EV 09 – Critical Incidents
Session 04 – LEPM/CBRNE Hazards
LD 43 – Emergency Management

Date Revised: 12/09/19

Event Goal: To teach recruit officers how to respond to a critical incident.

Session Goal: The law enforcement responder will have a basic knowledge to identify the signs and symptoms presented by the victims of a potential CBRNE event.

Learning Objectives:

- Identify the phases of a WMD incident **[43.V.L]**
- Identify the types and characteristics of explosives and improvised explosive devices **[43.V.I]**
- Have knowledge of dissemination devices and how terrorists may use them, and methods utilized by law enforcement personnel to protect themselves and the public
- Have knowledge of the classification of chemical hazards, associated indicators, how terrorists might use these weapons, and methods utilized by the law enforcement personnel to protect themselves and the public **[43.V.G]**
- Identify the indicators for biological agents and the methods utilized by the law enforcement personnel to protect themselves and the public **[43.V.D]**
- Identify the indicators and detection methods for radiological agents and methods utilized by the law enforcement personnel to protect themselves and the public **[43.V.E]**
- Identify the indicators, hazards, and potential terrorist use of nuclear weapons **[43.V.E]**
- Identify the indicators, hazards, and survey detection methods for explosive devices, and methods utilized by law enforcement personnel to protect themselves and the public

Session Time: 1.5 Hours

Resources:

- Power Point
- Audio/video device
- Classroom with tables

- **Session Summary:** In this module, the law enforcement responder will be able to identify the indicators and methods utilized by the law enforcement associated with a CBRNE incident.

Outline	Instructor Notes
I. CBRNE Hazards **[43.V.L]** A. Incident Phases 1. Notification Phase – The notification phase begins with the recognition that an incident is about to occur or has occurred, continues until the first emergency vehicle arrives at the incident site, and site management begins. The notification may be initiated by anyone **[LD1,26] [1]** 2. Notification Phase Actions – During the	Facilitated discussion (1 hour) **[LD43]** – Types and characteristics of explosives and improvised explosive devices **[LD 1]** – Leadership: Identifying the responsibilities of the first responding officer on the scene of an unusual occurrence

notification phase, law enforcement responders observing a dissemination device or what appears to be signs and symptoms of a CBRNE event should immediately:

a. Ensure responders operate from a safe distance.
b. Ensure all awareness level actions have been properly implemented.
    1) Has the presence of multiple devices been considered? Are the perpetrators still in the area?
    2) Are any responders in jeopardy? Are any responders potentially contaminated?
    3) Have the proper authorities (National Response Center) been notified?
    4) Are walking casualties being segregated upwind, uphill, and upstream? Remember, the walking casualties are probably contaminated.
    5) Has the area been blocked to prevent people from entering or leaving, and are crowds being controlled?
    6) Are specific verbal instructions being given from a safe distance? Are personnel being warned of the danger?
c. Gather critical information about the incident and pass it on to those who need to know.
    1) Number of casualties
    2) Signs and symptoms
    3) Weather
d. Ensure that safe incident management activities have been instituted.
    1) Site security and force protection
    2) Crowd control
    3) Proper Personal Protective Equipment (PPE) is being used by responders.
    4) Approach site from upwind direction

3. Response Phase – The response phase begins at the start of incident management and concludes with the evacuation of the last victim. This phase focuses on saving lives.
    a. Response Phase Actions – hose traffic points close to the downwind CBRNE hazard area must be prepared to evacuate quickly if notified of a change in wind speed or direction. If possible, position equipment upwind, uphill, and upstream from the

[LD 26] – Identify the types and characteristics of explosives and improvised explosive devices

[1] ASK –What are some of the things you need to do and consider at a MCI?

- Answer – Notifications, security, crowd control, information about the incident, check for multiple devices, Officer safety, attending to casualties.

CBRNE site. Also, be aware of ventilation exhaust ports from the CBRNE site (e.g., from subways and buildings). The site and downwind CBRNE hazard area must be secured, and entry into the area restricted. 4. Recovery Phase – The recovery phase begins when the CBRNE incident is stabilized, and the last victim is delivered to a medical facility to receive definitive medical treatment. It concludes with the end of the area survey for CBRNE contamination. During this time, the focus is on re-establishing infrastructure services that may have been interrupted by the attack. During this phase, state and federal responders may arrive to provide assistance. Other challenges will include the decontamination of essential equipment, establishment of decontamination station, establishment of an equipment decontamination station, and evidence collection. 5. Restoration Phase – The last phase, the restoration phase, begins upon completion of the survey for contamination, and continues until all contamination is eliminated. 6. Recovery and Restoration Phase Actions – The recovery and restoration phase will often involve private contractors and nonpublic safety agencies. Ensure that any runoffs resulting from decontamination operations are controlled if possible.	
B. CBRN Dissemination Devices **[2]** 1. Direct Deposit Devices – Constructed to inject the agent directly into a target. This type of device does not immediately bring to mind a weapon of mass destruction, because it affects one person at a time. 2. Breaking Devices – Encapsulate the agent and release it when broken. They are most effective with chemical agents. The breaking device that most often comes to mind is one made of glass, such as the Molotov cocktail. 3. Bursting or Exploding Device – An explosive or bursting device employs a small burster charge surrounded by the agent, which is activated by a fuse, timer, or other device. 4. Spraying Devices – Contain an agent reservoir and employ pressure to disseminate the agent,	**[2] ASK –** What are some ways to deliver a CBRN device? • Answers-Direct deposit, breaking devices, bursting or exploding devices, spraying devices, and vectors.

whether chemical or biological.

5. Vectors – (organisms, such as mosquitoes, fleas, or ticks that carry disease-causing micro-organisms from one host to another) would most likely be used for dissemination of biological agents. They are the least predictable and least controllable of dissemination devices.

C. Personal Protective Equipment (PPE)

1. PPE Level A – PPE level A is a vapor-tight and liquid-resistant PPE ensemble consisting of the following:
   a. Positive pressure, full-face piece Self-Contained Breathing Apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved Institute for Occupational Safety and Health (NIOSH)
   b. Totally-encapsulating chemical-protective suit
   c. Gloves, outer, chemical resistant
   d. Gloves, inner, chemical resistant
   e. Boots, chemical resistant, steel toe and shank
2. PPE Level B – The PPE Level B ensemble affords the law enforcement responder complete respiratory protection and is splash-resistant. PPE Level B consists of:
   a. Positive pressure, full-face piece, self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved)
   b. Hooded chemical-resistant clothing (overalls, and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls)
   c. Gloves outer, chemical resistant
   d. Gloves, inner, chemical resistant
   e. Boots, outer, chemical resistant steel toe and shank
3. PPE Level C-Like PPE Level B, The PPE Level C ensemble can be worn during operations in the warm zone. Unless the suits material is splash-resistant it is not recommended to engage in D contamination operations. The components of Level C PPE are as follows:
   a. Full-face or half-mask, air-purifying respirators (NIOSH approved). Goggles are required with half-mask
   b. Hooded chemical-resistant clothing (overalls;

two-piece chemical splash suit; disposable chemical-resistant overalls) c. Gloves, outer, chemical resistant d. Gloves, inner, chemical resistant e. Boots (outer) chemical resistant (steel toe and shank optional) 4. PPE Level D- The last protective level during emergency operations is Level D. Most responders will arrive at a scene in PPE level D and change into a higher level of protection. Level D, a work uniform, affords minimal protection and consists of: a. Coveralls b. Boots/shoes, chemical-resistant steel toe and shank 5. Recommended Initial Protection Levels **[LD41]** a. Agent Category — Level of Protection 1) Unknown — Level A 2) Nerve — Level A 3) Blister — Level A 4) Blood — Level B 5) Choking — Level B 6) Biological — HEPA filter with Level C 7) Radiological Particulates — HEPA Filter with Level C 6. PPE Level C and the Law Enforcement Responder a. Level C optional items 1) Corrective inserts (as needed) 2) Cloth coveralls 3) Radio 4) Hard hat 5) Escape mask 6) Chemical-resistant tape 7) Cooling vest 7. Physical and Mental Stressors While Working in PPE Level C and Air Purifying Respirator (APR) a. Takes time to put on b. Impaired communication c. Impaired vision d. Heat stress e. Increased weight f. Encapsulation g. Limited duration of use h. Limited oxygen availability i. Dexterity issues 8. Establishment of Zones- The basic approach is to	**[LD 41]** – Recognize the roles and responsibilities of a First Responder at the awareness level

establish three distinct zones, the exclusion zone (the hot zone), contamination reduction zone (called the warm zone), and the support zone (called the cold zone), law enforcement will establish an inner perimeter in the cold zone and an outer perimeter beyond that to exclude any unauthorized persons near the scene. 9. Classification of Chemical Agents- Improvised devices utilizing ordinance, radiological, biological, and chemical materials have become relatively easy to produce, hide and utilize. **[LD41]** 10. Characteristics of Chemical Agents a. Types- Examples of chemical agents, which includes the chemical classification and individual chemicals referencing the Emergency Response Guide (ERG). The U.S. military uses two alphabetical letters to identify chemical agents, such as GB (sarin), VX etc.; chemical name, trade name/synonym, or military classifications are used interchangeably. b. Dissemination- How the agent is dispersed; an especially important consideration for the awareness individual to assist in recognition information, how to evacuate or shelter in place, how to identify agents, etc. c. Availability- Whether the agent is commercially available, including some examples of how the agent is used in a commercial or household setting. d. Odor- Specific smells for each agent. Some chemical agents are accompanied by a characteristic odor that may provide a warning. However, after a while, people may become used to the chemical and no longer detect the smell. The chemical still be present even if there is no detectable odor. e. Routes of Entry- Chemical agents have several routes of entry into the body; they are inhalation, ingestion, absorption, and injection. f. General Signs and/or Symptoms- A sign is an objective finding that can be seen, heard, smelled, or measured. A symptom is a finding that the patient feels but that can only be identified by the patient.	**[LD 41]** – Identify the types of control zones at a hazardous materials incident

g. CWA and TIC/TIM- When used as weapons, are intended to kill, seriously injure, or incapacitate people through physiological effects. Characterized by the rapid onset of medical symptoms (minutes to hours, CWA and TICs/TIMSs produce easily observed signatures (colored residue, dead foliage, pungent odor, and dead insect and animal life). 11. Toxic Industrial Chemicals (TIC)/ Toxic Industrial Materials (TIM) - Chemical agents used prior to World War II were relatively simple substances. Most were either common industrial chemicals or their derivatives. One is Phosgene an agent employed to irritate the eyes and respiratory tracts of soldiers. Phosgene is used today throughout industry as a chlorinating material. A second was Hydrogen Cyanide an agent that prevents transfer of oxygen to bodily tissues. Today, Hydrogen Cyanide is used worldwide in the manufacture of acrylic polymers. **[43.V.G] [LD41]**	**[LD43]** – Types of chemical WMD toxic industrial chemicals/materials
12. TIC/TIM When Used as a Weapon- There is a wide range of TICs/TIMs 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. Inhalation effects of chlorine and phosgene are similar to those of mustard agent.	**[LD 41]** – Identify the types of chemical WMD and toxic industrial chemicals/materials
13. Sources of TIC/TIM a. Chemical manufacturing plants. b. Food processing, storage facilities with large anhydrous ammonia tanks, and chemical transportation assets. c. Gasoline and jet fuel storage tanks at distribution centers. d. Airports, barge terminals with compressed gases in tanks, pipelines, and pumping stations. e. Industries in which cyanide and mercury compounds are used. f. Pesticide manufacturing and supply distributors. g. Educational, medical, and research	

laboratories.

14. Nerve Agents
    a. Characteristics upon dissemination-G-series nerve agents may be dispersed as a liquid or as a vapor. The vapors are highly toxic, resulting in illness and death if untreated. VX behaves differently in that it is oily and similar to baby oil in appearance and viscosity-and persistent.
    b. Nerve agent symptoms acronym SLUDGEM;
        1) Salivation (the act or process of secreting saliva)
        2) Lacrimation (secretion of tears, especially in excess)
        3) Urination (the passing of urine)
        4) Defecation (evacuation of feces)
        5) Gastric Distress (physiological anomalies in the abdominal tract)
        6) Emesis (the act of vomiting)
        7) Miosis (constriction of the pupil of the eye)
    c. DUMBELLS
        1) Diarrhea
        2) Urination
        3) Miosis
        4) Bronchoconstriction (constriction of the bronchial tubes).
        5) Emesis
        6) Lacrimation
        7) Salivation
15. Blister Agents- Characteristics upon dissemination-Mustard is a blister agent that poses both a contact and vapor hazard. Its color ranges from clear to dark brown depending on purity, and it has a characteristic garlic-like odor. Mustard is a viscous liquid at room temperature.
16. Blood Agents- Characteristics upon dissemination- Hydrogen cyanide (HCN) and cyanogens 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 sight before the agent reaches a lethal concentration.

17. Choking Agents- Characteristics upon dissemination- Because phosgene and chlorine choking agents are heavier than air they will settle into low places in the surrounding terrain. Subways, sewers, and manholes would, for instance, be likely concentration areas if phosgene or chlorine were used. Therefore, evacuation to higher floors in buildings, evacuations of subways, and so forth would be appropriate. D. Biological Agents- The effects of a biological attack are not likely to be immediately visible at the scene of the attack. Rather, healthcare workers and emergency communications operators would have the first indication of an attack, unless the containers used to disseminate the agent are left at the scene, or communications from the terrorists indicated what occurred **[43.V.D]** 1. Indicators – Because of the incubation period, recognizing a biological attack or incident will be more difficult and subtle than a chemical attack; the victims may go unnoticed. The onset of symptoms can be gradual and nonspecific; often, signs, and symptoms are mistaken as the flu. a. Mist or fog sprayed by slow-moving aircraft or helicopter. b. Aerial bombs that pop, rather than explode. c. Unusual concentrations of insects or sighting of insects not normally found in the geographical region. d. A disease that is unusual or does not occur naturally in a given geographic area. e. Large number of casualties. f. Data suggesting a massive point-source outbreak. g. Illness limited to fairly localized or circumscribed geographical areas. h. Dead animals or multiple species. i. Absence of natural vectors in the area of outbreak. 2. Biological Agents and Characteristics – Certain characteristics are common to most biological agents. They are obtained from nature where they cause disease naturally, and they are relatively easy to acquire. Biological agents are invisible to the senses. Since they cannot be felt, tasted, or smelled, biological agents are not	**[LD43]** – Biological WMD agents

humanly detectable, especially when the agent is disseminated in an aerosol form. a. Types – Biological weapons are usually made up of bacteria, rickettsia, viruses, or toxins. b. Dissemination – How an agent is dispersed is an especially important consideration for the responder to assist in the recognition of information, evacuation of potential victims, and avoiding the contamination area. c. Availability – Biological agents may be commercially available, stored in an authorized laboratory, or recovered from a natural setting. d. Routes of entry – There are several ways biological agents can gain access to the body, including inhalation, ingestion or injection. Gases or aerosols can be inhaled. Residue that has settled on food or drink products can be consumed. With rare exception, biological agents did not typically enter the body by absorption. One example of an agent that is absorbed is mycotoxins. e. Incubation periods – Most biological agents require days to weeks before the effects are experienced. Once the incubation period is completed, victims will begin to exhibit effects of exposure that occurred days or weeks before. The time required for a biological agent to gain access to the human body and cause harm is highly dependent on the dose a person receives and the pathogenicity of that agent. Periods may vary from a few hours with a toxin to many days with a bacteria or virus **[3]**	**[3] ASK –** How would you know if there was a biological attack? • Answer – looking for signs and symptoms of a large group of people in a contained area or a common area that victims had visited in the past.
3. Bacteria – Examples of bacteria – Bacillus anthracis (anthrax), Yersinia pestis (plague), and Francisellatularensis (tularemia) may be used as a terrorist weapon. Anthrax causes disease in cattle, sheep, and other hoofed animals. This makes anthrax an ideal candidate for bioterrorism. Tularemia, also known as rabbit fever or deerfly fever, is an animal disease that causes disease in humans (zoonosis). It can be found in the four corners region of the United States (Utah, Arizona, Colorado, and New Mexico). 4. Viruses	

a. Viruses are microorganisms smaller than bacteria. They are incapable of metabolism and completely dependent upon the host cell for reproduction. b. Examples of diseases by viruses that could be used as a terrorist weapon include smallpox and various Viral Hemorrhagic Fevers (VHF) such as Ebola, Marburg, Lassa, Junin and Machupo. 5. Toxins a. Toxins are potent poisons produced by a variety of living organisms – including bacteria, plants, and animals. Some biological toxins are the most toxic substances known. b. Examples of toxins that may be used as terrorist weapons are ricin and botulinum toxin. Ricin is the toxin derived from the water soluble component of the castor bean. Very little ricin is needed to cause great harm. For instance, only three micrograms of ricin per kilogram of body weight can kill an individual. 6. Advantages and Disadvantages of Using Biological Agents as WMD a. Availability – Biological pathogens can be obtained from nature, hospital labs, and university research facilities, among other places. b. Hard to detect – Normally requires a biological laboratory to detect. c. Used covertly – Biological agents can be spread throughout large areas by natural convection, air, or water currents. Biological agents in aerosol form will move with the air. d. Easily spread – Ventilation systems in buildings or transportation facilities may actually become part of the dissemination system, carrying biological agents far from the initial source. e. Tie up resources – In some cases, such as anthrax spores, a hazard can remain for many years. Biological agents sometimes require decontamination, tying up resources and increasing media attention. Once disseminated, biological agents can remain in the air as vapor or aerosols, or they can settle	

on surfaces. This attribute requires that facilities be monitored and decontaminated before being returned to service. Decontamination is a tedious, time-consuming, and resource-intensive process that requires personnel be fully protected from the effects of the agent. f. Psychological impact – Psychological impact will extend far beyond the biological agent's actual effects. The mere thought of imminent exposure to a biological agent causes a terror reaction in many people. g. Difficult to prepare for – It is difficult for civilian government agencies to prepare for biological terrorist incidents. Most civilian agencies now have some kind of HazMat response team available. While these teams and their equipment can form the core of an element that responds to a terrorist biological incident, that they are likely to be challenged beyond their current capability in terms of knowledge, human resources, and equipment. The numbers of potential casualties of any response organization. Medical personnel will be the initial first responders with the large numbers of patients presenting similar symptoms. Good epidemiologic investigation of a disease outbreak will assist medical personnel in identification and management of the disease. In addition to emergency individuals, the entire health care community must be trained, equipped, and prepared to handle such incidents **[4]** h. Terrorists may avoid biological agents as WMD for the following reasons 1) Delayed effects can detract from the intended impact – Terrorist activities are generally intended to make a public political statement. Determining whether an outbreak of disease or illness is the result of natural causes or terrorism is a difficult task. This uncertainty about the cause and the time delay in identifying effects can distract from the potency of the political statement or the credibility of the	**[4] ASK –** What are some benefits of using a biological agent? • Answer- Delayed effects due to the incubation period. A discovery of the attack takes time to track. This allows the suspects to leave the area and flee.

terrorist claim. This may be outweighed by the fear that is created – even a hoax instills considerable fear. 2) Production of biological agents and devices is hazardous to the terrorist – Although commonly available HazMat equipment may provide protection to the terrorist, there is some risk of exposure and infection. 3) Development of effective biological weapons requires numerous difficult steps – One report listed 16 steps required to plan and execute a biological terrorist attack to kill millions; some steps would be difficult to complete. Problems cited range from lack of knowledge, difficulty in obtaining equipment and materials, safety, risk of detection, and difficulty in preservation and dissemination. However, the information, equipment, and skills required to accomplish these processes are readily available. 7. Protection- When responding to an incident that may involve biological agents, the law enforcement responder should act defensively, ensuring personal safety and assisting victims to take protective actions. Until the area has been declared free of biological agents, responders and victims should assume the worst. a. Use good sanitation measures: 1) Do not smoke, eat, or drink anything in the immediate area of the incident. 2) Touch nothing, if possible. 3) Wash hands with soap and water. Any potentially contaminated equipment, which may have been in contact with the agent, will require decontamination as well. E. Radiological Hazards- A radiological Dispersal Device (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 **[43.V.E]** 1. Common Radiation Exposures a. Chest x-ray (10-30 mrem)	**[LD43]** – Characteristics of nuclear/radiological WMD agents

b. Cigarette smoking, approx. 1.5 packs daily over a year (1300 mrem) c. Mild radiation sickness (200,000 mrem) d. Lethal dose (450,000 mrem) e. Max. annual routine dose (5000 mrem) f. Max. emergency property (10,000 mrem) g. Max. emergency dose lifesaving (25,000 mrem) 2. Indicators of Radiological Material- Since radiation itself is not detectable by human senses responders must be aware of any indicators that a release of radioactive materials has occurred and must use all available methods to determine the nature and extent of the hazard. Law enforcement responders can carry relatively inexpensive detectors that can provide awareness of the presence of radiological materials. 3. Health Hazards and Risks a. Internal- The intake of radioactive material through the respiratory and digestive tracts or through open wounds. b. External- Damage received either through contact with the radioactive material (contamination) or from receiving gamma radiation without being contaminated. c. Acute exposures are large doses occurring over a short period. Acute exposures normally pose a high health risk, with symptoms occurring within hours or days. Symptoms of acute radiation exposure include skin burning, vomiting, and indigestion. d. Chronic exposures are small doses occurring over a long period. Chronic exposures normally pose a smaller health risk, with symptoms (tumors, etc.) delayed for years. F. Exposure Verses Contamination 1. External Exposure- External irradiation occurs when all or part of the body is exposed to penetrating radiation from an external source. Following external exposure, people are not radioactive and can be safely approached and processed by responders. No special handling is required because of the exposure to radiation. 2. External Contamination- An externally contaminated person has radiological material	

physically attached to his/her skin and/or hair that presents a continuing hazard to the victim and responders until it is removed.

3. Internal Contamination and Internal Exposure- Occurs when unprotected victims ingest, inhale, or receive radioactive material through an open wound. Internally contaminated victims present a minimal radiation risk to responders. The internally contaminated victim may also be externally contaminated.

G. Location of Radiological Material
   1. Nuclear weapons storage facilities
   2. Nuclear power plants
   3. Government facilities (Department of Defense [DOD] and Department of Energy [DOE])
   4. Medical facilities
   5. Research and educational laboratories
   6. Industrial manufacturing facilities/construction sites
   7. In transit

H. Protection from Radiation – Protection from the effects from radiation is achieved through time, distance, and shielding.
   1. Time – The radiation dose is reduced in proportion to the reduction of exposure time; therefore, one should always work toward reducing exposure time. The dose is cumulative and must be closely monitored. Avoid any unnecessary exposure to radiation.
   2. Distance – The distance one is from the source of radiation is a critical factor in reducing the radiation exposure dose. While alpha particles only travel a little over one inch in air, gamma rays travel extensive distances. As a result, gamma rays pose the greatest threat of exposure.
   3. Shielding – Various materials can serve as shielding, depending on the type of radiation. Alpha particles cannot penetrate unbroken skin or even paper. Alpha particles travel approximately one or two inches in air.
   4. Beta radiation is easily stopped by clothing or aluminum foil; it travels approximately 10 to 15 feet in air, and can penetrate only a few millimeters of tissue
   5. Gamma rays are only reduced by dense materials such as lead, steel, concrete, or iron. Gamma

rays travelhundreds of meters in open air and can easily penetrate the human body.

I. Use of PPE at a Radiological Incident Site- PPE protection levels are classified as A, B, C, and D, with Level A giving the greatest protection and Level D giving the least. PPE Level A consists of full encapsulation and Self-Contained Breathing Apparatus (SCBA) equipment providing maximum respiratory and chemical vapor protection. PPE Level B provides respiratory protection and splash protection but does not provide vapor protection to the entire body. PPE Level C provides splash protection but limited respiratory protection because the mask only filters air. Protection provided is dependent on the type of filter used in the mask. PPE Level D usually signifies a duty uniform with no added protection.
    1. Airborne radiological particulates- If airborne radiological particulates are the only concern, Level C protection is generally considered as sufficient when combined with appropriate decontamination procedures.
    2. None of the PPE presently available offer protection against the radioactive rays such as gamma or the high-energy particles such as neutrons.
    3. Where toxic chemical agents are suspected, PPE Level B or higher protection is initially required for protection of both the respiratory system and skin.
        a) When the presence of both radiological materials and toxic chemicals is suspected, responders should use the highest level of PPE until the situation is fully understood.
        b) PPE serves as protection against inhalation and ingestion of radioactive particles.

J. Nuclear Weapons- The use of a nuclear device by a terrorist would produce devastating effects, including thermal (heat) impulse, blast wave, penetrating neutron and gamma radiation, and radioactive fallout with radiological contamination, and would have a tremendous psychosocial impact on the community and the entire country.
    1. A “Small” nuclear weapon less than one kiloton may be mistaken for a large truck bomb
    2. It is unlikely that a terrorist will use nuclear weapons

K. Explosive Materials- Explosives are substances that- through chemical reaction-rapidly and violently change to a gas, accompanied by high temperatures, extreme shock, and a loud noise. There are three types of explosions **[43.V.F]** 1. Atomic- An atomic explosion is characterized by the splitting (fission) or fusing (fusion) of specific atoms, causing the release of tremendous amounts of energy. 2. Mechanical- A mechanical explosion is characterized by a gradual buildup of pressure in a container until it overcomes the structural resistance of the container and an explosion occurs (i.e., pipe bomb). 3. Chemical- A chemical explosion is the rapid conversion of a solid or liquid explosive compound into gases having much greater volume than the substances from which they are generated. L. Classification by Types of Explosion **[43.V.I] [5]** 1. High Explosives detonate 2. Low explosives, which deflagrate M. Classifications by Sensitivity of Materials- Explosives are classified also by their sensitivity (the amount of energy required to initiate the reaction). 1. Primary explosives- Primary explosives are very sensitive and require a small amount of energy to be initiated. Primary explosives are mainly used in detonators to initiate secondary explosives. 2. Secondary explosives- Secondary explosives are relatively insensitive and need a great amount of energy to initiate decomposition. Secondary explosives require a detonator to explode. 3. Tertiary explosives- Tertiary explosives are the most insensitive of high explosives, requiring a large stimulus to cause detonation. They require confinement, especially when used in small quantities. N. Improvised Explosive Device (IED) - An IED is a type of bursting/explosive device that is not a military weapon or commercially-produced explosive device-a device that is altered from the manufacturer's intended use. An IED is a homemade device designed to cause death or injury by using explosives alone or in combination with toxic chemicals, biological toxins, or radiological material. 1. Constructed in a nonstandard manner,	**[LD43]** – Characteristics of incendiary devices **[LD43]** – Types and characteristics of explosives and improvised explosive devices **[5] ASK –** What's the advantage of using explosives? • Answer - Looking for ease of availability, ease of construction, mass casualties, fear factor, etc.

incorporating explosives or destructive, lethal, noxious, pyrotechnic, or incendiary chemicals
2. Designed to kill, injure destroy, disfigure, distract, or harass
3. Delivered to a target

O. Components of IED- IED generally consist of four basic components:
1. Power sources- Power sources are commonly electric because the majority of IED contain an electric initiator. Batteries (a common power source) are manufactured in many shapes and sizes.
2. Initiators- Initiators provide the additional energy required to start a chain reaction with the explosive, causing it to burn or detonate.
3. Explosives (fillers) - Explosives are a necessary ingredient of the IED, and the component that causes most of the damage. When an explosive is incorporated into a device, it is not necessarily in contact with all other IED components. These components will often survive in some form after the device detonates.
4. Switches- Switches are incorporated into a device as either an arming switch or a fuse. They can be simple or complex in nature. More than one switch can be used to create a redundancy in the system. Many IED will incorporate both an arming switch and a fusing switch.

P. Effects of an Explosion
1. Incendiary/thermal effect- The incendiary effect is usually seen as a bright flash or fireball at the moment of detonation and will involve heat.
2. Fragmentation effect- This is when pieces of the explosive device or its container come apart and spread out from the seat of the explosion.
3. Shrapnel effect- Shrapnel differs from fragmentation in that it doesn't derive from working parts of the device. It can include:
   a. Nails
   b. Marbles
   c. Ball bearings
4. Blast pressure effect- This involves the resulting bubble surrounding the seat of an explosion. It encompasses the entire area behind the shock front emanating from the seat of the explosion. There are three stages of blast pressure:
   a. Positive pressure- The positive pressure

phase occurs when the blast creates a shockwave that moves rapidly from the seat of the explosion, pushing the air away from it and delivering violent force to everything in its path. It is formed at the instant of detonation when the blast compresses the surrounding atmosphere and pushes it outward.

b. Peak overpressure- This is the highest amount of positive pressure above normal atmosphere that an explosive charge achieves during detonation or explosion. It pushes air away from the seat of the explosion.

c. Negative pressure- The negative pressure phase occurs when the ambient pressure is less than atmospheric pressure, causing a suction effect. It follows immediately after a positive phase, but lasts two to three times longer. The negative pressure phase is essentially a vacuum or suction phase, thus accounting for much of the debris found at the seat of the explosion nearby.

d. Ground shock- This occurs when the explosion is initiated while buried in the earth or submerged in water. Because of the relative incompressibility of both earth and water, the shockwave should extend further and with more force than air. This effect is similar to that of a small earthquake. Structural damage may be substantially greater.

Q. Use of IED to Disperse CRBN Materials- An IED may be used to initiate a CBRN event; in these cases the IED is used to scatter the hazard.
   1. Most of the standard chemical munitions contain a burster charge surrounded by the agent.
   2. When the burster charge is activated by an appropriate fuse, it ruptures the munitions and causes the agent to be disseminated.

R. Delivery of IED
   1. Pipes and tubes
   2. Suitcases, handbags, purses
   3. Postal mail
   4. Toys
   5. Cellular phones and pagers
   6. Computers

7. Furniture
8. Cigarette boxes
9. Flashlights
10. Bottles, cans, and jars (any container)

S. Responding to a Preblast Incident- As the law enforcement responder arrives on the scene of a potential explosion incident, several decisions must be made based on the situation, the first of which is whether to evacuate. If available the law enforcement responder needs to know the following:
   1. Location of the bomb(s)
   2. What it looks like
   3. Type/size of bomb(s)
   4. Time of detonation
   5. How will it detonate (timing, command, temperature, etc.)

T. Safety Procedures- Each agency has its own standard operating procedure for threats involving explosives before a situation occurs. The following are suggestions from Mike Pickett's Explosives Identification Guide:
   1. Be aware of possible multiple devices
   2. Do not transmit two-way radios, radar, or television transmitting devices within 1,000 feet of the device. This includes the MDC.
   3. Notify the proper authorities, depending on the jurisdiction and situation.
   4. Clear and control the area as one would during a hazardous materials incident.
   5. Stage Emergency Medical Services (EMS), fire, and the police units outside the control point.
   6. Do not approach the suspected explosive, because it may have motion-sensitive or acoustic fuses that function once a target is sensed.
   7. Reduce the potential effects of a blast and flying shrapnel by opening doors and windows and by placing emergency vehicles in the path of the blast wave to act as a shield.

U. Priority Actions- Upon initial assessment of the situation, the responder, using the Bureau of Alcohol, Tobacco, Firearms, and Explosives (BATFEE) distance table, should establish a safe perimeter, then search and evacuation decisions must be made. A responder must take great care to avoid endangering him/herself, other responders, and the public. Proper standoff distances and shielding must be considered when positioning vehicles and equipment and when

moving or evacuating personnel. The identification and preservation of evidence are a secondary priority. V. Scene Survey Techniques- When a bomb threat has been made, a scene survey must occur (if time permits) to make evacuation determinations. There are different methods of approach, including company search procedures. The following are some examples: 1. Listen for unusual noises 2. Look for tripwires or devices in the doorway 3. Use electronic devices or medical stethoscopes 4. Search from floor to waist height, from waist to head, and from head to ceiling 5. Finally, inside false or suspended ceilings, ceiling-mounted fixtures, air conditioning ducts, etc. 6. Use two searchers and visibly "split the room" in half W. Hazards Encountered in Structures Following an Explosion- Three common types of structural hazards following an incident involving an explosive device **[6]** 1. Glass 2. Fragments 3. Collapse/fire hazards 4. Multiple devices 5. Natural gas 6. Electrical lines 7. Other CRBNE weapons 8. Bodily fluids X. Multiple Devices- These are additional explosives placed at the scene of on-going response 1. Responders are the target 2. Devices may be hidden from view 3. Devices may be time delayed, cell-phone activated, or radio-controlled Y. Guidelines for Responding to an Incident Involving Multiple Devices: 1. Anticipate the presence of multiple devices at any suspicious incident. 2. Survey the scene for multiple devices before moving into an incident area 3. Avoid touching or moving anything that may conceal an explosive device. 4. Effectively manage the scene with boundaries, exclusion zones, triage areas, etc. 5. Preserve the scene as much as possible for evidence collection and crime investigation.	**[6] ASK –** What are some hazards you may encounter following an explosion? • Answer – Glass, fragments, collapse and fire hazards, multiple devices, natural gas, electrical lines, other CBRNE weapons.

Z. Law Enforcement Response Priorities- The law enforcement responder has particular priorities to address. The first priority is the safety of the responder and the public. Every effort must be made to avoid additional casualties among the public. Law enforcement responders must also ensure their personal protection. Too often, law enforcement responders rush into a situation with little concern for their own safety and become victims. As victims, they are no longer available to assist in the response effort and may require additional resources for treatment (if survival is possible). Too many responder lives were lost on September 11, 2001 **[43.V.M]**	**[LD43]** – Basic on-scene actions at a WMD incident