FIRE AND RESCUE DEPARTMENTS OF NORTHERN VIRGINIA

FIREFIGHTING AND EMERGENCY OPERATIONS MANUAL

WEAPONS OF MASS DESTRUCTION (WMD) AND CLANDESTINE INCIDENTS

Second Edition

Issued: August 2007
Revised: August 2016

ACKNOWLEDGMENTS

This document was developed through a cooperative effort of the following Northern Virginia fire departments:

- City of Alexandria
- Arlington County
- City of Fairfax
- Fairfax County
- Fauquier County
- Fort Belvoir
- Fort Myer
- Loudoun County
- City of Manassas
- Marine Corps Base Quantico
- Metropolitan Washington Airports Authority (MWAA)
- Prince William County
- Stafford County

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Fairfax County: Battalion Chief Tyrone Harrington, Captain Dan Shaw, Captain David Barlow, Master Technician Matthew Tamillow
Fort Belvoir: Lieutenant Kevin Good
Fort Myer: Assistant Chief Bruce Surette, Captain William Long
Loudoun County: Lieutenant Scott Lantz
City of Manassas: Battalion Chief Mark Nary
Marine Corps Base Quantico: Captain Robert Helbock
MWAA: Captain Jason Graber, Captain Gary Hubble
Prince William County: Lieutenant Bryan Ross
Stafford County: Lieutenant Brian Thompson

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Stafford County: Battalion Chief John Ennis
Arlington County: Lieutenant Norman Graham
Alexandria City: Captain Michael Dunn
Prince William: Lieutenant Dan McCleese

The committee would like to thank the following individuals and organizations for their help in the development of this manual:

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City of Fairfax: Susan Wiczalkowski, Administrative Assistant

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PREFACE

This manual is designed to be used as a resource and reference for all fire department personnel in Northern Virginia for response to actual or suspected incidents involving weapons of mass destruction (WMD).

This manual is not meant to supercede any individual jurisdiction's hazardous materials team operational guidelines; it is meant as an initial operational guideline for personnel that arrive on an incident prior to a hazardous materials team.

The manual will reference four general categories of WMD: chemical, biological, radiological/nuclear, and explosive. Two additional related subject areas will also be covered in this manual: clandestine drug labs and chemical suicides.

Changes in the second edition of the manual include:

- The addition of material on clandestine drug labs and chemical suicides.
- An updated resource list.
- Consolidated the command and control information for all chemical, biological, radiological/nuclear, and explosive (CBRNE) events into one section.

DEFINITIONS

Bottle Bomb: A mixture of chemicals confined in a bottle causing an exothermic reaction resulting in an overpressurization and rupture of the container (e.g., drano and aluminum foil).

Chemical Suicide: A suicide, or attempted suicide, using a single chemical or mixed chemicals in a confined space (e.g., bathroom, automobile).

Clandestine Lab: A place where controlled substances used for illegal or illicit purposes are secretly manufactured.

Contamination: The process of *transferring* a hazardous material from its source to people, equipment, or the environment. The material *remains* in contact with the person or object and creates a continuing risk of injury or harm.

Etiological: Involves a living microorganism, or its toxins, which causes, or may cause, human disease. Biological agents are the most obvious examples of etiological agents.

Exclusion Zone: Also referred to as the hot zone, an exclusion zone is an area of maximum exclusion of all personnel unless attired in the appropriate level of protection, such as chemical protective equipment (CPE).

Exposure: An incident of contact or an encounter with a hazardous chemical, biological, or energetic (explosive) agent.

Pathogen: Any organism (usually living) capable of producing serious disease or death, such as bacteria, fungi, and viruses.

Public Health Emergency: An incident which may or has the potential of spreading some fashion of sickness/illness to the public.

RAD: An abbreviation for radiation. Any material or combination of materials that spontaneously emit ionizing radiation, and have a specific activity greater than 0.002 microcuries per gram.

Radiological Frisking: To survey external surfaces of people and objects using radiological meters and probes.

Roentgen: A unit of measurement for the exposure of X-rays and gamma rays.

Single Pot Method: Use of one sealed container which is generally flipped upside down to cause the reaction needed to turn several toxic ingredients into methamphetamine.

Toxin: Toxic substances of natural origin produced by an animal, plant, or microbe; they differ from chemical substances in that they are not manmade. Toxins include botulism, ricin, and mycotoxins.

Weapons of Mass Destruction (WMD): Any explosive, incendiary, poison gas, bomb, grenade, or rocket having a propellant charge of more than four ounces, missile having an explosive or incendiary charge of more than one-quarter ounce, or mine or device similar to the above. Any weapon involving a disease organism. Any weapon that is designed to release radiation at a level dangerous to human life.

OVERVIEW

Weapons of mass destruction (WMD), include, but are not limited to, four main categories of threats known as CBRNE (chemical, biological, radiological/nuclear, and explosive).

A WMD event will be a dynamic and continually evolving situation that will involve multiple agencies. When responding to incidents involving WMD, there are a few key considerations common to all of these events:

- Unified command should be established early, as is done with any major event.
- Multiple events should be anticipated.

Particular attention must be paid to highly populated areas or venues, such as mass transit, sporting events, and shopping malls.

First responders may be targets for terrorists and terrorism events. As such, responders must be diligent in maintaining situational awareness and operational security throughout the duration of the incident. It is also important first responders be aware of the potential for secondary devices and avoid areas where secondary devices may be placed such as mailboxes, trashcans, and note and attempt to avoid unattended backpacks, luggage, and suspicious packages. Units should stage away from line of sight of the target area, away from buildings with large amounts of glass, and use distant structural and/or natural barriers for protection. (Additional information can be found at https://www.osha.gov/SLTC/emergencypreparedness/guides/secondary.html.)

Terrorism is defined by 28 Code of Federal Regulations (CFR) as, "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population or any segment thereof, in furtherance of political or social objectives."[1]

A key element for a terrorist is symbolism. The following are examples of high profile, high-potential terrorist targets:

- Federal, state, and local government buildings.
- Mass transit facilities (such as subways, airports, train stations).
- Public buildings and assembly areas (examples include shopping malls, sports complexes, theaters).
- Controversial businesses (such as abortion clinics, fur retailers).

Any terrorist event is considered a federal crime. Every effort should be made to preserve and recognize evidence. Anything out of the ordinary should be noted for later evaluation.

Incidents involving the use of WMD have the potential for injuring or killing large numbers of people. Incidents of this type are very similar to hazardous material incidents and have the potential for, or could become, a mass casualty incident. Additionally, an incident involving a WMD is a criminal situation that requires the close cooperation of law enforcement agencies.

[1] 28 CFR Section 0.85 https://www.gpo.gov/fdsys/granule/CFR-2010-title28-vol1/CFR-2010-title28-vol1-sec0-85/content-detail.html

INITIAL ACTIONS

First arriving responders will play a critical role in the initial response to an incident involving WMD. Their initial actions will set the pace for the incident and may determine the success of the operation.

Size up factors may include:

- Dispatched information,
- Time of day,
- Weather,
- Area involved,
- Type and scope of the event,
- Number of casualties,
- Signs and symptoms of casualties,
- Vapor cloud,
- Occupancy/location, and
- Significant or historic anniversaries.

Investigation may be necessary, including a reconnaissance by properly protected first responders. Use of appropriate detection and monitoring devices will be a valuable tool.

Isolate and deny entry to limit the access and egress of civilians. The combined use of control zones and perimeters will protect the first responders and assist in determining the size of the event and number of victims.

Request additional resources based upon situational size-up and scope of incident. Consideration should be given to the number of casualties and type of symptoms. The need for specialized resources, such as hazardous materials units, technical rescue, state and federal resources, and other specialized responders should be considered.

Command and Control of Incidents

Acts of terrorism or incidents involving weapons of mass destruction have the potential to quickly overwhelm local emergency resources. In the event of an explosive, chemical, biological, or radiological attack, public safety agencies will be significantly challenged.

These dynamic events require a strong command and control element, coordination between local/state/federal response agencies, and effective communications at all levels. These requirements are accomplished through the early and continuous use of the Incident Command/Unified Command System (ICS/UCS). Use of the ICS/UCS will help facilitate safer operations for response personnel, effective achievement of strategic goals/tactical objectives, and efficient use of resources. Use of the ICS/UCS is particularly imperative in light of the multi-agency/multi-jurisdictional arena in which the Incident Commander (IC) must operate.

Emergency Medical Services (EMS)

EMS command and control should be managed according to the *NOVA Command Officer Operations Manual and Mass Casualty Incident Manual (MCIM)*.

There are antidotes available that are critical to counteracting certain chemical warefare agents and organophosphates. A common term used to describe signs of a person that has been exposed to these chemicals is SLUDGEM, which stands for Salivation, Lacrimation, Urination, Defication, Gastrointestinal upset, Emisis, and Miosis. These antidotes are carried on pre-designated units throughout the region, referred to as CHEMPACKS. There are EMS CHEMPACKS for field use and hospital CHEMPACKS for in-hospital use. Additionally, larger quantities of available antidotes are located in the Strategic National Stockpile (SNS) and at the Centers for Disease Control (CDC) for the general population. There will be time restrictions when these resources are requested. Should these stockpiles be needed, they should be requested through the Northern Virginia Regional Hospital Coordination Center (RHCC).

Basic Responsibilities in a Terrorism/WMD Incident

The following section covers the basic responsibilities of the first responders arriving on the scene of a suspected or confirmed WMD incident.

- Ensure the safety of response personnel:
  - Establish isolation/control/work zones.
  - Use proper personal protective equipment (PPE).
  - Implement time, distance, and shielding principles.
  - Minimize the number of personnel assigned to the danger area.
  - Fire and rescue personnel should be aware of the possibility of secondary devices and use extreme caution when scanning the area for potential threats.
  - Ensure law enforcement officers have checked for secondary devices.
  - Ensure law enforcement officers have controlled active threats – shooters, hostile crowd, etc.
  - Maintain accountability of personnel.
  - Decontaminate and provide medical care if necessary.
- Conduct a thorough and continuous size-up/hazard and risk assessment.
  - Pay attention to signs and symptoms of patients
  - Are there mass casualties with little or no trauma?
  - Are there dead plants or animals in the area?
  - Is there discarded personal protective equipment?
- Continually collect intelligence and/or information regarding the incident.
  - Was there an explosion? Large or small? Structural damage?
  - Is there a liquid present?
  - Is there a vapor cloud or aerosol dispersal device reported?
  - Is the incident in a confined location or open space?
- Establish the incident objectives for the incident:
  - Life safety:
    - Isolate/deny entry – establish control zones.
    - Remove endangered victims.

        - Rescue viable patients.
        - Decontaminate.
        - Triage, treat, and transport patients.
        - Initiate public protection (evacuation and or shelter-in-place) actions.
    - Incident control and stabilization.
    - Infrastructure, environmental, and property protection.
    - Protect the crime scene and infrastructure.
- Establish an incident action plan for implementation.
- Make appropriate notifications (i.e., hospitals, agencies with statutory authority) and provide regular updates.
- Develop a communications plan that provides adequate radio channels, cellular telephones, and other necessary equipment and personnel.
- Participate in unified command operations with other local, state, and federal agencies.
- Request additional and/or specialized resources as necessary.
- Stage incoming units at a secure location.
- Develop an incident command organization appropriate to manage the incident.
- Ensure an outer-perimeter is established to restrict site access.
- Manage public information and media interaction.
- Protect the crime scene and evidence.

Decontamination

The following list covers basic decontamination considerations for first responders arriving on the scene of a suspected or confirmed WMD incident.

- Establish decontamination locations upwind and uphill of the incident.
- Decontamination personnel must wear PPE and SCBA until otherwise instructed by Command or the Hazmat Branch.
- Be alert for secondary devices (i.e., unattended personal items, baggage, etc.), weapons, and perpetrators. Also, be aware that perpetrators may be among the victims. If you encounter unusual behavior/demeanor, unusual personal belongings on a victim, weapons, or a victim's actions appear inappropriate for the situation, request assistance from police.
- Request police for security of personnel, victims, personal property, and collection and preservation of evidence.
- Clothing removal is decontamination. Encourage victims to remove clothing and provide some modesty cover (doff-it-kits, Tyvek suits/coveralls) if possible, prior to decontamination, and have blankets, shelter or clothing available post decontamination.
- If possible, separate male and female victims. Children, regardless of sex, should remain with parents or guardians.
- Prioritize asymptomatic, symptomatic, and non-ambulatory casualties.
- Coordinate decontamination with EMS triage activities.
- Decontamination corridors are ideal targets for secondary devices.

Types of Decontamination

Two types of decontamination that are available to first responders are Emergency Gross Decontamination, Figure 1, and Mass Decontamination, Figure 2.

Figure 1: Emergency decontamination.

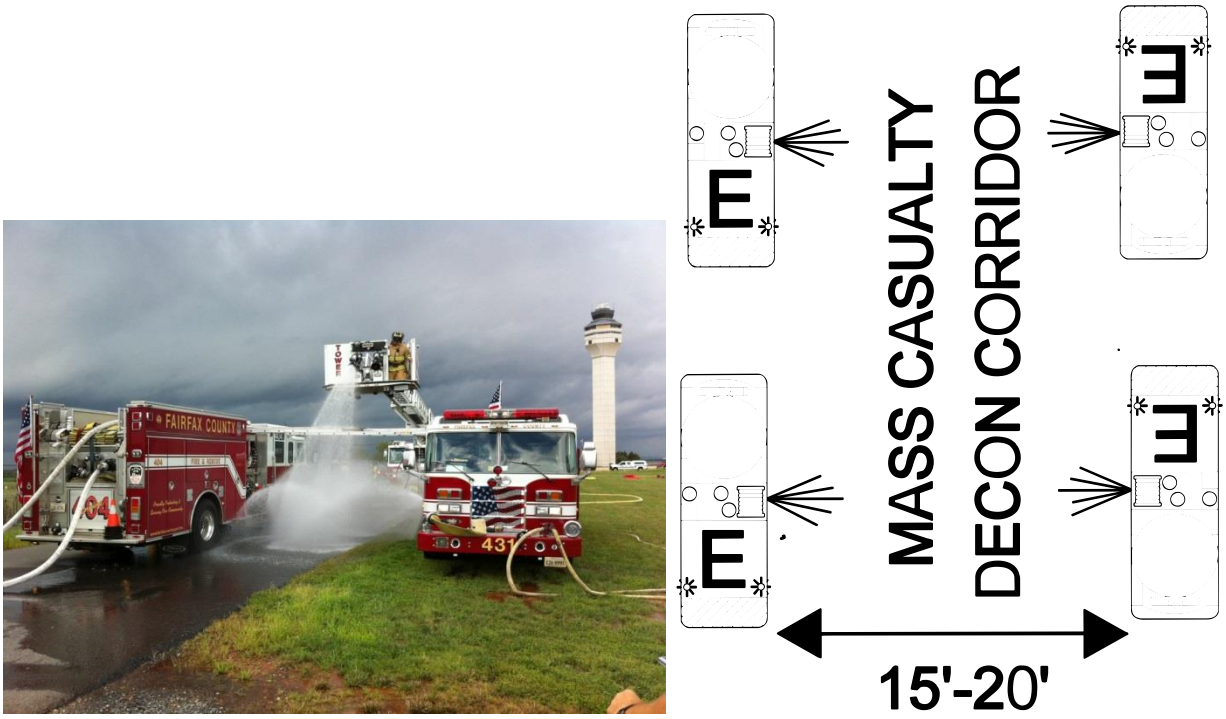


Figure 2: Mass decontamination.

Special Operations

In the event of a WMD event, special operations personnel will be a valuable resource to the IC. Special operations personnel will be able to assist the IC in determining levels of contamination with an explosion (for example, a dirty bomb), assist in determining the structural stability of buildings involved in the blast or exposed to the blast, and Explosive Ordinance Disposal (EOD) teams will be able to assist with locating and identifying secondary devices, as well as, the disposal of any unexploded devices.

Hazardous materials response teams will play an important role in any post explosion event. Any explosive detonation should be considered *dirty* until it can be ruled out by detection and monitoring equipment. Hazardous materials personnel should detect for the presence of radiation, chemical agents, and combustible gases. Keep in mind that just because one or more of these agents are detected, it does not make it a terrorist event. Many businesses have these agents for use in their everyday processes. However, if the agents do not match the occupancy, special care should be exercised.

Hazardous materials personnel should also check for damaged utilities such as ruptured gas mains or service lines that could present a secondary explosion or flammability hazard.

Hazardous materials personnel will also play a key role in the decontamination process. Following an explosion, if at all possible, victims should be decontaminated prior to transport to a medical facility. This will reduce the transfer of dust and other possible contaminates that have not been monitored for on the scene (such as asbestos for example).

Hazardous materials teams should prepare to make hot zone entry for reconnaissance and detection, and monitoring. While operating in the hot zone, hazardous materials teams should monitor for:

- Identifications of the type of agent present,
- Toxicity/concentrations (Immediately Dangerous to Life and Health, or IDLH, levels),
- Atmospheric oxygen available,
- Presence of flammable gases, and
- Radiation levels.

Based on the information gathered above, hazardous materials personnel will:

- Select levels of personal protective equipment PPE for units based on the task they are performing.
- Report the number of victims, their symptoms and conditions, and any other information that may be needed.
- The Hazmat Branch will be established to coordinate with the incoming specialized teams, including other hazardous materials teams.
- Coordinate setting-up the control zones (hot, warm, and cold zones).
- Determine direction of travel of the plume if applicable. This will not be an exact science, but an initial plume model should be prepared in the initial stages of the event. The plume model will be constantly reevaluated throughout the incident.

- Coordinate and ensure that the most effective and proper decontamination is being used. This may include several decontamination sites around the incident (such as mass decontamination corridors, technical decontamination, and emergency decontamination).
    - A separate technical decontamination corridor under the direction of the Hazmat Branch shall be established for hazardous materials team use only.

Units can reduce levels of PPE upon a decision from the IC, in coordination with the Hazmat Branch/Group Officer, based upon the situation information obtained as specified above.

Special operations hazardous materials personnel will conduct available tests to determine the agent used. If the test results are positive, hazardous materials personnel will coordinate decontamination of the victims in available shower facilities with warm water and soap. Emergency clothing packets will be provided and the victims clothing shall be bagged. Responders shall decontaminate themselves as appropriate.

If a dispersion device is found, EOD personnel should attempt to disrupt or control the device. EOD personnel should also ensure that the device and the area around the device are free of booby traps.

Special operations personnel will also interact with law enforcement agencies as appropriate for crime scene preservation and evidence collection. Special operations teams will play a vital role in the event of a radiation event. First-arriving units will be able to determine the presence of radiation; however, hazardous materials teams will be required to determine the level of contamination on people or patients. For an event involving radiation, special operations hazardous materials personnel should:

- Determine control zones based on meter readings and action levels per jurisdiction.
- Determine levels of contamination (patient radiological frisking with specialized radiation meters). This can be a time-consuming process if there are a large number of possible patients because the hazardous materials team member methodically moves a radiation probe in close proximity to the patient slowly over their entire body searching for possible radiation contamination.
- Decontaminate patients.
- Conduct radiological patient frisking (post-decontamination) to determine if further decon is needed.

Special operations personnel will interface with outside agencies such as the US Department of Energy, the Environmental Protection Agency, the Department of Transportation, and other applicable agencies.

Technical rescue teams will play a vital role in assessing the structural stability of affected structures, shoring of damaged structures, rescue of trapped victims, and the use of technical search equipment.

EOD personnel will play a key role in determining the presence of secondary devices and the rendering safe of any unexploded devices.

All personnel must remember that any explosive detonation must be treated as a crime scene until it can be proven otherwise. The preservation of evidence is paramount. In addition, all explosions should be considered to be *dirty* until proven otherwise.

Command

Responsibilities of the IC at a CBRNE incident include:

- Ensure the safety of response personnel:
  - Establish isolation/control/work zones. Isolation zones will be the intial zone identified by first responders to keep everyone out, control zones will be identified by hazmat trained personnel using detection equipment for hot, warm and cold zones. Work zones will occur within the hot, warm and cold zones i.e. decon corridor within the warm zone.
  - Ensure use of appropriate PPE.
  - Implement time, distance, and shielding principles.
  - Minimize the number of personnel assigned to the danger/IDLH area.
  - Maintain situational awareness and operational security for the incident. This could include requesting police to standby at the command post and setting up perimeter control and being aware of bystanders and their actions (normal reactions for the incident type or unusual behavior).
  - Check the site and peripheral areas for secondary devices and/or suspicious packages.
  - Control any active threats that present real or perceived harm to responders.
  - Ensure site and scene security at critical areas (command post, staging, treatment, media area).
  - Establish and maintain accountability for personnel.
  - Provide decontamination and medical care as necessary.
  - Provide Rapid Intervention Team (RIT) capabilities.

- Conduct a thorough and continuous size-up/hazard and risk assessment:
  - Determine the severity of the explosion and extent of damage, type of biological agent, physical/chemical properties, dissemination methods
  - Assess and minimize danger to personnel and citizens.
  - Determine the number of patients and severity of injuries, exposures.
  - Evaluate collateral damage (such as collapsed buildings, uncontrolled utilities).
  - Evaluate the threat to exposures (such as people, other buildings).
  - Determine the required resources (conventional or specialized) needed and available.
  - Determine current and expected weather conditions.
  - Evaluate the potential for secondary devices or other criminal activities with law enforcement agencies.

- Continually collect intelligence and/or information regarding the incident:
  - This can only be successful through participation, and unified command, with law enforcement.

- Establish the strategic goals for the incident:
  - Ensure life safety of responders, victims, and public.

- Initiate incident control/stabilization operations.
- Provide protection for infrastructure, environment, and property.
- Protect the crime scene and preserve evidence.

- Establish tactical objectives and an action plan for implementation:

  - Life safety/incident control/stabilization:
    - Isolate/deny entry and establish control zones (hot, warm, and cold).
    - Determine the proper stand-off distance based on the blast, collateral damage, etc.
    - Have EOD check for secondary devices or other threats.
    - Remove endangered victims to casualty collection point in a safe area. Do not treat patients in the blast area until secondary devices can be ruled-out.
    - Search collapsed/damaged structures for patients.
    - Rescue viable patients from IDLH environment.
    - Perform mass decontamination of victims if warranted.
    - Triage, treat, and transport patients.
    - Initiate public protection (evacuation and or shelter-in-place) actions.
    - Address psychological needs of victims (i.e., the worried well).

- Request additional and/or specialized resources as necessary:
  - EMS resources as outlined in the NOVA *Mass Casualty Incident Manual*.
  - Additional alarms will be required as these incidents are staffing intensive.
  - EOD teams (law enforcement, fire/rescue, or military) should be requested early in the operation.
  - Technical Rescue Operations Teams and US&R can be valuable adjuncts due to collateral/structural damage.
  - Hazardous materials response teams can assist in establishing the IDLH and decontamination of dirty patients.
  - Utility companies will be required for post blast damage.
  - Heavy equipment (cranes, front-end loaders, etc.) can assist in gaining access to trapped patients in post blast scenarios.

- Stage incoming units at a secure location:
  - Maintain adequate resources in staging for the incident and ensure a staging manager is assigned.
  - Ensure the staging area is swept for secondary devices.

- Develop a communications plan that provides adequate radio channels, cellular telephones, and other necessary equipment:
  - Use multiple radio channels for functional areas (EMS, rescue, fire suppression).
  - Cellular/satellite telephones.
  - Activate notification systems (i.e., EAN/Everbridge Alert, Reverse 911).

Expanded command considerations & EOC activations:

- Establish a unified command with other local, state, and federal agencies:

- Develop an incident command organization appropriate to manage the incident.
- Appoint division/group supervisors, deputy section chiefs and branch directors, and command and general staff (C&GS) as necessary. (Note: The Deputy IC and sections may be from a different agency, i.e., the Operations Section Chief is from fire and rescue and his/her deputy is from law enforcement.)
- Jointly develop incident objectives with unified command members.
- Jointly prioritize incident objectives.
- Jointly develop an initial action plan (IAP) and revise/update plan as necessary.
- Document all actions and communications.
- Ensure adequate work facilities and resources. (For example, command vehicles are ordered to support the C&GS.)

- Participate in joint public information and media interaction:
  - Establish a joint information initiative with other unified command agencies.
  - Provide public protection directions and information.
  - Maintain accuracy with all information.
  - Establish timely updates.
  - Do not compromise the investigation.

- Make appropriate notifications and provide regular updates:
  - Communications centers.
  - Emergency operations center.
  - NOVA RHCC.
  - Virginia Department of Emergency Management.
  - Federal Bureau of Investigation.
  - Applicable health departments.
  - Washington Metropolitan Transit Authority.

- Infrastructure, environmental, and property protection:
  - Minimize adverse impact on transportation, utilities, economic interests, etc.
  - Decontaminate/remediate site if necessary.
  - Protect the crime scene and avoid disturbing or destroying evidence.
  - Coordinate with law enforcement to secure the scene due to convergence of the public.
  - Ensure an outer perimeter is established by law enforcement to restrict site access to the incident scene and command area.
  - Provide support to law enforcement for the investigation.

- Prepare for long-term/multi-operational periods:
  - Activate the regional incident management team (IMT).
  - Development of formal incident action plans (IAP).
  - Recall of off-duty staff should be considered.
  - Rehabilitation of personnel (food, work/rest rotations, drink, restroom facilities and shelter, etc.) will be required.

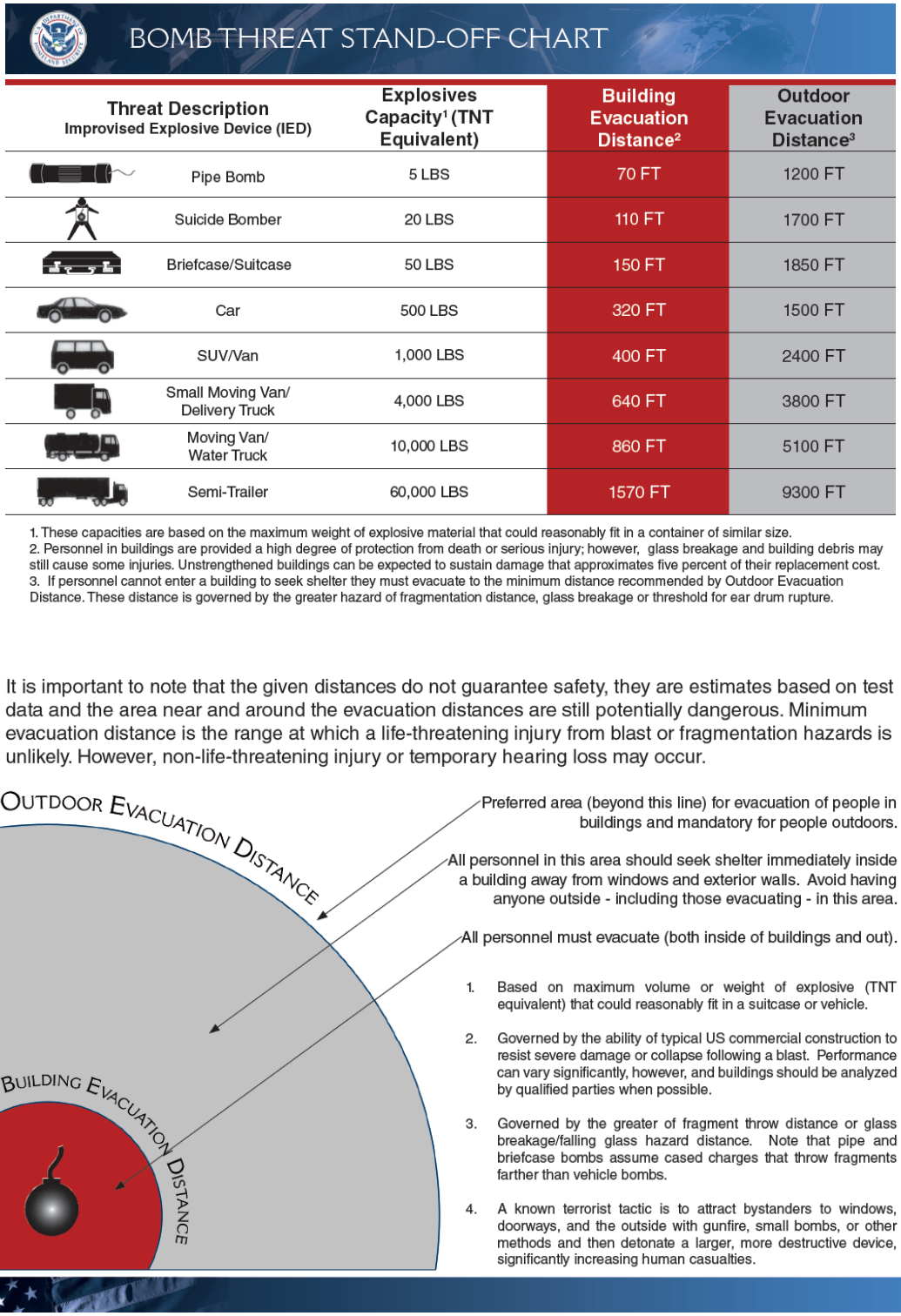
- Transition from response to recovery phase:
  - Determine the need for and address Critical Incident Stress Management (CISM) for

all responders.

- Prepare to transfer the incident to law enforcement for criminal investigation.
- Begin the demobilization process.
- Complete all necessary documentation.

INCIDENTS INVOLVING EXPLOSIVES

This section will focus on post-blast incidents. For pre-blast information, refer to Figure 3.



BOMB THREAT STAND-OFF CHART

Threat Description Improvised Explosive Device (IED)	Explosives Capacity[1] (TNT Equivalent)	Building Evacuation Distance[2]	Outdoor Evacuation Distance[3]
Pipe Bomb	5 LBS	70 FT	1200 FT
Suicide Bomber	20 LBS	110 FT	1700 FT
Briefcase/Suitcase	50 LBS	150 FT	1850 FT
Car	500 LBS	320 FT	1500 FT
SUV/Van	1,000 LBS	400 FT	2400 FT
Small Moving Van/ Delivery Truck	4,000 LBS	640 FT	3800 FT
Moving Van/ Water Truck	10,000 LBS	860 FT	5100 FT
Semi-Trailer	60,000 LBS	1570 FT	9300 FT

1. These capacities are based on the maximum weight of explosive material that could reasonably fit in a container of similar size.
2. Personnel in buildings are provided a high degree of protection from death or serious injury; however, glass breakage and building debris may still cause some injuries. Unstrengthened buildings can be expected to sustain damage that approximates five percent of their replacement cost.
3. If personnel cannot enter a building to seek shelter they must evacuate to the minimum distance recommended by Outdoor Evacuation Distance. These distance is governed by the greater hazard of fragmentation distance, glass breakage or threshold for ear drum rupture.

It is important to note that the given distances do not guarantee safety, they are estimates based on test data and the area near and around the evacuation distances are still potentially dangerous. Minimum evacuation distance is the range at which a life-threatening injury from blast or fragmentation hazards is unlikely. However, non-life-threatening injury or temporary hearing loss may occur.

1. Based on maximum volume or weight of explosive (TNT equivalent) that could reasonably fit in a suitcase or vehicle.
2. Governed by the ability of typical US commercial construction to resist severe damage or collapse following a blast. Performance can vary significantly, however, and buildings should be analyzed by qualified parties when possible.
3. Governed by the greater of fragment throw distance or glass breakage/falling glass hazard distance. Note that pipe and briefcase bombs assume cased charges that throw fragments farther than vehicle bombs.
4. A known terrorist tactic is to attract bystanders to windows, doorways, and the outside with gunfire, small bombs, or other methods and then detonate a larger, more destructive device, significantly increasing human casualties.

Figure 3: DHS information for incidents involving explosives.

First responders have the potential to encounter devices ranging from soda bottles to suicide bombers. Recent history has shown that explosive-type incidents are the most prevalent type of terrorist event (domestic and international) encountered.

Firefighter PPE and SCBA should be donned prior to arrival on the scene and worn until the involvement of other chemical, biological, and/or radiological agents can be ruled out.

If the incident is believed to be the result of a terrorist action, consideration should be given to the potential for secondary devices. Unusual packages and objects (such as unidentified boxes, packages, or suitcases) located in unusual places (at or near the front door, standpipe, hydrant) should be viewed with suspicion and avoided until confirmed as not dangerous. Command should be immediately notified.

Do not use two-way radios, radar, or television transmitting devices within 300 feet of potentially explosive devices. This includes the mobile data terminals in the apparatus and cellular phones. The electromagnetic radiation (EMR) given off by these devices may detonate the item. This is an initial recommendation that may change upon need or further input from EOD teams.

Multiple explosive devices should always be a consideration for first responders.

In an effort to inflict bodily or psychological harm, explosives can also be used to disseminate chemical, biological, or radiological substances. For example, Sodium Cyanide was believed to be used in the first World Trade Center attacks in 1993. The probability of explosives being used to disseminate chemical and biological weapons is minimal due to the heat generated from an explosion; it is more likely that it will be used in conjunction with radiological materials.

Observing the appearance and signs/symptoms of victims may indicate whether a chemical agent has been released. Monitoring of the scene by the hazardous materials team is essential to determine what chemical agent(s) were used.

The use of radiological materials with the explosive device should always be a consideration. Immediate signs and symptoms of victims should not be used as an indication that radiological materials are involved. The use of radiological detection and monitoring equipment is necessary to make this determination. If there is a radiological agent associated with the explosive device the radiological portion of this manual shall be used in conjunction with the explosives section.

If there is a chemical or biological agent associated with the explosive device, the primary reference should be the chemical portion of this manual.

In WMD incidents with contaminated mass casualties, responders can be most effective by rapidly initiating mass casualty decontamination procedures for the victims.

Explosives – Initial Actions

First responders should review the *Basic Responsibilities in a Terrorism/WMD Incident* section in the beginning of this manual. All incidents involving explosives should be considered a real threat until proven otherwise. Keep in mind that any explosive device could be used as a

dissemination device for other WMD materials, such as radiological, chemical, and biological agents. A real threat for first responders at these types of events may include secondary devices that are targeted to specifically harm first responders.

First-arriving unit officers and command staff shall gather as much information as possible from emergency communications centers regarding the situation while en route to the scene.

The first-arriving suppression/EMS unit should approach the scene cautiously to evaluate the situation. Consider staging a minimum of 500 feet from the site or where debris/damage is first encountered. This unit may be referred to as the reconnaissance (recon) group.

PPE and SCBA should be worn and used due to the unknown potential of chemical, biological, and radiological agents involved.

Incoming units should stage at a greater distance than the first-arriving unit. Avoid line-of-sight with the blast area and stage away from buildings with large amounts of glass. Use structural and/or natural barriers to assist with protection. If multiple threats have been received for the same location (either in close succession or over a period of time), avoid using a preplanned staging area or predictable staging location such as one used during a fire alarm response. This is due to the possibility of a secondary device being planted near a previous or predictable staging area. Take into consideration buildings with extensive glass and buildings that may be vulnerable due to construction features or type, and use natural barriers to protect responders.

Additional initial actions include:

- Restrict/reduce radio traffic (including mobile data CAD or MCT) and cellular phone use at suspected site. According to local EOD units, vehicle radios and MDTs should be shut down 300' from the scene as these units are powerful transmitters. Portable radios can be left on to monitor but should not make transmissions within 50' of the suspected IED.
- Establish command and implement ICS early into the incident.
- Secure and announce the initial exclusion/hot zone.
- Do not touch or approach any suspected packages! This is a function of an EOD team.

Take into consideration the following during size-up:

- Potential number of victims.
- Exposure problems.
- Damage to structures, roads, and infrastructure.
- Detection equipment availability to first responders (such as radiation detection devices, multi gas meters).
- Collateral damage.
- Water supply considerations.
- Fire damage.
- Evacuation routes for responders and civilians.
- The need for additional resources (such as hazardous materials, EMS, technical rescue, and EOD resources).
- Entry into a post-blast area should be limited to life safety purposes only. Responders should enter the area for viable victims only and then exit the area to begin treatment.

Do not remove or disturb anything from the incident scene; it is considered a crime scene. It may be necessary, however, to move things to affect rescues. If this occurs, try to be cognizant of the location and placement of objects prior to removal. Prior to moving objects or victims, if possible, photograph, videotape, or document their location.

Safety considerations include:

- Consider the possible presence of secondary devices.
- Stage apparatus a safe distance from incident site.
- Perform rapid incident size-up.
- Consider stability of area, structure, etc.
- Ensure detection and monitoring equipment is used, i.e., four-gas meter, rad pager/detector.
- Consider possibility of a contaminated device (radiological, chemical or biological). Ensure testing and monitoring is performed to rule out contamination. If contamination exists, refer to appropriate action plan in that section of manual.
- Secondary hazards:
    - Unstable structures.
    - Damaged utilities.
    - Secondary device(s).
    - Patients/perpetrators with a secondary device or weapon.
    - Bloodborne pathogens.
- Use of appropriate PPE for the responder as determined by the specifics of the event and what level the participation and proximity to the event.
- Consider bringing Rapid Trauma Kits with you for initial multiple patient care
- Responders should limit the use of radios, cell phones, or other two-way devices within 300 feet of the immediate incident area.

Classification of Explosives

Explosives can be categorized as high-order explosives (HE) or low-order explosives (LE). High-order explosive produces a deafening, supersonic, over-pressurization shock wave.

Low-order explosive creates a supersonic explosion, however, it lacks the over-pressurization. It is, therefore, important that EMS care providers understand the differences between the two classifications, since you can anticipate different injury patterns.

Blast Injuries

There are four basic mechanisms of blast injuries that a responder should anticipate with explosive devices: primary, secondary, tertiary, and quandary.

A blast wave is defined as an over-pressurized wave, an increased pressurization that affects the body and objects the waves come in contact with. Blast waves are associated only with high-order explosives. Blast injuries are characterized by anatomical and physiological changes from the direct or reflective forces impacting the body's surface.

There is another type of a blast injury called blast wind, which is a force of superheated air flow; these are associated with both high and low-order explosives.

Table 1 details the type of injuries that may be encountered for each of the four basic mechanisms of blasts.

Table 1: Patient assessment considerations for blast injuries.

Mechanism	Patient Assessment Considerations
Primary	▪ Unique to HE, resulting from the over-pressurization wave with body surfaces ▪ Injuries anticipated (gas filled structures within the body are affected) ▫ Lungs ▫ GI tract ▫ Sinus ▫ Middle ear ▪ Types of injuries ▫ Pulmonary barotrauma (blast lung) – primary blast injury of the lung presents a clinical picture similar to pulmonary contusion from blunt chest trauma, but without rib fractures or chest wall injury; chest tightness, pain, and hemoptysis are common complaints ▫ Abdominal hemorrhage ▫ Middle ear and sinus ruptures – rupture of the tympanic membrane may cause tinnitus, pain, and hearing loss ▫ Head injuries/ concussion with the absent of any noted head trauma – typically result from trauma caused by the immediate explosion (close proximity); detonation forces will often cause traumatic amputations or massive tissue destruction; fatalities are common
Secondary	▪ Results from flying debris and bomb fragments ▪ Any Part of the body can be affected ▪ Penetrating ballistic or blunt injuries ▪ Additional blunt trauma injuries associated with structure collapse/falling debris
Tertiary	▪ Results from flying debris/bomb fragmentation (resulting from the bomb wind) ▪ Any body part may be affected ▪ Injuries anticipated ▫ Fractures and traumatic amputation ▫ Closed head injuries
Quaternary	▪ All explosive-related injuries, illnesses, or disease not due to primary, secondary and tertiary mechanisms ▪ Including exacerbation or complications of existing conditions ▪ Any body parts may be affected ▪ Injuries anticipated ▫ Thermal injury (burns) caused by excessive high temperatures created in the blast – can be flash burns, partial thickness, or full thickness ▫ Crush injuries ▫ Closed or open head injuries ▫ Other respiratory complications from dust and smoke, such as COPD, asthma, or respiratory distress ▫ Angina

Mechanism	Patient Assessment Considerations
	▫ Hypertension ▫ Psychological shock

Other injuries that may be anticipated in victims of explosive incidents include the following:

- Gray out – eye and throat problems associated with quantities of airborne pulverized concrete throughout the blast area; entrapped victims become disguised by the gray powder and blend in to the surrounding debris, making search efforts difficult.
- Contamination from explosive device.
- Chemical, biological, or radioactive component that is also associated with an explosive device.
  - Anticipate both explosive injuries and primary hazard of secondary contamination.
  - Refer to appropriate guide for management of these injuries.
  - Isolation of contaminated persons to prevent cross-contamination .
  - Decontamination challenges.

Other Considerations

While performing emergency operations, first responders should preserve evidence and avoid disturbing areas not directly involved in rescue activities, including those areas containing fatalities.

Leave fatalities and their surroundings undisturbed. Do not remove fatalities until appropriate authorization has been given.

Incidents involving explosives are the most common form of terrorist events. These incidents have the ability to inflict harm (cause trauma) to a large number of victims, damage buildings and infrastructure, ignite fires, and create additional hazards, such as gas leaks, water main breaks, and electrical hazards. Additionally, chemical, radiological, or biological agents may be attached to the explosive device in order to disseminate the agent. As such, command has the potential to encounter mass casualties, hazardous conditions, and possibly other CBRNE agents. Explosive incidents may require mass medical care, interaction with medical facilities, specialized resources (such as technical rescue teams), the need to identify and/or rule-out CBRNE agents, and decontamination.

Explosive events require a strong unified command and control element, coordination between local state, and federal response agencies, and effective communications at all levels.

☑ Local agencies: EMS, fire, law enforcement, RHCC, public works, emergency management

☑ State agencies: Virginia Department of Emergency Management (VDEM), Virginia State Police (VSP), National Guard – CST

☑ Federal agencies: Federal Bureau of Investigation (FBI), Department of Homeland Security/Federal Emergency Management Agency (including Urban Search and Rescue Teams)

INCIDENTS INVOLVING BIOLOGICAL AGENTS

The use of biological weapons in warfare has been recorded throughout history, and has the ability to affect a few individuals up to millions of people. Biological agent attacks will present in one of two ways: focused response or public health emergency. Focused response incidents involve a single, known, point source of contamination; for example, an individual stands up in a restaurant, announces the glass vial in his/her hand contains anthrax, and breaks the vial. A public health emergency will involve a large number of victims who begin to experience similar symptoms and report to medical facilities. In a covert biological agent attack, the most likely first indicator of an event would be an increased number of patients presenting with clinical features caused by the disseminated disease agent.

Once a biological attack or any outbreak of disease is suspected, the epidemiologic investigation should begin. The conduct of the investigation will not differ significantly whether or not the outbreak is intentional.

Well in advance of any event, public health authorities must implement surveillance systems so they can recognize patterns of nonspecific syndromes that could indicate the early manifestations of a biological warfare attack. The system must be timely, sensitive, specific, and practical. To recognize any unusual changes in disease occurrence, surveillance of background disease activity should be ongoing, and any variation should be followed up promptly with a directed examination of the facts regarding the change.

Accurate intelligence is required to develop an effective defense against biological warfare. Once an agent has been dispersed, detection of the biological aerosol prior to its arrival over the target, in time for personnel to don protective equipment, is the best way to minimize or prevent casualties.

The most important route of exposure to biological agents is through inhalation. Other routes for delivery of biological agents are thought to be less important than inhalation, but are nonetheless potentially significant. Contamination of food and water supplies, either purposefully or incidentally after an aerosol biological warfare attack, represents a hazard for infection or intoxication by ingestion. Assurance that food and water supplies are free from contamination should be provided by appropriate preventive medicine authorities in the event of an attack.

Intact skin provides an excellent barrier for most biological agents. (T-2 Mycotoxins would be an exception because of their dermal activity.) However, mucous membranes and abraded, or otherwise damaged, integument can allow for passage of some bacteria and toxins, and should be protected in the event of an attack.

Biological Agents – Initial Actions

The first step in providing adequate protection for people, property, and first responders during a biological event is to establish response priorities. First responders should review the Basic Responsibilities in a Terrorism/WMD Incident section in the beginning of this manual.

For a WMD event, response priorities are life safety, incident stabilization, and property and environmental concerns.

Each first responder must focus on these priorities in accordance with department policies. Becoming incapacitated by an unknown biological agent can occur if you do not prioritize your response options.

Incident stabilization focuses on preventing a biological problem from becoming more serious than it already is, or growing to a point where the biological incident is no longer manageable.

As a responder, to minimize the impact of the biological event, you must do the following:

- Secure the scene.
- Establish an exclusion zone.
- Prevent those outside the area from gaining access.
- Direct victims to move away from the affected area to a safe refuge collection point (casualty collection point).
- Direct victims to stay in one area, such as treatment or decontamination areas.
- Use Hazardous Materials Operations-level training/skills to limit the spread of the agent, thus reducing area of contamination (e.g., spill control).
- Make notifications early and ask for help early.
- Protection of the environment only becomes a concern after life safety and incident stabilization have occurred. (This is often a hazardous materials response team function.)
- Environmental protection is not easy for any WMD event.
- Ensure evidence protection and preservation during a biological event.

First responders should use appropriate safe worksite practices to avoid exposure to WMD agents. For exposure to occur there has to be a dose or concentration of the agent present in sufficient quantity to cause harm; the individual must also be in the agent's presence for a given period of time.

Indicators of a biological attack can include:

- Unusual number of sick or dying people or animals.
- Suspicious bombing incidents.
- Unscheduled or unusual dissemination of sprayed materials.
- Abandoned spray or dispersion devices.
- Containers from laboratory or biological supply houses (Petri dishes).
- Unusual swarms of insects.
- Casualties distributed with wind direction.
- High number of respiratory illnesses.
- Written or verbal threats.

During a biological event, harm can occur in two ways. Primary harm is etiological; approach uphill, upwind. Secondary harm is chemical and mechanical. Stay out of contaminated areas; if exposure or suspected exposure has occurred, perform emergency decontamination and direct to medical help.

Structural PPE, Level-B, or Level-C chemical PPE (or CPE) provides excellent protection for a focused response and standard body substance isolation (BSI) protection is appropriate for public health emergencies. The main goal to follow for a biological event for all first responders is self-protection.

Biological agents (bacteria, viruses, and toxins) have the ability to cause diseases or, in the case of toxins, poison exposed victims and response personnel. Unlike chemical agents, biological agents will not produce illness or symptoms in a rapid manner. Bacteria and viruses have incubation periods that range from several days to weeks. Toxins may begin to manifest illness/symptoms within hours. As such, command has the potential to encounter victims that have been exposed, but are not symptomatic. There is potential for large numbers of psychosymatic patients seeking medical intervention/antibiotics. Command will need to provide or prepare for special protective clothing, agent identification, possible mass decontamination, multiple psychosomatic patients, and interaction with medical facilities.

Biological incidents still require a strong unified command and control element, coordination between local, state, and federal response agencies, and effective communications at all levels. Some of these agencies will participate in unified command while others will work through the liaison officer.

- ☑ Local agencies: EMS, fire, health, law enforcement, RHCC, emergency management
- ☑ State agencies: VDEM, VSP, Virginia Department of Health (VDH), National Guard – CST, Virginia Department of Evironmental Quality (VDEQ)
- ☑ Federal agencies: FBI, US Public Health Service, U.S. Marines Chemical Biological Incident Response Force (CBIRF)

Biological Agent Recognition

Due to the fact that the detection of biological agents is nearly impossible by normal senses, EMS considerations are based on outward signs and clues for responding units.

Biological agents include the following:

- Antrhax
- Plague
- Ricin
- Botulism
- Smallpox

Recognition of a biological hazard can occur through several methods including:

- Identification of a credible threat.
- Discovery of bioterrorism evidence (devices, agent, clandestine lab).
- Diagnosis (identification of a disease caused by an agent identified as a possible bioterrorism agent).
- Detection (gathering and interpretation of public health surveillance data).

When people are exposed to a pathogen such as anthrax or smallpox, they may not know that they have been exposed, and those who are infected, or subsequently become infected, may not

feel sick for some time. This delay between exposure and onset of illness, known as the incubation period, is characteristic of infectious diseases. The incubation period may range from several hours to a few weeks, depending on the exposure and pathogen. Unlike acute incidents involving explosives or hazardous chemicals, the initial detection and response to a biological attack on civilians is likely to be made by direct patient care providers and the public health community. Indications may be multiple patients over a given work period with similar signs, symptoms, and disease etiology. First responders and EMS providers should remain aware of these repetitive or similar situations and report to local emergency departments.

Terrorists could also employ a biological agent that would affect agricultural commodities over a large area (such as wheat rust or a virus affecting livestock), potentially devastating the local, or even national, economy. The response to agricultural bioterrorism should also be considered during the planning process.

Responders should be familiar with the characteristics of the biological agents of greatest concern for use in a bioterrorism event.

Unlike victims of exposure to chemical or radiological agents, victims of biological agent attack may serve as carriers of the disease with the capability of infecting others (such as victims with smallpox or the plague).

The subtle and sometimes infectious nature of several diseases may result in emergency response personnel being exposed and ill before an incident outbreak has been defined and an agent identified.

To reduce the risk to emergency response personnel, it is important that personnel, who identify unusual illnesses, groups or cluster of similar disease patterns or symptoms, report their suspicions to their supervisor, emergency department personnel, department infectious disease officer, or the local health department.

INCIDENTS INVOLVING CHEMICAL AGENTS

There is a significant threat against the United States with regard to the use of chemical agents, either by terrorists groups or individuals. Chemical agents have the potential to cause mass casualties and death in a short period of time; as such, highly populated areas and locations where people work and congregate are at greater risk (such as mass transit, office buildings, malls, and special events).

The scope and severity of the incident will be determined by the chemical and physical properties of the agent, dissemination methods, quantity released, and environmental factors (temperature, wind, etc.)

Chemical agents are divided into two groups: toxic industrial chemicals (TICs) and chemical warfare agents.

Some chemicals can be classified in both categories, for example, chlorine is classified as a TIC and as a choking agent under chemical warfare agents.

TICs are readily available in large quantities in industrial settings, bulk storage, and in transportation. They present a unique hazard because of their accessibility and quantity in every community. Examples of TICs are chlorine, sulfur dioxide, phosgene, anhydrous ammonia, and concentrated sulfuric acid.

Chemical warfare agents are highly toxic and may persist in the environment from minutes to years. The persistence of these agents depends on humidity, temperature, physical state, and the type of soil and vegetation in the area. Depending on the agent, human exposure can occur via skin (dermal), inhalation, ingestion of contaminated water or food, or entry through other mucous-lined areas such as the eyes, nose, and open cuts. A brief description of the four major types of chemical warfare agents and their effects on human health are described later in this section.

Perhaps the most important factor in the effectiveness of chemical weapons is the efficiency of dissemination. Chemical weapons can be easily disseminated; however, they are very difficult to effectively disseminate. The primary reason is that most chemical agents are heavier than air and have a low vapor pressure.

There is a wide array of methods that can be used to disseminate chemical agents. Understanding the type of dissemination device is important for the purpose of identifying the affected area. An exploding device may not affect as large an area as would a spraying device.

The following is a list of indicators of a possible chemical weapons incident. This should be used in conjunction with the dispatch information, reports from onlookers and any other information that may be pertinent.

- Explosion with little or no structural damage.
- Reports of a device that dispersed a mist or vapor.
- Multiple casualties exhibiting similar signs and symptoms (SLUDGEM).
- Mass casualties with no apparent reason or trauma.

- Reports of unusual odors, liquids, spray devices, or cylinders.
- Dead animals and plants.
- Discarded personal protective equipment.

Generally, chemicals tend to affect people at roughly the same time, so release of a chemical agent will tend to produce a group of casualties at locations near the release. An exception to this is the mustard agents. Due to the latent period between exposure and appearance of symptoms for mustard casualties, it is possible that casualties would appear at separated locations to which they had traveled after exposure, possibly over a period of several hours (2-48).

As soon as possible, the hazmat branch officer will provide the incident commander with recommendations for levels of protection. After gathering information on the agent released and levels of concentration, efforts will be made to transition personnel into chemical protective equipment and air-purifying respirators (APRs) or powered air-purifying respirators (PAPRs). This will allow personnel to work for longer periods of time with less stress on their bodies.

In WMD incidents with contaminated mass casualties, responders can be most effective by rapidly removing the patients from the IDLH environment and initiating mass casualty decontamination (decon) procedures for the victims.

Consider administering antidotes if available and as necessary per jurisdictional protocals.

Decontamination is the key factor to an overall successful response. For decontamination to be the most beneficial to the exposed victims of a chemical incident, it must be performed within minutes of the agent exposure. Decontamination is necessary to reduce the possibility of agents on the clothing or skin, as well as reducing exposure to the first responder and or hospital personnel and to reduce cross contamination. Clothing removal is decontamination.

Studies have been done looking at the advantages of using soaps, detergents, and bleach in the decontamination process; however, the only decontaminant expected to be immediately available to the first responder is water.

In all situations, the greatest challenges will be minimizing the potential for panic, identifying the suspect substance, and providing prudent treatment.

Responders may also be pre-staged as a result of a credible threat as identified by law enforcement authorities. In this instance, the fire department IC shall report to the law enforcement command post and confer with the law enforcement official in charge.

Chemical Agents-Initial Actions

Early recognition of the event is the key to successful outcomes. First responders should review the *Basic Responsibilities in a Terrorism/WMD Incident* section in the beginning of this manual.

As a responder, to minimize the impact of the chemical event, you must do the following:

- Signs and symptoms exhibited by victims are a key element of early recognition. Multiple victims having the same complaints should immediately raise suspicion of a WMD event.
- All threats and hoaxes must be treated as real until proven otherwise.
- Attempt to stage apparatus uphill and upwind at least 300 feet from the incident site.
- Establish command.
- Perform size-up.
- Establish an exclusion zone.
- Remove patients to an area of safe refuge.
- Separate symptomatic and asymptomatic patients.
- All emergency decontamination must be performed in SCBA and PPE.
- At all times, officers and firefighters need to be cognizant of the amount of air available to them. All fire department personnel operating in the hot or warm zone will have to go through decontamination before coming off air. Thus, one must allow for a sufficient amount of air to be able to make it through decontamination. This will have an impact on a unit's objective or task, for it will limit how far, long, or deep they will be able to go.
- Early and rapid decontamination should be done with a hand line.
- Emergency and mass decon should begin with symptomatic patients first.
- Emergency decontamination should be done by stripping the patients clothing, flush with water, and cover with disposable blankets or other materials as available. (Strip–Flush–Cover.)
- Most victims who have had direct contact with a liquid nerve agent will be acutely symptomatic.

Chemical agents have the ability inflict harm to exposed victims and response personnel in a very rapid manner. As such, command has the potential to encounter extremely hazardous conditions and mass casualties. Command will need to provide or prepare for special protective clothing, agent detection/identification, mass decontamination, multiple casualties, and interaction with medical facilities.

Chemical incidents require a strong unified command and control element, coordination between local, state, and federal response agencies, and effective communications at all levels. Some of these agencies will participate in unified command; others will work through the liaison officer.

- ☑ Local agencies: EMS, fire, law enforcement, RHCC, public works, emergency management.

- ☑ State agencies: VDEM, VSP, National Guard – CST, VDEQ

- ☑ Federal agencies: FBI, CBIRF, Environmental Protection Agency (EPA)

Emergency Medical Services

Medical management of patients exposed to chemical agents involve an initial site assessment and a determination of the need to evacuate the injured and other potential victims from the area and nearby facilities.

Initial rescue efforts should focus on providing clear, audible, concise directions to those who can self-evacuate. Instructions should direct individuals where to go to wait for decontamination.

Those unable to self-evacuate may need to be either assisted or rescued by firefighters protected by full structural turn-out PPE, including SCBA or higher level of CPE.

Triage

The initial triage of a large number of victims, some who may need immediate intervention, combined with the unaffected, may be extremely difficult. The extent to which triage will be performed is directly related to the number of victims present and the availability of resources to handle the victims. An event that results in a large number of victims will require a sorting (triage) process to provide the greatest good to the greatest number.

The triage process in a chemical incident is an ongoing process. Patient conditions may change, either improving or deteriorating, as they are moved through the decontamination process.

Initial triage should begin by directing those who can self-evacuate to a designated decontamination area. Those who can not self-evacuate must be quickly evaluated for signs of life and removed to the decontamination area using appropriate lifting/moving techniques. Those determined to not be viable or deceased should be left in place and removed later when resources allow.

The triage type, along with many different treatment modalities, may be used based on the severity of symptoms, severity of exposure, type of contamination, number of victims, or other types of injuries.

In a purely chemical event, the START system of triage is not applicable. However, the START system of triage may be used, after patient decontamination, if the event combines a chemical exposure and an event causing traumatic injuries (i.e., explosion, multiple trauma).

For additional information regarding patient triage and transportation, refer to the NOVA *Multiple Casualty Incident Manual*.

Chemical Agent Types

Nerve Agents [Examples: Tabun (GA), Sarin (GB), Soman (GD), VX]			
Routes of Entry	**Primary Target Organ**	**Signs and Symptoms**	**Treatment**
Multiple routes can be anticipated to include skin, eyes, and respiratory system	Central nervous system (CNS)	▪ SLUDGEM ▪ Salivation ▪ Lacrimation (severe tearing, runny eyes) ▪ Urination ▪ Defecation ▪ Gastrointestinal (nausea) ▪ Emesis (vomiting) ▪ Miosis (pinpoint pupils) ▪ Altered level of consciousness or unconciousness ▪ Seizures ▪ Apnea (absent respirations) ▪ Presents in the same fashion as patient exposed to an organophosphate	Consideration should be given to refer to local protocol for treatment with Atropine and 2-PAM (Mark I auto-injectable kits). Treatment of a patient exposed to a nerve agent consists of decontamination, ventilation, administration of the antidote, and supportive therapy. The aggressiveness to which treatment occurs is based upon the condition of the patient and the responsiveness to treatment (mild, moderate, severe: 1, 2 or 3 Mark I kits with possible Valium). Due to large number of symptomatic patients, consider contacting Medical Control and requesting standing orders for all patient treatment.

Blister Agents (Vesicants) [Examples: Mustards Gases, Lewisite]			
Routes of Entry	**Primary Target Organ**	**Signs and Symptoms**	**Treatment**
Skin absorption Mucous membranes	Skin, eyes, and respiratory	▪ Skin ▫ Erythema (redness) ▫ Blistering ▫ Burning, itching skin ▫ Immediate pain (Lewisite, Phosgene Oxime) ▪ Eyes ▫ Mild: tearing, itchy, burning ▫ Moderate: mild plus reddening, swelling of lids, moderate pain ▫ Severe: moderate plus marked swelling of lids, possible cornea damage, severe pain ▪ Airway ▫ Mild: runny nose, sneezing, nosebleed, hoarseness, hacking cough ▫ Severe: mild plus severe productive cough, shortness of breath (mild to severe) ▪ Gastrointestinal ▫ Nausea, vomiting, diarrhea	Flush or brush remaining agent from patient once out of the environment and give supportive care.

Choking Agents [Examples: Chlorine, Phosgene]			
Routes of Entry	**Primary Target Organ**	**Signs and Symptoms**	**Treatment**
Inhalation	Lungs (bronchioles and alveoli) Mucous membranes	▪ Immediately after exposure, patient may notice irritation of the eyes, nose and throat. More commonly, there may be no effects during or immediately after exposure. Major effects do not normally occur until hours later ▪ Usually 2-24 hours after exposure the patient will notice shortness of breath. Initially may be mild, and the eventual severity of this shortness of breath will depend on the amount of exposure ▪ As damage progresses, the dyspnea will become more severe and a cough will develop. In severe cases, the patient may start coughing up clear, foamy sputum. Patient symptoms may present as pulmonary edema and may include tightness in chest ▪ Laryngeal spasm	Supportive respiratory care and therapy.

Blood Agents [Examples: Cyanogen Chloride, Hydrogen Cyanide]			
Routes of Entry	**Primary Target Organ**	**Signs and Symptoms**	**Treatment**
Inhalation Skin and eye absorption	Central nervous system (CNS), heart, and at the cellular level	▪ Dependant on concentration ▪ Increased rate and depth of breathing ▪ Dizziness ▪ Nausea, vomiting ▪ Headache ▪ Convulsions ▪ Cessation of respiration ▪ Cessation of heartbeat	Administration of Amyl Nitrate and/or Cyanide Antidote kits.

Irritant Agents (Riot Control Agents) [Examples: Pepper Spray (OC), Tear Gas (CS), CN]			
Routes of Entry	**Primary Target Organ**	**Signs and Symptoms**	**Treatment**
Mucous membranes	Eyes Nose and mouth Airways Skin Gastrointestinal tract Cardiovascular	▪ Pain, burning, and irritation to exposed mucous membranes ▪ Skin and eye pain ▪ Burning in the nostrils ▪ Respiratory discomfort ▪ Tingling of exposed skin	Flush or brush remaining agent from patient once out of the environment and give supportive care.

INCIDENTS INVOLVING RADIOLOGICAL AGENTS

This chapter provides operating procedures and guidelines for responding to incidents involving radioactive materials and is consistent with the Council of Government's (COG) Standard Operating Guideline and the Radiological Dispersal Device Response Guideline. It is important to note that the COG document focuses on the initial actions of first responders. It does NOT cover other aspects of a response such as hazardous materials, command, medical, and decontamination considerations, discussed in this document.

Radiological emergencies are among the most complicated type of response that fire departments may be faced with. This section is designed to offer a comprehensive basis and background for such a response. It is understood that much of this information is basic to those who have had radiological training; as such, much of the information has been placed in the appendix. However, it is recommended that those who do not have sufficient training or knowledge should review all information.

Over the last few decades, several events worldwide have involved potential or actual dispersal of radioactive materials. These events, whether intentional or accidental, make it clear that incidents involving radiation and radioactive materials must be addressed in emergency response plans.

Many believe the primary reason for the use of radiological or nuclear materials as it relates to terrorism is to cause psychological fear. In fact, many predict that more people will be killed from the psychological implications rather than the actual radiological material.

Radiation Basics

Ionizing radiation can be classified as emissions of: Alpha particles, Beta particles, and Gamma rays. Ionizing radiation is radiation that has enough energy to remove electrons from the material it passes through. Small doses can be tolerated; large doses can be harmful.

Alpha Particles

Alpha radiation is fully absorbed within the first millimeter of an exposed tissue mass. If the source of the alpha radiation is external to the body, all of the alpha radiation is absorbed in the superficial layers of dead cells. Even if tissue paper is interposed, the alpha participles will be absorbed, and will not reach the skin. Because of this, alpha radiation is not an external hazard. If alpha-emitting material is internally deposited, all the radiation energy will be absorbed in a very small volume of tissue immediately surrounding each particle. Internal deposition of alpha particles can cause radiation injury on a long-term basis.

Beta Particles

High-speed electrons in the form of beta radiation lose most of their energy after penetrating only a few millimeters of tissue. If the beta emitting material is on the surface of the skin, the resulting beta irradiation causes damage to the basal stratum of the skin. The lesion is similar to a superficial thermal burn. However, if the beta material is internally deposited, the beta radiation can cause significant damage. The damage will be in spheres of tissue around each fragment or

source of radioactive material. The distribution is determined by the physical chemical nature of the material.

Gamma/X-ray Photons

Gamma rays and X-rays are highly energetic and highly penetrating photons. It is similar to visible photons, but is of high energy. Gamma radiation can penetrate through skin and clothing. Therefore it is both an internal and external hazard.

Radiation Measurements

In the United States the standard measurement used for radiation is the Roentgen. This is slowly being phased out by the European standard, which measures radiation in Sieverts.

The NOVA fire departments and hazardous material teams will use the Roentgen (R) as the standard unit to measure radiological exposure. Agencies responding to assist in the incident will be expected to comply with this standard..

NOVA and COG fire departments will measure radiation in micro-roentgen (μR), milli-roentgen (mR) and roentgen (R).

1,000 micro-roentgen (μR) = **1**milli-roentgen (mR)

1,000 milli-roentgen (mR) = **1** Roentgen (R)

The exposure rate is a measure of how much radiation is present. This is similar to a speedometer – the more you press on the gas, the higher the reading. Exposure rate is measured per hour.

The exposure dose is a measurement of the total amount of radiation exposure an individual has received. This is similar to an odometer, where the farther you travel, the higher the number.

The exposure dose is dependant on the exposure rate and time. Because the exposure rate is measured per hour, it requires that an individual remain exposed for an entire hour to receive that rate. If the exposure rate is 5R/hr, an individual will have to be exposed to that radiation for the entire hour, to receive the exposure dose of 5R.

Health Effects

The health effects of radiation exposure are determined by how much radiation you are exposed to. We are exposed to radiation on a daily basis. Natural background in the DC area ranges between: 5 - 20 μR/hr (microRoentgen/hr).

Naturally occurring radioactive materials are found in the air, soil, and water. In addition to these naturally occurring sources, we use radioactive material for power generation, in consumer products, and in medicine. Each of us receives an average of 360 mR (milliRem) per year, or about 1 mR per day, from these sources of radiation.

Workers who are occupationally exposed to radiation are limited to exposures less than 5R (5000 mR) per year. At these exposure levels there are no observable clinical health effects.

The lethal dose for 50% of the population is between 300-400 R without medical attention, with medical attention, that exposure number goes up to around 600 R.

Radiation Protection

In all suspected radiation incidents, the principles of as low as reasonably achievable (ALARA) shall be used to limit responders' exposure to radiation. ALARA is based on the uncertainty of biological effects from low levels of ionizing radiation and reminds personnel that radiation exposure received by the general public and radiation workers should be kept to as low as reasonably achievable. ALARA is not a dose limit, but a process that has the objective of limiting doses as far below applicable limits as is reasonably achievable.

The basic principles of ALARA are:

1. Maximize distance,
2. Minimize exposure time, and
3. Maximize shielding.

Distance

Radioactivity is emitted from a radioactive source in all directions like a sphere. As you get farther from the source there are fewer radioactive emissions per the same unit of area. Even small changes in the distance will make a significant difference.

NEVER pick up an unknown radioactive source with your bare hands. Even increasing the distance by a few inches (using tongs to handle the source) can make a significant difference in the exposure received.

Dose is inversely proportional to distance. Therefore, greater distance means lower dose.

Time

The less time you spend around a radiation source the less exposure you will receive. If you are in an area where the exposure rate is 60R/hr and you spend 15 minutes, your exposure will be 15 R (60R/hr divided by 4).

Time is an important concept to manage during any response to a radiation incident. If there is a need for extended operations in a radiation field, rotating the personnel will reduce each person's exposure. Another way to minimize the time spent in a radiation field is to ensure the personnel entering the radiation field have a clearly defined task to perform. They should have a complete understanding of how they are going to perform the task and what equipment they will be using. Finally, they should come out of the radiation field when their task is accomplished or a specified time period is reached.

Limit the number of personnel operating in the area to those necessary to complete a task in a time efficient manner. (Keep unnecessary people out of the hot zone, but use as many members as necessary to perform rapid victim removal.)

Shielding

The more material between you and the source the less radiation exposure you will receive. Any type of material can be used for shielding, but as a general rule, the denser the material the less material is required to get the same shielding effect.

During a radiological event it may be necessary for materials to be placed in front of the source. Doing so would block the radiation and allow for closer access to the site and in turn allow for longer operating times and reduced exposure.

Additional measures should be practiced when providing radiation protection for first responders to ensure they receive the lowest possible dose of radiation at an incident:

- Always wear structural fire fighting gear, including respiratory protection.
- Ensure the task is worthy of the exposure (risk vs. benefit).

Maximum Dose Limits

The following chart summarizes the National Council on Radiation Protection and Measurement (NCRP) recommended lifetime maximum dose limits.[2]

COG and NOVA Fire and Rescue Departments have adopted the dose limits shown in Table 2.

Table 2: Adopted dose limits.

Dose Limit (Whole Body)	Emergency Action Dose Guidelines/Activity Performed
5 R (rem)	All activities
10 R (rem)	Protecting major property
25 R (rem)	Lifesaving or protection of large populations
>25 R (rem)	Lifesaving or protection of large populations; only by volunteers who understand the risks

Response to Suspected Radiological Release

The inhalation of radiological materials is the most dangerous type of exposure to the body and it is the most difficult to treat. Wearing SCBA affords the greatest protection for all firefighters in any WMD event!

[2] Report No. 138 - Management of Terrorist Events Involving Radioactive Material, National Council on Radiation Protection & Measurement, http://www.ncrppublications.org/Reports/138

It is best to assume that radiation is present for any explosive or unusual incident until it can be ruled out through detection and monitoring. All personnel should wear PPE and SCBA until radiation is confirmed **not** to be present.

If radiation is not present, follow existing standard operating procedures or NOVA manuals.

The two primary questions which need to be addressed immediately by responding fire department personnel are:

- Is radiation present?
- Are there life safety issues?

If responding to an explosion or an event with numerous people down or incapacitated, every effort should be made to approach the incident from uphill and upwind. Additionally, begin the approach 500 feet from the incident or at the edge of debris field.

Be cognizant of weather conditions, especially wind direction. This will have the greatest impact on dispersal and direction of travel of radiological materials.

Incorporate local bomb/explosive response policies.

If a firefighter runs out of air, several things can be done to minimize inhalation of radioactive materials:

- Do not remove face piece. Improvise by covering face piece regulator hole with something that has not been contaminated.
- At a minimum, cover hole with glove or hood until emergency decontamination can be done.

Fire Department Tactical Response

If victims are present or the likelihood is great, fire department personnel can begin life saving actions. First responders should review the *Basic Responsibilities in a Terrorism/WMD Incident* section in the beginning of this manual.

If initial fire department personnel are NOT equipped with radiological dosimeters, they may conduct life saving operations for a maximum of 15 minutes.

If initial fire department personnel ARE equipped with radiological dosimeters, they may conduct life saving operations in accordance with the Maximum Dose Limits, outlined in the Emergency Actions Dose Guidelines table.

Remove all victims as quickly as possible from the explosion site and/or the radiological source.

> *It must be noted emphatically that radioactive contamination, whether internal or external, is almost never immediately life threatening and, therefore, a radiological assessment or*

decontamination should never take precedence over significant medical conditions. (NCRP Report No. 138 p.44)[3]

Additionally, it is unlikely for a patient to be so contaminated that he or she is a radiation hazard to health care providers.

The signs and symptoms of acute and chronic radiation poisoning occur following a nuclear blast and will not be seen with a RDD. The primary injuries associated with a RDD will be blast injuries.

Treatment of life-threatening injuries always takes precedence over decontamination. Thus, any patient that is tagged red should not be delayed medical treatment to be decontaminated. Individuals with such injuries should be stabilized, if possible, and immediately transported to a medical facility.

The medical facility should be given advance warning if they are going to receive patients exposed to radiation so that the hospital can initiate its radiological response plan.

Fire department EMS personnel must wear respiratory protection when treating contaminated patients. At a minimum this should include surgical mask, gloves, and gown. Firefighter PPE or Level C ensemble is recommended. Individual jurisdictional procedures should be used for decontamination.

If no victims are present, initial actions should be limited to:

- Establishing a control zone based on the presence or absence of contamination. The area should initially be taped off. If contamination is present, establish the control zone at two times background readings or 50µR/hr. Establish restricted zones, including the downwind plume area.
- Isolate the area.
- Evacuate the area.
- Deny entry.
- Establish staging area for incoming resources.
- Establish extended action plan.

Zones for Radiological Dispersal Device (RDD) with Life Safety Concerns

The maximum zone limits are to be used in an RDD event that has life safety concerns. As soon as the life safety concerns are remedied the establishment of new zones should become the priority. Consult Appendix K for more information.

The hot, warm, and cold zones will reduce radiation exposures and aid in controlling secondary contamination.

[3] Report No. 138 - Management of Terrorist Events Involving Radioactive Material, National Council on Radiation Protection & Measurement, http://www.ncrppublications.org/Reports/138

The size of the radiological incident scene will determine the size of the control zones as well as the number of control points needed.

- COLD ZONE: Represents the outer boundary of an emergency incident and an area of the least potential for contaminant exposure to workers and others. It is generally an area intended to act as a buffer to keep persons not involved in the response away from the incident at a safe distance. The cold zone is also where incident functions such as the command post, rehab, staging, and others are set up.

- WARM ZONE: Represents an area of less potential for contaminant exposure to workers and is the zone that contains the decontamination area. The decontamination activity is located on the upwind and uphill side of the incident. Decontamination begins at the edge of the hot zone and extends into the warm zone. This area will be used as the hazardous materials team base of operations. Only personnel who have assigned tasks or assignments should be in the warm zone.

- HOT ZONE: Represents the area with the greatest degree of threat to individuals working in that area and requires the highest level of personal protection equipment. This area has to be clearly marked with banner tape or a satisfactory substitute to indicate to workers the high potential for exposure and thus the greatest level of personal protection. Everyone exiting the hot zone must proceed through the decontamination steps.

The dose rates will determine the location of the hot, warm, and cold zones. If the dose rates are lower, the zones may be adjusted accordingly.

Table 3: Maximum zone limits.

Maximum Zone Limits for RDD with Life Safety			
Cold Zone	**Warm Zone**	**Hot Zone**	**Absolute Turn Back**
2 mR/hr	2mR-10R/hr	Over 10R/hr	200 R/hr

These zones are <u>not</u> likely to be in concentric circles.

The 2mR/hr line should be used only when there is no contamination present within the cold zone. If contamination is present, the cold zone line should be pushed back to levels consistent with two times background or 50 μR/hr. This will reduce the spread of contamination and allow first responders to more readily assess whether victims have been effectively decontaminated.

Figure 4: Control Zones

The control zones should be taped or identified as soon as resources are available.

Operations in the warm zone (i.e., decontamination, control points) should be located as far from the hot zone as possible to minimize total dose exposure.

Operations within the hot zone should be for critical operations or life saving purposes only.

Dosimetry Guidelines

Dosimeters record the total exposure to external gamma radiation. All personnel making entry into an area in which a radiation field is known or suspected to exist shall use dosimeters. It is acceptable for only one member of each team to wear a dosimeter if the team works together in the same area.

Pencil dosimeters and electronic dosimeters should be worn outside PPE, on the core of the body, to allow for reading in the hot zone. When wearing external dosimeters, they should be read and reported every 15 minutes. All pencil dosimeters should be zeroed prior to entry. Dosimeters that cannot be zeroed must be read and recorded prior to entry to establish a base line.

Responder Documentation

In all suspected radiation incidents, responders' exposure to radiation must be documented. In order to ensure that responder doses are recorded, the following specific practices shall be used:

- Any dose received shall be reported.
- Responders working as a team and sharing dosimeters shall report the same readings AND indicate that the readings are estimated as a result of shared dosimeters.
- Responders shall report total dose, type, and source of radiation if known, and the time over which exposure occurred.
- Use of a Dosimeter Tracking Form is recommended.

INCIDENTS INVOLVING CLANDESTINE LABS

Across the United States, clandestine labs pose an ongoing threat to first responders. Using products that are readily available, people can turn normally safe products into illicit drugs, explosives, and chemical or biological agents. Production methods involve numerous chemical reactions that cause corrosive, explosive, flammable, and toxic environments and can cause fires, explosions, and other uncontrolled reactions.

The purpose of this section is to increase situational awareness on every call by first responders and further reduce the potential for injury to the public and other first responders. According to a *Public Health Reports* research abstract entitled *Hazards of Illicit Methamphetamine Production and Efforts at Reduction: Data from the Hazardous Substances Emergency Events Surveillance System*:[4]

> *"From 1990 to 2009, the Hazardous Substances Emergency Events Surveillance (HSEES) Program, established by the Centers for Disease Control and Prevention and the Agency for Toxic Substances and Disease Registry (ATSDR), collected and analyzed information about acute releases of hazardous substances and threatened releases that resulted in a public health action, such as an evacuation. The goal of the program was to use the collected data to identify prevention strategies that could be implemented to reduce the frequency of these events and the associated morbidity (injury) and mortality (death) experienced by first responders, employees, and the general public.*
>
> *HSEES data indicate that the majority of clandestine meth lab events occurred in residential areas. About 15% of meth lab events required evacuation. Nearly one-fourth of these events resulted in injuries, with 902 reported victims. Most victims (61%) were official responders, and one-third were members of the general public."*

This section will discuss precursor materials and initial recognition for the four major types/classifications of clandestine labs. This section is not intended to be a response guide or a mitigation guide for first responders. Upon identifying a potential lab, proper notifications should be made to include a hazardous materials team, EOD, and law enforcement.

Lab Recognition

According to the *NES Clandestine Laboratory First Responder Field Guide (4th Edition)*, clandestine labs are defined as a place where controlled substances used for illegal or illicit purposes are secretly manufactured. United Stated Drug Enforcement Asministration data shows that in Virginia alone, there were 221 clandestine lab incidents in 2012.[5]

Clandestine labs can be found anywhere and are not limited to fixed facilities, sometimes being mobile in any kind of vehicle, Figure 5, Figure 6, Figure 7. Hazards associated with these labs can pose a serious risk to all first responders as well as the general public that may be in the

[4] http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3072910/
[5] http://www.justice.gov/dea/resource-center/meth-lab-maps.shtml

vicinity. Being able to recognize common materials as well as processes will greatly improve a first responders actions when coming across a clandestine lab operation.

Responders need to be aware that in most cases the people operating these labs are not actual scientists and materials used will not always be lab grade equipment. Some common equipment found includes, but is not limited to:

- Blenders
- Coffee Filters
- Crock Pots
- Funnels
- Pressure Cookers
- Pyrex Glassware
- Canning Jars
- Hot Plates/Electric Frying Pans
- PVC Pipe
- Jars Containing Bi-phasic Materials

Figure 5: Mobile clandestine lab.

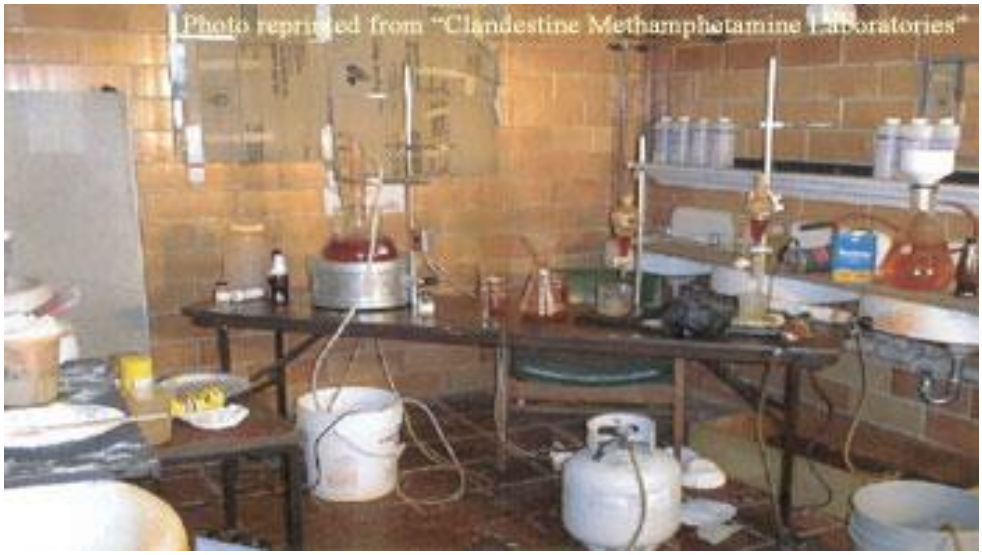


Figure 6: Example of a clandestine lab in a structure.

Figure 7: Example of a clandestine lab in an outdoor area.

As with the equipment being used, the chemicals too are not of lab quality and are often readily accessible at local retailers. Government regulations have made acquiring some of these materials more difficult but people have found ways around the shopping restrictions or have taken to improvising with other chemicals, sometimes making the process even more dangerous.

Some common chemical precursors are:

- Acids, to include sulfuric, hydrochloric, and nitric acid
- Camping fuel
- Lye (sodium hydroxide
- Ephedrine/pseudoephedrine (commonly found in over the counter cold medicines)
- Ether (starting fluid)
- Red phosphorous or an abnormal amount of matchsticks
- Acetone
- High concentration hydrogen peroxide
- Iodine
- Ammonium nitrate
- Anhydrous ammonia
- Lithium (commonly found in batteries)
- Hexane tablets

**Please note this is not a full list. The list of chemicals can change on a regular basis due to constant experimenting. Also, several chemicals can be used throughout multiple labs and processes.*

First responders should know there are multiple types of clandestine labs; two types in particular – illicit/illegal drugs and homemade explosives labs – are easier to establish due to availability of

materials and information that is accessible via the Internet. Precursors for the two are very similar and the two can mimic each other in a lot of ways. Other labs that may be found include labs for the production of chemical and/or biological agents. These labs are less common due to the need for expensive equipment and it is more difficult to obtain the equipment and precursors.

Some precursors are common to both drug labs and homemade explosives labs. The main difference in these labs are the processes used to obtain a final product. This typically involves the application of heat in meth labs and the cooling of the product in explosive labs. First responders should not be in contact with a lab for long enough to discern which type of lab they are dealing with – it is far more important to fire responder safety that responders be aware that they are dealing with some type of clandestine lab and recognize the need to evacuate and call for additional resources.

Signs of a clandestine lab can be extensive. The *NES Clandestine Laboratory First Responder Field Guide* recommends using the LQC for determining if a situation is suspicious:

L=Location	While observing a location, use common sense to ask yourself if certain things belong. *Example: Does it make sense to have multiple cans of starting fluid in the kitchen of a house?*
Q=Quantity	Observe the amount of potential precursors found. *Example: Would an average person need 100 boxes of Sudafed?*
C=Combination	Any combination of location and quantity. *Example: Why would the average person have 100 boxes of Sudafed stored next to 50 cans of starting fluid?*

Booby Traps

It is a general rule if a clandestine lab exists then there is probably some sort of booby trap associated with it. Booby traps can serve a dual purpose: they can be designed to protect the equipment from rival drug dealers as well as first responders. After recognizing the presence of a lab the first responder should be at a heightened state of awareness for booby traps. Some booby traps include but are not limited to:

- Cyanide gas generators,
- Incendiary devices,
- Electrified flooring,
- Mouse traps, and
- Trip wires.

Figure 8: Example of a booby trap in a clandestine lab.

First responders should anticipate booby traps at suspected labs and follow this set of rules:

- Do not touch/move anything.
- Evacuate immediately and ensure the evacuation of potentially affected responders and citizens is to a designated safe area until cleared by appropriately trained personnel.
- Do not use radios within 300 feet of the suspected lab as some booby traps could be radio frequency (RF) controlled.
- Call for additional resources, such as hazardous materials resources, EOD, and law enforcement.
- At no time should responders touch or move anything pertaining to the potential lab. This is a safety issue as well as creating problems for chain of custody for evidence.

Command

Clandestine lab incidents can quickly turn into large multi-agency events. It is extremely important for command to be established early. The first-arriving unit should take the responsibility of establishing command until the arrival of a higher ranking officer. Due to the probability of it becoming a multi-agency event command should be passed to a command officer well versed in unified command.

CHEMICAL SUICIDE

Chemical or detergent suicide is a method of committing suicide using common household products to create a toxic gas. This phenomenon reportedly began in Japan in 2008 where 500 suicides using this technique were reported in the first half of that year. It has gained worldwide popularity due to the amount of information available on the Internet in forums and social networking sites that provide recipes, instructions, and how-to videos for the purpose of committing suicide. The most commonly produced gas is Hydrogen Sulfide (H_2S), which is noted on the Internet as the most effective gas for a quick and painless death. This method involves mixing the two products in a container, usually a bucket or small garbage can. When these products are mixed, in relatively small quantities, the chemical reaction produces heat and a flammable, toxic gas causing death in minutes.

When responding to chemical suicides suspected or otherwise, take precautions to avoid exposure to gas and confined spaces. First responders should use SCBAs and structural personnel protective equipment avoiding contact with any products. Responders have been seriously injured mitigating these calls by exposure to hydrogen sulfide gas that can persist in lethal concentrations in confined spaces for long periods. Be cognizant that not all individuals committing suicide with this method will leave warning signs or that other indicators of the hazards present will be obvious, Figure 9. Situational awareness and knowledge of chemical suicide indicators will help prevent injuries to responders. Call for a hazardous materials response if a chemical suicide is suspected. In addition, emergency gross decontamination should be done on any viable patient prior to transport.

Figure 9: Some chemical suicide incidents can be obvious while others will not have warning signs.

Indicators of chemical suicide can include:

- Unresponsive person in a confined area (vehicle, bathroom, or closet).
- Rotten eggs smell or sulfur odor.
- Warning signs indicating presence of toxic gas or that say “Call Hazmat” etc.
- Windows, doors, vents taped or otherwise made to contain gas.
- Cloudy or fogged windows on vehicles.
- Abnormal presence of containers or bottles of chemicals, pesticides, and acids.

- Victim wearing protective goggles and rubber gloves.

Common household products that could be used in chemical suicides include:

Acids

- Sulfuric Acid
- Muriatic Acid
- Tile and Stone Cleaners
- Lysol Disinfectant
- Kaboom Shower, Tub, and Tile Cleaner

Sulfur

- Lime Sulfur
- Oil paints
- Latex paints
- Dandruff shampoo
- Pesticides
- Garden fungicides

Figure 10: Common household products can be used in chemical suicides.

Aluminum Phosphide

Aluminum Phosphide is predominately used in India and Iran for controlling pests (rats) in food storage. It can also be found in the United States in the rail industry where it is used to control pests in railcars. It has been used as a method for committing suicide in two documented cases in Loudoun County, Virginia. Aluminum Phosphide is typically found in tablet form, approximately the size of an aspirin, Figure 11. When the tablet comes in contact with moisture it produces Phosphine gas, which has an IDLH of 50ppm. If a victim is suspected of having taken Aluminum Phosphide tablets, the first responder must notify the hospital and call for a hazardous materials response to meet them at the emergency room for the monitoring of Phosphine levels. When transporting a patient with suspected chemical suicide, first responders should use appropriate PPE and ventilation within the transport unit. This is due to the possibility of the patient off-gassing or vomiting within a confined space.

Figure 11: Alumium Phophide in tablet form.

APPENDIX A – RESOURCE LIST

These numbers are for reference and informational purposes only. For emergency needs, resources should be contacted through the emergency communications center.

Teams:

- VSP Bomb Squad Hotline: 703-803-0026
- Arlington Bomb Squad ECC: 703-228-7878 (ECC supervisor)
- Fairfax EOD: 703-280-0500
- Alexandria Hazmat: Station 209: 703-746-5209 Hazmat 209 cell 571-259-1428
- Arlington Hazmat : 703-228-0101/0109 Fire Station 101 and 109
- Fairfax County Hazmat Team Station 440: 703-322-4500 HMU cell 571-221-0336
- Prince William Hazmat Team: 571-762-3331 Duty Hazmat phone
- Loudoun County Hazmat Team Station 619: 571-258-3719 HM619 cell 571-246-7546
- Fredricksburg Hazmat Team: 540-372-1059
- MWAA Hazmat Team: 703-572-2304 Special Ops
- VEOC: 800-468-8892

APPENDIX B – ACRONYMS

APR	Air Purifying Respirator
ATF	Alcohol Tobacco and Firearms
BSI	Body Substance Isolation
C&GS	Command & General Staff
CAD	Computer Aided Dispatch
CBIRF	Chemical Biological Incident Response Force
CBRNE	Chemical, Biological, Radiological, Nuclear, Explosive
COG	Council of Governments
COPD	Chronic Obstructive Pulmonary Disease
CPE/CPC	Chemical Protective Ensemble (or Equipment)
CST	Civilian Support Team
EOC	Emergency Operations Center
EOD	Explosive Ordinance Disposal
EPA	Environmental Protection Agency
ERG	Emergency Response Guide
FBI	Federal Bureau of Investigation
FFPPE	Fire Fighting Personal Protective Ensemble (or Equipment)
FR	First Responder
HE	High-order Explosive
HMRT	Hazardous Materials Response Team
HSEEP	Homeland Security Exercise and Evaluation Program
HVAC	Heating, Ventilation, Air Conditioning
IAP	Incident Action Plan
ICS/UC	Incident Command System/Unified Command
IDLH	Immediately Dangerous to Life and Health
IED	Improvised Explosive Device
IMT	Incident Management Team
LE	Low-order Explosive
MCI	Mass Casualty Incident
MCT	Mobile Computer Terminal

MedCOM	Medical Communications
mR	Milli-Roentgen
NIMS	National Incident Management System
NMRT	National Medical Response Team
PAPR	Powered Air Purifying Respirator
PPE	Personal Protective Ensemble (or Equipment)
R	Roentgen
RHCC	Regional Hospital Coordination Center
RIT	Rapid Intervention Team
μR	Micro-Roentgen
RDD	Radiological Dispersion Device
SBCCOM	Soldier Biologic Chemical Command
SLUDGEM	Salivation, Lacrimation, Urination, Defecation, Gastrointestinal upset, Emisis, Miosis
SNS	Strategic National Stockpile
Sv	Sievert
TIC	Toxic Industrial Chemical
TRACEM	Thermal Radiological Asphyxiant Chemical Etiological Mechanical
USAR	Urban Search and Rescue
USPH	United States Public Health
VDEM	Virginia Department of Emergency Management
VDEQ	Virginia Department of Environmental Quality
VDH	Virginia Department of Health
VSP	Virginia State Police
WMD	Weapons of Mass Destruction