

# NFPA® 473

**Standard for Competencies for  
EMS Personnel Responding to  
Hazardous Materials/Weapons  
of Mass Destruction Incidents**

**2018**



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## NFPA® 473

### Standard for

## Competencies for EMS Personnel Responding to Hazardous Materials/ Weapons of Mass Destruction Incidents

### 2018 Edition

This edition of NFPA 473, *Standard for Competencies for EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents*, was prepared by the Technical Committee on Hazardous Materials Response Personnel. It was issued by the Standards Council on August 1, 2017, with an effective date of August 21, 2017, and supersedes all previous editions.

This edition of NFPA 473 was approved as an American National Standard on August 21, 2017.

### Origin and Development of NFPA 473

Following the development of NFPA 471, *Recommended Practice for Responding to Hazardous Materials Incidents* (which was incorporated into NFPA 472 and NFPA 473 for the 2008 editions), and NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents* (which was retitled *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents* for the 2008 edition), the Technical Committee on Hazardous Materials Response Personnel undertook the development of a standard relating to the professional competencies of emergency medical personnel who could be required to respond to hazardous materials incidents. The roles and responsibilities of EMS personnel at hazardous materials incidents had not been identified in the majority of emergency response systems.

The first edition of NFPA 473 was released in 1992. In the 1997 edition, the committee reviewed the first edition and updated it for consistency with the related NFPA 471 and NFPA 472 and for clarity of the competencies.

In 1998 the committee processed a Tentative Interim Amendment (TIA) to address concerns related to the unique challenges of responding to hazardous materials incidents that could be caused by criminal or terrorist activity. Those concerns were motivated by the 1995 bombing of the Alfred P. Murrah Federal Building in Oklahoma City and other national and international incidents.

The TIA added paragraphs on recognizing criminal and terrorist activities, differentiating between chemical and biological agents, actions to take when criminal or terrorist activity is suspected, providing patient care at incidents resulting from chemical and biological agents, and other similar competencies.

In the 2002 edition, the TIA material was updated and moved into the body of the text, along with other updates to coordinate with a similar TIA and other new material in NFPA 472 related to weapons of mass destruction and incidents involving radioactive materials. Additional changes in wording and format were made in accordance with the 2000 edition of the *Manual of Style for NFPA Technical Committee Documents*.

The 2008 edition of NFPA 473 was completely rewritten to address the hazards that emergency medical services (EMS) personnel encounter from hazardous materials/weapons of mass destruction. New definitions and technical information were added. The requirements in the 2008 edition enhanced the safety and protection of response personnel and all components of the EMS system.

The 2013 edition adopted the concept of mission-specific competencies that were previously integrated into the 2008 edition of NFPA 472. The 2013 edition was expanded to include a new chapter on competencies for advanced life support (ALS) responders assigned mission-specific responsibilities, including ALS responders assigned to a hazardous materials response team, ALS responders assigned to provide clinical intervention at a hazardous materials/WMD incident, and ALS responders assigned to treatment of smoke inhalation victims.

In the 2018 edition of NFPA 473, the technical committee has provided great detail for emergency medical services personnel to coordinate with the hazardous materials safety officer. The technical committee made minor revisions to the document for consistency with the other hazardous materials response personnel documents and industry-recognized terminology. Revisions were also made to reflect the competency-based style of the document.

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**Committee Scope:** This Committee shall have primary responsibility for documents on the requirements for professional qualifications, professional competence, training, procedures, and equipment for emergency responders to hazardous materials/weapons of mass destruction incidents.

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## NFPA 473

## Standard for

# Competencies for EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents

2018 Edition

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A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex C. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex C.

## Chapter 1 Administration

**1.1 Scope.** This standard identifies the levels of competence required of emergency medical services (EMS) personnel who respond to incidents involving hazardous materials or weapons of mass destruction (WMD).

▲ **1.1.1** This document covers the requirements for basic life support and advanced life support personnel in the prehospital setting.

▲ **1.1.2** This standard is based on the premise that all EMS responders are trained to meet at least the core competencies of the operations level responders as defined in Chapter 5 of NFPA 472.

**1.2 Purpose.** The purpose of this standard is to specify minimum requirements of competence and to enhance the safety and protection of response personnel and all components of the emergency medical services system.

**1.2.1** It is not the intent of this standard to restrict any jurisdiction from exceeding these minimum requirements.

**1.3\* CDC Categories A, B, and C.** This standard uses the U.S. Centers for Disease Control and Prevention (CDC) categories of diseases and agents.

## Chapter 2 Referenced Publications

**2.1 General.** The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

**2.2 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 472, *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, 2018 edition.

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, 2017 edition.

NFPA 1584, *Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises*, 2015 edition.

### 2.3 Other Publications.

**2.3.1 U.S. Government Publications.** U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

*Emergency Response Guidebook*, Pipeline and Hazardous Materials Administration, U.S. Department of Transportation, 2016.

ICS Forms, [www.fema.gov/emergency/nims/JobAids.shtm](http://www.fema.gov/emergency/nims/JobAids.shtm), ICS Form 206.pdf.

Title 18, U.S. Code, Section 2332a, “Use of Weapons of Mass Destruction.”

Title 29, Code of Federal Regulations, Part 1910.120, “Hazardous Waste Operations and Emergency Response.”

**2.3.2 Other Publications.** *Merriam-Webster’s Collegiate Dictionary*, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

### 2.4 References for Extracts in Mandatory Sections. (Reserved)

## Chapter 3 Definitions

**3.1 General.** The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster’s Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

### 3.2 NFPA Official Definitions.

**3.2.1\* Approved.** Acceptable to the authority having jurisdiction.

**3.2.2\* Authority Having Jurisdiction (AHJ).** An organization, office, or individual responsible for enforcing the requirements

of a code or standard, or for approving equipment, materials, an installation, or a procedure.

**3.2.3\* Listed.** Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

**3.2.4 Shall.** Indicates a mandatory requirement.

**3.2.5 Should.** Indicates a recommendation or that which is advised but not required.

**3.2.6 Standard.** An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

### 3.3 General Definitions.

**3.3.1 Advanced Life Support (ALS).** Emergency medical treatment beyond basic life support level as defined by the medical authority having jurisdiction in conjunction with the American Heart Association guidelines.

**3.3.1.1 Emergency Medical Technician — Intermediate (EMT-I).** An individual who has completed a course of instruction that includes selected modules of the U.S. Department of Transportation National Standard EMT — Paramedic curriculum and who holds an intermediate level EMT-I or EMT-C certification from the authority having jurisdiction.

**3.3.1.2 Emergency Medical Technician — Paramedic (EMT-P).** An individual who has successfully completed a course of instruction that meets or exceeds the requirements of the U.S. Department of Transportation National Standard EMT — Paramedic curriculum and who holds an EMT-P certification from the authority having jurisdiction.

**3.3.1.3 Medical Director.** An individual who plans and directs all aspects of an organization's or system's medical policies and programs, including operations and offline (protocol) and online medical direction (direct communication consultation); is responsible for strategic clinical relationships with other physicians; oversees the development of the clinical content in materials; ensures all clinical programs are in compliance; writes and reviews research publications appropriate to support clinical service offerings; requires an active degree in medicine with specialty experience or training in emergency and disaster medical mitigation, administration, and management; relies on experience and judgment to plan and accomplish goals; and typically coordinates with the incident command.

**3.3.1.4\* Medical Team Specialist.** Any health care provider or medically trained specialist acting under the authority of the medical director, and within the context of the National Incident Management System, authorized to act as the medical point of contact for an incident.

**3.3.2\* Allied Professional.** That person who possesses the knowledge, skills, and technical competence to provide assistance in the selection, implementation, and evaluation of tasks at a hazardous materials/weapons of mass destruction (WMD) incident.

**3.3.3 Basic Life Support (BLS).** Emergency medical treatment at a level as defined by the medical authority having jurisdiction in conjunction with American Heart Association guidelines.

**3.3.3.1\* Emergency Care First Responder (ECFR).** An individual who has successfully completed the specified emergency care first responder course developed by the U.S. Department of Transportation and who holds an ECFR certification from the authority having jurisdiction.

**3.3.3.2 Emergency Medical Technician — Ambulance/Basic (EMT-A/B).** An individual who has successfully completed an EMT-A or EMT-B curriculum developed by the U.S. Department of Transportation or equivalent and who holds an EMT-A/B certification from the authority having jurisdiction.

**3.3.4 Competence.** Possessing the knowledge, skills, and judgment needed to perform indicated objectives.

**3.3.5\* Components of Emergency Medical Service (EMS) System.** The parts of a comprehensive plan to treat an individual in need of emergency medical care following an illness or injury.

**3.3.6 Contaminant.** A hazardous material, or the hazardous component of a weapon of mass destruction (WMD), that physically remains on or in people, animals, the environment, or equipment, thereby creating a continuing risk of direct injury or a risk of exposure.

**3.3.7\* Demonstrate.** To show by actual performance.

**3.3.8 Describe.** To explain verbally or in writing using standard terms recognized in the hazardous materials response community.

**3.3.9 Emergency Medical Services (EMS).** The provision of treatment, such as first aid, cardiopulmonary resuscitation, basic life support, advanced life support, and other prehospital procedures, including transportation, of patients.

**3.3.10 Emergency Response Guidebook (ERG).** The reference book, written in plain language, to guide emergency responders in their initial actions at the incident scene, specifically the *Emergency Response Guidebook* from the U.S. Department of Transportation, Transport Canada, and the Secretariat of Transportation and Communications, Mexico.

**3.3.11 EMS Hazardous Materials (EMS/Hazardous Materials/WMD) Responder.**

**3.3.11.1 Emergency Medical Services Responders to Hazardous Materials/Weapon of Mass Destruction at the ALS Level (ALS Responder).** Operations-level responders who are ALS certified, assigned EMS mission-specific responsibilities at hazardous materials/WMD incidents, and are trained to

meet all competencies of NFPA 472, Chapters 4 and 5, and all competencies for the assigned responsibilities in NFPA 473, Chapters 4 and 5.

Δ **3.3.11.2 Emergency Medical Services Responders to Hazardous Materials/Weapon of Mass Destruction at the BLS Level (BLS Responder).** Operations-level responders who are BLS certified, assigned EMS mission-specific responsibilities at hazardous materials/WMD incidents, and are trained to meet all competencies of NFPA 472, Chapters 4 and 5, and all competencies for the assigned responsibilities in NFPA 473, Chapter 4.

N **3.3.12 Evaluate.** The process of assessing or judging the effectiveness of a response operation or course of action within the training and capabilities of the emergency responder.

**3.3.13\* Exposure.** The process by which people, animals, the environment, property, and equipment are subjected to or come in contact with a hazardous material/weapon of mass destruction (WMD).

N **3.3.14 Exposures.** The people, animals, environment, property, and equipment that might potentially become exposed at a hazardous materials/weapons of mass destruction (WMD) incident.

N **3.3.15\* Fissile Material.** Material whose atoms are capable of nuclear fission (capable of being split).

N **3.3.16 Hazard.** Capable of causing harm or posing an unreasonable risk to life, health, property, or the environment.

Δ **3.3.17\* Hazardous Material.** Matter (solid, liquid, or gas) or energy that when released is capable of creating harm to people, the environment, and property, including weapons of mass destruction (WMD) as defined in 18 U.S. Code, Section 2332a, as well as any other criminal use of hazardous materials, such as illicit labs, environmental crimes, or industrial sabotage.

**3.3.18 Identify.** To select or indicate verbally or in writing using standard terms to establish the fact of an item being the same as the one described.

**3.3.19 Incident.** An emergency involving the release or potential release of hazardous materials/weapons of mass destruction (WMD).

**3.3.20\* Incident Commander (IC).** The individual responsible for all incident activities, including the development of strategies and tactics and the ordering and the release of resources.

**3.3.21 Incident Command System (ICS).** A specific component of an incident management system (IMS) designed to enable effective and efficient on-scene incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure.

**3.3.22\* Incident Management System (IMS).** A process that defines the roles and responsibilities to be assumed by personnel and the operating procedures to be used in the management and direction of emergency operations to include the incident command system (ICS), unified command, multi-agency coordination system, training, and management of resources.

**3.3.23 Medical Control.** The physician or designee providing direction for patient care activities in the prehospital setting.

**3.3.24 Medical Surveillance.** The ongoing process of medical evaluation of hazardous materials response team members and public safety personnel who respond to a hazardous materials incident.

Δ **3.3.25 Mission-Specific Competencies.** The knowledge, skills, and judgment needed by operations-level responders who have completed the operations-level competencies and who are designated by the authority having jurisdiction (AHJ) to perform mission-specific tasks, such as decontamination, victim/hostage rescue and recovery, and evidence preservation and sampling.

**3.3.26 Patient.** Any person or persons requiring or requesting a BLS/ALS evaluation or intervention at the scene of a hazardous materials/WMD incident.

N **3.3.27\* Personal Protective Equipment (PPE).** The protective clothing and respiratory protective equipment provided to shield or isolate a person from the hazards encountered at hazardous materials/weapon of mass destruction (WMD) incident operations.

**3.3.28 Protocol.** A guideline for a series of sequential steps directing patient treatment.

**3.3.29 Region.** A geographic area that includes the local and neighboring jurisdiction for an EMS agency.

N **3.3.30\* Safety Data Sheet (SDS).** Formatted information provided by chemical manufacturers and distributors of hazardous products, which contains information about chemical composition, physical and chemical properties, health and safety hazards, emergency response, and waste disposal of the material.

N **3.3.31 Victim Prioritization and Patient Triage.** Victim prioritization utilizes risk-based factors to establish an action plan for victim removal and eventual treatment. Patient triage is a clinical prioritization employed to maximize survival and to prioritize application of therapeutic modalities.

**3.3.32\* Weapon of Mass Destruction (WMD).** (1) Any destructive device, such as any explosive, incendiary, or poison gas bomb, grenade, rocket having a propellant charge of more than four ounces, missile having an explosive or incendiary charge of more than one quarter ounce (7 grams), mine, or device similar to the preceding description; (2) any weapon involving toxic or poisonous chemicals; (3) any weapon involving a disease organism; or (4) any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.

#### **3.3.32.1\* Radiological Weapons of Mass Destruction.**

**3.3.32.1.1\* Improvised Nuclear Device (IND).** An illicit nuclear weapon that is bought, stolen, or otherwise obtained from a nuclear state (that is, a national government with nuclear weapons), or a weapon fabricated from fissile material that is capable of producing a nuclear explosion.

**3.3.32.1.2\* Radiation Dispersal Device (RDD).** A device designed to spread radioactive material through a detonation of conventional explosives or other means.

**3.3.32.1.3\* Radiation Exposure Device (RED).** A device intended to cause harm by exposing people to radiation without spreading radioactive material.

## Chapter 4 Competencies for Hazardous Materials/WMD Basic Life Support (BLS) Responder

### 4.1 General.

**4.1.1 Introduction.** All emergency medical services (EMS) personnel at the hazardous materials/WMD basic life support (BLS) responder level, in addition to their BLS certification, shall be trained to meet at least the competencies of the operations level responders as defined in Chapter 5 of NFPA 472 and all competencies of this chapter.

**4.1.2 Goal.** The goal of the competencies at the BLS responder level shall be to provide the individual with the knowledge and skills necessary to safely deliver BLS at hazardous materials/WMD incidents, function within the established IMS/ICS, and perform the following duties:

- (1) Analyze a hazardous materials/WMD incident to determine the potential health hazards encountered by the BLS responder, other responders, and anticipated and actual patients by completing the following tasks:
  - (a) Survey an incident where hazardous materials/WMD have been released and evaluate suspected and identified patients for signs and symptoms of exposure
  - (b) Collect hazard and response information from available technical resources to determine the nature of the problem and potential health effects of the substances involved
- (2) Plan to deliver BLS to any exposed patient within the scope of practice by completing the following tasks:
  - (a) Identify preplans of high-risk areas and occupancies to identify potential locations where significant human exposures can occur
  - (b) Identify the capabilities of the hospital network to accept exposed patients and perform emergency decontamination if required
  - (c) Identify the medical components of the communication plan
  - (d) Describe the role of the BLS responder as it relates to the local emergency response plan and established IMS/ICS
- (3) Implement a prehospital treatment plan within the scope of practice by completing the following tasks:
  - (a) Determine the nature of the hazardous materials/WMD incident as it relates to anticipated or actual patient exposures and subsequent medical treatment
  - (b) Identify the need for and the effectiveness of decontamination efforts
  - (c) Determine if the available medical resources will meet or exceed patient care needs
  - (d) Describe evidence preservation issues associated with patient care
  - (e) Develop and implement a medical monitoring plan for responders
  - (f) Report and document the actions taken by the BLS responder at the incident scene

(4) Coordinate the following tasks with the hazardous materials safety officer:

- (a) Analyze potential health concerns, which could be inclusive of environmental concerns
- (b) Plan for treatment and services delivery for patients and responders

### 4.2 Competencies — Analyzing the Incident.

**4.2.1 Surveying Hazardous Materials/WMD Incidents.** Given scenarios of hazardous materials/WMD incidents, the BLS responder shall assess the nature and severity of the incident as it relates to anticipated or actual EMS responsibilities at the scene.

**4.2.1.1** Given examples of the following types of containers, the BLS responder shall identify the potential mechanisms of injury/harm and possible treatment modalities:

- (1) Pressure
- (2) Nonpressure
- (3) Cryogenic
- (4) Radioactive

**4.2.1.2** Given examples of the nine U.S. Department of Transportation (DOT) hazard classes, the NFPA 704 markings, and the Globally Harmonized System (GHS) classifications, the BLS responder shall identify possible types of injuries or illnesses and possible prehospital treatment modalities associated with each hazard class.

**4.2.1.3** Given examples of various hazardous materials/WMD incidents at fixed facilities, the BLS responder shall identify the following available health-related resource personnel:

- (1) Occupational/environmental health and safety representatives
- (2) Radiation safety officers (RSO)
- (3) Occupational physicians and nurses
- (4) Site emergency response teams
- (5) Product or container specialists

**4.2.1.4** Given the following biological agents, the BLS responder shall describe the signs and symptoms of exposure and/or illness for the following:

- (1) Variola major virus (smallpox)
- (2) *Clostridium botulinum*
- (3) Coliforms (e.g., *E. coli* O157:H7)
- (4) Ricin toxin
- (5) *Bacillus anthracis* (anthrax)
- (6) Venezuelan equine encephalitis virus
- (7) *Rickettsia*
- (8) *Yersinia pestis* (plague)
- (9) *Francisella tularensis* (tularemia)
- (10) Viral hemorrhagic fever
- (11) Ebola
- (12) Other CDC Category A, B, or C-listed organism

**4.2.1.5** Given a scenario involving a hazardous materials/WMD, the BLS responder shall determine the general health risks to patients exposed to those substances in the case of any release with the following:

- (1) Visible cloud
- (2) Liquid pooling
- (3) Solid dispersion

**4.2.1.6** Given examples of hazardous materials/WMD incidents involving illicit laboratory operations, BLS responders assigned to respond to illicit laboratory incidents shall identify the potential drugs/WMD being manufactured and shall describe the operational considerations, perform a comprehensive scene survey, and complete a hazard and risk analysis to meet the following related requirements:

- (1)\* Given examples of illicit drug manufacturing methods, identify the health hazards associated with the products and processes involved in the illicit laboratory
- (2) Given examples of illicit chemical WMD methods, identify the hazards of the potential products and processes involved in the illicit laboratory
- (3) Given examples of illicit biological WMD methods, identify the health hazards of the potential products and processes involved in the illicit laboratory
- (4) Given examples of illicit laboratory operations, describe the potential booby traps that have been encountered by response personnel
- (5) Given examples of illicit laboratory operations, describe the agencies that have investigative authority and operational responsibility to support the response

**4.2.1.7** Given a scenario involving radioactive materials, including an accidental release, a radiological dispersion device (RDD), and a radiological exposure device (RED), the BLS responder shall determine the prehospital care based upon the probable health risks and potential patient outcomes by completing the following:

- (1) Determine the most likely exposure pathways for a given radiation exposure, including inhalation, ingestion, injection, and direct skin exposure
- (2) Identify the difference between radiation exposure and radioactive contamination and the health concerns associated with each

**4.2.1.8** Given three examples of pesticide labels and labeling, the BLS responder shall use the following information to determine the associated health risks and prehospital care for an exposure:

- (1) Hazard statement
- (2) Precautionary statement
- (3) Signal word
- (4) Pesticide name

**4.2.2 Collecting and Interpreting Hazard and Response Information.** The BLS responder shall obtain information from the following sources to determine the nature of the medical problem and potential health effects:

- (1) Hazardous materials databases
- (2) Clinical monitoring
- (3) Reference materials (e.g., SDS and ERG)
- (4)\* Technical information centers (e.g., CHEMTREC, CANUTEC, and SETIQ) and local, state, provincial, and federal authorities
- (5) Allied professionals
- (6) Regional poison control centers

**4.2.3 Establishing and Enforcing Scene Control Procedures.** Given two scenarios involving hazardous materials/WMD incidents, the BLS responder shall identify how to establish and enforce scene control, including control zones and emergency decontamination, and communications between responders and to the public and shall meet the following requirements:

- (1) Identify the procedures for establishing scene control through control zones
- (2) Identify the criteria for determining the locations of the control zones at hazardous materials/WMD incidents
- (3) Identify the basic techniques for the following protective actions at hazardous materials/WMD incidents:
  - (a) Evacuation
  - (b) Shelter-in-place protection
  - (c) Isolation of the hazard area and denial of entry
- (4) Demonstrate the ability to perform emergency decontamination
- (5) Identify the items to be considered in a safety briefing prior to allowing personnel to work at the following:
  - (a) Hazardous materials incidents
  - (b) Hazardous materials/WMD incidents involving criminal activities
- (6) Identify the procedures for ensuring coordinated communication between responders and to the public

### 4.3 Competencies — Planning the Response.

#### 4.3.1 Identifying High Risk Areas for Potential Exposures.

**4.3.1.1** The BLS responder, given an events calendar and pre-incident plans, which can include the local emergency planning committee plan, as well as the agency's emergency response plan and standard operating procedures (SOPs), shall identify the venues for mass gatherings, industrial facilities, potential targets for terrorism, and any other location where an accidental or intentional release of a harmful substance can pose a health risk to any person in the local geographical area as determined by the AHJ and shall identify the following:

- (1) Locations where hazardous materials/WMD are used, stored, or transported
- (2) Areas and locations that present a potential for a high loss of life or rate of injury in the event of an accidental or intentional release of hazardous materials/WMD
- (3)\* External factors that might complicate a hazardous materials/WMD incident, including routes of travel and traffic issues, receiving hospital availability, communications interoperability, and inter-agency cooperation

#### 4.3.2 Determining the Capabilities of the Local Hospital Network.

**4.3.2.1** The BLS responder shall identify the following methods and vehicles available to transport hazardous materials patients and shall determine the location and potential routes of travel to the medically appropriate local and regional hospitals, based on the patients' needs:

- (1) Adult trauma centers
- (2) Pediatric trauma centers
- (3) Adult burn centers
- (4) Pediatric burn centers
- (5) Hyperbaric chambers
- (6) Field hospitals
- (7) Dialysis centers
- (8) Supportive care facilities
- (9) Forward deployable assets
- (10) Other specialty hospitals or medical centers

**4.3.2.2** Given a list of receiving hospitals in the region, the BLS responder shall describe the location, availability, and capability of hospital-based decontamination facilities.

**4.3.2.3** The BLS responder shall describe the BLS protocols for prehospital care and SOPs for a mass casualty incident (MCI), including priority condition, treatment, and transport at a hazardous materials/WMD incident where exposures have occurred as developed by the AHJ and the prescribed role of medical control and poison control centers.

**4.3.2.4** The BLS responder shall identify the formal and informal mutual aid resources (hospital- and non-hospital-based) for the field management of multicasualty incidents, as follows:

- (1) Mass-casualty trailers with medical supplies
- (2) Mass-decedent capabilities
- (3) Regional decontamination units
- (4) Replenishment of medical supplies during long-term incidents
- (5) Rehabilitation units for the EMS responders
- (6) Replacement transport units for vehicles lost to mechanical trouble, collision, theft, and contamination

**4.3.2.5** The BLS responder shall identify the special hazards associated with inbound and outbound air transportation of patients exposed to hazardous materials/WMD.

#### 4.3.3 Identifying Incident Communications.

**4.3.3.1** Given an incident communications plan, the BLS responder shall identify the following:

- (1) Medical components of the communications plan
- (2) Ability to communicate with other responders, transport units, and receiving facilities

**4.3.3.2** Given examples of various patient exposure scenarios, the BLS responder shall describe the following information to be transmitted to the medical or poison control center or the receiving hospital prior to arrival:

- (1) Name of the substance(s) involved
- (2) Physical and chemical properties of the substance(s) involved
- (3) Number of victims being transported
- (4) Age and sex of transported patient
- (5) Patient condition and chief complaint
- (6) Medical history
- (7) Circumstances and history of the exposure, such as duration of exposure and primary route of exposure
- (8) Vital signs, initial and current
- (9) Symptoms described by the patient, initial and current
- (10) Presence of associated injuries, such as burns and trauma
- (11) Decontamination status
- (12) Treatment rendered or in progress
- (13) Patient response to treatment(s)
- (14) Estimated time of arrival

#### 4.3.4 Identifying the Role of the BLS Responder.

**4.3.4.1** Given scenarios involving hazardous materials/WMD, the BLS responder shall identify his or her role during hazardous materials/WMD incidents as specified in the emergency response plan and SOPs developed by the AHJ, as follows:

- (1) Describe the purpose, benefits, and elements of the IMS/ICS as it relates to the BLS responder
- (2) Describe the typical incident command structure for the emergency medical component of a hazardous materials/WMD incident as specified in the emergency response plan and SOPs, as developed by the AHJ

- (3) Demonstrate the ability of the BLS responder to function within the IMS/ICS
- (4) Demonstrate the ability to initiate an ICS for a hazardous materials/WMD incident where an IMS/ICS does not currently exist
- (5) Identify the procedures for requesting additional resources at a hazardous materials/WMD incident

**4.3.4.2** The hazardous materials/WMD BLS responder shall describe his or her role within the hazardous materials response plan developed by the AHJ or identified in the local emergency response plan, as follows:

- (1) Determine the toxic effect of hazardous materials/WMD
- (2) Estimate the number of patients
- (3) Recognize and assess the presence and severity of symptoms
- (4) Take and record vital signs
- (5) Determine resource maximization and assessment
- (6) Assess the impact on the health care system
- (7) Perform appropriate patient monitoring
- (8) Communicate pertinent information

#### 4.4 Competencies — Implementing the Planned Response.

**4.4.1 Determining the Nature of the Incident/Providing Medical Care.** The BLS responder shall demonstrate the ability to identify the mechanisms of injury or harm and the clinical implications and provide emergency medical care to those patients exposed to hazardous materials/WMD agent by completing the following tasks:

- (1) Determine the physical state of the released substance, in addition to the environmental influences surrounding the release, as follows:
  - (a) Solid
  - (b) Liquid
  - (c) Gas
  - (d) Vapor
  - (e) Dust
  - (f) Mist
  - (g) Aerosol
- (2) Identify potential routes of exposure and correlate those routes of exposure to the physical state of the released substance, to determine the origin of the illness or injury, as follows:
  - (a) Inhalation
  - (b) Absorption
  - (c) Ingestion
  - (d) Injection
- (3)\* Describe the potential routes of entry into the body, the common signs and symptoms of exposure, and the BLS treatment options approved by the AHJ for exposure(s) to the following classification of substances:
  - (a) Corrosives
  - (b) Pesticides
  - (c) Chemical asphyxiants
  - (d) Simple asphyxiants
  - (e) Organic solvents
  - (f) Nerve agents
  - (g) Vesicants and blister agents
  - (h) Blood agents
  - (i) Choking agents
  - (j) Irritants

- (k) Biological agents and toxins
  - (l) Incapacitating agents
  - (m) Radioactive materials
  - (n) Nitrogen compounds
  - (o) Hydrocarbon/hydrocarbon derivatives
  - (p) Fluorine compounds
  - (q) Phenolic compounds
- (4) Describe the basic toxicological principles relative to assessment and treatment of persons exposed to hazardous materials, including the following:
- (a) Acute and chronic effects
  - (b) Local and systemic effects
  - (c) Dose-response relationship
- (5) Given examples of various hazardous materials/WMD, define the basic toxicological terms as applied to patient care:
- (a) Threshold limit value — time-weighted average (TLV-TWA)
  - (b) Permissible exposure limit (PEL)
  - (c) Threshold limit value — short-term exposure limit (TLV-STEL)
  - (d) Immediately dangerous to life and health (IDLH)
  - (e) Threshold limit value — ceiling (TLV-C)
  - (f) Parts per million/parts per billion/parts per trillion (ppm/ppb/ppt)
- (6) Given examples of hazardous materials/WMD incidents with exposed patients, evaluate the progress and effectiveness of the medical care provided at a hazardous materials/WMD incident to ensure that the overall incident response objectives, along with patient care goals, are being met by completing the following tasks:
- (a) Locate and track all exposed patients at a hazardous materials/WMD incident, from priority conditions and treatment to transport to a medically appropriate facility
  - (b) Review the incident objectives at periodic intervals to ensure that patient care is being carried out within the overall incident action plan
  - (c) Ensure that the required incident command system forms are completed, along with the patient care forms, during the course of the incident
  - (d) Evaluate the need for trained and qualified EMS personnel, medical equipment, transport units, and other supplies based on the scope and duration of the incident

**4.4.2 Decontamination.** Given the emergency response plan and SOPs developed by the AHJ, the BLS responder shall do the following:

- (1) Determine if patient decontamination activities were performed prior to accepting responsibility and transferring care of exposed patients
- (2) Determine the need and location for patient decontamination, including mass casualty decontamination, in the event none has been performed prior to arrival of EMS personnel and complete the following tasks:
  - (a) Given the emergency response plan and SOPs developed by the AHJ, identify sources of information for determining the appropriate decontamination procedure and identify how to access those resources in a hazardous materials/WMD incident
  - (b) Given the emergency response plan and SOPs developed by the AHJ, identify (within the plan) the

supplies and equipment required to set up and implement the following:

- i. Emergency decontamination operations for ambulatory and nonambulatory patients with open wounds
  - ii. Mass decontamination operations for ambulatory and nonambulatory patients with open wounds
- (c) Identify procedures, equipment, and safety precautions for the treatment and handling of emergency service animals brought to the decontamination corridor at hazardous materials/WMD incidents
  - (d) Identify procedures, equipment, and safety precautions for communicating with critical, urgent, and potentially exposed patients, and identify population prioritization as it relates to decontamination purposes
  - (e) Identify procedures, equipment, and safety precautions for preventing cross contamination

#### 4.4.3 Determining the Ongoing Need for Medical Supplies.

**4.4.3.1** Given examples of single-patient and multicase casualty hazardous materials/WMD incidents, the BLS responder shall determine the following:

- (1) If the available medical equipment will meet or exceed patient care needs throughout the duration of the incident
- (2) If the available transport units will meet or exceed patient care needs throughout the duration of the incident

**4.4.4 Preserving Evidence.** Given examples of hazardous materials/WMD incidents where criminal acts are suspected, the BLS responder shall make every attempt to preserve evidence during the course of delivering patient care by completing the following tasks:

- (1) Evaluate the incident for potential criminal activity, and cooperate with the law enforcement agency having investigative jurisdiction
- (2) Identify the unique aspects of criminal hazardous materials/WMD incidents, including crime scene preservation and evidence preservation, to avoid the destruction of potential evidence on medical patients during the decontamination process
- (3) Identify, within the emergency response plan and SOPs developed by the AHJ, procedures, equipment, and safety precautions for preserving evidence during decontamination operations at hazardous materials/WMD incidents
- (4) Ensure that any information regarding suspects, sequence of events during a potentially criminal act, and observations made based on patient presentation or during patient assessment are documented and communicated to the law enforcement agency having investigative jurisdiction

**4.4.5 Medical Support at Hazardous Materials/WMD Incidents.** Given examples of hazardous materials/WMD incident, the BLS responder shall describe the procedures of the AHJ for performing medical monitoring and support of hazardous materials incident response personnel and shall complete the following tasks:

- (1) Given examples of various hazardous materials/WMD incidents requiring the use of PPE, the BLS responder shall complete the following tasks:

- (a) Demonstrate the ability to set up and operate a medical monitoring station
- (b) Demonstrate the ability to recognize the signs and symptoms of heat stress, cold stress, heat exhaustion, and heat stroke
- (c) Determine the BLS needs for responders exhibiting the effects of heat stress, cold stress, and heat exhaustion
- (d) Describe the medical significance of heat stroke and the importance of rapid transport to an appropriate medical receiving facility
- (e) Given a simulated hazardous materials incident, demonstrate the appropriate documentation of medical monitoring activities
- (2) The BLS responder responsible for pre-entry medical monitoring shall obtain hazard and toxicity information on the hazardous materials/WMD from the designated hazardous materials technical reference resource or other sources of information at the scene.
- (3) The following information shall be conveyed to the entry team, incident safety officer, hazardous materials officer, other EMS personnel at the scene, and any other responders responsible for the health and well-being of those personnel operating at the scene:
  - (a) Substance name
  - (b) Hazard class
  - (c) Multiple hazards and toxicity information
  - (d) Applicable decontamination methods and procedures
  - (e) Potential for cross contamination
  - (f) Procedure for transfer of patients from the constraints of the incident to the EMS
  - (g) Prehospital management of medical emergencies and exposures
- (4) The BLS responder shall evaluate the pre-entry health status of responders to hazardous materials/WMD incidents as per the AHJ policies and procedures prior to their donning personal protective equipment (PPE) by performing the following tasks (consideration shall be given to excluding responders if they do not meet criteria specified by the AHJ prior to working in chemical protective clothing):
  - (a) Record vital signs
  - (b) Body weight measurements to address hydration considerations
  - (c) General health observations
  - (d) Body temperature: hypothermia/hyperthermia
  - (e) Blood pressure: hypotension/hypertension
  - (f) Pulse rate: bradycardia/tachycardia as defined
  - (g) Respiratory rate: bradypnea/tachypnea
- (5) The BLS responder shall determine how the following factors influence cold and heat stress on hazardous materials/WMD response personnel:
  - (a) Baseline level of hydration
  - (b) Underlying physical fitness
  - (c) Environmental factors
  - (d) Activity levels during the entry
  - (e) Level of PPE worn
  - (f) Duration of entry
  - (g) Cold stress
- (6) The BLS responder shall medically evaluate all team members after decontamination and PPE removal, using the following criteria:
  - (a) Pulse rate determined within the first minute
  - (b) Pulse rate determined 3 minutes after initial evaluation
  - (c) Temperature
  - (d) Body weight
  - (e) Blood pressure
  - (f) Respiratory rate
- (7) The BLS responder shall recommend that any hazardous materials team member be prohibited from redonning chemical protective clothing if any of the following criteria is exhibited:
  - (a) Signs or symptoms of heat stress or heat exhaustion
  - (b) Abnormal vital signs
  - (c) Abnormal core body temperature
  - (d) Abnormal heart rate and/or rhythm
  - (e) Abnormal blood pressure
  - (f)\* Significant acute body weight loss
- (8) Any team member exhibiting the signs or symptoms of extreme heat exhaustion or heat stroke shall be transported to the medical facility.
- (9) The BLS responder responsible for medical monitoring and support shall immediately notify the persons designated by the incident action plan that a team member required significant medical treatment or transport. Transportation shall be arranged through the designee identified in the emergency response plan.

**4.5 Reporting and Documenting the Incident.** Given a scenario involving a hazardous materials/WMD incident, the responder assigned to use PPE shall complete the reporting and documentation requirements consistent with the emergency response plan or SOPs and identify the reports and supporting documentation required by the emergency response plan or SOPs.

**4.6 Compiling Incident Reports.** The BLS responder shall describe his or her role in compiling incident reports that meet federal, state, local, and organizational requirements, as follows:

- (1) List the information to be gathered regarding the exposure of all patient(s) and describe the reporting procedures, including the following:
  - (a) Detailed information on the substances released
  - (b) Pertinent information on each patient treated and transported
  - (c) Routes, extent, and duration of exposures
  - (d) Actions taken to limit exposure
  - (e) Decontamination activities
- (2) At the conclusion of the hazardous materials/WMD incident, identify the methods used by the AHJ to evaluate transport units that might have been contaminated and the process and locations available to decontaminate those units

## Chapter 5 Competencies for Hazardous Materials/WMD Advanced Life Support (ALS) Responder

### 5.1 General.

**Δ 5.1.1 Introduction.** All emergency medical services (EMS) personnel at the hazardous materials/WMD advanced life support (ALS) responder level, in addition to their ALS certification, shall be trained to meet at least the competencies of the operations level responders as defined in Section 6.2 (mission-specific PPE) of NFPA 472 and all competencies of this chapter.

**Δ 5.1.2 Goal.** The goal of the competencies at the ALS responder level shall be to provide the individual with the knowledge and skills necessary to safely deliver ALS at hazardous materials/WMD incidents and to function within the established IMS/ICS, as follows:

- (1) Analyze a hazardous materials/WMD incident to determine the potential health risks to the ALS provider, other responders, and anticipated/actual patients by completing the following tasks:
  - (a) Survey a hazardous materials/WMD incident to determine whether harmful substances have been released and to evaluate suspected and identified patients for telltale signs of exposure
  - (b) Collect hazard and response information from reference sources and allied professionals on the scene to determine the nature of the problem and potential health effects of the substances involved *(See Annex C for a list of informational references.)*
  - (c) Survey the hazardous materials/WMD scene for the presence of secondary devices and other potential hazards
  - (d) Inspect the operation for strategies or tactics that might cause undue environmental stress (harm) on the responder
- (2) Plan to deliver ALS to exposed patients, within the scope of practice and training competencies established by the AHJ, by completing the following tasks:
  - (a) Evaluate high-risk areas/occupancies within the AHJ to identify potential locations where significant human exposures can occur
  - (b) Identify the capabilities of the hospital network within the AHJ to accept exposed patients and to perform emergency decontamination if required
  - (c) Evaluate the components of the incident communication plan within the AHJ
  - (d) Describe the role of the ALS responder as it relates to the local emergency response plan and established IMS/ICS
  - (e) Identify supplemental regional and national medical resources, including but not limited to assets of the strategic national stockpile (SNS) or other government programs
- (3) Implement a prehospital treatment plan for exposed patients, within the scope of practice and training competencies established by the AHJ, by completing the following tasks:
  - (a) Determine the nature of the hazardous materials/WMD incident as it relates to anticipated or actual patient exposures and subsequent medical treatment
  - (b) Determine the need or effectiveness of decontamination prior to accepting an exposed patient

- (c) Determine if the available medical equipment, transport units, and other supplies, including antidotes and therapeutic modalities, will meet patient care needs
  - (d) Describe the process of evidence preservation where criminal or terrorist acts are suspected or confirmed
  - (e) Develop and implement a medical monitoring plan for those responders operating in chemical protective clothing at a hazardous materials/WMD incident
  - (f) Evaluate the need to administer antidotes to affected patients
- (4) Participate in the termination of the incident by completing the following tasks:
    - (a) Participate in an incident debriefing
    - (b) Participate in an incident critique with the appropriate agencies
    - (c) Report and document the actions taken by the ALS responder at the scene of the incident
  - (5) Coordinate with the hazmat safety officer to complete the following tasks:
    - (a) Analyze potential health concerns, which might be inclusive of environmental issues
    - (b) Plan for treatment and services delivery for patients and responders

### 5.2 Competencies — Analyzing the Hazardous Materials Incident.

**5.2.1 Surveying Hazardous Materials/WMD Incidents.** Given scenarios of hazardous materials/WMD incidents, the ALS responder shall assess the nature and severity of the incident as it relates to anticipated or actual EMS responsibilities at the scene.

**5.2.1.1** Given examples of the following marked transport vehicles (and their corresponding shipping papers or identification systems) that can be involved in hazardous materials/WMD incidents, the ALS responder shall evaluate the general health risks based on the physical and chemical properties of the anticipated contents:

- (1) Highway transport vehicles, including cargo tanks
- (2) Intermodal equipment, including tank containers
- (3) Rail transport vehicles, including tank cars

**5.2.1.2** Given examples of various hazardous materials/WMD incidents at fixed facilities, the ALS responder shall demonstrate the ability to perform the following tasks:

- (1) Identify a variety of containers and their markings, including bulk and nonbulk packages and containers, drums, underground and aboveground storage tanks, specialized storage tanks, or any other specialized containers found in the AHJ's geographic area, and evaluate the general health risks based on the physical and chemical properties of the anticipated contents
- (2) Identify the following job functions of health-related resource personnel available at fixed facility hazardous materials/WMD incidents:
  - (a) Environmental health and safety representatives
  - (b) Radiation safety officers
  - (c) Occupational physicians and nurses
  - (d) Site emergency response teams
  - (e) Specialized experts

▲ **5.2.1.3** The ALS responder shall identify two ways to obtain a safety data sheet (SDS) at a hazardous materials/WMD incident and shall demonstrate the ability to identify the following health-related information:

- (1) Substance name or synonyms
- (2) Physical and chemical properties
- (3) Health hazards of the material
- (4) Signs and symptoms of exposure
- (5) Routes of entry
- (6) Permissible exposure limits
- (7) Emergency medical procedures or recommendations
- (8) Responsible party contact

**5.2.1.4** Given scenarios at various fixed facilities, transportation incidents, pipeline release scenarios, maritime incidents, or any other unexpected hazardous materials/WMD incident, the ALS responder, working within an incident command system must evaluate the off-site consequences of the release, based on the physical and chemical nature of the released substance, and the prevailing environmental factors to determine the need to evacuate or shelter-in-place affected persons.

**5.2.1.5\*** Given examples of the following biological threat agents, the ALS responder shall define the various types of biological threat agents, including the signs and symptoms of exposure, mechanism of toxicity, incubation periods, possible disease patterns, and likely means of dissemination:

- (1) Variola major virus (smallpox)
- (2) *Clostridium botulinum* (botulism)
- (3) Coliforms (e.g., *E. coli* O157:H7)
- (4) Ricin toxin
- (5) *Bacillus anthracis* (anthrax)
- (6) Venezuelan equine encephalitis virus
- (7) *Rickettsia*
- (8) *Yersinia pestis* (plague)
- (9) *Francisella tularensis* (tularemia)
- (10) Viral hemorrhagic fever
- (11) Ebola
- (12) Other CDC Category A, B, or C-listed organism

**5.2.1.6\*** Given examples of various types of hazardous materials/WMD incidents involving toxic industrial chemicals, toxic industrial materials, blister agents, blood agents, nerve agents, choking agents, and irritants, the ALS responder shall describe the following to determine the general health risks to patients exposed to those substances and to identify those patients who might be candidates for antidotes:

- (1) Identify the toxidrome for each TIC/TIM/military agent
- (2) Determine the BLS and ALS medical modalities

**5.2.1.7\*** Given examples of hazardous materials/WMD found at illicit laboratories, the ALS responder shall identify general health hazards associated with the chemical substances and describe the following:

- (1) Route of entry
- (2) Mechanism of injury (target organ)

**5.2.1.8\*** Given examples of a hazardous materials/WMD incident involving radioactive materials, including radiation dispersion devices (RDD), radiation exposure devices (RED), and improvised nuclear devices (IND), the ALS responder shall determine the probable health risks and potential patient outcomes by completing the following tasks:

- (1) Determine the types of radiation (alpha, beta, gamma, and neutron), the isotope if possible, and potential health effects of each
- (2) Determine the most likely exposure pathways for a given radiation exposure, including inhalation, ingestion, injection, and direct skin exposure
- (3) Describe the difference between radioactive contamination and radiation exposure
- (4) Identify priorities for decontamination in scenarios involving radioactive materials
- (5) Describe the manner in which acute medical illness or traumatic injury can influence decisions about decontamination and patient transport

**5.2.1.9** Given examples of typical labels found on pesticide containers, the ALS responder shall define the following terms:

- (1) Pesticide name
- (2) Pesticide classification (e.g., insecticide, rodenticide, organophosphate, carbamate, organochlorine)
- (3) Environmental Protection Agency (EPA) registration number
- (4) Manufacturer name
- (5) Ingredients broken down by percentage
- (6) Cautionary statement (e.g., Danger, Warning, Caution, Keep from Waterways)
- (7) Strength and concentration
- (8) Treatment information

▲ **5.2.2 Collecting and Interpreting Hazard and Response Information.** The ALS responder shall demonstrate the ability to utilize various reference sources at a hazardous materials/WMD incident, including the following:

- (1) DOT *Emergency Response Guidebook*
- (2) SDS
- (3) CHEMTREC/CANUTEC/SETIQ
- (4) Regional poison control centers
- (5) NFPA 704 identification system
- (6) Hazardous materials information system (HMIS)
- (7) Local, state, federal, tribal, and provincial authorities
- (8) Shipper/manufacture contacts
- (9) Agency for Toxic Substances and Disease Registry (ATSDR) medical management guidelines
- (10) Allied professionals
- (11) Electronic databases
- (12) Radiation safety officer (RSO)

**5.2.2.1 Identifying Secondary Devices.** Given scenarios involving hazardous materials/WMD, the ALS responders shall describe the importance of evaluating the scene for secondary devices prior to rendering patient care, including the following safety points:

- (1) Evaluate the scene for likely areas where secondary devices can be placed
- (2) Visually scan operating areas for a secondary device before providing patient care
- (3) Avoid touching or moving anything that can conceal an explosive device
- (4) Designate and enforce scene control zones
- (5) Evacuate victims, other responders, and nonessential personnel as quickly and safely as possible

### 5.3 Competencies — Planning the Response.

#### 5.3.1 Identifying High-Risk Areas for Potential Exposures.

**5.3.1.1** The ALS responder, given an events calendar and pre-incident plans, which can include the local emergency planning committee plan as well as the agency's emergency response plan and SOPs, shall identify the venues for mass gatherings, industrial facilities, potential targets for terrorism, or any other locations where an accidental or intentional release of a harmful substance can pose an unreasonable health risk to any person within the local geographical area as determined by the AHJ and shall do the following:

- (1) Identify locations where hazardous materials/WMD are used, stored, or transported
- (2) Identify areas and locations presenting a potential for a high loss of life or rate of injury in the event of an accidental/intentional release of a hazardous materials/WMD substance
- (3) Evaluate the geographic and environmental factors that can complicate a hazardous materials/WMD incident, including prevailing winds, water supply, vehicle and pedestrian traffic flow, ventilation systems, and other natural or man-made influences, including air and rail corridors

#### 5.3.2 Determining the Capabilities of the Local Hospital Network.

**5.3.2.1** The ALS responder shall identify the methods and vehicles available to transport hazardous materials patients and shall determine the location and potential routes of travel to the following appropriate local and regional hospitals, based on patient need:

- (1) Adult trauma centers
- (2) Pediatric trauma centers
- (3) Adult burn centers
- (4) Pediatric burn centers
- (5) Hyperbaric chambers
- (6) Field hospitals
- (7) Other specialty hospitals or medical centers

**5.3.2.2** Given a list of local receiving hospitals in the AHJ's geographic area, the ALS responder shall describe the location and availability of hospital-based decontamination facilities.

**5.3.2.3** The ALS responder shall describe the ALS protocols and SOPs developed by the AHJ and the prescribed role of medical control and poison control centers during mass casualty incidents, at hazardous materials/WMD incidents where exposures have occurred, and in the event of disrupted radio communications.

**5.3.2.4** The ALS responder shall identify the following mutual aid resources (hospital- and non-hospital-based) identified by the AHJ for the field management of multicasualty incidents:

- (1) Mass-casualty trailers with medical supplies
- (2) Mass-decedent capability
- (3) Regional decontamination units
- (4) Replenishment of medical supplies during long-term incidents
- (5) Locations and availability of mass-casualty antidotes for selected exposures, including but not limited to the following:
  - (a) Nerve agents and organophosphate pesticides
  - (b) Biological agents and other toxins

- (c) Asphyxiants
- (d) Hydrocarbon/hydrocarbon derivatives
- (e) Radiation exposures or contamination events

- (6) Rehabilitation units for the EMS responders
- (7) Replacement transport units for those vehicles lost to mechanical trouble, collision, theft, and contamination

**5.3.2.5** The ALS responder shall identify the special hazards associated with inbound and outbound air transportation of patients exposed to hazardous materials/WMD.

**5.3.2.6** The ALS responder shall describe the available medical information resources concerning hazardous materials toxicology and response.

#### 5.3.3 Identifying Incident Communications.

**5.3.3.1** The ALS responder shall identify the components of the communication plan within the AHJ geographic area and determine that the EMS providers have the ability to communicate with other responders on the scene, with transport units, and with local hospitals.

**5.3.3.2** Given examples of various patient exposure scenarios, the ALS responder shall describe the following information to be transmitted to the medical control or poison control center or the receiving hospital prior to arrival:

- (1) The exact name of the substance(s) involved
- (2) The physical and chemical properties of the substance(s) involved
- (3) Number of victims being transported
- (4) Age and sex of transported patients
- (5) Patient condition and chief complaint
- (6) Medical history
- (7) Circumstances and history of the exposure, such as duration of exposure and primary route of exposure
- (8) Air monitoring and detection values
- (9) Any advanced detection information identified
- (10) Vital signs, initial and current
- (11) Symptoms described by the patient, initial and current
- (12) Presence of associated injuries, such as burns and trauma
- (13) Decontamination status
- (14) Treatment rendered or in progress, including the effectiveness of antidotes administered
- (15) Estimated time of arrival

#### 5.3.4 Identifying the Role of the ALS Responder.

**5.3.4.1** Given scenarios involving hazardous materials/WMD, the ALS responder shall identify his or her role during hazardous materials/WMD incidents as specified in the emergency response plan and SOPs developed by the AHJ, as follows:

- (1) Describe the purpose, benefits, and elements of the incident command system at it relates to the ALS responder
- (2) Describe the typical incident command structure for the emergency medical component of a hazardous materials/WMD incident as specified in the emergency response plan and SOPs developed by the AHJ
- (3) Describe the role of the ALS responder within the incident command system
- (4) Describe the role of the ALS responder within the incident command system during a hazardous materials/WMD incident when an ICS does not currently exist
- (5) Identify the procedures for requesting additional resources at a hazardous materials/WMD incident

**5.3.4.2** Describe the hazardous materials/WMD ALS responder's role in the hazardous materials/WMD response plan developed by the AHJ or identified in the local emergency response plan as follows:

- (1) Determine the toxic effect of hazardous materials/WMD
- (2) Estimate the number of patients
- (3) Recognize and assess the presence and severity of symptoms
- (4) Assess the impact on the health care system
- (5) Perform appropriate patient monitoring
- (6) Communicate pertinent information
- (7) Estimate pharmacological need
- (8) Address threat potential for clinical latency
- (9) Estimate exposure dosage
- (10) Estimate treatment dosage
- (11) Train in the following diagnostic monitoring equipment:
  - (a)  $\text{SaO}_2$
  - (b) Capnography
  - (c) Rainbow technology

**5.3.5 Supplemental Medical Resources.** Given scenarios of various hazardous materials/WMD mass casualty incidents, the ALS responder shall identify the supplemental medical resources available to the AHJ, including the strategic national stockpile (SNS) program.

**5.3.5.1** Describe the SNS program, including the following components:

- (1) Intent and goals of the SNS program
- (2) Procedures and requirements for deploying the SNS to a local jurisdiction
- (3) Typical supplies contained in 12-hour push package
- (4) Role of the technical advisory response unit (TARU)

#### 5.4 Competencies — Implementing the Planned Response.

**5.4.1 Determining the Nature of the Incident and Providing Medical Care.** The ALS responder shall describe the ability to provide emergency medical care to those patients exposed to hazardous materials/WMD by completing the following tasks:

- (1) The ALS responder shall determine the physical state of the released substance and the environmental influences surrounding the release, as follows:
  - (a) Solid
  - (b) Liquid
  - (c) Gas, vapor, dust, mist, aerosol
- (2)\* The ALS responder shall identify potential routes of exposure and correlate those routes of exposure to the physical state of the released substance, to determine the origin of the illness or injury, as follows:
  - (a) Inhalation
  - (b) Absorption
  - (c) Ingestion
  - (d) Injection
- (3) The ALS responder shall describe the potential routes of entry into the body, the common signs and symptoms of exposure, and the ALS treatment options approved by the AHJ (e.g., advanced airway management, drug therapy), including antidote administration where appropriate, for exposure(s) to the following classification of substances:
  - (a) Corrosives
  - (b) Pesticides

- (c) Chemical asphyxiants
- (d) Simple asphyxiants
- (e) Organic solvents
- (f) Nerve agents
- (g) Vesicants
- (h) Irritants (riot control agents)
- (i) Biological agents and toxins
- (j) Incapacitating agents
- (k) Radioactive materials
- (l) Nitrogen compounds
- (m) Hydrocarbon/hydrocarbon derivatives
- (n) Fluorine compounds
- (o) Phenolic compounds

(4) The ALS responder shall describe the basic toxicological principles relative to assessment and treatment of persons exposed to hazardous materials, including the following:

- (a) Acute and chronic effects
- (b) Local and systemic effects
- (c) Dose-response relationship

(5) Given examples of various hazardous substances, the ALS responder shall define the basic toxicological terms as they relate to the treatment of an exposed patient, as follows:

- (a) *Threshold limit value — time weighted average* (TLV-TWA)
- (b) *Lethal doses and lethal concentrations*, as follows:
  - i.  $\text{LD}_{10}$
  - ii.  $\text{LD}_{50}$
  - iii.  $\text{LC}_{10}$
  - iv.  $\text{LC}_{50}$
- (c) *Parts per million/parts per billion/parts per trillion* (ppm/ppb/ppt)
- (d) *Immediately dangerous to life and health* (IDLH)
- (e) *Permissible exposure limit* (PEL)
- (f) *Recommended exposure limit* (REL)
- (g) *Threshold limit value — short-term exposure limit* (TLV-STEL)
- (h) *Threshold limit value — ceiling* (TLV-C)
- (i) *Solubility*
- (j) *Poison* — a substance that causes injury, illness, or death
- (k) *Toxic* — harmful nature related to amount and concentration

(6) Given examples of hazardous materials/WMD incidents with exposed patients, the ALS responder shall evaluate the progress and effectiveness of the medical care provided at a hazardous materials/WMD incident, to ensure that the overall incident response objectives, along with patient care goals, are being met by completing the following tasks:

- (a) Locate and track all exposed patients at a hazardous materials/WMD incident, from priority conditions and treatment to transport to the appropriate hospital
- (b) Review the incident objectives at periodic intervals to ensure that patient care is being carried out within the overall incident response plan
- (c) Ensure that the incident command system forms are completed, along with the patient care forms required by the AHJ, during the course of the incident

- (d) Evaluate the need for trained and qualified EMS personnel, medical equipment, transport units, and other supplies, including antidotes based on the scope and duration of the incident

**5.4.2\* Decontaminating Exposed Patients.** Given the emergency response plan and SOPs developed by the AHJ and given examples of hazardous materials/WMD incidents with exposed patients, the ALS responder shall do as follows:

- (1) Given the emergency response plan and SOPs developed by the AHJ, identify and evaluate the patient decontamination activities performed prior to accepting responsibility for and transferring care of exposed patients
- (2) Determine the need and location for patient decontamination, including mass-casualty decontamination, in the event none has been performed prior to arrival of EMS personnel, and complete the following tasks:
  - (a) Given the emergency response plan and SOPs developed by the AHJ, identify and evaluate the patient decontamination activities performed prior to accepting responsibility for and transferring care of exposed patients; identify sources of information for determining the appropriate decontamination procedure and how to access those resources in a hazardous materials/WMD incident
  - (b) Given the emergency response plan and SOPs developed by the AHJ, identify and evaluate the patient decontamination activities performed prior to accepting responsibility for and transferring care of exposed patients
  - (c) Given the emergency response plan and SOPs provided by the AHJ, identify the supplies and equipment required to set up and implement technical or mass-casualty decontamination operations for ambulatory and nonambulatory patients
  - (d) Given the emergency response plan and SOPs developed by the AHJ, identify the procedures, equipment, and safety precautions for securing evidence during decontamination operations at hazardous materials/WMD incidents
  - (e) Identify procedures, equipment, and safety precautions for handling tools, equipment, weapons, and law enforcement and K-9 search dogs brought to the decontamination corridor at hazardous materials/WMD incidents
  - (f) Identify procedures, equipment, and safety precautions for communicating with critically, urgently, and potentially exposed patients, and population prioritization and management techniques
  - (g) Determine the threat of cross contamination to all responders and patients by completing the following tasks:
    - i. Identify hazardous materials/WMD with a high risk of cross contamination
    - ii. Identify hazardous materials/WMD agents with a low risk of cross contamination
    - iii. Describe how the physical state of the hazardous materials/WMD provides clues to its potential for secondary contamination, when the exact identity of the hazardous materials/WMD is not known

**5.4.3 Evaluating the Need for Medical Supplies.** Given examples of single-patient and multicaseualty hazardous materials/WMD incidents, the ALS responder shall determine if the available medical equipment, transport units, and other supplies, including antidotes, will meet or exceed expected patient care needs throughout the duration of the incident.

**5.4.4 Evidence Preservation.** Given examples of hazardous materials/WMD incidents where criminal acts are suspected, the ALS responder shall make every attempt to preserve evidence during the course of delivering patient care by completing the following tasks:

- (1) Determine if the incident is potentially criminal in nature and cooperate with the law enforcement agency having investigative jurisdiction
- (2) Identify the unique aspects of criminal hazardous materials/WMD incidents, including crime scene preservation, evidence preservation, and destruction of potential evidence found on medical patients, and/or the destruction of evidence during the decontamination process
- (3) Ensure that any information regarding suspects, sequence of events during a potential criminal act, or observations made based on patient presentation or during patient assessment are documented and communicated and passed on to the law enforcement agency having investigative jurisdiction

**5.4.5 Medical Support at Hazardous Materials/WMD Incidents.** Given examples of hazardous materials/WMD incidents, the ALS responder shall describe the procedures of the AHJ for performing medical monitoring and support of hazardous materials incident response personnel, and shall complete the following tasks:

- (1) The ALS responder responsible for pre-entry medical monitoring shall obtain hazard and toxicity information on the released substance from the designated hazardous materials technical reference resource or other reliable sources of information at the scene. The following information shall be conveyed to the entry team, incident safety officer, hazardous materials officer, other EMS personnel at the scene, and any other responders responsible for the health and well-being of those personnel operating at the scene:
  - (a) Substance name
  - (b) Hazard class
  - (c) Hazard and toxicity information
  - (d) Applicable decontamination methods and procedures
  - (e) Potential for secondary contamination
  - (f) Procedure for transfer of patients from the constraints of the incident to the emergency medical system
  - (g) Prehospital management of medical emergencies and exposures, including antidote administration
- (2) The ALS responder shall evaluate the pre-entry health status of hazardous materials/WMD responders prior to donning PPE by performing the following tasks:
  - (a) Record vital signs
  - (b) Record body weight measurements
  - (c) Record general health observations
- (3) The ALS responder shall determine the medical fitness of those personnel charged with donning chemical protective clothing, using the criteria set forth in the emergency action plan (EAP) and the SOP developed by the AHJ.

Consideration shall be given to excluding responders from working in personal protective equipment if they exhibit any significant abnormalities in the following areas:

- (a) Body temperature (taking temperature or skin temperature does not correlate to body temperature)
- (b) Vital signs
- (4) The ALS responder shall determine how the following factors influence heat stress on hazardous materials/WMD response personnel:
  - (a) Baseline level of hydration
  - (b) Underlying physical fitness
  - (c) Environmental factors
  - (d) Activity levels during the entry
  - (e) Level of PPE worn
  - (f) Duration of entry
  - (g) Cold stress
- (5) Given examples of various hazardous materials/WMD incidents requiring the use of chemical protective ensembles, the ALS responder shall complete the following tasks:
  - (a) Demonstrate the ability to set up and operate a medical monitoring station
  - (b) Demonstrate the ability to recognize the signs and symptoms of heat stress, heat exhaustion, and heat stroke
  - (c) Determine the ALS needs for responders exhibiting the effects of heat stress, cold stress, and heat exhaustion
  - (d) Describe the medical significance of heat stroke and the importance of rapid transport to an appropriate medical receiving facility
- (6) Given a simulated hazardous materials/WMD incident, the ALS responder shall demonstrate documentation of medical monitoring activities.
- (7) The ALS responder shall evaluate all team members after decontamination and PPE removal, using the following criteria:
  - (a) Pulse rate — done within the first minute
  - (b) Pulse rate — 3 minutes after initial evaluation
  - (c) Temperature
  - (d) Body weight
  - (e) Blood pressure
  - (f) Respiratory rate
- (8) The ALS responder shall recommend that any hazardous materials team member exhibiting any of the following signs be prohibited from redonning chemical protective clothing:
  - (a) Signs or symptoms of heat stress or heat exhaustion
  - (b) Abnormal vital signs
  - (c) Abnormal core body temperature
  - (d) Abnormal heart rate or rhythm
  - (e) Significant acute body weight loss
- (9) The ALS responder shall notify immediately the appropriate persons designated by the emergency response plan if a team member requires significant medical treatment or transport (arranged through the appropriate designee identified by the emergency response plan).

**5.5 Competencies — Terminating the Incident.** Upon termination of the hazardous materials/WMD incident, the ALS responder shall complete the reporting, documentation, and EMS termination activities as required by the local emergency response plan or the organization's SOPs and shall meet the following requirements:

- (1) Identify the reports and supporting documentation required by the emergency response plan or SOPs
- (2) Demonstrate completion of the reports required by the emergency response plan or SOPs
- (3) Describe the importance of personnel exposure records
- (4) Describe the importance of debriefing records
- (5) Describe the importance of critique records
- (6) Identify the steps in keeping an activity log and exposure records
- (7) Identify the steps to be taken in compiling incident reports that meet federal, state, local, and organizational requirements
- (8) Identify the requirements for compiling personal protective equipment logs
- (9) Identify the requirements for filing documents and maintaining records, as follows:
  - (a) List the information to be gathered regarding the exposure of all patient(s) and describe the reporting procedures, including the following:
    - i. Detailed information on the substances released
    - ii. Pertinent information on each patient treated or transported
    - iii. Routes, extent, and duration of exposures
    - iv. Actions taken to limit exposure
    - v. Decontamination activities
  - (b) Identify the methods used by the AHJ to evaluate transport units for potential contamination and the process and locations available to decontaminate those units

## Chapter 6 Competencies for Advanced Life Support (ALS) Responders Assigned Mission-Specific Responsibilities

### 6.1 General.

#### 6.1.1 Introduction.

▲ **6.1.1.1** This chapter shall address competencies for the following advanced life support (ALS) responders who are assigned mission-specific responsibilities at hazardous materials/WMD incidents by the authority having jurisdiction (AHJ) beyond the competencies of the hazardous materials/WMD ALS responder (*see Chapter 5*):

- (1) ALS responder assigned to a hazardous materials team
- (2) ALS responder assigned to provide clinical interventions at a hazardous materials/WMD incident
- (3) ALS responders assigned to treatment of smoke inhalation victims

**6.1.1.2** The ALS responder assigned mission-specific responsibilities at hazardous materials/WMD incidents shall be trained to meet all competencies at the basic life support (BLS) responder level (*see Chapter 4*), all competencies at the advanced life support (ALS) responder level (*see Chapter 5*), and all competencies for the assigned responsibilities in the applicable section(s) in this chapter.

▲ **6.1.1.3** The ALS responder assigned mission-specific responsibilities at hazardous materials/WMD incidents shall also be trained to meet all competencies at the NFPA 472, awareness level (Chapter 4) and operations level core (Chapter 5).

**6.1.1.4** The ALS responder assigned mission-specific responsibilities at hazardous materials/WMD incidents shall receive additional training to meet applicable governmental occupational health and safety regulations.

**6.1.1.5** The ALS responder assigned mission-specific responsibilities at hazardous materials/WMD incidents shall operate under the guidance of a hazardous materials technician, an allied professional, an emergency response plan, or standard operating procedures.

**6.1.1.6** The development of assigned mission-specific knowledge and skills shall be based on the tools, equipment, and procedures provided by the AHJ for the mission-specific responsibilities assigned.

**6.1.2 Goal.** The goal of the competencies in this chapter shall be to provide the operations level responder assigned mission-specific responsibilities at hazardous materials/WMD incidents by the AHJ with the knowledge and skills to perform the assigned mission-specific responsibilities safely and effectively.

**6.1.3 Mandating of Competencies.** This standard shall not mandate that the response organizations perform mission-specific responsibilities.

**6.1.3.1** ALS responders assigned mission-specific responsibilities at hazardous materials/WMD incidents, operating within the scope of their training in this chapter, shall be able to perform their assigned mission-specific responsibilities.

**6.1.3.2** If a response organization desires to train some or all of its operations level responders to perform mission-specific responsibilities at hazardous materials/WMD incidents, the minimum required competencies shall be as set out in this chapter.

## **6.2 Mission-Specific Competencies: Advanced Life Support (ALS) Responder Assigned to a Hazardous Materials Team.**

### **6.2.1 General.**

#### **6.2.1.1 Introduction.**

**6.2.1.1.1** The ALS responder assigned to a hazardous materials team shall be that person assigned to provide direct medical support and intervention to the members of an established hazardous materials team.

**6.2.1.1.2** The ALS responder assigned to a hazardous materials team shall be trained to meet all competencies for the assigned responsibilities in Chapters 4 and 5, and all competencies in this section.

▲ **6.2.1.1.3** The ALS responder assigned to a hazardous materials team shall be trained to meet all competencies of NFPA 472, Chapters 4 and 5.

**6.2.1.1.4** The ALS responder assigned to a hazardous materials team shall receive the additional training necessary to meet the specific needs of the AHJ.

**6.2.1.1.5** The ALS responder assigned mission-specific responsibilities at hazardous materials/WMD incidents shall receive additional training to meet applicable governmental response and occupational health and safety regulations.

**6.2.1.1.6** The ALS responder assigned mission-specific responsibilities at hazardous materials/WMD incidents shall operate under the guidance of a hazardous materials technician, an allied professional, an emergency response plan, or standard operating procedures.

**6.2.1.1.7** The development of assigned mission-specific knowledge and skills shall be based on the tools, equipment, and procedures provided by the AHJ for the mission-specific responsibilities assigned.

**6.2.1.2 Goal.** The goal of the mission specific competencies in this section shall be to provide the ALS responder assigned to a hazardous materials team with the knowledge and skills to perform the following tasks safely and effectively:

- (1) Plan a response within the authority of the AHJ to support hazardous materials team operations
- (2) Implement the planned response consistent with the standard operating procedures of the AHJ to support hazardous materials team operations
- (3) Terminate the incident consistent with the standard operating procedures of the AHJ to document hazardous materials team operations

### **6.2.2 Competencies: Analyzing the Incident. (Reserved)**

### **6.2.3 Competencies: Planning the Response.**

**6.2.3.1** Given the standard operating procedures of the AHJ, the ALS responder assigned to a hazardous materials team shall create baseline medical information for each hazardous materials team member in compliance with the AHJ and OSHA requirements for confidentiality.

**6.2.3.2** Given existing guidance from the AHJ, The ALS responder assigned to a hazardous materials team shall explain the importance of becoming an advocate for team member physical fitness and encouraging proper exercise and nutrition for team members.

**6.2.3.3** Given existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall establish and implement an awareness program to encourage proper hydration and medical surveillance actions by hazardous materials team members prior to hazardous materials response operations.

**6.2.3.4** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall establish and maintain a liaison with local and regional medical direction and medical control entities that may be involved with hazardous materials team medical care.

**6.2.3.5** Given the emergency response plan and existing guidance from the AHJ, the ALS responder shall advise the following local and regional medical direction and medical control entities on the potential hazardous exposures and physical stressors on hazardous materials team members at a hazardous materials/WMD incident.

**6.2.3.6** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall develop a list of the following health care facilities likely to receive injured or ill hazardous materials team members and the points of contact within those facilities:

- (1) Trauma centers
- (2) Emergency departments

- (3) Burn centers
- (4) Cardiovascular centers
- (5) Stroke centers
- (6) Hyperbaric centers

**6.2.3.7** Given a list of health care facilities, the ALS responder assigned to a hazardous materials team shall describe how to establish and maintain the following:

- (1) Capability and patient flow efficiency of decontamination facilities
- (2) Standard inventory of antidotal pharmaceuticals

**6.2.3.8\*** Given a listing of regional health care facilities with decontamination capabilities, the ALS responder assigned to a hazardous materials team shall demonstrate how to provide guidance for the health care facility in preparation for hazardous materials team member care.

**6.2.3.9** Given a list of regional EMS responders, the ALS responder assigned to a hazardous materials team shall establish and maintain a matrix of responder capabilities to include:

- (1) Patient decontamination capabilities
- (2) Contaminated patient transportation capabilities
- (3) Staff hazardous materials training levels
- (4) Access to advanced hazardous materials medical interventions
- (5) Personal protective equipment inventories

**6.2.3.10** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall obtain and maintain medical equipment dedicated to supporting hazardous materials team operations.

**6.2.3.11** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall obtain and maintain patient rescue devices intended for affecting rescue of injured or ill hazardous materials team members from the hot zone.

**6.2.3.12** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall provide training on hot zone rescue techniques to the hazardous materials team members.

#### **6.2.4 Competencies: Implementing the Planned Response.**

**6.2.4.1** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall verify that site medical surveillance is established in accordance with AHJ policies and that all team members complete medical surveillance prior to entry.

**6.2.4.2** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall ensure that the ICS 206 Medical Form or equivalent medical site survey form is completed and included as part of the incident action plan.

**6.2.4.3** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall describe how to function as the hazardous materials team medical group supervisor during an exercise.

Δ **6.2.4.4** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall describe how to coordinate support to the hazardous materials team from EMS ambulances and medical

personnel assigned to support hazardous materials operations as defined in OSHA 29 CFR 1910.120(q).

**6.2.4.5** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall demonstrate how to establish emergency decontamination for injured or ill hazardous materials team members, including removal from all personal protective equipment (PPE) provided by the AHJ.

**6.2.4.6** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall describe how to coordinate with the decontamination group supervisor to ensure the following:

- (1) Effectiveness of technical decontamination operations
- (2) Recognition of team member medical concerns

**6.2.4.7** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall describe how to coordinate the following:

- (1) Preparation of a team rescue equipment cache near the technical decontamination line
- (2) Preparation of a backup team to affect a rescue in coordination with the hazardous materials safety officer

**6.2.4.8** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall describe how to coordinate the rescue, medical treatment, and transportation of injured or ill hazardous materials team members in conjunction with the hazardous materials officer, hazardous materials safety officer, and EMS personnel assigned to the incident.

Δ **6.2.4.9** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall describe the following:

- (1) How to establish a hazardous materials rehabilitation group in accordance with NFPA 1584
- (2) Procedures to ensure team member compliance with rehabilitation efforts

**6.2.4.10** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall describe the following procedures:

- (1) Acting as a patient advocate for team members requiring transport to a health care facility for treatment
- (2) Assisting health care responders as necessary with information regarding the patient's injury and/or illness

**6.2.4.11** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall describe:

- (1) Safety concerns when utilizing air medical transportation during hazardous materials incidents
- (2) Methods to prevent air medical crew and aircraft from secondary contamination during incidents

#### **6.2.5 Competencies: Evaluating Progress. (Reserved)**

#### **6.2.6 Competencies: Terminating the Incident.**

**6.2.6.1** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall describe the importance of completing all team medical documentation required by the AHJ following incident responses.

**6.2.6.2** Given the emergency response plan, existing guidance from the AHJ, and with guidance from the appropriate AHJ medical director, the ALS responder assigned to a hazardous materials team shall describe the process for coordinating morbidity and mortality review sessions for all medical personnel involved in patient care on hazardous materials team members during incidents.

**6.3 Mission-Specific Competencies: Advanced Life Support (ALS) Responder Assigned to Provide Clinical Interventions at Hazardous Materials/WMD Incident.**

**6.3.1 General.**

**6.3.1.1 Introduction.**

**6.3.1.1.1** The ALS responder assigned to provide clinical interventions at a hazardous materials/WMD incident shall be that person who is assigned to provide antidotes, antibiotics, and/or radiological countermeasures to persons contaminated by hazardous materials.

**6.3.1.1.2** The ALS responder who is assigned to provide clinical interventions at a hazardous materials incident shall be trained to meet all competencies for NFPA 473, Chapter 4, “Competencies for Hazardous Materials/WMD Basic Life Support (BLS) Responder,” and Chapter 5, “Competencies for Hazardous Materials/WMD Advanced Life Support (ALS) Responder,” and the competencies in this section.

▲ **6.3.1.1.3** The ALS responder who is assigned to provide clinical interventions at a hazardous materials/WMD incident shall also be trained to meet all competencies at the NFPA 472 awareness level (Chapter 4) and operations level core (Chapter 5).

**6.3.1.1.4** The ALS responder assigned to provide clinical interventions at a hazardous materials incident shall receive the additional training necessary to meet the specific needs of the AHJ.

**6.3.1.1.5** The ALS responder assigned mission-specific responsibilities at hazardous materials/WMD incidents shall receive additional training to meet applicable governmental response and occupational health and safety regulations.

**6.3.1.1.6** The ALS responder assigned mission-specific responsibilities at hazardous materials/WMD incidents shall operate under the guidance of a hazardous materials technician, an allied professional, an emergency response plan, or standard operating procedures.

**6.3.1.1.7** The development of assigned mission-specific knowledge and skills shall be based on the tools, equipment, and procedures provided by the AHJ for the mission-specific responsibilities assigned.

**6.3.1.2 Goal.** The goal of the mission-specific competencies in this section shall be to provide the ALS responder assigned to provide clinical interventions at a hazardous materials incident with the knowledge and skills to perform the following tasks safely and effectively:

- (1) Plan a response within the authority of the AHJ to provide advanced clinical interventions
- (2) Implement the planned response consistent with the medical protocols of the AHJ to provide advanced clinical interventions

**6.3.2 Competencies: Analyzing the Incident. (Reserved)**

**6.3.3 Competencies: Planning the Response.**

**6.3.3.1** Given the emergency response plan and existing guidance from the AHJ medical director, the ALS responder assigned to provide clinical interventions at a hazardous materials incident shall receive advanced training on pharmaceutical and clinical interventions.

**6.3.3.2** Given the emergency response plan and existing guidance from the AHJ, the ALS responder assigned to provide clinical interventions at a hazardous materials incident shall identify potential sources of hazardous material exposure within the response area of the AHJ that may require clinical intervention skills and/or equipment.

**6.3.4 Competencies: Implementing the Planned Response.**

**6.3.4.1\*** Given the emergency response plan and existing guidance from the AHJ medical director, the ALS responder assigned to provide clinical interventions at a hazardous materials incident shall identify the toxidromes for the following:

- (1) Organophosphates
- (2) Carbamates
- (3) Military nerve agents
- (4) Cyanides
- (5) Chlorine and acid gases
- (6) Anhydrous ammonia
- (7) Hydrogen fluoride
- (8) Phenolic compounds
- (9) Military vesicant agents
- (10) Nitrogen containing compounds
- (11) Hydrocarbons/hydrocarbon derivatives
- (12) Bacteria
- (13) Viruses
- (14) Biologic toxins
- (15) Riot control agents
- (16) Phosgene
- (17) Ionizing radiation

**6.3.4.2\*** Given the emergency response plan and existing guidance from the AHJ medical director, the ALS responder assigned to provide clinical interventions at a hazardous materials incident shall describe the clinical application and actions of the following pharmaceuticals based upon approval for clinical use by the AHJ:

- (1) Atropine sulfate
- (2) Pralidoxime (2-PAM)
- (3) Diazepam
- (4) Calcium gluconate
- (5) Amyl nitrite
- (6) Sodium nitrite
- (7) Sodium thiosulfate
- (8) Hydroxocobalamin
- (9) Methylene blue
- (10) Sodium bicarbonate
- (11) Naloxone
- (12) Dimercaprol
- (13) Polyethylene glycol
- (14) Zinc EDTA
- (15) Calcium EDTA
- (16) Prussian blue
- (17) Water

- (18) Magnesium sulfate
- (19) Prednisone
- (20) Tetracaine (pontocaine)

**6.3.4.3** Given the emergency response plan and existing guidance from the AHJ medical director, the ALS responder assigned to provide clinical interventions at a hazardous materials incident shall demonstrate the ability to properly perform the following clinical skills using the equipment approved and provided for use by the AHJ:

- (1) Nebulizer treatment
- (2) Morgan lens insertion
- (3) Monitor hemoglobin oxygenation levels
- (4) Monitor carboxyhemoglobin levels
- (5) Monitor end tidal carbon dioxide levels
- (6) Monitor methemoglobin levels
- (7) Administer square centimeter grid subcutaneous injections

### 6.3.5 Competencies: Evaluating Progress.

**N 6.3.5.1** The following features of the rehabilitation process shall be evaluated:

- (1) Rehabilitation area established in an area free of airborne contamination produced by the incident
- (2) Rehabilitation process activated, and personnel assigned to staff the area
- (3) Responders assigned to rotate through the rehabilitation evaluated for fluid replenishment, medical monitoring, and heating/cooling measures if required
- (4) Environmental conditions monitored in and around the rehabilitation area
- (5) Process established for identifying responders who might not be medically fit to return to active duty at the incident or who might require more advanced medical evaluation

**N 6.3.5.2** The following situations, which could require advanced medical evaluation or intervention, shall be described:

- (1) Excessive work conditions, including heat or cold stress or significant physical activity
- (2) PPE breach or failure resulting in physical injury to the responder
- (3) Inhalation exposures to toxic by-products of combustion
- (4) Other exposure scenarios that might adversely impact the responder

### 6.3.6 Competencies: Terminating the Incident. (Reserved)

## 6.4 Mission-Specific Competencies: Advanced Life Support (ALS) Responder Assigned to Treatment of Smoke Inhalation Victims.

### 6.4.1 General.

#### 6.4.1.1 Introduction.

**Δ 6.4.1.1.1** The ALS responder assigned to treatment of smoke inhalation victims shall be trained to meet at least the core competencies of the operations level responders as defined in Chapter 5 of NFPA 472 and all competencies of this section.

**6.4.1.1.2** The ALS responder assigned to treatment of smoke inhalation victims at hazardous materials/WMD incidents, structural fires, or any other incident where smoke inhalation illness or injury is suspected shall operate under the medical control of a physician or designee providing direction for patient care activities in the prehospital setting.

#### 6.4.1.2 Goal.

**6.4.1.2.1** The goal of the competencies of this chapter shall be to provide the ALS responder with the knowledge and skills necessary to safely deliver care at hazardous materials/WMD incidents, structural fires, or any other incident where smoke inhalation illness or injury is suspected and to function within the established IMS/ICS as follows:

- (1) Analyze the incident to determine the potential health risks to the ALS responder, other responders, and anticipated/actual patients by completing the following tasks:
  - (a) Survey the incident to identify causes of suspected or confirmed illness or injury resulting from acute exposure to fire smoke
  - (b) Collect information from on-scene emergency response personnel, civilians, or other knowledgeable persons to determine if victims have been rescued or otherwise removed from a closed space structure fire or any other situation indicating the potential for a smoke exposure
- (2) Plan to deliver ALS to smoke-exposed patients, within the scope of practice and training competencies established by the AHJ, including specific training on smoke exposures and antidotal therapy, by completing the following tasks:
  - (a) Identify the capabilities of the hospital network within the AHJ to accept patients with significant burns, trauma, or those patients that may be candidates for hyperbaric therapy
  - (b) Identify receiving hospitals with Food and Drug Administration (FDA) approved antidote(s) for suspected or confirmed cyanide poisoning resulting from a smoke exposure
- (3) Implement a prehospital treatment plan for smoke inhalation patients, within the scope of practice and training competencies established by the AHJ, by completing the following tasks:
  - (a) Perform a complete assessment of the smoke inhalation patient
  - (b) Determine the need for rapid field decontamination of the smoke inhalation patient including clothing removal
  - (c) Identify and treat any associated life-threatening injuries including burns or trauma within the scope of practice established by the AHJ
  - (d) Identify available and AHJ-approved field adjuncts to measure pulse oximetry, carbon monoxide levels and lactate levels
  - (e) Identify and treat any underlying medical conditions such as cardiac arrest, respiratory distress or arrest, seizures or altered level of consciousness, within the scope of practice established by the AHJ
  - (f) Determine the need to administer FDA-approved antidotes to affected patients within the scope of practice established by the AHJ
  - (g) Identify the most appropriate receiving hospital and provide for rapid transport
- (4) Participate in the termination of the incident by reporting and documenting the actions taken by the ALS responder at the scene of the incident

### 6.4.2 Competencies: Analyzing the Incident.

**6.4.2.1 Identifying General Hazards.** Given examples of various types of fire scenes involving residential or commercial structure fires, vehicle fires, aircraft fires, and other hazardous materials/WMD incidents, the ALS responder shall describe the commonly found components of fire smoke, including carbon monoxide and hydrogen cyanide, and shall describe the general health hazards associated with those substances, including the following:

- (1) Mechanism of toxicity
- (2) Acute and delayed toxicological effects
- (3) Dose-response relationship
- (4) Signs and symptoms of mild, moderate, and severe exposures

**6.4.2.2 Identifying Victims.** Given examples of various types of fire scenes involving residential or commercial structure fires, vehicle fires, aircraft fires, and other hazardous materials/WMD incidents, the ALS responder shall describe the general health risks to patients exposed to fire smoke and shall identify those patients who might require clinical interventions, including antidotes for associated cyanide poisoning.

### 6.4.3 Competencies: Planning to Deliver ALS Patient Care.

**6.4.3.1 Identifying Resources for Treating Acute Patients.** Given examples of smoke inhalation patients, including circumstance of the exposure, signs and symptoms, underlying medical conditions (cardiac arrest, respiratory distress or arrest, seizure, or altered mental status), the ALS responder shall identify the methods and vehicles available to transport smoke inhalation patients and shall determine the location and potential routes of travel to the following appropriate local and regional hospitals, based on patient need:

- (1) Adult trauma centers
- (2) Pediatric trauma centers
- (3) Adult burn centers
- (4) Pediatric burn centers
- (5) Hyperbaric chambers
- (6) Field hospitals
- (7) Hospitals or medical centers with FDA-approved cyanide antidotes
- (8) Hospitals or medical centers with the capability of performing whole blood cyanide testing

**6.4.4 Competencies: Implementing a Prehospital Care Plan.** Given examples of smoke inhalation patients including circumstance of the exposure, signs and symptoms, underlying medical conditions (cardiac arrest, respiratory distress or arrest, seizure, or altered mental status), the ALS responder shall demonstrate the ability to perform the critical BLS and ALS clinical interventions, including antidotes for known and suspected cyanide poisoning, within the scope of practice and training competencies established by the AHJ.

### 6.4.5 Competencies: Evaluating Progress. (Reserved)

### 6.4.6 Competencies: Terminating the Incident.

**6.4.6.1 Reporting and Documenting the Incident.** Given a scenario where treatment of a smoke inhalation patient occurred, the ALS responder shall demonstrate the ability to report and document all facets of patient care in accordance with the incident reporting system used within the AHJ.

## Annex A Explanatory Material

*Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.*

**A.1.3** The CDC categories of bioterrorism diseases and agents are as follows (for more information, see the CDC website [www.bt.cdc.gov](http://www.bt.cdc.gov)):

- (1) Category A
  - (a) Anthrax (*Bacillus anthracis*)
  - (b) Botulism (*Clostridium botulinum* toxin)
  - (c) Plague (*Yersinia pestis*)
  - (d) Smallpox (variola major)
  - (e) *Francisella tularensis* (tularemia)
  - (f) Viral hemorrhagic fevers [filoviruses (e.g., Ebola, Marburg) and arenaviruses (e.g., Lassa, Machupo)]
- (2) Category B
  - (a) Brucellosis (*Brucella* species)
  - (b) Epsilon toxin of *Clostridium perfringens*
  - (c) Food safety threats (e.g., *Salmonella* species, *Escherichia coli* O157:H7, *Shigella*)
  - (d) Glanders (*Burkholderia mallei*)
  - (e) Melioidosis (*Burkholderia pseudomallei*)
  - (f) Psittacosis (*Chlamydia psittaci*)
  - (g) Q fever (*Coxiella burnetii*)
  - (h) Ricin toxin from *Ricinus communis* (castor beans)
  - (i) Staphylococcal enterotoxin B
  - (j) Typhus fever (*Rickettsia prowazekii*)
  - (k) Viral encephalitis [alphaviruses (e.g., Venezuelan equine encephalitis, eastern equine encephalitis, western equine encephalitis)]
  - (l) Water safety threats (e.g., *Vibrio cholerae*, *Cryptosporidium parvum*)
- (3) Category C — emerging infectious diseases, such as Nipah virus and hantavirus

**Category A Diseases/Agents.** The U.S. public health system and primary health care providers must be prepared to address various biological agents, including pathogens that are rarely seen in the United States. These high-priority agents include organisms that pose a risk to national security because of the following:

- (1) They can be easily disseminated or transmitted from person to person.
- (2) They result in high mortality rates and have the potential for major public health impact.
- (3) They might cause public panic and social disruption.
- (4) They require special action for public health preparedness.

**Category B Diseases/Agents.** These second-highest priority agents have the following characteristics:

- (1) They are moderately easy to disseminate.
- (2) They result in moderate morbidity rates and low mortality rates.
- (3) They require specific enhancements of CDC's diagnostic capacity and enhanced disease surveillance.

**Category C Diseases/Agents.** These third-highest priority agents include emerging pathogens that could be engineered for mass dissemination in the future because of the following characteristics:

- (1) Availability
- (2) Ease of production and dissemination
- (3) Potential for high morbidity and mortality rates and major health impact

**A.3.2.1 Approved.** The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

**A.3.2.2 Authority Having Jurisdiction (AHJ).** The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

**A.3.2.3 Listed.** The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

• **A.3.3.1.4 Medical Team Specialist.** This can include, but is not exclusive to, nurses, nurse practitioners, EMTs, physician assistants, and in some cases a health and safety officer.

■ **A.3.3.2 Allied Professional.** Examples of an allied professional could include certified safety professional (CSP), certified health physicist (CHP), certified industrial hygienist (CIH), radiation safety officer (RSO), or similar credentialed or competent individuals as determined by the AHJ. An allied professional can also be referred to as a technical specialist or subject matter expert (SME) in a mission-specific area.

**A.3.3.3.1 Emergency Care First Responder (ECFR).** In Canada, the terminology used is Emergency Medical Assistant-1 (EMA-1), Emergency Medical Assistant-2 (EMA-2), and Emergency Medical Assistant-3 (EMA-3).

**A.3.3.5 Components of Emergency Medical Service (EMS) System.** These components include the following:

- (1) First responders
- (2) Emergency dispatching
- (3) EMS agency response
- (4) Hospital emergency departments
- (5) Specialized care facilities

**A.3.3.7 Demonstrate.** This performance can be supplemented by simulation, explanation, illustration, or a combination of these.

■ **A.3.3.13 Exposure.** The magnitude of exposure is dependent primarily on the duration of exposure and the concentration of the hazardous material. This term is also used to describe a person, an animal, the environment, or a piece of equipment. The exposure can be external, internal, or both.

■ **A.3.3.15 Fissile Material.** Department of Transportation (DOT) regulations define fissile material as plutonium-239, plutonium-242, uranium-233, uranium-235, or any combination of these radionuclides. This material is usually transported with additional shipping controls that limit the quantity of material in any one shipment. Packaging used for fissile material is designed and tested to prevent a fission reaction from occurring during normal transport conditions as well as hypothetical accident conditions. [472:A.3.3.27]

**A.3.3.17 Hazardous Material.** In the United Nations model codes and regulations, hazardous materials are dangerous goods. See also 3.3.32 and A.3.3.32, **Weapon of Mass Destruction (WMD)**.

**A.3.3.20 Incident Commander (IC).** This position is equivalent to the on-scene incident commander. The IC has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site.

**A.3.3.22 Incident Management System (IMS).** The IMS provides a consistent approach for all levels of government, private sector, and volunteer organizations to work together effectively and efficiently to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. An IMS provides for interoperability and compatibility among all levels of government, private sector, and volunteer organization capabilities. The IMS includes a core set of concepts, principles, terminology, and technologies covering the ICS, multiagency coordination systems, training, and identification and management of resources.

■ **A.3.3.27 Personal Protective Equipment (PPE).** Personal protective equipment includes both personal protective clothing and respiratory protection. Adequate personal protective equipment should protect the respiratory system, skin, eyes, face, hands, feet, head, body, and hearing. [472:A.3.3.47]

■ **A.3.3.30 Safety Data Sheet (SDS).** SDS is a component of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) and replaces the term material safety data sheet (MSDS). GHS is an internationally agreed-upon system, created by the United Nations beginning in 1992. It was designed to replace the various classification and labeling standards used in different countries by using consistent criteria on a global level. It supersedes the relevant European Union (EU) system, which has implemented the GHS into EU law as the Classification, Labelling and Packaging (CLP) Regulation, and United States Occupational Safety and Health Administration (OSHA) standards. The SDS requires more information than MSDS regulations and provides a standardized structure for presenting the required information.

**A.3.3.32 Weapon of Mass Destruction (WMD).** The source of this definition is 18 USC 2332a. Weapons of mass destruction (WMD) are known by many different abbreviations and acronyms, the most common of which is CBRNE, which is the

acronym for chemical, biological, radiological, nuclear, and explosive problems that could be released as the result of a terrorist attack.

**A.3.3.32.1 Radiological Weapons of Mass Destruction.** The intent of the annex material is to provide information on the different types of radiological/nuclear devices that can be used as a weapon by those with malicious intent.

**A.3.3.32.1.1 Improvised Nuclear Device (IND).** The nuclear explosion from an IND produces extreme heat, powerful shockwaves, and prompt radiation that would be acutely lethal for a significant distance. It also produces potentially lethal radioactive fallout, which may spread and deposit over very large areas. A nuclear detonation in an urban area could result in over 100,000 fatalities (and many more injured), massive infrastructure damage, and thousands of square kilometers of contaminated land. If the IND fails to work correctly and does not create a nuclear explosion, then the detonation of the conventional explosives would likely disperse radioactive material like an explosive radiation dispersal device (RDD).

**A.3.3.32.1.2 Radiation Dispersal Device (RDD).** Any device that intentionally spreads radioactive material across an area with the intent to cause harm, without a nuclear explosion occurring. An RDD that uses explosives for spreading or dispersing radioactive material is commonly referred to as a “dirty bomb” or “explosive RDD.” Nonexplosive RDDs could spread radioactive material using common items such as pressurized containers, fans, building air-handling systems, sprayers, crop dusters, or even spreading by hand.

**A.3.3.32.1.3 Radiation Exposure Device (RED).** A device, used interchangeably with the term “radiological exposure device” or “radiation emitting device,” consisting of radioactive material, either as a sealed source or as material within some type of container, or a radiation-generating device, to cause harm by exposure to ionizing radiation.

**A.4.2.1.6(1)** Examples of products involved in illicit drug manufacturing include the following:

- (1) Ammonia
- (2) Ephedrine and pseudoephedrine
- (3) Flammable solvents such as ether compounds and methanol
- (4) Fluorinated/chlorinated hydrocarbons (Freon)
- (5) Hydrogen chloride
- (6) Aluminum chloride
- (7) Iodine
- (8) Lithium or sodium metal
- (9) Phosphine gas
- (10) Red phosphorus
- (11) Sodium hydroxide or other caustic substances

**A.4.2.2(4)** CHEMTREC, the Chemical Transportation Emergency Center, is a round-the-clock resource for obtaining immediate emergency response information for accidental chemical releases. CANUTEC, the Canadian Transport Emergency Centre, is operated by Transport Canada to assist emergency response personnel in handling dangerous goods emergencies. SETIQ is the Mexican Emergency Transportation System for the Chemical Industry.

**A.4.3.1.1(3)** External factors can include geographic, environmental, mechanical, and transportation factors such as prevailing winds, water supply, vehicle and pedestrian traffic flow,

ventilation systems, and other natural or man-made influences, including air and rail corridors.

**A.4.4.1(3)** Examples of hazard classifications include the following:

- (1) Acids, alkalis, and corrosives
- (2) Fumigants and pesticides: organophosphates, carbamates, zinc or aluminum phosphide, strychnine, sulfuric fluoride
- (3) Chemical asphyxiants: cyanide, carbon monoxide, hydrogen sulfide
- (4) Simple asphyxiants: nitrogen, helium
- (5) Organic solvents: xylene, benzene, methylene chloride
- (6) Nerve agents: Tabun, Sarin, Soman, V agent
- (7) Vesicants and blister agents: mustard, Lewisite
- (8) Blood agents: cyanide, cyanogen chloride, arsine
- (9) Choking agents: ammonia, chlorine, diphosgene, phosgene
- (10) Pepper spray, irritants, and riot-control agents: CS (orthochlorobenzalmalononitrile), CN (chloroacetophenone), CR (dibenzoxazepine), MACE (phenylchloromethylketone), OC (oleoresin capsicum)
- (11) Biological agents and toxins: anthrax, mycotoxin, plague, viral hemorrhagic fevers, smallpox, ricin
- (12) Incapacitating agents: BZ, LSD
- (13) Radioactive materials: cobalt-60, cesium-137, iridium-192
- (14) Nitrogen-containing compounds: aniline, nitrates
- (15) Hydrocarbons/hydrocarbon derivatives
- (16) Fluorine compounds: hydrogen fluoride, hydrofluoric acid
- (17) Phenolic compounds: carboic acid, cresylic acid

**A.4.4.5(7)(f)** Regarding the issue of weighing individuals, recent medical research has focused on the concerns relating to water consumption and the difficulty in managing oral fluid intake. Often the distinction of water intoxication and resulting hyponatremia versus dehydration from insufficient water consumption, especially during sustained and prolonged operations, cannot be determined by vital sign measurements alone in the prehospital setting. One invaluable measure in making this distinction is a comparison weight of the individual prior to and following entry and re-entry to the operational theater. It is for this reason that comparison weighing is an included recommendation for evaluation of fitness.

**A.5.2.1.5** Biodromes of common Category A bioterrorism agents are provided in Annex B, Table B<sub>1</sub>; common bioagent mass casualty antidotes are provided in Annex B, Table B<sub>2</sub>.

**A.5.2.1.6** Examples of toxic industrial materials are corrosives, reproductive hazards, carcinogens, flammable hazards, and explosive hazards. Toxidromes of common toxicants are provided in Annex B, Table B<sub>3</sub>; antidotes for common toxicants are provided in Annex B, Table B<sub>4</sub>.

**A.5.2.1.7** Some examples of hazardous materials/WMD found at illicit laboratories include but are not limited to the following:

- (1) Ammonia
- (2) Ephedrine and pseudoephedrine
- (3) Flammable solvents such as ether compounds and methanol
- (4) Fluorinated/chlorinated hydrocarbons (Freon)
- (5) Hydrogen chloride

- (6) Iodine
- (7) Lithium and/or sodium metal
- (8) Red phosphorus
- (9) Sodium hydroxide or other caustic substances
- (10) Category A, B, and C agents
- (11) TICs
- (12) TIMs
- (13) Radioactive materials

**A.5.2.1.8** ASTM E2601, *Standard Practice for Radiological Emergency Response*, provides guidance on the first 24 hours of response to such incidents; Table A1.3 of ASTM E2601 presents medical aspects of radiation injury (0 to 125 rem). CRCPD Publication 06-6, *Handbook for Responding to a Radiological Dispersal Device — First Responder's Guide — the First 12 Hours*, provides guidance on the first 12 hours of response to RDD incidents; Table 3 of the CRCPD Publication 06-6 provides “turn-back” exposure rates and dose guidelines.

**A.5.4.1(2)** See A.4.4.1(3).

**Δ A.5.4.2** Most ALS medical treatment at hazardous materials/WMD incidents will be delivered in the cold zone, after decontamination. In some cases, ALS skills need to be delivered in the warm or hot zone prior to or concurrent with decontamination. In those situations, ALS responders need to balance the need for performing life-saving interventions with decontamination, taking into consideration the nature and severity of the incident; the medical needs of the patient; and the need to perform decontamination prior to rendering care.

Life safety of the responder is paramount. ALS responders who anticipate functioning under these conditions should receive training and meet the mission-specific PPE competencies as defined in Section 6.2 of NFPA 472.

It is critical that EMS providers review their responsibilities within their local emergency response plan before an incident occurs to ensure that EMS responders are adequately trained for their expected roles within the IMS/ICS at the hazardous materials/WMD incident. The priorities for priority conditions, treatment, or decontamination in the setting of other significant injuries should be based on the following requirements:

- (1) **Priority I — Medical Care First.** Medical care outweighs immediate decontamination, and patients should be grossly decontaminated only as priority to transport. Contaminated patients with serious or critical illness, trauma, or burns should be decontaminated while their life-threatening injuries are being addressed.
- (2) **Priority II — Combined Priorities.** Medical care needs are balanced with a priority to decontaminate. These patients present with a serious illness other than from the chemical exposure, have trauma or burn injuries, and have not been decontaminated but might have a high level of contamination. There might be a risk to the EMS provider from an ongoing exposure to the hazardous substance. In this situation, it might not be safe to render medical care without the appropriate PPE. The ABCs (airway/breathing/circulation) and threats to life should be managed along with rapid decontamination.
- (3) **Priority III — Decontaminate First.** Decontamination should be performed prior to providing medical care. In this situation, it might not be safe to render medical care without the appropriate PPE.

**Δ Table A.5.4.2 Patient Priority Levels**

| Level of Contamination                                           | Priority Based on Condition |                        |                      |
|------------------------------------------------------------------|-----------------------------|------------------------|----------------------|
|                                                                  | Medically Critical (A)      | Medically Unstable (B) | Medically Stable (C) |
| Heavily contaminated with highly toxic substance                 | II                          | III                    | III                  |
| Heavily contaminated with low-toxicity substance                 | I                           | II                     | II                   |
| Low-level contamination with highly toxic substance              | II                          | III                    | III                  |
| Low-level contamination with low-toxicity substance              | I                           | I                      | II                   |
| Chemical in eyes: Decontaminate eyes immediately and thoroughly. |                             |                        |                      |

Patient conditions are categorized as follows:

- (1) A = Critical condition: airway compromised, serious signs or symptoms of shock, cardiac arrest, life-threatening trauma or burns
- (2) B = Unstable condition: shortness of breath, unstable vital signs, altered level of consciousness after the exposure, significant trauma or burns
- (3) C = Stable condition: stable vital signs, no altered level of consciousness, no significant trauma or burns

See Table A.5.4.2.

**A.6.2.3.8** The ALS responder should provide guidance, including assistance during Joint Commission and Local Emergency Planning Committee (LEPC) preparation exercises.

**A.6.3.4.1** Toxidromes of common toxicants are provided in Annex B, Table B.3; biodromes of common Category A bioterrorism agents are provided in Annex B, Table B.1; ASTM E2601, *Standard Practice for Radiological Emergency Response*, provides guidance on the first 24 hours of response to radiological incidents; CRCPD Publication 06-6, *Handbook for Responding to a Radiological Dispersal Device — First Responder's Guide — the First 12 Hours*, provides guidance on the first 12 hours of response to RDD incidents; Table 3 of the CRCPD Publication 06-6 provides “turn-back” exposure rates and dose guidelines.

**A.6.3.4.2** Antidotes for common toxicants are provided in Table B.3; common bioagent mass casualty antidotes are provided in Table B.2; and Table A.1.3 of ASTM E2601, *Standard Practice for Radiological Emergency Response*, presents medical aspects of radiation injury (0 to 125 rem).

## Annex B Toxicity Analysis and Antidote Tables

*This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.*

**Δ B.1** See Table B.1 for a list of hazardous materials biodromes.

**B.2** See Table B.2 for a list of bioagent antidotes.

**Δ B.3** See Table B.3 for a list of hazardous materials toxidromes.

**Δ B.4** See Table B.4 for a list of hazardous materials antidotes.

**Table B.1 HazMat Biodromes — Category A Bioagents**

| Bioterrorism Agent                                                                                                                                                      | Exposure Routes                                                                                            | Incubation Period                                                                         | Signs and Symptoms                                                                                                                                                                                                                                                                                                                                                                                               | Infective Dose                                                 | Precautions                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Anthrax ( <i>Bacillus anthracis</i> — encapsulated, aerobic, gram-positive, spore-forming, rod-shaped bacterium)                                                        | Cutaneous anthrax — most common                                                                            | Usually an immediate response up to 1 day                                                 | Local skin involvement after direct contact with spores or bacilli; localized itching followed by 1) papular lesion that turns vesicular and 2) subsequent development of black eschar within 7–10 days of initial lesion                                                                                                                                                                                        | Any direct exposure to vesicle secretions of cutaneous anthrax | Standard contact precautions; avoid direct contact with wound or wound drainage                                                           |
|                                                                                                                                                                         | Inhalation anthrax — less common                                                                           | Usually <1 week; may be prolonged for weeks up to 2 months                                | Nonspecific symptoms such as low-grade fever, nonproductive cough, malaise, fatigue, myalgias, profound sweats, chest discomfort (upper respiratory tract symptoms are rare)                                                                                                                                                                                                                                     | <8,000 to 50,000 spores                                        | Standard contact precautions; avoid direct contact with wound or wound drainage                                                           |
|                                                                                                                                                                         | Gastrointestinal anthrax — less common                                                                     | Usually 1–7 days                                                                          | Nausea, anorexia, vomiting, and fever progressing to severe abdominal pain, hematemesis, and diarrhea that is almost always bloody; acute abdomen picture with rebound tenderness may develop                                                                                                                                                                                                                    |                                                                | Standard contact precautions; avoid direct contact with wound or wound drainage                                                           |
| Botulism ( <i>Clostridium botulinum</i> toxin produced by <i>Clostridium botulinum</i> , an encapsulated, anaerobe, gram-positive, spore-forming, rod-shaped bacterium) | Inhalation botulism (does not occur naturally, only as bioterrorism agent)                                 | Foodborne botulism symptoms begin within 6–10 hours; inhalation botulism could be shorter | Symmetrical cranial neuropathies (difficulty swallowing or speaking, dry mouth, diplopia (double vision), blurred vision, dilated or nonreactive pupils, ptosis (drooping eyelids); symmetrical descending weakness respiratory dysfunction (requiring mechanical ventilation); descending flaccid paralysis; intact mental state; no sensory dysfunction; no fever; constipation more common in infant botulism |                                                                | Botulism is not transmissible from person-to-person; use standard precautions                                                             |
| Plague ( <i>Yersinia pestis</i> — bacillus)                                                                                                                             | Pneumonic plague — airborne for exposure by inhalation                                                     | 1 to 6 days                                                                               | First signs of illness are fever, headache, weakness, and rapidly developing pneumonia with shortness of breath, chest pain, cough, and sometimes bloody or watery sputum                                                                                                                                                                                                                                        | <100 organisms                                                 | Droplet precautions; surgical-type masks (N95); post-exposure prophylaxis (doxycycline 100 mg or ciprofloxacin 500 mg orally twice daily) |
|                                                                                                                                                                         | Bubonic plague — most common form, when <i>Yersinia pestis</i> enters body through skin break              |                                                                                           | Enlarged, tender lymph nodes, fever, chills and prostration                                                                                                                                                                                                                                                                                                                                                      |                                                                |                                                                                                                                           |
|                                                                                                                                                                         | Septicemic plague — when plague bacteria multiply in blood, usually a complication of pneumonic or bubonic |                                                                                           | Fever, chills, prostration, abdominal pain, shock, and bleeding into skin and other organs                                                                                                                                                                                                                                                                                                                       |                                                                |                                                                                                                                           |

(continues)

▲ Table B.1 Continued

| Bioterrorism Agent                          | Exposure Routes                                                                                                                                                                                                    | Incubation Period                                                                                                             | Signs and Symptoms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Infective Dose                                               | Precautions                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Smallpox ( <i>variola major</i> )           | Direct and fairly prolonged face-to-face contact is required to spread smallpox from one person to another; Smallpox also can be spread through direct contact with infected bodily fluids or contaminated objects | Initial symptoms (prodrome — duration: 2 to 4 days) sometimes contagious; early rash (duration: about 4 days) most contagious | First symptoms of smallpox include fever, malaise, head and body aches, and sometimes vomiting; fever is usually high, in the range of 101 to 104 degrees Fahrenheit, at this time people are usually too sick to carry on their normal activities (called the <i>prodrome</i> phase and may last for 2 to 4 days); rash emerges first as small red spots on the tongue and in the mouth; spots develop into sores that break open and spread large amounts of the virus into the mouth and throat; at this point the person becomes most contagious; sores in mouth break down, a rash appears on the skin, starting on the face and spreading to the arms and legs and then to the hands and feet; usually rash spreads to all parts of the body within 24 hours; as rash appears, the fever usually falls and the person may start to feel better; by third day of the rash, the rash becomes raised bumps; by fourth day, the bumps fill with a thick, opaque fluid and often have a depression in the center that looks like a bellybutton (a major distinguishing characteristic of smallpox) | 10–100 organisms with human-to-human transmission within 3 m | Airborne (N95 mask) and contact precautions; Smallpox vaccine, a live-virus vaccine made from vaccinia virus, is highly effective at inducing immunity against smallpox prior to exposure; if administered within 3 days after exposure to smallpox virus, it may prevent disease, or decrease the severity of disease and risk of death                                                         |
| Tularemia ( <i>Francisella tularensis</i> ) | Airborne for exposure by inhalation                                                                                                                                                                                | Symptoms appear 3 to 5 days post-exposure, but can take as long as 14 days                                                    | Onset is usually abrupt with fever (38°C to 40°C), headache, chills, and rigors (violent shivering), generalized body aches often prominent in lower back), coryza (common cold symptoms), and sore throat; dry or slightly productive cough and substernal pain or tightness with or without signs of pneumonia; nausea, vomiting, and diarrhea may occur                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 10–50 organisms                                              | Airborne (N95 mask) and contact precautions; a live attenuated vaccine derived from avirulent <i>Francisella tularensis</i> biovar <i>palaeartica</i> (type B) is under review by the Food and Drug Administration (has been used to protect laboratorians routinely working with the bacterium); post-exposure (before illness occurs) prophylactic treatment with doxycycline or ciprofloxacin |

(continues)

**Table B.1** *Continued*

| Bioterrorism Agent                                                                                    | Exposure Routes                                   | Incubation Period                        | Signs and Symptoms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Infective Dose                                            | Precautions                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Viral hemorrhagic fevers [filoviruses (e.g., Ebola, Marburg) and arenaviruses (e.g., Lassa, Machupo)] | Inhalation or close contact with infected patient | 5 to 10 days (may be as long as 3 weeks) | Overall the vascular system will be damaged, and the body's ability to regulate itself impaired; these symptoms are often accompanied by hemorrhage bleeding; initial signs and symptoms often include marked fever, fatigue, dizziness, muscle aches, loss of strength, and exhaustion; severe cases often show signs of bleeding under the skin, in internal organs, or from body orifices like the mouth, eyes, or ears. However, although they may bleed from many sites around the body, patients rarely die because of blood loss; severely ill patient cases may also show shock, nervous system malfunction, coma, delirium, and seizures; in some case renal (kidney) failure may occur | 400 plaque-forming units by inhalation is fatal in 5 days | Airborne (N95 mask) and contact precautions; isolate infected patients; wear hard hygiene protective clothing (double gloves, impermeable gowns, leg/shoe covering, face shields/goggles) |

Source: CDC databases.

**Table B.2** Bioagent Mass Casualty Antidotes

| Antidote            | Bioagent              | Common Adult Dose                                           |
|---------------------|-----------------------|-------------------------------------------------------------|
| Ciprofloxacin       | Anthrax — Inhalation  | 500 mg po bid                                               |
| Ciprofloxacin       | Anthrax — Prophylaxis | 500 mg po bid                                               |
| Doxycycline         | Plague                | 100 mg po bid                                               |
| Ciprofloxacin       | Plague                | 500 mg po bid                                               |
| Doxycycline         | Tularemia             | 100 mg po bid                                               |
| Vaccinate           | Smallpox              |                                                             |
| Botulinum antitoxin | Botulinum             | 10 mL vial (most effective if administered within 24 hours) |

Bid: two times a day.

IM: Intramuscular. IV: Intravenous. po: Oral.

Source: CDC databases.

**Table B.3 HazMat Toxidromes**

| Toxidrome                               | Typical Toxicants                                                                                                                              | Predominant Route of Exposure               | Predominant Toxicodynamics                                                                                                                                                                                                                                            | Predominant Target(s) of Toxicity          |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Irritant gas — highly water soluble     | Ammonia (NH <sub>3</sub> )<br>Formaldehyde (HCHO)<br>Hydrogen chloride (HCl)<br>Sulfure dioxide (SO <sub>2</sub> )                             | Inhalation                                  | Irritant and corrosive local toxic effects, by readily dissolving in the water of exposed mucous membranes and the upper airway, forming a corrosive aqueous solution that causes inflammation, edema, and corrosion of the exposed mucous membranes and upper airway | Airway                                     |
| Irritant gas — moderately water soluble | Chlorine (Cl <sub>2</sub> )                                                                                                                    | Inhalation                                  | Irritant and corrosive local toxic effects, by dissolving in the water of exposed mucous membranes and the upper airway and lower airways, forming a corrosive aqueous solution that causes inflammation, edema, and corrosion of the exposed upper and lower airways | Airway breathing                           |
| Irritant gas — slightly water soluble   | Phosgene (COCl <sub>2</sub> )<br>Nitrogen dioxide (NO <sub>2</sub> )                                                                           | Inhalation                                  | Irritant and corrosive local toxic effects, by slowly dissolving in the water of the alveolar-capillary membrane of the lung, forming a corrosive aqueous solution that causes delayed non-cardiogenic pulmonary edema                                                | Breathing                                  |
| Asphyxiant — simple                     | Carbon dioxide (CO <sub>2</sub> )<br>Methane (CH <sub>4</sub> )<br>Propane (CH <sub>3</sub> , CH <sub>2</sub> , CH <sub>3</sub> )              | Inhalation                                  | Displacement of O <sub>2</sub> from the ambient atmosphere, decreasing the O <sub>2</sub> supply to the lungs                                                                                                                                                         | Cardiovascular disability (nervous system) |
| Asphyxiant — systemic (chemical)        | Carbon monoxide (CO)<br>Hydrogen cyanide (HCN)<br>Hydrogen sulfide (H <sub>2</sub> S)<br>Hydrogen azide (HN <sub>3</sub> )<br>Isobutyl nitrite | Inhalation                                  | Interference with O <sub>2</sub> transportation and/or utilization within the blood and/or other tissues                                                                                                                                                              | Cardiovascular disability (nervous system) |
| Cholinergic                             | Organophosphate pesticides<br>Carbamate insecticides                                                                                           | Skin and mucous membranes                   | Excess acetylcholine accumulation at both the muscarinic and nicotininc receptors in the CNS/PNS, due to inhibition of acetylcholinesterase, the enzyme that breaks down acetylcholine                                                                                | Disability (nervous system)                |
| Cholinergic                             | Organophosphate nerve agents                                                                                                                   | Inhalation and/or skin and mucous membranes | Excess acetylcholine accumulation at both the muscarinic and nicotininc receptors in the CNS/PNS, due to inhibition of acetylcholinesterase, the enzyme that breaks down acetylcholine                                                                                | Disability (nervous system)                |
| Corrosive                               | Acids (hydrochloric, nitric, sulfuric, etc.)<br>Bases (sodium hydroxide, ammonium hydroxide, potassium hydroxide)                              | Skin and mucous membranes                   | Irritant and corrosive local toxic effects that cause chemical burns of the skin and mucous membranes that come into contact with the corrosive solutions                                                                                                             | Airway cardiovascular                      |
| Hydrocarbon and halogenated hydrocarbon | Gasoline<br>Propane<br>Toluene<br>Chloroform                                                                                                   | Inhalation of gases or vapors               | Inhalation can cause sleepiness to the point of narcosis (deep stupor and/or coma) and cardiac irritability because the heart is sensitized to catecholamines (epinephrine and norepinephrine)                                                                        | Cardiovascular disability (nervous system) |