well be used to

disperse other agents or to set the stage for responders to become victims of a secondary device.

The primary inhalation threat and decontamination problem will normally be dust. Any expedient breathing protection should be used – mask, wet towels, handkerchiefs, t-shirts, etc. – while exiting the area.

Chemical Weapons

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

There are numerous chemical agents each with different symptoms and effects. The most common families are:

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| Nerve Agents | Nerve agents attack the nervous system. Most belong to the family of chemicals known as organophosphates. Many common pesticides belong in this family group. |
| 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, eye, nose, lips and mouth. They cause vomiting or 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. Generally the intention is to temporarily incapacitate, harass the target or force them to evacuate the area. However incapacitation agents may be used to force responders to remove protective gear facilitating exposure to doses of other agents. Examples of incapacitating agents are pepper spray, tear gas or other riot control agents. |

Biological weapons

Biological weapons present a serious challenge for response planning. There is a 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 biological incident unless it is detected early. There are two basic types of biological weapons:

- Pathogens** These are disease-causing organisms, some of which can reproduce and keep spreading long after the incident. The potential for many thousand casualties is possible but the more likely outcome is much less because of the difficulty of efficient delivery. Pathogens can be bacteria such as anthrax, viruses such as small pox, or fungi like yeast and molds, mycoplasmas that cause pneumonia and similar problems, or rickettsiae. Plague, small pox, anthrax, hemorrhagic fever, and rabbit fever are known to be probable biological weapons.
- 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. Possible toxic weapons are ricin, botulism toxin, and aflatoxin. Again the difficulty is in finding an effective way to disperse or distribute the toxin.

Nuclear and Radiological weapons

While possible, it is considered unlikely that a terrorist will attempt to transport and utilize a nuclear device. It is much more likely that terrorists may attempt to use conventional weapons to attack nuclear power plants, radioactive storage or processing facilities. 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 most likely be from dust contaminated with radioactive sources. It will be very important for the responder to use respiratory protection to avoid breathing in the radioactive dust.

Differences between a Chemical, Biological and Radiological Agent

Chemical and biological agents as well as radioactive material can be dispersed in the air we breathe, the water we drink, or on surfaces we physically contact. Dispersion methods may be as simple as opening a container, using conventional spray devices, or as elaborate as detonating an improvised explosive device.

Chemical incidents are characterized by the rapid onset of medical symptoms (minutes to hours) and easily observed signatures (colored residue, dead foliage, pungent odor, dead insects and animals).

Biological incidents are characterized by the onset of symptoms in hours to days. Typically, there will be no characteristic signatures because biological agents are usually odorless and

colorless. Because the delayed onset of symptoms in a biological incident, the area affected may be greater due to the movement of infected individuals.

Radiological incidents are characterized by the onset of symptoms, if any, in days to weeks or longer. Typically, there will be no characteristic signatures. Specialized equipment is required to determine the size of the affected area and whether the level of radioactivity presents an immediate or long term health hazard. At the levels created by most probable sources, not enough radiation would be generated to kill people or cause severe illness. In a radiological incident generated by a “dirty bomb”, or radiological Dispersal Device (RDD), in which a conventional explosive is detonated to spread radioactive contamination, the primary hazard is from the explosion. However, certain radioactive materials dispersed in the air could contaminate up to several city blocks, creating fear and possibly panic and requiring potentially costly cleanup.

Indicators of a possible CBRNE incident

There are many early warning indicators of a CBRNE incident. In all but the large cities detection equipment may not be available. All first responders should consider the following:

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), erthema (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 or droplets, particularly where there should be none

Abandoned aerosol sprayers in the area of sick people

Unusual odors or tastes

Unexplained mists or hazes

Sudden or unexplained appearance of low-lying clouds

Most likely targets for a CBRNE incident

- Government buildings
- Military installations
- Landmark buildings
- Schools
- Events with high populations
- Abortion clinics
- Malls
- Post offices
- Utility Plants
- Water supplies
- Corporate headquarters
- Police stations
- Transportation terminals
- Airports
- Tunnels
- Bridges
- Fuel depots

Safety Precautions

- Approach cautiously from upwind
- Suspect the worst until air is tested
- Consider the safety of the people in the immediate area, including your own
- Secure the scene
- Identify the Hazards
- Assess the situation
- Decide on site entry
- Establish a command post
- Establish lines of communication
- Rescue casualties where possible
- Evacuate if necessary
- Continually reassess the situation and modify the response accordingly
- Use barrier protection until the area is deemed safe
- Possible crime scene, preserve evidence if possible

Self protection for responders

Distance yourself from the hazard. The best available barrier should be put between you and the agent. The only way to protect yourself is to keep the hazard from entering or coming into contact with your body. Reduce the time you are exposed as much as possible. If you are not properly equipped 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 coats, hats, eye protection, wet towels, or handkerchiefs over the face may help. Get away and decontaminate immediately.

After working in the incident area, proper decon of you and your equipment will probably be required for your own protection as well as that of others.

Emergency Decontamination

All chemical weapons have the potential for secondary contamination of ambulances, police, fire, equipment, hospitals, 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 contaminated scenes. Responders should be prepared to perform emergency decon, if necessary, prior to establishment of decon stations.

Decon is critical within minutes if a nerve, blood, blister, or choking agent has been encountered. Immediately and repeatedly flush the eyes with large amounts of water. Use water from any uncontaminated source to spray or douse victims. Emergency responders should follow standard decontamination procedures (flush-strip-flush) using soap and water. If possible, further decontamination should be performed using a 0.5% hypochlorite solution (1 part bleach and 9 parts water). If biological agents are suspected, a contact time of 10-15 minutes should be allowed before rinsing. The solution can be used on soft wound, but not in the eyes or open wounds of the abdomen, chest, brain, or spine. Isolate the victims and keep them warm and hydrated until standard decon can be performed.

For persons contaminated with radioactive material, remove them to a low radiation area if possible. Remove their clothing and place it in a clearly marked sealed container such as a plastic bag. Use decon methods described above avoid breaking the skin. External radiological contamination on intact skin surface rarely causes a high enough dose to be a hazard to either the contaminated person or first responders. For this reason, except in very unusual circumstances, an injured person who is also radiologically contaminated should be medically stabilized before decon measures are initiated.

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 agents may not be verifiable, especially in the case of biological agents.

Whenever a CBRNE incident is suspected, remember the time-distance-shielding rule for protection. Spend as little time as possible in the hazard zone, keep your distance from the area and shield yourself from the hazard. Decontaminate as soon as possible.

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