The Capitol Region
Metropolitan Medical Response System
Hartford, Connecticut

Deliverable #5
Response to a Chemical, Radiological, Nuclear or Explosive WMD Event

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The Capitol Region Metropolitan Medical Response System
Plan for Responding to a Chemical, Radiological,
Nuclear or Explosive WMD Event

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Introduction

This component plan provides basic guidelines and establishes responsibilities for emergency response agencies when planning their responses to, and managing the health consequences of, a mass casualty incident (MCI) involving chemical, radiological, nuclear or explosive materials (CRNE), blunt trauma, especially incidents resulting from the deployment of weapons of mass destruction (WMD).

The jurisdiction covered by this plan includes those communities participating in the Capitol Region Council of Governments (CRCOG) or in the Capitol Region Emergency Planning Committee (CREPC). This Capitol Region Metropolitan Medical Response System (CR-MMRS) plan is intended to supplement and enhance the existing emergency operations plans developed by each of those communities.

Objectives

The objectives of this plan are to:

- Establish a course of action that minimizes the adverse impact of an incident involving WMD/CRNE materials upon life, health, property and the environment
- Establish procedures for a coordinated effort on the part of those communities participating in the Capitol Region Emergency Planning Committee in responding to an incident involving WMD/CRNE materials
- Identify the capabilities of, and coordinate the actions of, emergency response agencies, personnel, equipment and other resources that would respond to an MCI in the Capitol Region
- Create a response mechanism that can be incorporated into the local emergency operations plans for each of the 40 communities participating in CREPC

Initial Responder Actions

Hazards associated with an incident involving WMD/CRNE materials include:

- Thermal Hazard: Extreme heat and cold, e.g. burning liquids or metals (petroleum distillates, magnesium) and cryogenic materials (liquid oxygen)
- Radiological/Nuclear Hazard: Alpha (α), Beta (β) and Gamma (γ) radiation from nuclear material
- Asphyxiation Hazard: Lack of oxygen in the atmosphere due to displacement by heavier than air vapors or depletion by a chemical reaction such as burning
- Chemical Hazard: Toxic or corrosive substances, e.g. acids (sulfuric, hydrochloric); caustics (ammonium hydroxide); toxic substances (nerve agents, pesticides or other chemical agents)
- Biological/Etiological Hazard: Disease-causing material including bacteria, viruses and toxins
• Mechanical Hazard: Any type of mechanism which causes trauma (firearms, explosives, blunt trauma)

Initial first responder actions shall focus on the safety and protection of emergency responders while minimizing the effects of the incident on life, health, property and the environment.

Principles of First Responder Protection

Though the type of required protection varies with the cause of the incident, there are three basic principles of first responder protection that apply to all types of hazards:

1. Time: Spend the shortest amount of time possible in the hazard area

2. Distance: Maximize the distance from the hazard area
   - Recommended isolation distances (from the North American Emergency Response Guidebook) include:
     - Explosives (Guide #112): Isolate 500 meters (≈1/3 mile) in all directions
     - Radiological (Guides #160–165): Isolate 25–50 meters in all directions (see Annex B)
     - Weaponized Chemicals (#153): Isolate 25-155 meters (≈500 feet) in all directions

3. Shielding: Use appropriate shielding, including vehicles, buildings, chemical protective clothing and personal protective equipment (PPE) to address specific hazards

Training Standards for Capitol Region First Responders

Fire department first responders in the Capitol Region are trained to the Hazardous Materials awareness and operations level in compliance with OSHA 29 CFR 1910.120. Initial actions by awareness and operations-level first responders emphasize:
   • Personnel safety
   • Isolation and confinement of the incident
   • Remaining in a defensive posture at all times

Currently, there are five trained, operational regional Hazmat teams in Connecticut, one of which is located in the Capitol Region. Hazardous Materials personnel in the Capitol Region are trained to the technician level in compliance with this same OSHA regulation. Initial actions for Hazmat personnel shall be conducted in an offensive posture and include:
   • Reconnaissance
   • Agent detection
   • Identification
   • Confinement
   • Mitigation

Training standards for Capitol Region first responders include:
• When responding to the scene of an incident involving WMD/CRNE materials, approach the incident whenever possible from upwind and uphill

• Stage vehicles properly, and avoid positioning vehicles in a manner that impedes egress from the scene

• Plan tentative escape routes and safe-refuge assembly points for emergency personnel

• Approach the scene utilizing appropriate PPE

• Be alert to the potential presence of a secondary device

• Consider the use of alternate response routes to minimize the possibility and effect of a planned ambush of personnel and equipment assets, and avoid traffic route “choke points”

• Whenever possible, identify materials involved before taking any remedial action or exposing personnel

• Do not pass through any vapor clouds or spilled materials

• Establish the Incident Command System as soon as possible, and request additional resources early

• Limit access to the scene, and establish security and exclusion zones with defined inner and outer perimeters

• Isolate the hazard area and control any mass exodus of people, including contaminated persons

• Prepare for emergency decontamination, and do not allow contaminated persons to leave the scene prior to decontamination

• Address immediate life-threatening situations, move the victims to a safe area, then perform appropriate on-scene decontamination

ABILITY TO DETECT AND IDENTIFY WEAPON MATERIALS OR AGENTS

The initial responders to any mass casualty incident (MCI) in the Capitol Region of CT normally would include fire and police personnel. First responders assess the conditions at the scene and determine if additional responder teams with specialized skills and detection equipment are necessary. Additional resources may include:

• Regional or state bomb squads
• Regional or state Hazardous Materials response teams
• The Connecticut Department of Environmental Protection (chemical and radiation divisions)
• Commercial environmental management companies
• The New England Radiological Health Compact
• The Radiological Assistance Program from the U.S. Department of Energy

Chemical, radiological, nuclear and explosive materials each have specific characteristics. Detection and identification of these agents are specific to each threat. However, there are certain signs at an incident
that may suggest to the first responders that this is not a “normal” event. General warning indicators of a potential WMD/CRNE event for initial responders after an overt release of an agent may include (but are not limited to):

- Explosions that disperse or dispense liquids, mists or gases
- Explosions that seem to destroy a package or suspected explosive device
- Unscheduled or unusual dissemination of aerosol sprays
- Abandoned spraying devices
- Numerous dead animals, birds, fish, insects, or people
- Mass casualties in the absence of obvious trauma or mechanism of injury
- Unusually high demand for EMS or hospital services for people who share common symptoms or who are clustered in the same geographic area

In the case of an incident involving the covert release (“Incident without an Address”) of WMD/CRNE materials, first indicators may include:

- Altered EMS call patterns
- Unusual increases in demand for hospital services
- Suspicions of the medical providers in the community
- The community health surveillance systems maintained by local health departments and the Connecticut Department of Public Health

In either the overt or covert scenario, agent identification may be accomplished through testing at state or federal laboratory facilities. In the event of a suspected intentional release of WMD/CRNE materials, a crime scene shall be established and samples of unknown substances shall be sent for analysis and identification to state and/or federal laboratories as determined by the lead law enforcement agency on-scene.

ABILITY TO EXTRACT VICTIMS

In an event involving WMD/CRNE materials, actions taken by emergency responders are based upon the need to protect life, property and the environment. Actions taken by emergency responders shall be carried out in accordance with applicable OSHA regulations and NFPA standards, including as a minimum:

- 29 CFR 1910.120 – Hazardous Waste Operations and Emergency Response (HAZWOPER)
- 29 CFR 1910.156 – Fire Brigade Standard
- NFPA 472

A WMD incident may require a wide variety of response from all levels of government, industry, and private contractors. The need for specialized equipment and technical knowledge during this incident may be extensive, and the number of critical decisions that must be made in areas of containment, emergency worker safety, public protective actions, and environmental protection are complex.

If it is determined that the incident scope exceeds the response capabilities of local resources, local incident command or other appropriate authorities may request additional assets by activating the Capitol Region Emergency Planning Committee’s Regional Emergency Disaster Plan (CREPC RED Plan) by calling the Regional Incident Communication System (RICS) at 860-832-3477.
Victim extraction during an incident involving an explosive device presents responders with many challenges and may differ greatly from actions taken during an event involving chemical, radiological or nuclear agents. Steps leading to victim extraction include:

- **If an explosion incident involves entrapment of victims**, Fire and EMS responders wearing PPE appropriate for the hazard shall perform technical rescue and extrication.
- **Responder entry into the incident perimeter** shall be undertaken with extreme caution until Bomb Squad personnel determine that no further explosive risk exists.
- **Law enforcement personnel** shall control entry into the incident perimeter.
- **Contaminated ambulatory persons** shall be directed to safe refuge assembly points (located within the perimeter of the “hot zone” but as far from the source of contamination as possible) in preparation for decontamination.
  - This action is the first step in the Simple Triage and Rapid Transport (START) Triage process recommended by CREPC.
- **Emergency responders wearing hazard-appropriate PPE** shall triage non-ambulatory persons and assist them to an assembly point in preparation for decontamination.
- **Persons deemed non-viable** (Category: Morgue) during the triage process shall be left in place and undisturbed until movement is directed by representatives from the Connecticut Office of the Chief Medical Examiner (OCME), in order to preserve evidence and to facilitate the criminal investigation of the event.
- **After decontamination has been performed**, patients shall be moved to treatment and transportation staging areas outside the hot zone in preparation for evacuation to health care facilities or remote treatment locations. Patients shall be periodically re-assessed to determine changes in transport priority.
- **This process shall be performed until all contaminated victims have been decontaminated and evacuated from the scene.**

**ABILITY TO DECONTAMINATE VICTIMS AT AN INCIDENT SCENE**

The Capitol Region Metropolitan Medical Response System has developed a comprehensive plan for on-scene and pre-hospital decontamination which is entitled the CR-MMRS Rapid Action Mass Decontamination Plan. See Annex C.

**VICTIM TRIAGE**

The purpose of triage is to classify patients based on the severity of their injuries in order to preserve the maximum number of lives through rapid and effective utilization of medical resources.

Response agencies in the Capitol Region utilize appropriate triage systems that call for rescuers to classify patients based on the presence and quality of respirations, adequacy of circulation, and mental status. While conducting triage assessment, rescuers correct life-threatening problems only, such as airway obstruction or severe uncontrolled bleeding. In a WMD/CRNE incident, this may also include antidote administration.

The EMS Sector shall be established under the direction of the EMS Scene Control Officer. A Triage Officer shall be designated and his/her designee(s) shall perform triage operations. During a WMD/CRNE incident, victims shall be medically triaged after decontamination, prioritizing those victims most likely to respond to medical treatment and to antidotes, and requiring the least amount of personnel resources.
Triage tags shall be utilized to classify patient severity and as the principal means of patient tracking. The triage tag can also be used to identify injuries and any treatment rendered prior to transport to a definitive care facility. The triage tag system recommended and endorsed by the Capitol Region MMRS can record completion of gross or secondary decontamination and types of solutions used, whether the patient was exposed to chemical agents, and if antidotes were administered. This tag is recommended to all Fire and EMS agencies in the Capitol Region to standardize triage operations and equipment system-wide. This tag also features numbered and bar-coded tear-off sections, one of which can be secured to patient belonging bags while another is maintained by the EMS Transportation Officer to facilitate patient tracking. The triage tag shall be maintained with the patient’s medical record at the hospital. The START tag is visualized in the following graphic:
ON-SCENE TREATMENT OF VICTIMS

The Treatment Sector shall be established under the direction of the EMS Control Officer. When assigning a location for the Treatment Sector, consideration shall be given to transportation resource accessibility to facilitate evacuation of victims to definitive care facilities.

- The Treatment Sector shall be established in the “Cold Zone,” uphill and upwind from the incident, and in proximity to the decontamination corridor(s).
- Persons shall be transported from the Treatment Sector at the direction of the Treatment Officer, in coordination with the EMS Transportation Officer, as transportation and definitive care resources become available.
- The Treatment Sector shall not be used as a location for treatment of patients with life-threatening problems (Category: Immediate), as these persons are to be evacuated from the scene immediately following completion of decontamination.
- Patients moved to the Treatment Sector may have injuries not immediately life-threatening, but that require care beyond what may have been provided during initial triage (Category: Delayed or Minor).
- Victims shall receive treatment commensurate with their injuries that complies with Connecticut ALS and BLS Standards of Care. On-site treatment shall include care for injuries that result from agent dissemination or other mechanisms of injury.
- Medical attention on-scene shall be focused on airway management, adequacy of ventilation and cardiovascular support.
- If indicated, specific antidotal treatment shall be initiated under the direction of Medical Control only when the involved agent has been identified and is amenable to antidote therapy, and if patients demonstrate symptoms specific to a particular toxidrome.

PROCEDURES FOLLOWING EXPOSURE TO A RADIOLOGICAL DEVICE

Victim contamination resulting from exposure to a radiological or nuclear incident requires special medical consideration. Life-threatening injuries must be addressed before a radiological survey is performed and decontamination is conducted.

- Serious injuries shall be stabilized, and victims with critical injuries shall be transported immediately to a hospital.
- An assessment of the patient for external or internal contamination shall be performed in the field or on the way to a hospital, and shall be conducted by a member of the Department of Environment Protection (DEP), or by a member of the regional HAZMAT team.
- Sites of radioactivity and wounds shall be indicated clearly on the patient, together with the victim’s name, time, date and location at which the survey was conducted.
- Assessment includes making radiation measurements and collection of information suggestive of a significant exposure (such as nausea, vomiting, weakness and fatigue).
- If the victim is in a contaminated area, he/she shall be relocated to an area of lower background radiation under supervision of senior medical personnel.
- External decontamination:
  - Removal of clothing is the single most effective action, followed by wrapping the victim in a cloth sheet or blanket to permit handling.
  - Clothing shall be placed in a sealed container (i.e., plastic bag) that is labeled with the patient’s name, location, time and date, as well as with the words “Radioactive – do not discard.”
If inhalation of radioactivity is suspected, a nasal sample from both nostrils shall be obtained, using two clean swabs. They shall be labeled and saved for analysis at a later time.

For localized areas of contamination, simple irrigation of the surface with tepid water (with or without a mild detergent) is effective:

- Hot water shall not be used (in order to avoid increased absorption of contaminants through hyperemic areas of the skin). Cold water shall be avoided as well, since skin ports may be closed, trapping radioactivity within them.

Decontamination shall be aimed at decreasing contamination levels to a level that is twice background, as complete decontamination is generally not possible.

First-responders shall wear gloves and a gown or other protective clothing. A film badge or personal dosimeter shall be used at all times.

**Internal decontamination:**
- Internal contamination may occur through ingestion, inhalation or transdermal absorption of radioactivity.
- Patients with large amounts of radioactive material imbedded in a wound require that the metal be removed (with forceps or other instrument) to minimize exposure and contamination of the first responders.
- Other approaches to internal decontamination shall be used after arrival at the hospital, as recommended in the surge capacity plan developed by the CT Radiation Safety Response Planning Group (see Annex C).

**Pre Hospital Treatment for Radiation Exposure:**

- First-responders shall be cognizant of these basic radiation protection principles:
  - TIME: reduce the amount of time exposed
  - DISTANCE: increase your distance from the radioactive source
  - SHIELDING: use shielding between you and the radioactive source
- At all times, universal precautions shall be used to protect healthcare providers from radiation contamination. This includes the use of protective gloves, masks, shoe covers and disposable gowns.
- Treatment of persons exposed to radiological and nuclear materials is dependent upon the mechanism of injury and is performed in accordance with BLS and BTLS standards.
  - No antidotes are currently available to counteract the effects of exposure to radiological and nuclear materials. While radio-protectants, such as amifostine and keratinocyte growth factor have been used in some patients in experimental studies, routine use of radio-protectants is not recommended for victims or first-responders.
- The first priority in the field is to stabilize the victim and treat life-threatening injuries. This includes first aid and resuscitation.
- Following decontamination procedures, a repeat radiation count shall be performed and the results recorded.
Guidelines for On-Scene Responders to a Radiological Incident

Guidelines for victims who may be exposed to (but not contaminated by) radiation

1) First-responders shall don gloves, gown and surgical mask and cap. Each responder shall be provided with a personal dosimetry device.

2) Patients shall be triaged into medically stable and medically unstable categories.

3) Medically unstable patients shall be evaluated and treated as with any patient, in the following order of importance:
   - First aid or resuscitation
   - Medical stabilization
   - Definitive treatment of serious injuries
   - These patients shall be transported to a hospital immediately
   - A radiological survey and decontamination procedures may be performed in the ambulance on the way to the hospital, provided that these actions do not interfere with immediate medical needs

4) Medically stable patients exposed to radiation shall be moved to an area of low radiation
   - The outer clothing of the patient shall be removed and the patient shall be wrapped in a cloth sheet/blanket to permit handling
   - Wrapping shall be loose to avoid hyperthermia and to permit easy excess by medical personnel
   - Minor injuries (minor burns, cuts, etc.) shall be treated before symptoms from radiation exposure
   - Open wounds shall be covered with a clean dressing
   - Medically stable patients shall not be released to ambulance personnel before a radiological survey has been completed
   - If contamination is confirmed, preliminary decontamination shall be performed according to the following principles

Guidelines for medically stable but contaminated victims

1) Steps 1 through 4 above shall be followed

2) Decontamination of the medically stable patient shall be performed after removal of patient clothing
   a) Decontamination involves washing the individual with tepid water to remove any radioactive contamination, beginning with areas of highest levels of contamination
   b) Washing shall be performed gently without irritation to the skin, which may cause absorption of radioactivity. After washing, the radiological survey shall be repeated and results recorded
   c) Decontamination efforts shall aim at lowering contamination levels to a level of twice background (i.e., approximately <0.05 mR/hr). Subsequently, decontamination may be attempted two additional times (total of 3 attempts)

3) All clothing and bedding as well as metal objects (jewelry, coins, belt buckles, etc.) shall be placed into a sealed plastic bag that is identified with the patient’s name, location, time and date. Bag shall indicate "Radioactive-Do Not Discard"

4) Patients with injuries shall be transported to a medical facility for further treatment

Guidelines for Hospital Radiation Treatment

Medical therapy in the hospital shall include in order of importance:
1) First aid and resuscitation
2) Medical stabilization
3) Definitive treatment of serious injuries
Thereafter, other issues such as preventing or minimizing contamination, treatment of minor injuries and treatment of internal contamination, shall be addressed. Although contaminated individuals may emit small amounts of radiation from their body surface, the risk to healthcare givers is commensurate with or below the risk commonly faced in the course of medical practice in an Emergency Department.

*Therefore, all medical decisions shall be based solely on the physical condition of the victims, regardless of radiological contamination.* For further clarification regarding in-hospital care of patients exposed to radiation, please consult the surge capacity plan developed by the CT Radiation Safety Response Planning Group.

**ADMINISTRATION OF ANTIDOTES FOLLOWING A CHEMICAL EXPOSURE**

Weaponized chemical agents are divided into five main categories:
- Vesicants
- Pulmonary agents
- Systemic asphyxiants (also known as Blood Agents)
- Nerve agents
- Riot Control agents

Treatment of persons exposed to weaponized chemical agents includes, first and foremost, removing the agent from the victim, followed by aggressive basic life support with an emphasis on airway management, respiratory and cardiovascular support. The administration of antidotes is useful primarily with persons exposed to systemic asphyxiants (e.g. cyanide) and nerve agents (e.g. Tabun (GA), Sarin (GB), Soman (GD), GF and VX).

**ANTIDOTE THERAPY IN CYANIDE AND CYANOGENIC COMPOUND EXPOSURE**

After removing the patient from the source of exposure, after ensuring adequate skin and eye decontamination, and after establishing adequate ventilation using 100% oxygen for symptomatic patients, the following antidote therapy is indicated:

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<th>Adult</th>
<th>Pediatric</th>
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<td>Sodium Nitrite</td>
<td>300 mg/10 mL IV over 5 min.</td>
<td>0.12-0.33 mL/kg (10 mL max) IV over 5 min.</td>
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<tr>
<td>Sodium Thiosulfate</td>
<td>12.5 Gm/50 mL IV over 10-20 min</td>
<td>1.6 mL/kg IV over 10-20 min.</td>
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ANTIDOTE THERAPY IN NERVE AGENT EXPOSURE

1. Remove the patient from the source of exposure
2. Ensure adequate skin and eye decontamination
3. Establish adequate ventilation using 100% oxygen for symptomatic patients

FOR INHALATION EXPOSURE

**Low-Dose with Mild Effects**
Eyes and nose most affected by exposure
Eye or head pain
Dim or blurred vision
Conjunctival injection
Rhinorrhea
Bronchoconstriction with tightness in chest
Mild bronchosecretions

Treatment
IV Atropine 2.0 mg IM Miosis (pinpoint pupils)
600 mg IM Pralidoxime
(1 MARK I kit)

**Medium-Dose with Moderate Effects**
Shortness of breath (moderate to marked dyspnea)
Coughing
Wheeze
Nausea
Vomiting
Fasciculations, general weakness

Treatment
Atropine 4.0 mg IM or IV
Pralidoxime 1200 mg IM
(2 MARK I kits)
(Atropine 2.0 mg may be repeated q 5-10 minutes PRN for secretion control)

**High-Dose with Severe Effects**
Loss of consciousness
Seizures
Apnea
Flaccid paralysis
Death usually occurs within minutes

Treatment
Atropine 6.0 mg IM or IV
Pralidoxime 1800 mg IM
(3 MARK I kits)
(Atropine 2.0 mg may be repeated q 3-5) minutes PRN

FOR DERMAL EXPOSURE

**Low-Dose with Mild Effects**
Localized sweating at exposure site
Fine muscle fasciculations at exposure site
Miosis NOT an early sign in dermal exposure

Treatment
Atropine 2.0 mg IM or IV
Pralidoxime 600 mg IM
(1 MARK I kit)

**Medium-Dose with Moderate Effects**
Nausea
Vomiting
Severe headache
Generalized fasciculations
Feelings of weakness
NO RESPIRATORY SIGNS/SYMPOMTS

Treatment
Atropine 4.0 mg IM or IV
Pralidoxime 1200 mg IM
(2 MARK I kits)

**High-Dose with Severe Effects**
Sudden loss of consciousness
Seizures, flaccid paralysis
Apnea, death

Treatment
Atropine 6.0 mg IM or IV
Pralidoxime 1800 mg IM
(3 MARK I kits)
Victim Transportation

The EMS Control Officer shall establish the Transportation Sector and designate a Transportation Officer. The Transportation Officer’s responsibilities include:

- On-scene coordination of Emergency Medical Service transportation of decontaminated victims to definitive care facilities or to remote treatment locations
- Patient evacuation shall be coordinated with the Treatment Sector Officer
- All patients shall be decontaminated prior to transport to definitive care facilities
- The Transportation Officer shall establish and maintain the ambulance loading area in proximity to the patient Treatment Sector
- The Transportation Officer shall communicate with CMED to ascertain and monitor bed availability and capabilities at definitive care destinations
  - Based on this information, the Transportation Officer shall determine patient destinations and advise CMED of the number and nature of patients being transported
  - CMED shall advise the Transportation Officer as to the final destinations of patients to be transported based on the latest available bed capacity information
- The Transportation Officer or a designee shall maintain a record of patient destinations to facilitate patient tracking
- CMED and the Regional Incident Communications System (RICS) may work together to coordinate transportation resources
  - If the Transportation Officer, in coordination with the EMS Control Officer, determines that existing transportation resources are inadequate, the On-Scene Incident Commander shall notify RICS at 860-832-3477 to request additional transportation resources to the scene
  - If it is determined that the incident scope exceeds the response capabilities of local resources, a request by RICS for state and/or federal assets may occur

Emergency and Inpatient Definitive Care

The 10 acute care hospitals in the Capitol Region area with full-service Emergency Departments (EDs), inpatient critical care facilities (ICU/CCU) and Operating Room (OR) capability are:

- Bradley Memorial Hospital in Southington
- Bristol Hospital in Bristol
- Connecticut Children’s Medical Center in Hartford
- Hartford Hospital in Hartford
- Johnson Memorial Hospital in Stafford
- Manchester Memorial Hospital in Manchester
- New Britain General Hospital in New Britain
- Rockville General Hospital in Rockville
- St. Francis Hospital and Medical Center in Hartford
- UCONN Health Center in Farmington

The Emergency Departments at the 10 hospitals have incorporated facilities to perform patient decontamination if required until the state’s Mobile Decontamination Units (MDU’s) deploy and arrive at designated locations.

Prior experience has shown that many people can be expected to bypass voluntarily the decontamination process established at the scene of an incident, and instead will self-refer to the site of medical care most familiar to them, usually the local hospital. For this reason, the Capitol area hospitals are working to
assure that staff at all definitive care facilities are trained to perform decontamination, triage and treatment in hazard-appropriate PPE in the event of an incident involving WMD/CRNE materials.

In a large-scale WMD/CRNE event, the Capitol Region may exceed its capability to expand to meet the needs of a large-scale incident. As stated in the MMRS Forward Movement of Patients Plan (CR-MMRS Deliverable 7), hospital bed status shall be monitored by CMED and RICS in order to distribute patients so as not to overload any single definitive care facility. If it is determined that the incident scope exceeds the definitive care capabilities of the regional health system, an activation of the National Disaster Medical System (NDMS) may be authorized by the Capitol Region MMRS, or by CT Department of Emergency Management and Homeland Security, or by CTDPH.

Management of Self-Referred Patients

- When the hospitals in the Capitol Region are alerted by CMED or RICS that an incident involving WMD/CRNE materials has occurred, hospital administrators shall direct hospital security resources to "lock down" or secure all access into and out of the hospital.
  i) The lock-down prevents contamination of the facility and of hospital personnel from exposure to incident victims who have self-referred
  ii) Local or regional law enforcement agencies may be requested by the facility to assist in securing healthcare facilities and in controlling the flow of patients who self-refer
- Should the self-referred patient load exceed available hospital resources, or if Emergency Department and inpatient capacity become saturated, hospital representatives shall notify RICS at 860-832-3477.
  i) CMED and RICS shall coordinate with the Transportation Officer at the incident scene to assure patient transport to alternate locations where definitive care can be delivered
  ii) Area hospitals participate in a statewide protocol that outlines the process involved to grant emergency privileges to licensed health professionals. These procedures shall be followed in the event of an incident involving WMD/CRNE materials where additional personnel resources are required

Procurement and Provision of Pharmaceuticals

- Pharmaceutical antidotes specifically designated for use by CREPC first responders have been purchased by the Capitol Region MMRS (see CR-MMRS Deliverable 2a). The inventory is sufficient to care for a minimum of 1,000 first responder victims.
- First responder agencies completing the training program developed and prescribed by the Capitol Region MMRS, or the training plan accredited by the CT Department of Public Health (CTDPH), are authorized to carry the MARK 1 auto-injector and CANA kits on their person or on their apparatus for immediate use when indicated. Additional MARK 1 and CANA kits are stored and secured by CR-MMRS to provide additional support to units in the field.
- Antibiotics in sufficient quantity to protect 10,000 responders and their families for treatment of exposure to biological agents also have been purchased and stored by CR-MMRS.
- In the event the Capitol Region MMRS pharmaceutical stockpiles are depleted as a result of an incident involving WMD/CRNE materials, three separate processes may occur:
  i) CR-MMRS may request additional resources from local retailers
  ii) CR-MMRS may activate the CREPC RED Plan and request mutual aid from among the six New England MMRS jurisdictions
  iii) CR-MMRS may request state assistance in activating the Connecticut Strategic National Stockpile Plan
• The decision to release the contents of the MMRS pharmaceutical cache can be made only by the CR-MMRS Medical Response Coordinator, or by the CR-MMRS Medical Officer.

Procurement and Provision of Equipment

• Supplemental medical supplies and equipment initially shall be provided by the local responding agencies. All units responding to an incident involving WMD/CRNE materials shall carry a full compliment of equipment, as well as extra supplies whenever possible. Any units responding from a hospital may be asked to transport spare equipment being stored in hospital equipment lockers and re-supply areas.

• The local healthcare systems in the Capitol Region incorporate extensive inventory and materials management departments and distribution centers. In the event of an incident involving WMD/CRNE materials, required medical supplies and equipment shall be distributed through these systems. Local healthcare systems are affiliated with outlying facilities and distributors in the region, and they may be asked to provide additional resources.

• If the incident escalates and additional medical supplies and equipment are required, equipment stockpiles maintained by area EMS and fire agencies may be requested to be deployed to the scene or to remote treatment locations by the EMS Control Officer through CMED and RICS. If it is determined that the scope of the incident exceeds the region’s available equipment resources, a request for state and federal assets may occur through activation of the CREPC RED Plan.
ANNEX A.
PERSONNEL AND EQUIPMENT INVENTORY OF AREA HAZARDOUS MATERIALS TEAMS

Capitol Region / West Hartford Fire Department Hazardous Materials Team

Personnel
16 Hazardous Materials Technician Level (minimum of 4 on duty at all times)
4 Chemists (on-call)
? Advanced Hazardous Materials Life Support Paramedics/Toxmedics

Equipment
1 Travel-IR Infra-red Spectrometer
2 Photo Ionization Detectors (PID)
4 APD 2000
3 Scott Patriot Multi-Gas Detectors
2 Colorimetric Tube Systems
2 Dräger CDS (Colorimetric tubes for detection of chemical WMD)
20 Dosimeters
2 CD V-700 with batteries
2 CD V-715 with batteries
2 Chemical Classifier Strips
4 Chlor ’n Oil PCB Screening Kits
2 Rolls M8 & M9 Paper
1 M256A1 Kits
1 Mercury Spill Kit
8 Scott PAPR
40 Kappler Level-A Suits
60 Kappler Level-B Suits
5 Decontamination Shelters
1 Portable hot water heater
1 Mobile Decontamination Unit
  Decontamination Tent (2)
  Dupont Suit Pressure Tester
  Nomex Jumpsuits (80)
  PPB Rae Monitors (2)
  Multi-Rae Monitors (2) w/ calibration kit
  Area-Rae Monitors w/ computer link & calibration kit (4)
  XXL Responder Plus Level A Suits (24)
  XXL Kappler Level B Suits (24)
  Tyvek Coveralls (Modesty Garments) (2000)
  Disposable Latex Booties (Victims) (2000)
  Scott 4.5 SCBA (10)
  Scott 4.5 SCBA Bottles (24)
  Chemical Tape (2 Cases)
  Tingley Boots (12 Pairs)
  Ludlum Pancake Probes –Radiation Detection (2)
New Britain Fire Department
Hazmat technicians and one (1) rehabilitation unit

East Hartford Fire Department
One (1) Mass Decontamination Trailer and support personnel

Manchester Fire Department
One (1) Mass Decontamination Trailer and support personnel

UCONN Health Center Fire Department

Equipment
2 Photo Ionization Detectors (PID)
1 APD 2000
1 Scott Patriot Multi-Gas Detectors
2 Colorimetric Tube Systems
2 Dräger CDS (Colorimetric tubes for detection of chemical WMD)
20 Dosimeters
1 M256A1 Kits
6 Kappler Level-A Suits
20 Kappler Level-B Suits
1 Mobile Decontamination Unit
   Decontamination Tent (2)
   Dupont Suit Pressure Tester
   PPB Rae Monitors (2)
   Multi-Rae Monitors (2) w/ calibration kit
   Area-Rae Monitors w/ computer link & calibration kit (4)
   XXL Responder Plus Level A Suits (24)
   XXL Kappler Level B Suits (24)
   Tyvek Coveralls (Modesty Garments) (2000)
   Disposable Latex Booties (Victims) (2000)
   Scott 4.5 SCBA (10)
   Scott 4.5 SCBA Bottles (24)
   Chemical Tape (2 Cases)
   Tingley Boots (12 Pairs)
   Ludlum Pancake Probes – Radiation Detection (2)

Bradley International Airport Fire Department
One (1) Mass Decontamination Trailer
One (1) Mass Casualty Incident Trailer
Hartford Police Bomb Squad

Equipment:
Golden x-ray machine
RTR4 real time x-ray machine
420 gauge PAN disrupter
12 gauge PAN disrupter
Blasting machines, electric and non-electric
Blasting galvanometers
Ballistic assault vests
MED ENG bomb suits
Communications kit for bomb suits
Evidence kit
REMOTEC Andros 5A Robot
REMOTEC Andros 6A Robot
MED ENG blast shield
Bomb Blanket
Scott Air Packs
APD 2000
Hand held Assays, Anthrax, Ricin
M256 kit
RAE 4 gas plus PID
MED ENG Search suits
EOD Rae Systems gas monitor
Level B suits
COBRA Command “System
Foxray Digital x-ray system
Personal radiation detection devices
Annex B: Recommended Hospital-Based Decontamination Process

Research into the behavior of people faced with a major emergency in their community indicates that up to 80% of citizens disregard any prior information and travel to the nearest hospital or other healthcare facility for evaluation and care. Most arrive at the hospital via private vehicles.

It is estimated that the ratio of “worried well” to afflicted individuals may be as high as 20:1. Hospitals must be prepared to meet this need, in accordance with Joint Commission on Accreditation of Healthcare Organizations (JCAHO) Environment of Care EC 1.4. Hospital plans are required for hazard analysis, incident mitigation, community and hospital-wide coordination, establishment of alternate care sites, and facility evacuations to accommodate a surge in patients requiring admission.

Persons self-deploying to hospitals have not been decontaminated. Therefore, hospitals must take steps to limit the ability of these potentially contaminated patients to gain access to the facility, including the following:

- Initiate secured lock-down procedures: “No One In, and No One Out”
  - Lock-down is the key process in preventing contamination of a facility. Failure to initiate an early lock-down may mean the loss of the entire facility
- Establish a secured perimeter around the hospital campus to limit access
- Establish and cordon off a mass decontamination site as far as reasonably possible from hospital access points to leave entrances clear for emergencies and acute admissions
  - Cordoned-off areas allow the establishment of a multi-corridor decontamination process, and direct patients away from the hospital to alternative treatment sites

Upon the first indication that contaminated persons are entering the area near the hospital, the hospital shall initiate procedures that are based on the A.C.I.D. acronym:

- **A** – Assess and Activate:
  - Assess threat to facility
  - Activate hospital emergency action plan
- **C** – Call:
  - Call appropriate emergency numbers to alert and notify 911 Dispatch, MEDNET, CMED, and RICS
  - Early notification is essential to allow time for efficient deployment of additional resources
- **I** – Isolate:
  - Isolate facility and people
  - Redirect people to secured decontamination area
- **D** – Decontaminate:
  - Decontaminate persons per facility emergency action plan

Each healthcare facility shall develop a mass decontamination workforce with responsibility for implementing the facility’s mass decontamination plan.

- At least one individual from the workforce shall be available on-site on a 24/7 basis
- Upon activation, the decontamination workforce shall stand up the decontamination equipment and begin the decontamination process as soon as possible
- For facilities where only one person may be available, that single person shall act as a liaison with the responsibility to summon first responders to perform the actual decontamination
Recommended Protocol for Hospital-Based Decontamination

A. Identification of Event
   1. Recognition of Contaminated Patient
   2. Identify Contaminated Areas
   3. Establish Control Zones

B. Activation of Response Plan
   1. Facility Notification
   2. Job Assignments
   3. External Notifications

C. Determine Need for Decontamination
   1. Who Needs Decontamination?
   2. Priority

D. Action Plan Development
   1. Capabilities of facility?
   2. Decontamination site?
   3. Flow
   4. Procedure
   5. Selection of PPE
   6. Pre-Entry Monitoring of Decontamination Workgroup
   7. Equipment Set-Up
   8. Safety Considerations

E. General Decontamination Process
   1. Patient: Remove Valuables
   2. Patient: Remove Clothing
   3. Water Rinse
      a. Start at Head and Move Down
      b. Gentle Soap Wash
      c. Best to Use Sponges or Soft Brushes
   4. Dry, Clean Covering

F. Decontamination Re-Evaluation
   1. Need For Further Decontamination?

G. Medical Triage by Properly Equipped and Trained Hospital Triage Team

H. Termination Process for Hospital Employees
   1. Decontaminate The Decontamination Workgroup
      a. Start With The Most Contaminated Team Member
      b. Same Decon Process As Patients, Except PPE Is Left On
   2. Post-Monitoring Of Decon Workgroup
   3. Containment Of PPE
   4. Containment Of Expendable Equipment
   5. Containment Of Collected Waste Water Runoff
   6. Containment Of Durable Equipment Requiring Decontamination
   7. Maintain Security Of All Items Until Properly Disposed
   8. Debrief/Evaluation Of Decon Process
   9. Complete Final Documentation
Hospital Pre-Incident Decontamination Baseline Capacity

According to the CT Statewide Mobile Decontamination Unit Activation Plan under development by the DEMHS, each municipality and healthcare facility shall have a plan and a capability to decontaminate a moderate number of individuals using available equipment and staff.

As established by CREPC ESF 8 (Health and Medical), each Capitol Region acute care hospital shall apply the following formula to determine the recommended level of decontamination capacity at that facility:

\[
\text{Capacity} = \frac{\text{Number of Annual ED Visits}}{1,000} = \text{Decontaminated Patients per Hour}
\]

Example: Hospital A sees 15,000 patients per year in its Emergency Department. Using the above formula, Hospital A shall have the capacity to decontaminate 15 patients per hour using available internal resources (staff and equipment).

Upon first indications that a regional or statewide decontamination event is occurring, the hospital shall notify RICS at 860-832-3477 to request activation of the CREPC RED Plan and additional support from regional decontamination resources, and shall issue an alert and notification to other facilities via the CMED MEDNET system.

Upon notification, all regional hospitals shall stand up their appropriate plans for facility site control and decontamination. Affected hospitals shall follow regional protocols for hospital diversion as needed.
Patient Triage Diagram

**Event**

Patients arrive with or without notification

Activate Disaster Plan and Prepare Staff to receive patient(s)

Triage Patient(s)

Decontamination Required?

- Yes
  - Activate hospital decontamination protocols
  - Collect personal belongings/evidence**
  - Secondary Triage
  - Undress Patient(s)
    - Assistance or Medical Treatment Required?
      - Yes
        - Provide Assistance and/or treatment within hospital capability
        - Decontaminate Patient(s)
        - Assess for adequacy of decontamination**
        - Adequate?
          - No
            - Re-decontaminate and/or provide technical decontamination**
          - Yes
            - Redress Patient(s) with clean covering
            - Reassessment and Treatment
            - Disposition
      - No
        - Directed patient(s) self-decontamination
        - Redress Patient(s)

- NO
  - Patient(s) to Treatment Area
  - Collect personal belongings/evidence**

Note: ** indicates a document will be available for reference.
# Personal Protective Equipment and Training For Hospitals

<table>
<thead>
<tr>
<th>Level of Protection</th>
<th>Personal Protective Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minimum Protection</strong></td>
<td>PPE Level: D</td>
</tr>
<tr>
<td>These PPE considerations offer minimal protection acting mainly as a liquid/splash barrier for the following:</td>
<td></td>
</tr>
<tr>
<td>• No staff contact or exposure is anticipated</td>
<td></td>
</tr>
<tr>
<td>• Chemical is known and is low risk contaminant</td>
<td></td>
</tr>
<tr>
<td>Used with exterior decontamination of ambulatory patients who can understand self decontamination instructions</td>
<td></td>
</tr>
<tr>
<td>Splash protection:</td>
<td></td>
</tr>
<tr>
<td>Full face shield</td>
<td></td>
</tr>
<tr>
<td>Gloves</td>
<td></td>
</tr>
<tr>
<td>Water repelling gown</td>
<td></td>
</tr>
<tr>
<td>Rubber boots</td>
<td></td>
</tr>
<tr>
<td>Hood or hair cover</td>
<td></td>
</tr>
<tr>
<td>Respiratory Protection:</td>
<td></td>
</tr>
<tr>
<td>Not needed</td>
<td></td>
</tr>
<tr>
<td>Or High Efficiency Particulate Air Filter (HEPA) mask</td>
<td></td>
</tr>
<tr>
<td><strong>Intermediate Protection</strong></td>
<td>PPE Level: C</td>
</tr>
<tr>
<td>Provides protection from hazardous materials for the following:</td>
<td></td>
</tr>
<tr>
<td>Staff contact or exposure is anticipated</td>
<td></td>
</tr>
<tr>
<td>Ambulatory patients who may require assistance</td>
<td></td>
</tr>
<tr>
<td>Chemical is known AND is a low risk contaminant</td>
<td></td>
</tr>
<tr>
<td>Splash protection:</td>
<td></td>
</tr>
<tr>
<td>Full face shield</td>
<td></td>
</tr>
<tr>
<td>Chemical resistant suit with hood</td>
<td></td>
</tr>
<tr>
<td>Chemical resistant gloves</td>
<td></td>
</tr>
<tr>
<td>Chemical resistant boots</td>
<td></td>
</tr>
<tr>
<td>Respiratory protection:</td>
<td></td>
</tr>
<tr>
<td>Air Purifying Respiratory</td>
<td></td>
</tr>
<tr>
<td><strong>Preferred Protection</strong></td>
<td>PPE Level: B</td>
</tr>
<tr>
<td>Provides hazardous materials protection for the following:</td>
<td></td>
</tr>
<tr>
<td>Actual staff contact with patients or contaminant is anticipated</td>
<td></td>
</tr>
<tr>
<td>The agent is unknown AND/OR is a high risk contaminant</td>
<td></td>
</tr>
<tr>
<td>Splash protection</td>
<td></td>
</tr>
<tr>
<td>Chemical resistant suit with hood</td>
<td></td>
</tr>
<tr>
<td>Chemical resistant boot &amp; gloves</td>
<td></td>
</tr>
<tr>
<td>Full face shielding</td>
<td></td>
</tr>
<tr>
<td>Respiratory protection:</td>
<td></td>
</tr>
<tr>
<td>Supplied Air / SCBA</td>
<td></td>
</tr>
</tbody>
</table>
Patient Directions for Decontamination

PATIENT:
You may have been exposed to a hazardous substance. For your own health and safety as well as others, you must be thoroughly cleaned before we can safely treat you. This is what you must do. Please read all the steps, then follow them exactly. Thank you.

Go to the designated area
Prepare to undress behind the privacy curtain

- Open the plastic bags
- Place all of your valuables (wallet, keys) into the small plastic bag and seal it. If you have prescription glasses or hearing aids, keep them with you
- Remove ALL your clothing
- Put clothes into large plastic bag
- Put the small valuables bag and large clothes bag in the designated place
- Put on the wristband or neck identification
- Now step into the shower / tub area

Shower Area

- Wet yourself all over in the shower
- Thoroughly wash with soap and water, paying attention to hair, ears, etc.
- Rinse for at least one minute
- Step out of the shower area and we will have a towel and clothing for you

- We will keep you covered
- Then we will take you to the Treatment Sector
- If it is safe to do so, we will give you back your clothes and valuables
Annex C: Guidelines for Field Response to a Radiation Incident

INTRODUCTION AND PURPOSE

By the time it is known that an explosive radiation incident has occurred in a confined area, most likely there will be numerous casualties, all the radioactive material will have been released, and plume growth will be progressing. Under those conditions, there will be no time to evaluate possible countermeasures. Therefore, a pre-planned system of response is critical to the successful management of such an event.

The purpose of this document is to offer guidance to planners, first responders, and senior decision makers to assist them in developing strategies for protective actions and operational procedures for the first 48 hours after an explosive event has occurred involving the release, explosive aerosolization and dispersion of radioactive material. The document includes practical guidance for the user community, i.e., planners, police, firefighters, hazardous materials technicians, and emergency medical technicians, who must enter the contaminated area to rescue injured victims, and to protect critical infrastructure. It also is pertinent to Emergency Operations Center (EOC) managers who will recommend protective actions to senior decision makers.

PRINCIPAL AREAS OF CONCERN

- Optimizing the size of the initial evacuation zones, including definitions and evacuation strategies for the hot, warm, and cold zones, based on the most recent scientific evidence
- Strategies for sheltering and evacuation
- Managing the triage of large numbers of potentially contaminated evacuees
- Managing “the worried well”

RECOMMENDED RESPONSE PROTOCOLS

A. ESTABLISHING GROUND ZERO

The area impacted during the emergency phase by an explosive Radiation Dispersion Device (RDD), as well as lesser affected areas that have levels of contamination that meet or exceed the criteria of 10 –50 mSv for evacuation (U.S. EPA 1992), can be assumed to be bounded within a 600 foot radius (Harper et al. 2006) and might be considerably smaller, depending on the amount of radioactivity in the weapon and the kinetics of the explosive.

Accordingly:
1. If there is no knowledge of the size of the initial radiological source, or if it is known that the device contained a very large radiological source (greater than 370 T bq or 10,000 Ci), establishing a hot zone boundary at 800 feet in all directions from ground zero is assumed to be a reasonable and safe precaution. This boundary definition is consistent for both alpha, beta and gamma emitters.
2. Control access to the hot zone to limit the number of non-contaminated persons entering the most contaminated area
3. Define the outer boundary of the hot zone at 10 mSv hr1 to establish the point where emergency personnel can stay, unrestricted, for 4 –5 hours without exceeding 50 mSv from external exposure
4. Confirm the outer boundary of the hot zone when the actual 10 mSv h1 line is determined from instrument readings. In most cases, this will be much closer to the source than 500 m.
5. If it is known that the source is smaller than 370 T bq (10,000 Ci), establish the initial hot zone boundary at 800 feet without waiting for measurements from instrumentation.
6. Do not decide anything based on the perceived wind direction, especially in an urban setting where the wind field can be very complex.

7. Once the hot zone is defined, establish the outer boundary of the warm zone where the radiation level is in the range of 0.01–0.1 mSv h⁻¹.
   a. Use of this range to define this boundary gives first responders flexibility to set up the outer boundary of the warm zone at the most pragmatic locations, rather than being tied to an explicit exposure rate.

8. The cold zone is defined outside of the outer boundary of the warm zone such that occupancy time is unrestricted for the first responders.

9. Establish the command post in the cold zone upwind from ground zero, or where the radiation or contamination level is less than 0.01–0.1 mSv h⁻¹, or at 1,000 counts min⁻¹ at 3 cm above the ground on a pancake type Geiger-Meuller type probe for a beta-gamma emitter, or 10 counts min⁻¹ at 1–2 cm above the ground with a 100 cm² alpha probe.
   a. If geographical circumstances do not permit this from a practical standpoint, the alternative recommendation is to choose the location based on levels of ground contamination that limits the impact to personnel and equipment.
   b. This selected place might have dose rates up to 0.2 mSv h⁻¹, or 10,000 counts min⁻¹ at 3 cm above the ground on a pancake-type Geiger-Mueller-type probe for a beta-gamma emitter, or 100 counts min⁻¹ at 1–2 cm above the ground with a 100 cm² alpha probe.

10. As soon as possible, ensure that first responders promptly measure and record exposure rates to determine, map and mark the hot, warm and cold spots.
   a. This is the most critical piece of information that the local EOC will need to begin to assess the order of magnitude of the overall event, and will assist first responders to control their own exposure in the first critical hours.

11. Expect that there will be a need to redefine the size of the evacuation zone. This will probably occur after federal resources arrive in the 12–24 hour timeframe indicated in the National Response Plan (U.S. DHS 2004).

12. Expect an orderly mass self-evacuation from the affected area, including the hot zone.
   a. Pre-designate evacuation routes and exits/triage/decontamination points to quickly channel evacuees safely away from the hot zone.
   b. Pre-position radiological monitors at exits.
   c. Assure that exits are located in relatively cold zones (< 2x background).

13. While medically significant levels of contamination are not expected among uninjured contaminated persons, some hot zone evacuees or contaminated victims may need prompt decontamination and/or medical intervention due to potential acute effects from hot skin contamination, or to mitigate an inhalation exposure.

B. DECONTAMINATION STRATEGIES

PRIORITIZING CASUALTIES FOR DECONTAMINATION

At any WMD/CRNE incident, the number of victims may exceed the emergency responders’ capabilities to rescue, decontaminate, and treat all victims. Emergency responders on-scene act to prioritize victims for receiving decontamination, treatment, and medical evacuation, while providing the greatest benefit for the greatest number. Therefore, whenever large numbers of contaminated victims are involved, it is recommended that they be sorted into ambulatory and non-ambulatory categories:

Ambulatory casualties are those victims who are able to understand directions, talk and walk unassisted, and may be medically triage-tagged after decontamination as minor (green tag), delayed (yellow tag) or immediate (red tag).
• The first (highest) priority for ambulatory victim decontamination are casualties who were closest to the point of release and report they were exposed to an aerosol or mist, have some evidence of liquid deposition on clothing or skin, or have serious medical symptoms.
• These casualties shall be directed to move upwind into an assembly area within the Hot Zone, adjacent to the Warm Zone, where they can be prioritized for decontamination.
• The second priority includes those ambulatory casualties who were not as close to the point of release and may not have evidence of liquid deposition on clothing or skin, but who are clinically symptomatic.
• The third priority includes victims suffering conventional injuries, especially open wounds or respiratory symptoms.
• The fourth (lowest) priority includes asymptomatic ambulatory casualties remote from the point of release.  

**Non-ambulatory casualties** are victims who are unconscious, unresponsive, or unable to move without assistance.

• These victims may be more seriously injured than ambulatory victims and must remain in place until sufficient personnel resources in hazard-appropriate PPE are available to make entry into the incident Hot Zone.
• Prioritization of non-ambulatory victims for decontamination and initial antidote therapy shall be accomplished using the CREPC-recommended START or other appropriate triage system.

*Since the most important aspect of decontamination is the timely and effective removal of the contaminating agent, the precise methods used to remove the agent are not nearly as important as the speed by which the agent is removed.*

• When possible, Capitol Region responders shall employ a high-volume/low-pressure water shower system with a neutral pH soap solution.
• Decontamination must be conducted as soon as possible to save lives. Thus, first arriving fire companies to the scene of a WMD/CRNE incident that requires emergency decontamination shall use resources that are immediately available and start decontamination as soon as possible.
• Personnel shall don appropriate PPE and, by deploying hand lines with fog nozzles (high-volume/low-pressure water) capable of showering ambulatory victims, shall attempt to decontaminate victims who may be attempting to flee the immediate area of agent release. This approach shall serve to partially decontaminate the victims, and also may protect the responders from cross-contamination by victims seeking assistance.
• Having the victims remove their clothing prior to decontamination decreases potential contamination by as much as 80%, and also decreases the possibility of forcing the agent through clothing onto the skin. Also, agent vapor may be trapped within the clothing and may be a potential hazard to first responders.
• Disrobing is recommended prior to showering for chemical agents. However, the decision to disrobe shall be made by the Incident Commander based upon the situation.
• Wetting down casualties as they start to disrobe speeds up the decontamination process, and is recommended for decontaminating biological or radiological casualties.
• After being decontaminated, victims shall be directed to an assembly area within the Warm Zone to be monitored for the presence of any further contamination.
• Appropriate authorities may request the activation of the 10 Mobile Decontamination Units (MDU) in the Capitol Region to deploy to the incident and/or to the nearest hospitals to the incident. Deployment of the MDU’s may be accomplished by contacting RICS at 860-832-3477.
• Ideally, all victims at the incident scene shall be decontaminated prior to being transported. However, the Tokyo Sarin incident taught us that many casualties will bypass the incident site decontamination process and proceed directly to area hospitals. These casualties shall be decontaminated at the hospitals prior to being triaged and admitted to the Emergency Department.
• As defined in the CR-MMRS Rapid Action Mass Decontamination Protocol, it is the responsibility of each acute care hospital in the Capitol Region to be able to conduct decontamination procedures for the first 60-90 minutes of an incident utilizing their existing plans and equipment.

Triage and decontamination strategies for radiation events preferably shall be developed separately from those used for chemical and biological agents.
• Expect that the victims’ clothes or bodies will not be dangerously contaminated, nor will they have inhaled enough radioactivity to cause acute health effects.
• This is in contrast to chemical or biological agents where the material present on the victims could be immediately dangerous to them or others with whom they will subsequently have contact.
• Do not plan to perform mass decontamination if the number of evacuees is very large. Instead:
• Allow personnel to go home and tell them to remove and bag their external garments before entering their dwelling. Few, if any, particles will penetrate outside clothing, especially if it is not summertime. Garments and jackets serve as effective protection from radioactive particulates.
• Advise those who think they were contaminated to take a shower with warm water and mild soap, gently washing the exposed skin as practical (head, hair, hands), and to not use hair conditioner, which may fix the contamination.
• Survey the bagged clothing after the emergency phase with support of outside emergency resources who will arrive during and after the intermediate phase.
• Do not plan to decontaminate motor vehicles in the emergency phase.
• Do not waste effort trying to contain contaminated wash water (U.S. EPA 1992).

TRIAGE STRATEGIES
• First, separate those people who need medical attention from those who do not.
• Assume that a person is not likely to have received a significant dose from inhalation unless there is evidence of gross external contamination at triage.
• Separate from all others those persons with upper body contamination, particularly of the shoulder, head, and hair. People with significant upper body contamination may require evaluation for follow-up medical treatment because they may have inhaled excessive amounts of radioactive material.
• Assume that individuals with contamination only on colder portions of the body crossed the contaminated zone, but were not exposed to the passing plume, and did not inhale hot airborne radioactivity in excessive concentrations.

PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR THE FIRST RESPONDERS

Because the initial plume will pass beyond the hot zone in 10–15 minutes, most first responders will not be exposed to hot airborne concentrations of particulates because they will arrive after it has passed, or first will encounter the plume downstream, when concentrations have become diluted. Therefore, because the remaining levels of airborne radioactivity along with any additional contribution from re-suspension will be relatively cold, the PPE requirements, as a minimum, are as follows:
• Uniform
• Goggles
• Gloves of any type
• Half-face air purifying respirator (APR) (most responders typically use a full-face APR that affords more protection)
Improvised respiratory protection is recommended for use by the public to reduce inhalation during the approximately 10 to 15 minutes of the plume’s passage. For improvised respiratory protection, the following procedure is recommended:

- Cover the mouth and nose with a dry cloth or handkerchief (NCRP 2001)
  
  Note: Wet fabric could actually increase the amount of inhaled particles by concentrating the radioactivity, and may cause labored breathing

- Remove the protection 30 minutes after detonation

SHELTERING

Sheltering is not a critical countermeasure for an explosive scenario anywhere, although it can reduce exposure if located away from ground zero. Sheltering indoors during the passage of the plume can result in reduced exposure values (concentrations inside the building might be as low as 5% of external concentrations).

However, sheltering beyond the passage of the plume can result in an additional exposure when the airborne concentration inside the buildings becomes higher than the outdoor concentration. This could occur due to the intake by a large urban building’s ventilation system of material from the passing plume, so that, when the outdoor concentrations have significantly decreased, higher levels of particulates remain inside the building.

The prompt shutdown or isolation of the air intakes to a large urban building for 60 minutes post-detonation likely would mitigate the impact to the occupants. However, if the building is not equipped with a radiation detector, it is not likely that the management would know there is airborne radioactivity. In addition, most buildings do not have the ability to shut down an entire ventilation system with the “push of a button.”

SOURCE **

The Capitol Region Metropolitan Medical Response System acknowledges with gratitude the fine work of the below-named authors that allowed the development of this annex on radiation response strategies. For further detail, please consult the following document:

Emergency Response Guidance For The First 48 Hours After The Outdoor Detonation Of An Explosive Radiological Dispersal Device
Stephen V. Musolino and Frederick T. Harper
Health Physics April 2006, Volume 90, Number 4
Annex D: CR-MMRS Protocol for Use of the Nerve Agent Antidote (Mark I) Kit

1. Statement of Purpose

The use of the MARK 1 auto-injector is intended for self- or unit-preservation in the event of poisoning by a chemical nerve agent. Use of the kit is limited solely to this purpose. The use of this antidote for any other class of agents is contraindicated and may be a life-threatening hazard to the responder.

2. Indications for Use

In the event of exposure to a known or a suspected WMD chemical agent, responders shall withdraw immediately from the area if possible. Withdrawal shall be made with the realization that the responder may be contaminated and shall be limited to the nearest fresh-air site avoiding contamination of bystanders or other responders.

3. Kit Dosing

In general, pinpoint pupils, increased secretions, and muscle fasciculation are the most reliable signs of nerve agent exposure.

Nerve agents are either vaporous or liquid agents belonging to the classification of drugs known as organophosphates. Tabun (GA), Sarin (GB), Soman (GC) and VX are the most commonly stockpiled agents. The first three, though transported as liquids, are weaponized by vaporization and are inhaled. VX stays in a heavy liquid form, much like motor oil, and is spread by the droplet route.

Dosing for Mild Vapor Exposure

1. Signs and symptoms following a vapor exposure occur within seconds to minutes, and include:
   a. Miosis – constriction of the pupil. Characteristically occurs from a nerve agent vapor exposure to the eye, or from direct liquid contact with the eye. Miosis is usually accompanied by eye pain, described often as a dull ache in the front of the forehead, or as pain about the orbit
   b. Headache
   c. Dim vision
   d. Increased salivation, lacrimation, and rhinorrhea (rhinorrhea may be the first indicator of exposure, aside from eye findings, in a vapor exposure)
   e. Mild respiratory distress
   f. Mild muscle weakness and/or mild, localized muscle twitching

2. Management:
   a. Most symptoms resolve spontaneously within 15-30 minutes
   b. No specific treatment is indicated

3. Treatment:
   a. If airway effects are noted (chest tightness, shortness of breath, airway secretions), and/or if other symptoms are not improving over time
   b. Monitor progress, noting that MARK-I medications do not reverse miosis. Supplemental oxygen is required in those personnel with pulmonary manifestations, or with a history of cardiac disease
Dosing for Moderate Exposure

1. **Signs and symptoms** for a moderate exposure include:
   a. Those occurring in mild exposures, plus:
   b. Increased respiratory distress
   c. Muscular weakness and fasciculation – twitching can be localized, as in the case of mild to moderate liquid exposure, or generalized, as in large liquid and moderate to large vaporous exposures
   d. Gastrointestinal effects (vomiting and diarrhea) – these are generally the first systemic signs of skin exposure (liquid agent) to a nerve agent
   e. Sweating – may be localized for a mild to moderate liquid exposure, or generalized for a vapor or large liquid exposure
   f. Tachycardia, hypertension

2. **Management and Treatment:****
   a. ONE OR TWO MARK-I kits are administered, then titrate to symptomatology (up to a maximum of three MARK I kits)
   b. Respiratory management – supplemental oxygen, assistance in secretion management

Dosing for Severe Exposure

NOTE: The onset of symptoms for a severe exposure are usually rapid, from seconds to minutes for a vapor exposure, but may take up to 30 minutes for a VX or liquid exposure

1. **Signs and symptoms** for a severe exposure include:
   a. Miosis
   b. Copious respiratory secretions impairing a patent airway
   c. Severe respiratory distress or apnea
   d. Possible cyanosis
   e. Muscle twitching which progresses to muscle rigidity and flaccid paralysis
   f. Altered level of consciousness – patient may be unconscious or seizing
   g. Incontinence of bowel and bladder

2. **Management and Treatment:**
   a. THREE MARK-I kits shall be given in rapid succession
   b. Anticonvulsant medications shall probably be required, even in the absence of seizure activity
   c. Therefore, Administer ONE DIAZEPAM AUTO-INJECTOR
   d. Aggressive airway control, including BVM, intubation, Combitube insertion, and vigilant suctioning

Special Considerations

1. Riot control agents (i.e., mace, tear gas, pepper spray) are irritants to mucous membranes
   a. Excessive tearing and rhinorrhea likely will be present
   b. Shortness of breath may be present
   c. Miosis is never present
   d. Atropine and Pralidoxime are not indicated

2. Pesticides (i.e., malathion, chlorpyrifos, diazinon) are also organophosphates
   a. These agents are not as potent
   b. Treatment is usually limited to atropine alone
   c. Pralidoxime is not indicated for pesticides containing carbamates
3. Industrial gases (i.e., chlorine and phosgene) have similar presentations to nerve agents
   a. Shortness of breath, skin or mucous membrane irritation, and cough may be present
   b. Muscle fasciculation and miosis are not present

4. Capitol Region MMRS Procedure for Administration of MARK 1 Kits

   Note: Two self-administration protocols are outlined. There are no therapeutic advantages to either procedure and either may be employed with the same effect. The sequential protocol allows the two components of the MARK I kit to be given one at a time, while the simultaneous protocol allows for both auto-injectors to be administered at the same time.

Self-Administration: Sequential Protocol

1. The MARK I kit consists of two auto-injectors:
   a. The larger, black-tipped Pralidoxime, labeled #2, contains 600 mg of medication in 2.0 ml of diluent
   b. The smaller, green-tipped Atropine, labeled #1, contains 2.0 mg in 0.7ml of diluent
2. Hold the kit in the non-dominant hand with the larger (#2) auto-injector on top
3. Grasp the smaller (#1) auto-injector in the dominant hand with a pencil-type grip, pull and remove the smaller green-tipped #1 Atropine injector from its clips
   a. The Atropine auto-injector is now “armed”
4. Select a large muscle mass – the antero-lateral thigh is the preferred site, but the upper and outer quadrant of the buttocks is permissible, particularly for thin victims
5. Remove any objects (coins, keys, buttons) that may be obstructing the path of the spring-loaded needle; do not inject directly onto or in close proximity to the thigh, hip, or knee bone. The auto-injectors are intended for use through clothing and turnout gear
6. Place the colored end (needle side) against the selected site and apply firm, even, stabbing pressure to the auto-injector
7. Hold in place for 10 seconds, then massage the site if possible
8. Repeat, using the black-colored Pralidoxime injector labeled #2
9. Monitor for improvement in symptoms
   a. Note: miosis or pupillary constriction will not improve unless topical Atropine is applied
10. Multiple or repeated doses may be given according to signs and symptoms up to a maximum of 3 MARK-I kits
11. Make every effort to dispose of used needles carefully, either by utilizing a sharps container or bucket, or by bending the tips of the non-retracting needles against a hard surface (ground)
Self-Administration: Simultaneous Protocol

1. Prepare both auto-injectors, as described above
2. Select two muscle sites, one in each thigh or buttock
3. Simultaneously, inject both auto-injectors into the desired sites, holding firm pressure for 10 seconds until both auto-injectors are fully discharged
4. Massage, dispose of sharps, and monitor effects and symptoms as above

Buddy Administration

1. If conscious, have the recipient squat and not kneel to receive antidote administration
2. If unconscious, position the recipient on his/her side in a lateral position
3. Select the thigh or upper outer quadrant of the buttocks as the site of injection (the thigh is preferable)
4. Administer injection as per the protocol
5. Monitor for improvement or need for additional MARK I injections
6. In order to determine that a responder has received treatment with antidote kit(s), each CR-MMRS kit includes a marking pen. The pen is to be used to signify that a responder has received treatment with MARK 1 kits and/or Diazepam
   a. A single vertical line shall be drawn upon the forehead of the responder for each MARK 1 kit received, and a “V” shall be added if appropriate to signify the administration of the Valium (Diazepam) component

Post-Treatment Actions

1. Once self-treatment has been performed, and the responder has self-evacuated if possible, the responder shall notify other personnel on scene of the danger and shall await decontamination before advancing for further medical evaluation
2. Once treated with antidote kit(s), the responder shall be taken off-line immediately and transported to the nearest Emergency Department for further medical evaluation
3. A triage tag shall be attached to the responder indicating the use of MARK 1 / Diazepam auto injector(s), and adding any information regarding the exposure (liquid or vapor, signs and symptoms), and if the responder has been decontaminated