NFPA®

470

Hazardous Materials/Weapons of Mass Destruction (WMD) Standard for Responders

2022

Includes
NFPA 472 | NFPA 473 | NFPA 1072

NFPA®

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Hazardous Materials/Weapons of Mass Destruction (WMD) Standard for Responders

2022 Edition

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NFPA® 470

Hazardous Materials/Weapons of Mass Destruction (WMD) Standard for Responders

2022 Edition

This edition of NFPA 470, *Hazardous Materials/Weapons of Mass Destruction (WMD) Standard for Responders*, was prepared by the Technical Committee on Hazardous Materials Response Personnel, released by the Correlating Committee on Professional Qualifications, and acted on by the NFPA membership during the 2021 NFPA Technical Meeting held June 14–July 2. It was issued by the Standards Council on August 26, 2021, with an effective date of September 15, 2021.

This document has been amended by one or more Tentative Interim Amendments (TIAs) and/or Errata. See "Codes & Standards" at www.nfpa.org for more information.

This edition of NFPA 470 was approved as an American National Standard on September 15, 2021.

Origin and Development of NFPA 470

The 2022 edition of NFPA 470, *Hazardous Materials/Weapons of Mass Destruction (WMD) Standard for Responders*, marks the initial integration of NFPA 472, NFPA 473, and NFPA 1072 into a single hazardous materials/WMD safety standard. At the April 2019 NFPA Standards Council Meeting, the Council directed NFPA staff and all NFPA Emergency Response and Responder Safety (ERRS) Technical Committees to consolidate and unify NFPA standards with similar content areas. The goal of this effort is to increase usability, reduce errors and conflicts, and ultimately produce higher quality standards. For more information about the ERRS consolidation project, please see nfpa.org/errs.

This consolidated document was structured to list the competencies (formerly in NFPA 472) and professional qualifications (formerly in NFPA 1072) for each hazardous materials/WMD responder position sequentially, followed by the competencies specific to emergency medical services (EMS) personnel responding to these incidents (formerly in NFPA 473) at the end of the document.

In NFPA 470, the technical committee updated terminology throughout the standard for better alignment with the National Incident Management System (NIMS) and with NFPA 3000™, *Standard for an Active Shooter/Hostile Event Response (ASHER) Program*. Chapters 17 and 19 were added to address the professional qualifications for hazardous materials officers and hazardous materials safety officers and to align with the competencies for these positions, as adopted from NFPA 472. Chapter 33 was updated to add professional qualifications language to align with the competencies for hazardous materials technicians with a radiological hazard specialty at hazardous materials/WMD incidents. References to NFPA 1891, *Standard on Selection, Care, and Maintenance of Hazardous Materials, CBRN, and Emergency Medical Operations Clothing and Equipment*, were added to Annex A to provide additional information on the process for the selection, care, and maintenance of chemical protective clothing (CPC). Annex D, Competencies for Operations Level Responders Assigned Radiological Agent–Specific Tasks, of NFPA 472 (2018 edition) was converted to mandatory text as Section 8.10, Mission-Specific Competencies: Radiological Hazard-Specific Tasks.

The technical committee wishes to dedicate this first edition of NFPA 470 to a long-time committee member and friend, Mr. Charles J. Wright. Mr. Wright is an original member of the NFPA Technical Committee on Hazardous Materials Response Personnel and one of the principal writers of NFPA 1072, which brought the hazardous materials training standards into the professional qualifications community. The technical committee is deeply indebted to Mr. Wright for his professionalism, commitment to excellence, and passion for making a difference.

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NFPA 470

Hazardous Materials/Weapons of Mass Destruction (WMD) Standard for Responders

2022 Edition

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. 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 and extracted publications can be found in Chapter 2 and Annex K.

Chapter 1 Administration

1.1* Scope. This standard provides minimum requirements for personnel responding to incidents involving hazardous materials and weapons of mass destruction (WMD).

1.1.1 Even numbered Chapters 4 through 44 identify the minimum levels of competence required by responders to emergencies involving hazardous materials/WMD.

1.1.1.1 Even numbered Chapters 4 through 44 apply to any individual or member of any organization who responds to hazardous materials/WMD incidents.

1.1.1.2 Even numbered Chapters 4 through 44 cover the competencies for Awareness Level Personnel, Operations Level Responders, Hazardous Materials Technicians, Incident Commanders, Hazardous Materials Officers, Hazardous Materials Safety Officers, and other Specialist Employees.

1.1.2 Odd numbered Chapters 5 through 45 identify the minimum job performance requirements (JPRs) for personnel at the scene of a hazardous materials/WMD incident at the following levels: awareness, operations, operations mission-specific, Hazardous Materials Technician, and Incident Commander.

1.1.3 Chapters 6 through 46 identify the levels of competence required of emergency medical services (EMS) personnel who respond to incidents involving hazardous materials or WMD.

1.1.3.1 Chapters 46 through 48 cover the requirements for all levels of certified EMS personnel in the out-of-hospital setting.

1.1.3.2 Chapter 46 is based on the premise that all emergency medical responder (EMR) and emergency medical technician (EMT) or equivalent certified personnel are trained to meet at least the core competencies of the Operations Level Responders as defined in Chapter 6.

1.2 Purpose. The purpose of this standard is to specify minimum requirements for the following:

(1) Levels of competence required by responders to emergencies involving hazardous materials/WMD
(2) JPRs for personnel at the scene of a hazardous materials/WMD incident
(3) Levels of competence required by EMS personnel who respond to incidents involving hazardous materials/WMD

1.2.1 The purpose of even numbered Chapters 4 through 44 is to specify minimum competencies required for those who respond to hazardous materials/WMD incidents and necessary for a risk-based response to these incidents.

1.2.1.1 The competencies contained in even numbered Chapters 4 through 44 help reduce the numbers of accidents, injuries, and illnesses during response to hazardous materials/WMD incidents and shall help prevent exposure to hazardous materials/WMD, thus reducing the possibility of fatalities, illness, and disabilities to emergency response personnel.

1.2.1.2 Even numbered Chapters 4 through 44 provide the requisite knowledge that forms the basis for the associated JPRs established in odd numbered Chapters 5 through 45.

1.2.2 The purpose of odd numbered Chapters 5 through 45 is to specify the minimum JPRs for service at the scene of a hazardous materials/WMD incident at the following levels: awareness, operations, operations mission-specific, Hazardous Materials Technician, and Incident Commander.

1.2.2.1 Odd numbered Chapters 5 through 45 define personnel at the scene of a hazardous materials/WMD incident at the following levels: awareness, operations, operations mission-specific, Hazardous Materials Technician, and Incident Commander.

1.2.2.2 The intent of odd numbered Chapters 5 through 45 is to ensure that personnel at the scene of a hazardous materials/WMD incident at the levels of awareness, operations, operations mission-specific, Hazardous Materials Technician, and Incident Commander are qualified.

1.2.2.3* Odd numbered Chapters 5 through 45 do not address organization or management responsibility.

1.2.2.4 JPRs for each level and position are the tasks personnel must be able to perform to carry out the job duties.

1.2.2.5* Personnel at the scene of a hazardous materials/WMD incident at the levels of awareness, operations, operations mission-specific, Hazardous Materials Technician,

and Incident Commander must remain current with the general knowledge and skills and JPRs addressed for each level or position of qualification.

1.2.3 The purpose of Chapters 46 through 48 is to specify minimum requirements of competence and to enhance the safety and protection of response personnel and all components of the EMS system.

1.2.3.1* CDC Categories A, B, and C. Chapters 46 through 48 use the US Centers for Disease Control and Prevention (CDC) categories of diseases and agents.

1.3* Application. This standard can be applied as follows:

(1) Chapters 1 through 3, even numbered Chapters 4 through 44, and Annexes A, D, E, F, G, H, and K constitute the 2022 edition of NFPA 472, incorporated in this standard.
(2) Chapters 1 through 3, odd numbered Chapters 5 through 45, and Annexes A, B, J, and K constitute the 2022 edition of NFPA 1072, incorporated in this standard.
(3) Chapters 1 through 3, 46 through 48, and Annexes A, I, and K constitute the 2022 edition of NFPA 473, incorporated in this standard.

1.3.1 The requirements in this standard (Chapters 4 through 48) are to be accomplished in accordance with the requirements of the authority having jurisdiction (AHJ) and all applicable NFPA standards.

1.3.1.1 It is not required that the requirements in this standard (Chapters 4 through 48) be mastered in the order in which they appear. The AHJ must establish instructional priority and the training program content to prepare personnel to meet the requirements of this standard.

1.3.1.2* Performance of each requirement in this standard (Chapters 4 through 48) must be evaluated by personnel approved by the AHJ.

1.3.1.3 Performance of each requirement in this standard (Chapters 4 through 48) must be completed in accordance with recognized practices and procedures or as defined by law or by the AHJ.

1.3.1.4 Personnel assigned the duties for each level or position in this standard must meet all the requirements defined in the standard for that level or position prior to being qualified.

1.3.1.5 The AHJ must provide personal protective clothing and the equipment necessary to conduct assignments.

1.3.1.6 Requirements involving exposure to products of combustion must be performed in approved PPE.

1.3.1.7 Wherever the terms *rules*, *regulations*, *policies*, *procedures*, *supplies*, *apparatus*, or *equipment* are referred to, it is implied that they are those of the AHJ.

1.3.1.8* For each level and position as identified in odd numbered Chapters 5 through 45, persons must participate in continuing professional development activities to maintain competency with the JPRs covered in this standard for each level and position that the person is professionally qualified to act.

1.3.2 Prior to training to meet the requirements of this standard, personnel must meet the following requirements:

(1) Educational requirements established by the AHJ
(2) Age requirements established by the AHJ
(3) Medical requirements established by the AHJ
(4) Job-related physical performance requirements established by the AHJ

1.3.3 It is not the intent of Chapters 4 through 48 to restrict any jurisdiction from exceeding these minimum requirements.

1.4 Equivalency. Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.4.1 Technical documentation must be submitted to the AHJ to demonstrate equivalency.

1.4.2 The system, method, or device must be approved for the intended purpose by the AHJ.

1.5 Units. In this standard, equivalent values in SI units are not to be considered as the requirement, as these values can be approximate. *(See Table 1.5.)*

Table 1.5 US-to-SI Conversions

Quantity	US Unit/Symbol	SI Unit/Symbol	Conversion Factor
Length	inch (in.)	millimeter (mm)	1 in. = 25.4 mm
	foot (ft)	meter (m)	1 ft = 0.305 m
Area	square foot (ft^2)	square meter (m^2)	1 ft^2 = 0.0929 m^2
Volume	gallon (gal)	liter (L)	1 gal = 3.785 L
	quart (qt)	liter (L)	1 qt = 0.9463 L
Weight	pound (lb)	gram (g)	1 lb = 453.6 g
Pressure	atmosphere (atm)	millimeters of mercury (mm Hg)	1 atm = 760 mm Hg
	inches of mercury (in. Hg)	millimeters of mercury (mm Hg)	1 in. Hg = 25.4 mm Hg
	inches of water (in. H_2O)	millimeters of mercury (mm Hg)	1 in H_2O = 1.87 mm Hg
	pounds per square inch (psi)	millimeters of mercury (mm Hg)	1 psi = 51.7 mm Hg
	pounds per square inch (psi)	bar	1 psi = 0.068 bar
	pounds per square inch (psi)	pascal (Pa)	1 psi = 6894.8 Pa
Radiation	rad	gray (Gy)	100 rad = 1 Gy
	rem	sievert (Sv)	100 rem = 1 Sv
	curie (Ci)	becquerel (Bq)	1 Bq = 2.7×10^{-11} Ci

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.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam,* 2021 edition.

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response,* 2022 edition.

NFPA 1001, *Standard for Fire Fighter Professional Qualifications,* 2019 edition.

NFPA 1584, *Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises,* 2022 edition.

NFPA 1891, *Standard on Selection, Care, and Maintenance of Hazardous Materials Clothing and Equipment*, 2022 edition.

2.3 Other Publications.

2.3.1 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM A240/A240M, *Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications*, 2020.

2.3.2 ATSDR Publications. Agency for Toxic Substances and Disease Registry, Centers for Disease Control and Prevention, 1600 Clifton Road, Atlanta, GA 30329.

Managing Hazardous Materials Incidents (MHMIs), Volume III — *Medical Management Guidelines (MMGs) for Acute Chemical Exposures*, 2000.

2.3.3 DOT Publications. US Department of Transportation, 1200 New Jersey Avenue, SE, Washington, DC 20590.

Emergency Response Guidebook, Pipeline and Hazardous Materials Administration, 2020.

National Standard Curriculum: *Emergency Medical Technician Paramedic,* 1998.

2.3.4 EPA Publications. US Environmental Protection Agency, William Jefferson Clinton East Building, 1200 Pennsylvania Avenue, NW, Washington, DC 20460.

Emergency Planning and Community Right-to-Know Act (EPCRA), 42 U.S.C. § 116, 1986.

Superfund Amendments and Reauthorization Act (SARA), 1986.

2.3.5 FEMA Publications. Federal Emergency Management Agency, U.S. Department of Homeland Security, 500 C Street, SW, Washington, DC 20472.

ICS Form 206, *Medical Plan.*

2.3.6 US Government Publications. US Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

18 US Code, Section 2332a.

Title 29, Code of Federal Regulations, Part 1910.120(q), "Emergency Response Program to Hazardous Substance Releases."

Title 40, Code of Federal Regulations, Part 311, "Worker Protection."

2.3.7 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 51, *Standard for the Design and Installation of Oxygen–Fuel Gas Systems for Welding, Cutting, and Allied Processes*, 2018 edition.

NFPA 70®, National Electrical Code®, 2020 edition.

NFPA 1000, *Standard for Fire Service Professional Qualifications Accreditation and Certification Systems*, 2022 edition.

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 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* 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.

3.2.5 Shall. Indicates a mandatory requirement.

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

3.2.7 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 US 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 US 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 Analyze. To identify a hazardous materials/weapons of mass destruction (WMD) problem and determine likely behavior and harm within the training and capabilities of the emergency responder.

3.3.4 Area of Safe Refuge. An area where people are held until they can be safely decontaminated, treated, or removed.

3.3.5 Area of Specialization.

3.3.5.1 ***Individual Area of Specialization.*** The qualifications or functions of a specific job(s) associated with chemicals and/or containers used within an organization.

3.3.5.2 ***Organization's Area of Specialization.*** Any chemicals or containers used by the Specialist Employee's employer.

3.3.6 Assignment. A job, task, role, or function to be performed that can come from a supervisor or other established authority as determined by the authority having jurisdiction (AHJ) (e.g., Hazardous Materials Technician, allied professional, emergency response plans, or standard operating procedures).

3.3.7* Backup Team. A required team comprising two or more responders equipped with approved personal protective equipment (PPE)/chemical protective clothing (CPC) and assigned by the Incident Commander to provide emergency removal of a stricken entry team member from the hot zone.

3.3.8 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.

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

3.3.8.2 ***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.

3.3.9 CANUTEC. The Canadian Transport Emergency Centre, operated by Transport Canada, that provides emergency response information and assistance on a 24-hour basis for responders to hazardous materials/weapons of mass destruction (WMD) incidents.

3.3.10 CHEMTREC. A public service of the American Chemistry Council that provides emergency response information and assistance on a 24-hour basis for responders to hazardous materials/weapons of mass destruction (WMD) incidents.

3.3.11 Competence. Possessing knowledge, skills, and judgment needed to perform assigned incident objectives.

3.3.12* 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.

3.3.13* Confined Space. An area large enough and so configured that a person can enter and perform assigned work but that has limited or restricted means for entry and exit and is not designed for continuous human occupancy.

3.3.14 Container. A receptacle, piping, or pipeline used for storing or transporting material of any kind; synonymous with "packaging" in transportation.

3.3.14.1* ***Bulk Transportation Containers.*** Containers, including transport vehicles, having a liquid capacity of

more than 119 gal (450 L), a solids capacity of more than 882 lb (400 kg), or a compressed gas water capacity of more than 1001 lb (454 kg) that are either placed on or in a transport vehicle or vessel or are constructed as an integral part of the transport vehicle, including the following: (1) cargo tanks including nonpressure tanks — MC-306/DOT-406 or equivalent, low-pressure tanks — MC-307-DOT-407 or equivalent, corrosive liquid tanks — MC-312/DOT-412 or equivalent, high-pressure tanks — MC-331 or equivalent, and cryogenic liquid tanks — MC-338 or equivalent, compressed gas tubes trailers, and dry bulk cargo tanks; (2) portable tanks such as intermodal tanks, including tanks for liquids and solids, tanks for liquefied compressed gases, tanks for refrigerated liquefied gases (cryogenic liquids), and multiple-element gas containers (MEGC) for nonrefrigerated compressed gases; (3) tank cars including nonpressure tank cars, pressure tank cars, and cryogenic liquid tank cars; and (4) ton containers.

3.3.14.2 ***Facility Storage Tanks.*** Atmospheric and low-pressure storage tanks, pressurized storage tanks, and cryogenic storage tanks.

3.3.14.3 ***Intermediate Bulk Containers (IBCs).*** Pressure, nonpressure, and cryogenic rigid or flexible portable containers, other than cylinders or portable tanks, designed for mechanical lifting.

3.3.14.4 ***Nonbulk Containers.*** Containers, including bags, boxes, carboys, cylinders, drums, and Dewar flasks for cryogenic liquids, having a liquid capacity of 119 gal (450 L) or less, a solids capacity of 882 lb (400 kg) or less, or a compressed gas water capacity of 1001 lb (454 kg) or less.

3.3.14.5 ***Pipeline.*** A length of pipe including pumps, valves, flanges, control devices, strainers, and/or similar equipment for conveying fluids. [**70:**427.2]

3.3.14.6 ***Piping.*** Assemblies of piping components used to convey, distribute, mix, separate, discharge, meter, control, or snub fluid flows. Piping also includes pipe-supporting elements but does not include support structures, such as building frames, bents, foundations, or any other equipment excluded from this standard. [**51,** 2018]

3.3.14.7* ***Radioactive Materials Containers.*** Excepted packaging, industrial packaging, Type A, Type B, and Type C packaging for radioactive materials.

3.3.15 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.

3.3.16 Contamination. The process of transferring a hazardous material, or the hazardous component of a weapon of mass destruction (WMD), from its source to people, animals, the environment, or equipment, which can act as a carrier.

3.3.16.1 ***Cross Contamination.*** The process by which a contaminant is carried out of the hot zone and contaminates people, animals, the environment, or equipment.

3.3.17 Control. The procedures, techniques, and methods used in the mitigation of hazardous materials/weapons of mass destruction (WMD) incidents, including containment, extinguishment, and confinement.

3.3.17.1 ***Confinement.*** Those procedures taken to keep a material, once released, in a defined or local area.

3.3.17.2 ***Containment.*** The actions taken to keep a material in its container (e.g., to stop a release of the material or reduce the amount being released).

3.3.17.3 ***Extinguishment.*** To cause to cease burning.

3.3.18 Coordination. The process used to get people who might represent different agencies to work together integrally and harmoniously in a common action or effort.

3.3.19* Decontamination. The physical and/or chemical process of reducing and preventing the spread and effects of contaminants to people, animals, the environment, or equipment involved at hazardous materials/weapons of mass destruction (WMD) incidents.

3.3.19.1* ***Emergency Decontamination.*** The process of immediately reducing contamination of people in potentially life-threatening situations with or without the formal establishment of a decontamination corridor.

3.3.19.2* ***Gross Decontamination.*** A phase of the decontamination process where significant reduction of the amount of surface contamination takes place as soon as possible, most often accomplished by mechanical removal of the contaminant or initial rinsing from handheld hose lines, emergency showers, or other nearby sources of water.

3.3.19.3* ***Mass Decontamination.*** The physical process of reducing or removing surface contaminants from large numbers of victims in potentially life-threatening situations in the fastest time possible.

3.3.19.4* ***Technical Decontamination.*** The planned and systematic process of reducing contamination to a level that is as low as reasonably achievable.

3.3.20 Degradation. A chemical action involving the molecular breakdown of a protective clothing material or equipment due to contact with a chemical.

3.3.21* Demonstrate. To show by actual performance.

3.3.22 Describe. To explain verbally or in writing using standard terms recognized by the hazardous materials/weapons of mass destruction (WMD) response community.

3.3.23 Detection and Monitoring Equipment. Instruments and devices used to detect, classify, or quantify materials.

3.3.24 Dispersal Device. Any weapon or combination of mechanical, electrical, or pressurized components that is designed, intended, or used to cause death or serious bodily injury through the release, dissemination, or impact of toxic or poisonous chemicals or their precursors, biological agent, toxin or vector, or radioactive material.

3.3.25 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.

3.3.26 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 US Department of Transportation, Transport Canada, and the Secretariat of Transport and Communications, Mexico.

3.3.27 Endangered Area. The actual or potential area of exposure associated with the release of a hazardous materials/weapons of mass destruction (WMD).

3.3.28* Entry Team. A team comprising two or more responders equipped with approved personal protective equipment (PPE)/chemical protective clothing (CPC) and assigned by the Incident Commander to perform duties in the hot zone.

3.3.29 Evaluate. To assess or judge the effectiveness of a response operation or course of action within the training and capabilities of the emergency responder.

3.3.30 Evidence. Material(s) that can be presented to a court or jury in proof of the facts and that can include records, documents, or objects.

3.3.31 Evidence Preservation. Deliberate and specific actions taken with the intention of protecting potential evidence from contamination, damage, loss, or destruction.

3.3.32 Example. An illustration of a problem serving to show the application of a rule, principle, or method (e.g., past incidents, simulated incidents, parameters, pictures, and diagrams).

3.3.33* 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).

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

3.3.35 Field Screening. A set of procedures, to include at a minimum nondestructive field testing to identify the presence of explosive devices, radiological materials, flammable materials, volatile organic compounds (VOC), strong oxidizers, fluorides, or corrosives, that serves as a protective safety measure prior to collection, transportation, and laboratory analysis.

3.3.36* Fissile Material. Material whose atoms are capable of nuclear fission (capable of being split).

3.3.37* Harm. An adverse effect caused by being exposed to a hazard.

3.3.38* Hazard. A condition or material capable of causing harm to life, container, property, or the environment.

3.3.39* Hazard Control Zones. The areas at hazardous materials/weapons of mass destruction (WMD) incidents within an established perimeter that are designated based upon safety and the degree of hazard.

3.3.39.1 ***Cold Zone.*** The hazard control zone of hazardous materials/weapons of mass destruction (WMD) incidents that contains the incident command post and such other support functions as are deemed necessary to control the incident.

3.3.39.2 ***Decontamination Corridor.*** The area usually located within the warm zone where decontamination is performed.

3.3.39.3 ***Hot Zone.*** The hazard control zone immediately surrounding hazardous materials/weapons of mass destruction (WMD) incidents, which extends far enough to prevent adverse effects of hazards to personnel outside the zone and where only personnel who are trained, equipped, and authorized to do assigned work are permitted to enter.

3.3.39.4* ***Warm Zone.*** The hazard control zone at hazardous materials/weapons of mass destruction (WMD) incidents where personnel and equipment decontamination and hot zone support takes place.

3.3.40* 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 US Code, Section 2332a, as well as any other criminal use of hazardous materials, such as illicit labs, environmental crimes, or industrial sabotage.

3.3.41* Hazardous Materials Branch/Group. The function within an overall incident command system (ICS) that deals with the mitigation and control of the hazardous materials/weapons of mass destruction (WMD) portion of an incident.

3.3.42* Hazardous Materials Response Team (HMRT). An organized group of trained response personnel operating under an emergency response plan and applicable standard operating procedures who perform Hazardous Materials Technician level skills at hazardous materials/weapons of mass destruction (WMD) incidents.

3.3.43* Hazardous Materials Technician. See 3.4.3.1.

3.3.44 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.

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

3.3.46 Incident Analysis. The process of analyzing the risk at an incident by identifying the materials and containers involved, predicting the likely behavior of each container and its contents, and estimating the potential harm or outcomes associated with that behavior.

3.3.47 Incident Command System (ICS). A component of an incident command system (ICS) designed to enable effective and efficient on-scene incident management by integrating organizational functions, tactical operations, incident planning, incident logistics, and administrative tasks within a common organizational structure.

3.3.48* Incident Objectives. Incident-specific statements describing intended outcomes within a given operational period.

3.3.49* Job Performance Requirement (JPR). A written statement that describes a specific job task, lists the items necessary to complete the task, and defines measurable or observable outcomes and evaluation areas for the specific task. [**1000,** 2022]

3.3.50 Match. To provide with a counterpart.

3.3.51* Mayday. Any situation at a hazardous materials/weapons of mass destruction (WMD) incident where an entry team member is unable to safely exit the hot zone or an event cannot be resolved by the entry team member within 30 seconds.

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

3.3.53 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.

3.3.54 Mission-Specific Competencies. See 3.4.2.1.2

3.3.55 Modes of Operation (Nonintervention, Defensive, and Offensive).

3.3.55.1* ***Nonintervention Mode.*** An operating mode used where the risk to emergency responders is greater than the benefit, in which responders do not operate near the hazardous materials/weapons of mass destruction (WMD) or container, focusing on public protective actions only and allowing the container or product to take its natural course.

3.3.55.2* ***Defensive Mode.*** An operating mode characterized as medium risk to emergency responders, in which responders do not have direct contact with the hazardous materials/weapons of mass destruction (WMD), focusing on safely controlling or limiting the effects of a release.

3.3.55.3* ***Offensive Mode.*** An operating mode characterized as higher risk to emergency responders, in which responders could have direct contact with the hazardous materials/weapons of mass destruction (WMD), taking aggressive actions to control the release of hazardous materials/WMD.

3.3.56 Objective. A goal that is achieved through the attainment of a skill, knowledge, or both, that can be observed or measured.

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

3.3.58 Penetration. The movement of a material through a suit's closures, such as zippers, buttonholes, seams, flaps, or other design features of chemical-protective clothing, and through punctures, cuts, and tears.

3.3.59 Permeation. A chemical action involving the movement of chemicals, on a molecular level, through intact material.

3.3.60* 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/weapons of mass destruction (WMD) incident operations.

3.3.61 Plan.

3.3.61.1* ***Emergency Response Plan (ERP).*** A plan developed by the authority having jurisdiction (AHJ) with the cooperation of all participating agencies and organizations, including a jurisdiction with emergency responsibilities and those outside the jurisdiction who have entered into response/support agreements, that identifies goals and incident objectives for that emergency type, agency roles, and overall strategies.

3.3.61.2* ***Incident Action Plan (IAP).*** An oral or written plan approved by the Incident Commander (IC) containing incident objectives reflecting the overall strategy for managing an incident for a specific time frame and target location.

3.3.61.2.1* ***Action Plan.*** Creation of a plan to determine strategies and tactics within an incident action plan (IAP) and is a detailed proposal that will safely accomplish incident objectives, favorably influence outcomes, and increase the safety of responders and the public.

3.3.61.3* ***Site Safety and Control Plan.*** A site-specific safety document used within the incident command system (ICS) to organize information important to hazardous materials response operations.

3.3.62* Planned Response. The incident action plan, with the site safety and control plan, consistent with the emergency response plan and/or standard operating procedures for a specific hazardous materials/weapons of mass destruction (WMD) incident.

3.3.63 Predict. To estimate or forecast the future behavior of a hazardous materials/weapons of mass destruction (WMD) container and/or its contents within the training and capabilities of the emergency responder.

3.3.64 Priority Conditions. A process by which a responder can arrange or organize individuals that have had an exposure to a potential hazardous substance contamination, which has influence from chemical and physical properties of a hazardous chemical with associated route of entry and potential mechanism of toxicological occurrence (low-level contamination with a highly toxic substance, low-level contamination with a low-toxicity substance).

3.3.65* Protective Clothing. One component of personal protective equipment (PPE) that is defined as any clothing specifically designed, treated, or fabricated to protect personnel from hazards that are caused by extreme environmental conditions or a dangerous work environment.

3.3.65.1* ***Ballistic Protective Clothing (BPC).*** An item of personal protective equipment that provides protection against specific ballistic threats by helping to absorb the impact and reduce or prohibit penetration to the body from bullets and steel fragments from handheld weapons and exploding munitions.

3.3.65.2* ***Chemical-Protective Clothing (CPC).*** The ensemble elements (garment, gloves, and footwear) provided to shield or isolate a person from the hazards encountered during hazardous materials/WMD incident operations.

3.3.65.2.1* ***Liquid Splash–Protective Ensemble.*** Multiple elements of compliant protective clothing and equipment products that when worn together provide protection from some, but not all, risks of hazardous materials/WMD emergency incident operations involving liquids.

3.3.65.2.2* ***Vapor-Protective Ensemble.*** Multiple elements of compliant protective clothing and equipment that when worn together provide protection from some, but not all, risks of vapor, liquid-splash, and particulate environments during hazardous materials/WMD incident operations.

3.3.65.3* ***High Temperature–Protective Clothing.*** Protective clothing designed to protect the wearer for short-term high temperature exposures.

3.3.65.4* ***Structural Firefighting Protective Clothing.*** The fire-resistant protective clothing normally worn by firefighters during structural firefighting operations, which includes a helmet, coat, pants, boots, gloves, PASS device, and a fire-resistant hood to cover parts of the head and neck not protected by the helmet and respirator facepiece.

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

3.3.67* Public Safety Bomb Technician. A trained individual who is authorized by the AHJ to perform interrogation and render safe activities on improvised explosive devices or other devices that could contain a hazardous material.

3.3.68 Public Safety Sampling. The detection, monitoring, or collection of a material for the purposes of determining the hazards present and to guide public safety response decisions.

3.3.69 Qualified. Having knowledge of the installation, construction, or operation of apparatus and the hazards involved.

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

3.3.71* Rescue Team. Consists of responders trained to receive a stricken entry team member who has been removed from the hot zone by the backup team. Use of the rescue team is an option that is activated by the Incident Commander based on an assessment of risk and the needs of the incident.

3.3.72* Respiratory Protection. Equipment designed to protect the wearer from the inhalation of contaminants.

3.3.73* Response. That portion of incident management in which personnel are involved in controlling hazardous materials/weapons of mass destruction (WMD) incidents.

3.3.74* Risk. The probability of an adverse outcome.

3.3.75* Risk-Based Response. Systematic process, based on the facts, science, and circumstances of the incident, by which responders analyze a problem involving hazardous materials/weapons of mass destruction (WMD)to assess the hazards and consequences, develop an incident action plan (IAP), and evaluate the effectiveness of the plan.

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

3.3.77* Sampling. The process of selecting materials to analyze.

3.3.78 Scenario. A sequence or synopsis of actual or imagined events used in the field or classroom to provide information necessary to meet student competencies; can be based upon threat assessment.

3.3.79 SETIQ. The Emergency Transportation System for the Chemical Industry in Mexico that provides emergency response information and assistance on a 24-hour basis for responders to emergencies involving hazardous materials/weapons of mass destruction (WMD).

3.3.80 Stabilization. The point in an incident when the adverse behavior of the hazardous material, or the hazardous component of a weapon of mass destruction (WMD), is controlled.

3.3.81 Standard Operating Procedure (SOP). A written directive that establishes specific operational or administrative methods to be followed routinely for the performance of a task or for the use of equipment.

3.3.82* Strategies. The general course of action, direction, or plan to accomplish incident objectives.

3.3.83 Surrounding Conditions. Conditions to be taken into consideration when identifying the scope of a hazardous materials/WMD incident, including but not limited to topography; land use, including utilities and fiber-optic cables; accessibility; weather conditions; bodies of water, including recharge ponds; public exposure potential; patient presentation; overhead and underground wires and pipelines; storm and sewer drains; possible ignition sources; adjacent land use such as rail lines, highways, and airports; and the nature and extent of injuries.

3.3.84* Tactics. Specific actions or tasks taken to achieve strategies involving the deployment and directing of resources on an incident.

3.3.85 Termination. That portion of incident management after the cessation of tactical operations in which personnel are involved in documenting safety procedures, site operations, hazards faced, and lessons learned from the incident and include specifications for debriefing, post-incident analysis, and critique in a specific sequence.

3.3.85.1 ***Critique.*** An element of incident termination that examines the overall effectiveness of the emergency response effort and develops recommendations for improvement.

3.3.85.2 ***Debriefing.*** An element of incident termination that focuses on the following: (1) informing responders exactly what hazmat they were (possibly) exposed to and the signs and symptoms of exposure; (2) identifying damaged equipment requiring replacement or repair; (3) identifying equipment or supplies requiring specialized decontamination or disposal; (4) identifying unsafe work conditions; (5) assigning information-gathering responsibilities for a post-incident analysis.

3.3.85.3 ***Post-Incident Analysis.*** An element of incident termination that includes completion of the required incident reporting forms, determining the level of financial responsibility, and assembling documentation for conducting a critique.

3.3.86* UN/NA Identification Number. The four-digit number assigned to a hazardous material/weapon of mass destruction (WMD) that is used to identify and cross-reference products in the transportation mode.

3.3.87 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.

3.3.88* Weapon of Mass Destruction (WMD). Any weapon or material that is designed to cause death or serious injury or damage to buildings, structures, or the environment such as an explosive or incendiary bomb, rocket, or grenade (destructive or delivery device); containing or delivering a toxic or danger-

ous chemical; biological agent, toxin, or vectors; or a weapon that is designed to release dangerous levels of radiation.

3.3.88.1* ***Radiological Weapons of Mass Destruction.***

3.3.88.1.1* ***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.

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

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

3.4 Hazardous Materials Responder Level Definitions.

3.4.1 Awareness Level.

3.4.1.1 ***Awareness Level Personnel.*** Personnel who, in the course of their normal duties, could encounter an emergency involving hazardous materials/weapons of mass destruction (WMD) and who are expected to recognize the presence of the hazardous materials/WMD, protect themselves, call for trained personnel, and secure the scene.

3.4.2 Operations Level.

3.4.2.1 ***Operations Level Competencies.***

3.4.2.1.1 ***Agent-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 respond to releases or potential releases of a specific group of WMD agents.

3.4.2.1.2 ***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, evidence preservation, and sampling.

3.4.2.1.3* ***Operations Level Responders.*** Persons who respond to hazardous materials/weapons of mass destruction (WMD) incidents for the purpose of implementing or supporting actions to protect nearby persons, animals, the environment, or property from the effects of the release.

3.4.2.1.4 ***Operations Mission-Specific Responders.***

3.4.2.1.4.1 ***Operations Level Responders Assigned to Disablement/Disruption of Improvised Explosives Devices (IED), Improvised WMD Dispersal Devices, and Operations at Improvised Explosive Laboratories.*** Persons, competent at the operations level, who are assigned to interrupt the functioning of improvised explosive devices (IED) and improvised WMD dispersal devices and to conduct operations at improvised explosive laboratories.

3.4.2.1.4.2 ***Operations Level Responders Assigned to Perform Air Monitoring and Sampling.*** Persons, competent at the operations level, who are assigned to implement air monitoring and sampling operations at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.2.1.4.3 ***Operations Level Responders Assigned to Perform Evidence Preservation and Sampling.*** Persons, competent at the operations level, who are assigned to preserve forensic evidence, take samples, and/or seize evidence at hazardous materials/weapons of mass destruction (WMD) incidents involving potential violations of criminal statutes or governmental regulations.

3.4.2.1.4.4 ***Operations Level Responders Assigned to Perform Mass Decontamination.*** Persons, competent at the operations level, who are assigned to implement mass decontamination operations at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.2.1.4.5 ***Operations Level Responders Assigned to Perform Product Control.*** Persons, competent at the operations level, who are assigned to implement product control measures at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.2.1.4.6 ***Operations Level Responders Assigned to Perform Technical Decontamination.*** Persons, competent at the operations level, who are assigned to implement technical decontamination operations at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.2.1.4.7 ***Operations Level Responders Assigned to Perform Victim Rescue/Recovery.*** Persons, competent at the operations level, who are assigned to rescue and/or recover exposed and contaminated victims at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.2.1.4.8 ***Operations Level Responders Assigned to Respond to Illicit Laboratory Incidents.*** Persons, competent at the operations level, who are assigned to secure the scene, identify the laboratory process, and preserve evidence at hazardous materials/weapons of mass destruction (WMD) incidents involving illicit laboratories with potential violations of criminal statutes specific to the illegal manufacture of drugs or weapons of mass destruction (WMD).

3.4.2.1.4.9 ***Operations Level Responders Assigned Responsibilities for Biological Response.*** Persons, competent at the operations level, who, at hazardous materials/weapons of mass destruction (WMD) incidents involving biological materials, are assigned to support the Hazardous Materials Technician and other personnel, provide strategic and tactical recommendations to the on-scene Incident Commander, serve in a technical specialist capacity to provide technical oversight for operations, and act as a liaison between the Hazardous Materials Technician, response personnel, and other outside resources regarding biological issues.

3.4.2.1.4.10 ***Operations Level Responders Assigned Responsibilities for Chemical Response.*** Persons, competent at the operations level, who, at hazardous materials/weapons of mass destruction (WMD) incidents involving chemical materials, are assigned to support the Hazardous Materials Technician and other personnel, provide strategic and tactical recommendations to the on-scene Incident Commander, serve in a technical specialist capacity to provide technical oversight for operations, and act as a liaison between the Hazardous Materials Technician, response personnel, and other outside resources regarding chemical issues.

3.4.2.1.4.11 ***Operations Level Responders Assigned Responsibilities for Radiological Hazard-Specific Response.*** Persons, competent at the operations level, who, at hazardous materials/weapons of mass destruction (WMD) incidents involving a radiological hazard, are assigned to support the Hazardous Materials Technician and other personnel, provide strategic and tactical recommendations to the on-scene Incident Commander, serve in a technical specialist capacity to provide technical oversight for operations, and act as a liaison between the Hazardous Materials Technician, response personnel, and other outside resources regarding radiological hazard-specific issues.

3.4.2.1.4.12 ***Operations Level Responders Assigned to Use Personal Protective Equipment (PPE).*** Persons, competent at the operations level, who are assigned to use personal protective equipment (PPE) at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.3 Technician Level.

3.4.3.1 ***Hazardous Materials Technician.*** A person who responds to hazardous materials/weapons of mass destruction (WMD) incidents using a risk-based response process to analyze a problem involving hazardous materials/WMD, plan a response to the problem, implement the planned response, evaluate progress of the planned response and adjust accordingly, and assist in terminating the incident.

3.4.3.2 ***Hazardous Materials Technician with an Advanced Chemical Risk Assessment and Analysis Specialty.*** A person who provides technical support to the Hazardous Materials Technician and other personnel by implementing advanced chemical risk assessment and analysis operations at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.3.3 ***Hazardous Materials Technician with an Advanced Decontamination Specialty.*** A person who provides technical support to the Hazardous Materials Technician and other personnel by applying advanced knowledge of decontamination applications, technology, and procedures.

3.4.3.4 ***Hazardous Materials Technician with an Advanced Monitoring and Detection Specialty.*** A person who provides technical support to the Hazardous Materials Technician and other personnel by implementing advanced monitoring and detection operations at hazardous materials/WMD incidents.

3.4.3.5 ***Hazardous Materials Technician with an Advanced Product Control Specialty.*** A person who provides technical support to the Hazardous Materials Technician and other personnel and implements advanced knowledge of product control applications, technology, and procedures at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.3.6 ***Hazardous Materials Technician with a Cargo Tank Specialty.*** A person who provides technical support pertaining to cargo tanks, provides oversight for product removal and movement of damaged cargo tanks, and acts as a liaison between the Hazardous Materials Technician and other outside resources at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.3.7 ***Hazardous Materials Technician with a Consequence Analysis and Planning Specialty.*** A person who provides technical support to the Hazardous Materials Technician and other personnel using technology systems and technical resource data to analyze the problem and estimate the area of impact, formulating recommendations for public protective actions, and assisting in developing IAPs at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.3.8 ***Hazardous Materials Technician with a Flammable Gases Bulk Storage Specialty.*** A person who, in incidents involving flammable gas bulk storage tanks, provides support to the Hazardous Materials Technician and other personnel, provides strategic and tactical recommendations to the on-scene Incident Commander, provides oversight for fire control and product removal operations, and acts as a liaison between technicians, firefighting personnel, and other resources.

3.4.3.9 ***Hazardous Materials Technician with a Flammable Liquids Bulk Storage Specialty.*** A person who, in incidents involving bulk flammable liquid storage tanks and related facilities, provides support to the Hazardous Materials Technician and other personnel, provides strategic and tactical recommendations to the on-scene Incident Commander, provides oversight for fire control and product removal operations, and acts as a liaison between technicians, response personnel, and outside resources.

3.4.3.10 ***Hazardous Materials Technician with an Intermodal Tank Specialty.*** A person who provides technical support pertaining to intermodal tanks, including UN portable tanks and multiple-element gas containers (MEGC), provides oversight for product removal and movement of damaged intermodal tanks, and acts as a liaison between the Hazardous Materials Technician and other outside resources at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.3.11 ***Hazardous Materials Technician with a Marine Tank and Non-Tank Vessel Specialty.*** A person who provides technical support pertaining to marine tank and non-tank vessels, provides oversight for product removal and movement of damaged marine tank and non-tank vessels, and acts as a liaison between the Hazardous Materials Technician and other outside resources at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.3.12 ***Hazardous Materials Technician with a Radiological Hazard Specialty.*** A person who provides support pertaining to the Hazardous Materials Technician and other personnel, uses radiation detection instruments, manages the control of radiation exposure, conducts hazards assessment, and acts as a liaison between Hazardous Materials Technicians at incidents involving radioactive materials.

3.4.3.13 ***Hazardous Materials Technician with a Tank Car Specialty.*** A person who provides technical support pertaining to tank cars, provides oversight for product removal and movement of damaged tank cars, and acts as a liaison between the Hazardous Materials Technician and other outside resources.

3.4.3.14 ***Hazardous Materials Technician with a Weapons of Mass Destruction (WMD) Specialty.*** A person who provides technical support to the Hazardous Materials Technician and other emergency response personnel by applying advanced knowledge of WMD agents, response equipment,

and response procedures during the intentional release of hazardous materials or WMD(s).

3.4.4 Command Level.

3.4.4.1* ***Hazardous Materials Officer.*** The person who is responsible for directing and coordinating all operations involving hazardous materials/weapons of mass destruction (WMD) as assigned by the Incident Commander (IC).

3.4.4.2* ***Hazardous Materials Safety Officer.*** The person who works within an incident command system (ICS) (specifically, the hazardous materials branch/group) to ensure that recognized hazardous materials/weapons of mass destruction (WMD) safe practices are followed at hazardous materials/WMD incidents.

3.4.4.3* ***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.

3.4.5 Specialist Employees.

3.4.5.1* ***Specialist Employee A.*** That person who is specifically trained to handle incidents involving chemicals or containers for chemicals used in the organization's area of specialization.

3.4.5.2* ***Specialist Employee B.*** That person who, during his or her regular job duties, works with or is trained in the hazards of specific chemicals or containers within the individual's area of specialization.

3.4.5.3* ***Specialist Employee C.*** That person who responds to incidents involving chemicals and/or containers within the organization's area of specialization.

3.4.6 Emergency Medical Services Responders to Hazardous Materials/Weapons of Mass Destruction (WMD).

3.4.6.1 ***Emergency Medical Services Responders to Hazardous Materials/Weapon of Mass Destruction (WMD) at the ALS Level (ALS Responder).*** Operations Level Responders who are ALS certified, assigned EMS mission-specific responsibilities at hazardous materials/WMD incidents, and trained to meet all competencies in Chapters 4, 6, and 8 and all competencies for the assigned responsibilities in Chapters 46, 47, and 48.

3.4.6.2 ***Emergency Medical Services Responders to Hazardous Materials/Weapon of Mass Destruction (WMD) at the BLS Level (BLS Responder).*** Operations Level Responders who are BLS certified, assigned EMS mission-specific responsibilities at hazardous materials/WMD incidents, and trained to meet all competencies in Chapters 4 and 6 and all competencies for the assigned responsibilities in Chapter 46.

Chapter 4 Competencies for Hazardous Materials/WMD Awareness Level Personnel (NFPA 472)

4.1 General.

4.1.1 Introduction.

4.1.1.1 Awareness Level Personnel shall be persons who, in the course of their normal duties, could encounter an emergency involving hazardous materials/weapons of mass destruction (WMD) and who are expected to recognize the presence of the hazardous materials/WMD, protect themselves, call for trained personnel, and secure the area.

4.1.1.2 Awareness Level Personnel shall be trained to meet all competencies defined in Sections 4.1 through 4.4 of this chapter.

4.1.1.3 Awareness Level Personnel shall receive additional training to meet applicable governmental occupational health and safety regulations.

4.1.2 Goal.

4.1.2.1 The goal of the competencies in this chapter shall be to provide personnel who in the course of normal duties encounter hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 4.1.2.2 in a safe and effective manner.

4.1.2.2 Given examples of hazardous materials/WMD incidents, policies and procedures, approved reference sources, and approved communications equipment, Awareness Level Personnel shall be able to perform the following tasks:

(1) Analyze the incident to identify both the hazardous materials/WMD present and the basic hazards for each hazardous materials/WMD agent involved by completing the following tasks:
   (a) Recognize the presence of hazardous materials/WMD.
   (b) Identify the name, United Nations/North American (UN/NA) identification number, marking/label/placard, container shape included in the *Emergency Response Guidebook (ERG)*, or other distinctive marking applied for the hazardous materials/WMD involved from a safe location.
   (c) Identify potential hazards from the current edition of the ERG, safety data sheet (SDS), shipping papers, and other approved reference sources.

(2) Implement actions consistent with the authority having jurisdiction (AHJ) emergency response plan, standard operating procedures, and the current edition of the ERG, SDS, or an equivalent document by completing the following tasks:
   (a) Isolate the hazard area and deny entry, follow personal safety procedures, and avoid or minimize hazards.
   (b) Initiate required notifications and communicate necessary information.

4.2 Competencies — Analyzing the Incident.

4.2.1 Recognizing the Presence of Hazardous Materials/WMD. Given examples of hazardous materials/WMD incidents and approved reference sources, Awareness Level Personnel shall recognize those situations where hazardous materials/WMD are present by completing the following requirements:

(1) Define the terms *hazardous material* (*dangerous goods* internationally) and *WMD*.
(2) Identify the hazard classes and divisions of hazardous materials/WMD and identify common examples of materials in each hazard class or division.
(3) Identify the primary hazards and associated harm with each hazard class and division.
(4) Identify the difference(s) between hazardous materials/WMD incidents and other emergencies.

(5) Identify typical occupancies and locations in the community where hazardous materials/WMD are manufactured, transported, stored, used, or disposed of.
(6) Identify typical container shapes included in the ERG that can indicate the presence of hazardous materials/WMD.
(7) Identify facility and transportation markings and colors that indicate hazardous materials/WMD, including the following:
    (a) Transportation markings, including UN/NA identification number marks, marine pollutant mark, elevated temperature (HOT) mark, commodity marking, and inhalation hazard mark
    (b) NFPA 704 markings
    (c) Military hazardous materials/WMD markings
    (d) Special hazard communication markings for each hazard class
    (e) Pipeline markings
    (f) Container markings
(8) Given an NFPA 704 marking, describe the significance of the colors, numbers, and special symbols.
(9) Identify placards and labels that indicate hazardous materials/WMD.
(10) Identify the following basic information about SDS:
    (a) Where to find SDS
    (b) Major sections of an SDS
(11) Match the name of the shipping papers found in transportation (air, highway, rail, and water) with the mode of transportation.
(12) Identify the following basic information on shipping papers for hazardous materials:
    (a) Entries on shipping papers that indicate the presence of hazardous materials
    (b) Person responsible for having the shipping papers in each mode of transportation
    (c) Where the shipping papers are found in each mode of transportation
    (d) Where the papers can be found in an emergency in each mode of transportation
(13) Identify examples of other clues, including senses (sight, sound, and odor), that indicate the presence of hazardous materials/WMD.

4.2.2 Identifying Hazardous Materials/WMD. Given examples of hazardous materials/WMD incidents, Hazardous Materials Awareness Level Personnel shall, from a safe location, identify the hazardous materials/WMD involved in each situation by name, UN/NA identification number, marking/label/placard applied, or container shape from the ERG or approved reference sources by completing the following requirements:

(1) Identify difficulties encountered in determining the specific names of hazardous materials/WMD at facilities and in transportation.
(2) Identify sources for obtaining the names of, UN/NA identification numbers for, types of placard/label applied, or container shape associated with hazardous materials/WMD in transportation.
(3) Identify sources for obtaining the names of hazardous materials/WMD at a facility.

4.2.3* Collecting Hazard Information. Given examples of hazardous materials/WMD by name, UN/NA identification number, marking/label/placard applied, and/or container shape, Hazardous Materials Awareness Level Personnel shall identify the potential hazards for each material using the current edition of the ERG or other approved reference sources; SDS; and manufacturer, shipper, and carrier documents (including shipping papers and emergency response information) and contacts by completing the following:

(1) Identify various methods for determining the ERG guide page for a hazardous material/WMD, including the name of the material; UN/NA identification number; table of markings, labels, and placards; and container identification charts.
(2) Identify the primary hazard (explosion, fire, or health) on the guide page for a given material.

4.3* Competencies — Planning the Response. (Reserved)

4.4 Competencies — Implementing the Planned Response.

4.4.1* Isolate the Hazard Area. Given examples of hazardous materials/WMD incidents, the emergency response plan, policies and procedures, and the current edition of the ERG, Awareness Level Personnel shall isolate and deny entry to the hazard area by completing the following requirements:

(1) Identify the location of both the emergency response plan and/or standard operating procedures.
(2) Identify the role of the Awareness Level Personnel during hazardous materials/WMD incidents.
(3) Identify the following basic precautions to be taken to protect themselves and others in hazardous materials/WMD incidents:
    (a) Identify the precautions necessary when providing emergency medical care to victims of hazardous materials/WMD incidents.
    (b) Identify typical ignition sources found at the scene of hazardous materials/WMD incidents.
    (c)* Identify the ways hazardous materials/WMD are harmful to people, animals, the environment, and property.
    (d)* Identify the general routes of entry for human exposure to hazardous materials/WMD.
(4)* Given examples of hazardous materials/WMD and the identity of each hazardous material/WMD (name, UN/NA identification number, marking/label/placard, container shape), identify the following response information:
    (a) Emergency action (fire, spill, or leak and first aid)
    (b) The following recommended PPE:
        i. Work uniforms
        ii. Structural firefighting protective clothing or other high temperature–protective clothing
        iii. Positive pressure self-contained breathing apparatus (SCBA)
        iv. Chemical-protective clothing and equipment
(5) Identify the definitions for each of the following protective actions:
    (a) Isolation of the hazard area and denial of entry
    (b) Evacuation
    (c)* Shelter-in-place
(6) Identify the size and shape of recommended initial isolation and protective action zones.
(7) Describe the difference(s) between small and large spills as found in the Table of Initial Isolation and Protective Action Distances in the ERG or equivalent document.

(8) Identify the circumstances under which the following distances are used at hazardous materials/WMD incidents:
   (a) Table of Initial Isolation and Protective Action Distances
   (b) Isolation distances in the numbered guides
(9) Describe the difference(s) between the isolation distances on the orange-bordered guidebook pages and the protective action distances on the green-bordered ERG pages.
(10) Identify the purpose of and methods used to isolate the hazard area and deny entry to unauthorized persons at hazardous materials/WMD incidents.

4.4.2 Initiating the Notification Process. Given a hazardous materials/WMD incident, policies and procedures, and approved communications equipment, Awareness Level Personnel shall initiate notifications at a hazardous materials/WMD incident and communicate the necessary information.

4.5* Competencies — Evaluating Progress. (Reserved)

4.6* Competencies — Terminating the Incident. (Reserved)

Chapter 5 Professional Qualifications for Hazardous Materials/WMD Awareness Level Personnel (NFPA 1072)

5.1 General.

5.1.1 Awareness Level Personnel are those persons who, in the course of their normal duties, could encounter an emergency involving hazardous materials/weapons of mass destruction (WMD) and who are expected to recognize the presence of the hazardous materials/WMD, protect themselves, call for trained personnel, and secure the area.

5.1.2* Awareness Level Personnel shall meet the JPRs defined in Sections 5.2 through 5.4.

5.1.3 General Knowledge Requirements. Role of Awareness Level Personnel at a hazardous materials/WMD incident, location and contents of the AHJ emergency response plan, and standard operating procedures for Awareness Level Personnel.

5.1.4 General Skills Requirements. (Reserved)

5.2* Recognition and Identification.

5.2.1 Recognize and identify the hazardous materials/WMD and hazards involved in a hazardous materials/WMD incident, given a hazardous materials/WMD incident and approved reference sources, so that the presence of hazardous materials/WMD is recognized, and the materials, their hazards, and associated harm are identified.

(A)* Requisite Knowledge. What hazardous materials (dangerous goods internationally) and WMD are; the differences between hazardous materials/WMD incidents and other emergencies; definitions of hazard classes and divisions of hazardous materials/WMD; ways in which hazard classes and divisions are harmful to people, the environment, animals, and property; general routes of entry for human exposure to hazardous materials/WMD; sights, sounds, and odors that might indicate the presence of hazardous materials; limitations of using senses to determine presence of hazardous materials/WMD; indicators to the presence of hazardous materials including container shapes included in the ERG, NFPA 704 markings, globally harmonized system (GHS) markings, placards, labels, pipeline markings, other transportation markings [including UN/NA identification number marks, marine pollutant mark, elevated temperature (HOT) mark, commodity marking and inhalation mark], shipping papers and emergency response information and the person responsible for the shipping papers in each mode of transportation (air, highway, rail, and water), where shipping papers are found during emergencies and nonemergency situations in each mode of transportation, and other indicators (including military hazardous materials/WMD markings, special hazard communication markings, and special container markings); difficulties encountered in determining the specific names of hazardous materials/WMD at facilities and in transportation; accessing response information from the *Emergency Response Guidebook* (ERG) (current edition) using the alphabetical index of chemical names, numerical index of identification numbers, table of markings, labels, and placards, or container identification charts; and types of hazard information available from the ERG, safety data sheets (SDS), shipping papers and emergency response information, and sources for obtaining the names of hazardous materials/WMD at a facility.

(B)* Requisite Skills. Recognizing indicators to the presence of hazardous materials/WMD; identifying hazardous materials/WMD by name, UN/NA identification number, marking/label/placard applied, or container shapes identified in the ERG; and using the ERG, SDS, manufacturer/shipper/carrier documents (including shipping papers and emergency response information) and other approved reference sources to identify hazardous materials/WMD and their primary hazards.

5.3* Initiate Protective Actions.

5.3.1 Isolate the hazard area and deny entry at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, policies and procedures, and approved reference sources, so that the hazard area is isolated and secured, personal safety procedures are followed, hazards are avoided or minimized, and additional people are not exposed to further harm.

(A)* Requisite Knowledge. Use of the ERG, SDS, shipping papers and emergency response information, or other approved reference sources to identify initial isolation and protective action distances, identify initial emergency actions (fire, spill, or leak and first aid), identify initial PPE, and identify recommended protective actions; the difference between the isolation distances on the orange-bordered guidebook pages and the protective action distances on the green-bordered ERG pages; the difference(s) between small and large spills as found in the Table of Initial Isolation and Protective Action Distances in the ERG or equivalent document; policies and procedures for isolating the hazard area and denying entry; and the purpose of and methods for isolating the hazard area and denying entry.

(B)* Requisite Skills. Recognizing precautions for protecting responders and the public; identifying isolation areas, denying entry, and avoiding or minimizing hazards.

5.4 Notification.

5.4.1 Initiate required notifications at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, policies and procedures, and approved communica-

tions equipment, so that the notification process is initiated and the necessary information is communicated.

(A)* Requisite Knowledge. Policies and procedures for notification, reporting, and communications.

(B) Requisite Skills. Communicating in accordance with policies and procedures.

Chapter 6 Competencies for Hazardous Materials/WMD Operations Level Responders (NFPA 472)

6.1 General.

6.1.1 Introduction.

6.1.1.1* The Operations Level Responder shall be that person who responds to hazardous materials/weapons of mass destruction (WMD) incidents for the purpose of implementing or supporting actions to protect nearby persons, animals, the environment, or property from the effects of the release.

6.1.1.2 The Operations Level Responder shall be trained to meet all competencies at the awareness level *(see Chapter 4)* and the competencies defined in Sections 6.2 through 6.5.

6.1.1.3* The Operations Level Responder shall receive additional training to meet applicable occupational health and safety regulations.

6.1.2 Goal.

6.1.2.1 The goal of the competencies in this chapter shall be to provide Operations Level Responders with the knowledge and skills to perform the competencies in 6.1.2.2 in a safe manner.

6.1.2.2* When responding to hazardous materials/WMD incidents, Operations Level Responders shall be able to perform the following tasks:

(1) Identify the scope of the problem, including the potential hazards, harm, and outcomes, by completing the following tasks:
   (a) Survey a hazardous materials/WMD incident to identify the location and form of any release, the containers and materials involved, and the surrounding conditions.
   (b) Collect hazard and response information from the ERG, SDS, CHEMTREC/CANUTEC/SETIQ, governmental authorities, and shipper/manufacturer/carrier documents, including shipping papers and emergency response information and shipper/manufacturer/carrier contacts.
   (c) Identify the likely behavior of a hazardous material/WMD and its container.
   (d) Identify the potential hazards, harm, and outcomes.
(2) Plan an initial response to a hazardous materials/WMD incident within the capabilities and competencies of available personnel and PPE by completing the following tasks:
   (a) Describe the strategies for the incident.
   (b) Describe the tactics available for each objective.
   (c) Determine whether the PPE provided is suitable for implementing each option.
   (d) Identify decontamination needs — emergency decontamination for people and animals and gross decontamination for tools, equipment, PPE, and apparatus.
   (e) Develop a plan of action, including safety considerations.
(3) Perform assigned tasks at a hazardous materials/WMD incidents to favorably change the outcomes consistent with the emergency response plan and standard operating procedures by completing the following tasks:
   (a) Establish and maintain scene control procedures, including control zones, and communications.
   (b) Where criminal or terrorist acts are suspected, establish a means of evidence preservation.
   (c) Initiate an incident command system (ICS) for hazardous materials/WMD incidents.
   (d) Perform tasks assigned as identified in the incident action plan.
   (e) Perform emergency decontamination for people and animals and gross decontamination for tools, equipment, PPE, and apparatus.
(4) Evaluate and report the progress of the assigned tasks taken at a hazardous materials/WMD incident to ensure that the strategies are met in a safe, effective, and efficient manner by completing the following tasks:
   (a) Evaluate the status of the actions taken in accomplishing the strategies.
   (b) Communicate the status of the planned response.

6.2 Competencies — Analyzing the Incident.

6.2.1* Surveying Hazardous Materials/WMD Incidents. Given examples of hazardous materials/WMD incidents, an assignment, policies and procedures, and approved reference sources, Operations Level Responders shall identify the scope of the problem including container types, materials involved and their physical state (gas, liquid, solid), location and physical state of any release, and surrounding conditions by completing the requirements of 6.2.1.1 through 6.2.1.1.6.

6.2.1.1 Given examples of containers for various hazard classes of hazardous materials/WMD, Operations Level Responders shall identify each container by type.

6.2.1.1.1* Given examples of the following containers for nonrefrigerated liquefied compressed gases and chemicals under pressure, Operations Level Responders shall identify each container by type:

(1) Bulk fixed facility pressure containers
(2) Pressure tank cars
(3) High-pressure cargo tanks
(4) Pressure UN portable tanks (intermodal tanks)
(5) Multiple-element gas containers (MEGCs)
(6) Ton containers
(7) Y-cylinders
(8) Liquefied compressed gas cylinders
(9) Vehicle-mounted pressure containers

6.2.1.1.2 Given examples of the following containers for refrigerated liquefied gases (cryogenic liquids), Operations Level Responders shall identify each container by type:

(1) Bulk fixed facility cryogenic containers
(2) Cryogenic liquid tank cars
(3) Cryogenic liquid cargo tanks
(4) Cryogenic liquid UN portable tanks (intermodal tanks)
(5) Cryogenic cylinders
(6) Dewar flasks

6.2.1.1.3 Given examples of the following containers for liquids, Operations Level Responders shall identify each container by type:

(1) Bulk fixed facility tanks
(2) Nonpressure tank cars (general service)
(3) Nonpressure liquid cargo tanks
(4) Low-pressure chemical cargo tanks
(5) Nonpressure UN portable tanks (intermodal tanks)
(6) Flexible intermediate bulk containers/rigid intermediate bulk containers (FIBCs/RIBCs)
(7) Flexible bladders
(8) Drums
(9) Bottles, flasks, carboys

6.2.1.1.4 Given examples of the following containers for solids, Operations Level Responders shall identify each container by type:

(1) Bulk fixed facility containers
(2) Railway gondolas, coal cars, hopper cars, nonpressure tank cars
(3) Dry bulk cargo trailers
(4) Nonpressure UN portable tanks (intermodal tanks)
(5) FIBCs/RIBCs
(6) Drums
(7) Bags, bottles, boxes

6.2.1.1.5 Given examples of the following containers for nonrefrigerated, compressed gases (high pressure), Operations Level Responders shall identify each container by type:

(1) Compressed gas tube trailers
(2) Multiple-element gas containers (MEGC) (intermodal tube modules)
(3) Cylinders

6.2.1.1.6 Given examples of the following containers for mixed-loads, Operations Level Responders shall identify each container by type:

(1) Box cars
(2) Mixed cargo trailers
(3) Freight containers

6.2.1.1.7 Given examples of the following radioactive material containers, Operations Level Responders shall identify the characteristics of each container by type *(see A.3.3.14.7)*:

(1) Excepted (package)
(2) Industrial (package)
(3) Type A (package)
(4) Type B (package)
(5) Type C (package)

6.2.1.2 Given examples of transport vehicles and facility storage containers, Operations Level Responders shall identify the markings that differentiate one container from another.

6.2.1.2.1 Given examples of the following marked transport vehicles and their corresponding shipping papers, Operations Level Responders shall identify marking used for identifying the specific transport vehicle:

(1) Highway transport vehicles, including cargo tanks
(2) Intermodal equipment, including UN portable tanks (intermodal tanks)
(3) Rail transport vehicles, including tank cars

6.2.1.2.2 Given examples of facility storage tanks, Operations Level Responders shall identify the markings indicating container size, product contained, and site identification numbers.

6.2.1.3 Given examples of hazardous materials incidents, Operations Level Responders shall identify the name(s) of the hazardous material(s) in 6.2.1.3.1 through 6.2.1.3.3.

6.2.1.3.1 Given examples of pipeline markers, Operations Level Responders shall identify the emergency telephone number, owner, and products as applicable.

6.2.1.3.2* Given examples of pesticide labels, Operations Level Responders shall identify the active ingredient, hazard statement, name of pesticide, and pest control product registration number.

6.2.1.3.3 Given examples of labels for a radioactive material, Operations Level Responders shall identify the type or category of label, contents, activity, transport index, and criticality safety index as applicable.

6.2.1.4 Operations Level Responders shall identify and list the surrounding conditions that should be noted when surveying a hazardous materials/WMD incident, including but not limited to the following:

(1) Topography
(2) Land use
(3) Accessibility
(4) Weather conditions
(5) Bodies of water
(6) Public exposure potential
(7) Overhead and underground wires and pipelines
(8) Storm and sewer drains
(9) Possible ignition sources
(10) Adjacent land use such as rail lines
(11) Highways
(12) Airports
(13) Nature and extent of injuries
(14) Building information, including the following:
    (a) Floor drains
    (b) Ventilation ducts
    (c) Air returns

6.2.1.5 Operations Level Responders shall describe resources to verify information obtained from the survey of a hazardous materials/WMD incident.

6.2.1.6* Given examples of hazardous materials/WMD incidents involving terrorist or criminal activities, Operations Level Responders shall identify the following at a minimum:

(1) Locations that could be targets for terrorist or criminal activities
(2) Indicators of possible terrorist or criminal activity involving chemical agents
(3) Indicators of possible terrorist or criminal activity involving biological agents and toxins
(4) Indicators of possible terrorist or criminal activity involving radiological agents
(5) Indicators of possible terrorist or criminal activity involving illicit laboratories
(6) Indicators of possible terrorist or criminal activities involving explosives
(7) Indicators of secondary devices
(8) Actions necessary when an incident is suspected to involve terrorist or criminal activity

6.2.1.7 Operations Level Responders shall describe ways in which responders are exposed to toxic products of combustion.

6.2.2 Collecting Hazard and Response Information. Given examples of hazardous materials/WMD incidents, an assignment, the names of the hazardous materials/WMD involved, policy and procedures, and approved reference sources, Operations Level Responders shall collect hazard and response information from SDS, CHEMTREC/CANUTEC/SETIQ, governmental authorities, and manufacturers, shippers, and carriers (highway, rail, water, air, and pipeline) by completing the following requirements:

(1) Using an SDS for a specified material, identify the following hazard and response information:
   (a) Identification, including supplier identifier and emergency telephone number
   (b) Hazard identification
   (c) Composition/information on ingredients
   (d) First aid measures
   (e) Firefighting measures
   (f) Accident release measures
   (g) Handling and storage
   (h) Exposure controls/personal protection
   (i) Physical and chemical properties
   (j) Stability and reactivity
   (k) Toxicological information
   (l) Ecological information (nonmandatory)
   (m) Disposal considerations (nonmandatory)
   (n) Transport information (nonmandatory)
   (o) Regulatory information (nonmandatory)
   (p) Other information
(2) Identify the types of assistance provided by, procedure for contacting, and information to be provided to CHEMTREC/CANUTEC/SETIQ and governmental authorities.
(3) Identify methods of contacting manufacturers, shippers, and carriers (highway, rail, marine, air, and pipeline) to obtain hazard and response information.
(4) Identify the type of assistance provided by governmental authorities with respect to criminal or terrorist activities involving the release or potential release of hazardous materials/WMD.
(5) Identify methods to communicate with carrier representatives to reduce the impact of a release.

6.2.3* Predicting the Likely Behavior of a Material and Its Container. Given examples of hazardous materials/WMD incidents involving a single hazardous material/WMD, an assignment, results of the incident survey, hazard information collected, and policies and procedures, Operations Level Responders shall describe the likely behavior of the material or agent and its container and the potential hazards associated with that behavior by completing the following requirements:

(1) Use the hazard information obtained from the current edition of the ERG, SDS, CHEMTREC/CANUTEC/SETIQ, governmental authorities, and manufacturer, shipper, and carrier contacts to describe the significance and impact of the following terms and chemical and physical properties on the product, the container, and the environment:
   (a)* Biological agents and toxins
      i. Bacteria
      ii. Viruses
   (b) Carcinogen
   (c) Corrosivity
      i. Acid
      ii. Base
      iii. Concentration
      iv. pH scale
      v. Strength
   (d) Expansion ratio (liquefied gases and cryogenics)
   (e) Flammability
      i. Boiling point
      ii. Flammable range
      iii. Flash point
      iv. Ignition (autoignition) temperature
      v. Lower explosive limit (LEL)
      vi. Upper explosive limit (UEL)
   (f) Persistence
   (g) Physical state (solid, liquid, gas)
   (h) Poison
   (i) Products of combustion (toxic)
   (j) Reactivity
      i. Air
      ii. Chemical
      iii. Energetic
      iv. Oxidizers
      v. Polymerization
      vi. Water
   (k) Radiation (ionizing and nonionizing)
   (l) Routes of exposure
   (m) Specific gravity
   (n) Vapor density
   (o) Vapor pressure
   (p) Toxicity
(2) Use the hazard information obtained from the current edition of the ERG, SDS, CHEMTREC/CANUTEC/SETIQ, governmental authorities, and manufacturer, shipper, and carrier contacts to identify the differences between the following terms:
   (a) *Contamination* and *secondary contamination*
   (b) *Exposure* and *contamination*
   (c) *Exposure* and *hazard*
   (d) *Infectious* and *contagious*
   (e) *Acute effects* and *chronic effects*
   (f) *Acute exposures* and *chronic exposures*
(3)* Identify ways containers can breach (disintegration, runaway cracking, closures open up, punctures, and splits or tears).
(4)* Identify ways containers can release their contents (detonation, violent rupture, rapid relief, spill, or leak).
(5)* Identify dispersion patterns that can be created upon release of a hazardous material (hemispherical, cloud, plume, cone, stream, pool, and irregular).
(6)* Identify the time frames for estimating the duration that hazardous materials/WMD will present an exposure risk (short-term, medium-term, and long-term).
(7)* Identify the health and physical hazards that could cause harm.
(8) Identify types of skin contact hazards encountered.

6.2.4* Estimating Potential Outcomes. Given examples of hazardous materials/WMD incidents, an assignment, the identified behavior of the hazardous materials/WMD and its container and the hazards associated with that behavior, the surrounding conditions, policies and procedures, and approved reference sources, Operations Level Responders shall

identify the potential outcomes affecting people, animals, the environment, and property by completing the following requirements:

(1)* Identify a resource for determining the size of an endangered area of a hazardous materials/WMD incident.
(2) Given the dimensions of the endangered areas and the surrounding conditions at a hazardous materials/WMD incident, describe the number and type of exposures within that endangered area.
(3) Identify resources available for determining the concentrations of a released hazardous materials/WMD within an endangered area.
(4)* Given the concentrations of the released materials, describe the factors for determining the extent of physical, health, and safety hazards within the endangered area of a hazardous materials/WMD incident.
(5) Describe the impact that time, distance, and shielding have on exposure to radioactive materials specific to the expected dose rate.
(6) Describe the potential for secondary devices at criminal or terrorist events.

6.3 Competencies — Planning the Response.

6.3.1 Collecting Response Information. Given examples of hazardous materials/WMD incidents, an assignment, the identity of hazardous materials/WMD involved, policy and procedures, and approved reference sources, Operations Level Responders shall collect response information on the hazardous materials/WMD involved from ERG, SDS, CHEMTREC/CANUTEC/SETIQ, governmental authorities, and manufacturers, shippers, and carriers (highway, rail, marine, air, pipeline).

6.3.2 Describing Strategies. Given examples of hazardous materials/WMD incidents, an assignment, policies and procedures, approved reference sources, scope of the problem including behavior of the hazardous materials/WMD and its container and likely harm and outcomes, and response information collected, Operations Level Responders shall describe the strategies for the problem by completing the following:

(1) Describe the number of exposures that could be saved with the resources provided by the AHJ.
(2) Describe the steps for determining strategies.
(3) Describe how to assess the risk to a responder for each hazard class in rescuing injured persons at a hazardous materials/WMD incident.
(4) Identify the three modes of operation at hazardous materials/WMD incidents, which includes the following:
    (a) Offensive
    (b) Defensive
    (c) Nonintervention

6.3.3 Identifying Tactics. Given examples of hazardous materials/WMD incidents, an assignment, policies and procedures, approved reference sources, the scope of the problem, and strategies, Operations Level Responders shall identify the tactics for each strategy by completing the following:

(1) Identify the options to accomplish a given strategy.
(2) Describe the prioritization of emergency medical care and removal of victims from the hazard area relative to exposure and contamination concerns.

6.3.4 Determining Suitability of Personal Protective Equipment (PPE). Given examples of hazardous materials/WMD incidents, an assignment, policies and procedures, approved reference sources, scope of the problem, strategies, and tactics, Operations Level Responders shall identify whether available PPE is applicable to performing assigned tasks by completing the following requirements:

(1)* Identify the respiratory protection required for a given tactic and the following:
    (a) Describe the advantages, limitations, uses, and operational components of the following types of respiratory protection at hazardous materials/WMD incidents:
        i. Self-contained breathing apparatus (SCBA)
        ii. Supplied air respirators
        iii. Powered air-purifying respirators
        iv. Air-purifying respirators
    (b) Identify the required physical capabilities and limitations of personnel working in respiratory protection.
(2) Identify skin contact hazards encountered at hazardous materials/WMD incidents and the purpose, advantages, and limitations of the following types of protective clothing at hazardous materials/WMD incidents:
    (a) Chemical-protective clothing, including liquid splash–protective ensembles and vapor-protective ensembles *(see A.3.3.65.2, A.3.3.65.2.1, and A.3.3.65.2.2)*
    (b) High temperature–protective clothing, including proximity suits and entry suits *(see A.3.3.65.3)*
    (c) Structural firefighting protective clothing *(see A.3.3.65.4)*

6.3.5* Identifying Emergency Decontamination Issues. Given examples of hazardous materials/WMD incidents, an assignment, policies and procedures, approved reference sources, scope of the problem, strategies, tactics, and personal protective equipment to be used, Operations Level Responders shall identify the emergency decontamination needs for the problem by completing the following:

(1) Identify ways that people, PPE, apparatus, tools, and equipment become contaminated.
(2) Describe how the potential for secondary contamination determines the need for emergency decontamination.
(3) Explain the importance, differences, and limitations of emergency/field expedient, gross, technical, and mass decontamination procedures at hazardous materials incidents.
(4) Identify the purpose of emergency decontamination procedures at hazardous materials incidents.

6.4 Competencies — Implementing the Planned Response.

6.4.1 Establishing Scene Control. Given examples of hazardous materials/WMD incidents, an assignment with limited potential of contact with hazardous materials/WMD, policies and procedures, scope of the problem, likely behavior and harm, and authorized tools, equipment, and PPE, Operations Level Responders shall establish and maintain scene control, including control zones and emergency decontamination, and communications between responders and to the public by completing 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
(4)* Perform emergency decontamination while preventing spread of contamination and avoiding hazards while using PPE.
(5)* Identify the items to be considered in a safety briefing prior to allowing personnel to work at the following:
  (a) Hazardous material incidents
  (b)* Hazardous materials/WMD incidents involving criminal activities
(6) Identify the procedures for ensuring coordinated communication between responders and to the public.

6.4.2* Recognizing and Preserving Evidence. Given examples of hazardous materials/WMD incidents, Operations Level Responders shall describe how to recognize and preserve evidence as listed in the emergency response plan or standard operating procedures.

6.4.3* Initiating the Incident Command System. Given examples of hazardous materials/WMD incidents, an assignment with limited potential of contact with hazardous materials/WMD, policies and procedures, and the scope of the problem, Operations Level Responders shall participate in the incident command system as required by the AHJ by completing the following requirements:

(1) Identify the role of the Operations Level Responder during hazardous materials/WMD incidents as specified in the emergency response plan and standard operating procedures.
(2) Identify the levels of hazardous materials/WMD incidents as defined in the emergency response plan.
(3) Identify the organization, purpose, importance, benefits, and elements of the incident command system for hazardous materials/WMD incidents.
(4) Identify the duties and responsibilities of the following functions within the incident command system:
  (a)* Incident Safety Officer
  (b) Hazardous materials branch or group
(5) Identify the considerations for determining the location of the incident command post for a hazardous materials/WMD incident.
(6) Identify the procedures for requesting additional resources at a hazardous materials/WMD incident.
(7) Describe the role and strategies of other agencies that respond to hazardous materials/WMD incidents.

6.4.4 Using Personal Protective Equipment (PPE). Given examples of hazardous materials/WMD incidents, an assignment with limited potential for contact with hazardous materials/WMD, the scope of the problem, strategies, assigned tasks, and policies and procedures, Operations Level Responders shall select and use the approved PPE provided by the AHJ by completing the following requirements:

(1) Identify the importance of the buddy system.
(2) Identify the importance of the backup team.
(3) Identify the safety precautions to be observed when approaching and working at hazardous materials/WMD incidents.
(4) Identify the signs and symptoms of thermal stress and procedures for their control.
(5) Identify the capabilities and limitations of personnel working in the PPE provided by the AHJ.
(6)* Identify the procedures for inspection, donning, working in, going through decontamination while wearing, and doffing approved PPE provided by the AHJ.
(7) Identify the procedures for cleaning, disinfecting, and inspecting PPE provided by the AHJ *[see A.6.4.4(6)]*.
(8) Inspect, don, work in, go through decontamination while wearing, and doff approved PPE *[see A.6.4.4(6)]*.
(9) Isolate contaminated tools, equipment, and PPE.
(10) Clean, disinfect, and inspect PPE provided by the AHJ.
(11) Maintain and store PPE following the instructions provided by the manufacturer on the care, use, and maintenance of the protective ensemble elements.

6.5 Competencies — Evaluating and Reporting Progress.

6.5.1 Evaluating the Status of Planned Response. Given examples of hazardous materials/WMD incidents, an assignment, policies and procedures, scope of the incident, an incident action plan, and assigned tasks, Operations Level Responders shall evaluate the progress and effectiveness of the assigned tasks in accomplishing the incident objectives and shall meet the following requirements:

(1) Identify the facts and circumstances that would indicate improving, static, or deteriorating conditions based on the effectiveness of strategies and tactics employed to accomplish the incident objectives in the IAP.
(2) Determine the status of assigned tasks.
(3) Describe the circumstances under which it would be prudent to withdraw from a hazardous materials/WMD incident.

6.5.2 Communicating the Status of Planned Response. Given examples of hazardous materials/WMD incidents an assignment, policies and procedures, an evaluation of the progress and effectiveness of the assigned tasks, and approved communication tools and equipment, Operations Level Responders shall report the progress and effectiveness of the assigned tasks to the supervisor as necessary by completing the following requirements:

(1) Identify the procedures for reporting the status of the planned response through the normal chain of command.
(2) Identify the methods for immediate notification of the Incident Commander and other response personnel about critical emergency conditions at the incident.

6.6* Competencies — Terminating the Incident. (Reserved)

Chapter 7 Professional Qualifications for Hazardous Materials/WMD Operations Level Responders (NFPA 1072)

7.1 General.

7.1.1 Operations Level Responders are those persons who respond to hazardous materials/weapons of mass destruction (WMD) incidents for the purpose of implementing or supporting actions to protect nearby persons, the environment, or property from the effects of the release.

7.1.2 Operations Level Responders shall meet the job performance requirements (JPRs) defined in Sections 5.1 through 5.4.

7.1.3 Operations Level Responders shall meet the JPRs defined in Sections 7.2 through 7.6.

7.1.4 General Knowledge Requirements. Role of Operations Level Responders at a hazardous materials/WMD incident; location and contents of AHJ emergency response plan and standard operating procedures for Operations Level Responders, including those response operations for hazardous materials/WMD incidents.

7.1.5 General Skills Requirements. (Reserved)

7.2* Identify Potential Hazards.

7.2.1 Identify the scope of the problem at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, policies and procedures, and approved reference sources, so that container types, materials, location and physical state (form) of release, and surrounding conditions are identified, hazard and response information is collected, the potential behavior of a material and its container is identified, and the potential hazards, harm, and outcomes associated with that behavior are identified.

(A)* Requisite Knowledge. Types of information to be collected during the hazardous materials/WMD incident survey, including types of containers and the physical state of their likely contents, material involved, general location and physical state (form) of release, and surrounding conditions in accordance with 6.2.1.4; container identification markings, including transportation vehicles and facility storage tanks, pesticide labels, radioactive material labels, piping and pipeline markings and contacting information; availability of shipping papers in transportation and of safety data sheets (SDS) at facilities; types of hazard and response information available from and how to contact CHEMTREC, CANUTEC, and SETIQ, governmental authorities, and manufacturers, shippers, and carriers (highway, rail, water, air, pipeline); how to communicate with subject matter experts including carrier and manufacturer representatives to reduce impact of a release; basic physical and chemical properties in accordance with 6.2.3(1) and 6.2.3(2); how to identify the behavior of a material and its container based on the material's physical and chemical properties and identify hazards associated with that behavior; examples of potential criminal and terrorist targets; indicators of possible criminal or terrorist activity for each of the following: chemical agents, biological agents, radiological agents, illicit laboratories and explosives; additional hazards associated with terrorist or criminal activities, such as secondary devices and threats; and how to determine the likely harm and outcomes associated with the identified behavior and the surrounding conditions.

(B)* Requisite Skills. Identifying container types, materials, location and physical state (form) of release, and surrounding conditions at a hazardous materials/WMD incident; collecting hazard and response information; communicating with pipeline operators or carrier representatives; describing the likely behavior of the hazardous materials or WMD and its container; and describing the likely outcomes associated with the identified behavior and surrounding conditions.

7.3* Identify Tactics.

7.3.1 Identify the tactics for a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, policies and procedures, approved reference sources, and the scope of the problem, so that response information is collected; strategies, tactics, safety precautions, suitability of approved personal protective equipment (PPE) available, and emergency decontamination needs are identified; and an action plan is developed.

(A)* Requisite Knowledge. Basic components of an incident action plan (IAP); modes of operation (offensive, defensive, and nonintervention); types of strategies; types of tactics; types of response information available from the *Emergency Response Guidebook* (ERG), SDS, shipping papers and emergency response information, and other resources; types of assistance provided by, procedure for contacting, and information to be provided to CHEMTREC, CANUTEC, and SETIQ, governmental authorities, and manufacturers, shippers, and carriers (highway, rail, water, air, pipeline); safety procedures; actions necessary when incident involves potential criminal or terrorist activities; risk analysis concepts; purpose, advantages, limitations, required physical capabilities and limitation of personnel working in PPE; uses of approved PPE to determine if PPE is suitable for the incident conditions; difference between the terms included in 10.2.3.1(B); contamination types, including sources and hazards of carcinogens at incident scenes; types of decontamination (emergency, mass, and technical); purpose, advantages, and limitations of emergency decontamination; and procedures, tools, and equipment for performing emergency decontamination.

(B)* Requisite Skills. Identifying strategies and tactics based on the scope of the problem and available resources; identifying whether approved PPE is suitable for the incident conditions; and identifying emergency decontamination needs based on the scope of the problem.

7.4* Action Plan Implementation.

7.4.1 Perform assigned tasks at a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment with limited potential of contact with hazardous materials/WMD, policies and procedures, the scope of the problem, approved tools, equipment, and PPE, so that protective actions and scene control are established and maintained, on-scene incident command is initiated, evidence is preserved, approved PPE is selected and used in the proper manner, exposures and personnel are protected, safety procedures are followed, hazards are avoided or minimized, assignments are completed, and emergency decontamination is conducted in the field.

(A)* Requisite Knowledge. Scene control procedures; procedures, including control zones and the criteria for determining the locations of the control zones; for protective actions, including evacuation and sheltering-in-place; procedures for ensuring coordinated communications between responders and to the public; evidence recognition and preservation procedures; incident command organization; purpose, importance, benefits, and organization of incident command at hazardous materials/WMD incidents; policies and procedures for implementing incident command at hazardous materials/WMD incidents; duties and responsibilities of the Incident Safety Officer; items to be considered in a safety briefing per 6.4.1(5); duties and responsibilities of the hazardous materials branch or group; capabilities, limitations, inspection, donning, working in, going through decontamination while wearing, and doffing of approved PPE; signs and symptoms of thermal stress; safety precautions when working at hazardous materials/WMD incidents; purpose, advantages, and limitations of emergency decontamination; the need for emergency decontamination in the field based on the task(s) performed

and contamination received, including sources and hazards of carcinogens at incident scenes; emergency decontamination; and cleaning, disinfecting, and inspecting tools, equipment, and PPE.

(B)* Requisite Skills. Establishing and maintaining scene control; recognizing and preserving evidence; inspecting, donning, working in, going through decontamination while wearing, and doffing approved PPE; isolating contaminated tools, equipment, and PPE; conducting emergency decontamination; and cleaning, disinfecting, and inspecting approved tools, equipment, and PPE.

7.5 Emergency Decontamination.

7.5.1 Perform emergency decontamination at a hazardous materials/WMD incident, given a hazardous materials/WMD incident that requires emergency decontamination; an assignment; scope of the problem; policies and procedures; and approved tools, equipment, and PPE for emergency decontamination, so that emergency decontamination needs are identified, approved PPE is selected and used, exposures and personnel are protected, safety procedures are followed, hazards are avoided or minimized, emergency decontamination is set up and implemented, and victims and responders are decontaminated.

(A)* Requisite Knowledge. Contamination, cross contamination, and exposure; contamination types; routes of types of decontamination (emergency, mass, and technical); purpose, advantages, and limitations of emergency decontamination; policies and procedures for performing emergency decontamination; approved tools and equipment for emergency decontamination; and hazard avoidance for emergency decontamination.

(B) Requisite Skills. Selecting an emergency decontamination method; setting up emergency decontamination in a safe area; using PPE in the proper manner; implementing emergency decontamination; preventing spread of contamination; and avoiding hazards during emergency decontamination.

7.6* Progress Evaluation and Reporting.

7.6.1 Evaluate and report the progress of an assigned task for a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, policies and procedures, status of implemented strategies and tactics, and approved communication tools and equipment, so that the effectiveness of the assigned task is evaluated and communicated to the Incident Commander or designee so that the IAP can be adjusted as needed.

(A)* Requisite Knowledge. Components of progress reports; policies and procedures for evaluating and reporting progress; methods for immediate notification of Incident Commander and other response personnel regarding critical emergency conditions at an incident; use of approved communication tools and equipment; facts and circumstances indicating improving, static, or deteriorating conditions based on the assigned tasks intended to accomplish the incident objectives; and the ability to compare actual behavior of the material and the container to the predicted circumstances under which it would be prudent to withdraw from a hazardous materials/WMD incident.

(B)* Requisite Skills. Determining incident status; determining whether the strategies are being accomplished; using approved communications tools and equipment; and communicating the status of assigned tasks.

Chapter 8 Competencies for Hazardous Materials/WMD Operations Level Responders Assigned Mission-Specific Responsibilities (NFPA 472)

8.1 General.

8.1.1 Introduction.

8.1.1.1* This chapter shall address competencies for Operations Level Responders who are assigned mission-specific responsibilities at hazardous materials/WMD incidents by the AHJ beyond the competencies at the operations level *(see Chapter 6)*. Operations Mission-Specific Responders will be identified by the specialty area as follows:

(1) PPE *(see Section 8.2)*
(2) Mass decontamination *(see Section 8.3)*
(3) Technical decontamination *(see Section 8.4)*
(4) Evidence preservation and public safety sampling *(see Section 8.5)*
(5) Product control *(see Section 8.6)*
(6) Detection, monitoring, and sampling *(see Section 8.7)*
(7) Victim rescue and recovery *(see Section 8.8)*
(8) Illicit laboratory incidents *(see Section 8.9)*
(9) Radiological hazard-specific tasks *(see Section 8.10)*
(10) Disablement/disruption of improvised explosive devices (IED), improvised WMD dispersal devices, and operations at improvised explosives laboratories *(see Section 8.11)*
(11) Diving in contaminated water environment *(see Section 8.12)*
(12) Evidence collection *(see Section 8.13)*

8.1.1.2 Operations Mission-Specific Responders shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies in Section 8.2, and all competencies for each assigned responsibility in Sections 8.3 through 8.11.

8.1.1.3* Operations Mission-Specific Responders shall receive additional training to meet applicable AHJ occupational health and safety regulations.

8.1.1.4 Operations Mission-Specific Responders shall operate under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures.

8.1.1.5 The development of assigned mission-specific knowledge and skills shall be based on the resources and procedures provided by the AHJ for the mission-specific responsibilities assigned.

8.1.2 Goal. The goal of the competencies in this chapter shall be to provide Operations Mission-Specific Responders with the knowledge and skills to perform the assigned mission-specific responsibilities in a safe and effective manner.

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

8.1.3.1 Operations Mission-Specific Responders, operating within the scope of their training in this chapter, shall be able to perform their assigned mission-specific responsibilities.

8.1.3.2 If a response organization desires to train some or all of its Operations Mission-Specific Responders with responsibilities at hazardous materials/WMD incidents, the minimum required competencies shall be as set out in this chapter.

8.2 Mission-Specific Competencies: PPE.

8.2.1 General.

8.2.1.1 Introduction.

8.2.1.1.1 Operations Mission-Specific Responders at hazardous materials/WMD incidents shall be assigned by the AHJ to select, inspect, don, work in, go through decontamination while wearing, and doff AHJ-provided PPE at hazardous materials/WMD incidents.

8.2.1.1.2 Operations Mission-Specific Responders at hazardous materials/WMD incidents assigned to use AHJ-provided PPE shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, and all competencies in this section.

8.2.1.1.3 Operations Mission-Specific Responders at hazardous materials/WMD incidents assigned to use AHJ-provided PPE shall operate under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures.

8.2.1.1.4 Operations Mission-Specific Responders assigned to use AHJ-provided PPE shall receive the additional training necessary to meet specific needs of the AHJ.

8.2.1.1.4.1 Operations Mission-Specific Responders shall have the knowledge of the types of AHJ-approved communications equipment and be competent in the equipment's operation.

8.2.1.2 Goal. The goal of the competencies in this section shall be to provide Operations Mission-Specific Responders assigned to select, inspect, don, work in, go through decontamination while wearing, and doff AHJ-provided PPE with the knowledge and skills to perform the tasks in a safe and effective manner. Given examples of hazardous materials/WMD incidents, an assignment; the scope of the problem; strategies and tactics for the incident; policies and procedures; access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures; approved PPE; and policies and procedures, Operations Mission-Specific Responders assigned to use AHJ-provided PPE shall be able to perform the following tasks:

(1) Select PPE provided by the AHJ based on tasks assigned.
(2) Inspect, don, work in, go through emergency and technical decontamination while wearing, and doff PPE provided by the AHJ consistent with the AHJ standard operating procedures and the incident site safety and control plan by following safety procedures, avoiding or minimizing hazards, and protecting exposures and personnel.
(3) Maintain and store PPE consistent with AHJ policies and procedures.
(4) Report and document the use of PPE.

8.2.2 Competencies — Analyzing the Incident. (Reserved)

8.2.3 Competencies — Planning the Response.

8.2.3.1 Selecting PPE. Given examples of hazardous materials/WMD incidents with known and unknown hazardous materials/WMD and the PPE provided by the AHJ, Operations Mission-Specific Responders assigned to use PPE provided by the AHJ shall select the PPE required to support assigned tasks based on AHJ policies and procedures by completing the following requirements:

(1)* Describe the importance of working under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures.
(2) Describe the purpose of each type of PPE provided by the AHJ for response to hazardous materials/WMD incidents based on NFPA standards and how these items relate to EPA levels of protection.
(3) Describe capabilities and limitations of PPE provided by the AHJ for the hazards and associated types of harm based on a determination of the risks for that jurisdiction or community.
(4) Select PPE provided by the AHJ for assigned mission-specific tasks at hazardous materials/WMD incidents based on AHJ policies and procedures.
    (a) Describe the following terms and explain their impact and significance on the selection of chemical-protective clothing (CPC):
        i. Degradation
        ii. Penetration
        iii. Permeation
    (b) Identify indications of material degradation of CPC.
    (c) Identify the different designs of vapor-protective clothing and liquid splash–protective clothing, and describe the advantages and disadvantages of each type.
    (d)* Identify the advantages and disadvantages of the following cooling measures:
        i. Air cooled
        ii. Ice cooled
        iii. Water cooled
        iv. Phase change cooling technology
    (e) Identify the physiological and psychological stresses that can affect users of PPE.
    (f) Describe AHJ policies and procedures for going through the emergency and technical decontamination process while wearing PPE.

8.2.4 Competencies — Implementing the Planned Response.

8.2.4.1 Using PPE. Given examples of the PPE provided by the AHJ, Operations Mission-Specific responders assigned to use PPE shall demonstrate the ability to inspect, don, work in, go through decontamination while wearing, and doff the AHJ-provided PPE to support assigned mission-specific tasks by completing the following requirements:

(1) Describe safety precautions for responders wearing PPE, including buddy systems, backup systems, accountability systems, safety briefings, and evacuation/escape procedures
(2) Inspect, don, work in, and doff PPE provided by the AHJ following safety procedures, protecting exposures and responders, and avoiding or minimizing hazards
(3) Go through the process of being decontaminated (emergency and technical) while wearing PPE
(4) Maintain and store PPE according to AHJ policies and procedures

8.2.5 Competencies — Evaluating Progress. (Reserved)

8.2.6 Competencies — Terminating the Incident.

8.2.6.1 Reporting and Documenting PPE Use. Given examples of hazardous materials/WMD incidents and AHJ policies and procedures, Operations Mission-Specific Responders assigned PPE provided by the AHJ shall report and document use of the PPE by the AHJ by completing the following *[see A.8.11.3.1(1)(b)]*:

(1) Identify the reports and supporting documentation required by the AHJ pertaining to PPE use.
(2) Describe the importance of responders exposure records.
(3) Identify the steps in keeping an activity log and exposure records.
(4) Identify the requirements for filing documents and maintaining records.

8.3 Mission-Specific Competencies: Mass Decontamination.

8.3.1 General.

8.3.1.1 Introduction.

8.3.1.1.1 Operations Mission-Specific Responders assigned to perform mass decontamination at hazardous materials/WMD incidents shall be competent at the operations level *(see Chapter 6)* and assigned by the AHJ to select, set up, implement, evaluate, and terminate mass decontamination for ambulatory and nonambulatory victims at hazardous materials/WMD incidents.

8.3.1.1.2 Operations Mission-Specific Responders assigned to perform mass decontamination at hazardous materials/WMD incidents shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all mission-specific competencies for PPE *(see Section 8.2)*, and all competencies in this section.

8.3.1.1.3 Operations Mission-Specific Responders assigned to perform mass decontamination 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.

8.3.1.1.4* Operations Mission-Specific Responders assigned to perform mass decontamination at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the AHJ.

8.3.1.2 Goal.

8.3.1.2.1 The goal of the competencies in this section shall be to provide Operations Mission-Specific Responders assigned to select, set up, implement, evaluate, and terminate mass decontamination for ambulatory and nonambulatory victims at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 8.3.1.2.2 in a safe and effective manner.

8.3.1.2.2 Given examples of hazardous materials/WMD incidents that require mass decontamination; an assignment; the scope of the problem; policies and procedures; AHJ-provided resources and PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, Operations Mission-Specific Responders assigned to perform mass decontamination shall be able to perform the following tasks:

(1) Select a mass decontamination process to minimize the hazard for an assigned mission-specific task within the capabilities of available responders, PPE, and response equipment provided by the AHJ.
(2) Set up and implement the selected mass decontamination process to decontaminate victims, responders, tools, and equipment consistent with AHJ policies and procedures and the incident site safety and control plan following safety procedures, avoiding or minimizing hazards, and protecting exposures and responders.
(3) Evaluate the effectiveness of the mass decontamination process.
(4) Report and document mass decontamination activities.

8.3.2 Competencies — Analyzing the Incident. (Reserved)

8.3.3 Competencies — Planning the Response.

8.3.3.1 Selecting a Mass Decontamination Process. Given examples of hazardous materials/WMD incidents requiring mass decontamination, Operations Mission-Specific Responders assigned to perform mass decontamination shall select a mass decontamination process that will minimize the hazard and spread of contamination based on AHJ policies and procedures by completing the following requirements:

(1) Describe the importance of working under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures when performing assigned tasks.
(2) Identify the advantages and limitations of mass decontamination methods.
(3) Identify sources of information for determining the correct mass decontamination methods, and identify how to access those resources in a hazardous materials/WMD incident.
(4) Identify the tools, equipment, and PPE required to set up and implement mass decontamination operations.
(5) Describe crowd control techniques that can be used at incidents where mass decontamination is required.
(6) Describe the AHJ's mass decontamination unit/team positions, and describe the roles and responsibilities.

8.3.4 Competencies — Implementing the Planned Response.

8.3.4.1 Performing Decontamination Operations Identified in the Incident Action Plan. Given examples of mass decontamination processes, resources, and PPE provided by the AHJ, Operations Mission-Specific Responders assigned to perform mass decontamination shall demonstrate the ability to set up and implement mass decontamination operations for ambulatory and nonambulatory victims consistent with AHJ policies and procedures following safety procedures, protecting exposures and Responders, and avoiding or minimizing hazards.

8.3.5 Competencies — Evaluating Progress.

8.3.5.1 Evaluating the Effectiveness of the Mass Decontamination Process. Given examples of contaminated items that have undergone the required decontamination, Operations Mission-Specific Responders assigned to mass decontamination operations shall identify procedures for determining whether the items have been fully decontaminated according to the standard operating procedures of the AHJ or the incident action plan.

8.3.6 Competencies — Terminating the Incident.

8.3.6.1 Reporting and Documenting Mass Decontamination Operations. Given examples of hazardous materials/WMD incidents involving mass decontamination operations and AHJ

policies and procedures, Operations Mission-Specific Responders assigned to perform mass decontamination shall identify the reporting and documentation required by the AHJ.

8.4 Mission-Specific Competencies: Technical Decontamination.

8.4.1 General.

8.4.1.1 Introduction.

8.4.1.1.1 Operations Mission-Specific Responders assigned to perform technical decontamination at hazardous materials/WMD incidents shall be competent at the operations level *(see Chapter 6)* and assigned by the AHJ to select, set up, implement, evaluate, and terminate technical decontamination in support of entry operations and for ambulatory and nonambulatory victims at hazardous materials/WMD incidents.

8.4.1.1.2 Operations Mission-Specific Responders assigned to perform technical decontamination at hazardous materials/WMD incidents shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all mission-specific competencies for PPE *(see Section 8.2)*, and all competencies in this section.

8.4.1.1.3 Operations Mission-Specific Responders assigned to perform technical decontamination at hazardous materials/WMD incidents shall operate under the guidance of a Hazardous Materials Technician, an allied professional, or standard operating procedures.

8.4.1.1.4* Operations Mission-Specific Responders assigned to perform technical decontamination at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the AHJ.

8.4.1.2 Goal.

8.4.1.2.1 The goal of the competencies in this section shall be to provide Operations Mission-Specific Responders assigned to select, set up, implement, evaluate, and terminate technical decontamination in support of entry operations and for ambulatory and nonambulatory victims at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 8.4.1.2.2 in a safe and effective manner.

8.4.1.2.2 Given examples of hazardous materials/WMD incidents that require technical decontamination; an assignment; the scope of the problem; policies and procedures for technical decontamination; AHJ-approved resources and PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, Operations Mission-Specific Responders assigned to perform technical decontamination shall be able to perform the following tasks:

(1) Select a technical decontamination process in support of entry operations and/or for ambulatory and nonambulatory victims, the capabilities of available responders, PPE, and response equipment in accordance with AHJ policies and procedures.
(2) Set up and implement the selected technical decontamination operations and methods following safety procedures, avoiding or minimizing hazards, and protecting exposures and responders.
(3) Evaluate the effectiveness of the technical decontamination process.
(4) Report and document the technical decontamination operations.

8.4.2 Competencies — Analyzing the Incident. (Reserved)

8.4.3 Competencies — Planning the Response.

8.4.3.1 Selecting a Technical Decontamination Process. Given examples of hazardous materials/WMD incidents that require technical decontamination; an assignment; the scope of the problem; policies and procedures; AHJ-approved resources and PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, Operations Mission-Specific Responders assigned to perform technical decontamination shall select a technical decontamination process to minimize the hazard and spread of contamination in support of entry operations and for ambulatory and nonambulatory victims by completing the following requirements:

(1) Describe the importance of working under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures when performing assigned tasks.
(2) Describe the advantages and limitations of each of the following technical decontamination methods:
    (a) Absorption
    (b) Adsorption
    (c) Chemical degradation
    (d) Dilution
    (e) Disinfection
    (f) Evaporation
    (g) Isolation and disposal
    (h) Neutralization
    (i) Solidification
    (j) Sterilization
    (k) Vacuuming
    (l) Washing
(3) Identify sources of information on the technical decontamination operations and methods available, and identify how to access those sources in hazardous materials/WMD incidents.
(4) Identify the tools, equipment, and PPE for performing required setup, and implement the selected technical decontamination operations.
(5) Identify the procedures, tools, equipment, and safety precautions for processing evidence collected during technical decontamination at hazardous materials/WMD incidents.
(6) Identify procedures, equipment, and safety precautions for handling resources, tools, equipment, weapons, criminal suspects, and animals brought to the decontamination corridor at hazardous materials/WMD incidents.

8.4.4 Competencies — Implementing the Planned Response.

8.4.4.1 Setting Up and Implementing Technical Decontamination. Given examples of technical decontamination operations, methods, and resources and PPE provided by the AHJ, Operations Mission-Specific Responders assigned to perform technical decontamination shall set up and implement technical decontamination operations and methods in support or entry operations and for ambulatory and nonambulatory victims following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards.

8.4.5 Competencies — Evaluating Progress.

8.4.5.1 Evaluating the Effectiveness of the Technical Decontamination Process. Given examples of contaminated victims, responders, tools, equipment, and PPE that have undergone the selected technical decontamination operations and methods, Operations Mission-Specific Responders assigned to perform technical decontamination shall evaluate the effectiveness of the technical decontamination process consistent with AHJ policies and procedures or the IAP by describing the procedures for evaluating effectiveness of the technical decontamination process by visual observations, monitoring device(s), ultraviolet lights, wipe sampling, and chemical analysis.

8.4.6 Competencies — Terminating the Incident.

8.4.6.1 Reporting and Documenting Technical Decontamination Operations. Given examples of a hazardous materials/WMD incidents involving technical decontamination operations/activities and AHJ policies and procedures, Operations Mission-Specific Responders assigned to perform technical decontamination shall identify the reporting and documentation required by the AHJ.

8.5 Mission-Specific Competencies: Evidence Preservation and Public Safety Sampling.

8.5.1 General.

8.5.1.1 Introduction.

8.5.1.1.1 Operations Mission-Specific Responders assigned to perform evidence preservation and public safety sampling and to preserve forensic evidence at hazardous materials/WMD incidents involving potential violations of criminal statutes or governmental regulations, including those involving suspicious letters and packages, illicit laboratories, a release/attack with a WMD agent, and environmental crimes shall be trained to the operations level *(see Chapter 6)* at a minimum.

8.5.1.1.2 Operations Mission-Specific Responders assigned to perform evidence preservation and public safety sampling at hazardous materials/WMD incidents shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all mission-specific competencies for PPE *(see Section 8.2)*, and all competencies in this section.

8.5.1.1.3 Operations Mission-Specific Responders assigned to perform evidence preservation and public safety sampling at hazardous materials/WMD incidents shall operate under the guidance of a Hazardous Materials Technician, an allied professional, or standard operating procedures.

8.5.1.1.4 Operations Mission-Specific Responders assigned to perform evidence preservation and public safety sampling at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the AHJ.

8.5.1.2 Goal.

8.5.1.2.1 The goal of the competencies in this section shall be to provide Operations Mission-Specific Responders assigned to perform evidence preservation and public safety sampling at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 8.5.1.2.2 in a safe and effective manner.

8.5.1.2.2 Given examples of hazardous materials/WMD incidents involving potential violations of criminal statutes or governmental regulations, including those involving suspicious letters and packages, illicit laboratories, a release/attack with a WMD agent, and environmental crimes; an assignment; the scope of the problem; policies and procedures; and AHJ-provided resources and PPE, Operations Mission-Specific Responders assigned to perform evidence preservation and public safety sampling shall be able to perform the following tasks:

(1) Analyze hazardous materials/WMD incidents to determine the complexity of the problem and potential outcomes by completing the following tasks:
   (a) Determine if the incident is potentially criminal in nature, and identify the law enforcement agency having investigative authority.
   (b) Identify unique aspects of criminal hazardous materials/WMD incidents.
(2) Plan a response for an activity where there is potential criminal intent involving hazardous materials/WMD within the capabilities and competencies of available responders, PPE, and resources by completing the following tasks:
   (a) Determine the tactics to conduct evidence preservation and public safety.
   (b) Describe how the tactics are within the legal authorities, capabilities, and competencies of available responders, PPE, and other resources.
(3) Implement the planned response to hazardous materials/WMD incidents involving potential violations of criminal statutes or governmental regulations by completing the following tasks under the guidance of law enforcement/the AHJ:
   (a) Secure the scene.
   (b) Identify and preserve evidence.
   (c) Collect public safety samples.
(4) Report and document evidence preservation and public safety sampling operations.

8.5.2 Competencies — Analyzing the Incident.

8.5.2.1 Determining If the Incident Is Potentially Criminal in Nature. Given examples of hazardous materials/WMD incidents, Operations Mission-Specific Responders assigned to perform evidence preservation and public safety sampling shall describe indicators of criminal activity that might be associated with each of the following situations:

(1) Hazardous materials/WMD suspicious letter
(2) Hazardous materials/WMD suspicious package
(3) Hazardous materials/WMD illicit laboratory
(4) Release/attack with a WMD agent
(5) Environmental crimes

8.5.2.2 Identifying the Law Enforcement Agency That Has Investigative Jurisdiction (AHJ). Given examples of hazardous materials/WMD incidents involving potential criminal activity, Operations Mission-Specific Responders assigned to perform evidence preservation and public safety sampling shall identify the agency having investigative authority and the incident response considerations associated with each of the following situations:

(1) Hazardous materials/WMD suspicious letter
(2) Hazardous materials/WMD suspicious package

(3) Hazardous materials/WMD illicit laboratory
(4) Release/attack with a WMD agent
(5) Environmental crimes

8.5.3 Competencies — Planning the Response.

8.5.3.1 Identifying Unique Aspects of Criminal Hazardous Materials/WMD Incidents. Operations Mission-Specific Responders assigned to evidence preservation and public safety sampling shall describe the unique aspects associated with illicit laboratories, hazardous materials/WMD incidents, and environmental crimes by completing the following requirements:

(1) Given examples of incidents involving illicit laboratories, hazardous materials/WMD(s), or environmental crimes, Operations Mission-Specific Responders assigned to perform evidence preservation and public safety sampling shall perform the following tasks:
   (a) Describe the procedure for securing the scene.
   (b) Describe the procedure to notify the agency with investigative authority.
   (c) Describe the procedure to notify the Public Safety Bomb Technician.
   (d) Describe the procedure to determine whether Operations Mission-Specific Responders are within their legal authority to perform evidence preservation and public safety sampling tasks.
   (e) Describe the procedure to document responders and scene operations associated with the incident.
   (f) Identify substance/material to sample.
   (g) Identify the applicable public safety sampling equipment.
   (h) Describe the procedures to protect public safety samples from contamination.
   (i) Describe procedures for documenting public safety sampling.
   (j) Describe public safety sampling process and techniques.
   (k) Describe field screening protocols.
   (l) Describe public safety labeling and packaging procedures.
   (m) Describe public safety sampling packaging decontamination procedures.
   (n) Describe packaging procedures for transportation public safety samples.
   (o) Describe chain-of-custody procedures.
(2) Given examples of illicit laboratory incidents, Operations Mission-Specific Responders assigned to evidence preservation and public safety sampling shall be able to perform the following tasks:
   (a) Describe the hazards, safety procedures, decontamination, and tactical guidelines for this type of incident.
   (b) Describe the factors to be evaluated in selecting the PPE, sampling equipment, detection devices, and public safety sample and evidence packaging and transport containers.
   (c) Describe the sampling options for both liquid and solid public safety sample collection.
(3) Given examples of environmental crimes, Operations Mission-Specific Responders assigned to evidence preservation and public safety sampling shall be able to perform the following tasks:
   (a) Describe the hazards, safety procedures, decontamination, and tactical guidelines for this type of incident.
   (b) Describe the factors to be evaluated in selecting the PPE, sampling equipment, detection devices, and public safety sample packaging and transport containers.
   (c) Describe the sampling options for both liquid and solid materials.
(4) Given examples of hazardous materials/WMD incidents with suspicious letters, Operations Mission-Specific Responders assigned to evidence preservation and public safety sampling shall be able to perform the following tasks:
   (a) Describe the hazards, safety procedures, decontamination, and tactical guidelines for this type of incident.
   (b) Describe the factors to be evaluated in selecting the PPE, sampling equipment, detection devices, and public safety sample packaging and transport containers.
   (c) Describe the sampling options for both the liquid and solid materials.
(5) Given examples of a hazardous materials/WMD incidents with suspicious packages, Operations Mission-Specific Responders assigned to evidence preservation and public safety sampling shall be able to perform the following tasks:
   (a) Describe the hazards, safety procedures, decontamination, and tactical guidelines for this type of incident.
   (b) Describe the factors to be evaluated in selecting the PPE, sampling equipment, detection devices, and public safety sample packaging and transport containers.
   (c) Describe the sampling options for both liquid and solid materials.
(6) Given examples of hazardous materials/WMD incidents/attacks involving the release agents, Operations Mission-Specific Responders assigned to evidence preservation and public safety sampling shall be able to perform the following tasks:
   (a) Describe the hazards, safety procedures, decontamination, and tactical guidelines for this type of incident.
   (b) Describe the factors to be evaluated in selecting the PPE, sampling equipment, detection devices, and public safety sample packaging and transport containers.
   (c) Describe the sampling options for both liquid and solid materials.
(7) Given examples of different types of criminal hazardous materials/WMD incidents, Operations Mission-Specific Responders shall identify and describe the application, use, and limitations of the various types of field screening tools that can be utilized for assessing the following properties:
   (a) Corrosivity
   (b) Flammability
   (c) Oxidation
   (d) Ionizing radiation dose and contamination
   (e) Volatile organic compounds (VOC)
   (f) Fluorides

(8) Describe the possible adverse impacts of consuming or destroying potential evidence during sampling and field screening techniques.
(9) Describe the procedures for maintaining the evidentiary integrity of all items removed from the crime scene.
(10) Describe circumstances when public safety samples can become evidence.

8.5.3.2 Selecting Personal Protective Equipment (PPE). Given examples of the PPE provided by the AHJ, the Operations Mission-Specific Responders assigned to perform evidence preservation and public safety sampling shall select the PPE required to support evidence preservation and public safety sampling at hazardous materials/WMD incidents based on the AHJ's procedures and the PPE selection matrix from NFPA 1891, Annex B. *(See Section 8.2.)*

8.5.4 Competencies — Implementing the Planned Response.

8.5.4.1 Implementing the Planned Response. Given examples of incident action plans for criminal incidents involving hazardous materials/WMD(s), Operations Mission-Specific Responders assigned to evidence preservation and public safety sampling shall implement selected response actions consistent with the emergency response plan or standard operating procedures by completing the following requirements:

(1) Secure the scene.
(2) Describe the procedure to notify the agency with investigative authority.
(3) Describe the procedure to notify the Public Safety Bomb Technician.
(4) Determine whether the Operations Level Responders are within their legal authority to perform evidence preservation and public safety sampling tasks.
(5) Document responders and scene operations associated with the incident.
(6) Identify and preserve potential evidence at the scene.
(7) Identify substance/material to sample.
(8) Identify the applicable public safety sampling equipment.
(9) Protect public safety samples from contamination.
(10) Complete public safety sampling documentation.
(11) Collect public safety samples.
(12) Perform field screening procedures.
(13) Label and package public safety samples.
(14) Decontaminate public safety sample packaging.
(15) Package public safety samples for safe transportation.
(16) Perform chain-of-custody procedures.

8.5.5 Competencies — Evaluating Progress. (Reserved)

8.5.6 Competencies — Terminating the Incident. Given examples of hazardous materials/WMD incidents involving evidence preservation and public safety sampling operations and AHJ policies and procedures, Operations Mission-Specific Responders assigned to perform evidence preservation and public safety sampling shall identify the reporting and documenting requirements for evidence preservation and public safety sampling operations as required by the AHJ.

8.6 Mission-Specific Competencies: Product Control.

8.6.1 General.

8.6.1.1 Introduction.

8.6.1.1.1 Operations Mission-Specific Responders assigned to perform product control with limited risk of personal exposure shall be competent at the operations level *(see Chapter 6)* and assigned by the AHJ to confine and contain releases of hazardous materials/WMD and control flammable liquids and flammable gases.

8.6.1.1.2 Operations Mission-Specific Responders assigned to perform product control at hazardous materials/WMD incidents shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all mission-specific competencies for PPE *(see Section 8.2)*, and all competencies in this section.

8.6.1.1.3 Operations Mission-Specific Responders assigned to perform product control 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.

8.6.1.1.4 Operations Mission-Specific Responders assigned to perform product control at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the AHJ.

8.6.1.2 Goal.

8.6.1.2.1 The goal of the competencies in this section shall be to provide the Operations Mission-Specific Responders assigned to perform product control, including to confine or contain releases of hazardous materials/WMD and to control flammable liquid and flammable gas releases, with limited risk of personal exposure at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 8.6.1.2.2 in a safe and effective manner.

8.6.1.2.2 Given examples of hazardous materials/WMD incidents with release of product; an assignment: the scope of the problem; policies and procedures; approved resources and PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, Operations Mission-Specific Responders assigned to perform product control shall be able to perform the following tasks:

(1) Select techniques to control releases with limited risk of personal exposure at hazardous materials/WMD incidents within the capabilities and competencies of available responders, resources, and PPE, in accordance with the AHJ policies and procedures, by completing the following requirements:
    (a) Describe control techniques to confine/contain released product with limited risk of personal exposure available to the Operations Level Responder.
    (b) Describe the location and operation of remote control/emergency shutoff devices on cargo and intermodal tanks and containers at fixed facilities containing flammable liquids and gases.
    (c) Describe the characteristics and applicability of available control agents and equipment available for controlling flammable liquid and flammable gas releases.
(2) Implement selected techniques for controlling released product with limited risk of responders exposure at the incident following safety procedures, avoiding or minimizing hazards, and protecting exposures and responders.
(3) Report and document product control operations.

8.6.2 Competencies — Analyzing the Incident. (Reserved)

8.6.3 Competencies — Planning the Response.

8.6.3.1 Selecting Product Control Techniques. Given examples of hazardous materials/WMD incidents, Operations Mission-Specific Responders assigned to perform product control with limited risk of personal exposure shall select techniques to confine or contain releases of hazardous materials/WMD and to control flammable liquid and flammable gas releases within the capabilities and competencies of available responders, tools and equipment, PPE, and resources in accordance with the AHJ's policies and procedures by completing the following requirements:

(1) Explain the importance of working under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures.
(2) Explain the difference between control, confinement, containment, and extinguishment.
(3) Describe the product control techniques available to Operations Mission-Specific Responders.
(4) Describe the application, necessary resources, and safety precautions associated with each of the following control techniques:
    (a) Absorption
    (b) Adsorption
    (c) Damming
    (d) Diking
    (e) Dilution
    (f) Diversion
    (g) Remote valve shutoff
    (h) Retention
    (i) Vapor dispersion
    (j) Vapor suppression
(5) Identify and describe the use of resources provided by the AHJ for product control, including AHJ-provided foam application equipment, diking equipment, damming equipment, approved absorbent materials and products, shovels and other hand tools, piping, heavy equipment (such as backhoes), floats, and spill booms and control agents, including foam and dispersal agents.
(6) Identify the characteristics and applicability of the following AHJ-provided foams:
    (a) Aqueous film-forming foam (AFFF)
    (b) Alcohol-resistant concentrates
    (c) Fluoroprotein
    (d) High-expansion foam
(7) Identify the location and describe the operation of remote control/emergency shutoff devices to contain flammable liquid and flammable gas releases on cargo tanks on MC/DOT-306/406, MC/DOT-307/407, and MC-331 cargo tanks, intermodal tanks, and containers at fixed facilities.
(8) Describe the safety precaution associated with each product control technique.

8.6.4 Competencies — Implementing the Planned Response.

8.6.4.1 Performing Product Control Techniques. Given examples of the product control techniques and the resources provided by the AHJ at hazardous materials/WMD incidents, Operations Mission-Specific Responders assigned to perform product control shall implement the product control technique to confine/contain the release with limited risk of personal exposure by completing the following requirements:

(1) Using resources provided by the AHJ, perform the product control techniques in 8.6.4.1(2) following safety procedures, protecting exposures and responders, and avoiding or minimizing hazards.
(2) Operate remote control/emergency shutoff devices to reduce or stop the flow of hazardous material from MC-306/DOT-406, MC-407/DOT-407, and MC-331 cargo tanks, intermodal tanks, and containers at fixed facilities containing flammable liquids or gases.

8.6.4.2 Given the required resources provided by the AHJ, perform product control techniques following safety procedures, protecting exposures and responders, and avoiding or minimizing hazards with the following:

(1) Using the equipment provided by the AHJ, control flammable liquid and flammable gas releases using techniques, including hose handling, nozzle patterns, and attack operations, found in NFPA 1001.
(2) Using the foams or resources provided by the AHJ, control the spill or fire involving flammable liquids by application of foam(s) or agent(s).

8.6.5 Competencies — Evaluating Progress. (Reserved)

8.6.6 Competencies — Terminating the Incident.

8.6.6.1 Reporting and Documenting Product Control Operations. Given examples of a hazardous materials/WMD incidents involving product control, the Operations Mission-Specific Responders assigned to perform product control shall identify the documentation and reporting procedures for product control operations as required by the AHJ.

8.7 Mission-Specific Competencies: Detection, Monitoring, and Sampling.

8.7.1 General.

8.7.1.1 Introduction.

8.7.1.1.1 Operations Mission-Specific Responders assigned to perform detection, monitoring, and sampling shall be competent at the operations level *(see Chapter 6)* and shall be assigned by the AHJ to detect, monitor, and sample at hazardous materials/WMD incidents.

8.7.1.1.2 Operations Mission-Specific Responders assigned to perform detection, monitoring, and sampling at hazardous materials/WMD incidents shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all mission-specific competencies for PPE *(see Section 8.2)*, and all competencies in this section.

8.7.1.1.3 Operations Mission-Specific Responders assigned to perform detection, monitoring, and sampling 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.

8.7.1.1.4 Operations Mission-Specific Responders assigned to perform air monitoring and sampling at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the AHJ.

8.7.1.2 Goal.

8.7.1.2.1 The goal of the competencies in this section shall be to provide the Operations Mission-Specific Responders assigned to perform detecting, monitoring, and sampling at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 8.7.1.2.2 safely and effectively.

8.7.1.2.2 Given examples of hazardous materials/WMD incidents; an assignment; the scope of the problem; policies and procedures; approved resources; detection, monitoring, and sampling equipment; PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, Operations Mission-Specific Responders assigned to perform detection, monitoring, and sampling shall be able to perform the following tasks:

(1) Select equipment for detecting, monitoring, and sampling suitable for the hazardous materials/WMD present at the incidents within the capabilities and competencies of available responders; approved resources including detection, monitoring, and sampling equipment; and PPE in accordance with the AHJ policies and procedures.
(2) Operate the selected equipment to detect, monitor, and sample hazardous materials/WMD present at the incidents following safety procedures, avoiding or minimizing hazards, and protecting exposures and responders.
(3) Report and document detection, monitoring, and sampling operations.

8.7.2 Competencies — Analyzing the Incident. (Reserved)

8.7.3 Competencies — Planning the Response.

8.7.3.1 Selecting Detection, Monitoring, and Sampling Equipment. Given examples of hazardous materials/WMD incidents and the detection, monitoring, and sampling equipment provided by the AHJ, Operations Mission-Specific Responders assigned to perform detection, monitoring, and sampling at hazardous materials/WMD incidents shall be able to perform the following:

(1) Describe the importance of working under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures.
(2) Describe detection, monitoring, and sampling methods and equipment available.
(3) Describe the considerations for selecting detection, monitoring, and sampling equipment for an assigned task within the capabilities and competencies of available responders and approved detection, monitoring, sampling equipment, and PPE.
(4) Given the detection, monitoring, and sampling equipment provided by the AHJ, describe the following for each piece of equipment:
    (a) Application, capabilities, and limitations
    (b) Procedures operating the equipment, including field testing, safety precautions, and action levels
    (c) Procedures for reading, interpreting, documenting, and communicating results of detection, monitoring, and sampling operations
    (d) Procedures for decontaminating detection, monitoring, and sampling equipment according to manufacturer's recommendations or AHJ policies and procedures
    (e) Procedures for maintaining detection, monitoring, and sampling equipment according to manufacturers' specifications or AHJ policies and procedures

8.7.4 Competencies — Implementing the Planned Response.

8.7.4.1 Operating Detection, Monitoring, and Sampling Equipment. Given examples of hazardous materials/WMD incidents, as assignment, and the selected detection, monitoring, and sampling equipment, Operations Mission-Specific Responders shall implement detection, monitoring, and sampling operations as necessary and shall be able to perform the following:

(1) Field test the detection, monitoring, and sampling equipment to be used according to the manufacturers' specification and AHJ policies and procedures, including the following:
    (a) Functional (i.e., bump) test
    (b) Calibration
    (c) Other required tests
(2) Operate the equipment to detect, monitor, and sample the hazardous materials/WMD present following safety procedures, avoiding or minimizing hazards, and protecting exposures and responders.
(3) Read, interpret, and document readings from the detection, monitoring, and sampling equipment.
(4) Communicate results of detection, monitoring, and sampling operations.
(5) Decontaminate the detection, monitoring, and sampling equipment.
(6) Maintain detection, monitoring, and sampling equipment according to the manufacturers' specifications or AHJ policies and procedures.

8.7.5 Competencies — Evaluating Progress. (Reserved)

8.7.6 Competencies — Terminating the Incident.

8.7.6.1 Reporting and Documenting Detection, Monitoring, and Sampling Operations. Given examples of hazardous materials/WMD incidents involving detection, monitoring, and sampling operations and AHJ policies and procedures, Operations Mission-Specific Responders assigned to perform detection, monitoring, and sampling shall identify the reporting and documentation requirements of the AHJ.

8.8 Mission-Specific Competencies: Victim Rescue and Recovery.

8.8.1 General.

8.8.1.1 Introduction.

8.8.1.1.1 Operations Mission-Specific Responders assigned to perform victim rescue and recovery at hazardous materials/WMD incidents shall be competent at the operations level *(see Chapter 6)* and assigned to rescue and recover exposed and/or contaminated victims at hazardous materials/WMD incidents.

8.8.1.1.2 Operations Mission-Specific Responders assigned to perform victim rescue and recovery at hazardous materials/WMD incidents shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all mission-specific competencies for PPE *(see Section 8.2)*, and all competencies in this section.

8.8.1.1.3 Operations Mission-Specific Responders assigned to perform victim rescue and recovery 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.

8.8.1.1.4* Operations Mission-Specific Responders assigned to perform victim rescue and recovery at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

8.8.1.2 Goal.

8.8.1.2.1 The goal of the competencies in this section shall be to provide the Operations Level Responder assigned to rescue and/or recover exposed and/or contaminated victims at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 8.8.1.2.2 in a safe and effective manner.

8.8.1.2.2 Given examples of hazardous materials/WMD incidents involving exposed and/or contaminated victims; an assignment; the scope of the problem; policies and procedures; approved resources, including special rescue equipment, and PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, Operations Mission-Specific Responders assigned to perform victim rescue and recovery shall be able to perform the following tasks:

(1) Select rescue and/or recovery options for victims at the incident within the capabilities of available responders and approved tools, equipment, special rescue equipment, and PPE in accordance with the AHJ's policies and procedures by completing the following requirements:
    (a) Identify the status of potential victims
    (b) Select rescue and/or recovery options based on the status of potential victims
(2) Search for, rescue, and recover victims following safety procedures, avoiding or minimizing hazards, and protecting exposures and responders
(3) Report and document victim rescue and/or recovery operations

8.8.2 Competencies — Analyzing the Incident. (Reserved)

8.8.3 Competencies — Planning the Response.

8.8.3.1 Selecting Rescue and Recovery Options. Given examples of hazardous materials/WMD incidents involving exposed and/or contaminated victims; an assignment; the scope of the problem; policies and procedures; approved resources, including special rescue equipment, and PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, Operations Level Responder assigned to rescue and recover victims shall select the victim rescue and recovery option(s) for the assignment and be able to perform the following tasks:

(1) Describe the importance of working under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures.
(2) Choose whether the task is victim rescue, victim recovery, or both.
    (a) Describe the difference between victim rescue and victim recovery operations.
    (b) Describe considerations for determining the feasibility of conducting rescue or recovery operations in each of the following situations:
        i. Line-of-sight with ambulatory victims
        ii. Line-of-sight with nonambulatory victims
        iii. Non-line-of-sight with ambulatory victims
        iv. Non-line-of-sight with nonambulatory victims
        v. Victim rescue operations versus victim recovery operations
(3) Select the rescue and recovery options within the capabilities of available responders, approved tools, equipment, special rescue equipment, and PPE for the situation at hand.
(4) Describe both rescue and recovery options for each of the following situations:
    (a) Line-of-sight with ambulatory victims
    (b) Line-of-sight with nonambulatory victims
    (c) Non-line-of-sight with ambulatory victims
    (d) Non-line-of-sight with nonambulatory victims
(5) Describe the procedures for implementing victim rescue and recovery operations within the incident command system.
(6) Select the victim rescue or recovery option(s) and equipment for the assigned situation within the capabilities of available responders, approved tools, equipment, special rescue equipment, and PPE.
(7) Identify the equipment options required to protect victims during rescue and recovery operations.

8.8.4 Competencies — Implementing the Planned Response.

8.8.4.1 Victim Rescue and Recovery. Given examples of hazardous materials/WMD incidents and the recommended victim rescue and recovery option(s) for the incident, Operations Mission-Specific Responders assigned to rescue and recover victims shall implement the selected victim rescue and recovery options by completing the following requirements:

(1) Identify the different victim and recovery team positions, roles, and responsibilities.
(2) Select and use specialized rescue equipment and procedures provided by the AHJ to support victim rescue and recovery.
(3) Search for, rescue, and recover victims following safety procedures, avoiding or minimizing hazards, and protecting exposures and responders.
(4) Select required PPE for rescuers and equipment to protect victims.
(5) Triage and transfer victims to the decontamination group, casualty collection point, or area of safe refuge or emergency medical care in accordance with the IAP.
(6) Follow the AHJ's procedures for the decontamination of rescue/recovery responders and their equipment.

8.8.5 Competencies — Evaluating Progress. (Reserved)

8.8.6 Competencies — Terminating the Incident.

8.8.6.1 Reporting and Documenting Victim Rescue and Recovery Operations. Given examples of a hazardous materials/WMD incidents involving victim rescue and recovery operations and AHJ policies and procedures, the Operations Level Responder shall identify the reporting and documentation requirements of the AHJ pertaining to victim rescue and recovery operations.

8.9 Mission-Specific Competencies: Response to Illicit Laboratory Incidents.

8.9.1 General.

8.9.1.1 Introduction.

8.9.1.1.1 The Operations Mission-Specific Responders assigned to secure the scene, identify the laboratory or process, and preserve evidence at hazardous materials/WMD incidents involving illicit laboratories with potential violations of criminal statutes specific to the illegal manufacture of drugs or WMD shall be competent at the operations level.

8.9.1.1.2 Operations Mission-Specific Responders who respond to illicit laboratory incidents shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all mission-specific competencies for PPE *(see Section 8.2)*, and all competencies in this section.

8.9.1.1.3 Operations Mission-Specific Responders who respond to illicit laboratory incidents shall operate under the guidance of a Hazardous Materials Technician, an allied professional, or standard operating procedures.

8.9.1.1.4* Operations Mission-Specific Responders who respond to illicit laboratory incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

8.9.1.2 Goal.

8.9.1.2.1 The goal of the competencies in this section shall be to provide the Operations Mission-Specific Responders assigned to respond to illicit laboratory incidents with the knowledge and skills to perform the tasks in 8.9.1.2.2 in a safe and effective manner.

8.9.1.2.2 Given examples of hazardous materials/WMD incidents involving an illicit laboratory with potential violations of criminal statues specific to the illegal manufacture of drugs or WMD; an assignment in an IAP; scope of the problem; policies and procedures; approved tools, equipment, and PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, Operations Mission-Specific Responders shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident to determine the complexity of the problem, potential outcomes, and whether the incident has the potential to be a criminal illicit laboratory operation.
(2) Plan a response for a hazardous materials/WMD incident involving potential illicit laboratory operations in compliance with evidence preservation operations within the capabilities and competencies of available responders, PPE, and response equipment after notifying the responsible law enforcement agencies of the problem.
(3) Implement the planned response to a hazardous materials/WMD incident involving potential illicit laboratory operations utilizing applicable evidence preservation guidelines.
(4) Report and document illicit laboratory response operations.

8.9.2 Competencies — Analyzing the Incident.

8.9.2.1 Determining If a Hazardous Materials/WMD Incident Is an Illicit Laboratory Operation. Given examples of hazardous materials/WMD incidents involving illicit laboratories, Operations Mission-Specific Responders shall identify the potential drugs and hazardous materials/WMD being manufactured by completing the following related requirements:

(1) Given examples of illicit drug manufacturing methods, describe the operational considerations, hazards, and products involved in the illicit process.
(2) Given examples of illicit chemical WMD methods, describe the operational considerations, hazards, and products involved in the illicit process.
(3) Given examples of illicit biological WMD methods, describe the operational considerations, hazards, and products involved in the illicit process.
(4) Given examples of illicit laboratory operations, describe the booby traps that have been encountered by response responders.
(5) Given examples of illicit laboratory operations, describe the agencies that have investigative authority and operational responsibility to support the response.

8.9.3 Competencies — Planning the Response.

8.9.3.1 Determining the Tactics. Given examples of an analysis of hazardous materials/WMD incidents involving illicit laboratories, Operations Mission-Specific Responders shall identify possible tactics.

8.9.3.2 Identifying Unique Aspects of Criminal Hazardous Materials/WMD Incidents.

8.9.3.2.1 Operations Mission-Specific Responders assigned to respond to illicit laboratory incidents shall identify the unique operational aspects associated with illicit drug manufacturing and illicit WMD manufacturing.

8.9.3.2.2 Given examples of illicit drug manufacturing or illicit WMD manufacturing, Operations Mission-Specific Responders assigned to illicit laboratory incidents shall describe the following tasks:

(1) Securing and preserving the scene
(2) Joint hazardous materials and Public Safety Bomb Technician site reconnaissance and hazard identification
(3) Determining atmospheric hazards through air monitoring and detection
(4) Mitigation of immediate hazards while preserving evidence
(5) Coordinated crime scene operation with the agency having investigative authority
(6) Documenting responders and scene operations associated with the incident

8.9.3.3 Identifying the Agency That Has Investigative Jurisdiction. Operations Mission-Specific Responders assigned to respond to illicit laboratory incidents shall identify the AHJ with investigative authority for the following:

(1) Illicit drug manufacturing
(2) Illicit WMD manufacturing
(3) Environmental crimes resulting from illicit laboratory operations
(4) Improvised explosive devices, improvised WMD dispersal devices, and improvised explosives laboratories

8.9.3.4 Identifying Unique Tasks and Operations at Sites Involving Illicit Laboratories.

8.9.3.4.1 Operations Mission-Specific Responders assigned to respond to illicit laboratory incidents shall identify and

describe the unique tasks and operations that can be encountered.

8.9.3.4.2 Given examples of illicit drug manufacturing or illicit WMD manufacturing incidents, describe the following:

(1) Hazards, safety procedures, and tactical guidelines for this type of emergency
(2) Factors to be evaluated in selection of the proper PPE for each type of tactical operation
(3) Factors to be considered in selection of appropriate decontamination procedures
(4) Factors to be evaluated in the selection of detection devices
(5) Factors to be considered in the development of a remediation plan

8.9.4 Competencies — Implementing the Planned Response.

8.9.4.1 Implementing the Planned Response. Given examples of illicit drug/WMD laboratory operations involving hazardous materials/WMD, Operations Mission-Specific Responders assigned to respond to illicit laboratory incidents shall implement or oversee the implementation of the selected tactics in a safe and effective manner.

8.9.4.1.1 Given examples of simulated illicit drug/WMD laboratory incidents and an assignment, Operations Mission-Specific Responders shall be able to perform the following tasks:

(1) Describe safe and effective methods to secure the scene
(2) Demonstrate decontamination procedures for tactical animals
(3) Demonstrate decontamination procedures for potential suspects
(4) Describe methods to identify and avoid hazards found at illicit laboratories such as booby traps and releases of hazardous materials
(5) Describe procedures for conducting joint hazardous materials/hazardous devices assessment operations

8.9.4.1.2 Given examples of illicit drug/WMD laboratory entry operations and an assignment, Operations Mission-Specific Responders shall describe methods for identifying the following during reconnaissance operations:

(1) Manufacture of illicit drugs
(2) Manufacture of illicit WMD materials
(3) Environmental crimes associated with the manufacture of illicit drugs/WMD materials
(4) Improvised explosive devices, improvised WMD dispersal devices, and improvised explosives laboratories

8.9.4.1.3 Given examples of illicit drug/WMD laboratory incidents and an assignment, Operations Mission-Specific Responders shall describe joint agency crime scene operations, including support to forensic crime scene processing teams.

8.9.4.1.4 Given examples of illicit drug/WMD laboratory incidents and an assignment, Operations Mission-Specific Responders shall describe the policy and procedures for post–crime scene processing and site remediation operations.

8.9.4.1.5 Operations Mission-Specific Responders assigned to respond to illicit laboratory incidents shall describe local procedures for performing decontamination upon completion of the illicit laboratory mission.

8.9.5 Competencies — Evaluating Progress. (Reserved)

8.9.6 Competencies — Terminating the Incident.

8.9.6.1 Reporting and Documenting Illicit Laboratory Response Operations. Given examples of hazardous materials/WMD incidents involving illicit laboratories, an assignment, and AHJ policies and procedures, Operations Mission-Specific Responders shall identify the reporting and documentation requirements of the AHJ.

8.10 Mission-Specific Competencies: Radiological Hazard-Specific Tasks.

8.10.1 General.

8.10.1.1 Introduction.

8.10.1.1.1 Operations Mission-Specific Responders assigned to perform radiological hazard–specific tasks shall be competent at the operations level *(see Chapter 6)* and assigned to support the Hazardous Materials Technician and other responders, provide strategic and tactical recommendations to incident command, serve as a technical advisor to provide technical oversight for operations, and act as a liaison between the Hazardous Materials Technician, response responders, and outside resources regarding radiological issues.

8.10.1.1.2 Operations Mission-Specific Responders assigned to perform radiological hazard–specific tasks at hazardous materials/WMD incidents shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all mission-specific competencies for PPE *(see Section 8.2)*, and all competencies in this section.

8.10.1.1.3 Operations Mission-Specific Responders assigned to perform radiological hazard–specific tasks 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.

8.10.1.1.4 Operations Mission-Specific Responders assigned to perform radiological hazard–specific tasks at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

8.10.1.2 Goal.

8.10.1.2.1 The goal of the competencies in this section shall be to provide Operations Mission-Specific Responders assigned radiological hazard–specific tasks at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 8.10.1.2.2 in a safe and effective manner.

8.10.1.2.2 When responding to hazardous materials/WMD incidents involving radiological hazards, Operations Mission-Specific Responders assigned to perform radiological hazard–specific tasks shall be able to perform the following tasks:

(1) Analyze hazardous materials/WMD incidents involving radiological hazards to determine the complexity of the problem and potential outcomes by completing the following tasks:
    (a) Understand types of radiation and potential harm of each type at an incident.
    (b) Predict the direct exposure pathways, including inhalation, ingestion, injection, and absorption.
(2) Plan a response for a hazardous materials/WMD incident involving a radiological hazard within the capabilities and

competencies of available responders, PPE, and response equipment.
(3) Implement the planned response to a hazardous materials/WMD incident involving a radiological hazard.
(4) Report and document radiological response operations.

8.10.2 Competencies — Analyzing the Incident.

8.10.2.1 Determining if the Incident Involves a Radiological Hazard. Given examples of hazardous materials/WMD incidents involving a radiological hazards, Operations Mission-Specific Responders assigned radiological hazard–specific tasks shall be able to perform the following tasks.

(1) Define the following terms:
   (a) Dose/Dose rate
   (b) Exposure/Exposure rate
   (c) Fissile
   (d) Half-life
   (e) Improvised nuclear device (IND)
   (f) Ionizing radiation
   (g) Non-ionizing radiation
   (h) Radiation dispersal device (RDD)
   (i) Radiation exposure device (RED)
   (j) Radioactive material
      i. Manmade
      ii. Naturally occurring
   (k) Radioactivity
   (l) Special nuclear material
   (m) Units of measure for radiation
      i. Roentgen
      ii. Rad/gray
      iii. Rem/Sievert
   (n) Units of measure for radioactivity
      i. Becquerel
      ii. Curie
(2) Identify the following potential locations where radiological hazards could be encountered:
   (a) Medical facilities
   (b) Research laboratories
   (c) Nuclear power plants
   (d) Industrial/commercial facilities
   (e) Government facilities
   (f) Radioactive material/waste shipments
   (g) Industrial applications
   (h) Transportation
(3) Identify the following types of radiation and the potential harm associated with each:
   (a) Alpha radiation
   (b) Beta radiation
   (c) Gamma, X-ray radiation
   (d) Neutron radiation
(4) Identify the following terms related to a nuclear detonation:
   (a) Blast and thermal effects
   (b) Electromagnetic radiation, pulse
   (c) Fallout and ground shine
   (d) Prompt radiation effects
(5) Identify the following potential routes of internal exposure to radioactive material and the potential harm associated with each:
   (a) Absorption
   (b) Ingestion
   (c) Inhalation
   (d) Injection

8.10.3 Competencies — Planning the Response.

8.10.3.1 Given examples of analysis incidents involving a radiological hazards, Operations Mission-Specific Responders assigned radiological hazard–specific tasks shall be able to determine tactics for the incident.

8.10.3.2 Operations Mission-Specific Responders assigned radiological hazard–specific tasks shall be able to perform the following tasks:

(1) Given examples of the concealment of radiation sources in a public areas, describe the considerations for the following:
   (a) Identification of the source
   (b) Determination of exposure rate and isolation distance
   (c) Estimation of responders exposure from the source
(2) Given examples of releases of a radioactive materials, describe the considerations for establishing a hot zone for the following scenarios:
   (a) Radioactive material release from a dissemination device or system
   (b) Radioactive material release from a package
   (c) Radioactive material release or spill of a liquid agent
   (d) Radiological dispersal device (RDD)
   (e) Improvised nuclear device (IND)
(3) Describe the factors to be evaluated in selecting PPE for use at an incident involving a radiological hazard.
(4) Given examples of the following scenarios, describe the considerations for selecting personal protective clothing:
   (a) Radioactive material release from a package
   (b) Radioactive material release or spill of a liquid agent
   (c) Radiation dispersal device (RDD)
   (d) Radiation exposure device (RED)
   (e) Improvised nuclear device (IND)
(5) Describe the factors to be considered for selecting decontamination procedures for use at an incident involving radioactive material.
(6) Given the following scenarios, describe the considerations for selecting decontamination procedures:
   (a) Victim with localized external contamination (e.g., hands or feet)
   (b) Victim with significant or whole-body external contamination
   (c) Victim with internal contamination
   (d) Hard surfaces (e.g., floors and tables) contaminated with radioactive material
   (e) Porous surfaces or equipment with inaccessible areas contaminated with radioactive material
(7) Describe the factors to be considered in the identification and quantification of radioactive material, including the following:
   (a) Sampling techniques for radioactive contamination
   (b) Field test limitations, accuracy, and interpretation of results
   (c) Field screening and overpacking consistent with local protocols
   (d) Methods available for isotopic identification

(e) Preservation of material for laboratory testing
(f) Preservation of forensic evidence

(8) Identify the local, state, and federal resources available to assist the Operations Level Responder to identify a radiological hazard and manage the incident.

8.10.4 Determining Detection and Monitoring Requirements. Given examples of the classes of radiation detection systems, Operations Mission-Specific Responders shall identify factors to be evaluated as part of the use of these systems, including mission objectives, system validation, capability, limitations, detection levels, operator training, and interpretation of results for the following:

(1) Personal radiation detectors (PRDs)
(2) Radiation exposure rate survey meters
(3) Contamination survey meters
(4) Radioisotope identification detectors (RIIDs)
(5) Portal monitor systems
(6) Dosimetry devices

8.10.5 Competencies — Implementing the Planned Response.

8.10.5.1 Given examples analysis of incidents involving radiological hazards, Operations Mission-Specific Responders assigned radiological hazard–specific tasks shall implement or oversee the implementation of the selected tactics safely and effectively.

8.10.5.2 Operations Mission-Specific Responders assigned radiological agent–specific tasks shall be able to complete the following tasks:

(1) Given a simulated incident involving an RED or the concealment of a radioactive material source in a public area, describe the procedures for the following:
   (a) Locating the source
   (b) Identifying initial isolation zone
   (c) Identifying the source [i.e., isotope(s) involved]
   (d) Determining source exposure rate
   (e) Dose estimation for affected responders
(2) Given examples of simulated incidents involving a release of radioactive materials from a dissemination or dispersion devices, describe the procedures for the following:
   (a) Managing exposed and/or contaminated victims
   (b) Sampling and identification of the material involved
   (c) Decontamination
   (d) Field screening and packaging the material involved
   (e) Laboratory analysis of the material involved
(3) Given examples of simulated incidents involving a release of radioactive materials from a packages, describe the procedures for the following:
   (a) Managing exposed and/or contaminated victims
   (b) Decontamination
   (c) Sampling and identification of the material involved
   (d) Field screening and packaging the material involved
   (e) Laboratory analysis of the material involved
(4) Given examples of incidents involving release of radioactive materials from spills, describe the procedures for the following:
   (a) Managing exposed and/or contaminated victims
   (b) Decontamination
   (c) Sampling and identification of the material involved
   (d) Field screening and packaging the material involved
   (e) Laboratory analysis of the material involved
(5) Given examples of incidents involving releases of radioactive materials from the detonations of IND, describe the procedures for the following:
   (a) Managing exposed and contaminated victims
   (b) Decontamination
   (c) Sampling and identification of the material involved
   (d) Field screening and packaging the material involved
   (e) Laboratory analysis of the material involved

8.10.6 Competencies — Evaluating Progress. (Reserved)

8.10.7 Competencies — Terminating the Incident. (Reserved)

8.11 Mission-Specific Competencies: Disablement/Disruption of Improvised Explosive Devices (IEDs), Improvised WMD Dispersal Devices, and Operations at Improvised Explosives Laboratories.

8.11.1 General.

8.11.1.1 Introduction.

8.11.1.1.1 Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall be competent at the operations level *(see Chapter 6)* and assigned to interrupt the functioning of an IED or an improvised WMD dispersal device or conduct operations at improvised explosives laboratories.

8.11.1.1.2 Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall possess current certification as a hazardous device technician from the FBI Hazardous Devices School, Department of Defense, or equivalent certifying agency as determined by the AHJ and be functioning as a member of a bomb squad or recognized military unit.

8.11.1.1.3 Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all mission-specific competencies for PPE *(see Section 8.2)*, mission-specific competencies for response to illicit laboratories *(see Section 8.9)*, and all competencies in this section.

8.11.1.1.4 Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall operate under the guidance of an allied professional or standard operating procedures.

8.11.1.1.5 Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall receive the additional training necessary to meet the specific needs of the AHJ.

8.11.1.2 Goal.

8.11.1.2.1 The goal of the competencies in this section shall be to provide Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories with the knowledge and skills to perform the tasks in 8.11.1.2.2 and 8.11.1.2.3 in a safe and effective manner.

8.11.1.2.2 When responding to hazardous materials/WMD incidents involving a potential IED or improvised WMD dispersal device, Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving an improvised WMD dispersal device to determine the complexity of the problem and potential outcomes by completing the following tasks:
   (a) Determine if an IED or WMD dispersal device is present.
   (b) Categorize the device by its delivery method.
(2) Plan a response for a hazardous materials/WMD incident where there is a potential improvised WMD dispersal device within the capabilities and competencies of available responders, PPE, and response equipment by completing the following tasks:
   (a) Determine if tactics can be employed to conduct a disablement/disruption of the device.
   (b) Describe the actions to be taken and the resources to be requested if the incident exceeds the available capabilities.
(3)* Implement the planned response to a hazardous materials/WMD incident involving an IED or WMD dispersal device by employing disablement/disruption techniques, established protocol of military units, or the AHJ under the guidance of the Senior Public Safety Bomb Technician present.
(4) Report and document potential IED or improvised WMD dispersal device operations.

8.11.1.2.3 When responding to hazardous materials/WMD incidents involving potential improvised explosives laboratories, Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving a potential improvised explosives laboratory to determine the complexity of the problem and potential outcomes and whether the incident has the potential for being an improvised explosives laboratory operation.
(2) Plan a response to a hazardous materials/WMD incident involving a potential improvised explosives laboratory in compliance with mitigation techniques and evidence recovery within the capabilities and competencies of available responders, PPE, and control equipment, after notifying the responsible investigative agencies of the problem.
(3) Implement the planned response to a hazardous materials/WMD incident involving a potential improvised explosives laboratory utilizing applicable standard operating procedures and/or technical advice from qualified allied professionals.
(4) Report and document potential improvised explosives laboratories operations.

8.11.2 Competencies — Analyzing the Incident.

8.11.2.1 Determining If the Incident Involves the Potential Presence of an Improvised WMD Dispersal Device. Given examples of hazardous materials/WMD incidents involving an IED or improvised WMD dispersal device, Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall identify and/or categorize the hazard by completing the following and describe products that might be encountered in the incident associated with each situation:

(1) Letter/package-based improvised dispersal device
(2) Briefcase/backpack-based improvised dispersal device
(3) Transportation-borne WMD dispersal device
(4) Fixed location hazards where an IED has been placed to cause the deliberate release of a material

8.11.2.2 Determining If the Hazardous Materials/WMD Incident Involves an Improvised Explosives Laboratory Operation. Given examples of hazardous materials/WMD incidents involving improvised explosives laboratories, Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall identify the potential explosives/WMD being manufactured by completing the following related requirements:

(1) Given examples of improvised explosives manufacturing methods, describe the operational considerations, hazards, and products involved in the process.
(2) Given examples of improvised explosives laboratory operations, describe the booby traps that have been encountered by response responders.
(3) Given examples of improvised explosives laboratory operations, describe the agencies that have investigative authority and operational responsibility to support the response.

8.11.3 Competencies — Planning the Response.

8.11.3.1 Identifying Unique Aspects of Improvised WMD Dispersal Device Related Hazardous Materials/WMD Incidents. When responding to hazardous materials/WMD incidents, Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratory incidents shall be capable of identifying the unique aspects associated with such incidents by completing the following requirements:

(1) Given an incident involving a non-vehicle-based WMD dispersal device, be able to perform the following tasks:
   (a) Describe the hazards, safety procedures, and tactical guidelines for this type of incident.
   (b)* Describe the factors to be evaluated in selecting the PPE.
   (c) Describe the procedure for identifying and obtaining the appropriate emergency response elements to support disablement/disruption operations.
(2) Given an incident involving a vehicle-borne WMD dispersal device, be able to perform the following tasks:
   (a) Describe the hazards, safety procedures, and tactical guidelines for this type of incident.
   (b) Describe the factors to be evaluated in selecting the PPE *[see A.8.11.3.1(1)(b)]*.
   (c) Describe the procedure for identifying and obtaining the appropriate emergency response elements to support disablement/disruption operations.
(3) Given examples of different types of incidents involving an improvised WMD dispersal device, identify and describe the application, use, and limitations of various

types of field screening tools that can be utilized for determining the presence of the following materials:

(a) Gamma/X-ray and neutron radiation
(b) Explosive materials [commercial and homemade explosives (HME)]

8.11.3.2 Identifying Unique Aspects of Improvised Explosives Laboratory-Related Hazardous Materials/WMD Incidents. When responding to conduct mitigation procedures on energetic materials at an improvised explosives laboratory, Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall be capable of identifying the unique aspects associated with such incidents by completing the following requirements given a scenario involving an improvised explosives laboratory and detection devices provided by the AHJ:

(1) Describe the hazards, safety procedures, and tactical guidelines for this type of incident.
(2) Describe the factors to be evaluated in selecting the PPE *[see A.8.11.3.1(1)(b)]*.
(3) Describe the application, use, and limitations of various types of field screening tools that can be utilized for determining the presence of the following materials:
    (a) Radioactive materials that emit alpha, beta, gamma, or neutron radiation, including radionuclide identification of gamma emitting radioactive materials
    (b) Explosive materials (commercial and HME)
(4) Demonstrate the field test and operation of each detection device and interpret the readings based on local procedures.
(5) Describe local procedures for decontamination of themselves and their detection devices upon completion of the material detection mission.
(6) Describe the procedure for identifying and obtaining the appropriate emergency response elements to support disablement/disruption or mitigation operations.

8.11.3.3 Identifying Potential Tactics.

8.11.3.3.1 Given examples of incidents involving a potential IED or improvised WMD materials dispersal device, Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall identify possible tactics.

8.11.3.3.2 Given examples of incidents involving potential improvised explosives laboratories, Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall identify possible tactics.

8.11.3.4* Selecting Personal Protective Equipment. Given examples of the PPE provided by the AHJ, Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at an incident with improvised explosives laboratories shall select the PPE required to support such operations at hazardous materials/WMD incidents.

8.11.4 Competencies — Implementing the Planned Response.

8.11.4.1 Given examples of incidents involving a potential IED or improvised WMD dispersal device, Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at an improvised explosives laboratory shall be able to complete the following tasks:

(1) Using detection and monitoring devices provided by the AHJ, demonstrate the field test and operation of each device and interpret the readings based on AHJ procedures.
(2) Perform diagnostics based on procedures instructed by a nationally accredited hazardous devices school or program.
(3)* Perform disablement/disruption techniques in accordance with established military or AHJ protocols.
(4) Assist in planning the air monitoring and sampling operations within the capabilities and competencies of available responders, PPE, and response equipment and, in accordance with the AHJ, describe the air monitoring and sampling options available.
(5) Given the air monitoring and sampling equipment provided by the AHJ, complete the following:
    (a) Select the detection or monitoring equipment suitable for detecting or monitoring of the IED or improvised WMD dispersal device.
    (b) Describe the operation, capabilities, limitations, local monitoring procedures, field-testing, and maintenance procedures associated with each device provided by the AHJ.
    (c) Describe local procedures for decontamination of the detection and monitoring devices upon completion of the mission.

8.11.4.2 Given examples of improvised explosives laboratory incidents, Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs and improvised WMD dispersal devices shall be able to perform the following tasks:

(1) Describe the safe and effective methods for law enforcement to secure the scene.
(2) Demonstrate methods to identify and avoid safety hazards at improvised explosives laboratories such as booby traps, releases of hazardous materials, and initiating components.
(3) Using detection and monitoring devices provided by the AHJ, demonstrate the field test and operation of each device and interpret the readings based on local or agency procedures.
(4) Describe the methods that could be utilized to mitigate the hazards identified.

8.11.4.3 Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall demonstrate the ability to wear an appropriate combination of chemical protective clothing, respiratory protection, and ballistic protection for the hazards identified in 8.11.2.1 and 8.11.2.2.

8.11.4.4 Operations Mission-Specific Responders assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall describe the local procedures for the technical decontamination process.

8.11.5 Competencies — Evaluating Progress. (Reserved)

8.11.6 Competencies — Terminating the Incident. (Reserved)

8.12 Diving in Contaminated Water Environments.

8.12.1 General.

8.12.1.1 Introduction.

8.12.1.1.1 Operations Mission-Specific Responders assigned to perform diving in contaminated water environments shall be competent at the operations level *(see Chapter 6)* and assigned to perform either dive or dive surface support operations in water suspected to be contaminated with hazardous materials during emergency response operations, defined as "no notice" dive operations for the purposes of immediate protection of lives or property.

8.12.1.1.2 Operations Mission-Specific Responders assigned to perform contaminated water diving during emergency response operations shall possess current certification per the policies of the AHJ to perform diving operations, to include the use of self-contained underwater breathing apparatus (SCUBA) (which could include rebreather diving apparatus), and/or surface supplied diving apparatus.

8.12.1.1.3 Operations Mission-Specific Responders assigned to perform contaminated water surface support operations during emergency response shall be certified per the policies of the AHJ to perform all surface support operations tasks assigned by the AHJ such as dive tender, air console operator, dive supervisor, or other related task.

8.12.1.1.4 Operations Mission-Specific Responders assigned to perform contaminated water diving or dive surface support operations during emergency response shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all mission-specific competencies for PPE *(see Section 8.2)*, and all competencies in this section.

8.12.1.1.5 Operations Mission-Specific Responders assigned to perform contaminated water diving or dive surface support operations during emergency response shall operate under the guidance of a Hazardous Materials Technician, allied professional, or standard operating procedures.

8.12.1.1.6 Operations Mission-Specific Responders assigned to perform contaminated water diving or dive surface support operations during emergency response shall receive the additional training necessary to meet the specific needs of the AHJ.

8.12.1.2 Goal.

8.12.1.2.1 The goal of the competencies in this section shall be to provide Operations Mission-Specific Responders assigned to perform contaminated water diving or dive surface support operations with the knowledge and skills to perform the tasks in 8.12.1.2.2 in a safe and effective manner.

8.12.1.2.2 When responding to emergency incidents involving water potentially contaminated with hazardous materials, Operations Mission-Specific Responders assigned to perform contaminated water diving or dive surface support operations during emergency response shall be able to perform the following tasks:

(1) Analyze an emergency incident involving water potentially contaminated with hazardous materials to determine the complexity of the problem and potential outcomes by completing the following tasks:
   (a) Determine if hazardous materials are present.
   (b) Categorize the hazards to the dive responder by performance of a hazard risk assessment.
(2) Plan a response for an emergency incident where there is a potential to dive in water contaminated with hazardous materials within the capabilities and competencies of available responders, PPE, and control equipment by completing the following tasks:
   (a) Determine if tactics can be employed effectively to conduct a safe diving operation.
   (b) Describe the actions to be taken and the resources to be requested if the incident exceeds the available capabilities.
(3) Implement the planned response to a contaminated water diving operation by employing diving operations in accordance with the policies of the AHJ under the guidance of a Hazardous Materials Technician, allied professional, or standard operating procedures.
(4) Evaluate the response to a contaminated water diving operation by determining the effectiveness of protective equipment and efficiency of decontamination.
(5) Terminate the response to a contaminated water diving operation by documenting the incident and determining the levels of contamination on diving equipment.

8.12.2 Competencies — Analyzing the Incident.

8.12.2.1 Performing a Pre-Dive Assessment of the Dive Location. Given examples of dive locations with contaminated water diving or dive surface support incidents and an assignment, Operations Mission-Specific Responders shall perform a risk assessment and be able to describe the hazards that might be associated with each of the following situations:

(1)* Hazards associated with dive locations documented in available environmental reports and reference materials
(2) Historical releases of hazardous materials near or upstream from the dive location
(3) Knowledge of hazardous materials containers or vessels near or upstream from the dive location

8.12.2.2 Determining If the Incident Involves Potential Contamination of the Water. Given examples of hazardous materials/WMD incidents involving the potential contamination of water and an assignment, Operations Mission-Specific Responders shall describe the hazards that might be encountered from the incident associated with each of the following situations:

(1) Chemicals floating on the surface of the water
(2) Chemicals stratified in the water column or infiltrated in bottom sediment
(3) Pathogenic biological materials in the water
(4) Radiological particulates or radioactive sources in the water
(5) Hazmat containers floating on the surface of the water
(6) Hazmat containers below the surface of the water

8.12.2.3 Determining the Risk from Hazards at the Dive Location. Given examples of hazardous materials/WMD at dive locations and an assignment, Operations Mission-Specific Responders shall identify the potential risk to divers and dive surface support responders by completing the following requirements:

(1) Given examples of hazardous materials/WMD identified at dive locations, describe the hazards to divers and dive surface support responders and the operational considerations associated with each hazard:

(a) Flammable or combustible materials
(b) Flammable solid/dangerous when wet materials
(c) Organic peroxides and oxidizers
(d) Poisons and toxins
(e) Radioactive materials
(f) Pathogenic biologic materials
(g) Corrosive materials

(2) Given examples of hazardous materials/WMD containers identified at dive locations, describe the secondary hazards, including mechanical hazards, to divers and dive surface support responders and the operational considerations associated with each hazard:

(a) Drums, cargo tanks, or other low-pressure containers floating on the surface
(b) Drums, cargo tanks, or other low-pressure containers resting on the bottom
(c) Compressed gas cylinders, containers, cargo tanks, or other pressure vessels floating on the surface
(d) Compressed gas cylinders, containers, cargo tanks, or other pressure vessels resting on the bottom

8.12.3 Competencies — Planning the Response.

8.12.3.1 Identifying Unique Aspects of Dive-Related Hazardous Materials/WMD Incidents. When responding to hazardous materials/WMD incidents, Operations Mission-Specific Responders assigned to perform contaminated water diving or dive surface support operations shall be capable of identifying the unique aspects associated with such incidents by completing the following requirements:

(1) Given examples of incidents involving contaminated water diving emergency response operations, perform the following:

(a) Describe the safety procedures and guidelines required by the AHJ for this type of incident.
(b) Describe the factors to be evaluated in selecting the PPE for surface support responders.
(c) Describe the factors to be evaluated in selecting dive suit types.
(d) Describe the factors to be evaluated in selecting dive suit materials.
(e) Describe the factors to be evaluated in selecting diver breathing air supply systems.
(f) Describe the factors to be evaluated in selecting the detection and monitoring used by surface support responders.
(g) Describe the factors to be evaluated in selecting decontamination procedures and solutions.
(h) Describe the factors to be evaluated by medical responders in support of contaminated dive operations.
(i) Describe the procedures for evaluating the diver's readiness to dive as required by the AHJ.
(j) Describe techniques for contamination avoidance, including buoyancy techniques when applicable.
(k) Describe the factors to be evaluated in selecting water quality sampling equipment in support of the operation, as required by the AHJ.
(l) Describe the factors to be evaluated in selecting sediment sampling equipment in support of the operation, as required by the AHJ.

(2) Given an incident involving a contaminated water diving emergency response operation, perform the following support functions:

(a) Describe the application, use, and limitations of various types of detection and monitoring equipment utilized by the AHJ to include the following:

i. Combustible gas indicators
ii. Oxygen monitors
iii. Toxic gas detectors
iv. pH indicators
v. Radiation monitors
vi. Volatile organic compound (VOC) detectors

(b) Describe the field test and operation of each detection device provided by the AHJ, and interpret the readings based on local procedures.
(c) Describe AHJ procedures for decontamination of responders and equipment upon completion of dive operations.
(d) Describe the AHJ procedure for identifying and obtaining the appropriate emergency response elements to support dive and dive surface support operations.

8.12.3.2 Identifying Potential Tactics.

8.12.3.2.1 Given examples of contaminated water dive emergency response incidents and an assignment, Operations Mission-Specific Responders assigned shall identify possible tactics.

8.12.3.2.2 Given examples of PPE provided by the AHJ, Operations Mission-Specific Responders assigned to perform contaminated water diving or dive surface support operations during emergency response shall select the PPE required to perform operations during contaminated water diving and dive surface support operations.

8.12.4 Competencies — Implementing the Planned Response.

8.12.4.1 Given examples of contaminated water dive incidents and an assignment, Operations Mission-Specific Responders shall be able to complete the following tasks:

(1) Using the detection and monitoring devices provided by the AHJ for use during surface operations, demonstrate the field test and operation of each device and interpret the readings based on AHJ procedures.
(2) Demonstrate the establishment of the technical decontamination corridor in anticipation of diver egress from contaminated water in accordance with AHJ procedures.
(3) Demonstrate the ability to collect dive site water quality samples for analysis post-dive, to assist with the evaluation of dive equipment contamination as required by the AHJ.

8.12.4.2 Given examples of contaminated water dive incidents, Operations Mission-Specific Responders certified by the AHJ to perform contaminated water diving during emergency response shall be able to complete the following tasks:

(1) Demonstrate the ability to use diving dry suits provided by the AHJ.
(2) Demonstrate the ability to use full facemask regulators provided by the AHJ.
(3) Demonstrate the ability to use diving helmets provided by the AHJ.
(4) Demonstrate the ability to relay pertinent hazard identification information from submerged containers or vessels as possible, given visibility conditions.

8.12.4.3 Operations Mission-Specific Responders assigned to perform contaminated water surface support operations during emergency response shall demonstrate the ability to wear an appropriate combination of chemical protective clothing, respiratory protection, and personal flotation devices for the hazards identified in 8.12.2.2 and 8.12.2.3.

8.12.4.4 Operations Mission-Specific Responders assigned to perform contaminated water surface support operations during emergency response shall demonstrate the AHJ procedures for technical decontamination.

8.12.5 Competencies — Evaluating Progress. Given scenarios involving a contaminated water dive operation, the Operations Level Responder assigned to contaminated water diving or dive surface support operations during emergency response shall be able to complete the following tasks:

(1) Evaluate the effectiveness of contaminated diving protective equipment.
(2) Evaluate the effectiveness of the technical decontamination process.

8.12.6 Competencies — Terminating the Incident.

8.12.6.1 Given examples of contaminated water dive incidents and an assignment, Operations Mission-Specific Responders shall be able to complete the following tasks:

(1) Describe the AHJ procedures for returning potentially contaminated dive equipment to service.
(2) Describe the AHJ procedures for evaluating water and sediment quality samples post-dive for potential contaminants, exposure analysis, and evaluation of dive equipment for contamination.
(3) Describe the AHJ procedures for evaluating sediment samples for contamination.
(4) Describe the AHJ procedures for documenting dive site activities.

8.13 Mission-Specific Competencies — Evidence Collection.

8.13.1 General.

8.13.1.1 Introduction.

8.13.1.1.1 Operations Mission-Specific Responders assigned to perform evidence collection at hazardous materials/WMD incidents shall be competent at the operations level *(see Chapter 6)* and assigned by the AHJ to collect evidence at hazardous materials/WMD incidents involving potential violations of criminal statutes or governmental regulations, including those involving suspicious letters and packages, illicit laboratories, a release/attack with a WMD agent, and environmental crimes.

8.13.1.1.2 Operations Mission-Specific Responders assigned to perform evidence collection at hazardous materials/WMD incidents shall possess the authority to collect evidence, as delegated by the AHJ, in accordance with governmental regulations.

8.13.1.1.3 Operations Mission-Specific Responders assigned to perform evidence collection at hazardous materials/WMD incidents shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all mission-specific competencies for PPE *(see Section 8.2)*, and all competencies in this section.

8.13.1.1.4 Operations Mission-Specific Responders assigned to perform evidence collection at hazardous materials/WMD incidents shall operate under the guidance of a Hazardous Materials Technician, an allied professional, or standard operating procedures.

8.13.1.1.5 Operations Mission-Specific Responders assigned to perform evidence collection at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

8.13.1.2 Goal.

8.13.1.2.1 The goal of the competencies in this section shall be to provide Operations Mission-Specific Responders assigned to perform evidence collection at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 8.13.1.2.2 in a safe and effective manner.

8.13.1.2.2 Given examples of hazardous materials/WMD incidents involving potential violations of criminal statutes or governmental regulations including those involving suspicious letters and packages, illicit laboratories, a release/attack with a WMD agent, and environmental crimes; an assignment in an IAP; the scope of the problem; policies and procedures; and approved tools, equipment, and PPE, Operations Mission-Specific Responders assigned to perform evidence collection shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident to determine the complexity of the problem and potential outcomes by completing the following tasks:
    (a) Determine whether the incident is potentially criminal in nature, and identify the law agency having investigative authority.
    (b) Identify unique aspects of criminal hazardous materials/WMD incidents.
(2) Plan a response for an incident where there is potential criminal activity involving hazardous materials/WMD within the capabilities and competencies of available responders, PPE, and equipment by completing the following tasks:
    (a) Determine the tactics to conduct evidence collection.
    (b) Describe how the tactics are within the legal authorities, capabilities, and competencies of available responders, PPE, and response equipment.
(3) Implement the planned response to a hazardous materials/WMD incident involving potential violations of criminal statutes or governmental regulations by completing the following tasks under the guidance of law enforcement:
    (a) Secure the scene.
    (b) Preserve evidence.
    (c) Take public safety samples as needed for responder safety.
    (d) Collect evidence.
(4) Report and document evidence collection operations.

8.13.2 Competencies — Analyzing the Incident.

8.13.2.1 Determining If the Incident Is Potentially Criminal in Nature. Given examples of hazardous materials/WMD incidents, Operations Mission-Specific Responders assigned to collect evidence shall describe indicators of criminal activity that might be associated with each of the following situations:

(1) Hazardous materials/WMD suspicious letter
(2) Hazardous materials/WMD suspicious package
(3) Hazardous materials/WMD illicit laboratory

(4) Release/attack with a WMD agent
(5) Environmental crimes

8.13.2.2 Identifying the AHJ That Has Investigative Authority. Given examples of hazardous materials/WMD incidents involving potential criminal activity, Operations Mission-Specific Responders assigned to collect evidence shall describe the potential criminal violation(s) and identify the AHJ having investigative authority and the incident response considerations associated with each of the following situations:

(1) Hazardous materials/WMD suspicious letter
(2) Hazardous materials/WMD suspicious package
(3) Hazardous materials/WMD illicit laboratory
(4) Release/attack with a WMD agent
(5) Environmental crimes

8.13.3 Competencies — Planning the Response.

8.13.3.1 Identifying Unique Aspects of Criminal Hazardous Materials/WMD Incidents. Operations Mission-Specific Responders assigned to collect evidence shall describe the unique aspects associated with illicit laboratories, hazardous materials/WMD incidents, and environmental crimes by completing the following requirements:

(1) Given examples of incidents involving illicit laboratories, hazardous materials/WMD incidents, or environmental crimes, operations mission-specific responders shall perform the following tasks:
    (a) Describe the procedure for securing the scene.
    (b) Describe the procedure for notifying the agency with investigative authority.
    (c) Describe the procedure for notifying a Public Safety Bomb Technician.
    (d) Describe the procedure for determining whether the Operations Level Responders are within their legal authority to perform evidence collection tasks.
    (e) Describe the procedure for documenting responders and scene operations associated with the incident.
    (f) Describe the procedure for identifying and preserving potential evidence at the scene.
    (g) Identify evidence to collect.
    (h) Identify applicable evidence collection equipment.
    (i) Describe the procedures to protect evidence from contamination.
    (j) Describe the procedures for documentation evidence collection.
    (k) Describe evidence collection process and techniques.
    (l) Describe field screening protocols.
    (m) Describe evidence labeling and packaging procedures.
    (n) Describe evidence packaging decontamination procedures.
    (o) Describe packaging procedures for transporting evidence.
    (p) Describe evidence chain-of-custody procedures.
(2) Given examples of illicit laboratories, Operations Mission-Specific Responders assigned to collect evidence shall be able to perform the following tasks:
    (a) Describe the hazards, safety procedures, decontamination, and tactical guidelines for this type of incident.
    (b) Describe the factors to be evaluated in selecting the PPE, evidence collection equipment, detection devices, evidence packaging, and transport containers *[see A.8.11.3.1(1)(b)]*.
    (c) Describe the evidence collection options for both liquid sample and solid materials.
(3) Given examples of environmental crimes, Operations Mission-Specific Responders assigned to collect evidence shall be able to perform the following tasks:
    (a) Describe the hazards, safety procedures, decontamination, and tactical guidelines for this type of incident.
    (b) Describe the factors to be evaluated in selecting the PPE, evidence collection equipment, detection devices, evidence packaging, and transport containers *[see A.8.11.3.1(1)(b)]*.
    (c) Describe the evidence collection options for both liquid and solid materials.
(4) Given examples of hazardous materials/WMD suspicious letter incidents, Operations Mission-Specific Responders assigned to collect evidence shall be able to perform the following tasks:
    (a) Describe the hazards, safety procedures, decontamination, and tactical guidelines for this type of incident.
    (b) Describe the factors to be evaluated in selecting the PPE, evidence collection equipment, detection devices, evidence packaging, and transport containers *[see A.8.11.3.1(1)(b)]*.
    (c) Describe the evidence collection options for both liquid and solid materials.
(5) Given examples of hazardous materials/WMD suspicious package incidents, Operations Mission-Specific Responders assigned to collect evidence shall be able to perform the following tasks:
    (a) Describe the hazards, safety procedures, decontamination, and tactical guidelines for this type of incident.
    (b) Describe the factors to be evaluated in selecting the PPE, evidence collection equipment, detection devices, evidence packaging, and transport containers *[see A.8.11.3.1(1)(b)]*.
    (c) Describe the evidence collection options for both liquid and solid materials.
(6) Given examples of releases/attacks involving a hazardous material/WMD agents, Operations Mission-Specific Responders assigned to collect evidence shall be able to perform the following tasks:
    (a) Describe the hazards, safety procedures, decontamination, and tactical guidelines for this type of incident.
    (b) Describe the factors to be evaluated in selecting the PPE, evidence collection equipment, detection devices, evidence packaging, and transport containers *[see A.8.11.3.1(1)(b)]*.
    (c) Describe the evidence collection options for both liquid and solid materials.
(7) Given examples of different types of potential criminal hazardous materials/WMD incidents, Operations Mission-Specific Responders shall identify and describe the application, use, and limitations of various types of field screening tools that can be utilized for assessing for the following properties:

(a) Corrosivity
(b) Flammability
(c) Oxidizers
(d) Ionizing radiation dose and contamination
(e) Volatile organic compounds (VOC)
(f) Fluorides

(8) Describe the possible adverse impacts of consuming or destroying potential evidence during field screening and evidence collection operations.
(9) Describe the procedures for maintaining the evidentiary integrity of all evidence collected and removed from the crime scene.

8.13.3.2 Selecting PPE. Given the PPE provided by the AHJ, Operations Mission-Specific Responders assigned to evidence collection shall select the PPE required to support evidence collection at hazardous materials/WMD incidents based on the AHJ's procedures *[see Section 8.2 and A.8.11.3.1(1)(b)]*.

8.13.4 Competencies — Implementing the Planned Response.

8.13.4.1 Implementing the Planned Response. Given examples of incident action plans for criminal incidents involving hazardous materials/WMD, operations mission-specific responders assigned to collect evidence shall implement selected tactics consistent with the emergency response plan or standard operating procedures by completing the following requirements:

(1) Secure the scene.
(2) Describe the procedure for notifying the agency with investigative authority.
(3) Describe the procedure for notifying a Public Safety Bomb Technician.
(4) Determine whether the Operations Level Responders are within their legal authority to perform evidence collection tasks.
(5) Document responders and scene operations associated with the incident.
(6) Identify and preserve potential evidence at the scene.
(7) Identify evidence collected.
(8) Identify applicable evidence collection equipment.
(9) Protect evidence from contamination.
(10) Complete evidence collection documentation.
(11) Collect evidence.
(12) Perform field screening procedures.
(13) Label and package evidence.
(14) Decontaminate evidence packaging.
(15) Package evidence for safe transportation.
(16) Perform chain-of-custody procedures.

8.13.5 Competencies — Evaluation Progress. (Reserved)

8.13.6 Competencies — Terminating the Incident.

8.13.6.1 Reporting and Documenting Evidence Collection Operations. Given examples of hazardous materials/WMD incidents involving evidence collection operations, an assignment, and AHJ policies and procedures, Operations Mission-Specific Responders shall identify the reporting and documentation as required by the AHJ.

Chapter 9 Professional Qualifications for Hazardous Materials/WMD Operations Level Responders Assigned Mission-Specific Responsibilities (NFPA 1072)

9.1 General.

9.1.1 Operations Level Responders assigned mission-specific responsibilities at hazardous materials/weapons of mass destruction (WMD) incidents are those Operations Level Responders designated by the authority having jurisdiction (AHJ) to perform additional tasks to support the AHJ's response mission, expected tasks, equipment, and training in the following areas:

(1) Personal protection equipment (PPE) *(see Section 9.2)*
(2) Mass decontamination *(see Section 9.3)*
(3) Technical decontamination *(see Section 9.4)*
(4) Evidence preservation and public safety sampling *(see Section 9.5)*
(5) Product control *(see Section 9.6)*
(6) Detection, monitoring, and sampling *(see Section 9.7)*
(7) Victim rescue and recovery *(see Section 9.8)*
(8) Illicit laboratory incidents *(see Section 9.9)*
(9) Radiological hazard-specific *(see Section 9.10)*

9.1.2 Operations Level Responders assigned mission-specific responsibilities at hazardous materials/WMD incidents shall meet the JPRs defined in Sections 5.1 through 5.4.

9.1.3 Operations Level Responders assigned mission-specific responsibilities at hazardous materials/WMD incidents shall meet the JPRs defined in Sections 7.2 through 7.6.

9.1.4 Operations Level Responders assigned mission-specific responsibilities at hazardous materials/WMD incidents shall meet the JPRs defined in Section 9.2.

9.1.5 Operations Level Responders assigned mission-specific responsibilities at hazardous materials/WMD incidents shall have additional competencies that are specific to their response mission, expected tasks, equipment, and training as determined by the AHJ.

9.1.6* Qualification for Operations Level Responders assigned mission-specific responsibilities at hazardous materials/WMD incidents is specific to a mission area. For qualification, Operations Mission-Specific Responders shall perform all the JPRs listed in at least one level of a specialty area Sections 9.2 through 9.9. Operations Mission-Specific Responders will be identified by their specialty.

9.1.7* Operations Level Responders 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.

9.1.8 General Knowledge Requirements. (Reserved)

9.1.9 General Skills Requirements. (Reserved)

9.2* Personal Protective Equipment.

9.2.1* Select, don, work in, and doff approved PPE at a hazardous materials/WMD incident, given a hazardous materials/WMD incident; a mission-specific assignment in an IAP that requires use of PPE; the scope of the problem; strategies and tactics for the incident; access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures; approved PPE; and policies

and procedures, so that under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, approved PPE is selected, inspected, donned, worked in, decontaminated, and doffed; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; PPE is maintained and stored consistent with AHJ policies and procedures and NFPA 1891; and all reports and documentation pertaining to PPE use are completed.

(A)* Requisite Knowledge. Policies and procedures for PPE selection and use; importance of working under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures when selecting and using PPE; the purpose, capabilities, and limitations of and specialized donning, doffing, and usage procedures for approved PPE; components of an IAP; procedures for decontamination, inspection, maintenance, and storage of approved PPE; process for being decontaminated while wearing PPE; and procedures for reporting and documenting the use of PPE.

(B)* Requisite Skills. Selecting PPE for the assignment; inspecting, maintaining, storing, donning, working in, and doffing PPE; going through decontamination (emergency and technical) while wearing the PPE; and reporting and documenting the use of PPE.

9.3* Mass Decontamination.

9.3.1 Perform mass decontamination for ambulatory and nonambulatory victims at a hazardous materials/WMD incident, given a hazardous materials/WMD incident that requires mass decontamination; an assignment in an IAP; scope of the problem; policies and procedures; approved tools, equipment, and PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, so that under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, a mass decontamination process is selected, set up, implemented, evaluated, and terminated; approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; personnel, tools, and equipment are decontaminated; and all reports and documentation of mass decontamination operations are completed.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; advantages and limitations of operations and methods of mass decontamination; policies and procedures for performing mass decontamination; approved tools, equipment, and PPE for performing mass decontamination; crowd management techniques; and AHJ's mass decontamination team positions, roles, and responsibilities; and requirements for reporting and documenting mass decontamination operations.

(B)* Requisite Skills. Selecting and using PPE; identifying sources of information for determining the correct decontamination method and how to access those resources at a hazardous materials/WMD incident; selecting a mass decontamination method to minimize the hazard; setting up and implementing mass decontamination operations in a safe location; evaluating the effectiveness of the mass decontamination method; and completing required reports and supporting documentation for mass decontamination operations.

9.4* Technical Decontamination.

9.4.1 Perform technical decontamination in support of entry operations and for ambulatory and nonambulatory victims at a hazardous materials/WMD incident, given a hazardous materials/WMD incident that requires technical decontamination; an assignment in an IAP; scope of the problem; policies and procedures for technical decontamination; approved tools, equipment, and PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, so that under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, a technical decontamination method is selected, set up, implemented, evaluated, and terminated; approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; personnel, tools, and equipment are decontaminated; and all reports and documentation of technical decontamination operations are completed.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; AHJ's technical decontamination team positions, roles, and responsibilities; importance of working under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures; advantages and limitations of operations and methods of technical decontamination including adsorption, chemical degradation, dilution, disinfection, evaporation, isolation and disposal, neutralization, solidification, sterilization, vacuuming, and washing; technical decontamination methods and their advantages and limitations; policies and procedures for performing technical decontamination; approved tools, equipment, and PPE for performing technical decontamination; AHJ's technical decontamination team positions, roles, and responsibilities; and requirements for reporting and documenting technical decontamination operations.

(B)* Requisite Skills. Selecting and using PPE; selecting a technical decontamination procedure to minimize the hazard; setting up and implementing technical decontamination operations; evaluating the effectiveness of the technical decontamination process; and completing reporting and documentation requirements.

9.5* Evidence Preservation and Public Safety Sampling.

9.5.1 Perform evidence preservation and public safety sampling at a hazardous materials/WMD incident, given a hazardous materials/WMD incident involving potential violations of criminal statutes or governmental regulations, including suspicious letters and packages, illicit laboratories, a release/attack with a WMD agent, and environmental crimes; an assignment in an IAP; scope of the problem; policies and procedures; approved tools, equipment, and PPE; and access to a Hazardous Materials Technician, an allied professional, including law enforcement personnel or others with similar authority, an emergency response plan, or standard operating procedures, so that under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, hazardous materials/WMD incidents with a potential violation of criminal statutes or governmental regulations are identified; notify agency/agencies having investigative jurisdiction and hazardous explosive device responsibility for the type of incident are notified; approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed;

hazards are avoided or minimized; evidence is identified and preserved; public safety samples are collected, and packaged, and the outside packaging is decontaminated; emergency responders, tools, and equipment are decontaminated; and evidence preservation and public safety sampling operations are reported and documented.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; importance of working under the guidance of a Hazardous Materials Technician, an allied professional, including law enforcement personnel or others with similar authority, an emergency response plan, or standard operating procedures; unique aspects of a suspicious letter, a suspicious package or device, an illicit laboratory, or a release/attack with a WMD agent; potential violations of criminal statutes or governmental regulations; agencies having response authority to collect evidence and public safety samples; agencies having investigative law enforcement authority to collect evidence or public safety samples; notification procedures for agencies having investigative law enforcement authority and hazardous explosive device responsibility; chain-of-custody procedures; securing, characterization, and preservation of the scene and potential forensic evidence; approved documentation procedures; types of evidence; use and limitations of equipment to conduct field screening of samples to screen for corrosivity, flammability, oxidizers, radioactivity, volatile organic compounds (VOC), and fluorides for admission into the Laboratory Response Network or other forensic laboratory system; use of collection kits; collection and packaging of public safety samples; decontamination of outside packaging; prevention of secondary contamination; protection and transportation requirements for sample packaging; and requirements for reporting and documenting evidence preservation and public safety sampling operations.

(B) Requisite Skills. Identifying incidents with a potential violation of criminal statutes or governmental regulations; identifying the agency having investigative jurisdiction over an incident that is potentially criminal in nature or a violation of government regulations; operating field screening and sampling equipment to screen for corrosivity, flammability, oxidizers, radioactivity, volatile organic compounds (VOC), and fluorides; securing, characterizing, and preserving the scene; identifying and protecting potential evidence until it can be collected by an agency with investigative authority; following chain-of-custody procedures; characterizing hazards; performing protocols for field screening samples for admission into the Laboratory Response Network or other forensic laboratory system; protecting evidence from secondary contamination; determining agency having response authority to collect public safety samples; collecting public safety samples; packaging and labeling samples; decontaminating samples; determining agency having investigative law enforcement authority to collect evidence and public safety samples; decontaminating outside sample packaging; preparing samples for protection and transportation to a laboratory; and completing required reports and supporting documentation for evidence preservation and public safety sampling operations.

9.6* Product Control.

9.6.1 Perform product control techniques with a limited risk of personal exposure at a hazardous materials/WMD incident, given a hazardous materials/WMD incident with release of product; an assignment in an IAP; scope of the problem; policies and procedures; approved tools, equipment, control agents, and PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, so that under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; a product control technique is selected and implemented; the product is controlled; victims, personnel, tools, and equipment are decontaminated; and product control operations are reported and documented.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; importance of working under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures; definitions of control, confinement, containment, and extinguishment; policies and procedures; product control methods for controlling a release with limited risk of personal exposure; safety precautions associated with each product control method; location and operation of remote/emergency shutoff devices in cargo tanks and intermodal tanks in transportation and containers at facilities that contain flammable liquids and flammable gases; characteristics and applicability of approved product control agents; use of approved tools and equipment; and requirements for reporting and documenting product control operations.

(B)* Requisite Skills. Selecting and using PPE; selecting and performing product control techniques to confine/contain the release with limited risk of personal exposure; using approved control agents and equipment on a release involving hazardous materials/WMD; using remote control valves and emergency shutoff devices on cargo tanks and intermodal tanks in transportation and containers at fixed facilities; and performing product control techniques.

9.7* Detection, Monitoring, and Sampling.

9.7.1 Perform detection, monitoring, and sampling at a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment in an IAP; scope of the problem; policies and procedures; approved resources; detection, monitoring, and sampling equipment; PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, so that under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, detection, monitoring, and sampling methods are selected; approved equipment is selected for detection, monitoring, or sampling of solid, liquid, or gaseous hazardous materials/WMD; approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; detection, monitoring, and sampling operations are implemented as needed; results of detection, monitoring, and sampling are read, interpreted, recorded, and communicated; personnel and their equipment are decontaminated; detection, monitoring, and sampling equipment is maintained; and detection, monitoring, and sampling operations are reported and documented.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; capabilities and limitations of approved PPE; importance of working under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures; approved

detection, monitoring, and sampling equipment; policies and procedures for detection, monitoring, and sampling; process for selection of detection, monitoring, and sampling equipment for an assigned task; operation of approved detection, monitoring, and sampling equipment; capabilities, limitations, and local monitoring procedures, including action levels and field testing; how to read and interpret results; methods for decontaminating detection, monitoring, and sampling equipment according to manufacturers' recommendations or AHJ policies and procedures; maintenance procedures for detection, monitoring, and sampling equipment according to manufacturers' recommendations or AHJ policies and procedures; and requirements for reporting and documenting detection, monitoring, and sampling operations.

(B) Requisite Skills. Selecting and using PPE; field testing and operating approved detection, monitoring, and sampling equipment; reading, interpreting, and documenting the readings from detection, monitoring, and sampling equipment; communicating results of detection, monitoring, and sampling; decontaminating detection, monitoring, and sampling equipment; maintaining detection, monitoring, and sampling equipment according to manufacturers' specifications or AHJ policies and procedures; and completing required reports and supporting documentation for detection, monitoring, and sampling operations.

9.8* Victim Rescue and Recovery.

9.8.1 Perform rescue and recovery operations at a hazardous materials/WMD incident, given a hazardous materials/WMD incident involving exposed and/or contaminated victims; an assignment in an IAP; scope of the problem; policies and procedures; approved tools, equipment, including special rescue equipment, and PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, so that under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, the feasibility of conducting a rescue or a recovery operation is determined; approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; rescue or recovery options are selected within the capabilities of available personnel, approved tools, equipment, special rescue equipment, and PPE; victims are rescued or recovered; victims are prioritized and patients are triaged and transferred to the decontamination group, casualty collection point, area of safe refuge, or medical care in accordance with the IAP; personnel, victims, and equipment used are decontaminated; and victim rescue and recovery operations are reported and documented.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; capabilities and limitations of approved PPE; importance of working under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures; the difference between victim rescue and victim recovery; victim prioritization and patient triage methods; considerations for determining the feasibility of rescue or recovery operations; policies and procedures for implementing rescue and recovery; capabilities and limitations of approved PPE; procedures, specialized rescue equipment required, and incident response considerations for rescue and recovery in the following situations: (1) line-of-sight with ambulatory victims, (2) line-of-sight with nonambulatory victims, (3) non-line-of-sight with ambulatory victims, (4) non-line-of-sight with nonambulatory victims, and (5) victim rescue operations versus victim recovery operations; AHJ's rescue team positions, roles, and responsibilities; and procedures for reporting and documenting victim rescue and recovery operations.

(B) Requisite Skills. Identifying both rescue and recovery situations; victim prioritizing and patient triaging; selecting proper rescue or recovery options; using available specialized rescue equipment; selecting and using PPE for the victim and the rescuer; searching for, rescuing, and recovering victims; following the AHJ's procedures for decontamination of rescue/recovery personnel and their equipment; and completing required reports and supporting documentation for victim rescue and recovery operations.

9.9* Response to Illicit Laboratory Incidents.

9.9.1 Perform response operations at a hazardous materials/WMD incident involving an illicit laboratory with potential violations of criminal statutes specific to the illegal manufacture of drugs or WMD, given a hazardous materials/WMD incident involving an illicit laboratory; an assignment in an IAP; scope of the problem; policies and procedures; approved tools, equipment, and PPE; and access to a Hazardous Materials Technician, an allied professional, including law enforcement agencies or others having similar investigative authority, an emergency response plan, or standard operating procedures, so that under the guidance of a Hazardous Materials Technician, an allied professional, including law enforcement agencies or others having similar investigative authority, an emergency response plan, or standard operating procedures, the scene is secured; the type of laboratory is identified; potential hazards are identified; approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; control procedures are implemented; evidence is identified and preserved; personnel, victims, tools, and equipment are decontaminated; and illicit laboratory operations are reported and documented.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; importance of working under the guidance of a Hazardous Materials Technician, an allied professional, including law enforcement personnel or others with similar authority, an emergency response plan, or standard operating procedures; types of illicit laboratories and how to identify them; unique aspects of criminal hazardous materials/WMD incidents; operational considerations at illicit laboratories; unique tasks and operations at sites involving illicit laboratories; hazards and products at illicit laboratories; booby traps often found at illicit laboratories; law enforcement agencies or others having similar investigative authority and responsibilities at illicit laboratories; crime scene coordination with law enforcement agencies or others having similar investigative authority; securing and preserving evidence; procedures for conducting a joint hazardous materials/hazardous devices assessment operation; procedures for determining atmospheric hazards through detection, monitoring, and sampling; procedures to mitigate immediate hazards; safety procedures and tactics; factors to be considered in the selection of decontamination, in the development of a remediation plan, and in decontaminating tactical law enforcement personnel, weapons, and law enforcement canines; procedures for decontaminating potential suspects; procedures for going through technical decontamination while wearing PPE; and procedures for

reporting and documenting illicit laboratory response operations.

(B) Requisite Skills. Implementing scene control procedures; selecting and using PPE; selecting detection, monitoring, and sampling equipment; implementing technical decontamination for personnel; securing an illicit laboratory; identifying and isolating hazards; identifying safety hazards; conducting a joint hazardous materials/hazardous devices assessment operation; decontaminating potential suspects, tactical law enforcement personnel, weapons and law enforcement canines; and completing required reports and supporting documentation for illicit laboratory response operations.

9.10 Radiological Hazard-Specific.

9.10.1 Perform radiological hazard assessment and provide strategic and tactical recommendations at a hazardous materials/WMD incident, given a hazardous materials/WMD incident involving a radiological hazard due to the presence or release of radioactive material, radiation dispersal device (RDD), radiation exposure device (RED), or an improvised nuclear device (IND); an assignment; policies and procedures; approved resources; detection, monitoring, sampling equipment, and PPE; and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, so that under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures; detection, monitoring, and sampling methods for radiological hazards are selected; approved PPE is selected and used; personnel are protected; safety procedures are followed; radiological hazards are identified, avoided, or minimized; detection, monitoring, and sampling operations are completed; results of detection, monitoring, and sampling are read, interpreted, communicated, and documented; and personnel, victims, tools, and equipment are decontaminated.

(A)* Requisite Knowledge. The importance of working under the guidance of a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures; definitions of different types of radioactive material (naturally occurring, manmade, fissile, and special nuclear material); the definitions of half-life, radioactivity, and the units of measure for radiation (roentgen, rad/gray, rem/sievert) and radioactivity (becquerel, curie); the types of radiological weapons of mass destruction (RDD, RED, and IND); potential locations where radiological hazards could be encountered; the four common types of ionizing radiation (alpha, beta, gamma, and neutron) and the potential harm associated with each; terms associated with a nuclear detonation, including fireball, shockwave, electromagnetic pulse, mushroom cloud, and fallout, and the potential harm associated with each; possible routes for internal exposure to radioactive material and the potential harm associated with each; considerations for identification of a concealed radiation source, including determination of exposure rate, isolation distance, and estimation of personnel exposure from the source; factors to be considered for selecting PPE for use at an incident involving radiological hazard due to the presence or release of radioactive material, RDD, RED or an IND; for personnel resources, how physical condition, location of contamination, and amount of radioactive material present influence selection of decontamination procedures for persons with localized external contamination (e.g., hands or feet), whole-body external contamination, or internal contamination; for resources other than personnel, how hard surfaces, porous surfaces, or equipment with inaccessible areas might limit the ability to survey for and decontaminate such items; factors to be considered in the identification and quantification of radioactive material, including sampling techniques for radioactive contamination; field test limitations, accuracy, and interpretation of results, field screening and overpacking consistent with local protocols, methods available for isotopic identification, preservation of material for laboratory testing and forensic evidence; local, state, and federal resources available to assist the Operations Level Responder to identify a radiological hazard and manage the incident; and factors to be evaluated as part of the use of radiological detection and monitoring systems.

(B) Requisite Skills. Selecting and using appropriate PPE for the radiological hazard present; field testing and operating approved detection, monitoring, and sampling equipment; reading, interpreting, and documenting the readings from detection, monitoring, and sampling equipment; communicating results of detection, monitoring, and sampling; decontaminating detection, monitoring, and sampling equipment; completing required reports and supporting documentation for detection, monitoring, and sampling operations; locating a concealed radiation source, identifying the initial isolation zone, identifying the source [i.e., isotope(s) involved], determining source exposure rate, and calculating a dose estimation for affected personnel; identifying and distinguishing between fixed and removable contamination; and describing procedures for decontamination, sampling, identification, field screening, packaging, and laboratory analysis of the material involved following the release of radioactive material from a hazardous materials/WMD incident.

Chapter 10 Competencies for Hazardous Materials/WMD Technicians (NFPA 472)

10.1 General.

10.1.1 Introduction.

10.1.1.1 Hazardous Materials Technicians shall respond to hazardous materials/WMD incidents using a risk-based response process by which they analyze a problem involving hazardous materials/WMD, plan a response to the problem, implement the planned response, evaluate progress of the planned response, adjust accordingly, and assist in terminating the incident.

10.1.1.2 Hazardous Materials Technicians shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, and all competencies of this chapter.

10.1.1.3* Hazardous Materials Technicians shall receive additional training to meet applicable governmental occupational health and safety regulations.

10.1.1.4 Hazardous Materials Technicians shall receive additional training necessary to meet any specific needs, such as the response mission, expected tasks, equipment, and training as determined by the AHJ.

10.1.2 Goal.

10.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians with the knowl-

edge and skills to perform the tasks in 10.1.2.2 in a safe manner.

10.1.2.2 In addition to being competent at both the awareness and operations levels, Hazardous Materials Technicians shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident to determine the complexity of the problem and potential outcomes by completing the following tasks:
   (a) Survey the hazardous materials/WMD incident to determine the following:
      i. Identify by name, specification, typical contents, and capacity of containers.
      ii. Verify the presence of hazardous materials/WMD, and determine the concentrations, if possible, of materials through the use of detection, monitoring, and sampling equipment.
      iii. Determine whether the incident is intentional.
      iv. Identify unique aspects of an intentional incident.
   (b) Given examples of biological, chemical, radiological and explosive threat agents, perform the following tasks:
      i. Determine the type of agent(s) involved.
      ii. Provide indicators for each agent.
      iii. Identify potential sources of biological, chemical, radiological, and explosive threat agents in industry and business.
      iv. Describe potential methods of production and dispersal of biological, chemical, radiological, and explosive threat agents.
   (c) Collect and interpret hazard and response information from printed and technical resources, computer databases, and monitoring equipment.
   (d) Describe the type and extent of damage to containers.
   (e) Predict the likely behavior of released materials and their containers when multiple materials are involved.
   (f) Estimate the potential outcomes at a hazardous materials/WMD incident by completing the following steps:
      i. Estimate the size of an endangered area using computer modeling, monitoring equipment, or specialists in this field.
      ii. Measure or predict the concentrations of materials within the endangered area.
      iii. Identify the physical, health, and safety hazards within the endangered area.
      iv. Identify the areas of potential harm within the endangered area.
      v. Identify the potential outcomes within the endangered area.
      vi. Communicate these outcomes to your supervisor.
   (g) Describe the planned response to a hazardous materials/WMD incident involving potential criminal intent.
   (h) Describe the hazards, safety procedures, and tactical guidelines for responding to the following:
      i. Release or attack with hazardous materials/WMD
      ii. Illicit laboratories
      iii. Hazardous materials/WMD suspicious package
      iv. Hazardous materials/WMD intelligence threat
      v. Environmental crime involving hazardous materials/WMD
(2) Develop and recommend to the Incident Commander or Hazardous Materials Officer the strategies and tactics at a hazardous materials/WMD incident within the capabilities of available personnel, PPE, and response equipment by completing the following tasks:
   (a) Identify the strategies for hazardous materials/WMD incidents.
   (b) Identify the potential tactics available for each strategy.
   (c) Select the PPE required for a given tactic.
   (d) Select a technical decontamination process to minimize the hazard.
   (e) Develop an incident action plan for a hazardous materials/WMD incident, including a site safety and control plan, consistent with the emergency response plan or standard operating procedures and within the capability of the available personnel, PPE, and response equipment.
   (f) Develop and recommend the factors to be evaluated in selecting the correct PPE, detection devices, and decontamination for the following types of incidents:
      i. Release or attack with hazardous materials/WMD
      ii. Illicit laboratories
      iii. Hazardous materials/WMD suspicious package
      iv. Hazardous materials/WMD intelligence threat
      v. Environmental crime involving hazardous materials/WMD
(3)* Implement the planned response to favorably change the outcomes consistent with the standard operating procedures and site safety and control plan by completing the following tasks:
   (a) Perform the duties of an assigned hazardous materials branch or group position within the ICS.
   (b) Inspect, don, work in, and go through decontamination while wearing PPE.
   (c) Perform product control techniques including the following:
      i. Confine released materials — adsorption, absorption, blanketing, damming, diking, dilution, dispersion, diversion, neutralization, retention, vapor dispersion, and vapor suppression.
      ii. Contain materials in bulk or nonbulk pressure containers and closures, nonbulk liquid containers and closures, and bulk liquid containers and closures — patching, plugging, repositioning container, sealing closures, and remote valve shutoff of leaks.
      iii. Overpack nonbulk and radioactive materials containers.
      iv. Transfer liquids from nonpressure containers.
      v. Perform decontamination functions identified in the IAP.
(4) Evaluate and report the progress of the planned response by completing the following tasks:

(a) Compare the actual behavior of the materials and container to that which was predicted.
(b) Determine the effectiveness of the strategies and tactics, including product control and decontamination operations.
(c) Suggest modifications to the IAP as needed until the scene is deemed stabilized and hazards are controlled.
(d) Communicate the results of the evaluation to the Incident Commander or Hazardous Materials Officer.

(5) Terminate the incident by completing the following tasks:
(a) Assist in the incident debriefing.
(b) Assist in the incident critique.
(c) Provide reports and documentation of the incident.

10.2 Competencies — Analyzing the Incident.

10.2.1 Surveying Hazardous Materials/WMD Incidents. Given examples of hazardous materials/WMD incidents with the release of identified and unidentified hazardous materials/WMD, an assignment, policies and procedures, and approved resources, Hazardous Materials Technicians shall complete the requirements of 10.2.1.1 through 10.2.1.2 by performing the following:

(1) Survey the incident and identify the containers by name, specification, capacity, and typical contents by name and hazard class.
(2) Classify hazardous materials/WMD present, verify their presence, and identify concentrations of hazardous materials/WMD involved through detection, monitoring, and sampling.
(3) Given examples of the following potential releases at hazardous materials/WMD incidents, describe products encountered and the incident response considerations associated with each situation:
(a) Hazardous materials/WMD with no release
(b) Hazardous materials/WMD with release of visible vapor cloud, liquid pooling, or solid dispersion
(c) Hazardous materials/WMD with release of visible vapor cloud, liquid pooling, or solid dispersion with suspected victims
(d) Hazardous materials/WMD with victims displaying signs and symptoms without an apparent chemical release

10.2.1.1 Identifying Containers and Contents.

10.2.1.1.1 Given examples of various containers for hazardous materials/WMD, Hazardous Materials Technicians shall identify each container by name and specification and identify the typical contents by name and hazard class.

10.2.1.1.2 Given examples of the following railroad cars, Hazardous Materials Technicians shall identify the container by name and specification and identify the typical contents by name and hazard class:

(1) Cryogenic liquid tank cars
(2) Nonpressure tank cars
(3) Pneumatically unloaded hopper cars
(4) Pressure tank cars

10.2.1.1.3 Given examples of the following intermodal tanks, the Hazardous Materials Technician shall identify the container by name and specification and identify the typical contents by name and hazard class:

(1) Intermodal tanks for liquids and solids
(2) Intermodal tanks for nonrefrigerated liquefied compressed gases
(3) Intermodal tanks for refrigerated liquefied gases
(4) Multiple-element gas containers (MEGC) for nonrefrigerated compressed gases (high pressure)

10.2.1.1.4 Given examples of the following cargo tanks, Hazardous Materials Technicians shall identify the container by name and specification and identify the typical contents by name and hazard class:

(1) Compressed gas tube trailers
(2) Corrosive liquid tanks
(3) Cryogenic liquid tanks
(4) Dry bulk cargo tanks
(5) High-pressure tanks
(6) Low-pressure chemical tanks
(7) Nonpressure liquid tanks

10.2.1.1.5 Given examples of the following facility storage tanks, Hazardous Materials Technicians shall identify the container by name and identify the typical contents by name and hazard class:

(1) Cryogenic liquid tank
(2) Nonpressure tank
(3) Pressure tank

10.2.1.1.6 Given examples of the following nonbulk packaging, Hazardous Materials Technicians shall identify the package by name and identify the typical contents by name and hazard class:

(1) Bags
(2) Carboys
(3) Cylinders
(4) Drums

10.2.1.1.7 Given examples of the following radioactive materials packages, Hazardous Materials Technicians shall identify the container/package by name and identify the typical contents by name:

(1) Excepted
(2) Industrial
(3) Type A
(4) Type B
(5) Type C

10.2.1.1.8 Given examples of the following packaging, Hazardous Materials Technicians shall identify the package by name and identify the typical contents by name and hazard class:

(1) Intermediate bulk container (IBC)
(2) Ton container

10.2.1.1.9 Given examples of facility and transportation containers, Hazardous Materials Technicians shall identify the approximate capacity of each container.

10.2.1.1.10 Using the markings on the container, Hazardous Materials Technicians shall identify the capacity (by weight or volume) of the following examples of transportation vehicles:

(1) Cargo tanks
(2) Tank cars
(3) Intermodal tanks and MEGCs

10.2.1.1.11 Using the markings on the container and other available resources, Hazardous Materials Technicians shall identify the capacity (by weight or volume) of each of the following facility containers:

(1) Cryogenic liquid tank
(2) Nonpressure tank (general service or low-pressure tank)
(3) Pressure tank

10.2.1.2* Detection, Monitoring, and Sampling. Given examples of hazardous materials/WMD incidents with released identified and unidentified hazardous materials, an assignment, policies and procedures, approved resources, detection and monitoring equipment, and PPE, Hazardous Materials Technicians shall, through detection, monitoring, and sampling, classify hazardous materials/WMD by the basic categories; verify the presence and concentrations of hazardous materials; determine the concentration of hazardous materials in the atmosphere; collect samples of solids, liquids, and gases; read, interpret, record, and communicate the results of detection and monitoring equipment; describe the process to maintain detection, monitoring, and sampling equipment according to manufacturers' recommendations or local policies and procedures; and report and document detection, monitoring, and sampling operations by completing the following:

(1) Select equipment for detection, monitoring, and sampling solids, liquids, and gases suitable for the hazardous materials/WMD present at the incident within the capabilities and competencies of available personnel, approved resources, including detection, monitoring, and sampling equipment, and PPE in accordance with the AHJ's policies and procedures, as follows:
    (a)* Identify the basic hazard categories and their definitions.
    (b) Describe monitoring technologies.
    (c)* Describe the types of detection and monitoring equipment, including colorimetric, electrochemical cells, flammable gas/LEL, noncontact thermal detection device, oxygen concentration, photoionization detector (PID), biological detection, and radiation detection and monitoring, including the following:
        i. Application, capabilities, and limitations
        ii.* Application of ionization energy (also known as *ionization potential*) when using a PID
        iii. Procedures operating the equipment, including field testing, safety precautions, and action levels
    (d) Describe the process for classifying basic hazard categories of identified solid and liquid materials and unidentified contaminants in the atmosphere.
    (e) Describe the following processes for radioactive materials:
        i. Determine radiation dose rates from radioactive material labels.
        ii. Determine the background exposure rate.
        iii. Determine if a radioactive materials container is leaking/breached by comparing meter readings to the Transportation Index (TI).
    (f) Describe the process for monitoring lighter-than-air gases and vapors, heavier-than-air gases and vapors in a confined area, and heavier-than-air gases and vapors in an unconfined area.
    (g) Describe the methods for collecting samples of solids, liquids, and gases.
    (h) Describe the procedures for reading, interpreting, recording, and communicating test results of detection and monitoring equipment.
    (i) Describe the field maintenance and testing procedures for detection and monitoring equipment.
    (j) Describe the procedures for decontaminating detection, monitoring, and sampling equipment according to manufacturer's recommendations or AHJ policies and procedures.
    (k) Describe the procedures for maintaining detection, monitoring, and sampling equipment according to manufacturers' specifications or local policies and procedures.
    (l) Describe the detection options for gases, liquids, and solids found at the following types of incidents:
        i. Release or attack with hazardous materials/WMD
        ii. Illicit laboratories
        iii. Hazardous materials/WMD suspicious package
        iv. Hazardous materials/WMD intelligence threat
        v. Environmental crime involving hazardous materials/WMD
(2)* Using the selected detection and monitoring equipment — colorimetric, electrochemical cells, flammable gas/LEL, noncontact thermal detection device, oxygen concentration, photoionization detector (PID), biological detection (if provided by the AHJ) — radiation detection monitoring devices, exposure rate instrument, and dosimetry devices, perform the following detection, monitoring, and sampling tasks following safety procedures, avoiding or minimizing hazards, and protecting exposures and personnel:
    (a) Field test the detection, monitoring, and sampling equipment to be used according the manufacturers' specification and local policies and procedures as determined by the AHJ, including the following:
        i. Functional (i.e., bump test)
        ii. Calibration
        iii. Other required tests
    (b) Classify hazardous materials by basic hazard categories.
    (c) Verify the presence of hazardous materials.
    (d) Determine the concentration of hazardous materials in the atmosphere.
    (e) Collect samples of solids, liquids, and gases.
    (f) Monitor, read, interpret, record, and communicate readings from the equipment.
    (g) Decontaminate detection, monitoring, and sampling equipment.
    (h) Report and document detection, monitoring, and sampling activities.
    (i) Describe the calibration process and maintenance procedures and perform functional test(s) on monitoring and detection equipment to be used according the manufacturers' specification and local policies and procedures, including the following:
        i. Functional (i.e., bump test)
        ii. Calibration

iii. Other required tests

(3)* Describe the process of interacting with the AHJ's law enforcement agency to provide for testing and analysis of potential WMD material.
  (a) Procedures to introduce samples into the laboratories in the network
  (b) Sampling procedures and required sampling equipment as per AHJ
  (c) Procedures for field screening items to be sent to laboratories as per AHJ
  (d) Packaging requirements for items to be sent to laboratories as per AHJ

10.2.2 Collecting and Interpreting Hazard and Response Information. Given examples of hazardous materials/WMD incidents, an assignment, policies and procedures, access to approved reference sources (technical resources, computer databases, and results of monitoring equipment), and access to approved resources (technical resources, computer databases, and results of monitoring equipment), and approved tools and equipment, Hazardous Materials Technicians shall collect, interpret, and communicate hazard and response information and shall meet the requirements of 10.2.2.1 through 10.2.2.5.

10.2.2.1* Hazardous Materials Technicians shall identify and explain the types, advantages, and limitations of hazard and response information available from each of the following resources:

(1) Hazardous materials databases
(2) Monitoring equipment
(3) Reference manuals
(4) Technical information centers (i.e., CHEMTREC/CANUTEC/SETIQ and governmental authorities)
(5) Technical information specialists

10.2.2.2 Hazardous Materials Technicians shall evaluate, interpret, and apply the following terms and properties and express their significance in a risk-based response analysis:

(1) Autorefrigeration
(2) Compound
  (a) Inorganic
  (b) Organic
(3) Compressed gases
  (a) Critical pressure
  (b) Critical temperature
(4) Corrosives
  (a) Dilution
  (b) Neutralization
(5) Decomposition temperature
(6) Endothermic
(7) Exothermic
(8) Heat transfer process
  (a) Conduction
  (b) Convection
  (c) Direct Contact
  (d) Radiation
(9) Mixture versus pure compound
(10) Odor threshold
(11) Radiation
  (a) Alpha
  (b) Beta
  (c) Gamma
  (d) Half-life
  (e) Isotope
  (f) Neutron
(12) Particulate size
(13) Polymerization
  (a) Catalyst
  (b) Inhibitor
  (c) Maximum safe storage temperature (MSST)
  (d) Monomer
  (e)* Self-accelerating decomposition temperature (SADT)
(14) Pyrophoric
(15) Solubility
  (a) Miscibility
  (b) Nonpolar
  (c) Polar
  (d) Solution
(16) Slurry
(17) Sublimation
(18) Temperature of product
(19) Vapor density (relative gas density)
(20) Vapor pressure
(21) Viscosity
(22) Volatility

10.2.2.3 Hazardous Materials Technicians shall recognize and identify the signs and symptoms and target organ effects of exposure to hazardous materials/WMD.

10.2.2.4* Hazardous Materials Technicians shall identify hazardous and response information to be communicated.

10.2.2.5 Hazardous Materials Technicians shall collect and interpret hazardous and response information.

10.2.3* Describing the Condition of the Container Involved in the Incident. Given examples of incident involving hazardous materials/WMD incidents; an assignment; policies and procedures; identity of material(s) involved and the hazards including results of detection, monitoring, and sampling; a container with required markings; and approved resources, the Hazardous Materials Technician shall assess the container and its closures, identify the damage to the container and its closures, identify the stress(es) on the container, describe the level of risk associated with the damage and stress(es), and communicate this information by completing the related requirements of 10.2.3.1 through 10.2.3.3.

10.2.3.1 Hazardous Materials Technicians shall identify the basic design and construction features, including closures for bulk, intermediate bulk, and nonbulk containers; facilities containers; radioactive materials containers; and piping and pipelines.

10.2.3.2 Hazardous Materials Technicians shall identify the typical types of damage for bulk, intermediate bulk, and nonbulk containers; facilities containers; radiological materials containers; and piping and pipelines and the levels of risk associated with the damage.

(1) Describe types of stress(es).
(2) Identify methods for determining the pressure and quantity of lading remaining in containers and indicators of an increase in container pressure.

10.2.3.3 Hazardous Materials Technicians shall assess the condition of the container and its contents following safety

procedures, avoiding or minimizing hazards, and protecting exposures and personnel.

(1) Identify the type and extent of damage to the container and its closures and the level of risk associated with the damage.
(2) Identify the stress(es) on the container.
(3) Communicate the results of the assessment.

10.2.4 Predicting Likely Behavior of Materials and Their Containers Where Multiple Materials Are Involved. Given examples of hazardous materials/WMD incidents; an assignment; policies and procedures; physical and chemical properties of the materials involved; results of detection, monitoring, and sampling; condition of the container [damage and stress(es)]; surrounding conditions; and approved reference sources, Hazardous Materials Technicians shall predict the likely behavior of the hazardous material/WMD involved, identify the reactivity issues and hazards of the combined materials, and communicate a description of the likely behavior by meeting the following requirements:

(1) Identify resources that indicate the reactivity issues of mixing various hazardous materials/WMD.
(2) Identify the impact of the following fire and safety features on the behavior of the products during an incident at a bulk liquid facility and explain the significance in the analysis process:
    (a) Fire protection systems
    (b) Monitoring and detection systems
    (c) Pressure relief and vacuum relief protection
    (d) Product spillage and control (impoundment and diking)
    (e) Tank spacing
    (f) Transfer operations
(3) Identify the impact of the following fire and safety features on the behavior of the products during an incident at a bulk gas facility and explain the significance in the analysis process:
    (a) Fire protection systems
    (b) Monitoring and detection systems
    (c) Pressure relief protection
    (d) Transfer operations

10.2.5 Estimating the Likely Size of an Endangered Area. Given examples of hazardous materials/WMD incidents, an assignment, policies and procedures, the likely behavior of the container and its contents, and approved resources and equipment, Hazardous Materials Technicians shall use approved resources and equipment; measure and predict concentrations of materials within the endangered area; identify the physical, health, and safety hazards within the endangered area; identify the areas of potential harm in the endangered area; estimate the potential outcomes within the endangered area; and communicate the potential outcomes by completing the following requirements:

(1) Identify resources for dispersion pattern prediction and modeling, including computers, monitoring equipment, or specialists in the field.
(2) Identify the methods for measuring and predicting concentrations of materials within the endangered area to determine public protective tactics and the areas to be protected.
(3) Identify the methods for identifying the physical, safety, and health hazards within the endangered area.
(4) Describe the following health hazard terms and exposure values, and explain the significance of a risk-based response analysis:
    (a) Biological effect
        i. Carcinogen
        ii. Irritant
        iii. Mutagen
        iv. Teratogen
    (b) Concentration units
        i. Parts per billion (ppb)
        ii. Parts per million (ppm)
        iii. Milligrams per meter cubed (mg/m^3)
    (c) Dose
    (d) Dose response
    (e) Exposure levels
        i.* Protective action criteria (PAC)
        ii. Immediately dangerous to life and health (IDLH)
        iii. Incapacitating concentration (I_{50})
        iv. Lethal concentration (LC_{50})
        v. Lethal dose (LD_{50})
        vi. Permissible exposure limit (PEL)
        vii. Recommended exposure limit (REL)
        viii. Threshold limit value — ceiling (TLV-C)
        ix. Threshold limit value — short-term exposure limit (TLV-STEL)
        x. Threshold limit value — time-weighted average (TLV-TWA)
    (f) Incubation period
    (g) Infectious dose
    (h) Inhalation hazards
        i. Poison inhalation hazard (PIH)
        ii. Toxic inhalation hazard (TIH)
    (i) Radiation dose rate
    (j) Radiation units
        i. Counts per minute (cpm) and kilo counts per minute (kcpm)
        ii. Radiation absorbed dose (rad)
        iii. Roentgen equivalent man (rem), millirem (mrem), microrem (μrem)
        iv. Sievert, millisievert (mSv), microsievert (μSv)
        v. Becquerel (Bq)
        vi. Curie (Ci)
        vii. Gray (Gy)
(5)* Identify methods for determining the outcomes within an endangered area.
(6) Given examples of hazardous materials/WMD releases and the corresponding instrument monitoring readings, determine the applicable public protective tactics and the areas to be protected.

10.2.6 Selecting Rescue and Recovery Options. Given examples of hazardous materials/WMD incidents involving exposed or contaminated victims; an assignment; the scope of the problem; policies and procedures; approved resources, including special rescue equipment and PPE; and an emergency response plan or standard operating procedures, Hazardous Materials Technicians assigned to rescue and recover victims shall select the victim rescue and recovery option(s) for the assignment and be able to perform the following tasks:

(1) Describe the importance of working under the guidance of an emergency response plan or standard operating procedures.
(2) Choose whether the task is victim rescue, victim recovery, or both.
    (a) Describe the difference between victim rescue and victim recovery operations.
    (b) Describe considerations for determining the feasibility of conducting rescue or recovery operations in each of the following situations:
        i. Line-of-sight with ambulatory victims
        ii. Line-of-sight with nonambulatory victims
        iii. Non-line-of-sight with ambulatory victims
        iv. Non-line-of-sight with nonambulatory victims
        v. Victim rescue operations versus victim recovery operations
(3) Select the rescue and recovery options within the capabilities of available personnel, approved tools, equipment, special rescue equipment, and PPE for the situation at hand.
(4) Describe both rescue and recovery options for each of the following situations:
    (a) Line-of-sight with ambulatory victims
    (b) Line-of-sight with nonambulatory victims
    (c) Non-line-of-sight with ambulatory victims
    (d) Non-line-of-sight with nonambulatory victims
(5) Describe the procedures for implementing victim rescue and recovery operations within the incident command system.
(6) Select the victim rescue or recovery option(s) and equipment for the assigned situation within the capabilities of available personnel, approved tools, equipment, special rescue equipment, and PPE.
(7) Identify the PPE protection options required to protect victims during rescue and recovery operations.

10.3 Competencies — Planning the Response.

10.3.1 Identifying Strategies and Tactics.

10.3.1.1 Given examples of hazardous materials/WMD incidents; an assignment; results of the incident analysis including incident-related information, life safety risks, environmental risks, and property risks; available resources; and policies and procedures, Hazardous Materials Technicians shall develop and recommend to the Incident Commander (IC) or Hazardous Materials Officer strategies and tactics by completing the following requirements:

(1) Describe the considerations for identifying strategies (defensive, offensive, and nonintervention).
(2) Describe the considerations for identifying the possible tactics to accomplish a given strategy.
(3) Determine the applicable public protective tactics and the areas to be protected.

10.3.2 Selecting PPE. Given examples of hazardous materials/WMD incidents, an assignment, results of the incident analysis, strategies and tactics for the incident, approved references, and policies and procedures, Hazardous Materials Technicians shall select the PPE required for the specified tactic(s) by completing the requirements in 10.3.2.1 through 10.3.2.5.

10.3.2.1 Hazardous Materials Technicians shall identify classes of PPE available based on NFPA standards, OSHA/EPA levels of PPE (A, B, C, D), and the advantages of using certified PPE.

10.3.2.2 Hazardous Materials Technicians shall describe the types of PPE that are available for protection against the anticipated hazards and associated types of harm based on a determination of the risks for the jurisdiction or community.

10.3.2.3 Hazardous Materials Technicians shall identify the following factors to be considered when selecting PPE:

(1)* Significance of degradation, penetration, and permeation on the selection of protective clothing
(2) Indications of material degradation of protective clothing
(3) Different designs of liquid splash–protective ensembles and vapor-protective ensembles and their advantages and disadvantages
(4) Types, advantages, and disadvantages of cooling measures used for personnel who are wearing PPE
(5)* Limitations involved when using chemical compatibility charts when selecting chemical protective clothing

10.3.2.3.1 Hazardous Materials Technicians shall describe the factors to be considered in 10.3.2.3 for the following types of incidents:

(1) Release or attack with hazardous materials/WMD
(2) Illicit laboratories
(3) Hazardous materials/WMD suspicious package
(4) Hazardous materials/WMD intelligence threat
(5) Environmental crime involving hazardous materials/WMD

10.3.2.4 Hazardous Materials Technicians shall identify the effects of physiological and psychological stresses on users of PPE.

10.3.2.5 Hazardous Materials Technicians shall identify the process for inspecting, testing, and maintenance of PPE *[see A.8.11.3.1(1)(b)]*.

10.3.3 Selecting Decontamination Procedures. Given examples of hazardous materials/WMD incidents, an assignment, results of the incident analysis, strategies and tactics for the incident, available resources, and policies and procedures, Hazardous Materials Technicians shall select the decontamination procedure for a given tactic and the equipment required to implement that procedure by completing the following requirements:

(1) Describe the application, advantages, and limitations of each of the following decontamination methods:
    (a) Absorption
    (b) Adsorption
    (c) Chemical degradation
    (d) Dilution
    (e) Disinfection
    (f) Evaporation
    (g) Isolation and disposal
    (h) Neutralization
    (i) Solidification
    (j) Sterilization
    (k) Vacuuming
    (l) Washing
(2) Identify reference sources for determining applicable decontamination methods, and identify how to access those resources in hazardous materials/WMD incidents.
(3) Identify equipment required to implement each of the decontamination methods.

10.3.4 Developing an Action Plan. Given a hazardous materials/WMD incident, an assignment, results of the incident analysis, strategies and tactics for the given incident, available resources, and policies and procedures, the Hazardous Materials Technician shall develop an action plan, including, but not limited to, a site safety and control plan, safety briefing materials, and pre-entry tasks; identify atmospheric and physical safety hazards when the incident involves a confined space; preserve evidence and take public safety samples at the incident consistent with the AHJ policies and procedures and within the capability of available personnel, PPE, and response equipment for that incident by completing the following requirements:

(1) Identify the components of an IAP and subplans.
(2) Identify the components of a safety briefing.
(3) Identify pre-entry activities to be performed.
(4) Identify the components of a site safety and control plan.
(5) Identify safety considerations to be included.
(6) Describe the difference between control, confinement, containment, and extinguishment.
(7) Describe the purpose of, procedures for, required tools and equipment for, and safety precautions for following techniques for hazardous materials/WMD (product) control:
    (a) Absorption
    (b) Adsorption
    (c) Blanketing
    (d) Damming
    (e) Diking
    (f) Dilution
    (g) Dispersion
    (h) Diversion
    (i) Neutralization
    (j) Overpacking
    (k) Patching
    (l) Plugging
    (m) Pressure isolation and reduction (isolation of valves, pumps, or energy sources)
    (n) Retention
    (o) Remote valve shutoff
    (p) Sealing closures
    (q) Vapor dispersion
    (r) Vapor suppression
(8) Describe the atmospheric and physical safety hazards associated with hazardous materials/WMD incidents involving confined spaces.
(9) Identify the procedures, equipment, and safety precautions for preserving and collecting legal evidence at hazardous materials/WMD incidents.

10.3.5 Victim Rescue and Recovery. Given examples of hazardous materials/WMD incidents and the recommended victim rescue and recovery option(s) for the incident, Hazardous Materials Technicians assigned to rescue and recover victims shall implement the selected victim rescue and recovery options by completing the following requirements:

(1) Identify the different victim and recovery team positions, roles, and responsibilities.
(2) Select and use specialized rescue equipment and procedures provided by the AHJ to support victim rescue and recovery.
(3) Rescue and recover victims following safety procedures, avoiding or minimizing hazards, and protecting exposures and personnel.
(4) Select required PPE for victims and rescuers.
(5) Triage and transfer victims to the decontamination group, casualty collection point, or area of safe refuge or emergency medical care in accordance with the IAP.
(6) Follow the AHJ's procedures for the decontamination of rescue/recovery personnel and their equipment.

10.4 Competencies — Implementing the Planned Response.

10.4.1* Performing Incident Command Duties. Given examples of an emergency response plan or standard operating procedures and examples of hazardous materials/WMD incidents, Hazardous Materials Technicians shall demonstrate the duties of an assigned function in the hazardous materials group within the ICS and shall identify the following during hazardous materials/WMD incidents:

(1) The various positions in the hazardous materials group within the ICS and describe the main functions
(2) The role of the Hazardous Materials Technician

10.4.2* Using PPE. Given examples of hazardous materials/WMD incidents, an assignment, policies and procedures, results of the incident analysis, strategies and tactics for the incident, and PPE ensembles as identified in the IAP, Hazardous Materials Technicians shall inspect, don, work in, go through decontamination while wearing, and doff PPE provided by the AHJ, and shall complete the following requirements:

(1) Describe safety for personnel wearing PPE, including buddy systems, backup systems, accountability systems, safety briefings, and evacuation/escape procedures.
(2) Inspect, don, work in, and doff PPE provided by the AHJ.
(3) Go through the process of being decontaminated (emergency and technical) while wearing PPE.
(4) Maintain and store PPE following instructions provided by the manufacturer and NFPA 1891.

10.4.3 Performing Product Control Techniques. Given examples of product control techniques and resources provided by the AHJ at hazardous materials/WMD incidents, Hazardous Materials Technicians shall confine/contain the release from bulk or nonbulk pressure containers/closures, nonbulk liquid containers/closures, and bulk liquid containers/closures, following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards, by completing the requirements in 10.4.3.1 through 10.4.3.4.

10.4.3.1 Product Control. Given examples of hazardous materials/WMD incidents with release of product; an assignment; results of the incident analysis; policies and procedures for product control; strategies and tactics for the incident; and approved tools, equipment, control agents, and PPE, Hazardous Materials Technicians shall, while following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards, perform the product control techniques by completing the following requirements:

(1) Identify and implement product control techniques to confine released hazardous materials/WMD, including the following:
    (a) Absorption
    (b) Adsorption
    (c) Damming
    (d) Diking
    (e) Dilution
    (f) Diversion
    (g) Retention

(h) Vapor dispersion
(i) Vapor suppression

(2) Identify the application and purpose of, advantages and limitations of, procedures for, required tools and equipment for, and safety precautions for each of the control techniques for confining released materials.
(3) Identify the procedures for controlling releases from the packaging/flammable liquid and flammable gas releases using techniques, including hose handling, nozzle, patterns, and attack operations.
(4) Identify the characteristics, applicability, and AHJ-provided foams or agents and the required equipment for application of the foam or agent to control the spill or fire by application of the foam(s) or agent(s).

10.4.3.2 Controlling Leaks from Containers.

10.4.3.2.1 Given examples of hazardous materials/WMD incidents; an assignment; results of the incident analysis; three scenarios, including a leak from a bulk or nonbulk pressure container or its closures, a leak from a nonbulk liquid container or its closures, and a leak from a bulk liquid container or its closures; policies and procedures for controlling leaks from containers and/or their closures; and approved tools, equipment, and PPE, Hazardous Materials Technicians shall, while following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards, control leaks from the containers and their closures and monitor for hazards as necessary, by completing the following requirements:

(1) Identify the product control techniques to contain leaking hazardous materials/WMD, including the following:
(a) Patching
(b) Plugging
(c) Repositioning the container
(d) Sealing closures
(e) Remote valve shutoff
(2) Identify types of containers, the closures, and ways the containers and closures develop leaks.
(3) Operate remote control/emergency shutoff devices to reduce or stop the flow of hazardous material from MC-306/DOT-406, MC-407/DOT-407, and MC-331 cargo tanks and intermodal tanks containing flammable liquids or gases or fixed facility containers.
(4) Given examples of the fittings on a pressure container and using tools and equipment provided by the AHJ, contain the leaks by the following methods:
(a) Close valves that are open
(b) Replace or tighten loose plugs
(c) Replace missing plugs

10.4.3.2.2 Hazardous Materials Technicians shall, given a 55 gal (208 L) drum and applicable tools and materials, contain the following types of leaks:

(1) Bung leak
(2) Chime leak
(3) Forklift puncture
(4) Nail puncture

10.4.3.3 Overpacking Nonbulk and Radioactive Materials Containers.

10.4.3.3.1 Given examples of hazardous materials/WMD incidents; an assignment; results of the incident analysis; a loaded damaged or leaking container; a suitable overpack container; policies and procedures; and approved tools, equipment, and PPE, Hazardous Materials Technicians shall, while following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards, place the damaged or leaking nonbulk or radioactive materials container into a suitable overpack and ensure the overpack is closed, marked, and labeled by completing the following requirements:

(1) Identify ways nonbulk and radioactive materials containers are damaged.
(2) Identify hazards associated with overpacking damaged or leaking nonbulk and radioactive materials containers.
(3) Identify methods for overpacking damaged or leaking nonbulk and radioactive materials containers, including tools and equipment required.
(4) Identify markings and labels required for overpack containers.
(5) Identify methods for decontaminating tools and equipment used for overpacking damaged or leaking nonbulk and radioactive materials containers.
(6) Identify equipment and maintenance procedures.

10.4.3.3.2 Hazardous Materials Technicians shall, given a 55 gal (208 L) drum and an overpack drum, demonstrate the ability to place the 55 gal (208 L) drum into the overpack drum using the following methods:

(1) Rolling slide-in
(2) Slide-in
(3) Slip-over

10.4.3.4 Liquid Product Transfer. Given examples of hazardous materials/WMD incidents; an assignment; results of the incident analysis; a leaking nonpressure container and a recovery container; policies and procedures for transferring liquids from leaking nonpressure containers; and approved tools, equipment, and PPE; Hazardous Materials Technicians shall, while following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards complete the following requirements:

(1) Select a compatible recovery container.
(2) Monitor for hazards.
(3) Select the required tools and equipment for transferring liquid product.
(4) Ground and bond the containers.
(5) Transfer liquid product.
(6) Perform vapor suppression, as necessary.
(7) Decontaminate tools and equipment.
(8) Inspect and maintain tools and equipment for transferring liquid product.
(9) Identify the maintenance and inspection procedures for the tools and equipment provided for the control of hazardous materials releases according to the manufacturer's specifications and recommendations and AHJ policies and procedures.
(10) Identify considerations for assessing a leak or spill inside a confined space without entering the area.

10.4.4 Operating as a Backup Team. A Hazardous Materials Technician operating as a member of a backup team shall conduct a rescue and remove an incapacitated entry team member from the hot zone.

10.4.5* Performing Decontamination Operations Identified in the Incident Action Plan. Given examples of hazardous materials/WMD incidents requiring decontamination; an assignment; the results of the incident analysis; policies and

procedures; and PPE and resources approved by the AHJ, Hazardous Materials Technicians shall implement, evaluate the effectiveness of, and terminate the following decontamination operations:

(1) Technical decontamination operations in support of entry operations
(2) Technical decontamination operations involving ambulatory and nonambulatory victims
(3) Mass decontamination operations involving ambulatory and nonambulatory victims

10.5 Competencies — Evaluating Progress.

10.5.1 Evaluating the Effectiveness of Actions Taken. Given examples of hazardous materials/WMD incidents, an assignment, current incident conditions, strategies and tactics taken, and approved communication equipment, Hazardous Materials Technicians shall compare the actual behavior of the material and container to that predicted, determine the effectiveness of tactics in accomplishing strategies, make modifications to the tactics as necessary, and communicate the results by completing the following requirements:

(1) Identify procedures for evaluating whether the tactics are effective in accomplishing the strategies.
(2) Identify resources for identifying improving, static, or deteriorating conditions.
(3) Identify approved communication procedures and communication equipment.
(4) Identify the process for modifying tactics.

10.5.2 Evaluating the Effectiveness of the Decontamination Process. Given examples of incident action plans for hazardous materials/WMD incidents, Hazardous Materials Technicians shall evaluate the effectiveness of any decontamination procedures identified in the incident action plans.

10.6 Competencies — Terminating the Incident.

10.6.1 Assisting in the Debriefing and Critiques. Given examples of hazardous materials/WMD incidents, an assignment, policies and procedures, operational observations of activities (incident information), and approved forms for documentation and reporting, Hazardous Materials Technicians shall communicate operational observations (incident information) at debriefings and critiques and complete, forward, and file required reports, records, and supporting documents by completing the following requirements:

(1) Describe the purpose, regulatory issues, elements, and procedures for conducting debriefings and critiques
(2) Describe documentation and reporting requirements according to the AHJ
(3) Identify approved forms and procedures for completing required reports, records, and supporting documentation
(4) Describe the importance of and procedures for filing documents and maintaining records

Chapter 11 Professional Qualifications for Hazardous Materials/WMD Technicians (NFPA 1072)

11.1 General.

11.1.1 Hazardous Materials Technicians are those persons who respond to hazardous materials/WMD incidents using a risk-based response process by which they analyze a problem involving hazardous materials/WMD, plan a response to the problem, implement the planned response, evaluate progress of the planned response, adjust accordingly, and assist in terminating the incident.

11.1.2 Hazardous Materials Technicians shall meet the job performance requirements (JPRs) defined in Sections 5.1 through 5.4.

11.1.3 Hazardous Materials Technicians shall meet the JPRs defined in Sections 7.2 through 7.6.

11.1.4 Hazardous Materials Technicians shall meet the job performance requirements defined in Sections 11.2 through 11.6.

11.1.5 Hazardous Materials Technicians shall have additional competencies that are specific to the response mission and expected tasks as determined by the AHJ.

11.1.6 General Knowledge Requirements. (Reserved)

11.1.7 General Skills Requirements. Written and verbal communication skills.

11.2 Analyze the Incident.

11.2.1* Hazard and Response Information Collection and Interpretation. Collect and interpret hazard and response information at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, including an incident with no release, incidents with a release of visible vapor cloud, liquid pooling, or solid dispersion with and without victims, and an incident with victims displaying signs and symptoms without an apparent chemical release; an assignment, policies and procedures; approved reference sources; and approved tools and equipment, so that hazard and response information is collected, interpreted, and communicated.

(A)* Requisite Knowledge. Types, advantages, and limitations of hazard and response information available from approved reference sources; significance and application of hazard and response terms, including chemical and physical properties in accordance with 10.2.2.2 and 10.2.5; signs and symptoms and target organ effects of exposure to hazardous materials/WMD; methods for determining the pressure and amount of lading in bulk containers and facility containers; and hazard and response information to be communicated.

(B)* Requisite Skills. Collecting and interpreting hazard and response information; identifying signs and symptoms of exposure to hazardous materials/WMD, including target organ effects of exposure to hazardous materials/WMD; and determining radiation exposure rates from labels attached to radioactive materials containers.

11.2.2* Detection, Monitoring, and Sampling. Classify hazardous materials/WMD and verify the presence and concentrations of hazardous materials through detection, monitoring, and sampling at a hazardous materials/WMD incident, given hazardous materials/WMD incidents, including one involving criminal intent, with released identified and unidentified hazardous materials; an assignment in an incident action plan (IAP); policies and procedures; approved resources; detection and monitoring equipment; and personal protective equipment (PPE), so that PPE is selected and used; hazardous materials/WMD are classified by their basic hazard categories; the presence of hazardous materials is verified; the concentrations of hazardous materials in the atmosphere are determined; signs of exposure in victims and responders are recognized and

identified; samples of solids, liquids, and gases are collected; results of detection and monitoring equipment are read, interpreted, recorded, and communicated; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; law enforcement agencies are notified as needed; samples to be sent to laboratories are field screened and appropriately packaged; personnel using the detection, monitoring, and sampling equipment, as well as the equipment, are decontaminated; detection, monitoring, and sampling equipment is maintained according to manufacturers' recommendations; and detection, monitoring, and sampling operations are reported and documented.

(A)* Requisite Knowledge. Basic categories of harm, including, but not limited to, thermal (heat and cold), radiation, chemical (toxic), reactive, corrosive, explosive, oxygen depletion, biological, and mechanical and their definitions; policies and procedures; detection, monitoring, and sampling technologies; analysis process for classifying basic hazard categories of identified solid, liquid, and gaseous materials and unidentified contaminants in the atmosphere; types of detection, monitoring, and sampling equipment [colorimetrics (e.g., tubes, chips, papers, strips, reagents); electrochemical cells (e.g., toxic gas sensors), flammable gas/LEL, noncontact thermal detection device, oxygen concentration, photoionization detector (PID), biological detection, and radiation detection and monitoring]; process for determining radiation dose rates from radioactive material labels; determining background, rate, and dose; determining if a radioactive materials container is leaking/breached by comparing meter readings to Transportation Index (TI); process for monitoring lighter-than-air gases and vapors, heavier-than-air gases and vapors in a confined area, and heavier-than-air gases and vapors in an unconfined area; capabilities and limiting factors of detection, monitoring, and sampling equipment; detection, monitoring, and sampling equipment required to classify the basic hazard categories; recognition and identification of signs and symptoms and target organ effects of exposure in victims and responders; methods for collecting samples of solids, liquids, and gases; detection options for gases, liquids, and solids at illicit laboratories, suspicious packages, environmental crimes, and intelligence threat incidents; procedures to introduce samples into network laboratories; procedures for field screening samples; packaging requirements for samples being sent to a laboratory; reading, interpreting, recording, and communicating test results of detection and monitoring, and sampling equipment; procedures for decontaminating detection, monitoring, and sampling equipment according to manufacturer's recommendations or AHJ policies and procedures; and maintenance and testing procedures including functional test, calibration, and other required tests for approved detection, monitoring, and sampling equipment.

(B)* Requisite Skills. Selecting and using PPE; determining radiation dose rates from radioactive material labels; using each of the following types of detection, monitoring, and sampling equipment [colorimetrics (e.g., tubes, chips, papers, strips, reagents); electrochemical cells (e.g., toxic gas sensors), flammable gas/LEL, noncontact thermal detection device, oxygen concentration, photoionization detector (PID), and radiation detection and monitoring devices] to either classify hazardous materials by basic hazard categories, verify the presence of hazardous materials or determine the concentration of hazardous materials when possible; collect samples of gases, liquids, and solids; monitoring, reading, interpreting, recording, and communicating readings from detection, monitoring, and sampling equipment according to the manufacturers' specifications and recommendations; and completing required reports and supporting documentation for detection, monitoring, and sampling operations.

11.2.3* Assessing Container Condition. Assess the condition of a container and its closures at a hazardous materials/WMD incident, given an incident involving hazardous materials/WMD; an assignment; policies and procedures; the scope of the incident; identity of material(s) involved and their hazards, including results of detection, monitoring, and sampling; a container with required markings; and approved resources and PPE, so that PPE is selected and used; the container and its closures are inspected; the type of damage to the container and closures is identified; the type of stress on the container is identified; the level of risk associated with container and closure damage and stress is identified; safety procedures are followed; hazards are avoided or minimized; personnel, tools, and equipment are decontaminated; and a description of the condition of the container and its closures is communicated.

(A)* Requisite Knowledge. Process for assessing container condition; basic design and construction features, including closures for bulk, intermediate bulk, and nonbulk containers, facility containers, radioactive materials containers, and piping and pipelines; types of damage and their level of risk; types of stress; specification markings; and methods for determining the pressure and quantity of lading remaining in containers and indicators of an increase in container pressure.

(B) Requisite Skills. Assessing the condition of the container and its closures, identifying the type of damage and level of risk associated with the damage, identifying stress(es) on the container, and communicating the condition of the container and its closures and the level of risk associated with that condition.

11.2.4* Predicting Behavior. Predict the behavior of the hazardous materials/WMD involved in a hazardous materials/WMD incident, given an incident involving multiple hazardous materials/WMD; an assignment; policies and procedures; physical and chemical properties of the materials involved; results of detection, monitoring, and sampling; condition of the container (damage and stress); surrounding conditions; and approved reference sources, so that the behavior of each hazardous materials/WMD container and its contents is identified, the reactivity issues and hazards of the combined materials are identified, and a description of the likely behavior of the hazards is communicated.

(A)* Requisite Knowledge. Application of the general hazardous materials behavior model to evaluate and predict likely behaviors of containers and materials; impact of fire and safety features on the behavior of products at bulk liquid and bulk gas facilities, including fire protection systems, monitoring and detection systems, pressure relief and vacuum protection, product spillage and control, tank spacing, and transfer operations and heat transfer processes that occur as a result of a cryogenic liquid spill; and methods for communicating the results of predicting behavior.

(B)* Requisite Skills. Applying the general hazardous materials behavior model to predict likely behavior of materials and their containers when multiple materials are involved, identifying reactivity issues associated with mixing various hazardous materials, and communicating the predicted behavior.

11.2.5* Estimating Outcomes. Estimate the potential outcomes at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, policies and procedures, the likely behavior of the container and its contents, and approved resources and equipment, so that the concentrations of materials within the endangered area are measured or predicted; physical, health, and safety hazards within the endangered area are identified; areas of potential harm in the endangered area are identified; potential outcomes within the endangered area are identified; and potential outcomes are communicated.

(A) Requisite Knowledge. Methods for determining concentrations of materials within the endangered area; resources for dispersion pattern prediction and modeling, including computers, monitoring equipment, or specialists in the field; methods for identifying physical, health, and safety hazards within the endangered area; health hazard terms and exposure valuesin accordance with 10.2.5, and their significance in the analysis process; methods for identifying areas of potential harm within the endangered area; methods for identifying potential outcomes in the areas of potential harm within the endangered area; and procedures for communicating potential outcomes.

(B) Requisite Skills. Using approved resources and equipment; determining concentrations of materials within the endangered area; identifying the physical, health, and safety hazards within the endangered area; identifying the areas of potential harm in the endangered area; estimating the potential outcomes in the endangered area; and communicating the potential outcomes.

11.3 Response Planning.

11.3.1 Strategies and Tactics. Develop and recommend to the Incident Commander or Hazardous Materials Officer strategies and tactics at a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment; results of the incident analysis, including incident-related information, life safety risks, environmental risks, and property risks; available resources; and policies and procedures, so that strategies are identified for the incident and tactics are identified for each strategy.

(A)* Requisite Knowledge. Possible tactics to accomplish given strategies, including public protective tactics, considerations for identifying strategies (defensive, offensive, and nonintervention), and possible strategies.

(B) Requisite Skills. Developing strategies for a hazardous materials incident and identifying tactics for each strategy.

11.3.2* Personal Protective Equipment (PPE) Selection. Select the PPE ensemble required for a given tactic at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, results of the incident analysis, strategies and tactics for the incident, approved references, and policies and procedures, so that required PPE is identified for each tactic.

(A)* Requisite Knowledge. Identify the PPE available for response based on NFPA PPE standards and certification levels; OSHA/EPA levels of PPE (A, B, C, and D); advantages of using certified PPE; types of PPE available for anticipated hazards identified through a risk-based response analysis; factors to be considered in selecting respiratory protection; factors to be considered in selecting chemical-protective clothing (CPC); factors to be considered in selecting PPE for incidents involving illicit laboratories, suspicious packages, intelligence threats, and environmental crimes; significance of degradation, penetration, and permeation on the selection of protective clothing; indications of material degradation of protective clothing; advantages and limitations of the different designs of liquid splash–protective ensembles and vapor-protective ensembles; types, advantages, and limitations of cooling measures for cooling personnel wearing PPE; the PPE selection matrix from NFPA 1891, Annex B; limitations when using the information provided on chemical compatibility charts; and effects of physiological and psychological stresses on users of PPE.

(B)* Requisite Skills. Selecting PPE ensemble for a specified tactic based on all hazards identified and determining the effectiveness of protective clothing based on its uses and limitations.

11.3.3 Decontamination Method Selection. Select the decontamination method for a given tactic at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, results of the incident analysis, strategies and tactics for the incident, available resources, and policies and procedures, so that a decontamination method to minimize the hazards for each tactic is identified and the equipment required to implement the decontamination method is identified.

(A)* Requisite Knowledge. Decontamination methods, including absorption, adsorption, chemical degradation, dilution, disinfection, evaporation, isolation and disposal, neutralization, solidification, sterilization, vacuuming, and washing; advantages and limitations of decontamination methods; decontamination methods for incidents involving illicit laboratories, suspicious packages, intelligence threats, and environmental crimes; reference sources for determining applicable decontamination operations and methods; methods for accessing these resources; and equipment required to implement specified decontamination operations and methods.

(B) Requisite Skills. Selecting decontamination procedures (operations and methods) and identifying the equipment required to implement decontamination procedure (operations and methods).

11.3.4* Action Plan Development. Develop a plan of action for a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, results of the incident analysis, strategies and tactics for the given incident, available resources, and policies and procedures, so that the tasks and resources required to meet the strategies are identified, specified strategies and tactics are addressed, plan is consistent with the emergency response plan and policies and procedures, and plan is within the capability of available personnel, PPE, and control equipment.

(A)* Requisite Knowledge. Components of an IAP and subplans; definitions of control, confinement, containment, and extinguishment; purpose of, procedures for, required tools and equipment for, and safety precautions for various techniques for hazardous materials/WMD (product) control; components of a safety briefing; atmospheric and physical safety hazards associated with hazardous materials/WMD in confined spaces; pre-entry tasks to be performed; and procedures, equipment, and safety precautions for preserving and collecting legal evidence.

(B) Requisite Skills. Preparing an action plan, identifying site safety and control components, identifying points for a safety briefing, identifying pre-entry tasks, identifying atmospheric and physical safety hazards when incident involves a confined space, and preserving and collecting legal evidence.

11.4 Action Plan Implementation.

11.4.1 Performing Assigned Roles in ICS. Perform assigned hazardous materials branch or group functions within ICS at a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment; results of the incident analysis; policies and procedures, including an emergency response plan and standard operating procedures; the IAP; and approved resources, so that the assigned functions within the hazardous materials branch or group are completed.

(A)* Requisite Knowledge. Organizational structure of the hazardous materials branch or group; duties and responsibilities of hazardous materials branch or group functions; resources available to complete assigned functions; reporting structure; and procedures for communicating with the hazardous materials branch or group supervisor, ICS operations section chief, or IC.

(B) Requisite Skills. Performing the duties and responsibilities of an assigned function in the hazardous materials branch or group organization and communicating observations to hazardous materials branch director/group supervisor, ICS operations section chief, or IC.

11.4.2* Personal Protective Equipment Use. Test, don, work in, and doff PPE at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, policies and procedures, results of the incident analysis, strategies and tactics for the incident, and PPE ensembles as identified in the IAP, so that PPE is inspected, donned, worked in, decontaminated, and doffed; safety procedures are followed; hazards are avoided or minimized; equipment is maintained and stored properly; and the use of PPE is reported and documented.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; capabilities, advantages, limitations, selection, and use of PPE; components of an IAP; safety procedures for personnel working in PPE; additional safety concerns of working in the hot zone; procedures for being decontaminated while wearing PPE; procedures for maintenance, testing, inspection, and storage of PPE according to manufacturers' specifications and recommendations; and importance of personnel exposure records, steps in keeping an activity log and exposure records, requirements for reporting and documenting the use of PPE, and requirements for filing documents and maintaining records.

(B) Requisite Skills. Testing, inspecting, donning, working in, going through technical decontamination while wearing PPE; and completing required reports and supporting documents for the use of PPE.

11.4.3 Performing Control Functions.

11.4.3.1* Product Control. Perform product control techniques at a hazardous materials/WMD incident, given a hazardous materials/WMD incident with release of product, an assignment, results of the incident analysis, policies and procedures for product control, strategies and tactics for the incident, and approved tools, equipment, control agents, and PPE, so that an approved product control technique is selected and implemented; the product is controlled; approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; personnel, victims, tools, and equipment used are decontaminated; tools and equipment are inspected and maintained; and product control operations are reported and documented.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; policies and procedures for product control; product control techniques (absorption, adsorption, blanketing, damming, diking, dilution, dispersion, diversion, neutralization, overpacking, patching, plugging, pressure isolation and reduction, retention, remote valve shutoff, vapor dispersion, and vapor suppression); purpose of, procedures for, required tools and equipment for, and safety precautions for hazardous materials/WMD control techniques; location and operation of remote emergency shutoff devices; characteristics, applicability, and use of approved product control agents; use of approved tools and equipment; and procedures for inspection and maintenance of tools and equipment.

(B)* Requisite Skills. Selecting and using PPE; selecting and using approved control agents and equipment on a release involving hazardous materials/WMD, using container control valves and remote emergency shutoff devices, performing product control techniques, inspecting and maintaining tools and equipment; and completing required and supporting documentation for product control operations.

11.4.3.2* Controlling Container Leaks. Control leaks from containers and their closures at a hazardous materials/WMD incident, given three scenarios, including (1) a leak from a bulk or nonbulk pressure container or its closures, (2) a leak from a nonbulk liquid container or its closures, and (3) a leak from a bulk liquid container or its closures; an assignment; results of the incident analysis; policies and procedures for controlling leaks from containers and/or their closures; and approved tools, equipment, and PPE, so that an approved product control technique is selected and used; approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; hazard monitoring is completed; leaks are controlled (confined or contained); emergency responders, tools, and equipment used are decontaminated; tools and equipment are inspected and maintained; and product control operations are reported and documented.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; policies and procedures for product control; types of containers and their closures; ways in which containers and their closures develop leaks and the hazards of and safety precautions for controlling; container/closure leaks; methods for controlling and containing container, closure, or fitting leaks on pressure and liquid nonbulk, intermediate bulk, radioactive, and facility containers, and pipe and pipelines including patching, plugging, repositioning the container, sealing closures, closing remote shutoffs and open valves, replacing and tightening loose plugs, and replacing missing plugs; location and operation of remote emergency shutoff devices on cargo tanks and at facilities; characteristics, applicability, and use of approved product control agents; approved tools and equipment used to control container/closure leaks; and procedures for inspection and maintenance of tools and equipment.

(B)* Requisite Skills. Selecting and using PPE; selecting and using approved control agents and equipment; controlling leaks on containers and their closures (patching, plugging, sealing closures, remote valve shutoff, closing valves, repositioning container; replacing missing plugs, and tightening loose fittings); decontaminating tools and equipment; inspecting and maintaining tools and equipment; and requirements for reporting and documenting product control operations.

11.4.3.3* Overpacking Nonbulk and Radioactive Materials Containers. Overpack damaged or leaking nonbulk and radioactive materials containers at a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment; results of the incident analysis; a loaded damaged or leaking container; a suitable overpack container; policies and procedures; and approved tools, equipment, and PPE, so that an approved overpack technique is selected; the damaged or leaking container is placed into a suitable overpack and the overpack is closed, marked, and labeled; approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; emergency responders, tools, and equipment are decontaminated; tools and equipment are inspected and maintained; and product control operations are reported and documented.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; policies and procedures for overpacking damaged or leaking nonbulk and radioactive materials containers; ways in which nonbulk and radioactive materials containers are damaged; hazards associated with overpacking damaged or leaking nonbulk and radioactive materials containers; methods to overpack damaged or leaking nonbulk and radioactive materials containers; marking and labeling overpack containers; the tools and equipment used to overpack damaged or leaking nonbulk and radioactive materials containers; and equipment and maintenance procedures.

(B) Requisite Skills. Selecting and using PPE; placing a damaged or leaking nonbulk materials container into the overpack container;placing a damaged or leaking radioactive materials container into an overpack container; following safety procedures and minimizing and avoiding hazards; decontaminating tools and equipment; inspecting and maintaining tools and equipment; and completing requirements for reporting and documenting product control operations.

11.4.3.4 Liquid Product Transfer. Transfer liquids from leaking nonpressure containers at a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment; results of the incident analysis; a leaking nonpressure container and a recovery container; policies and procedures for transferring liquids from leaking nonpressure containers; and approved tools, equipment, and PPE, so that an approved product transfer method is selected and used; approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; hazard monitoring is completed; the containers are bonded and grounded; product is transferred to the recovery container; emergency responders, tools, and equipment used are decontaminated; tools and equipment are inspected and maintained; and product control operations are reported and documented.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; policies and procedures for liquid product transfer; identifying a compatible recovery container; requirements for hazard monitoring; methods for transferring liquid product; grounding and bonding methods; methods for vapor suppression; use of approved tools and equipment; procedures for inspection and maintenance of tools and equipment according to the manufacturer's specifications and recommendations and AHJ policies and procedures; and requirements for reporting and documenting product control operations.

(B) Requisite Skills. Selecting and using PPE; identifying a compatible recovery container and transfer equipment; monitoring for hazards; grounding and bonding containers; transferring liquid product from a leaking container to a recovery container; suppressing vapors; decontaminating tools and equipment; inspecting and maintaining tools and equipment; and completing reports and supporting documentation for product control operations.

11.4.4 Rescue.

11.4.4.1 Rescue an Incapacitated Entry Team Member. Rescue an incapacitated entry team member from the hot zone, given a hazardous materials/WMD incident; an assignment within a backup team; communication of an entry team emergency; and approved tools, equipment, including special rescue equipment, and PPE; so that safety procedures are followed and the entry team member is removed from the hot zone, decontaminated, PPE doffed, and delivered into the care of EMS.

(A) Requisite Knowledge. Types of PPE and the hazards for which they are used, policies and procedures for conducting rescues, roles and responsibilities of backup team members, entry team emergency communication procedures, rescue tools and equipment, rescue prioritization, rescue methods and procedures of personnel in PPE, doffing PPE in an emergency, and emergency decontamination procedures.

(B) Requisite Skills. Identifying rescue situations, prioritizing rescues, selecting proper rescue options, using rescue tools and equipment, moving personnel in PPE, conducting rescues, doffing rescued personnel's PPE, and conducting emergency decontamination.

11.4.4.2 Victim Rescue and Recovery. Perform rescue and recovery operations at a hazardous materials/WMD incident, given a hazardous materials/WMD incident involving exposed and/or contaminated victims; an assignment; scope of the problem; policies and procedures; approved tools, equipment, including special rescue equipment, and PPE; and access to an emergency response plan, or standard operating procedures so that the feasibility of conducting a rescue or a recovery operation is determined; approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; rescue or recovery tactics are selected within the capabilities of available personnel, approved tools, equipment, special rescue equipment, and PPE; victims are rescued or recovered; victims are prioritized and patients are triaged and transferred to the decontamination group, casualty collection point, area of safe refuge, or medical care in accordance with the IAP; personnel, victims, and equipment used are decontaminated; and victim rescue and recovery operations are reported and documented.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; capabilities and limitations of approved PPE; importance of working under the guidance of an emergency response plan or standard operating procedures; the difference between victim rescue and victim recovery; victim

prioritization and patient triage methods; considerations for determining the feasibility of rescue or recovery operations; policies and procedures for implementing rescue and recovery; capabilities and limitations of approved PPE; procedures, specialized rescue equipment required, and incident response considerations for rescue and recovery in the following situations: (1) line-of-sight with ambulatory victims, (2) line-of-sight with nonambulatory victims, (3) non-line-of-sight with ambulatory victims, (4) non-line-of-sight with nonambulatory victims, and (5) victim rescue operations versus victim recovery operations; AHJ's rescue team positions, roles, and responsibilities; and procedures for reporting and documenting victim rescue and recovery operations.

(B) Requisite Skills. Identifying both rescue and recovery situations; victim prioritizing and patient triaging; selecting proper rescue or recovery tactics; using available specialized rescue equipment; selecting and using PPE for the victim and the rescuer; searching for, rescuing, and recovering victims; following the AHJ's procedures for decontamination of rescue/recovery personnel and their equipment; and completing required reports and supporting documentation for victim rescue and recovery operations.

11.4.5 Decontamination.

11.4.5.1 Mass Decontamination. Perform mass decontamination for ambulatory and nonambulatory victims at a hazardous materials/WMD incident, given a hazardous materials/WMD incident requiring mass decontamination; an assignment; results of the incident analysis; policies and procedures; and approved PPE, tools, and equipment, so that PPE is selected and used; a mass decontamination procedure is selected, set up, implemented, evaluated, and terminated; victims are decontaminated; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; personnel, tools, and equipment are decontaminated; and mass decontamination operations are terminated, reported, and documented.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; advantages and limitations of operations and methods of mass decontamination; policies and procedures for mass decontamination; approved tools, equipment, and PPE; procedures for performing mass decontamination; safety precautions; crowd management techniques; AHJ mass decontamination unit duties within the command structure; termination of mass decontamination operations; and required reports and supporting documentation for mass decontamination operations.

(B)* Requisite Skills. Selecting and using suitable PPE, selecting a mass decontamination procedure to minimize the hazard, setting up and implementing mass decontamination operations for ambulatory and nonambulatory victims, evaluating the effectiveness of the mass decontamination process, terminating mass decontamination operations, and completing reporting and documentation requirements.

11.4.5.2 Technical Decontamination. Establish and implement technical decontamination in support of entry operations and for ambulatory and nonambulatory victims at a hazardous materials/WMD incident, given a hazardous materials/WMD incident requiring technical decontamination; an assignment; results of the incident analysis; policies and procedures for technical decontamination; and approved PPE, tools, and equipment, so that approved PPE is selected and used; a technical decontamination procedure is selected, set up, implemented, evaluated, and terminated; victims are decontaminated; safety procedures are followed; hazards are avoided or minimized; if contaminated, personnel, tools, and equipment are decontaminated; technical decontamination operations are terminated; and all reports and documentation of technical decontamination operations are completed.

(A)* Requisite Knowledge. Types of PPE and the hazards for which they are used; advantages and limitations of operations and methods of technical decontamination; policies and procedures; approved tools, equipment, and PPE; procedures for performing technical decontamination; safety precautions; crowd management techniques; technical decontamination unit duties within the command structure; termination of technical decontamination operations; and approved forms for reporting and documenting technical decontamination.

(B)* Requisite Skills. Selecting and using PPE, selecting a technical decontamination procedure to minimize the hazard, setting up and implementing technical decontamination operations, evaluating the effectiveness of the technical decontamination procedure, terminating technical decontamination operations, and completing required reports and supporting documentation for technical decontamination operations.

11.5 Evaluating and Reporting Progress.

11.5.1 Evaluate and report the progress of assigned tasks at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, results of the incident analysis, an assignment, current incident conditions, tactics taken, and approved communication equipment, so that the actual behavior of material and container is compared to that predicted, the effectiveness of the tactics taken in accomplishing the strategy is determined, modifications to the strategies and tactics are made, and the results are communicated.

(A)* Requisite Knowledge. Procedures for evaluating whether the strategies and tactics are effective in accomplishing the strategies; resources for identifying improving, static, or deteriorating conditions; approved communication procedures and communication equipment; and the process for modifying tactics.

(B) Requisite Skills. Comparing predicted behavior of the material and its container to the actual behavior, determining effectiveness of tactics, communicating the status of tactics, and modifying the tactics based on the incident status review.

11.6* Terminating the Incident.

11.6.1 Terminate a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, policies and procedures, operational observations of response operations (incident information), and approved forms for documentation and reporting, so that assistance in scheduled incident debriefings and critiques is provided, and incident operations are reported and documented.

(A)* Requisite Knowledge. Purpose, regulatory issues, elements, and procedures for conducting debriefings and critiques; documentation and reporting requirements; approved forms and procedures for completing required reports, records, and supporting documentation; and importance of and requirements for reporting and documenting incident operations, including filing and maintenance requirements.

(B) Requisite Skills. Communicating operational observations (incident information) at debriefings and critiques; and completing, forwarding, and filing required reports, records, and supporting documentation.

Chapter 12 Competencies for Hazardous Materials/WMD Incident Commanders (NFPA 472)

12.1 General.

12.1.1 Introduction.

12.1.1.1 The Incident Commander (IC) at hazardous materials/weapons of mass destruction (WMD) incidents shall be that person, designated by the authority having jurisdiction (AHJ), responsible for all incident activities, including the development of strategies and tactics and the ordering and release of resources, assigned to hazardous materials/WMD incidents.

12.1.1.2 The Incident Commander at hazardous materials/WMD incidents shall be trained to be competent in the knowledge and performance of skills at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, and all competencies in this chapter.

12.1.1.3 The Incident Commander at hazardous materials/WMD incidents shall receive any additional training necessary to meet applicable governmental response and occupational safety and health regulations.

12.1.1.4 The Incident Commander at hazardous materials/WMD incidents shall receive any additional training necessary to meet specific needs of the jurisdiction, including knowledge of the incident command system (ICS), importance of command presence, and written and verbal skills.

12.1.2 Goal.

12.1.2.1 The goal of the competencies in this chapter shall be to provide the Incident Commander at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 12.1.2.2 in a safe manner.

12.1.2.2 In addition to being competent at the awareness level and able to perform all competencies at the operations level, the Incident Commander at hazardous materials/WMD incidents shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident to determine the complexity of the problem and potential outcomes by completing the following tasks:
   (a) Collect and interpret hazard and response information from printed and technical resources, databases, and monitoring equipment.
   (b) Estimate the potential risk within the endangered area at a hazardous materials/WMD incidents.

(2) Plan the response operations to hazardous materials/WMD incidents within the capabilities/competencies of available personnel, PPE, and response equipment by completing the following tasks:
   (a) Identify the strategies for hazardous materials/WMD incidents.
   (b) Identify the potential tactics available for each strategy.
   (c) Approve the level of PPE required for a given tactic.
   (d) Approve the decontamination process for a given tactic.
   (e)* Develop an IAP, including a site safety and control plan, consistent with the emergency response plan or standard operating procedures and within the capability of available personnel, PPE, and response equipment.

(3) Implement the planned response to a hazardous materials/WMD incident to change the outcome favorably and to be consistent with the emergency response plan or standard operating procedures by completing the following tasks:
   (a) Implement an ICS, including the specified procedures for identification, notification, and utilization of nonlocal resources (e.g., governmental personnel).
   (b) Direct resources (private, governmental, and others) with task assignments and on-scene activities and provide management overview, technical review, and logistical support to those resources.
   (c) Provide a focal point for information transfer to media and local elected officials through the ICS structure.
   (d) Take action to meet the incident objectives in the IAP.

(4) Evaluate the progress of the planned response at a hazardous materials/WMD incident to ensure that the incident objectives are met in a safe, effective, and efficient manner, and adjust the IAP as needed by completing the following tasks:
   (a) Compare the actual behavior of the material and container to that predicted.
   (b) Determine the effectiveness of incident objectives, strategies, and tactics.
   (c) Make modifications to the IAP as needed until the scene is determined to be stabilized and hazards are controlled.

(5) Terminate the response phase at a hazardous materials/WMD incident by completing the following tasks:
   (a) Transfer command (control) when appropriate.
   (b) Conduct an incident debriefing.
   (c) Conduct a multiagency critique.
   (d) Report and document the hazardous materials/WMD incident and submit the report to the designated entity.

12.2 Competencies — Analyzing the Incident.

12.2.1 Collecting and Interpreting Hazard and Response Information.

12.2.1.1 Given examples of hazardous materials/WMD incidents; incident information; policies and procedures; available resources; approved references; and access to a Hazardous Materials Technician, an allied professional, and an emergency plan or standard operating procedures, the Incident Commander at hazardous materials/WMD incidents shall ensure that the hazards are assessed and potential risks are evaluated.

12.2.1.2 Given examples of printed and technical resources, computer databases, and monitoring equipment, the Incident Commander at hazardous materials/WMD incidents shall identify and interpret the types of hazard and response information available from each of the following resources and explain the advantages and disadvantages of each resource:

(1) Hazardous materials databases
(2) Detection and monitoring equipment
(3) Reference manuals
(4) Technical information centers
(5) Technical information specialists

12.2.2 Estimating Potential Outcomes. Given examples of hazardous materials/WMD incidents, the surrounding conditions, and the predicted behavior of the container and its contents, the Incident Commander at hazardous materials/WMD incidents shall estimate the potential outcomes within the endangered, which includes completing the following tasks:

(1) Identify the steps for estimating the outcomes within an endangered area of a hazardous materials/WMD incident.
(2) Describe the following toxicological terms and exposure values, and explain their significance in the analysis process:
    (a) Biological effect
        i. Carcinogen
        ii. Irritant
        iii. Mutagen
        iv. Teratogen
    (b) Concentration units
        i. Milligrams per meter cubed (mg/m^3)
        ii. Parts per billion (ppb)
        iii. Parts per million (ppm)
    (c) Dose
    (d) Dose response
    (e) Exposure levels
        i.* Protective action criteria (PAC)
        ii. Immediately dangerous to life and health (IDLH)
        iii. Incapacitating concentration (I50)
        iv. Lethal concentration (LC50)
        v. Lethal dose (LD50)
        vi. Permissible exposure limit (PEL)
        vii. Recommended exposure limit (REL)
        viii. Threshold limit value — ceiling (TLV-C)
        ix. Threshold limit value — short- term exposure limit (TLV-STEL)
        x. Threshold limit value — time-weighted average (TLV-TWA)
    (f) Incubation period
    (g) Infectious dose
    (h) Inhalation hazards
        i. Poison inhalation hazard (PIH)
        ii. Toxic inhalation hazard (TIH)
    (i) Radiation dose rate
    (j) Radiation units
        i. Counts per minute (cpm) and kilo counts per minute (kcpm)
        ii. Radiation absorbed dose (rad)
        iii. Roentgen equivalent man (rem), millirem (mrem), microrem (μrem)
        iv. Sievert, millisievert (mSv), microsievert (μSv)
        v. Becquerel (Bq)
        vi. Curie (Ci)
        vii. Gray (Gy)
(3)* Identify methods for predicting the areas of potential harm within the endangered area of hazardous materials/WMD incidents.
(4) Identify the methods available to the organization for obtaining local weather conditions and predictions for short-term future weather changes.
(5) Explain the basic toxicological principles relative to assessment and treatment of personnel exposed to hazardous materials, including the following:
    (a) Acute and delayed toxicity (chronic)
    (b) Dose response
    (c) Local and systemic effects
    (d) Routes of exposure
    (e) Synergistic effects
(6)* Describe the health risks associated with the following:
    (a) Biological agents and biological toxins
    (b) Blood agents
    (c) Choking agents
    (d) Irritants (riot control agents)
    (e) Nerve agents
    (f) Radiological materials
    (g) Vesicants (blister agents)

12.3 Competencies — Planning the Response.

12.3.1 Identifying Incident Objectives. Given examples of an analysis of hazardous materials/WMD incidents and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, the Incident Commander at a hazardous materials/WMD incident shall identify incident objectives, operational modes (defensive, offensive, and nonintervention), strategies, and tactics.

12.3.2 Identifying Strategies and Tactics. Given examples of hazardous materials/WMD incidents, the results of the incident analysis, available resources, and access to a Hazardous Materials Technician, an allied professional, and an emergency response plan or standard operating procedures, the Incident Commander at hazardous materials/WMD incidents shall identify the incident objectives and potential strategies, approve the level of PPE, approve the decontamination process, select tactics based on available resources, and develop an IAP and site safety and control plan by completing the following tasks:

(1) Identify the possible tactics to accomplish a given strategy.
(2) Identify the purpose of each of the following techniques for hazardous materials control:
    (a) Absorption
    (b) Adsorption
    (c) Blanketing/covering
    (d) Contamination isolation
    (e) Damming
    (f) Diking
    (g) Dilution
    (h) Dispersion
    (i) Diversion
    (j) Fire suppression
    (k) Neutralization
    (l) Overpacking
    (m) Patching
    (n) Plugging
    (o) Pressure isolation and reduction (flaring; venting; vent and burn; isolation of valves, pumps, or energy sources)

(p) Retention
(q) Solidification
(r) Transfer
(s) Vacuuming
(t) Vapor control (dispersion, suppression)

12.3.3 Approving the Level of PPE. Given examples of hazardous materials/WMD incidents with known and unknown hazardous materials/WMD, the Incident Commander at hazardous materials/WMD incidents shall approve the PPE for the tactics specified in the IAP in each situation and shall complete the following tasks:

(1)* Identify NFPA standards for PPE and the conditions under which each type of PPE is used.
(2)* Identify the four EPA/OSHA levels of protection and how they compare to the NFPA standards.
(3) Describe the following terms and explain their impact and significance on the selection of chemical-protective clothing:
   (a) Degradation
   (b) Penetration
   (c) Permeation
(4) Describe safety considerations for personnel working in vapor-protective, liquid splash–protective, and high temperature–protective clothing.
(5) Identify the physiological and psychological stresses that can affect users of PPE.

12.3.4 Developing an Incident Action Plan (IAP). Given examples of hazardous materials/WMD incidents, the Incident Commander at hazardous materials/WMD incidents shall develop an IAP, including site safety and control plan, consistent with the emergency response plan or standard operating procedures and within the capability of the available personnel, PPE, and response equipment, and shall complete the tasks in 12.3.4.1 through 12.3.4.5.5.

12.3.4.1 The Incident Commander at hazardous materials/WMD incidents shall identify the steps for developing an IAP, including a site safety and control plan.

12.3.4.2 The Incident Commander at hazardous materials/WMD incidents shall identify the factors to be evaluated in selecting public protective actions, including evacuation and sheltering-in-place.

12.3.4.3 Given examples of emergency response plans or standard operating procedures, the Incident Commander at hazardous materials/WMD incidents shall identify the entity that will perform the following:

(1) Receive the initial notification
(2) Provide secondary notification and activation of response agencies
(3) Make ongoing assessments of the situation
(4) Command on-scene personnel (incident command system)
(5) Coordinate support and mutual aid
(6) Provide law enforcement and on-scene security (crowd control)
(7) Provide traffic control and rerouting
(8) Provide resources for public protective action (evacuation or shelter in-place)
(9) Provide fire suppression services
(10) Provide on-scene medical triage, treatment, and transport
(11) Provide public notification (warning)
(12) Provide public information (news media statements)
(13) Provide on-scene communications support
(14) Provide emergency on-scene decontamination
(15) Provide operations-level hazard control services
(16) Provide technician-level hazard mitigation services
(17) Provide environmental remedial action (cleanup) services
(18) Provide environmental monitoring
(19) Implement on-site accountability
(20) Provide on-site responder identification
(21) Provide incident scene security
(22) Provide incident or crime scene investigation
(23) Provide evidence collection and sampling

12.3.4.4 The Incident Commander at hazardous materials/WMD incidents shall identify the process for determining the effectiveness of a tactic based on the potential outcomes.

12.3.4.5 The Incident Commander at hazardous materials/WMD incidents shall identify the need for a site safety and control plan and safe operating practices and procedures that are required to be followed at a hazardous materials/WMD incident.

12.3.4.5.1 The Incident Commander at hazardous materials/WMD incidents shall identify the importance of preincident planning relating to safety during responses to specific sites.

12.3.4.5.2 The Incident Commander at hazardous materials/WMD incidents shall identify the procedures for presenting a safety briefing prior to allowing personnel to work on a hazardous materials/WMD incident.

12.3.4.5.3* The Incident Commander at hazardous materials/WMD incidents shall identify safety precautions associated with search and rescue missions at hazardous materials/WMD incidents.

12.3.4.5.4 The Incident Commander at hazardous materials/WMD incidents shall identify the advantages and limitations of the following and describe an example where each decontamination method would be used:

(1) Absorption
(2) Adsorption
(3) Chemical degradation
(4) Dilution
(5) Disinfection
(6) Evaporation
(7) Isolation and disposal
(8) Neutralization
(9) Solidification
(10) Sterilization
(11) Vacuuming
(12) Washing

12.3.4.5.5* The Incident Commander at hazardous materials/WMD incidents shall identify the atmospheric and physical safety hazards associated with hazardous materials/WMD incidents involving confined spaces.

12.4 Competencies — Implementing the Planned Response.

12.4.1 Implementing an Incident Command System. Given examples of emergency response plans and annexes related to hazardous materials/WMD incidents, the Incident

Commander at hazardous materials/WMD incidents shall identify the requirements of the plan, including the procedures for notification and utilization of nonlocal resources (governmental personnel), by completing the following requirements:

(1) Identify the role of the command element during a hazardous materials/WMD incident.
(2) Describe the concept of unified command and its application and use at a hazardous materials/WMD incident.
(3) Identify the duties and responsibilities of the following hazardous materials branch/group functions within the incident command system:
    (a) Decontamination
    (b) Entry (backup)
    (c) Hazardous materials branch director or group supervisor
    (d) Hazardous materials safety
    (e) Information and research
(4) Identify the steps for implementing the emergency response plans required under Title III Emergency Planning and Community Right-to-Know Act (EPCRA) of the Superfund Amendments and Reauthorization Act (SARA) Section 303 or other state and emergency response planning legislation.
(5) Given examples of emergency response planning documents, identify the elements of each of the documents.
(6) Identify the elements of ICS necessary to coordinate response activities at hazardous materials/WMD incidents.
(7) Identify the scope of the regulatory authority (including the regulations and primary agencies) pertaining to the production, transportation, storage, and use of hazardous materials and the disposal of hazardous wastes.
(8) Identify agencies and resources that can offer assistance during a hazardous materials/WMD incidents and identify their role and the type of assistance or resources that might be available.

12.4.2* Directing Resources (Private and Governmental). Given examples of hazardous materials/WMD incidents and the necessary resources to implement the planned response, the Incident Commander at hazardous materials/WMD incidents shall demonstrate the ability to direct the resources in a safe and efficient manner consistent with the capabilities of those resources.

12.4.3 Providing a Focal Point for Information Transfer to the Media and Elected Officials. Given examples of hazardous materials/WMD incidents, the Incident Commander at hazardous materials/WMD incidents shall identify information to be provided to the media and governmental officials and shall complete the following tasks:

(1) Identify the local policy for providing information to the media.
(2) Identify the responsibilities of the Public Information Officer and the Liaison Officer at a hazardous materials/WMD incidents.
(3) Describe the concept of a joint information center (JIC) and its application and use at a hazardous materials/WMD incidents.

12.4.4* Transferring Command and Control During the Response Phase and the Post-Response Phase. Given examples of hazardous materials/WMD incidents, the emergency response plan, and standard operating procedures, the Incident Commander at hazardous materials/WMD incidents shall be able to identify the steps to take to transfer command and control of the incident.

12.5 Competencies — Evaluating Progress.

12.5.1 Evaluating Progress of the Incident Action Plan (IAP). Given examples of hazardous materials/WMD incidents, actions taken, and changing incident conditions, the Incident Commander at hazardous materials/WMD incidents shall evaluate the progress of the IAP to determine whether the efforts are accomplishing the incident objectives and shall complete the following tasks:

(1) Identify the procedures for evaluating whether the strategies and tactics are effective in accomplishing the incident objectives.
(2) Identify the steps for comparing actual behavior of the material and the container to that predicted in the analysis process.
(3) Articulate the effectiveness of meeting incident objectives, including but not limited to the following:
    (a) Control, containment, or confinement operations
    (b) Incident stabilization
    (c) Resource utilization
    (d) Life safety concerns
    (e) Contamination spread
    (f) Established control zones
    (g) Environmental protection
    (h) Public protective actions
    (i) PPE
(4) Make modifications to the IAP as necessary.

12.6 Competencies — Terminating the Incident.

12.6.1 Terminating Response Operations. Given examples of hazardous materials/WMD incidents in which the incident objectives have been achieved, the Incident Commander at hazardous materials/WMD incidents shall describe the steps taken to terminate the incident consistent with the emergency response plan and/or standard operating procedures and shall complete the following tasks:

(1) Identify the steps required for terminating the hazardous materials/WMD incident.
(2) Identify the procedures for transferring command to the AHJ having responsibility for post-emergency response operations.

12.6.2 Conducting a Debriefing. Given examples of hazardous materials/WMD incidents, the Incident Commander at hazardous materials/WMD incidents shall conduct a debriefing of the incident and shall complete the following tasks:

(1) Describe components and key topics of an effective debriefing.
(2) Describe when a debriefing should take place.
(3) Describe who should be involved in a debriefing.
(4) Identify the procedures for conducting incident debriefings at a hazardous materials/WMD incident.

12.6.3 Conducting a Critique. Given examples of multiagency hazardous materials/WMD incidents, the Incident Commander at hazardous materials/WMD incidents shall conduct a critique of the incident and shall complete the following tasks:

(1) Describe the components of an effective critique.
(2) Describe who should be involved in a critique.

(3) Describe why an effective critique is necessary after a hazardous materials/WMD incident.
(4) Describe what written documents should be prepared as a result of the critique.
(5) Implement the procedure for conducting a critique of the incident.

12.6.4 Reporting and Documenting the Hazardous Materials/WMD Incident. Given examples of hazardous materials/WMD incidents, the Incident Commander at hazardous materials/WMD incidents shall demonstrate the ability to report and document the incident consistent with AHJ requirements and shall complete the following tasks:

(1) Identify the AHJ requirements for compiling incident reports, filing documents, and maintaining records as defined in the emergency response plan and/or standard operating procedures.
(2) Identify the steps in keeping an activity log and exposure records for hazardous materials/WMD incidents.
(3) Identify the procedures required for legal documentation and chain of custody and continuity described in the standard operating procedures or the emergency response plan.

Chapter 13 Professional Qualifications for Hazardous Materials/WMD Incident Commanders (NFPA 1072)

13.1 General.

13.1.1 The Incident Commander (IC) at hazardous materials/weapons of mass destruction (WMD) incidents is that person, designated by the authority having jurisdiction (AHJ), responsible for all incident activities/operations, including the development of incident objectives, selection of operational mode (defensive, offensive, and nonintervention), strategies, and tactics and the ordering and release of resources assigned to hazardous materials/WMD incidents.

13.1.2 An IC at hazardous materials/WMD incidents shall meet the job performance requirements defined in Sections 5.1 through 5.4 (Awareness).

13.1.3 An IC at hazardous materials/WMD incidents shall meet the job performance requirements defined in Sections 7.2 through 7.6 (Operations).

13.1.4 An IC at hazardous materials/WMD incidents shall meet the job performance requirements defined in Sections 13.2 through 13.6 (Incident Commander).

13.1.5* General Knowledge Requirements. Knowledge of ICS; importance of command presence; additional training necessary to meet both applicable governmental response and occupational health and safety regulations and other specific needs of the jurisdiction; and written and verbal communication skills.

13.1.6 General Skills Requirements. (Reserved)

13.2 Analyze the Incident.

13.2.1 Analyze a hazardous materials/WMD incident, given a hazardous material/WMD incident; incident information; policies and procedures; available resources; approved references; and access to a Hazardous Materials Technician, an allied professional, an emergency plan, or standard operating procedures, so that the hazards are assessed and risks are evaluated.

(A)* Requisite Knowledge. Advantages and limitations of hazardous materials databases, detection and monitoring equipment, reference manuals, technical information centers, and technical information specialists; methods available to obtain local weather conditions and predictions; and resources to predict behavior and estimate outcomes.

(B) Requisite Skills. Assessing hazards and evaluating risks; written and verbal communication.

13.3 Plan the Response.

13.3.1 Plan the response to a hazardous materials/WMD incident, given a hazardous materials/WMD incident, the results of the incident analysis, available resources, and access to a Hazardous Materials Technician, an allied professional, an emergency response plan, or standard operating procedures, so that the incident objectives, operational modes, strategies, and potential tactics are identified, level of personal protective equipment (PPE) is approved, decontamination process is approved, strategies and tactics are selected based on available resources, and an IAP, including the site safety and control plan, is developed.

(A)* Requisite Knowledge. Incident objectives, operational modes (offensive, defensive, and nonintervention), potential strategies and tactics, purpose of hazardous materials control techniques, approving the level of PPE, steps for developing an IAP, including the site safety and control plan, factors to be evaluated in public protective actions, making tactical assignments, and safe operating practices and procedures.

(B) Requisite Skills. Approving the PPE and decontamination process for tactics, developing an IAP, including the site safety and control plan, and ability to use verbal and written communication.

13.4 Implement the Incident Action Plan (IAP).

13.4.1 Implement the planned response in a hazardous materials/WMD incident, given a hazardous materials/WMD incident and resources and equipment available, so that ICS is implemented, resources are directed, a focal point for information transfer is established, and actions are taken to meet the strategies of the IAP.

(A)* Requisite Knowledge. Role of the command element, concept of unified command and its application and use, duties and responsibilities of hazardous materials branch/group functions, implementing ICS, directing resources, establishing a focal point for information transfer, and transfer of command.

(B) Requisite Skills. Implementing ICS, including unified command as necessary, assigning and directing resources, and establishing information transfer focal point.

13.5* Evaluate Progress and Adjust IAP.

13.5.1 Evaluate the progress and adjust the IAP as needed at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, results of the incident analysis, an incident action plan, actions taken, and changing incident conditions, so that actual behavior of material and container is compared to that predicted, effectiveness of strategies and tactics is determined, and modifications to the IAP are made as needed until the scene is determined to be stabilized and hazards are controlled.

(A)* Requisite Knowledge. Factors to be considered in evaluating progress of the IAP that was implemented, including stability of release, resources available, life safety concerns, environmental impacts, procedures for evaluating whether the strategies and tactics are effective in accomplishing the incident objectives, steps for comparing actual behavior of the material and the container to that predicted, and procedures for making modifications to the IAP.

(B) Requisite Skills. Comparing predicted behavior of the material and its container to the actual behavior, determining effectiveness of tactics and actions, and modifying the IAP when needed.

13.6* Termination of the Incident.

13.6.1 Terminate response operations at a hazardous materials/WMD incident, given a hazardous materials/WMD incident that has been determined to be stabilized with hazards controlled, operational observations, and approved forms for documentation and reporting, so that command is transferred, debriefings are held, post-incident analysis is completed, a critique is conducted, and overall incident response operations are reported and documented.

(A)* Requisite Knowledge. Transition from safe and nonsafe; regulatory issues; elements and procedures for conducting a debriefing, a post-incident analysis, and a critique; and requirements for reporting and documenting overall incident response operations.

(B) Requisite Skills. Transferring command; participating in a debriefing, post-incident analysis, and critiques; and completing required reports and supporting documentation for overall incident response operations.

Chapter 14 Competencies for Hazardous Materials/WMD Specialist Employees (NFPA 472)

14.1 General.

14.1.1 Introduction.

14.1.1.1 This chapter shall address competencies for the following Specialist Employees:

(1) Specialist Employee C
(2) Specialist Employee B
(3) Specialist Employee A

14.2 Specialist Employee C.

14.2.1 General.

14.2.1.1 Introduction.

14.2.1.1.1 The Specialist Employee C shall respond to incidents involving hazardous materials/WMD and/or containers in the organization's area of specialization, and the following:

(1) Consistent with the emergency response plan and/or standard operating procedures, the Specialist Employee C can be called on to gather and record information, provide technical advice, and arrange for technical assistance.
(2) The Specialist Employee C does not enter the hot or warm zone at an emergency.

14.2.1.1.2 The Specialist Employee C shall be trained to meet all competencies at the awareness level *(see Chapter 4)* relative to the organization's area of specialization and all additional competencies in Section 14.2.

14.2.1.2 Goal.

14.2.1.2.1 The goal of the competencies in this section shall be to provide the Specialist Employee C with the knowledge and skills to perform the duties and responsibilities assigned in the emergency response plan and/or standard operating procedures and to perform the tasks in 14.2.1.2.2 in a safe and effective manner.

14.2.1.2.2 When responding to hazardous materials/WMD incidents, the Specialist Employee C shall have the knowledge and skills to perform the following tasks in a safe manner:

(1) Assist the Incident Commander in analyzing the magnitude of an incident involving hazardous materials/WMD or containers for hazardous materials/WMD by completing the following tasks:
    (a) Provide information on the hazards and harmful effects of specific hazardous materials/WMD.
    (b) Provide information on the characteristics of specific containers for hazardous materials/WMD.
(2) Assist the Incident Commander in planning a response to an emergency involving hazardous materials/WMD or containers for hazardous materials/WMD by providing information on the potential tactics for hazardous materials/WMD or containers for hazardous materials/WMD.

14.2.2 Competencies — Analyzing the Incident.

14.2.2.1 Providing Information on the Hazards and Harmful Effects of Specific Hazardous Materials/WMD. Given examples of specific chemical(s) used in the organization's area of specialization and the corresponding SDS or other applicable resource, the Specialist Employee C shall advise the Incident Commander of the chemical's hazards and harmful effects and shall complete the following tasks:

(1) Identify the following hazard information from the SDS or other resource:
    (a) Physical and chemical properties
    (b) Physical hazards of the chemical (including fire and explosion hazards)
    (c) Health hazards of the chemical
    (d) Signs and symptoms of exposure
    (e) Routes of entry
    (f) Permissible exposure limits
    (g) Reactivity hazards
    (h) Environmental concerns
(2) Identify how to contact CHEMTREC/CANUTEC/SETIQ and governmental authorities.
(3) Identify the resources available from CHEMTREC/CANUTEC/SETIQ and governmental authorities.
(4) Given the emergency response plan and/or standard operating procedures, identify additional resources of hazard information, including a method of contact.

14.2.2.2 Providing Information on the Characteristics of Specific Containers. Given examples of containers for hazardous materials/WMD in the organization's areas of specialization, the Specialist Employee C shall advise the Incident Commander of the characteristics of the containers and shall complete the following tasks:

(1) Identify each container by name.

(2) Identify the markings that differentiate one container from another.
(3) Given the emergency response plan and/or standard operating procedures, identify the resources available that can provide information about the characteristics of the container.
(4) Identify indicators of possible criminal or terrorist activity, including the following:
    (a) Intentional release of hazardous materials
    (b) Unexplained bomb- and munitions-like material

14.2.3 Competencies — Planning the Response.

14.2.3.1 Providing Information on Potential Tactics for Specific Hazardous Materials/WMD. Given examples of specific chemical(s) used in the organization's area of specialization and a corresponding SDS or other resource, the Specialist Employee C shall advise the Incident Commander of the response information for that chemical by being able to complete the following tasks:

(1) Obtain the following response information:
    (a) Precautions for safe handling, including industrial hygiene practices, protective measures, and procedures for cleanup of spills and leaks
    (b) Applicable emergency response control measures, including PPE
    (c) Emergency and first-aid procedures
(2) Relay any suspicions of criminal or terrorist activity to the Incident Commander.
(3) Identify additional resources for obtaining response information.

14.2.3.2 Providing Information on Potential Tactics for Specific Containers. Given examples of specific facilities or transportation container(s) used in the organization's area of specialization, the Specialist Employee C shall advise the Incident Commander of the response information for that chemical by being able to complete the following tasks:

(1) Identify safe operating procedures for that container, including acceptable pressures, temperatures, and materials of construction, and potential adverse outcomes resulting from those conditions.
(2) Describe safety devices on the container, including emergency shutoff valves, pressure relief devices, and vacuum breakers.
(3) Identify early signs of container and safety device failure.
(4) Suggest emergency response procedures.

14.3 Specialist Employee B.

14.3.1 General.

14.3.1.1 Introduction.

14.3.1.1.1* The Specialist Employee B shall, in the course of regular job duties, work with or is trained in the hazards of specific chemicals or containers in the individual's area of specialization and the following:

(1) Because of their education, training, or work experience, the Specialist Employee B can be called on to respond to incidents involving these chemicals or containers.
(2) The Specialist Employee B can be used to gather and record information, provide technical advice, and provide technical assistance (including work in the hot zone) at the incident, consistent with the emergency response plan and/or standard operating procedures.

14.3.1.1.2 The Specialist Employee B shall be trained to meet all competencies at the awareness level *(see Chapter 4)* relative to the organization's area of specialization, all competencies at the Specialist Employee C level *(see Section 14.2)*, and all additional competencies in Section 14.3.

14.3.1.2 Goal.

14.3.1.2.1 The goal of these competencies shall be to ensure that the Specialist Employee B has the knowledge and skills to perform the duties and responsibilities assigned in the emergency response plan and/or standard operating procedures and the tasks in 14.3.1.2.2.

14.3.1.2.2 Within the employee's individual area of specialization, the Specialist Employee B shall be able to perform the following tasks:

(1) Assist the Incident Commander in analyzing the magnitude of an incident involving hazardous materials/WMD or containers for hazardous materials/WMD by completing the following tasks:
    (a) Provide and interpret information on the hazards and harmful effects of specific hazardous materials/WMD.
    (b) Provide and interpret information on the characteristics of specific containers.
    (c) Provide information on concentrations of hazardous materials/WMD from exposure monitoring, dispersion modeling, or any other predictive method.
(2) Assist the Incident Commander in planning a response to an incident involving hazardous materials/WMD or containers for hazardous materials/WMD by completing the following tasks:
    (a) Provide information on the potential tactics and their consequences for specific hazardous materials/WMD or containers for hazardous materials/WMD.
    (b) Provide information on the PPE requirements for a specific chemical.
    (c) Provide information on the technical decontamination methods for a specific chemical.
    (d) Provide information on the federal or provincial regulations that relate to the handling and disposal of a specific chemical.
    (e)* Support the Incident Commander with the development of an IAP consistent with the emergency response plan and/or standard operating procedures and within the capabilities of the available resources, for handling hazardous materials/WMD or containers in that incident.
(3) Implement the planned response, as developed with the Incident Commander, for hazardous materials/WMD or containers for hazardous materials/WMD, consistent with the emergency response plan and/or standard operating procedures and within the capabilities of the available resources, by completing the following tasks:
    (a) Perform tactics specified in the IAP, as agreed upon with the Incident Commander and consistent with the emergency response plan and/or standard operating procedures.

(b) Don, work in, and doff PPE needed to implement the tactics.

(4) Assist the Incident Commander in evaluating the results of implementing the planned response by completing the following tasks:

(a) Provide feedback on the effectiveness of the tactics taken.

(b) Provide reporting and subsequent documentation of the incident involving hazardous materials/WMD as required.

14.3.2 Competencies — Analyzing the Incident.

14.3.2.1 Providing and Interpreting Information on Hazards of Specific Hazardous Materials/WMD. Given examples of specific chemical(s) within the individual's area of specialization and a corresponding SDS or other resource, the Specialist Employee B shall advise the Incident Commander of the chemical's hazards and harmful effects of specific hazardous materials/WMD and the potential consequences based on the incident by completing the following requirements:

(1) Given a specific chemical, identify and interpret the following hazard information:

(a) Physical and chemical properties
(b) Physical hazards of the chemical (including fire and explosion hazards)
(c) Health hazards of the chemical
(d) Signs and symptoms of exposure
(e) Routes of entry
(f) Permissible exposure limits
(g) Reactivity hazards
(h) Environmental concerns

(2) Given examples of specific hazardous materials/WMD and the necessary resources, predict the potential behavior of the hazardous materials/WMD based on the damage found, including the consequences of that behavior.

(3) Identify the general types of hazard information available from the other resources identified in the emergency response plan and/or standard operating procedures.

14.3.2.2 Providing Information on Characteristics of Specific Containers. Given examples of containers for specific hazardous materials/WMD, the Specialist Employee B shall advise the Incident Commander of the characteristics and potential behavior of that container by completing the following requirements:

(1) Given examples of containers for specific hazardous materials/WMD, identify the purpose and operation of the closures found on those containers.

(2) Given a chemical container, list the types of damage that could occur.

(3) Given examples of containers for specific hazardous materials/WMD and the necessary resources, predict the potential behavior of the containers and the consequences, based on the damage found.

(4) Given the emergency response plan and/or standard operating procedures, identify resources (including a method of contact) for knowledge of the design, construction, and damage assessment of containers for hazardous materials/WMD.

14.3.2.3 Providing Information on Concentrations of Hazardous Materials/WMD.

14.3.2.3.1 Given examples of chemicals and the applicable monitoring equipment provided by the organization for that chemical or the available predictive capabilities (e.g., dispersion modeling, exposure modeling), the Specialist Employee B shall advise the Incident Commander of the concentrations of the released chemical and the implications of that information to the incident.

14.3.2.3.2 The Specialist Employee B shall meet the following additional requirements:

(1) Identify the applicable monitoring equipment.

(2) Use the monitoring equipment provided by the organization to determine the actual concentrations of a specific chemical.

(3) Given information on the concentrations of a chemical, interpret the significance of that concentration information to the incident relative to the hazards and harmful effects of the chemical.

(4) Demonstrate field calibration and testing procedures, as necessary, for the monitoring equipment provided by the organization.

(5) Given the emergency response plan and/or standard operating procedures, identify the resources (including a method of contact) capable of providing monitoring equipment, dispersion modeling, or monitoring services.

14.3.3 Competencies — Planning the Response.

14.3.3.1 Providing Information on Potential Tactics and Consequences for Specific Hazardous Materials/WMD. Given examples of specific hazardous materials/WMD or containers within the employee's individual area of specialization and the associated resources, the Specialist Employee B shall advise the Incident Commander of the potential tactics and their consequences and shall complete the following tasks:

(1) Given a specific chemical and a corresponding SDS, identify and interpret the following response information:

(a) Precautions for safe handling, including industrial hygiene practices, protective measures, and procedures for cleanup of spills or leaks
(b) Applicable control measures, including PPE
(c) Emergency and first-aid procedures

(2) Given examples of emergency response plans and/or standard operating procedures, identify additional resources for interpreting the hazards and applicable response information for a hazardous material/WMD.

(3) Describe the advantages and limitations of the potential tactics for a specific chemical.

(4) Given examples of emergency response plans and/or standard operating procedures, identify resources (including a method of contact) capable of the following:

(a) Repairing containers for hazardous materials
(b) Removing the contents of containers for hazardous materials
(c) Cleaning and disposing of hazardous materials/WMD or containers for hazardous materials/WMD

14.3.3.2 Providing Information on PPE Requirements. Given examples of specific hazardous materials/WMD or containers for hazardous materials/WMD within the employee's individual area of specialization and the associated resources, the Special-

ist Employee B shall advise the Incident Commander of the PPE necessary for various tactics by completing the following requirements *[See A.8.11.3.1(1)(b)]*:

(1)* Given a specific chemical, a corresponding SDS, or other chemical-specific resource, and the chemical protective clothing selection matrix within NFPA 1891, Annex B, identify PPE, including the construction materials that are compatible with that chemical.
(2) Given examples of emergency response plans and/or standard operating procedures, identify other resources (including a method of contact) capable of identifying the PPE that is compatible with a specific chemical.
(3) Given an incident involving a specific chemical and the tactics for that incident, determine whether the PPE is appropriate for the options presented.

14.3.3.3 Providing Information on Decontamination Methods. Given examples of specific chemicals within the employee's individual area of specialization and the available resources, the Specialist Employee B shall identify the technical decontamination process for various tactics and shall complete the following tasks:

(1) Given examples of specific chemicals and a corresponding SDS or other chemicals-specific resource, identify the potential methods for removing or neutralizing that chemical.
(2) Given examples of specific chemicals and a corresponding SDS or other chemical-specific resource, identify the circumstances under which disposal of contaminated equipment would be necessary.
(3) Given examples of emergency response plans and/or standard operating procedures, identify resources (including a method of contact) capable of identifying potential decontamination methods.

14.3.3.4 Providing Information on Handling and Disposal Regulations. Given examples of specific chemical(s) within the employee's individual area of specialization and the available resources, the Specialist Employee B shall advise the Incident Commander of the federal or provincial regulations that relate to the handling, transportation, and disposal of that chemical and shall complete the following tasks:

(1) Given examples of specifics chemicals and a corresponding SDS or other resource, identify federal or provincial regulations that apply to the handling, transportation, and disposal of that chemical.
(2) Given examples of specific chemicals and a corresponding SDS or other resource, identify the agencies (including a method of contact) responsible for compliance with the federal or provincial regulations that apply to the handling, transportation, and disposal of a specific chemical.
(3) Given examples of emergency response plans and/or standard operating procedures, identify resources for information pertaining to federal or provincial regulations relative to the handling and disposal of a specific chemical.

14.3.3.5 Developing an Incident Action Plan (IAP). Given examples of scenarios involving hazardous materials/WMD or containers used in the employee's individual area of specialization, the Specialist Employee B shall (in conjunction with the Incident Commander) develop an IAP, consistent with the emergency response plan and/or standard operating procedures and within the capabilities of the available resources, for handling hazardous materials/WMD or containers in that incident and shall complete the following tasks:

(1) Given examples of emergency response plans and/or standard operating procedures, identify the process for development of an IAP, including roles and responsibilities under the ICS site safety and control plan.
(2) Include a site safety and control plan in the IAP.

14.3.4 Competencies — Implementing the Planned Response.

14.3.4.1 Performing Tactics Specified in the Incident Action Plan. Given examples of assignment(s) by the Incident Commander in the employee's individual area of specialization, the Specialist Employee B shall perform the assigned actions consistent with the emergency response plan and/or standard operating procedures and shall complete the following tasks:

(1) Perform assigned tasks consistent with the emergency response plan and/or standard operating procedures and the available personnel, tools, and equipment (including PPE), including the following:
    (a) Confinement activities
    (b) Containment activities
    (c) Product removal activities
(2)* Identify factors that can affect an individual's ability to perform the assigned tasks.

14.3.4.2 Using PPE. Given examples of assignment(s) within the employee's individual area of specialization that is consistent with the emergency response plan and/or standard operating procedures, the Specialist Employee B shall be able to complete the following tasks:

(1) Don, work in, and doff the correct respiratory protection and protective clothing for the assigned tasks *[See A.8.11.3.1(1)(b)]*.
(2) Identify the safety considerations for personnel working in PPE, including the following:
    (a) Buddy system
    (b) Backup personnel
    (c) Symptoms of heat and cold stress
    (d) Limitations of personnel working in PPE
    (e) Indications of material degradation of chemical-protective clothing
    (f) Physical and psychological stresses on the wearer
    (g) Emergency procedures and hand signals
(3) Identify the procedures for cleaning, sanitizing, and inspecting PPE provided by the organization.

14.3.5 Competencies — Evaluating Progress.

14.3.5.1 Providing an Evaluation of the Effectiveness of Selected Strategies and Tactics. Given examples of incident(s) involving specific hazardous materials/WMD or containers for hazardous materials/WMD within the employee's individual area of specialization, the Specialist Employee B shall advise the Incident Commander of the effectiveness of the selected strategies and tactics and shall complete the following tasks:

(1) Identify the criteria for evaluating whether the selected strategies and tactics are effective in accomplishing the incident objectives.
(2) Identify the circumstances under which it would be prudent to withdraw from a chemical incident.

14.3.5.2 Reporting and Documenting the Incident. Given examples of scenario(s) involving hazardous materials/WMD

or containers for hazardous materials/WMD used in the employee's individual area of specialization, the Specialist Employee B shall complete the reporting and subsequent documentation requirements consistent with the emergency response plan and/or standard operating procedures and shall complete the following tasks:

(1) Identify the importance of documentation (including training records, exposure records, incident reports, and critique reports) for an incident involving hazardous materials/WMD.
(2) Identify the steps used in keeping an activity log and exposure records.
(3) Identify the requirements for compiling incident reports.
(4) Identify the requirements for compiling hot zone entry and exit logs.
(5) Identify the requirements for compiling PPE logs.
(6) Identify the requirements for filing documents and maintaining records.
(7) Identify resources (including a method of contact) knowledgeable of the federal or provincial reporting requirements for hazardous materials/WMD incidents.

14.4 Specialist Employee A.

14.4.1 General.

14.4.1.1 Introduction.

14.4.1.1.1 The Specialist Employee A shall be specifically trained to handle incidents involving chemicals or containers for chemicals used in the organization's area of specialization, and the following:

(1) Consistent with the emergency response plans and/or standard operating procedures, the Specialist Employee A is able to analyze an incident involving chemicals within his or her organization's area of specialization.
(2) The Specialist Employee A can then plan a response to incidents, implement the planned response within the capabilities of the resources available, and evaluate the progress of the planned response.

14.4.1.1.2 The Specialist Employee A shall be trained to meet all competencies at the awareness level *(see Chapter 4)* relative to the organization's area of specialization, all competencies at the Specialist Employee C level *(see Section 14.2)*, and all competencies at the Hazardous Materials Technician level *(see Chapter 10)* relative to the hazardous materials/WMD and containers used in the organization's area of specialization.

14.4.1.2 Goal.

14.4.1.2.1 The goal of this level of competence shall be to ensure that the Specialist Employee A has the knowledge and skills to perform the duties and responsibilities assigned in the emergency response plan and/or standard operating procedures.

14.4.1.2.2 In addition to being competent at the Specialist Employee C and the Hazardous Materials Technician levels, the Specialist Employee A shall be able to, in conjunction with the Incident Commander, perform the following tasks:

(1) Analyze an incident involving hazardous materials/WMD and containers for hazardous materials/WMD used in the organization's area of specialization to determine the magnitude of the incident by completing the following tasks:
    (a) Survey an incident involving hazardous materials/WMD and containers for hazardous materials/WMD, including the following:
        i. Identify the containers involved.
        ii. Identify or classify unknown materials.
        iii. Verify the identity of the hazardous materials/WMD.
    (b) Collect and interpret hazard and response information from printed resources, technical resources, computer databases, and monitoring equipment for hazardous materials/WMD.
    (c) Determine the extent of damage to containers of hazardous materials/WMD.
    (d) Predict the likely behavior of the hazardous materials/WMD and containers for hazardous materials/WMD.
    (e) Estimate the potential outcomes of an incident involving hazardous materials/WMD and containers for hazardous materials/WMD.
(2) Plan a response (within the capabilities of available resources) to an incident involving hazardous materials/WMD and containers for hazardous materials/WMD used in the organization's area of specialization by completing the following tasks:
    (a) Identify the strategies for an incident involving hazardous materials/WMD and containers for hazardous materials/WMD.
    (b) Identify the potential tactics for each strategy for an incident involving hazardous materials/WMD and containers for hazardous materials/WMD.
    (c) Select the PPE required for a given tactic for an incident involving hazardous materials/WMD and containers for hazardous materials/WMD.
    (d) Select the technical decontamination process for an incident involving hazardous materials/WMD and containers for hazardous materials/WMD.
    (e) Develop an IAP (within the capabilities of the available resources), including a site safety and control plan, for handling an incident involving hazardous materials/WMD and containers for hazardous materials/WMD consistent with the emergency response plan and/or standard operating procedures.
(3) Operating under ICS, implement the planned response (as developed with the Incident Commander) to an incident involving hazardous materials/WMD and containers for hazardous materials/WMD used in the organization's area of specialization consistent with the emergency response plan and/or standard operating procedures by completing the following tasks:
    (a) Don, work in, and doff correct PPE for use with hazardous materials/WMD.
    (b) Perform containment, control, and product transfer functions, as agreed upon with the Incident Commander, for hazardous materials/WMD and containers for hazardous materials/WMD.
(4) Evaluate the results of implementing the planned response to an incident involving hazardous materials/WMD and containers for hazardous materials/WMD used in the organization's area of specialization.

14.4.2 Competencies — Analyzing, Planning, Implementing, and Evaluating. The Specialist Employee A shall demonstrate competencies at the Specialist Employee C level *(see Section 14.2)* and the Hazardous Materials Technician level *(see*

Chapter 10) relative to hazardous materials/WMD and containers used in the organization's area of specialization.

Chapter 15 Reserved

Chapter 16 Competencies for Hazardous Materials/WMD Officers (NFPA 472)

16.1 General.

16.1.1 Introduction.

16.1.1.1 Hazardous materials officers (hazardous materials group supervisor within NIMS/ICS) at hazardous materials/WMD incidents shall be responsible for directing and coordinating all operations involving hazardous materials/WMD as assigned by the Incident Commander.

16.1.1.2 Hazardous materials officers shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies at the technician level *(see Chapter 10)*, and all competencies of this chapter.

16.1.1.3 Hazardous materials officers shall also receive training to meet AHJ response and occupational health and safety regulations.

16.1.2 Goal.

16.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Officers with the knowledge and skills to perform the tasks in 16.1.2.2 in a safe manner.

16.1.2.2 When responding to hazardous materials/WMD incidents, Hazardous Materials Officers shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident to determine the complexity of the problem by estimating the potential outcomes within the endangered area.
(2) Plan a response within the capabilities and competencies of available personnel, PPE, and response equipment by completing the following tasks:
    (a) Identify the strategies (defensive, offensive, and nonintervention) for hazardous materials/WMD incidents.
    (b) Identify the potential tactics (defensive, offensive, and nonintervention) available for each strategy.
    (c) Determine the level of PPE required for a given tactic.
    (d) Provide recommendations to the Incident Commander for the development of an incident action plan (IAP) for the hazardous materials group consistent with the emergency response plan and/or standard operating procedures and within the capability of available personnel, personal protective, and response equipment.
(3) Implement a response to favorably change the outcomes consistent with the emergency response plan and/or standard operating procedures by completing the following tasks:
    (a) Implement the functions within the incident command system as they directly relate to the specified procedures for hazardous materials group operations.
    (b) Direct hazardous materials group resources (private, governmental, and others) with task assignments and on-scene activities and provide management overviews, technical review, and logistical support to hazardous materials group resources.
(4) Evaluate the progress of the planned response to ensure that the strategies are effective, and adjust the IAP accordingly.
(5) Terminate the incident by completing the following:
    (a) Conduct a debriefing for hazardous materials group personnel.
    (b) Conduct a critique for hazardous materials group personnel.
    (c) Report and document the hazardous materials group operations.
    (d) Coordinate hazardous materials operations with the AHJ for post-emergency response operations (PERO).

16.2 Competencies — Analyzing the Incident. Given examples of hazardous materials/WMD incidents including the surrounding conditions, an assignment, and the predicted behavior of the container and its contents, Hazardous Materials Officers shall estimate the potential outcomes within the endangered area.

16.3 Competencies — Planning the Response.

16.3.1 Given examples of a hazardous materials/WMD incidents and an assignment, Hazardous Materials Officers shall identify the strategies (defensive, offensive, and nonintervention) for each incident.

16.3.2 Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Officers shall identify the potential tactics (defensive, offensive, and nonintervention) for each incident.

16.3.3 Selecting the Level of PPE and Resources. Given examples of hazardous materials/WMD incidents with known and unknown hazardous materials/WMD and an assignment, Hazardous Materials Officers shall select the PPE for the tactics specified in the IAP in each situation.

16.3.4 Developing a Plan of Action. Given scenarios involving hazardous materials/WMD incidents and an assignment, Hazardous Materials Officers shall develop a plan of action consistent with the emergency response plan and/or standard operating procedures that are within the capability of the available personnel, PPE, and response equipment, and shall complete the following tasks:

(1) Identify the order of the steps for developing the plan of action.
(2) Identify the factors to be evaluated in selecting public protective actions, including evacuation and shelter-in-place.
(3) Given the emergency response plan and/or standard operating procedures, identify procedures to accomplish the following tasks:
    (a) Make ongoing assessments of the situation.
    (b) Coordinate on-scene personnel assigned to the hazardous materials branch/group.
    (c) Coordinate hazardous materials/WMD support and mutual aid.
    (d) Coordinate public protective actions (evacuation or shelter-in-place).

(e) Coordinate with fire suppression services as they relate to hazardous materials/WMD incidents.
(f) Coordinate control, containment, and confinement operations.
(g) Coordinate with the medical group to ensure medical assistance, support, and treatment.
(h) Coordinate on-scene decontamination.
(i) Coordinate activities with those of the environmental remediation (cleanup) services.
(j) Coordinate evidence preservation and sampling in a contaminated environment.
(k) Coordinate with law enforcement and/or special operations agencies as they relate to hazardous materials/WMD incidents.

(4) Identify the process for determining the effectiveness of a tactic on the potential outcomes.
(5) Identify the procedures for presenting a safety briefing prior to allowing personnel to work on a hazardous materials/WMD incident.

16.4 Competencies — Implementing the Planned Response.

16.4.1 Implementing the Functions in the Incident Command System. Given examples of emergency response plans, Hazardous Materials Officers shall identify the requirements of the plan, including the required procedures for notification and utilization of nonlocal resources (i.e., governmental personnel), and shall complete the following tasks:

(1) Identify the process and procedures for obtaining cleanup and remediation services in the emergency response plan and/or standard operating procedures.
(2) Identify the steps for implementing the emergency response plans as required under the *Superfund Amendments and Reauthorization Act (SARA)*, Title III, Section 303, of the federal regulations or other emergency response planning legislation.
(3) Given examples of local emergency planning documents, identify the elements of each of the documents.
(4) Identify the elements of the local incident command system necessary to coordinate response activities at hazardous materials/WMD incidents.
(5) Identify the primary AHJ(s) and the scope of their regulatory authority (including the regulations) pertaining to the production, transportation, storage, and use of hazardous materials/WMD and the disposal of hazardous wastes.
(6) Identify the AHJ(s) and resources offering assistance to the hazardous materials group during a hazardous materials/WMD incident, and identify their role and the type of assistance or resources available.
(7) Identify the AHJ(s) agencies and resources offering assistance during a hazardous materials incident involving criminal or terrorist activities, and identify their role and the type of assistance or resources available.

16.4.2* Directing Resources (Private and Governmental). Given examples of hazardous materials/WMD incidents, an assignment, and the necessary resources to implement the planned response, Hazardous Materials Officers shall demonstrate the ability to direct the hazardous materials group resources in a safe and efficient manner consistent with the capabilities of those resources.

16.4.3 Providing a Focal Point for Information Transfer to Media and Elected Officials. Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Officers shall demonstrate the ability to act as a resource to provide information to the command element, the Public Information Officer, or the Liaison Officer for distribution to the media and governmental officials and shall complete the following tasks:

(1) Identify the local policy for providing information to the media.
(2) Identify the responsibilities of the Public Information Officer at a hazardous materials/WMD incident.

16.5 Competencies — Evaluating Progress. Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Officers shall evaluate the progress of the IAP to determine whether the efforts are accomplishing the strategies and shall complete the following tasks:

(1) Identify the procedures for evaluating whether the tactics are effective in accomplishing the strategies.
(2) Identify the steps for comparing actual behavior of the material and the container to that predicted in the analysis process.
(3) Determine the effectiveness of the following:
(a) Personnel
(b) Control zones
(c) PPE
(d) Control, containment, and confinement operations
(e) Decontamination
(f) EMS resources
(4) Make recommendations for appropriate modifications to the IAP.

16.6 Competencies — Terminating the Incident.

16.6.1 Terminating the Emergency Phase of the Incident. Given examples of hazardous materials/WMD incidents in which the incident objectives have been achieved and an assignment, Hazardous Materials Officers shall describe the steps necessary to terminate the emergency phase of the incident consistent with the emergency response plan and/or standard operating procedures and shall complete the following tasks:

(1) Describe the steps required for terminating the emergency phase of a hazardous materials/WMD incident.
(2) Describe the procedures for transferring command to the AHJ having responsibility for post-incident operations.

16.6.2 Conducting a Debriefing. Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Officers shall demonstrate the ability to conduct a debriefing of the incident for all units assigned to the hazardous materials group and shall complete the following tasks:

(1) Describe the components of an effective debriefing.
(2) Describe the key topics in an effective debriefing.
(3) Describe when a debriefing should take place.
(4) Describe who should be involved in a debriefing.
(5) Identify the procedures for conducting incident debriefings at a hazardous materials/WMD incident.

16.6.3 Conducting a Critique. Given the details of a scenario involving a hazardous materials/WMD incident, Hazardous Materials Officers shall demonstrate the ability to conduct a critique of the incident for all units assigned to the hazardous materials group and shall complete the following tasks:

(1) Describe three components of an effective critique.
(2) Describe who should be involved in a critique.

(3) Describe why an effective critique is necessary after a hazardous materials/WMD incident.
(4) Describe what written documents should be prepared as a result of the critique.
(5) Identify the procedure for conducting a critique of the incident.
(6) Identify the requirements for conducting a post-incident analysis as defined in the emergency response plan, standard operating procedures, or local, state, and federal regulations.

16.6.4 Reporting and Documenting the Incident. Given examples of a hazardous materials/WMD incidents and an assignment, Hazardous Materials Officers shall demonstrate the ability to report and document the incident consistent with the governmental requirements and shall complete the following tasks:

(1) Identify the requirements for compiling incident reports, filing documents, and maintaining records as defined in the emergency response plan and/or standard operating procedures.
(2) Identify the importance of documentation for a hazardous materials/WMD incident, including training records, exposure records, incident reports, and critique reports.
(3) Identify the steps in keeping an activity log and exposure records for hazardous materials/WMD incidents.
(4) Identify the procedures required for legal documentation and chain of custody/continuity described in the emergency response plan and/or standard operating procedures.

Chapter 17 Professional Qualifications for Hazardous Materials/WMD Officers (NFPA 1072)

17.1 General.

17.1.1 Introduction. A Hazardous Materials Officer (hazardous materials group supervisor within NIMS/ICS) at hazardous materials/WMD incidents shall be that person designated by the Incident Commander responsible for directing and coordinating all operations involving hazardous materials/WMD within the designated hazard control zones.

17.1.2 Hazardous Materials Officers at hazardous materials/WMD incidents shall meet the job performance requirements defined in Sections 5.2 through 5.4.

17.1.3 Hazardous Materials Officers at hazardous materials/WMD incidents shall meet the job performance requirements defined in Sections 7.2 through 7.6.

17.1.4 Hazardous Materials Officers at hazardous materials/WMD incidents shall meet the job performance requirements defined in Sections 11.2 through 11.6.

17.1.5 Hazardous Materials Officers at hazardous materials/WMD incidents shall meet the job performance requirements of Sections 17.2 through 17.5.

17.1.6 Hazardous Materials Officers at hazardous materials/WMD incidents shall also receive training to meet AHJ response and occupational health and safety regulations.

17.1.7* General Knowledge Requirements. Knowledge of ICS, specifically the Hazardous Materials Branch or Group; additional training necessary to meet organizational policies and procedures and occupational health and safety regulations of the jurisdiction; knowledge of local policies and procedures; knowledge of local, state, and federal resources for complex hazardous materials/WMD incidents; knowledge of local, state, and federal regulations for managing and reporting hazardous materials/WMD releases.

17.1.8 General Skills Requirements. Training to the level of operations being supervised; written and verbal communication skills; demonstrated competency in establishing a, assigning positions, safely managing all operations in hazard control zones, providing strategies and tactics for mitigating the hazardous release to the Incident Commander for approval, developing and communicating recommendations for public and responder protective actions, developing and communicating safety briefings for all personnel operating in hazard control zones, providing status updates on operations within hazard control zones, communicating hazard mitigation, conducting or working to support an incident debriefing and after action report (AAR), recommending requesting additional resources, and reporting agencies that must be notified.

17.2 Analyze the Incident.

17.2.1* Hazard and Response Information Collection and Interpretation. Use a risk-based response process to analyze the incident, given hazardous materials/WMD incidents, each involving a different product(s); an assignment; team personnel; surrounding environmental conditions; container condition(s); and approved reference sources, so that hazard and response information is reviewed and evaluated; physical and chemical properties are identified; and health hazards and their potential impact on the safety and health of personnel, people, animals, property, and environment are identified to determine the complexity of the problem by estimating potential outcomes within the endangered area; and communicating information to the Incident Commander or designee.

(A)* Requisite Knowledge. Types, advantages, and limitations of hazard and response information available from approved reference sources; significance and application of hazard and response terms, including chemical and physical properties and health exposures as listed in 10.2.2.2 and 10.2.5; methods for determining the pressure and amount of lading in bulk containers and facility containers; hazard and response information to be communicated; hazardous materials team structure and those assignments within the team directed to collect and interpret information; incident command structures at hazardous materials incidents.

(B)* Requisite Skills. Assigning hazardous materials team personnel to collect and interpret hazard and response information; identifying signs and symptoms of exposure to hazardous materials/WMD, including target organ effects of exposure to hazardous materials/WMD; determining radiation exposure rates from labels attached to radioactive materials containers; reviewing hazard information, health and safety concerns, PPE, and protective action recommendations from team personnel; and communicating recommendations on strategies and tactics to the Incident Commander or designee.

17.2.2* Detection, Monitoring, and Sampling. Use a risk-based response process to classify hazardous materials/WMD and verify the presence and concentrations of hazardous materials through detection, monitoring, and sampling at a hazardous materials/WMD incident, given hazardous materials/WMD incidents, each involving a different identified or unidentified product(s); an assignment; team personnel; surrounding

conditions; container condition(s); approved reference sources; detection and monitoring equipment; and personal protective equipment (PPE), so that PPE is selected and used; hazardous materials/WMD are classified by their basic hazard categories; the presence of hazardous materials is verified; the concentrations of hazardous materials in the atmosphere are determined where possible; signs of exposure in victims and responders are recognized and identified; samples of solids, liquids, and gases are collected; results of detection and monitoring equipment are read, interpreted, recorded, and communicated; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; personnel using the detection, monitoring, and sampling equipment are decontaminated; detection, monitoring, and sampling equipment is maintained according to manufacturers' recommendations; and detection, monitoring, and sampling operations are reported and documented.

(A)* Requisite Knowledge. Basic hazard categories, including biological, corrosivity, energetic, explosivity, radioactivity, reactivity, oxidizers, polymerization, flammability, oxygen concentration, thermal (heat and cold), and toxicity and their definitions; policies and procedures; detection, monitoring, and sampling technologies; analysis process for classifying basic hazard categories of identified solid, liquid, and gaseous materials and unidentified contaminants in the atmosphere; types of detection, monitoring, and sampling equipment, including, but not limited to, colorimetrics (e.g., tubes, chips, papers, strips, reagents), electrochemical cells (e.g., toxic gas sensors), flammable gas/LEL, noncontact thermal detection device, oxygen concentration, photoionization detector (PID), biological detection, and radiation detection and monitoring; process for determining radiation dose rates from radioactive material labels; determining background, rate, and dose; determining whether a radioactive materials container is leaking/breached by comparing meter readings to the Transportation Index (TI); process for monitoring lighter-than-air gases and vapors, heavier-than-air gases and vapors in a confined space, and heavier-than-air gases and vapors in an unconfined space; capabilities and limiting factors of detection, monitoring, and sampling equipment; detection, monitoring, and sampling equipment required to classify the basic hazard categories; recognition and identification of signs and symptoms and target organ effects of exposure in victims and responders; methods for collecting samples of solids, liquids, and gases; reading, interpreting, recording, and communicating test results of detection and monitoring, and sampling equipment; procedures for decontaminating detection, monitoring, and sampling equipment according to manufacturer's recommendations or AHJ policies and procedures; and maintenance and testing procedures, including functional test, calibration, and other required tests for approved detection, monitoring, and sampling equipment.

(B)* Requisite Skills. Selecting and recommending PPE levels for all personnel to the Incident Commander or designee for approval; determining radiation dose rates from radioactive material labels; using each of the following types of detection, monitoring, and sampling equipment, including, but not limited to, colorimetrics (e.g., tubes, chips, papers, strips, reagents), electrochemical cells (e.g., toxic gas sensors), flammable gas/LEL, noncontact thermal detection device, oxygen concentration, photoionization detector (PID), and radiation detection and monitoring devices to either classify hazardous materials by basic hazard categories, verify the presence of hazardous materials, or determine the concentration of hazardous materials where possible; collecting samples of gases, liquids, and solids; monitoring, reading, interpreting, recording, and communicating readings from detection, monitoring, and sampling equipment according to the manufacturers' specifications and recommendations; preparing a briefing for the Incident Commander with recommendations for PPE, hazard control zones, public and responder protective actions, health issues, decontamination, and strategies and tactics based on detection and monitoring results, and completing required reports and supporting documentation for detection, monitoring, and sampling operations.

17.2.3* Assessing Container Condition. Use a risk-based response process to assess the condition of a container and its closures at a hazardous materials/WMD incident, given hazardous materials/WMD incidents, each involving a different identified or unidentified product(s); surrounding environmental conditions; an assignment; team personnel; container condition(s); approved reference sources; results of detection, monitoring, and sampling; and a container with required markings, so that PPE is selected and used; the container and its closures are inspected; the type of damage to the container and closures is identified; the type of stress on the container is identified; the level of risk associated with container and closure damage and stress is identified; safety procedures are followed; hazards are avoided or minimized; personnel, tools, and equipment are decontaminated; and a description of the condition of the container and its closures is communicated.

(A)* Requisite Knowledge. Process for assessing container condition; basic design and construction features, including closures for bulk, intermediate bulk, and nonbulk containers, facility containers, radioactive materials containers, and piping and pipelines; types of damage and their level of risk; types of stress; specification markings; and methods for determining the pressure and quantity of lading remaining in containers; and indicators of an increase in container pressure.

(B) Requisite Skills. Assessing the condition of the container and its closures, identifying the type of damage and level of risk associated with the damage, identifying stress(es) on the container, and communicating the condition of the container and its closures and the level of risk associated with that condition.

17.2.4* Predicting Behavior. Use a risk-based response process to predict the behavior of a hazardous materials/WMD involved in a hazardous materials/WMD incident, given hazardous materials/WMD incidents, each involving a different identified or unidentified product(s); an assignment; team personnel; surrounding environmental conditions; container condition (damage and stress); approved reference sources; results of detection, monitoring, and sampling; chemical and physical properties of the material(s) involved; and a container with required markings, so that the behavior of each hazardous materials/WMD container and its contents is identified, the reactivity issues and hazards of the combined materials are identified, and a description of the likely behavior of the hazards is communicated.

(A)* Requisite Knowledge. Predicting reactivity issues of mixing various hazardous materials/WMD; impact of fire and safety features on the behavior of products at bulk liquid and bulk gas facilities, including fire protection systems, monitoring and detection systems, pressure relief and vacuum protection, product spillage and control, tank spacing, and transfer opera-

tions and heat transfer processes that occur as a result of a cryogenic liquid spill; and methods for communicating the results of predicting behavior to the Incident Commander or designee to support development of an IAP, including a site safety and control plan.

(B)* Requisite Skills. Predicting the likely behavior of materials and their containers when multiple materials are involved, identifying reactivity issues associated with mixing various hazardous materials, and communicating the predicted behavior to the Incident Commander or designee to support development of an IAP, including a site safety and control plan.

17.2.5* Estimating Outcomes. Use a risk-based response process to estimate the potential outcomes at a hazardous materials/WMD incident, given hazardous materials/WMD incidents, each involving a different identified or unidentified product(s); an assignment; team personnel; surrounding environmental conditions; container condition (damage and stress); approved reference sources; results of detection, monitoring and sampling; chemical and physical properties of the material(s) involved; a container with required markings, concentrations of materials within the endangered area are measured where possible or predicted; physical, health, and safety hazards within the endangered area are identified; areas of potential harm in the endangered area are identified; potential outcomes within the endangered area are identified; and potential outcomes are communicated to the Incident Commander or designee.

(A)* Requisite Knowledge. Methods for determining concentrations of materials within the endangered area; resources for dispersion pattern prediction and modeling, including computers, monitoring equipment, or specialists in the field; methods for identifying physical, health, and safety hazards within the endangered area; health hazard terms and exposure values in accordance with 10.2.5, and their significance in the analysis process; methods for identifying areas of potential harm within the endangered area; methods for identifying potential outcomes in the areas of potential harm within the endangered area; and procedures for communicating potential outcomes to the Incident Commander or designee.

(B) Requisite Skills. Using approved resources and equipment; determining concentrations of materials within the endangered area where possible; identifying the physical, health, and safety hazards within the endangered area; identifying the areas of potential harm in the endangered area; estimating the potential outcomes in the endangered area; and communicating the potential outcomes to the Incident Commander or designee.

17.3 Planning the Response.

17.3.1 Use a risk-based response process to develop and recommend strategies and tactical options to the Incident Commander or their designee at a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment; results of the incident analysis, including incident-related information, life safety risks, environmental risks, and property risks; and available resources, so that defensive, offensive, or nonintervention operational modes are identified for the incident, and strategies and tactics are identified for each incident objective.

(A)* Requisite Knowledge. Possible tactics to accomplish given strategies, including public protective actions, considerations for identifying operational modes (defensive, offensive, and nonintervention), and incident objectives.

(B) Requisite Skills. Developing strategies and identifying tactics for each incident objective and providing them as recommendations to the Incident Commander or designee for approval.

17.3.2* Personal Protective Equipment (PPE) Selection. Use a risk-based response process to select the PPE ensemble required for a given strategy or tactic at a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment; results of the incident analysis, including incident-related information, life safety risks, environmental risks, and risks to property; and available resources, so that required PPE is identified for each strategy or tactic and provided to the Incident Commander or their designee for approval.

(A)* Requisite Knowledge. PPE available for response based on NFPA PPE standards and certification levels; advantages of using certified PPE; types of PPE available for the hazards identified by the risk-based process; factors to be considered in selecting respiratory protection; factors to be considered in selecting chemical-protective clothing (CPC); significance of degradation, penetration, and permeation on the selection of protective clothing; indications of material degradation of protective clothing; advantages and limitations of the different designs of liquid splash–protective ensembles and vapor-protective ensembles; types, advantages, and limitations of cooling measures for cooling personnel wearing PPE; information provided on chemical compatibility charts; and effects of physiological and psychological stresses on users of PPE; incident command structure; and personnel/missions operating at hazardous materials/WMD incidents.

(B)* Requisite Skills. Selecting PPE ensemble for all personnel/missions operating at a hazardous materials/WMD based on all hazards identified, and determining the effectiveness of protective clothing based on its uses and limitations and providing those recommendations to the Incident Commander or their designee for approval.

17.3.3 Decontamination Method Selection. Use a risk-based response process to select the decontamination method for a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment; team personnel; results of the incident analysis, including incident-related information, life safety risks, environmental risks, and risks to property; available resources and PPE; so that a decontamination method to minimize the hazards for each mission and the necessary equipment to implement the decontamination method are identified and provided to the Incident Commander or their designee for approval.

(A)* Requisite Knowledge. Decontamination methods, including absorption, adsorption, chemical degradation, dilution, disinfection, evaporation, isolation and disposal, neutralization, solidification, sterilization, vacuuming, and washing; advantages and limitations of decontamination methods; reference sources for determining applicable decontamination operations and methods; methods for accessing these resources; and equipment required to implement specified decontamination operations and methods.

(B) Requisite Skills. Selecting decontamination procedures (operations and methods); identifying the equipment required

to implement decontamination procedures (operations and methods); supervising the establishment and operation of the decontamination process and personnel; and verifying a safe and effective operation.

17.3.4 Action Plan Development. Use a risk-based response process to develop an action plan for a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment; policies and procedures; results of the incident analysis, including incident-related information, life safety risks, environmental risks, and risks to property; available resources, so that PPE is identified for all tactical missions; the tasks and resources required to meet the strategies and tactics are identified and addressed; the action plan is consistent with the emergency response plan and policies and procedures; action plan is within the capability of available personnel, PPE, and control equipment; and the action plan is identified and provided to the Incident Commander or their designee for their approval.

(A)* Requisite Knowledge. Factors to be evaluated in selecting public protective actions, including evacuation and shelter-in-place; procedures on how to accomplish ongoing assessments; coordination of on-scene personnel assigned to the hazardous materials branch/group; public protective actions (evacuation or shelter-in-place); fire suppression services as they relate to hazardous materials/WMD incidents; control, containment, and confinement operations; the medical group to ensure medical assistance, support, and treatment; on-scene decontamination; the environmental remediation (cleanup) services; evidence preservation and sampling in a contaminated environment; law enforcement and/or special operations agencies as they relate to hazardous materials/WMD incidents; and identify the process for determining the effectiveness of strategies and tactics on the potential outcomes and the procedures for presenting a safety briefing prior to allowing personnel to work on a hazardous materials/WMD incident.

(B) Requisite Skills. Developing an action plan, including public protective actions (shelter-in-place and evacuation), coordinating on-scene personnel assigned to or supporting the, managing all operations within hazard-control zones, including safety briefings, control, containment, confinement, medical assistance, decontamination, evidence preservation, and providing on-going assessment of the outcomes expected, with updates to the Incident Commander or their designee.

17.4 Action Plan Implementation.

17.4.1 Implementing the Functions in the Incident Command System. Perform the mission of Hazardous Materials Officer within the ICS structure established for a hazardous materials/WMD incident; given a hazardous materials/WMD incident; an assignment; policies and procedures; results of the incident analysis, including incident-related information, life safety risks, environmental risks, and property risks; available resources; so that PPE is identified for all tactical missions; necessary information is provided to incident command, the Public Information Officer, or the Liaison Officer; an action plan is developed, including a site safety and control plan; and the assigned functions within the Hazardous Materials Branch or Group are completed and provided to the Incident Commander or their designee for their approval.

(A)* Requisite Knowledge. Organizational structure of the Hazardous Materials Branch or Group; duties and responsibilities of Hazardous Materials Branch or Group functions; resources available to complete assigned functions; reporting structure; local policy for providing information to the media; responsibilities of the Public Information Officer at a hazardous materials/WMD incident; and procedures for communicating with the Hazardous Materials Incident Commander or their designee.

(B) Requisite Skills. Performing the duties and responsibilities of an assignment as Hazardous Materials Officer in the Hazardous Materials Branch or Group organization and communicating reports and observations to the Incident Commander or their designee; implementing the emergency response plan as required; coordinating response activities within the hazard-control zones of a given incident; managing the transportation or storage of the hazardous material in a given hazardous materials/WMD incident; requesting mutual aid as needed; requesting local law enforcement (or state and federal agencies) if the given incident involves criminal or terrorist activities; determining and recommending mitigation or status of the hazard; evaluating mission status and recommending changes to the IAP when necessary; managing decontamination; and acting as a resource to incident command, the Public Information Officer, or the Liaison Officer for information distribution to the media and governmental officials.

17.5 Terminating the Incident.

17.5.1 Terminating the Emergency Phase of the Incident. Terminate the emergency phase of a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment; results of the incident analysis, including incident-related information, life safety risks, environmental risks, and risks to property; available resources; PPE assigned; a developed action plan, including a site safety and control plan; status of assigned functions within the Hazardous Materials Branch or Group; and status of the containment of the hazardous materials/WMD, so that cleanup and remediation services are completed in accordance with the given emergency response plan and/or standard operating procedures and the team is debriefed.

(A) Requisite Knowledge. Steps required for terminating the emergency phase of a hazardous materials/WMD incident; the procedures for transferring command to the AHJ having responsibility for post-incident operations; components of an effective debriefing; key topics in an effective debriefing; when a debriefing should take place; who should be involved in a debriefing; three components of an effective critique; who should be involved in a critique; why an effective critique is necessary after a hazardous materials/WMD incident; what written documents should be prepared as a result of the critique; procedures for conducting incident debriefings and critique at a hazardous materials/WMD incident; the requirements for conducting a post-incident analysis as defined in the emergency response plan, standard operating procedures, or local, state, and federal regulations; the requirements for compiling incident reports, filing documents, and maintaining records as defined in the emergency response plan and/or standard operating procedures; the importance of documentation for a hazardous materials/WMD incident, including training records, exposure records, incident reports, and critique reports; the steps in keeping an activity log and exposure records for hazardous materials/WMD incidents; and the procedures required for legal documentation and chain of

custody/continuity described in the emergency response plan and/or standard operating procedures.

(B) Requisite Skills. Conducting a debriefing, conducting a critique, completing cleanup and remediation services.

Chapter 18 Competencies for Hazardous Materials/WMD Safety Officers (NFPA 472)

18.1 General.

18.1.1* Introduction.

18.1.1.1 Hazardous Materials Safety Officers (Assistant Safety Officer — Hazardous Materials in NIMS/ICS) shall work within the ICS hazardous material group to ensure that recognized hazardous materials/WMD safe practices are followed at hazardous materials/WMD incidents.

18.1.1.2 Hazardous Materials Safety Officers shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies for mission-specific operations *(see Chapter 8)*, all competencies at the technician level *(see Chapter 10)*, and all competencies of this chapter.

18.1.1.3 Hazardous Materials Safety Officers shall also receive training to meet governmental response and occupational health and safety regulations.

18.1.2 Goal.

18.1.2.1* The goal of the competencies in this chapter shall be to provide Hazardous Materials Safety Officers with the knowledge and skills to evaluate hazardous materials/WMD incidents for safety, ensure that recognized safe operational practices are followed, and perform the tasks in 18.1.2.2 in a safe manner.

18.1.2.2 When responding to hazardous materials/WMD incidents, Hazardous Materials Safety Officers shall be able to perform the following tasks in a safe and effective manner:

(1) Use a risk-based response to analyze hazardous materials/WMD incidents to determine the complexity of the problems in terms of safety by observing scenes, review and evaluate hazard and response information, and apply risk-based response principles as it pertains to the safety of all persons in the hazardous materials group.
(2) Assist in planning safe responses within the capabilities of available response personnel and personal protective and response equipment by completing the following tasks:
    (a) Identify the safety precautions for potential tactics.
    (b) Provide recommendations regarding the site safety and control plan.
    (c) Assist in the development of IAP(s).
    (d) Review IAP(s) and provide recommendations regarding safety.
    (e) Review IAP(s) for the strategies and tactics as they pertain to the following:
        i. Personnel and resources
        ii. Control zones
        iii. PPE
        iv. Control, containment, and confinement operations
        v. Decontamination
        vi. Medical operations
(3) Ensure the implementation of a safe response consistent with IAP(s), emergency response plans, and/or standard operating procedures by completing the following tasks:
    (a) Perform the duties of the Hazardous Materials Safety Officer within the ICS.
    (b) Identify safety considerations for personnel performing the tactical operations identified in site safety and control plans.
    (c) Conduct safety briefings for personnel performing the tactical operations identified in the site safety and control plan.
    (d) Assist in the implementation and enforcement of site safety and control plans.
    (e) Maintain communications within the incident command structure during incidents.
    (f) Monitor status reports of activities in the hot and the warm zones.
    (g) Ensure the implementation of exposure monitoringand decontamination of personnel and the environment.
(4) Evaluate the progress of the planned responses to ensure that the strategies are being met in a safe manner by completing the following tasks:
    (a) Identify deviations from the site safety and control plan or other high-risk situations, and identify reevaluated tasks.
    (b) Alter, suspend, or terminate any activity that can be judged to be unsafe.
(5) Assist in terminating the incidents by completing the following tasks:
    (a) Perform the reporting, documentation, and follow-up required of the Hazardous Materials Safety Officer.
    (b) Assist in the debriefing of hazardous materials group personnel.
    (c) Assist in the incident critique.

18.2 Competencies — Analyzing the Incident.

18.2.1 Determining the Magnitude of the Problem in Terms of Safety. Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Safety Officers shall observe a scene, review and evaluate hazard and response information, apply a risk-based response principle as it pertains to the safety of all persons within the hazardous materials group, and meet the requirements of 18.2.1.1 through 18.2.1.4.

18.2.1.1 Hazardous Materials Safety Officers when given a chemical shall explain the basic toxicological principles relative to the safety of personnel exposed to hazardous materials/WMD, including the following:

(1) Acute and chronic toxicity
(2) Dose response
(3) Local and systemic effects
(4) Routes of exposure to toxic materials
(5) Non-measured effects (synergistic, potentiation, additive, and agonistic)

18.2.1.2* Hazardous Materials Safety Officers shall identify conditions including but not limited to the following factors where the hazards from flammability would require PPE:

(1) Unknown materials involved
(2) Oxygen-enriched atmosphere
(3) Detectable percentage of LEL on monitoring instruments

(4) Presence of materials with a widely flammable range
(5) Presence of reactive materials

18.2.1.3* Hazardous Materials Safety Officers shall identify conditions including but not limited to the following factors where personnel would not be allowed to enter the hot zone:

(1) Decontamination plan not established or not in place
(2) Emergency medical services not available
(3) Back-up personnel not available or not in place
(4) Flammable or explosive atmosphere present
(5) Oxygen-enriched atmosphere of 23.5 percent or greater present
(6) Required PPE not available
(7) Risk outweighing benefit
(8) Personnel not properly trained
(9) Insufficient personnel to perform tasks
(10) No identified tactical options that can positively influence the outcome of the incident
(11) Runaway reaction occurring

18.2.1.4* Given examples of the names of hazardous materials/WMD, a description of the containers, and reference sources, Hazardous Materials Safety Officers shall identify the hazards, physical conditions, chemical properties, and the potential impacts on safety and health of personnel and the public at an incident involving each of the materials or agents.

18.3 Competencies — Planning the Response.

18.3.1* Identifying the Safety Precautions for Potential Tactics. Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Safety Officers shall assist the Incident Safety Officer and Hazardous Materials Officer in developing a site safety and control plan to respond within the capabilities of available response personnel, PPE, and response equipment and shall complete the following tasks:

(1)* Identify specific safety precautions to be observed during mitigation of each of the hazards or conditions identified in 18.2.1.1 through 18.2.1.3.
(2)* Identify safety precautions associated with search and rescue missions at hazardous materials/WMD incidents.

18.3.2 Providing Recommendations Regarding Safety Considerations. Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Safety Officers shall develop risk-based recommendations for the protection of responders for each of the hazardous materials/WMD identified in 18.2.1.4.

18.3.3 Assisting in the Development of a Site Safety and Control Plan for Inclusion in the Incident Action Plan. Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Safety Officers shall assist the Incident Safety Officer and Hazardous Materials Officer in the development of the site safety and control plan for inclusion in the IAP and shall complete the following tasks:

(1)* Identify the importance and benefits of pre-emergency planning relating to specific sites, as follows:
  (a) Identification and mitigation of hazards during the planning process
  (b) Familiarization of personnel with facility
  (c) Identification of 24-hour responsible parties
  (d) Identification of a built-in containment system
  (e) Identification of the location of utility and other shutoff/shut on valves and switches
  (f) Identification of location of facility map
  (g) Identification of location and quantities of hazardous materials/WMD
  (h) Identification of vulnerable populations
  (i) Identification of facility response capabilities
(2) List the hazards and precautions to be observed in the factors when personnel approach a hazardous materials/WMD incident, including but not limited to the following:
  (a) Inhalation hazards
  (b) Dermal hazards
  (c) Flammable hazards
  (d) Reactive hazards
  (e) Electrical hazards
  (f) Mechanical hazards
  (g) Radiological hazards
(3)* List the elements of a site safety and control plan.
(4) Given examples of IAP(S) and scenarios involving one of the hazardous materials/WMD described in 18.2.1.4, develop a list of safety considerations for the incident.

18.3.4 Providing Recommendations Regarding Safety and Reviewing the Incident Action Plan. Given an IAP for an incident involving one of the hazardous materials/WMD and containers described in 18.2.1.4, Hazardous Materials Safety Officers shall identify the safety precautions for the IAP to the Incident Safety Officer, the Hazardous Materials Officer, and the Incident Commander and shall complete the following tasks:

(1) Ensure that the site safety and control plan in the proposed IAP is consistent with the emergency response plan and/or standard operating procedures.
(2) Make recommendations to the Incident Safety Officer and the Hazardous Materials Officer on the safety considerations in the proposed IAP.

18.3.5 Reviewing Selection of Personal Protective Equipment (PPE). Given scenarios involving hazardous materials/WMD incidents, the Hazardous Materials Safety Officer shall demonstrate the ability to review the selection of PPE required for a given tactic and shall complete the following tasks:

(1) Identify safety considerations, including but not limited to the following factors for personnel working in PPE:
  (a) Cold or heat stress
  (b) Diminished visibility
  (c) Product incompatibility issues
  (d) Mission work duration or orientation
  (e) Physiological stressors
  (f) Emergency conditions while working in PPE
(2) Given the names of three hazardous materials/WMD agents and the PPE selection matrix from NFPA 1891, Annex B, identify the chemical protective clothing that would provide protection from the identified hazards to the wearer for each of the three substances.
(3)* Given examples of hazardous materials/WMD agents, identify the PPE options for specified tactics.
(4) Identify the recommended methods for donning, doffing, and using all PPE provided by the AHJ for use in hazardous materials/WMD response activities.
(5)* Identify the safety considerations involved when using chemical compatibility charts when selecting chemical protective clothing.

18.3.6 Reviewing the Proposed Decontamination Procedures. Given examples of site-specific decontamination procedures by the Hazardous Materials Officer or Incident Commander for hazardous materials/WMD incidents, Hazardous Materials Safety Officers shall review the procedures to ensure that applicable safety considerations are included prior to implementation of the IAP.

18.3.7 Ensuring Provision of Emergency Medical Services. Given examples of a hazardous materials/WMD incidents and an assignment, Hazardous Materials Safety Officers shall review the emergency medical services procedures to ensure that response personnel are provided medical care and shall complete the following tasks:

(1)* Identify the elements required in a medical plan.
(2) Identify the importance of an on-site medical monitoring program.
(3) Identify the resources for the transportation and care of the injured personnel exposed to hazardous materials/WMD agents.

18.3.8 Reviewing the Control Procedures. Given examples of site-specific control procedures by the Hazardous Materials Officer or Incident Commander for hazardous materials/WMD incidents, Hazardous Materials Safety Officers shall review the procedures to ensure that applicable safety considerations are included prior to implementation of the IAP.

18.3.9 Reviewing the Proposed Control Zones. Given examples of site-specific control zones by the Hazardous Materials Officer or Incident Commander for hazardous materials/WMD incidents and an assignment, Hazardous Materials Safety Officers shall review the procedures to ensure that applicable safety considerations are included prior to implementation of the IAP and that these zones are evaluated continuously.

18.3.10 Reviewing the Qualifications of Personnel Within Assigned Positions. Given examples of site-specific personnel (internal and external resources) at hazardous materials/WMD incidents and an assignment, the Incident Commander authorizes the personnel working at the event. Hazardous Materials Safety Officers shall ensure that applicable safety considerations for personnel, including their training or qualifications, are included prior to their being assigned to a task.

18.4 Competencies — Implementing the Planned Response.

18.4.1 Performing the Duties of Hazardous Materials Safety Officers. Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Safety Officers shall perform the duties of the position in a manner consistent with the emergency response plan and/or standard operating procedures and shall complete the following tasks:

(1) Identify the duties of Hazardous Materials Safety Officer as defined in the emergency response plan or standard operating procedures. Determine the safety issues of the following at a minimum:
    (a) Personnel
    (b) Control zones
    (c) PPE
    (d) Control, containment, and confinement operations
    (e) Decontamination
    (f) Medical plan
(2) Demonstrate performance of the duties of Hazardous Materials Safety Officers as defined in the emergency response plan and/or standard operating procedures.

18.4.2 Monitoring Safety of Response Personnel. Given examples of hazardous materials/WMD incidents and an assignment, the Hazardous Materials Safety Officer shall ensure that personnel perform their tasks in a safe manner by identifying the safety considerations for the tactical operations identified in the site safety and control plan and shall complete the following tasks:

(1) Identify safe operating practices that are required to be followed at a hazardous materials/WMD incidents as stated in the emergency response plans or standard operating procedures.
(2) Identify how the following factors influence heat and cold stress for hazardous materials response personnel:
    (a) Activity levels
    (b) Duration of entry
    (c) Environmental factors
    (d) Hydration
    (e) Level of PPE
    (f) Physical fitness
(3) Identify the methods that minimize the potential harm from heat and cold stresses.
(4) Identify the safety considerations that minimize the psychological and physical stresses on personnel working in PPE.
(5) Describe conditions in which it would be prudent to withdraw from a hazardous materials/WMD incident, including but not limited to the following:
    (a) Fire or explosion
    (b) Container failure
    (c) PPE incompatibility with chemical
    (d) Extreme heat or cold
    (e) Changing chemical conditions
    (f) Conditions inconsistent with mission
    (g) Physical issue with responder
    (h) Damaged, malfunctioning, or failed PPE or equipment
    (i) Loss of communications
    (j) Inadequate lighting
(6)* Describe the procedures for the emergency removal and extraction of entry personnel who are down within the hot zone.

18.4.3 Conducting Safety Briefings. Given examples of hazardous materials/WMD incident, an assignment and site safety and control plans, Hazardous Materials Safety Officers shall prepare and participate in conducting the safety briefings for personnel performing the functions identified in the IAP(s) for incidents involving the hazardous materials/WMD identified in 18.2.1.4, as specified by the emergency response plan and/or standard operating procedures.

18.4.4* Implementing and Maintaining the Site Safety and Control Plan. Given examples of hazardous materials/WMD incidents, an assignment, and site safety and control plans Hazardous Materials Safety Officers shall assist the Incident Commander, the Incident Safety Officer, and the Hazardous Materials Officer in implementing and maintaining the safety considerations by completing but not limited to the following:

(1) Identify whether the boundaries of the established control zones are clearly marked, consistent with the site safety and control plan, and are being maintained.
(2) Identify whether the on-site medical monitoring required by the emergency response plan and/or standard operating procedures is being performed.

(3) Given an entry team, a backup team, and a decontamination team working in PPE, verify that each team is protected and prepared to perform its assigned tasks by completing the following:
   (a) Verify whether the selection of PPE and equipment is consistent with the site safety and control plan.
   (b) Verify whether each team has examined the PPE for barrier integrity and the equipment to ensure correct working order.
   (c) Verify whether PPE have been donned in accordance with the standard operating procedures and the manufacturer's recommendations.
(4) Verify whether each person entering the hot zone has a specific task assignment, understands the assignment, is trained to perform the assigned task(s), and is working with a designated partner at all times during the assignment.
(5) Verify whether a backup team is prepared at all times for entry into the hot zone during entry team operations.
(6) Verify whether the decontamination procedures specified in the site safety and control plan are in place before any entry into the hot zone.
(7) Verify the location(s) of the area of safe refuge.
(8) Verify that personal personnel and resources exiting the hot zone is decontaminated in accordance with the site safety and control plan and the degree of hazardous materials/WMD contamination.
(9) Verify the procedure for accountability of individuals operating in the hot zone, as specified in the emergency response plan and/or standard operating procedures.
(10)* Identify safety considerations that can minimize secondary contamination.

18.4.5 Maintaining Communications. Given examples of hazardous materials/WMD incidents, an assignment, and site safety and control plans Hazardous Materials Safety Officers shall maintain routine and emergency communications within the incident command structure at all times during the incident and shall complete the following tasks:

(1) Identify types of communications systems used at hazardous materials/WMD incident sites, including but not limited to the following:
   (a) Communications systems including in-suit radios
   (b) Hand-held portable radios
   (c) Emergency signaling devices
   (d) Hand signals
(2) Verify that each person assigned to work in the hot zone understands the emergency alerting and response procedures specified in the safety plan prior to entry into the hot zone.

18.4.6 Monitoring Status Reports.

18.4.6.1 Given examples of hazardous materials/WMD incidents, an assignment, and site safety and control plans, Hazardous Materials Safety Officers shall monitor routine and emergency communications within the incident command structure at all times during the incident.

18.4.6.2 Hazardous materials safety officer shall ensure that entry team members communicate the status of their work assignment to the Hazardous Materials Officer.

18.4.7 Implementing Exposure Monitoring. Given examples of hazardous materials/WMD incidents, an assignment, and site safety and control plans Hazardous Materials Safety Officers shall assist the Incident Commander, the Incident Safety Officer, and the Hazardous Materials Officer in implementing exposure monitoring.

18.4.8 Verifying Exposure Monitoring. Hazardous Materials Safety Officers shall identify that exposure monitoring (personnel and environment) is performed as specified in the emergency response plan and/or standard operating procedures and site safety and control plan considerations.

18.5 Competencies — Evaluating Progress.

18.5.1 Identifying Deviations from Safety Considerations or Other Dangerous Situations. Given examples of hazardous materials/WMD incidents, an assignment, and deviations from the site safety and control plan for activities in both the hot and warm zones and high-risk conditions, Hazardous Materials Safety Officers shall evaluate the progress of the planned response to ensure that the strategies are met in a safe manner and shall complete the following tasks:

(1) Identify those actions that deviate from the site safety and control plan or that otherwise violate accepted safe operating practices, organizational policies, or applicable occupational safety and health laws, regulations, codes, standards, or guidelines.
(2) Identify high-risk conditions that develop or are identified during work in the hot or warm zones that threaten the safety or health of persons in those zones.
(3) Identify the signs and symptoms of psychological and physiological stressors on personnel wearing PPE.

18.5.2 Taking Corrective Actions. Given examples of hazardous materials/WMD incidents, an assignment, and deviations from the site safety and control plans for activities in both the hot and warm zones and high-risk conditions, Hazardous Materials Safety Officers shall take such corrective actions as are necessary to ensure the safety and health of persons in the hot and warm zones and shall complete the following tasks:

(1) Send emergency communications to and receive emergency communications from the Incident Safety Officer, entry team personnel, the Hazardous Materials Officer, and others regarding safe working practices and conditions, as follows:
   (a)* Given examples of hazardous situations or conditions that have developed or been identified following hot zone entry, demonstrate the application of the emergency alerting procedures specified in the site safety and control plan to communicate the hazard and emergency response information to the affected personnel.
   (b) Given examples of demonstrated emergency alert via hand signal by a member of the entry team operating within the hot zone, identify the meaning of that signal as specified in the site safety and control plan.
(2) Identify the procedures to alter, suspend, or terminate any activity that can be judged to be imminently unsafe, and notify the appropriate individuals as specified in the site safety and control plan, emergency response plan, and/or standard operating procedures.

18.6 Competencies — Terminating the Incident.

18.6.1 Reporting and Documenting the Incident. Given examples of hazardous materials/WMD incidents and an assign-

ment, Hazardous Materials Safety Officers shall complete and submit the reports, documentation, and follow-up required of the Hazardous Materials Safety Officer and shall complete the following tasks:

(1) Identify the safety reports and supporting documentation required by the emergency response plan or standard operating procedures.
(2) Demonstrate completion of the safety reports required by the emergency response plan or standard operating procedures.
(3) Describe the importance of personnel exposure records.

18.6.2 Debriefing of Hazardous Materials Group Personnel. Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Safety Officers shall debrief hazardous materials group personnel regarding site-specific occupational safety and health issues.

18.6.2.1* Hazardous Materials Safety Officers shall be able to identify health and safety topics to be addressed in an incident debriefing.

18.6.2.2 Hazardous Materials Safety Officers shall demonstrate the procedure for debriefing hazardous materials group personnel regarding site-specific occupational safety and health areas of concern, as specified in the site safety and control plan, emergency response plan, and standard operating procedures.

18.6.3 Assisting in the Incident Critique. Given examples of hazardous materials/WMD incidents, an assignment, and site safety and control plans, Hazardous Materials Safety Officers shall provide safety and health-related critical observations of the activities that were performed in the hot and warm zones during the incident.

18.6.3.1 Information to Be Presented. Given examples of site safety and control plans and the Hazardous Materials Officer's report for an incident involving hazardous materials/WMD, Hazardous Materials Safety Officers shall identify the procedure for presenting safety and health-related observations of the activities that were performed in accordance with the emergency response plan or standard operating procedures.

Chapter 19 Professional Qualifications for Hazardous Materials/WMD Safety Officers (NFPA 1072)

19.1 General.

19.1.1* Hazardous Materials Safety Officers are those persons who work within an incident command system (ICS) (specifically, Hazardous Materials Branch or Group) to ensure that recognized hazardous materials/WMD safe practices are followed at hazardous materials/WMD incidents.

19.1.2 Hazardous Materials Safety Officers at hazardous materials/WMD incidents shall meet the job performance requirements defined in Sections 5.2 through 5.4.

19.1.3 Hazardous Materials Safety Officers at hazardous materials/WMD incidents shall meet the job performance requirements defined in Sections 7.2 through 7.6.

19.1.4 Hazardous Materials Safety Officers at hazardous materials/WMD incidents shall meet the job performance requirements defined in Sections 11.2 through 11.6.

19.1.5 Hazardous Materials Safety Officers at hazardous materials/WMD incidents shall meet the job performance requirements defined in Sections 19.2 through 19.6.

19.1.6 General Knowledge Requirements. AHJ policies and procedures, applicable occupational health and safety regulations, Incident Command System Safety Officer functions.

19.1.7 General Skill Requirements. Written and verbal communications skills.

19.2 Analyze the Incident.

19.2.1 Use a risk-based response process to analyze the incident, given hazardous materials/WMD incidents, each involving a different product(s); an assignment; team personnel; surrounding environmental conditions; container condition(s); at least three reference sources; and hazard and response information, so that hazard and response information is reviewed and evaluated, physical and chemical properties are identified, and safety and health hazards and their potential impact on the safety and health of personnel are identified.

(A) Requisite Knowledge. Chemical and physical properties and basic toxicological principles relative to the safety of exposed personnel; nonmeasured effects (synergistic, potentiation, additive, and agonistic); conditions where the flammability hazards would require PPE, including unknown materials involved, oxygen-enriched atmosphere, detectable percentage of LEL on monitoring instruments, presence of materials with a widely flammable range, and presence of reactive materials; conditions where personnel would not be allowed to enter the hot zone, including decontamination plan not established or not in place, emergency medical services not available, backup personnel not available or not in place, flammable or explosive atmosphere present, oxygen-enriched atmosphere present, required PPE not available, risk outweighing benefit, personnel not properly trained, insufficient personnel to perform tasks, no identified tactical options that can positively influence the outcome of the incident, and runaway reaction occurring.

(B) Requisite Skills. Analyzing hazard and response information; using reference sources to determine health hazards and physical and chemical properties; applying risk-based response to understand potential safety hazards to personnel.

19.3 Plan the Response.

19.3.1 Conduct action planning to assist in the development of the IAP, including the site safety and control plan, other action plans as needed, and strategies and tactics, to ensure personnel safety, given hazardous materials/WMD incident scenarios, an assignment, team personnel, the results of the incident analysis (behavior of the material and its container, hazards, risks, and outcomes); a proposed IAP, including decontamination procedures, EMS procedures, control procedures, and hazard-control zones; personnel qualifications; and the PPE selection matrix from NFPA 1891, Annex B, so that the Incident Safety Officer and Hazardous Materials Safety Officer are assisted in developing a site safety and control plan, safety precautions for strategies and tactics are provided, consistency between the IAP and emergency response plan and standard operating procedures is ensured, selection of PPE is reviewed, proposed decontamination procedures are reviewed, EMS provisions are ensured, control procedures are reviewed, proposed control zones are reviewed, qualifications of personnel with assigned positions are reviewed, and safety-related recommendations are provided to the appropriate authority.

(A)* Requisite Knowledge. Risk-based response safety precautions to be taken during mitigation and rescue; importance and benefits of pre-emergency planning relating to specific sites, including the items listed in 18.3.3(1)(i); precautions to be observed when personnel approach hazards identified during the response-based analysis; components of an IAP; components of a site safety and control plan; potential safety considerations at hazardous materials/WMD incidents; safety considerations for personnel working in PPE, including, but not limited to, cold or heat stress, diminished visibility, product incompatibility issues, mission work duration or orientation, physiological stressors, or emergency conditions while working in PPE; the PPE selection matrix from NFPA 1891, Annex B; advantages and limitations of AHJ-provided PPE; methods for donning and doffing of AHJ-provided PPE; decontamination methods and processes; EMS requirements at hazardous materials/WMD incidents; elements of an EMS plan; importance of an on-site medical monitoring program; resources for transportation and care of injured personnel exposed to the hazardous materials/WMD agents; safety considerations for control, containment, and confinement procedures; safety considerations for hazard control zones; personnel qualifications needed for assigned positions.

(B) Requisite Skills. Identifying safety and health hazards; selecting PPE according to identified hazards present and mission to be performed; using the PPE selection matrix from NFPA 1891, Annex B; identifying safety concerns relative to EMS, decontamination, control procedures, hazard control zones, and the use of chemical compatibility charts alone to select PPE; identifying personnel qualifications per assigned position.

19.4 Implement the Action Plan Within the IAP.

19.4.1 Ensure the implementation of a safe response that is consistent with the IAP, the emergency response plan, and/or standard operating procedures, given a hazardous materials/WMD incident, an assignment, team personnel, examples of emergency response plans and standard operating procedures, and an IAP, so that safety considerations for personnel performing control functions are identified in the site safety and control plan, safety briefings are conducted, the site safety and control plan is implemented and enforced, communication within the incident command structure is maintained, status reports for activities in the hot and warm zone are monitored, exposure monitoring and decontamination of personnel are implemented, and the duties of the Hazardous Materials Safety Officer are performed.

(A) Requisite Knowledge. Duties of the Hazardous Materials Safety Officer, safe operating practices required by the emergency response plan and standard operating procedures, how heat and cold stress influence activity levels, duration of entry, environmental factors, hydration, level of PPE, and physical fitness; methods to minimize heat and cold stress; safety considerations that minimize psychological and physical stresses on personnel working in PPE; conditions in which it would be prudent to withdraw from a hazardous materials/WMD incident, including, but not limited to, fire or the possibility of explosion, container failure, incompatibility of PPE, extreme heat or cold, changing chemical or environmental conditions, conditions that have become dangerous or incompatible with the mission, responders reaching physical limitations, failure of critical equipment or PPE, loss of critical communications, or inadequate lighting; procedures for the emergency removal and extraction of entry personnel who are incapacitated within the hot zone; components of a safety briefing; procedure for conducting safety briefings; how to mark boundaries of hazard control zones; on-site medical monitoring required by the emergency response plan and standard operating procedures; PPE inspection prior to entry; entry and backup team requirements; considerations that can minimize secondary contamination; types of communication systems; emergency alerts to be used at hazardous materials/WMD incidents; requirements for exposure monitoring.

(B) Requisite Skills. Performing duties of Hazardous Materials Safety Officer; monitoring safety of response personnel, conducting safety briefings, implementing and enforcing the site safety control plan, including, but not limited to, ensuring hazard control zones are clearly identified and maintained, medical monitoring is taking place, verification that proper PPE is universally used by all responders on scene, verification that all teams — and associated team members — understand the plan and are trained and prepared to perform necessary tasks, verify the backup team is in place, verify the decontamination team is in place and the decontamination process is operational prior to any entry into the hot zone, verify the location(s) of the area of safe refuge, verify decontamination is successful for all personnel and equipment based on expected contamination and the elimination of any secondary contamination, verify accountability procedures are in place and operational, and identify any other considerations to minimize responder exposure, communicate with personnel within the incident command structure, monitor status reports for deployed and available resources, implement exposure monitoring, and verify exposure monitoring.

19.5 Evaluate the Effectiveness of the Response.

19.5.1 Recognize actions that deviate from the site safety and control plan or that otherwise violate accepted safe operating practices, organizational policies, or applicable occupational safety and health laws, regulations, codes, standards, or guidelines; given a hazardous materials/WMD incident, an assignment, team personnel, the results of the incident analysis (behavior of the material and its container, hazards, risks, and outcomes), examples of emergency response plans and standard operating procedures, and an IAP with a site safety and control plan; so that hazardous situations or activities are identified, and unsafe activities are altered, suspended, or terminated.

(A) Requisite Knowledge. Conditions that might threaten the safety or health of persons in the hazard control zones; actions that deviate from the site safety and control plan or that otherwise violate accepted safe operating practices, organizational policies, or applicable occupational safety and health laws, regulations, codes, standards, or guidelines; emergency alerting procedures, including emergency alert hand signals; emergency communication procedures; procedure for altering, suspending, or terminating unsafe activities; notification processes within the incident command system; and signs and symptoms of psychological and physiological stressors on personnel wearing PPE.

(B) Requisite Skills. Identifying those actions that deviate from the site safety and control plan or that otherwise violate accepted safe operating practices, organizational policies, or applicable occupational safety and health laws, regulations, codes, standards, or guidelines; identifying conditions that develop or are identified during work in the hazard control

zones that threaten the safety or health of persons in those zones; identify the signs and symptoms of psychological and physiological stressors on personnel wearing PPE; sending and receiving emergency communications from the Incident Safety Officer, entry team personnel, backup team personnel, Hazardous Materials Officer, and others regarding safe working practices and conditions; applying the emergency alerting procedures specified in the site safety and control plan to communicate the hazard and emergency response information to the affected personnel; and demonstrating the emergency alert hand signal specified in the site safety and control plan to communicate the hazard and emergency response information to the affected personnel.

19.6 Terminate the Incident.

19.6.1 Assist in terminating the incident, given an example of a hazardous materials/WMD incident, an assignment, team personnel, the results of the incident analysis (behavior of the material and its container, hazards, risks, and outcomes), an IAP, site safety and control plans, and a Hazardous Materials Officer's report for an incident, so that safety reports and supporting documentation required by the emergency response plan or standard operating procedures are completed, safety and health-related observations to be presented in the incident critique are identified and documented, and hazardous materials group personnel are debriefed on site-specific occupational safety and health areas of concern as specified in the site safety and control plan, emergency response plan, and standard operating procedures.

(A) Requisite Knowledge. Importance of exposure reports; procedure for debriefing hazardous materials group personnel regarding site-specific occupational safety and health areas of concern as specified in the site safety and control plan, emergency response plan, and standard operating procedures; health and safety topics to be addressed in an incident debriefing; and procedures for presenting safety and health-related observations of the activities that were performed.

(B) Requisite Skills. Conducting a debriefing, completing safety reports and supporting documentation, and describing the importance of exposure reports.

Chapter 20 Competencies for Hazardous Materials/WMD Technicians with a Tank Car Specialty (NFPA 472)

20.1 General.

20.1.1 Introduction.

20.1.1.1 Hazardous Materials Technicians with a tank car specialty shall provide technical support pertaining to tank cars, provide oversight for product removal and movement of damaged tank cars, and act as a liaison between technicians and outside resources on tank car issues.

20.1.1.2 Hazardous Materials Technicians with a tank car specialty shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies at the technician level *(see Chapter 10)*, and all competencies of this chapter.

20.1.1.3 Hazardous Materials Technicians with a tank car specialty shall also receive training to meet governmental response and occupational health and other regulations.

20.1.2 Goal.

20.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians with a tank car specialty with the knowledge and skills to perform the tasks in 20.1.2.2 in a safe manner.

20.1.2.2 When responding to hazardous materials/WMD incidents, Hazardous Materials Technicians with a tank car specialty shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving tank cars to determine the complexity of the problem and potential outcomes by completing the following tasks:
   (a) Determine the type and extent of damage to tank cars.
   (b) Predict the likely behavior of tank cars and their contents during an incident.
(2) Plan a response to an incident involving tank cars within the capabilities and competencies of available personnel, PPE, and control equipment by determining the tactics (offensive, defensive, or nonintervention) for a hazardous materials/WMD incident involving tank cars.
(3) Implement or oversee the implementation of the planned response to a hazardous materials/WMD incident involving tank cars.

20.1.3 Mandating of Competencies. This standard shall not mandate that Hazardous Materials Response Teams performing offensive operations on tank cars have technicians with a tank car specialty.

20.1.3.1 Hazardous Materials Technicians operating within the bounds of their training as listed in Chapter 10 shall be able to intervene in incidents involving tank cars.

20.1.3.2 If a Hazardous Materials Response Team decides to train some or all its technicians to have in-depth knowledge of tank cars, this chapter shall set out the required competencies.

20.2 Competencies — Analyzing the Incident.

20.2.1 Determining the Type and Extent of Damage to Tank Cars. Given examples of damaged tank cars, Hazardous Materials Technicians with a tank car specialty shall describe the type and extent of damage to each tank car and its fittings and shall complete the following tasks:

(1) Given examples of tank car specification markings and the reference materials, describe the car's basic construction and features, including authorizing agency, class designation, significance of letter after the class designation [A, J, S, and T for nonpressure (general service) and pressure tank cars; P and R for DOT-117 tank cars; H for poison inhalation tank cars; and A, C, and, D for DOT 113 tank cars], tank test pressure, material of construction, and fittings, linings, and materials as shown in Table 20.2.1.
(2) Given examples of tank cars, identify the "B" end of the car.
(3) Given examples of various tank cars, identify each of the following tank car components present, and describe the design and purpose of each component:
   (a) Body bolster
   (b) Tank head puncture-resistance system
   (c) Interior or exterior heater coils or electric heating systems

(d) Jacket
(e) Lining and cladding
(f) Coupler vertical restraint system
(g) Tank
(h) Trucks (pin and bowl assembly)
(i) Underframe — continuous or stub sill
(j) Safety appliances
(k) Bottom discontinuity protection systems
(l) Top fitting protection
(m) Insulation
(n) Thermal protection

(4) Given examples of tank cars (jacketed and not jacketed), identify the jacketed tank cars.

(5) Describe the difference between insulation and thermal protection on tank cars and the intended purpose of each.

(6) Describe the difference between interior and exterior heater coils on tank cars in terms of potential loss of product.

(7) Given examples of various fittings arrangements for nonpressure tank cars transporting liquids and solids that include the following fittings, identify each fitting present by name, and describe the design, construction, and operation of each of the following fittings:

(a) Manway nozzle, as follows:
i. Low profile manway nozzle and a gasketed hinged and bolted manway cover
ii. Flued manway nozzle with a semi-permanent manway cover equipped with a small gasketed hinged and bolted fill hole with a quick-fill hole cover
iii. Pressure plate (bolted to manway nozzle)
iv. Single bolt manway covers

(b) Protective housing or combination housing to protect valves and fittings.

(c) Loading and unloading fittings within housing arrangement, as follows:
i. Liquid eduction line with liquid valve and closure such as pipe caps, plugs, or blind flanges and eduction pipe
ii. Air line (air inlet or vapor valve)
iii. Sump

(d) Bottom outlet nozzle that is either of the following:
i. Top operated with a stuffing box
ii. Bottom operated (internal or external ball, wafer-sphere, plug type)

(e) Bottom outlet valve (disengaging handle)
(f) Vacuum relief valve
(g) Sample line
(h) Gauging device that is either of the following:
i. Magnetic ball gauging device
ii. Outage gauge on the interior of the tank

(i) Bottom washout
(j) Pressure relief devices that are either of the following:
i. Reclosing pressure relief valves
ii. Nonreclosing rupture disc devices/safety vents
iii. Breather vent (continuous vent for hydrogen peroxide tank cars)

(8) Given examples of fitting arrangements for pressure tank cars transporting liquefied compressed gases and chemicals under pressure that include the following fittings, identify each fitting present by name and describe the design, construction, and operation of each fitting:

(a) Manway nozzle with a bolted pressure plate (manway cover)
(b) Protective housing with a hinged cover bolted to the pressure plate
(c) Pressure relief device (reclosing pressure relief valve or combination pressure relief valve)
(d) Loading and unloading fittings, as follows:
i. Liquid eduction line equipped with a valve and closure and excess flow valve
ii. Vapor eduction line equipped with a valve and closure and excess flow valve
(e) Thermometer well
(f) Sample line
(g) Magnetic ball gauging device

(9) Given examples of fitting arrangements for pressure tank cars transporting chlorine and sulfur dioxide that include the following fittings, identify each fitting present by name, and describe the design, construction, and operation of each fitting:

(a) Manway nozzle with pressure plate (manway cover)
(b) Protective housing with a hinged cover bolted to the pressure plate
(c) Loading and unloading fittings, including the following:
i. Liquid eduction line equipped with a valve and closure and either an excess flow valve (flow activated) or, on newer cars, a spring-loaded check valve
ii. Vapor eduction line equipped with a valve and closure and either an excess flow valve (flow activated) or, on newer cars, a spring-loaded check valve
(d) Pressure relief device (combination pressure relief device)

(10) Given examples of the fitting arrangements for pressure tank cars transporting carbon dioxide or nitrous oxide that include the following fittings, identify each fitting present by name and describe the design, construction, and operation of each fitting:

(a) Manway nozzle with pressure plate (manway cover)
(b) Protective housing with a hinged cover bolted to the pressure plate
(c) Loading and unloading fittings, as follows:
i. Liquid eduction line equipped with a valve and closure
ii. Vapor eduction line equipped with a valve and closure
(d) Pressure relief device (staged pressure relief system) piped to outside of protective housing, as follows:
i. Pressure regulating device
ii. Reclosing pressure relief valve
iii. Safety vent/rupture disc device
(e) Fixed length, telltale outage gauges
(f) Thermometer well

(11) Given examples of fitting arrangements for cryogenic liquid tank cars transporting refrigerated liquefied gases that include the following fittings, identify each fitting present by name and describe the design, construction, and operation of each fitting:
   (a) Protective housing (cabinet or box) at ground level
   (b) Valves (manually operated shut-off valves and control valves), as follows:
      i. Vapor phase pressure valve
      ii. Vapor phase venting valve
      iii. Liquid transfer valve
      iv. Liquid flow rate control valve
      v. Mixing device to control routing release of vaporized lading during transportation
   (c) Gauges, as follows:
      i. Liquid level gauges — inner tank and fixed-level dip tube set
      ii. Vapor phase pressure gauge
   (d) Pressure relief devices, as follows:
      i. Pressure relief valve (for inner tank and for annular space between outer jacket and inner tank)
      ii. Safety vent/rupture disc device
      iii. Regulator valve (pressure control valve)
   (e) Pressure controlling and mixing device (routine release of vaporizing liquid)

(12) Given examples of fittings identified in 20.2.1(7) through 20.2.1(11), identify the location(s) where each fitting is likely to leak and a reason for the leak.

(13) Given examples of each of the following types of tank car tank damage, identify the type of damage in each example:
   (a) Corrosion
   (b) Crack
   (c) Dent
   (d) Flame impingement
   (e) Puncture
   (f) Thinning of the tank metal caused by a score, gouge, wheel burn, and rail burn

(14) Given examples (actual or simulated) of scores, gouges, wheel burns, and rail burns, perform each of the following tasks:
   (a) Measure the depth of each score, gouge, wheel burn, and rail burn.
   (b) Identify where each score, gouge, wheel burn, and rail burn cross a weld, if that condition exists.
   (c) Measure the depth of the weld metal removed at any point where the score, gouge, wheel burn, and rail burn cross a weld.
   (d)* Given examples (actual or simulated) of where a score, gouge, wheel burn, and rail burn cross a weld, determine if the heat-affected zone has been damaged.

(15) Given examples (actual or simulated) of dents and rail burns, perform each of the following tasks:
   (a) Determine the radius of the curvature of each dent or rail burn.
   (b) Recognize those examples that include cracks at the point of minimum curvature.

(16) Given examples of damaged tank car fittings, describe the extent of damage to those fittings.

(17) Given examples of tank car tank damage, describe the extent of damage to the tank car tank.

(18) Given examples of tank cars, their contents, and the applicable equipment and reference materials, determine the pressure in the tank, using either of the following methods:
   (a) Pressure gauge
   (b) Temperature of the contents

(19)* Given examples of tank cars, use the tank car's gauging device to determine the outage in the tank.

20.2.2 Predicting the Likely Behavior of the Tank Car and Its Contents. Hazardous Materials Technicians with a tank car specialty shall predict the likely behavior of the tank car and its contents and shall complete the following tasks:

(1) Given examples of the following types of tank cars, describe the likely breach and release mechanisms associated with each type:
   (a) Cryogenic liquid tank cars
   (b) Nonpressure tank cars
   (c) Pressure tank cars

(2) Describe the difference in the following types of construction materials used in tank cars and their significance in assessing tank damage as shown in Table 20.2.2:
   (a) High-alloy steel plate
   (b) Aluminum alloy plate
   (c) Carbon steel plate
   (d) Nickel plate

(3) Describe the significance of selection of lading for compatibility with tank car construction material.

(4) Describe the significance of lining and cladding on tank cars in assessing tank damage.

(5) Describe the significance of the jacket on tank cars in assessing tank damage.

(6) Describe the significance of insulation and thermal protection on tank cars in assessing tank damage.

(7) Describe the significance of jacketed and sprayed-on thermal protection on tank cars in assessing tank damage.

(8) Describe the significance of interior and exterior heater coils on tank cars in assessing tank damage.

(9) Describe the significance of each of the following types of tank car damage on different types of tank cars in assessing tank damage:

Table 20.2.1 Current Tank Car Categories and Classes

Tank Car Categories	DOT Classes	AAR Classes
Nonpressure	DOT-111, DOT-115, DOT-117 *(DOT-103 and DOT-104 are authorized for use, but new construction is not authorized)*	AAR-206, AAR-211 *(AAR-211 is authorized for use, but new construction is not authorized)*
Pressure	DOT-105, DOT-109, DOT-112, DOT-114, DOT-120	
Cryogenic liquid	DOT-113	AAR-204

(a) Corrosion
(b) Crack
(c) Dent
(d) Flame impingement
(e) Puncture
(f) Score, gouge, wheel burn, rail burn

(10) Describe the significance of the depth of scores, gouges, wheel burns, and rail burns on tank cars in assessing tank damage.
(11) Describe the significance of damage to the heat-affected zone of a weld on a tank car in assessing tank damage.
(12) Describe the significance of a dent that includes the thinning of tank metal.
(13) Given examples of various types of tank cars, describe the significance of pressure increases in assessing tank damage.
(14) Given examples of various types of tank cars, describe the significance of the amount of lading in the tank in assessing tank damage
(15) Describe the significance of flame impingement on the vapor space and liquid space as it relates to a tank car.

20.3 Competencies — Planning the Response.

20.3.1 Determining the Tactics. Given examples of analysis of incidents involving tank cars, Hazardous Materials Technicians with a tank car specialty shall determine the tactics for each tank car involved and shall complete the following tasks:

(1) Describe the purpose of, potential risks associated with, procedures for, equipment required to implement, and safety precautions for the following product removal techniques for tank cars:
(a) Flaring liquids and vapors
(b) Hot and cold tapping
(c) Transferring liquids and vapors
(d) Vent and burn
(e) Venting vapors to atmosphere
(f) Venting vapors through a treatment (scrubbing) process
(2) Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for controlling leaks from various fittings on various tank cars.
(3) Describe the effect flaring or venting gas or liquid has on the pressure in the tank.
(4) Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for movement of damaged tank cars.
(5) Describe the inherent risks associated with, procedures for, and safety precautions for the following operations:
(a) Setting and releasing brakes on rail cars
(b) Shutting off locomotives using the fuel shutoff and the battery disconnect
(c) Uncoupling rail cars
(6) Describe the hazards associated with working on railroad property during emergencies.

Table 20.2.2 Tank Car Type and Materials Used in Construction of Tank

Tank Car Types	Materials of Construction of Tank
Nonpressure	Steel plate, aluminum alloy plate, high-alloy steel plate, nickel plate, and manganese-molybdenum steel plate
Pressure	Carbon steel plate, aluminum alloy plate, and high-alloy steel plate
Cryogenic liquid	Stainless steel — ASTM A240/A240M, Type 304 or 304L for the inner tank

20.4 Competencies — Implementing the Planned Response.

20.4.1 Implementing the Planned Response. Given examples of analysis of incidents involving tank cars and the planned response, Hazardous Materials Technicians with a tank car specialty shall implement or oversee the implementation of the selected tactics in a safe and effective manner and shall complete the following tasks:

(1) Given examples of leaking manway cover plates (loose bolts), control the leak.
(2) Given examples of leaking packing on the following tank car fittings, control the leak:
(a) Liquid or vapor valve packing nut
(b) Top-operated bottom outlet valve packing gland
(3) Given examples of open bottom outlet valves with a defective gasket in the cap, control the leak.
(4) Given examples of leaking top-operated bottom outlet valves, close valve completely to control the leak.
(5) Given examples of leaking fittings on pressure tank cars, repair the leak or use an applicable capping kit to control the leak.
(6) Given examples of the following types of leaks on various types of tank cars, plug or patch those leaks:
(a) Cracks, splits, or tears
(b) Puncture
(7) Given examples of the following product transfer and recovery equipment demonstrate the safe and correct application and use of the following:
(a) Portable pumps
(b) Pressure differential
(c) Vacuum
(8) Demonstrate the following types of product removal for tank cars:
(a) Flaring of liquids and vapors
(b) Transferring of liquids and vapors
(c) Venting
(d) Venting vapors and neutralizing them through a scrubbing method
(9) Given examples of the applicable resources, perform the following tasks:
(a) Set and release the hand brake on rail cars
(b) Shut off locomotives using the fuel shutoff and the battery disconnect
(c) Uncouple rail cars
(10)* Demonstrate grounding and bonding procedures for product transfer from tank cars, including the following:
(a) Selection of equipment
(b) Establishment of ground field
(c) Sequence of grounding and bonding connections
(d) Testing of ground field and grounding and bonding connections

20.5 Competencies — Evaluating Progress. (Reserved)

20.6 Competencies —— Terminating the Incident. (Reserved)

Chapter 21 Reserved

Chapter 22 Competencies for Hazardous Materials/WMD Technicians with a Cargo Tank Specialty (NFPA 472)

22.1 General.

22.1.1 Introduction.

22.1.1.1 Hazardous Materials Technicians with a cargo tank specialty shall provide technical support pertaining to cargo tanks, provide oversight for product removal and movement of damaged cargo tanks, and act as a liaison between technicians and outside resources.

22.1.1.2 Hazardous Materials Technicians with a cargo tank specialty shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies at the technician level *(see Chapter 10)*, and all competencies of this chapter.

22.1.1.3 Hazardous Materials Technicians with a cargo tank specialty shall also receive training to meet governmental response and occupational health and safety regulations.

22.1.2 Goal.

22.1.2.1 The goal of competencies in this chapter shall be to provide Hazardous Materials Technicians with a cargo tank specialty with the knowledge and skills to perform the tasks in 22.1.2.2 in a safe manner.

22.1.2.2 When responding to hazardous materials/WMD incidents, Hazardous Materials Technicians with a cargo tank specialty shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving cargo tanks to determine the complexity of the problem and potential outcomes by completing the following tasks:
   (a) Determine the type and extent of damage to cargo tanks.
   (b) Predict the likely behavior of cargo tanks and their contents during an incident.
(2) Plan a response for an incident involving cargo tanks within the capabilities and competencies of available personnel, PPE, and control equipment by determining the tactics (offensive, defensive, or nonintervention) for a hazardous materials/WMD incident involving cargo tanks.
(3) Implement or oversee the implementation of the planned response to a hazardous materials/WMD incident involving cargo tanks.

22.1.3 Mandating of Competencies. This standard shall not mandate that Hazardous Materials Response Teams performing offensive operations on cargo tanks have Hazardous Materials Technicians with a cargo tank specialty.

22.1.3.1 Hazardous Materials Technicians operating within the scope of their training as listed in Chapter 10 shall be able to intervene in cargo tank incidents.

22.1.3.2 If a Hazardous Materials Response Team elects to train some or all of its Hazardous Materials Technicians to have in-depth knowledge of cargo tanks, this chapter shall set out the required competencies.

22.2 Competencies — Analyzing the Incident.

22.2.1 Determining the Type and Extent of Damage to Cargo Tanks. Given examples of damaged cargo tanks, Hazardous Materials Technicians with a cargo tank specialty shall describe the type and extent of damage to each cargo tank and its fittings and shall complete the following tasks:

(1) Given examples of specification marks for cargo tanks and the reference materials, describe the tank's basic construction and features.
(2) Given examples of cargo tanks (jacketed and not jacketed), identify the jacketed cargo tanks.
(3) Given examples of the following types of cargo tank damage, identify the type of damage in each example:
   (a) Corrosion (internal and external)
   (b) Crack
   (c) Dent
   (d) Flame impingement
   (e) Puncture
   (f) Scrape, score, gouge, or loss of metal
(4) Given examples of damage to an MC-331 cargo tank, determine the extent of damage to the heat-affected zone.
(5) Given an example of an MC-331 cargo tank containing a compressed liquefied gas, determine the amount of liquid in the tank.
(6) Given examples of MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412 cargo tanks, identify and describe the design, construction, and operation of each of the following safety devices:
   (a) Dome cover design
   (b) Emergency remote shutoff device
   (c) Internal stop valve or external valve with accident protection, including method of activation (pneumatic, mechanical, and hydraulic)
   (d) Pressure and vacuum relief protection devices
   (e) Shear-type breakaway valves and piping
   (f) Fusible caps, plugs, links, and nuts
(7) Given examples of MC-331 and MC-338 cargo tanks, identify and describe construction and operation of each of the following safety devices:
   (a) Emergency remote shutoff device
   (b) Excess flow valve
   (c) Fusible link and nut assemblies
   (d) Internal self-closing stop valve or external valve with accident protection, including method of activation (pneumatic, cable, and hydraulic)
   (e) Pressure relief protection devices
(8) Given an example of an MC-306/DOT-406 cargo tank, identify and describe the following normal methods of loading and unloading:
   (a) Bottom loading
   (b) Top loading
   (c) Vapor recovery system
   (d) Tank monitoring (Scully)
(9) Given examples of the following types of cargo tank and tube trailers, identify and describe the normal methods of loading and unloading:
   (a) MC-307/DOT-407
   (b) MC-312/DOT-412
   (c) MC-331
   (d) MC-338
   (e) Compressed gas tube trailer

(f) Noncode trailers

(10) Describe the normal and emergency methods of activation for the following types of cargo tank valve systems:

(a) Pneumatic
(b) Mechanical
(c) Hydraulic

(11) Given examples of cargo tanks involved in an incident, identify the factors to be evaluated as part of the cargo tank damage assessment process, including the following:

(a) Amount of product released and amount remaining in the cargo tank
(b) Stress applied to the cargo tank
(c) Nature of the incident (e.g., rollover, vehicle accident, struck by object)
(d) Number of compartments
(e) Pressurized or nonpressurized
(f) Type and nature of tank damage (e.g., puncture, dome cover leak, valve failure)
(g) Type of cargo tank (MC, DOT, noncode specification)
(h) Material of construction (e.g., aluminum, steel, composites)

22.2.2 Predicting the Likely Behavior of the Cargo Tank and Its Contents. Hazardous Materials Technicians with a cargo tank specialty shall predict the likely behavior of the cargo tank and its contents and shall complete the following tasks:

(1) Given examples of the following types of cargo tanks, describe the likely breach and release mechanisms:

(a) MC-306/DOT-406 cargo tanks
(b) MC-307/DOT-407 cargo tanks
(c) MC-312/DOT-412 cargo tanks
(d) MC-331 cargo tanks
(e) MC-338 cargo tanks
(f) Compressed gas tube trailer

(2) Describe the difference in types of construction materials used in cargo tanks and their significance in assessing tank damage.

(3) Describe the significance of the cargo tank jacket in assessing tank damage.

(4) Describe the significance of each of the following types of damage on cargo tanks during damage assessment:

(a) Corrosion (internal and external)
(b) Crack
(c) Dent
(d) Flame impingement
(e) Puncture
(f) Scrape, score, gouge, or other reduction in tank shell thickness

(5) Given examples of damage to the heat-affected zone on an MC-331 cargo tank, describe its significance.

22.3 Competencies — Planning the Response.

22.3.1 Determining the Tactics. Given examples of the analysis of incidents involving cargo tanks, Hazardous Materials Technicians with a cargo tank specialty shall determine the tactics for each cargo tank involved and shall complete the following tasks:

(1) Given examples of incidents involving cargo tanks, describe the methods, procedures, risks, safety precautions, and equipment required to implement spill and leak control procedures.

(2) Given examples of overturned cargo tanks, describe the factors to be evaluated for uprighting the overturned tank, including the following:

(a) Condition and weight of the cargo tank
(b) Lifting capabilities of wreckers and cranes
(c) Preferred lifting points
(d) Selection of lifting straps and air bags
(e) Site safety precautions
(f) Type and nature of stress applied to the cargo tank
(g) Type of cargo tank and material of construction

22.4 Competencies — Implementing the Planned Response.

22.4.1 Implementing the Planned Response. Given examples of analysis of incidents involving cargo tanks and the planned response, Hazardous Materials Technicians with a cargo tank specialty shall implement or oversee the implementation of the selected response in a safe and effective manner and shall complete the following tasks:

(1) Demonstrate the methods for containing the following leaks on liquid cargo tanks (e.g., MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412):

(a) Dome cover leak
(b) Pressure relief devices (e.g., vents, rupture disc)
(c) Puncture
(d) Split or tear
(e) Valves and piping

(2) Describe the methods for containing the following leaks in MC-331 and MC-338 cargo tanks:

(a) Crack
(b) Failure of pressure relief device (e.g., relief valve, rupture disc)
(c) Valves and piping
(d) Puncture
(e) Split or tear

(3) Demonstrate grounding and bonding procedures for product transfer from cargo tanks, including the following:

(a) Selection of equipment
(b) Establishment of ground field
(c) Sequence of grounding and bonding connections
(d) Testing of ground field and grounding and bonding connections

(4) Given examples of the following product transfer and recovery equipment, demonstrate the safe application and use of each:

(a) Portable pumps (air, electrical, gasoline, and diesel)
(b) Compressors or compressed gas
(c) Vacuum trucks
(d) Vehicles with power-takeoff (PTO) driven pumps

(5) Given examples of an overturned MC-306/DOT-406 cargo tank, demonstrate the safe procedures for the following methods of product removal and transfer:

(a) Drilling
(b) The operation or removal of the internal self-closing stop valve
(c) Unloading lines
(d) Vapor recovery lines

(6) Given examples of an overturned MC-307/DOT-407 cargo tank, demonstrate the safe procedures for the following methods of product removal and transfer:

(a) Cleanout cap
(b) Product loading and unloading outlet
(c) Product lines

(7) Given examples of an overturned MC-331 cargo tank, demonstrate the safe procedures for product removal and transfer:
(a) Vapor line
(b) Liquid line

(8) Given examples of the necessary resources, demonstrate the flaring of a flammable gas cargo tank.

(9) Given examples of an overturned cargo tank, describe the safe procedures for product removal and transfer of the hot tap.

22.5 Competencies — Evaluating Progress. (Reserved)

22.6 Competencies — Terminating the Incident. (Reserved)

Chapter 23 Reserved

Chapter 24 Competencies for Hazardous Materials/WMD Technicians with an Intermodal Tank Specialty (NFPA 472)

24.1 General.

24.1.1 Introduction.

24.1.1.1 Hazardous Materials Technicians with an intermodal tank specialty shall provide technical support pertaining to intermodal tanks, including UN portable tanks and MEGC (known as tube modules), provide oversight for product removal and movement of damaged intermodal tanks, and act as a liaison between the technicians and outside resources.

24.1.1.2 Hazardous Materials Technicians with an intermodal tank specialty shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies at the technician level *(see Chapter 10)*, and all competencies of this chapter.

24.1.1.3 Hazardous Materials Technicians with an intermodal tank specialty shall also receive training to meet governmental response and occupational health and safety regulations.

24.1.2 Goal.

24.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians with an intermodal tank specialty with the knowledge and skills to perform the tasks in 24.1.2.2 in a safe manner.

24.1.2.2 When responding to hazardous materials/WMD incidents, Hazardous Materials Technicians with an intermodal tank specialty shall be able to perform the following tasks:

(1) Analyze hazardous materials/WMD incidents involving intermodal tanks to determine the complexity of the problem and potential outcomes by completing the following tasks:
(a) Determine the type and extent of damage to intermodal tanks.
(b) Predict the likely behavior of an intermodal tank and its contents in an emergency.

(2) Plan a response for incidents involving intermodal tanks within the capabilities and competencies of available personnel, PPE, and control equipment by determining the tactics (offensive, defensive, or nonintervention) for the incidents.

(3) Implement or oversee the implementation of planned responses to hazardous materials/WMD incidents involving intermodal tanks.

24.1.3 Mandating of Competencies. This standard shall not mandate that Hazardous Materials Response Teams performing offensive operations on intermodal tanks have technicians with an intermodal tank specialty.

24.1.3.1 Hazardous Materials Technicians operating within the scope of their training as listed in Chapter 10 shall be able to intervene in intermodal tank incidents.

24.1.3.2 If a Hazardous Materials Response Team elects to train some or all its Hazardous Materials Technicians to have in-depth knowledge of intermodal tanks, this chapter shall set out the minimum required competencies.

24.2 Competencies — Analyzing the Incident.

24.2.1 Determining the Type and Extent of Damage to Intermodal Tanks. Given examples of damaged intermodal tanks, Hazardous Materials Technicians with an intermodal tank specialty shall describe the type and extent of damage to each intermodal tank and its fittings and shall complete the following tasks:

(1) Given examples of intermodal tank specification markings and the reference materials, describe the tank's basic construction and features, as follows:
(a) Intermodal tanks for liquids and solids, as follows:
i. UN portable tanks T1-T23
ii. DOT IM101 and DOT IM102
iii. IMO Type 1 and IMO Type 2
(b) Intermodal tanks for nonrefrigerated liquefied compressed gases, as follows:
i. UN portable tank T50
ii. DOT Specification 51
iii. IMO Type 5
(c) Intermodal tanks for refrigerated liquefied gases, as follows:
i. UN portable tank T75
ii. DOT Specification 51
iii. IMO Type 7
(d) Multiple-element gas containers (MEGC) for nonrefrigerated compressed gases (high pressure)

(2) Given examples of various intermodal tanks, identify and describe the design and purpose of each of the following intermodal tank components, when present:
(a) Corner casting
(b) Data plate
(c) Heater coils (oil, hot water, steam) and electric heaters
(d) Insulation
(e) Jacket
(f) Refrigeration unit
(g) Supporting frame

(3) Given examples of fittings arrangements for intermodal tanks for liquids and solids that include the following fittings, identify each fitting present by name and describe the design, construction, and operation of each fitting:
(a) Top fittings, as follows:

i. Spillbox with overflow drain
ii. Manhole with a hinged and bolted cover
iii. Dipstick and calibration (strapping) chart
iv. Liquid eduction line, including removable eduction pipe and ball valve, butterfly valve, or blind flange
v. Air line connection with ball valve or butterfly valve with or without blind flange
vi. Pressure/vacuum relief valve with or without a frangible (bursting) disc and telltale

(b) Bottom discharge fittings, as follows:

i. Internal foot valve with external remote control (cable actuated with or without fusible link, hydraulic, or pneumatic operation)
ii. External butterfly valve externally operated
iii. Blank flange, threaded cap, plug, or equivalent tight liquid closure device
iv. Emergency shutoff device for some flammable liquids

(c) Temperature gauge

(4) Given examples of fittings arrangements for intermodal tanks for liquefied compressed gases and chemicals under pressure that include the following fittings, identify each fitting present by name and describe the design, construction, and operation of each fitting:

(a) Fittings — enclosed with a cover or recessed
(b) Loading and unloading fittings — three mutually independent shut-off devices in series, including the following:

i. Internal stop valve, excess flow valve, integral excess flow valve, or excess flow feature (self-closing safety device that closes automatically in event of fire
ii. External stop valve
iii. Blank flange, threaded cap, plug, or equivalent tight liquid closure device
iv. Emergency shut-off device

(c) Loading and unloading fittings for chlorine tanks, as follows:

i. Liquid eduction line (excess flow valve or spring-loaded check valve, eduction pipe, and valve)
ii. Vapor eduction line (excess flow valve or spring-loaded check valve, eduction nipple, and valve)
iii. Plug

(d) Pressure relief device, as follows:

i. Reclosing pressure relief valve
ii. Combination pressure relief valve (breaking pin or rupture disc)
iii. Tell-tale device

(e) Gauging device (rotary gauge and open and closed gauging devices)
(f) Sample line
(g) Thermometer gauge

(5) Given examples of fittings arrangements for intermodal tanks for refrigerated liquefied gases that include the following fittings, identify each fitting present by name and describe the design, construction, and operation of each fitting:

(a) Fitting compartment
(b) Loading and unloading fittings with mutually independent shut-off devices in series, as follows:

i. Pneumatically operated internal valve
ii. External valve
iii. Cap

(c) Pressure relief devices, as follows:

i. Reclosing pressure relief valve for inner tank
ii. Frangible discs in parallel with pressure relief valve vent/rupture disc device
iii. Regulator valve
iv. Mixing device to control routine release of vaporized lading during transportation
v. Pressure relief device for annular space between outer jacket and inner tank
vi. One safety vent/rupture disc device (outer jacket/tank)

(d) Two liquid-level gauges, as follows:

i. Gauge to measure liquid level within the inner tank (can be portable)
ii. Fixed-length dip tube set
iii. Vapor-phase pressure gauge to measure pressure within the inner tank

(e) Pressure building coils for unloading
(f) Pump for unloading
(g) Vacuum connection to annular space between outer jacket (tank) and inner tank

(6) Given examples of fittings arrangements for multiple-compartment gas containers (MEGCs) for nonrefrigerated compressed gases (high pressure) that include the following fittings, identify each fitting present by name and describe the design, construction, and operation of each fitting:

(a) Fitting compartment
(b) Manifold and manifold discharge CGA fittings (pipe sockets, shut-off valves)
(c) Filling and discharge openings
(d) Pressure relief devices

(7) Given examples of the following types of intermodal tank damage, identify the type of damage in each example and explain its significance:

(a) Corrosion (internal and external)
(b) Crack
(c) Dent
(d) Flame impingement
(e) Metal loss (gouge and score)
(f) Puncture

(8) Given examples of damage to the framework of intermodal tanks, describe the damage in each example and explain its significance in the analysis process.

(9) Given examples of intermodal tanks involved in incidents, identify the factors to be evaluated as part of the intermodal tank damage assessment process, including the following:

(a) Amount of product released and amount remaining in the intermodal tank
(b) Container stress applied to the intermodal tank
(c) Nature of the incident
(d) Number of compartments
(e) Pressurized or nonpressurized
(f) Type and extent of tank damage
(g) Type of intermodal tank
(h) Type of tank metal

(10)* Given examples of intermodal tanks for liquefied compressed gases containing a liquefied gas, determine the amount of liquid in the tank.
(11)* Given examples of damage to an intermodal tank for liquefied compressed gases, determine the extent of damage to the heat-affected zone.

24.2.2 Predicting the Likely Behavior of the Intermodal Tank and Its Contents. Hazardous Materials Technicians with an intermodal tank specialty shall predict the likely behavior of the intermodal tanks and their contents and complete the following tasks:

(1) Given examples of the following types of intermodal tanks, describe the likely breach/release mechanisms:
   (a) Intermodal tanks for liquids and solids, as follows:
      i. UN portable tanks T1-T23
      ii. DOT IM101 and DOT IM102
      iii. IMO Type 1 and IMO Type 2
   (b) Intermodal tanks for nonrefrigerated liquefied compressed gasses
      i. UN portable tank T50
      ii. DOT Specification 52
      iii. IMO Type 5
   (c) Intermodal tanks for refrigerated liquefied gases, as follows:
      i. UN portable tank T75
      ii. DOT Specification 51
      iii. IMO Type 7
   (d) Multiple-element gas containers (MEGC) for nonrefrigerated, nonliquefied compressed gases
(2) Describe the difference in types of construction materials used in intermodal tanks relative to assessing tank damage.

24.3 Competencies — Planning the Response.

24.3.1 Determining the Tactics. Given examples of analysis of incidents involving intermodal tanks, Hazardous Materials Technicians with an intermodal tank specialty shall determine the tactics for each intermodal tank involved and complete the following tasks:

(1) Describe the purpose of, potential risks associated with, procedures for, equipment required to implement, and safety precautions for the following product removal techniques for intermodal tanks:
   (a) Flaring liquids and vapors
   (b) Hot tapping
   (c) Transferring liquids and vapors (pressure and pump)
   (d) Venting to atmosphere
   (e) Venting vapors through a treatment (scrubbing) process
(2) Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for controlling leaks from various fittings on intermodal tanks.

24.4 Competencies — Implementing the Planned Response. Given examples of incidents involving intermodal tanks, a planned response for each incident, and an assignment, Hazardous Materials Technicians with an intermodal tank specialty shall implement or oversee the implementation of the selected tactics in a safe and effective manner and shall complete the following tasks:

(1) Given examples of leaks from the following fittings on intermodal tanks, control the leaks using approved methods and procedures:
   (a) Bottom outlet
   (b) Liquid/vapor valve
   (c) Manway cover
   (d) Pressure relief device
   (e) Tank
(2) Given the applicable equipment and resources, demonstrate the following:
   (a) Flaring of liquids and vapors
   (b) Transferring of liquids and vapors
   (c) Venting
(3)* Demonstrate grounding and bonding procedures for product transfer from intermodal tanks, including the following:
   (a) Selection of equipment
   (b) Establishment of ground field
   (c) Sequence of grounding and bonding connections
   (d) Testing of ground field and grounding and bonding connections
(4) Demonstrate the methods for containing the following leaks on liquid intermodal tanks:
   (a) Manway cover leak
   (b) Irregular-shaped hole
   (c) Pressure relief devices (e.g., vents, rupture disc)
   (d) Puncture
   (e) Split or tear
   (f) Valves and piping
(5) Describe the methods for containing the following leaks in intermodal tanks transporting liquefied compressed gas:
   (a) Crack
   (b) Failure of pressure relief device (e.g., relief valve, rupture disc)
   (c) Valves and piping
(6) Given the following product transfer and recovery equipment, demonstrate the safe and correct application and use of the following:
   (a) Portable pumps (air, electrical, gasoline, and diesel)
   (b) Vacuum trucks
   (c) Vehicles with power-takeoff driven pumps
(7)* Given examples of overturned liquid intermodal tanks and the necessary resources, demonstrate the safe procedures for transferring the product from the leaking tank to a recovery container.
(8)* Given examples of overturned intermodal tanks transporting flammable gases and the necessary resources, demonstrate the safe procedures for transferring the product from the leaking tank to a recovery container.
(9)* Given examples of intermodal tanks transporting flammable gases and the necessary resources, demonstrate flaring of the intermodal tank.

24.5 Competencies — Evaluating Progress. (Reserved)

24.6 Competencies — Terminating the Incident. (Reserved)

Chapter 25 Reserved

Chapter 26 Competencies for Hazardous Materials/WMD Technicians with a Marine Tank and Non-Tank Vessel Specialty (NFPA 472)

26.1 General.

26.1.1* Introduction.

26.1.1.1 Hazardous Materials Technicians with a marine tank and non-tank vessel specialty shall be trained to meet all competencies of the first responder awareness, operational, and technician levels, and the competencies of this chapter.

26.1.1.2* Hazardous Materials Technicians with a marine tank and non-tank vessel specialty also shall receive any additional training to meet applicable USCG, DOT, EPA, OSHA, and other governmental occupational health and safety regulatory requirements.

26.1.2 Goal.

26.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians with a marine tank and non-tank vessel specialty with the knowledge and skills to perform the tasks in 26.1.2.2 in a safe manner.

26.1.2.2 In addition to being competent at the Hazardous Materials Technician level, Hazardous Materials Technician with a marine tank and non-tank vessel specialty shall be able to perform the following tasks:

(1) Analyze a hazardous materials incident involving marine tank and non-tank vessels to determine the magnitude of the problem in terms of outcomes by completing the following tasks:
   (a) Determine the type and extent of damage to marine tank and non-tank vessels and its cargo systems.
   (b)* Predict the likely behavior of marine tank and non-tank vessels and its contents in an emergency.
   (c)* Establish initial appropriate controls.
(2) Plan a response for an emergency involving marine tank vessels within the capabilities and competencies of available personnel, PPE, and control equipment by completing the following tasks:
   (a) Determine the tactics (offensive, defensive, and nonintervention) for a hazardous materials emergency involving marine tank vessels.
   (b) Ensure that the tactics are within the capabilities and competencies of available personnel, PPE, and control equipment.
(3) Implement the planned response to a hazardous materials incident involving marine tank vessels.

26.1.3 Mandating of Competencies. This standard shall not mandate that Hazardous Materials Response Teams performing offensive operations on marine tank vessels have technicians with a marine tank and non-tank vessel specialty.

26.1.3.1 Hazardous Materials Technicians operating within the bounds of their training as listed in Chapter 11 shall be able to respond to marine vessel incidents.

26.1.3.2* If a Hazardous Materials Response Team desires to train some or all its technicians to have in-depth knowledge of marine tank and non-tank vessels, this chapter shall set out the minimum required competencies.

26.2 Competencies — Analyzing the Incident.

26.2.1 Determining the Type and Extent of Damage to Marine Vessels, Tank and Non-Tank. Given examples of damaged marine vessels, Hazardous Materials Technicians with a marine tank and non-tank vessel specialty shall describe the type and extent of damage to each marine vessel and its cargo ballast systems and shall meet the following related requirements:

(1)* Given examples of marine vessels, describe a marine vessel's basic construction and arrangement features for marine tank and non-tank vessels.
(2)* Given examples of various marine vessels, point out and explain the design and purpose of each of the various types of marine vessel cargo/ballast compartment design, structure, and components, when present.
(3)* Given examples of various fittings arrangements for marine tank and non-tank vessels, point out and explain the design, construction, and operation of each.
(4) Given examples of marine tank and non-tank vessels, identify and describe the normal methods of cargo transfer.
(5) Given examples of marine non-tank vessels, describe the following systems processes used in conjunction with cargo transfer:
   (a) Cargo transfer system,including liquid and vent piping arrangements
   (b)* Mechanical systems
   (c) Pressure systems
   (d) Vacuum systems
   (e)* Cargo securing system components
(6) Given examples of marine tank vessels, describe the following systems/processes used in conjunction with cargo transfer:
   (a) Cargo transfer system, including liquid and vent piping arrangements
   (b) Vapor recovery system
   (c) Vapor balancing
   (d) Pressuring cargo
   (e) Vacuum systems
   (f) Purging with an inert medium prior to transfer
   (g) Padding tanks
   (h) Inert gas system (tank vessel only)
   (i) Cargo monitoring systems (tank levels/alarms, tank pressures, pump controls, cargo line pressures, and cargo temperatures)
(7) Given examples of the following types of cargo compartment damage on marine vessels, identify the type of damage in each example and explain its significance:
   (a) Crack, puncture, slit, or tear
   (b) Dent
   (c) Flame impingement
   (d) Over- or underpressurization
   (e) Brittle fracture
   (f) Pinhole or corrosion
   (g)* Damage to a heat-affected zone
(8) Given examples of the types of emergency situations a marine vessel can experience that can result in damage to the vessel or its cargo transfer system, describe the following types of marine vessel emergencies and explain their significance related to the vessel's seaworthiness and cargo containment:

(a) Grounding
(b) Stranding
(c) Allision/collision
(d) Foundering
(e) Heavy weather damage
(f) Fire
(g) Explosion/BLEVE
(h) Polymerization and/or chemical reaction
(i) Cargo shifting or fluidization/liquefaction

(9) Given examples of marine vessels involved in an emergency, identify the factors to be evaluated as part of the marine vessel damage assessment process, including the following:

(a) Type of marine vessel
(b) Type and location of damage
(c) Fire control, stability, and ventilation plans/documentation
(d) Dangerous cargo manifest
(e) Stowage plan
(f) Ingress and egress and potential restrictions due to security arrangements
(g) Bilge and ballast arrangements
(h) Pressurized or nonpressurized systems
(i) Cargo pumping arrangements (tank vessels only)
(j) Number and location of cargo compartments
(k) Cargo transfer and monitoring control system/location
(l) Location/arrangement of void spaces in cargo area
(m) Type/characteristics of cargoes in the damaged cargo system
(n) Type/characteristics of other cargoes on the marine non-tank vessel (outside the damaged area)
(o) Cargo compatibility
(p) Stability and stresses applied to the marine non-tank vessel
(q) Type and nature of cargo system damage
(r) Amount of product both released and remaining in the cargo compartment

(10) Given a cargo system containing a bulk liquid, determine the amount of liquid in the cargo tank.

26.2.2 Predicting the Likely Behavior of the Marine Vessel and Its Contents. Hazardous Materials Technicians with a marine tank and non-tank vessel specialty shall understand the likely behavior of both marine tank vessels and marine non-tank vessels, as well as the vessel's contents, and meet the following related requirements:

(1) Given examples of the following types of marine vessels, provide examples of probable causes of releases:

(a) Certain bulk dangerous cargo ships (46 CFR Subchapter O, Parts 150–153)
i. Chemical tank ships
ii. Sophisticated parcel chemical tank ships
iii. Specialized chemical tank ships
iv. Chemical tank barges

(b) Liquefied gas tank ships (46 CFR Subchapter O, Parts 151 or 154)
i. Fully pressurized tank ships
ii. Semipressurized tank ships
iii. Ethylene (LPG and chemical gas) ships
iv. Fully refrigerated tank ships
v. Liquefied natural gas (LNG) ships
vi. Liquefied gas barges

(c) Tank ships (46 CFR Subchapter D, Parts 30–39)
i. Oil tank barges
ii. Oil tank ships

(d) Cargo and miscellaneous vessels (46 CFR Subchapter I, Parts 90–105)
i. Container vessels
ii. Break bulk
iii. Roll on/roll off (RoRo) vessels
iv. Dry bulk cargo ships or barges

(e) Offshore supply vessels (46 CFR Subchapter L, Parts 125–134)

(f) Passenger vessels (46 CFR Subchapter H, Parts 70–79)
i. Cruise ship
ii. Ferries

(g) Other vessels
i. Tug boats (46 CFR Subchapter C, Parts 24–27)
ii. Fishing vessels (46 CFR Subchapter C, Parts 24–28)
iii. Crew boat (46 CFR Subchapter T, Parts 175–185)
iv. Mobile offshore drilling unit (46 CFR Subchapter I-A, Parts 107–109)

(2)* Describe the significance of internal and external forces on a marine vessel's stress and stability in assessing marine vessel damage.

(3) Given examples of the resulting damages to the cargo compartments and cargo transfer systems on marine vessels, describe the significance in the risk analysis process:

(a) Cargo spills or releases
(b) Tank leakage within the vessel
(c) Overpressure/vacuum damage
(d) Shifting cargo
(e) Cargo/container securing systems

(4) Describe the significance of the following when assessing marine tank vessel damage:

(a) Lining and cladding on cargo compartments
(b) Coated and uncoated cargo compartments
(c) Insulation or thermal protection
(d) Heating or refrigeration coils in cargo compartments

26.3 Competencies — Planning the Response.

26.3.1 Determining the Tactics. Given examples of the analysis of emergencies involving marine vessels, the Hazardous Materials Technicians with a marine tank and non-tank vessel specialty shall determine the tactics for each marine vessel involved and shall meet the following related requirements:

(1) Describe the methods, procedures, risks, safety precautions, and equipment that are required to implement hazardous cargo incident control procedures for various types of incidents and marine vessels.

(2) Describe the purpose of, potential risks associated with, procedures for, equipment required to implement, and safety precautions for the following product removal techniques for hazardous materials in all forms, including bulk, non-bulk, solids, liquids, and gases:

(a) Vessel to/from shore transfer

(b) Vessel-to-vessel transfer
(c) Vessel to/from tank truck transfer
(d) Vessel to/from rail car transfer
(e) Internal transfer within the vessel
(f) Jettisoning of cargo
(g) Other types of transfers (e.g., frac/portable tanks)

(3) Describe the purpose of, procedures for, and risks associated with controlling leaks from various fittings on marine vessel cargo systems, including equipment needed and safety precautions.

(4) Describe the hazards associated with working with vessels and marine property during emergencies.

26.4 Competencies — Implementing the Planned Response.

26.4.1 Implementing the Planned Response. Given examples of analysis of emergencies involving marine vessels and the planned response, Hazardous Materials Technicians with a marine tank and non-tank vessel specialty shall implement or oversee the implementation of the selected tactics in a safe and effective manner and shall meet the following related requirements:

(1) Given a release from the following fittings on marine tank vessels, describe appropriate methods and procedures for controlling the release:

(a) Tank hatch/expansion trunk
(b) Valve or fitting
(c) Cargo compartment vent/access hatch/door
(d) Pressure/relief device (pressure and vacuum)
(e) Manifold or pipeline
(f) Transfer hoses and connections
(g) Other deck penetrations
(h) Bulk and non-bulk packaging

(2) Describe approved procedures for the following types of emergency cargo removal on board marine tank vessels:

(a) Gas/liquid transfer (pressure/pump)
(b) Flaring
(c) Venting
(d) Jettisoning of cargo

(3) Describe appropriate procedures for the following types of emergency cargo removal on board marine non-tank vessels:

(a) Cranes and other lifting equipment
(b) Unloading systems
(c) Ramps and other vehicular methods
(d) Gas/liquid transfer (pressure/pump)
(e) Venting
(f) Jettisoning of cargo

(4) Describe the importance of bonding, grounding, or isolation procedures for the transfer of flammable and combustible cargoes or other products that can give off flammable gases or vapors when heated or contaminated.

(5) Demonstrate the methods for containing the following leaks on marine vessels:

(a) Puncture
(b) Irregular-shaped hole
(c) Split or tear
(d) Dome/hatch cover leak
(e) Valves and piping failure
(f) Pressure relief devices (e.g., vents, burst/rupture disc)

(6) Given the following product transfer and recovery equipment, describe the safe and correct application and use of the following:

(a) Portable pumps (air, electrical, hydraulic, gasoline/diesel)
(b) Vehicles with power-take-off driven pumps
(c) Vehicles, such as fork lifts
(d) Pressure liquid transfer equipment
(e) Vacuum trucks
(f) Cranes
(g) Ramps
(h) Conveyors

(7)* Given examples of the necessary resources, describe the flaring of a pressure flammable gas from a liquefied gas tank vessel (ship or barge, as applicable).

(8) Given examples of scenarios involving flammable liquid spill from a marine tank vessel, describe the procedures for site safety and fire control during cleanup and removal operations.

26.5 Competencies — Evaluating Progress. (Reserved)

26.6 Competencies — Terminating the Incident. (Reserved)

Chapter 27 Reserved

Chapter 28 Competencies for Hazardous Materials/WMD Technicians with a Flammable Liquids Bulk Storage Specialty (NFPA 472)

28.1 General.

28.1.1 Introduction.

28.1.1.1 Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall provide support to the Hazardous Materials Technician and other emergency response personnel, provide strategic and tactical recommendations to the Incident Commander, provide oversight for fire control and product removal operations, and act as a liaison between technicians, response personnel, and outside resources for incidents involving flammable liquid bulk storage tanks and facilities, including related pipelines, piping, transfer pumps, additive tanks, and loading racks commonly found in a flammable liquid bulk storage tank facility.

28.1.1.2 Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall be trained to meet all requirements at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies at the technician level *(see Chapter 10)*, and all competencies of this chapter.

28.1.1.3 Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall also receive training to meet governmental response and occupational health and safety regulations.

28.1.1.4 Hazardous Materials Technicians with a flammable liquids bulk storage specialty are expected to use appropriate PPE and specialized fire, leak, and spill control equipment.

28.1.2 Goals.

28.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians with a flammable liquid bulk storage specialty with the knowledge and skills to perform the tasks in 28.1.2.2 in a safe manner.

28.1.2.2 In addition to being competent at the Hazardous Materials Technician level, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall be able to perform the following tasks:

(1) Analyze an incident involving a bulk flammable liquid storage tank to determine the magnitude of the problem by completing the following tasks:
   (a) Determine the type and extent of damage to the bulk liquid storage tank.
   (b) Predict the likely behavior of the bulk liquid storage tank and its contents in an incident.
(2) Plan a response for an incident involving a flammable liquid bulk storage tank within the capabilities and competencies of available personnel, PPE, and control equipment by completing the following tasks:
   (a) Determine the tactics (offensive, defensive, and nonintervention) for a hazardous materials/WMD incident involving flammable liquid bulk storage tanks.
   (b) Ensure that the options are within the capabilities and competencies of available personnel, PPE, and control equipment.
(3) Implement the planned response to a hazardous materials/WMD incident involving a flammable liquid bulk storage tank.

28.1.3 Mandating of Competencies. This standard shall not mandate that Hazardous Materials Response Teams performing offensive operations on flammable liquids bulk storage tanks and related facilities have Hazardous Materials Technicians with a flammable liquids bulk storage specialty.

28.1.3.1 Hazardous Materials Technicians operating within the bounds of their training as listed in Chapter 10 shall be able to respond to incidents involving flammable liquids bulk storage tanks and related facilities.

28.1.3.2 If a Hazardous Materials Response Team desires to train some or all of its Hazardous Materials Technicians to have in-depth knowledge of flammable liquid products, bulk storage tanks, and related facilities, this chapter shall set out the minimum required competencies.

28.2 Competencies — Analyzing the Incident.

28.2.1 Determining the Type and Extent of Damage to the Bulk Storage Tank. Given examples of incidents involving bulk flammable liquid storage tanks, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe the type of storage tank and the type and extent of damage to the tank and its associated valves, piping, fittings, and related equipment by completing the tasks in 28.2.1.1 through 28.2.1.6.

28.2.1.1 Given examples of various hydrocarbon and polar solvent fuels, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe their physical and chemical properties and their impact upon the selection, application, and use of Class B extinguishing agents for spill and fire scenarios.

28.2.1.2 Given examples of various flammable liquid bulk storage operations, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall be able to identify and describe the procedures for the normal movement and transfer of product(s) into and out of the facility and storage tanks. Examples shall be based on local or regional facilities and could include marketing terminals, pipeline operations and terminals, refineries, and bulk storage facilities.

28.2.1.3* Given examples of the following atmospheric pressure bulk liquid storage tanks, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe each tank's basic design and construction features and types of products commonly found:

(1) Cone roof tank
(2) Open (external) floating roof tank
(3) Open floating roof tank with a geodesic dome external roof
(4) Covered (internal) floating roof tank

28.2.1.4* Given examples of the following types of low-pressure horizontal and vertical bulk liquid storage tanks, Hazardous Materials Technicians shall be able to describe the tank's basic uses and design and construction features:

(1) Horizontal tank
(2) Dome roof tank

28.2.1.5 Given examples of various atmospheric and low pressure bulk liquid storage tanks and related facilities (e.g., loading racks), Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe the design and purpose of each of the following storage tank components, where present:

(1) Tank shell material of construction
(2) Type of roof and material of construction
(3) Primary and secondary roof seals (as applicable)
(4) Incident venting and pressure relief devices
(5) Tank valves
(6) Tank gauging devices
(7) Tank overfill device
(8) Secondary containment methods (as applicable)
(9) Transfer pumps (horizontal or vertical)
(10) Tank piping and piping supports
(11) Vapor recovery units (VRU) and vapor combustion units (VCU) units
(12) Truck loading rack additive tanks
(13) Loading rack product control and spill control systems
(14) Fixed or semifixed fire protection system

28.2.1.6 Given examples of primary and secondary spill confinement measures, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe the design, construction, and incident response considerations associated with each method provided.

28.2.2 Predicting the Likely Behavior of the Bulk Storage Tank and Contents. Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall predict the likely behavior of the tank and its contents by completing the tasks in 28.2.2.1 through 28.2.2.4.

28.2.2.1 Given examples of different types of flammable liquid bulk storage tank facilities, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall identify the impact of the following fire and safety features on the behavior of the products during an incident:

(1) Tank spacing
(2) Product spillage and control (impoundment and diking)
(3) Tank venting and flaring systems
(4) Transfer and product movement capabilities
(5) Monitoring and detection systems
(6) Fire protection systems

28.2.2.2 Given examples of flammable liquid bulk storage tanks involved in a fire, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall identify the factors to be evaluated as part of the analysis process, including the following:

(1) Type of storage tank
(2) Product involved
(3) Amount of product within the storage tank
(4) Nature of the incident (e.g., seal fire, tank overfill, full-surface fire)
(5) Tank spacing and exposures
(6) Fixed or semifixed fire protection systems present

28.2.2.3* Given examples of scenarios involving flammable liquid bulk storage tanks, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe the likely fire and spill behavior for each incident.

28.2.2.4* Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe the causes, hazards, and methods of handling the following conditions as they relate to fires involving flammable liquid bulk storage tanks and the related products:

(1) Frothover
(2) Slopover
(3) Boilover

28.3 Competencies — Planning the Response. Given examples of an analysis of incidents involving flammable liquid bulk storage tanks, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall determine tactics for the storage tank involved by completing the tasks in 28.3.1 through 28.3.11.

28.3.1 Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe the factors to be considered in evaluating and selecting Class B fire-fighting foam concentrates for use on flammable liquids.

28.3.2 Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe the factors to be considered for the portable application of Class B fire-fighting foam concentrates and related extinguishing agents for the following types of incidents:

(1) Flammable liquid spill (no fire)
(2) Flammable liquid spill (with fire)
(3) Flammable liquid storage tank fire

28.3.3 Given examples of types of flammable liquid bulk storage tanks, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall identify and describe the application, use, and limitations of the types of fixed and semifixed fire protection systems that can be used, including the following:

(1) Foam chambers
(2) Catenary systems
(3) Subsurface injection systems
(4) Fixed foam monitors
(5) Foam and water sprinkler systems

28.3.4 Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe the hazards, safety procedures, and tactical guidelines for handling an accumulated (in-depth) flammable liquid-spill fire.

28.3.5 Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe the hazards, safety procedures, and tactical guidelines for handling the product and water drainage and runoff problems that can be created at a flammable liquid bulk storage tank fire.

28.3.6 Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe the hazards, safety procedures, and tactical guidelines for handling a flammable liquid bulk storage tank with a sunken floating roof.

28.3.7 Given examples of flammable liquid bulk storage tank fires, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall describe the methods and associated safety considerations for extinguishing the following types of fires by using portable application devices:

(1) Pressure vent fire
(2) Seal fire on an open floating roof tank
(3) Seal fire on an internal floating roof tank
(4) Full-surface fire on an internal floating roof tank
(5) Full-surface fire on an external floating roof tank
(6) Dike fire
(7) Pipeline manifold fire
(8) Pump seal fire

28.3.8* Given examples of the size, dimensions, and products involved for flammable liquid spill fires, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall determine the following:

(1) Applicable extinguishing agent(s)
(2) Approved application method (both portable and fixed system applications)
(3) Approved application rate and duration based on NFPA 11 or other guidance used by the AHJ
(4) Required amount of Class B foam concentrate and required amount of water
(5) Volume and rate of application of water for cooling exposed tanks

28.3.9* Given examples of the size, dimensions, and product involved for flammable liquid bulk storage tank fires, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall determine the following:

(1) Applicable extinguishing agent(s)
(2) Approved application method (both portable and fixed system applications)
(3) Approved application rate and duration based on NFPA 11 or other guidance used by the AHJ
(4) Required amount of Class B foam concentrate and required amount of water
(5) Volume and rate of application of water for cooling involved and exposed tanks
(6) Recommendations for controlling product and water drainage and runoff

28.3.10* Given examples of the size, dimensions, and product involved for fires involving a single flammable liquid bulk storage tank and its dike area, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall determine the following:

(1) Applicable extinguishing agent(s)
(2) Approved application method (both portable and fixed system applications)
(3) Approved application rate and duration based on NFPA 11 or other guidance used by the AHJ
(4) Required amount of Class B foam concentrate and required amount of water
(5) Volume and rate of application of water for cooling involved and exposed tanks
(6) Recommendations for controlling product and water drainage and runoff

28.3.11* Given examples of the size, dimensions, and products involved for multiple flammable liquid bulk storage tanks burning within a common dike areas, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall determine the following:

(1) Applicable extinguishing agent(s)
(2) Approved application method (both portable and fixed system applications)
(3) Approved application rate and duration based on NFPA 11 or other guidance used by the AHJ
(4) Amount of Class B foam concentrate and water required
(5) Volume and rate of application of water for cooling involved and exposed tanks
(6) Recommendations for controlling product and water drainage and runoff

28.4 Competencies — Implementing the Planned Response. Given examples of an analysis of incidents involving flammable liquid bulk storage tanks, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall implement or oversee the implementation of the selected tactics completing the tasks in 28.4.1 and 28.4.2 in a safe and effective manner.

28.4.1 Given examples of scenarios involving a flammable liquid fire, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall demonstrate the safe and effective methods for extinguishing the following types of fires by using portable application devices:

(1) Valve and flange fires
(2) Pump fire (horizontal or vertical)
(3) Pressure vent fire
(4) Large spill fire
(5) Loading rack fire
(6) Storage tank fire

28.4.2 Given examples of scenarios involving a three-dimensional flammable liquid fire, Hazardous Materials Technicians with a flammable liquids bulk storage specialty shall demonstrate the safe and effective method for controlling and extinguishing the fire.

28.5 Competencies — Evaluating Progress. (Reserved)

28.6 Competencies — Terminating the Incident. (Reserved)

Chapter 29 Reserved

Chapter 30 Competencies for Hazardous Materials/WMD Technicians with a Flammable Gases Bulk Storage Specialty (NFPA 472)

30.1 General.

30.1.1 Introduction.

30.1.1.1 Hazardous Materials Technicians with a flammable gases bulk storage specialty shall provide support to the Hazardous Materials Technician and other personnel, provide strategic and tactical recommendations to the on-scene Incident Commander, provide oversight for fire control and product removal operations, and act as a liaison between technicians, response personnel, and outside resources at incidents involving flammable gases bulk storage tanks, including the related pipelines, piping, transfer pumps, and loading racks commonly found in a flammable gases bulk storage tank facilities.

30.1.1.2 Hazardous Materials Technicians with a flammable gases bulk storage specialty shall be trained to meet all requirements at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies at the technician level *(see Chapter 10)*, and all competencies of this chapter.

30.1.1.3 Hazardous Materials Technicians with a flammable gases bulk storage specialty shall also receive training to meet governmental response and occupational health and safety regulations.

30.1.1.4 Hazardous Materials Technicians with a flammable gases bulk storage specialty are expected to use appropriate PPE and specialized fire, leak, and spill control equipment.

30.1.2 Goal.

30.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians with a flammable gases bulk storage specialty with the knowledge and skills to perform the tasks in 30.1.2.2 in a safe manner.

30.1.2.2 In addition to being competent at the Hazardous Materials Technician level, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall be able to perform the following tasks:

(1) Analyze incidents involving flammable gas bulk storage tanks to determine the magnitude of the problem by completing the following tasks:
    (a) Determine the type and extent of damage to the bulk storage tank.
    (b) Predict the likely behavior of the bulk storage tank and its contents in an incident.
(2) Plan a responses for incidents involving flammable gas bulk storage tanks within the capabilities and competencies of available personnel, PPE, and control equipment by completing the following tasks:
    (a) Determine the tactics (offensive, defensive, and nonintervention) for a hazardous materials/WMD incident involving flammable gas bulk storage tanks.
    (b) Ensure that the tactics are within the capabilities and competencies of available personnel, PPE, and control equipment.

(3) Implement the planned response to hazardous materials/WMD incidents involving a flammable gas bulk storage tank.

30.1.3 Mandating of Competencies. This standard shall not mandate that Hazardous Materials Response Teams performing offensive operations on flammable gases bulk storage tanks and related facilities have Hazardous Materials Technicians with a flammable gases bulk storage specialty.

30.1.3.1 Hazardous Materials Technicians operating within the bounds of their training as listed in Chapter 12 shall be able to respond to incidents involving flammable gases bulk storage tanks and related facilities.

30.1.3.2 If a Hazardous Materials Response Team desires to train some or all its Hazardous Materials Technicians to have in-depth knowledge of flammable gas products and bulk storage tanks and related facilities, this chapter shall set out the minimum required competencies.

30.2 Competencies — Analyzing the Incident.

30.2.1 Determining the Type and Extent of Damage to the Bulk Storage Tank. Given examples of storage tank incidents, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall describe the type of storage tank and extent of damage to the tank and its associated piping and fittings by completing the tasks in 30.2.1.1 through 30.2.1.3.

30.2.1.1* Given examples of various flammable gas bulk storage operations, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall identify and describe the procedures for the normal movement and transfer of product(s) into and out of the facility and storage tanks.

30.2.1.2* Given examples of the following types of high pressure bulk gas storage tanks, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall describe the tank's uses and design and construction features:

(1) Horizontal (bullet) tank
(2) Spherical tank

30.2.1.3 Given examples of various high pressure bulk gas storage tanks, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall point out and explain the design and purpose of each of the following storage tank components and fittings:

(1) Liquid valve and vapor valve
(2) Excess flow valves
(3) Pressure relief valve
(4) Gauging device
(5) Tank piping and piping supports
(6) Transfer pumps
(7) Monitoring and detections systems
(8) Fixed or semifixed fire protection system

30.2.2 Predicting the Likely Behavior of the Bulk Storage Tank and Contents. Hazardous Materials Technicians with a flammable gases bulk storage specialty shall predict the likely behavior of the tank and its contents by completing the tasks in 30.2.2.1 through 30.2.2.3.

30.2.2.1 Given examples of different types of bulk flammable gas storage tank facilities, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall identify the impact of the following fire and safety features on the behavior of the products during an incident:

(1) Tank spacing
(2) Product spillage and control (impoundment and diking)
(3) Tank venting and flaring systems
(4) Transfer and product movement capabilities
(5) Monitoring and detection systems
(6) Fire protection systems

30.2.2.2 Given examples of different types of flammable gas bulk storage tanks, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall identify and describe the application, use, and limitations of the types of fixed and semifixed fire protection systems that can be used, including the following:

(1) Water spray systems
(2) Fixed water monitors
(3) Fixed hydrocarbon monitoring systems

30.2.2.3 Given examples of flammable gas bulk storage tanks and their associated piping, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall describe the likely breach or release mechanisms and fire scenarios.

30.3 Competencies — Planning the Response. Given examples of an analysis of an emergency involving flammable gas storage tanks, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall determine tactics for the storage tank involved. The technician with a flammable gases bulk storage specialty shall be able to perform the tasks in 30.3.1 through 30.3.5.

30.3.1 Hazardous Materials Technicians with a flammable gases bulk storage specialty shall describe the hazards, safety, and tactical considerations required for the following types of flammable gas incidents:

(1) Flammable vapor release (no fire)
(2) Flammable vapor release (with fire)
(3) Liquefied flammable gas release (no fire)
(4) Liquefied flammable gas release (with fire)

30.3.2 Given examples of flammable gas storage tanks with a liquid leak from the pressure relief valve, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall describe the hazards, safety, and tactical considerations for controlling this type of leak.

30.3.3 Hazardous Materials Technicians with a flammable gases bulk storage specialty shall describe the purpose of, potential risks associated with, procedures for, equipment required to implement, and safety precautions for the following product removal techniques:

(1) Transfer of liquids and vapors
(2) Flaring of liquids and vapors
(3) Venting
(4) Hot and cold tapping

30.3.4 Hazardous Materials Technicians with a flammable gases bulk storage specialty shall describe the concept of autorefrigeration and the effect that flaring or venting of gas or liquid has on tank pressure (flammable gas or flammable liquid product).

30.3.5 Hazardous Materials Technicians with a flammable gases bulk storage specialty shall describe the hazards, safety procedures, and tactical guidelines for handling product and water drainage and runoff problems that can be created at a flammable gas bulk storage facility incident.

30.4 Competencies — Implementing the Planned Response. Given examples of analysis of emergencies involving flammable gas bulk storage tanks, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall implement or oversee the implementation of the selected tactics in a safe and effective manner by completing the tasks in 30.4.1 through 30.4.4.

30.4.1 Given examples of flammable gas incidents, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall demonstrate the safe and effective methods for controlling the following types of emergencies by using portable application devices:

(1) Unignited vapor release
(2) Valve and/or flange vapor release (no fire)
(3) Valve and/or flange fire
(4) Pump fire (horizontal or vertical)

30.4.2 Given examples of the simultaneous release of both flammable liquids and flammable gases, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall demonstrate the safe and effective method for controlling the following types of emergencies by using portable application devices:

(1) Unignited vapor release
(2) Flange fire
(3) Pump seal fire

30.4.3 Hazardous Materials Technicians with a flammable gases bulk storage specialty shall demonstrate grounding and bonding procedures for the transfer of flammable gases, including the following:

(1) Selection of proper equipment
(2) Sequence of grounding and bonding connections
(3) Proper testing of grounding and bonding connections

30.4.4 Given examples of flammable gas incidents from bulk storage tanks or pipelines, Hazardous Materials Technicians with a flammable gases bulk storage specialty shall describe the procedures for site safety and fire control during cleanup and removal operations.

30.5 Competencies — Evaluating Progress. (Reserved)

30.6 Competencies — Terminating the Incident. (Reserved)

Chapter 31 Reserved

Chapter 32 Competencies for Hazardous Materials/WMD Technicians with a Radiological Hazard Specialty (NFPA 472)

32.1 General.

32.1.1 Introduction.

32.1.1.1 Hazardous Materials Technicians with a radiological hazard specialty shall provide support to the Hazardous Materials Technician on the use of radiation detection instruments, manage the spread of contamination and control of radiation exposure, conduct hazards assessment, and act as a liaison between Hazardous Materials Technicians and the Incident Commander or their designee at incidents involving radiological hazards.

32.1.1.2 Hazardous Materials Technicians with a radiological hazard specialty shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies at the technician level *(see Chapter 10)*, and the competencies of this chapter.

32.1.1.3 Hazardous Materials Technicians with a radiological hazard specialty shall also receive training to meet governmental response and occupational health and safety regulations.

32.1.1.4 Hazardous Materials Technicians with a radiological hazard specialty shall be expected to use specialized protective clothing and survey instrumentation.

32.1.2 Goal.

32.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians with a radiological hazard specialty with the knowledge and skills to perform the tasks in 32.1.2.2 in a safe manner.

32.1.2.2 In addition to being competent at the Hazardous Materials Technician level, Hazardous Materials Technicians with a radiological hazard specialty shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving a radiological hazard to determine the complexity of the problem and potential outcomes.
(2) Plan a response for an emergency involving a radiological hazard within the capabilities and competencies of available personnel, PPE, and control equipment based on an analysis of the a radiological hazard incident.
(3) Implement the planned response to a hazardous materials/WMD incident involving a radiological hazard.

32.1.3 Mandating of Competencies. This standard shall not mandate that Hazardous Materials Response Teams performing offensive operations on radiological hazard incidents have Hazardous Materials Technicians with a radiological hazard specialty.

32.1.3.1 Hazardous Materials Technicians operating within the bounds of their training as listed in Chapter 12 shall be able to respond to incidents involving radiological hazards.

32.1.3.2 If a Hazardous Materials Response Team elects to train some or all its Hazardous Materials Technicians to have in-depth knowledge of radiological hazards, this chapter shall set out the minimum required competencies.

32.2 Competencies — Analyzing the Incident.

32.2.1 Understanding Nuclear Science and Radioactivity. Hazardous Materials Technicians with a radiological hazard specialty shall have an understanding of nuclear science and radioactivity, including the units and terms used to describe radiation and radioactive material. by completing the following tasks:

(1) Define the following terms:
    (a) Absorbed dose
    (b) Becquerel (Bq)
    (c) Bremsstrahlung
    (d) Criticality
    (e) Curie (Ci)
    (f) Dose equivalent
    (g) Excitation
    (h) Exposure

(i) Fission
(j) Fusion
(k) Gray (Gy)
(l) Half-life
(m) Ionization
(n) Isotope
(o) Nucleon
(p) Nuclide
(q) Quality factor
(r) Roentgen
(s) Rad
(t) Rem
(u) Sievert (Sv)
(v) Specific activity

(2) Identify the basic principles of the mass-energy equivalence concept.
(3) Identify how the neutron-to-proton ratio is related to nuclear stability.
(4) Define the following terms related to nuclear stability:
(a) Radioactivity
(b) Radioactive decay
(5) Explain the characteristics of alpha, beta, gamma/X-ray, and neutron radiations and the methods by which they interact with matter.
(6) Define the term *radiation dispersal device (RDD)*.
(7) Define the term *radiation exposure device (RED)*.
(8) Define the term *improvised nuclear device (IND)*.
(9) Using reference documents or computer applications, identify the following for a given nuclide:
(a) Atomic number
(b) Atomic mass
(c) Stability
(d) Half-life
(e) Types and energies of radioactive emissions
(f) The decay chain and stable end-product of a radioactive nuclide
(10) Name examples of materials best suited as shielding from the following types of radiation:
(a) Alpha
(b) Beta
(c) Gamma/X-ray
(d) Neutron
(11) Explain the concept of linear energy transfer (LET).

32.2.2 Understanding the Biological Effects of Ionizing Radiation. Hazardous Materials Technicians with a radiological hazard specialty shall have an understanding of how ionizing radiation affects the human body by completing the following tasks:

(1) Define the law of Bergonie and Tribondeau.
(2) Describe factors that affect the radiosensitivity of cells.
(3) Given a list of types of cells, identify which are the most and which are the least radiosensitive.
(4) Define the following terms and give examples of each:
(a) Stochastic effect
(b) Nonstochastic effect
(5) Describe the $LD_{50/30}$ value for humans.
(6) Identify the possible somatic and genetic effects of an acute and chronic exposure to radiation.
(7) Explain the three classic syndromes and four stages of the acute radiation syndrome, and identify the exposure levels and symptoms associated with each.
(8) Describe the risks of radiation exposure to a developing embryo and fetus.
(9) Distinguish between the terms *somatic* and *heritable* as they apply to biological effects.

32.2.3 Radiation Detector Theory. Hazardous Materials Technicians with a radiological hazard specialty shall have an understanding of radiation detector theory in order to select the correct type of radiological survey instrument at a hazardous materials/WMD incident involving a radiological hazard by completing the following tasks:

(1) Given a graph of the gas amplification curve, identify the regions of the curve.
(2) Identify the characteristics of a detector operated in each of the useful regions of the gas amplification curve.
(3) Describe the methods employed with gas-filled detectors to discriminate among various types of radiation and various radiation energies.
(4) Explain how a scintillation detector and associated components operate to detect and measure radiation.
(5) Explain how neutron detectors detect neutrons and provide electrical signals.
(6) Explain the fundamental mechanism by which isotope identification detectors operate and the advantages and disadvantages of the types of systems available.

32.2.4 Radiological Hazard Transportation. Hazardous Materials Technicians with a radiological hazard specialty shall have an understanding of how a radiological hazard is transported and how to identify this material at a hazardous materials/WMD incident by completing the following tasks:

(1) List the applicable agencies that have regulations governing the transport of radiological hazard.
(2) Identify the types of packages used in the transport of radiological hazard and list examples of material shipped in each type of shipping package.
(3) Identify terminology and acronyms associated with shipments of radiological hazard.
(4) Describe methods that can be used to determine the radionuclide contents of a package.
(5) Identify the information contained on shipping papers used for transporting radiological hazard.
(6) Describe the radiation and contamination surveys that are performed on radiological hazard packages, and state the applicable limits.
(7) Describe the radiation and contamination surveys that are performed on exclusive-use vehicles, and state the applicable limits.
(8) Identify the approved placement of placards on a transport vehicle.

32.3 Competencies — Planning the Response.

32.3.1 External Exposure Control. Given examples of the analysis of an incidents involving radiological hazards, technicians with a radiological hazard specialty shall be able to determine the tactics needed to minimize external exposure to radiological hazards by completing the following tasks:

(1) Calculate the gamma exposure rate for specific radionuclides using equations or by using a computer application.
(2) Using the stay time equation, calculate an individual's remaining allowable dose equivalent or stay time.
(3) Identify distance to radiation sources techniques for minimizing personnel external exposures.

(4) Using the point source equation (inverse square law), calculate the exposure rate or distance for a point source of radiation.
(5) Define the *unit of density thickness*.
(6) Calculate shielding thickness or exposure rates for gamma/X-ray radiation using equations or by using a computer application.

32.3.2 Internal Exposure Control. Given examples of the analysis of incidents involving radiological hazard, technicians with a radiological hazard specialty shall determine the tactics needed to minimize internal exposure to radioactive material by completing the following tasks:

(1) Define the terms *annual limit on intake (ALI)* and *derived air concentration (DAC)*.
(2) Define the term *reference man*.
(3) Describe three factors that govern the behavior of radioactive materials in the body.
(4) Explain the two natural mechanisms that reduce the quantity of a radionuclide in the body.
(5) Explain the relationship of physical, biological, and effective half-lives.
(6) Given the physical and biological half-lives, calculate the effective half-life.
(7) Describe methods used to increase the elimination rate of radioactive materials from the body.

32.3.3 Radiation Survey Instrumentation. Given examples of the analysis of incidents involving radiological hazards, technicians with a radiological hazard specialty shall be able to determine the correct instrument to use for radiation and contamination monitoring by completing the following tasks:

(1) Describe the following features of and specifications for commonly used instruments:
    (a) Types of detectors or probes available for use
    (b) Operator-adjustable controls
    (c) Specific limitations and characteristics
(2) Describe the factors that affect the selection of a portable radiation survey instrument, and identify appropriate instruments for external radiation surveys.
(3) Identify the following features of and specifications for exposure rate instruments:
    (a) Types of detectors available for use
    (b) Detector shielding and window
    (c) Types of radiation detected and measured
    (d) Gamma/X-ray energy response characteristics
    (e) Markings for detector effective center
    (f) Specific limitations and characteristics
(4) List the factors that affect the selection of a portable contamination monitoring instrument.
(5) Describe the following features of and specifications for commonly used count rate meter probes:
    (a) Types of detectors available for use
    (b) Detector shielding and window
    (c) Types of radiation detected and measured
    (d) Gamma energy response characteristics
    (e) Specific limitations and characteristics

32.4 Competencies — Implementing the Planned Response.

32.4.1 Radiological Incidents. Given examples of analysis of incidents involving radiological hazards and planned responses, Hazardous Materials Technicians with a radiological hazard specialty shall implement or oversee the response to a given radiological emergency by completing the following tasks:

(1) Describe the general response and responsibilities of a Hazardous Materials Technician with a radiological hazard specialty during any radiological incident.
(2) Describe the response to personnel contamination.
(3) Describe the response to off-scale or lost dosimetry.
(4) Describe the response to rapidly increasing or unanticipated radiation levels.
(5) Describe the response to a radioactive material spill.
(6) Describe the response to a fire in a radiological area or involving radioactive materials.
(7) Identify the available federal responder resources, and explain the assistance that each group can provide.

32.4.2 Contamination Control. Given examples of analysis of incidents involving radiological hazards and planned responses, Hazardous Materials Technicians with a radiological hazard specialty shall be able to implement or oversee contamination control techniques to minimize the spread of radiological contamination by completing the following tasks:

(1) Define the terms *removable surface contamination* and *fixed surface contamination*, state the difference between them, and explain the common methods used to measure each.
(2) State the basic principles of contamination control, and list examples of implementation methods.
(3) State the purpose of using protective clothing in radiologically contaminated areas.
(4) Describe the basic factors that determine protective clothing requirements for personnel protection.

32.4.3 Decontamination. Given examples of analysis of incidents involving radiological hazards and planned responses, Hazardous Materials Technicians with a radiological hazard specialty shall be able to implement or oversee decontamination techniques for personnel and resources by completing the following tasks:

(1) Describe how personnel, PPE, apparatus, and tools become contaminated with radioactive material.
(2) State the purpose of radioactive material decontamination.
(3) Describe field decontamination techniques for equipment.
(4) Describe three factors that determine the actions taken in decontamination of personnel.
(5) Describe methods and techniques for performing personnel decontamination.

32.5 Competencies — Evaluating Progress.

32.5.1 Evaluating the Effectiveness of the Actions Taken. Given examples of radiological hazardous materials/WMD incidents, the conditions present, and tactics taken, Hazardous Materials Technicians with a radiological hazard specialty shall compare the actual behavior of the radiological hazard to the predicted behavior and determine the effectiveness of the tactics in accomplishing strategies.

32.5.1.1 Hazardous Materials Technicians with a radiological hazard specialty shall recommend modifications to the tactics as necessary, and communicate the results by completing the following tasks:

(1) Identify and consult with the responsible radiological AHJ over the radiological hazard involved.

(2) Compare initial and follow-up radiological assessment surveys.
(3) Confirm the presence or absence of radiological contamination.
(4) Determine response personnel radiation exposure levels.
(5) Confirm status of container integrity.
(6) Advise the Hazardous Materials Safety Officer of any need to alter, suspend, or terminate a response activity based on the evaluation of the radiological hazard assessments.

32.6 Competencies — Terminating the Incident. Given examples of radiological hazardous materials/WMD incidents in which the IAP objectives have been achieved, Hazardous Materials Technicians with a radiological hazard specialty shall describe the steps necessary to terminate the emergency phase of the incident consistent with the emergency response plan and/or standard operating procedures and shall complete the following tasks:

(1) Assist in the debriefing process by communicating operational observations and evaluation of the tactics taken to meet IAP objectives.
(2) Complete required personnel radiological exposure reports and radiological survey records in accordance with regulations.
(3) Confirm transfer of radioactive material or radiologically contaminated material to the appropriate agency or authority legally qualified to possess, transport, or dispose of such material.

Chapter 33 Professional Qualifications for Hazardous Materials/WMD Technicians with a Radiological Hazard Specialty (NFPA 1072)

33.1 General.

33.1.1 Hazardous Materials Technicians with a radiological hazard specialty shall provide technical support by conducting a hazard assessment, selecting and using radiation detection instruments, managing the spread of contamination, controlling radiation exposure, and acting as a liaison between the technicians, response personnel, and outside resources at hazardous materials/weapons of mass destruction (WMD) incidents involving radioactive material.

33.1.2 Hazardous Materials Technicians with a radiological hazard specialty shall meet the job performance requirements (JPRs) defined in Sections 5.2 through 5.4.

33.1.3 Hazardous Materials Technicians with a radiological hazard specialty shall meet the JPRs defined in Sections 7.2 through 7.6.

33.1.4 Hazardous Materials Technicians with a radiological hazard specialty shall meet the JPRs defined in Sections 11.2 through 11.6.

33.1.5 Hazardous Materials Technicians with a radiological hazard specialty shall meet the job performance requirements defined in Sections 33.2 through 33.4.

33.1.6 Hazardous Materials Technicians with a radiological hazard specialty shall have additional competencies that are specific to the response mission and expected tasks as determined by the AHJ.

33.1.7 General Knowledge Requirements. (Reserved)

33.1.8 General Skills Requirements. Written and verbal communication skills.

33.2 Analyze the Incident.

33.2.1 Nuclear Science and Radioactivity. Identify, interpret, and communicate units and terms associated with radiation and radioactive materials, given a hazardous materials/WMD incident with a radiological hazard, an assignment, policies and procedures, materials involved, and reference sources, so that the hazards and risks associated with ionizing radiation or radiological hazards are identified, interpreted, and communicated to the Hazardous Materials Technician or Incident Commander or their designee.

(A) Requisite Knowledge. Units and terms used to describe radiation and radiological hazards, including absorbed dose, atomic mass, atomic number, becquerel, bremsstrahlung, criticality, curie, decay chain, dose equivalent, excitation, exposure, fission, fusion, half-life, improvised nuclear device (IND), ionization, isotope, nucleon, nuclide, quality factor, rad/gray, radiation dispersal device (RDD), radiation exposure device (RED), radioactive decay, radioactivity, rem/sievert, stability, and stable end-product; mass-energy equivalence concept; neutron-to-proton ratio and how it is related to nuclear stability; characteristics of alpha, beta, gamma, and neutron radiations and the methods by which they interact with matter; types and energies of radioactive emissions; and the concept of linear energy transfer (LET).

(B) Requisite Skills. Explaining the principle of the mass-energy equivalence concept; explaining how the neutron-to-proton ratio is related to nuclear stability; explaining the characteristics of alpha, beta, gamma, and neutron radiations and the methods by which they interact with matter; explaining the concept of linear energy transfer (LET); identifying the atomic number, atomic mass, stability, half-life, types, and energies of radioactive emissions, decay chain, and stable end-product for a nuclide; and naming examples of materials best suited as shielding from alpha, beta, gamma, and neutron.

33.2.2 Biological Effects of Ionizing Radiation. Identify, interpret, and communicate terms used to describe the biological effects of ionizing radiation, given a hazardous materials/WMD incident with a radiological hazard, an assignment, policies and procedures, materials involved, and reference sources, so that the effects of ionizing radiation on the body are identified, interpreted, and communicated to the Hazardous Materials Technician or Incident Commander or their designee.

(A) Requisite Knowledge. How ionizing radiation affects the human body; the law of Bergonie and Tribondeau; factors that affect the radio-sensitivity of cells; the definitions of stochastic and nonstochastic effects and examples of each; the LD50/30 value for humans; somatic and genetic effects of an acute and chronic exposure to radiation; the three classic syndromes and four stages of acute radiation syndrome and the exposure levels and symptoms associated with each; the risks of radiation exposure to a developing embryo and fetus; and the terms somatic and heritable as they apply to biological effects.

(B) Requisite Skills. Explaining the law of Bergonie and Tribondeau; identifying factors that affect the radio-sensitivity of cells; identifying which types of cells are the most and which are the least radiosensitive; explaining the terms stochastic and nonstochastic effects and identifying examples of each; identi-

fying the LD50/30 value for humans; identifying somatic and genetic effects of an acute and chronic exposure to radiation; explaining the three classic syndromes and four stages of the acute radiation syndrome and identifying the exposure levels and symptoms associated with each; describing the risks of radiation exposure to a developing embryo and fetus; and identifying specific biological effects as either somatic or heritable.

33.2.3 Radiation Detector Theory. Explain radiation detector theory as it relates to selecting radiological survey instruments used to describe the biological effects of ionizing radiation, given a hazardous materials/WMD incident with a radiological hazard, an assignment, policies and procedures, materials involved, and reference sources, so that radiation detector theory is used in selecting radiological survey instruments.

(A) Requisite Knowledge. The gas amplification curve and regions of the curve suitable for radiation detection; characteristics of a detector operated in each of the useful regions of the gas amplification curve; methods employed with gas-filled detectors to discriminate among various types of radiation and various radiation energies; scintillation detector and associated components operation and the means by which they measure radiation; neutron detectors and the means by which they detect neutrons and provide an electrical signal; and mechanism by which isotope identification detectors operate and the advantages and disadvantages of the types of systems available.

(B) Requisite Skills. Identifying by name the six specific regions of the gas amplification curve; explaining the characteristics of a detector operated in each of the useful regions of the gas amplification curve; describing methods employed with gas-filled detectors to discriminate among various types of radiation and various radiation energies; explaining how a scintillation detector and associated components operate to detect and measure radiation; explaining how neutron detectors detect neutrons and provide electrical signals; and explaining the fundamental mechanism by which isotope identification detectors operate and the advantages and disadvantages of the types of systems available.

33.2.4 Radioactive Material Transportation. Describe the transportation process for a radiological hazard, given a radiological hazard, an assignment, policies and procedures, and reference materials, so that knowledge of the packaging is used in identifying and assessing the hazards and risks of the radiological hazard at a hazardous materials/WMD incident.

(A) Requisite Knowledge. Agencies that have regulations governing the transport of radioactive material; types of packages used; types of material shipped in each type of shipping package; terminology and acronyms associated with shipments of radioactive material; methods used to determine the radionuclide contents of a package; information contained on shipping papers used for transporting radioactive material; types of radiation and contamination surveys that are performed on radioactive material packages and the applicable limits of each; types of radiation and contamination surveys performed on exclusive-use vehicles and the applicable limits of each; and the approved placement of placards on a transport vehicle.

(B) Requisite Skills. Identifying the applicable agencies that have regulations governing the transport of radioactive material; describing the types of packages used in the transport of radioactive material and examples of the types of material shipped in each type of shipping package; identifying the terminology and acronyms associated with shipments of radioactive material; describing the methods used to determine the radionuclide contents of a package; identifying information contained on shipping papers specifically related to the transport of radioactive material; describing the radiation and contamination surveys performed on radioactive material packages, and identifying the applicable limits for each; describing the radiation and contamination surveys performed on exclusive-use vehicles, and identifying the applicable limits for each; and identifying the approved placement of placards on a transport vehicle.

33.3 Response Planning.

33.3.1 External Exposure Control. Identify control measures for minimizing external exposure to radiological hazards at a hazardous materials/WMD incident, given a hazardous materials/WMD incident with a radiological hazard, an assignment, policies and procedures, and reference materials, so that the control measures for minimizing external exposure are selected and incorporated in the action plan.

(A) Requisite Knowledge. The point source equation (inverse square law); the unit of density thickness; and where to find and how to calculate gamma exposure rate for radionuclides, an individual's remaining allowable dose equivalent or stay time, distance to radiation sources techniques for minimizing personnel external exposures, exposure rate or distance for a point source of radiation, and shielding thickness or exposure rates for gamma and x-ray radiation.

(B) Requisite Skills. Calculating or using computer applications to determine the gamma exposure rate for specific radionuclides; determining an individual's remaining allowable dose equivalent or stay time; identifying distance to radiation sources techniques to minimize personnel external exposures; determining exposure rate or distance for a point source of radiation using the point source equation (inverse square law); identifying the definition of the unit of density thickness; and determining shielding thickness or exposure rates for gamma and x-ray radiation by calculation or a computer application.

33.3.2 Internal Exposure Control. Identify control measures for minimizing internal exposure to radiological hazards at a hazardous materials/WMD incident, given a hazardous materials/WMD incident with a radiological hazard, an assignment, policies and procedures, and reference materials, so that the control measures for minimizing internal exposure are selected and incorporated in the action plan.

(A) Requisite Knowledge. The terms *annual limit on intake* (ALI), *derived air concentration* (DAC), *reference man, physical half-life, biological half-life,* and *effective half-life*; factors that govern the behavior of radioactive material in the body; natural mechanisms that reduce the quantity of a radionuclide in the body; the relationship between the physical, biological, and effective half-lives; and methods used to increase the elimination rate of radioactive material from the body.

(B) Requisite Skills. Identifying the definitions of *ALI*, *DAC*, and *reference man*; explaining the three factors that govern the behavior of radioactive material in the body, the two natural mechanisms that reduce the quantity of a radionuclide in the body, and the relationship between the physical, biological, and effective half-lives; calculating the effective half-life using the physical and biological half-lives of a radionuclide; and describing the methods used to increase the elimination rate of radioactive material from the body.

33.3.3 Radiation Survey Instrumentation. Select the correct instrument for radiation and contamination monitoring, given a hazardous materials/WMD incident with a radiological hazard, product involved, reference sources, and policies and procedures, so that the correct instrument for monitoring radiation and contamination is selected and incorporated in the action plan.

(A) Requisite Knowledge. Types of detectors or probes available, operator-adjustable controls, and specific limitations and characteristics of commonly used instruments; types of detectors available for use, detector shielding and window, types of radiation detected and measured, gamma energy response characteristics, markings for detector effective center, and specific limitations and characteristics of portable exposure rate instruments; types of detectors available for use, detector shielding and window, types of radiation detected and measured, gamma energy response characteristics, and specific limitations and characteristics of portable contamination monitoring instruments; and factors that affect the selection of portable radiation and contamination survey instruments.

(B) Requisite Skills. Identifying factors that affect the selection of portable radiation and contamination survey instruments; selecting appropriate instruments for external radiation and contamination surveys, and describing the types of detectors available for use, detector shielding and window, types of radiation detected and measured, gamma energy response characteristics, markings for detector effective center, and specific limitations and characteristics of exposure rate instruments and count rate survey meter probes.

33.4 Action Plan Implementation.

33.4.1 Radiological Incidents. Implement or oversee the response to a radiological emergency, given a hazardous materials/WMD incident, results of the incident analysis (behavior, hazards, risks, and outcomes), an action plan, policies and procedures, and resources, so that the action plan is implemented.

(A) Requisite Knowledge. Response actions and responsibilities of a with a radiological hazard specialty during any radiological incident; to manage personnel contamination, off-scale or lost dosimetry, rapidly increasing or unanticipated radiation levels, a spill, and a fire in a radiological area or involving radiological hazards; and available federal responder resources and the assistance that each group provides.

(B) Requisite Skills. Explaining the and responsibilities of a specialist during any radiological incident including response to personnel contamination, off-scale or lost dosimetry, rapidly increasing or unanticipated radiation levels, a spill, and a fire in a radiological area or involving radiological hazards, and identifying the available federal responder resources and describing the assistance that each group can provide.

33.4.2 Contamination Control. Implement or oversee the contamination control techniques, given a hazardous materials/WMD involving spreading radiological contamination, results of the incident analysis (behavior, hazards, risks, and outcomes), an action plan, policies and procedures, and resources, so that contamination control is implemented to minimize the spread of radiological contamination.

(A) Requisite Knowledge. Difference between *removable surface contamination* and *fixed surface contamination*, and common methods used to measure each; the principles of contamination control and implementation methods; purpose of using protective clothing in radiologically contaminated areas; and the factors that determine protective clothing requirements for personnel protection.

(B) Requisite Skills. Identifying the terms *removable surface contamination* and *fixed surface contamination*; explaining the difference between removable surface contamination and fixed surface contamination and the methods used to measure each; explaining the principles of contamination control; identifying implementation methods for contamination control; explaining the purpose of using protective clothing in radiologically contaminated areas; and identifying the factors that determine protective clothing requirements for personnel protection.

33.4.3 Personnel Decontamination. Implement or oversee the decontamination of personnel and resources, given a hazardous materials/WMD involving radiological hazards, results of the incident analysis (behavior, hazards, risks, and outcomes), policies and procedures, an action plan, and resources, so that the decontamination techniques identified in the action plan are implemented for personnel and resources at the incident.

(A) Requisite Knowledge. The ways that personnel, PPE, apparatus, and tools become contaminated with radioactive material; the purpose of radioactive material decontamination; field decontamination techniques for equipment; factors that determine the actions to take in decontamination of personnel; and the methods and techniques for performing personnel decontamination.

(B) Requisite Skills. Identifying how personnel, PPE, apparatus, and tools become contaminated with radioactive material, identifying field decontamination techniques for equipment, determining the actions to be taken in decontamination of personnel, and describing the methods and techniques for performing personnel decontamination.

33.4.4 Competencies — Evaluating Progress. (Reserved)

33.4.5 Competencies — Terminating the Incident. (Reserved)

Chapter 34 Competencies for Hazardous Materials/WMD Technicians with an Advanced Monitoring and Detection Specialty (NFPA 472)

34.1 General.

34.1.1 Introduction.

34.1.1.1 Hazardous Materials Technicians with an advanced monitoring and detection specialty shall be competent at the technician level and assigned to implement advanced monitoring and detection operations at hazardous materials/WMD incidents.

34.1.1.2 Hazardous Materials Technicians with an advanced monitoring and detection specialty at hazardous materials/WMD incidents shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies at the technician level *(see Chapter 10)*, and all competencies in this chapter.

34.1.1.3 Hazardous Materials Technicians with an advanced monitoring and detection specialty at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the AHJ.

34.1.2 Goal.

34.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians with an advanced monitoring and detection specialty at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 34.1.2.2 in a safe and effective manner.

34.1.2.2 When responding to hazardous materials/WMD incidents, Hazardous Materials Technicians with an advanced monitoring and detection specialty shall be able to perform the following tasks:

(1) Plan the monitoring and detection activities within the capabilities and competencies of available personnel, PPE, and response equipment.
(2) Describe the monitoring and detection options available to the technician level responder in accordance with the emergency response plan or standard operating procedures.
(3) Implement the monitoring and detection activities as specified in the IAP.

34.2 Competencies — Analyzing the Incident. (Reserved)

34.3 Competencies — Planning the Response.

34.3.1 Given examples of the monitoring and detection equipment provided by the AHJ, Hazardous Materials Technicians with an advanced monitoring and detection specialty shall select the detection or monitoring equipment suitable for detecting or monitoring solid, liquid, or gaseous hazardous materials/WMD.

34.3.2 Given examples of the monitoring and detection equipment provided by the AHJ, Hazardous Materials Technicians with an advanced monitoring and detection specialty shall survey the hazardous materials/WMD incident to presumptively identify or classify unknown materials and to verify the presence and concentrations of hazardous materials.

34.3.3 Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with an advanced monitoring and detection specialty shall, given the necessary equipment, presumptively identify or classify unknown materials involved, verify the identity of the hazardous materials/WMD involved, and determine the concentration of hazardous materials, by completing the requirements of 34.3.4 through 34.3.11.

34.3.4 Hazardous Materials Technicians with an advanced monitoring and detection specialty shall identify the steps in an analysis process for characterizing and presumptively identifying an unidentified contaminant in the atmosphere.

34.3.5 Hazardous Materials Technicians with an advanced monitoring and detection specialty shall identify the type(s) of monitoring technology used to determine the following potential hazards:

(1) Corrosivity
(2) Flammability
(3) Fluorine potential
(4) Oxidation potential
(5) Oxygen deficiency
(6) Pathogenicity
(7) Radioactivity
(8) Toxicity
(9) Thermal change

34.3.6 Hazardous Materials Technicians with an advanced monitoring and detection specialty shall demonstrate the use of and identify the capabilities, application, and limiting factors associated with the selection and use of the following monitoring equipment, test strips, and reagents that are provided by the AHJ. For the equipment not provided by the AHJ the Hazardous Materials Technician shall describe the technology's capabilities and its limitations including the following:

(1) Biological immunoassay indicators
(2) Colorimetric indicators [colorimetric detector tubes, indicating papers (pH paper, potassium iodide-starch paper, fluoride paper, and water finding paper), reagents, test strips]
(3) Flammable gas indicator
(4) DNA fluoroscopy
(5) Electrochemical cells
(6) Flame ionization detector
(7) Gas chromatograph/mass spectrometer (GC/MS)
(8) Infrared spectroscopy
(9) Ion mobility spectroscopy
(10) Gamma spectrometer [radioisotope identification device (RIID)]
(11) Metal oxide sensor
(12) Photoionization detectors
(13) Polymerase chain reaction (PCR)
(14) Radiation detection and measurement instruments
(15) Raman
(16) Spectroscope
(17) Ultrasound detection
(18) Wet chemistry
(19) Thermal indicating device (i.e., infrared thermometer)

34.3.7 Given examples of hazardous materials/WMD, including solids, liquids, and gasses, and using equipment, test strips, and reagents provided by the AHJ as applicable, Hazardous Materials Technicians with an advanced monitoring and detection specialty shall select from the following equipment and demonstrate the correct techniques to identify the hazards (corrosivity, flammability, oxidation potential, fluorine component, oxygen deficiency, radioactivity, toxicity, explosivity, and pathogenicity):

(1) Carbon monoxide sensor
(2) Colorimetric tubes
(3) Flammable gas indicator
(4) Oxygen sensor
(5) Passive dosimeters
(6) pH indicators
(7) Photoionization and flame ionization detectors
(8) Radiation detection instruments
(9) Reagents
(10) Test strips
(11) Thermal indicating device
(12) WMD detectors (explosive, chemical, and biological)
(13) Other equipment provided by the AHJ

34.3.8 Hazardous Materials Technicians with an advanced monitoring and detection specialty shall demonstrate methods for collecting samples of the following:

(1) Gas
(2) Liquid
(3) Solid

34.3.9 Given examples of detection and monitoring device(s) provided by the AHJ, Hazardous Materials Technicians with an advanced monitoring and detection specialty shall describe the

operation, capabilities and limitations, local monitoring procedures, field testing, calibration, and maintenance procedures associated with each device.

34.3.10 Given examples of detection and monitoring device(s) provided by the AHJ, Hazardous Materials Technicians with an advanced monitoring and detection specialty shall describe the correction factors and other information that could impact the accuracy of the results associated with the devices.

34.3.11 Selecting PPE. Given examples of PPE provided by the AHJ, Hazardous Materials Technicians with an advanced monitoring and detection specialty shall select the PPE required to support monitoring and sampling at hazardous materials/WMD incidents based on local procedures.

34.4 Competencies — Implementing the Planned Response.

34.4.1 Given examples of hazardous materials/WMD incidents and detection and monitoring devices provided by the AHJ, Hazardous Materials Technicians with an advanced monitoring and detection specialty shall demonstrate the field test and operation of each device and interpret the readings based on local procedures.

34.4.2 Hazardous Materials Technicians with an advanced monitoring and detection specialty shall describe local procedures for decontamination of themselves and their detection and monitoring devices upon completion of the monitoring mission.

34.5 Competencies — Evaluating Progress. (Reserved)

34.6 Competencies — Terminating the Incident. (Reserved)

Chapter 35 Reserved

Chapter 36 Competencies for Hazardous Materials/WMD Technicians with a Consequence Analysis and Planning Specialty (NFPA 472)

36.1 General.

36.1.1 Introduction.

36.1.1.1 Hazardous Materials Technicians with a consequence analysis and planning specialty shall be competent at the technician level and assigned to implement consequence analysis and planning operations at hazardous materials/WMD incidents.

36.1.1.2 Hazardous Materials Technicians with a consequence analysis and planning specialty shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies at the technician level *(see Chapter 10)*, and all competencies in this chapter.

36.1.1.3 Hazardous Materials Technicians with a consequence analysis and planning specialty shall receive the additional training necessary to meet specific needs of the jurisdiction.

36.1.2 Goal.

36.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians with a consequence analysis and planning specialty, utilizing technology systems and technical reference data to share current hazard information and the area of impact, predict future hazards or estimate the area of impact, formulate recommendations for public protective actions, and assist in developing IAPs at hazardous materials/WMD incidents.

36.1.2.2 The goal of the competencies in this chapter shall be to provide the Hazardous Materials Technicians with a consequence analysis and planning specialty with the knowledge and skills to perform the tasks in Sections 36.2 through 36.7 in a safe and effective manner.

36.2 Competencies — Analyzing the Incident.

36.2.1 Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a consequence analysis and planning specialty shall use, produce, and interpret printed and electronic maps to describe a risk analysis, which includes the following:

(1) Hazards
(2) Affected areas
(3) Incident information related to the scenario

36.2.2 Given examples of hazardous materials/WMD incidents and a map, Hazardous Materials Technicians with a consequence analysis and planning specialty shall perform the following skills:

(1) Orient the map
(2) Determine the scale
(3) Identify the hazard zone and incident facilities (command, staging, and shelters)

36.2.3 Hazardous Materials Technicians with a consequence analysis and planning specialty at hazardous materials/WMD incidents shall describe the following maps and map terms:

(1) Topographical features
(2) Coordinate/geo-reference systems
    (a) Longitude/latitude
    (b) Military Grid Reference System (MGRS)
    (c) Universal Transverse Mercator (UTM)
    (d) United States National Grid (USNG)
(3) FRA railroad marking system
    (a) Mile markers
    (b) Cross markers
(4) Electronic maps
(5) Commercially available and free Internet mapping products
(6) Accessing AHJ Global Information System (GIS) data
(7) Overhead photography
(8) US Department of Transportation (DOT) National Pipeline Mapping System (NPMS)
(9) Global positioning system

36.2.4 Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a consequence analysis and planning specialty shall describe the following weather and meteorological conditions and their impacts:

(1) Potentially hazardous weather
(2) Weather effects on hazardous materials and chemical dispersion
    (a) Water-reactive chemicals
    (b) Solubility

36.2.5 Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a consequence

analysis and planning specialty shall describe potential sources of weather forecasting information, including the limitations of open source weather stations.

36.2.6 Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a consequence analysis and planning specialty shall describe the process to deploy an incident weather station.

36.2.7 Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a consequence analysis and planning specialty shall describe the process to make local weather observations (manual weather).

36.2.8 Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a consequence analysis and planning specialty shall describe potential sources of modeling software and the following modeling terms:

(1) Air dispersion modeling
(2) Modeling types
    (a) Forward model
    (b) Reverse model
    (c) Modeling liquefied compressed gases
(3) Water spill model
(4) Radiant heat model
(5) Tank burn time estimation
(6) Boiling liquid expanding vapor explosion (BLEVE) model
(7) Explosion model
(8) Static standoff distances
(9) Radiological dispersion

36.3 Public Protection Actions.

36.3.1 Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a consequence analysis and planning specialty shall describe the following public protective action terms for hazard levels:

(1) Emergency Response Planning Guideline (ERPG)
(2) Emergency Action Guidance Level (EAGL)
(3) Temporary Emergency Exposure Levels (TEEL)
(4) Protective Action Criteria (PAC)

36.3.2 Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a consequence analysis and planning specialty shall describe the following activities:

(1) Isolation distances
(2) Evacuation planning and procedures
(3) Selecting safe shelter locations
(4) Shelter-in-place planning and procedures
    (a) Shelter-in-place considerations
    (b) Sharing shelter-in-place instructions
(5) Coordination with the Public Information Officer (PIO) and the joint information center (JIC)
    (a) Crisis communications
    (b) Hazard communications
(6) Emergency notification
(7) AHJ community notification system
(8) BLEVE estimation
(9) General Hazardous Materials Behavior Model (GHMBO)

36.4 Wide Area Monitoring and Sampling. Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a consequence analysis and planning specialty shall describe the wide area monitoring and sampling strategies, develop a plan, and describe the following:

(1) Resources and agencies for conducting wide area monitoring and sampling
(2) Indications for implementing wide area monitoring and sampling
    (a) Unable to model release scenario
    (b) Validate model
    (c) Use as model input
    (d) Document exposure levels
    (e) Responder safety
(3) Air monitoring
    (a) Wireless chemical detection
    (b) Air sampling
    (c) Water samples
(4) Wide area biological detection or sampling
(5) Wide area radiological detection

36.5 Drinking Water Contamination. Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a consequence analysis and planning specialty shall describe the potential impact to a water system, describe the AHJ plan regarding drinking water contamination, and describe the following:

(1) Current threat assessment
(2) Response procedures
(3) Notification procedures

36.6 Open Sources Information.

36.6.1 Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a consequence analysis and planning specialty shall describe potential sources of open source incident information.

36.6.2 Hazardous Materials Technicians with a consequence analysis and planning specialty shall describe the benefits and limitations of these sources and verification procedures for the following:

(1) Social media
(2) Traffic cameras
(3) Street views
(4) Tax records
(5) Building maps
(6) Shipper websites

36.7 Operational Security (OPSEC). Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a consequence analysis and planning specialty shall describe operational security and the following terms and concepts:

(1) Threats and adversaries
(2) Intelligence methods used by adversaries
(3) Operational security process
(4) Threat assessment
(5) Countermeasures

36.8 Competencies — Evaluating Progress. (Reserved)

36.9 Competencies — Terminating the Incident. (Reserved)

Chapter 37 Reserved

Chapter 38 Competencies for Hazardous Materials/WMD Technicians with an Advanced Chemical Risk Assessment and Analysis Specialty (NFPA 472)

38.1 General.

38.1.1 Introduction.

38.1.1.1 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall be competent at the technician level and assigned to implement advanced chemical risk assessment and analysis operations at hazardous materials/WMD incidents.

38.1.1.2 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies at the technician level *(see Chapter 10)*, and all competencies in this chapter.

38.1.1.3 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall receive the additional training necessary to meet specific needs of the jurisdiction.

38.1.2 Goal. The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty with the knowledge and skills to perform the tasks in 38.2.1 through 38.2.6 in a safe and effective manner.

38.2 Competencies — Analyzing the Incident.

38.2.1 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall include the use of chemical and physical properties in their decision-making process.

38.2.2 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall describe the following terms and their impact on the risk assessment process:

(1) States of matter
(2) Periodic table
(3) Metals and nonmetals
(4) Transition metals
(5) Metalloids
(6) Electropositive and electronegative
(7) Noble gases
(8) Halogens
(9) Alkali metals
(10) Alkaline earth metals
(11) Organic and inorganic

38.2.3 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall describe the following types of salts and explain their significance in the analysis process:

(1) Binary salt and binary oxide
(2) Hydroxide
(3) Peroxide
(4) Cyanide
(5) Oxy-salt
(6) Ammonium salt

38.2.4 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall describe the following hydrocarbons and their isomers and explain their significance in the analysis process:

(1) Aromatic
(2) Aliphatic
(3) Saturated
(4) Unsaturated

38.2.5 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall describe the following inorganic nonsalts and explain their significance in the analysis process:

(1) Binary non-salts
(2) Binary acids
(3) Oxyacids
(4) Peroxides
(5) Bases (alkalis)

38.2.6 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall describe the following hydrocarbons and hydrocarbon derivatives and explain their significance in the analysis process:

(1) Alcohols
(2) Amines
(3) Carboxylic acids
(4) Esters
(5) Aldehydes
(6) Ketones
(7) Ethers
(8)* Nitrogen-based compounds
(9) Halogenated hydrocarbons
(10) Organic peroxides
(11) Nitriles
(12) Thiols and mercaptans
(13) Isocyanates
(14) Carbamates

38.3 Competencies — Planning the Response.

38.3.1 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall describe the following terms and explain their significance in the analysis process:

(1) Chemical reaction
(2) Dissassociation
(3) Exothermic
(4) Endothermic
(5) Ionic/covalent bonds
(6) Molecular weight
(7) Oxidation and reduction
(8) Oxidation potential
(9) Partition coefficient
(10) Persistence
(11) Pyrophoric
(12) Water reactive
(13) Air reactive
(14) Aerosols
(15) Critical temperature
(16) Critical pressure
(17) Cryogenic

38.3.2 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall describe the heat transfer process that occurs as a result of a cryogenic liquid spill.

38.3.3 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall describe the following chemical reaction types:

(1) Oxidation and reduction
(2) Decomposition
(3) Replacement reactions
(4) Neutralization
(5) Polymerization

38.3.4 Hazardous Materials Technicians with an advanced chemical risk assessment and analysis specialty shall describe the use of ionization energy (also known as *ionization potential*) when planning a detection and monitoring strategy.

38.3.5* Hazardous Materials Technicians with an advanced chemical risk assessment and analysis and specialty shall describe the risks within the four categories of oxidizers as well as the following oxidizers, as listed in NFPA 430, and the risks associated with each of them:

(1) Class 1
(2) Class 2
(3) Class 3
(4) Class 4

38.4 Competencies — Evaluating Progress. (Reserved)

38.5 Competencies — Terminating the Incident. (Reserved)

Chapter 39 Reserved

Chapter 40 Competencies for Hazardous Materials/WMD Technicians with an Advanced Product Control Specialty (NFPA 472)

40.1 General.

40.1.1 Introduction.

40.1.1.1 Hazardous Materials Technicians with an advanced product control specialty shall be competent at the technician level and assigned to apply advanced knowledge of product control applications, technology, and procedures during response to hazardous materials/WMD incidents.

40.1.1.2 Hazardous Materials Technicians with an advanced product control specialty shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, the operations level mission-specific competencies for product control *(see Section 8.6)*, all competencies at the technician level *(see Chapter 10)*, and all competencies in this chapter.

40.1.1.3 Hazardous Materials Technicians with an advanced product control shall receive the additional training necessary to meet specific needs of the jurisdiction.

40.1.2 Goal.

40.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians who have an advanced product control specialty with the knowledge and skills to perform the tasks in 40.1.2.2 in a safe and effective manner.

40.1.2.2 Hazardous Materials Technicians with an advanced product control specialty shall be able to perform the following tasks:

(1) Describe the advanced product control options available to the technician level responder in accordance with the emergency response plan or standard operating procedures.
(2) Implement advanced product control response activities as specified in the emergency response plan or standard operating procedures.

40.1.2.3 Given examples of products, control techniques, and resources approved by the AHJ at hazardous materials/WMD incidents, Hazardous Materials Technicians with an advanced product control specialty shall control incidents from confinements, containers and their closures, and pipelines following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards, by completing the requirements in 40.1.2.3.1 and 40.1.2.3.2.

40.1.2.3.1 Product Control. Given examples of hazardous materals/WMD incidents with release of product(s), an assignment in an IAP, results of the incident analysis, policies and procedures for product control, strategies and options for the incident, resources and approved by the AHJ, Hazardous Materials Technicians with an advanced product control specialty shall perform the control techniques by completing the following requirements:

(1) Identify and implement the following product control techniques to confine released hazardous materials/WMD:
    (a) Absorption
    (b) Adsorption
    (c) Damming
    (d) Diking
    (e) Dilution
    (f) Diversion
    (g) Retention
    (h) Transfer
    (i) Vapor dispersion
    (j) Vapor suppression
(2) Identify the application and purpose of, advantages and limitations of, procedures for, required tools and equipment for, and safety precautions for each of the control techniques for hazardous materials/WMD incidents.

40.1.2.3.2 Controlling Leaks from Containers. Given examples of hazardous materials/WMD incidents; an assignment; results of the incident analysis; examples of scenarios, including but not limited to a leak from a bulk pressure container or its closures and a leak from a bulk liquid container or its closures; policies and procedures for controlling leaks from containers and/or their closures; and resources approved by the AHJ Hazardous Materials Technicians with an advanced product control specialty shall control leaks from the containers and their closures, monitoring for hazards as necessary, by completing the following requirements:

(1) Identify the following product control techniques for materials/WMD:
    (a) Patching
    (b) Plugging

(c) Repositioning the container
(d) Sealing closures
(e) Remote valve shutoff

(2) Identify types of containers and their closures and the way in which the containers and their closures develop leaks

40.1.2.4 Given examples of hazardous materials/WMD incidents, the selected product control techniques, and resources approved by the AHJ, Hazardous Materials Technicians with an advanced product control specialty shall confine and contain large-scale releases from containers, pipelines, or bulk transportation containers, following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards, by completing the requirements in 40.1.2.4.1.

40.1.2.4.1 Product Control. Given examples of hazardous materials/WMD incidents with release of product, an assignment, results of the incident analysis, policies and procedures for product control, strategies and options for the incident(s), and resources approved by the AHJ, Hazardous Materials Technicians with an advanced product control specialty shall perform the control techniques by completing the following requirements:

(1) Identify and implement the following product control techniques for hazardous materials/WMD:
(a) Absorption
(b) Adsorption
(c) Blanketing/covering
(d) Damming
(e) Diking
(f) Dilution
(g) Dispersion
(h) Diversion
(i) Fire suppression
(j) Neutralization
(k) Overpacking
(l) Patching
(m) Plugging
(n) Pressure isolation and reduction (flaring, venting, vent and burn, isolation of valves, pumps, or energy sources)
(o) Retention
(p) Solidification
(q) Transfer
(r) Vacuuming
(s) Vapor dispersion
(t) Vapor suppression

(2) Identify the application and purpose of, advantages and limitations of, procedures for, required tools and equipment for, and safety precautions for each of the control techniques for hazardous materials/WMD.

40.2 Competencies — Analyzing the Incident. (Reserved)

40.3 Competencies — Planning the Response. (Reserved)

40.4 Competencies — Implementing the Planned Response. (Reserved)

40.5 Competencies — Evaluating Progress. (Reserved)

40.6 Competencies — Terminating the Incident. (Reserved)

Chapter 41 Reserved

Chapter 42 Competencies for Hazardous Materials/WMD Technicians with a Weapons of Mass Destruction Specialty (NFPA 472)

42.1 General.

42.1.1 Introduction.

42.1.1.1 Hazardous Materials Technicians with a weapons of mass destruction (WMD) specialty shall be competent at the technician level and assigned to apply advanced knowledge of WMD agents, response equipment, and response procedures during the intentional release of hazardous materials or WMD(s).

42.1.1.2 Hazardous Materials Technicians with a WMD specialty shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, all competencies at the technician level *(see Chapter 10)*, and all competencies in this chapter.

42.1.1.3 Hazardous Materials Technicians with a WMD specialty shall receive the additional training necessary to meet specific needs of the AHJ.

42.1.2 Goal.

42.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians who have a WMD specialty with the knowledge and skills to perform the tasks in 42.1.2.2 in a safe and effective manner.

42.1.2.2 Hazardous Materials Technicians with a WMD specialty shall be able to perform the following tasks:

(1) Respond within the capabilities and competencies of available personnel, PPE, and response equipment.
(2) Describe the AHJ's emergency response plan or standard operating procedure for technician level response to hazardous materials/WMD.
(3) Implement the WMD response activities as specified in the emergency response plan or standard operating procedures.

42.2 Competencies — Analyzing the Incident.

42.2.1 Given examples of the following, Hazardous Materials Technicians with a WMD specialty shall generally describe the potential for illicit use, chemical properties, physical properties, toxicity, and health effects for each category listed:

(1) Chemical
(2) Biological
(3) Radiological
(4) Nuclear
(5) Explosive
(6) Nerve agents
(7) Blood agents
(8) Blister agents
(9) Choking agents
(10) Harassing (riot control) agents
(11) Incapacitating agents

42.2.1.1 Given examples of the following toxic industrial chemicals, Hazardous Materials Technicians assigned to respond to WMD incidents shall describe the potential for illicit use, chemical properties, physical properties, toxicity, and health effects for each hazard classification listed:

(1) Division 2.1 Flammable gases
(2) Division 2.2 Nonflammable gases
(3) Division 2.3 Poison gases
(4) Class 3 Flammable liquids
(5) Class 6 Poison (inhalation hazard)

42.2.1.2 Given examples of radioactive material and radiation exposure devices, Hazardous Materials Technicians with a WMD specialty shall describe the potential for illicit use and potential health effects from each.

42.2.1.3 Given examples of the following explosive materials, Hazardous Materials Technicians with a WMD specialty shall describe the potential for illicit use and physical properties for each explosive type listed:

(1) High-velocity explosives (velocity >3300 ft/sec)
(2) Low-velocity explosives (velocity <3300 ft/sec)
(3) Homemade explosives

42.2.1.4 Given examples of the following biological agents, Hazardous Materials Technicians with a WMD specialty shall describe the potential for illicit use, vectors, and health effects for each biological agent listed:

(1) *Bacillus anthracis*
(2) *Yersinia pestis*
(3) *Francisella tularensis*
(4) *Salmonella enterica*
(5) *Variola major*
(6) *Clostridium botulinum*
(7) Ricin toxin
(8) Abrin toxin

42.3 Competencies — Planning the Response.

42.3.1 Given examples of hazardous materials/WMD incidents, Hazardous Materials Technicians with a WMD specialty shall describe the importance of the following response safety considerations:

(1) Suspected presence of improvised explosive devices (IEDs)
(2) Presence of secondary explosive devices at bombing scenes
(3) Active radiological monitoring during response to suspected WMD incidents
(4) Active air monitoring of the incident command post, bases, and other operational areas during suspected intentional incidents

42.3.2 Hazardous Materials Technicians with a WMD specialty shall demonstrate the use of and identify the capabilities, application, and limiting factors associated with the selection and use of the following monitoring equipment, test strips, and reagents that are provided by the AHJ. For the equipment not provided by the AHJ, the Hazardous Materials Technician shall describe the technology's capabilities and its limitations, including the following:

(1) Ion mobility spectroscopy
(2) Flame photo spectrometry
(3) Fourier transform infrared spectroscopy
(4) Raman spectroscopy
(5) Colorimetric tubes
(6) Gas chromatography/mass spectroscopy
(7) Polymerase chain reaction
(8) Immunological assays
(9) Protein tests
(10) Nuclide identification devices
(11) Ultrasound detection

42.3.3 Given examples of hazardous materials/WMD incidents requiring the collection of samples and an assignment, Hazardous Materials Technicians with a WMD specialty shall describe the difference between the collection of samples for public safety purposes and the collection of evidence for law enforcement purposes.

42.3.4 Given examples of intentional WMD incidents and an assignment, Hazardous Materials Technicians with a WMD specialty shall describe the following response considerations while operating at a crime scene:

(1) Notification of law enforcement
(2) Coordination with law enforcement within ICS
(3) Support of law enforcement investigative operations at the incident site
(4) Responsibility for operational security (OPSEC)
(5) Potential restrictions on photography and release of investigative information
(6) Understand the potential for future testimony on any actions or observations at the incident site
(7) Coordination with strategic law enforcement management efforts at multiagency coordination centers

42.3.5 Selecting PPE. Given examples of hazardous materials/WMD incidents, an assignment, and the PPE provided by the AHJ, Hazardous Materials Technicians with a WMD specialty shall select the PPE required to support site operations, including the collection of public safety samples.

42.4 Competencies — Implementing the Planned Response.

42.4.1 Given examples of hazardous materials/WMD, incidents and an assignment, Hazardous Materials Technicians with a WMD specialty shall demonstrate the AHJ procedures for conducting field screening of suspicious biological materials for entry into the Laboratory Response Network (LRN) to include the following:

(1) Coordinate with hazardous device technicians to clear letters or packages of potential explosive devices.
(2) Screen for alpha, beta, and gamma radiation.
(3) Screen for flammable materials.
(4) Screen for corrosive liquids.
(5) Screen for strong oxidizers.
(6) Screen for volatile organic compounds.
(7) Document all field screening findings for LRN and law enforcement personnel.

42.4.2 Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Technicians with a WMD specialty shall demonstrate the AHJ procedures for response to a suspicious powder associated with a threat to include the following:

(1) Conduct a hazard risk assessment.
(2) Select the appropriate PPE for contaminated areas.

(3) Select the appropriate atmospheric monitoring equipment and techniques.
(4) Coordinate operations with appropriate law enforcement agencies.
(5) Field screen visible powders and letters, envelopes, or packaging for entry into the LRN.
(6) Under the direction of law enforcement, collect the bulk of visible powders and associated letters, envelopes, and so forth for submission to the LRN.
(7) Perform any additional public safety testing on the remainder of the visible powder as required by the AHJ and within capabilities.
(8) Assist law enforcement with preparation of samples for LRN submission as defined by the AHJ, to include chain of custody procedures.

42.4.2.1 Hazardous Materials Technicians with a WMD specialty shall describe local procedures for decontamination of themselves and their detection and monitoring devices upon completion of the sampling mission.

42.4.3 Hazardous Materials Technicians with a WMD specialty shall describe the AHJ procedures for response to a post-blast scene involving the potential use of hazardous materials including but not limited to the following:

(1) Identify the AHJ(s) with responsibility for presence in unified command.
(2) Describe the AHJ procedures for coordination between hazardous materials, hazardous devices, law enforcement, medical, rescue, fire suppression, and emergency management personnel and agencies.
(3) Describe the AHJ procedures to assess the incident scene for additional threats to public safety personnel.
(4) Describe the AHJ procedures to establish access control and decontamination corridors at the incident scene.
(5) Describe the AHJ procedures to transition from the emergency operational phase to the crime scene phase of the incident.

42.4.4 Hazardous Materials Technicians with a WMD specialty shall describe the AHJ procedures during response to an incident involving the potential criminal use of hazardous materials to include the following:

(1) Describe the AHJ procedures for preserving response documentation.
(2) Describe the AHJ procedures for maintaining OPSEC.
(3) Describe the AHJ procedures for coordination with hazardous device technicians to ensure the absence of IEDs.
(4) Describe the AHJ procedures for transitioning from the operational phase (to include rescue/life safety efforts and incident stabilization) to the crime scene phase.
(5) Describe the AHJ procedures for supporting law enforcement during the crime scene phase of the incident.

42.5 Competencies — Evaluating Progress. (Reserved)

42.6 Competencies — Terminating the Incident. (Reserved)

Chapter 43 Reserved

Chapter 44 Competencies for Hazardous Materials/WMD Technicians with an Advanced Decontamination Specialty (NFPA 472)

44.1 General.

44.1.1 Introduction.

44.1.1.1 Hazardous Materials Technicians with an advanced decontamination specialty shall be competent at the technician level and be assigned to apply advanced knowledge of decontamination applications, technology, and procedures during response to hazardous materials/WMD incidents.

44.1.1.2 Hazardous Materials Technicians with an advanced decontamination specialty shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 6)*, the operations level mission-specific competencies for mass decontamination *(see Section 8.3)* and technical decontamination *(see Section 8.4)*, all competencies at the technician level *(see Chapter 10)*, and all competencies in this chapter.

44.1.1.3 Hazardous Materials Technicians with an advanced decontamination specialty shall receive the additional training necessary to meet specific needs of the jurisdiction.

44.1.2 Goal.

44.1.2.1 The goal of the competencies in this chapter shall be to provide Hazardous Materials Technicians who have an advanced decontamination specialty with the knowledge and skills to perform the tasks in 44.1.2.2 in a safe and effective manner.

44.1.2.2 Hazardous Materials Technicians with an advanced decontamination specialty shall be able to perform the following tasks:

(1) Describe the advanced decontamination options available to the technician level responder in accordance with the emergency response plan or standard operating procedures.
(2) Implement advanced decontamination response activities as specified in the emergency response plan or standard operating procedures.

44.2 Competencies — Analyzing the Incident.

44.2.1 Given examples of the following contamination types, Hazardous Materials Technicians with an advanced decontamination specialty shall generally describe the decontamination options and decontamination technologies available for each category listed:

(1) Flammable materials
(2) Corrosive materials
(3) Toxic materials
(4) Biological materials
(5) Radiological materials

44.2.2 Given examples of the following decontamination technologies, Hazardous Materials Technicians with an advanced decontamination specialty shall describe the application and limitations for each decontamination technology listed:

(1) Quaternary ammonium solutions
(2) Sporicidal solutions
(3) Fiber technologies
(4) Disclosure technologies
(5) Compressed air application devices
(6) Electrostatic application devices
(7) Other decontamination technologies utilized by the AHJ

44.3 Competencies — Planning the Response.

44.3.1 Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Technicians with an advanced decontamination specialty shall describe the following types of advanced decontamination procedures as used by the AHJ:

(1) Advanced decontamination solutions
(2) Dry decontamination
(3) Remote location (limited water) decontamination
(4) Tactical decontamination
(5) Animals, wildlife, and livestock decontamination
(6) Decontamination of collected sample packaging

44.3.2 Given examples of the detection, monitoring, and disclosure technologies provided by the AHJ, Hazardous Materials Technicians with an advanced decontamination specialty shall describe the procedures for confirming the effectiveness of decontamination.

44.4 Competencies — Implementing the Planned Response.

44.4.1 Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Technicians with an advanced decontamination specialty shall demonstrate the AHJ procedures for decontamination to include the deployment and operation of the following:

(1) Decontamination shelters or trailers
(2) Decontamination solutions
(3) Decontamination solution application devices
(4) Specialized decontamination corridors used by the AHJ

44.4.2 Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Technicians with an advanced decontamination specialty shall describe local procedures for decontamination of themselves and their decontamination equipment upon completion of the operation.

44.5 Competencies — Evaluating Progress. Given examples of hazardous materials/WMD incidents and an assignment, Hazardous Materials Technicians with an advanced decontamination specialty shall describe the AHJ procedures for evaluating the effectiveness of decontamination.

44.6 Competencies — Terminating the Incident. (Reserved)

Chapter 45 Reserved

Chapter 46 Competencies for Hazardous Materials/WMD Basic Life Support (BLS) Responders (NFPA 473)

46.1 General.

46.1.1 Introduction. All emergency medical services (EMS) personnel at the hazardous materials/weapons of mass destruction (WMD) basic life support (BLS) responder level, in addition to their BLS certification, shall be trained to meet at minimum the competencies of the Operations Level Responders as defined in Chapter 6, and all competencies of this chapter.

46.1.2 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 careat hazardous materials/WMD incidents, functioning within the established incident command system (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 care to any exposed patient within their 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 within the authority having jurisdiction (AHJ).
    (d) Describe the role of the BLS level responder as it relates to the local emergency response plan and established ICS.
(3) Implement a prehospital treatment plan within their 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 with the Hazardous Materials Safety Officer to complete the following tasks:

(a) Analyze potential health concerns, which could include environmental concerns.
(b) Plan for treatment and services delivery for patients and responders.

46.2 Competencies — Analyzing the Incident.

46.2.1 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.

46.2.1.1 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

46.2.1.2 Given examples of US Department of Transportation (DOT) hazard classes, NFPA 704 markings, and the Globally Harmonized System (GHS), the BLS responder shall identify possible types of injuries/illnesses and possible prehospital treatment modalities associated with each hazard class.

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

(1) 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

46.2.1.4 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

46.2.1.5 Given examples of hazardous materials/WMD incidents, BLS responders 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

46.2.1.6 Given examples of hazardous materials/WMD incidents involving illicit laboratory operations, BLS responders 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.

46.2.1.7 Given examples of radioactive materials incidents, including accidental releases, radiological dispersion devices (RDD), and radiological exposure devices (RED), BLS responders 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.

46.2.1.8 Given examples of pesticide labels and labeling, BLS responders 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

46.2.2 Collecting and Interpreting Hazard and Response Information. BLS responders 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

46.2.3 Establishing and Enforcing Scene Control Procedures. Given examples of hazardous materials/WMD incidents, BLS responders shall identify how to establish and maintain 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.

46.3 Competencies — Planning the Response.

46.3.1 Identifying High-Risk Areas for Potential Exposures.

46.3.1.1 Given examples of events calendars and pre-incident plans, which can include the local emergency planning committee plan as well as the AHJ's emergency response plan and standard operating procedures (SOPs), BLS responders 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 interagency cooperation

46.3.2 Determining the Capabilities of the Local Hospital Network.

46.3.2.1 BLS responders 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

46.3.2.2 Given examples of regional receiving hospitals, BLS responders shall describe the location, availability, and capability of hospital-based decontamination facilities.

46.3.2.3 BLS responders shall describe the AHJ's 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, based on their level of certification and the prescribed role of medical control and poison control centers.

46.3.2.4 BLS responders 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

46.3.2.5 BLS responders shall identify the special hazards associated with inbound and outbound air transportation of patients exposed to hazardous materials/WMD.

46.3.3 Identifying Incident Communications.

46.3.3.1 Given examples of incident communications plans, BLS responders shall identify the following:

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

46.3.3.2 Given examples of various patient exposure scenarios, BLS responders 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

46.3.4 Identifying the Roles of BLS Responders.

46.3.4.1 Given examples of hazardous materials/WMD incidents, BLS responders shall identify their 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 BLS responders.
(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 BLS responders to function within the ICS.
(4) Demonstrate the ability to initiate an ICS for a hazardous materials/WMD incident where an ICS does not currently exist.
(5) Identify the procedures for requesting additional resources at a hazardous materials/WMD incident.

46.3.4.2 BLS responders shall describe their 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.

46.4 Competencies — Implementing the Planned Response.

46.4.1 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)
    (g) Milligrams per meter cubed (mg/m^3)
(6) Given examples of hazardous materials/WMD incident 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 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 (IAP) (if in conflict with IAP provide notification to the IC or direct supervisor).
    (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.

46.4.2 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.

46.4.3 Determining the Ongoing Need for Medical Supplies. Given examples of single-patient and multicasualty 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

46.4.4 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 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 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.

46.4.5 Medical Support at Hazardous Materials/WMD Incidents. Given examples of hazardous materials/WMD incidents, 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 record 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

(6) The BLS responder shall record the following for each team member after decontamination and PPE removal:

(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.

46.5 Competencies — Terminating the Incident.

46.5.1 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 standard operating procedures (SOPs) and identify the reports and supporting documentation required by the emergency response plan or SOPs.

46.5.2 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 47 Competencies for Hazardous Materials/WMD Advanced Life Support (ALS) Responders (NFPA 473)

47.1 General.

47.1.1 Introduction. All emergency medical services (EMS) personnel at the hazardous materials/weapons of mass destruction (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 8.2, and all competencies of this chapter.

47.1.2 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 care at hazardous materials/WMD incidents and to function within the established incident command system (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.
   (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 could cause undue environmental stress (harm) on the responder.
(2) Plan to deliver ALS care to exposed patients, within the scope of practice and training competencies established by the authority having jurisdiction (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 ICS.
   (e) Identify supplemental regional and national medical resources, including but not limited to assets of the strategic national stockpile (SNS) or other governmental 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 level responder at the scene of the incident.
(5) Coordinate with the Hazardous Materials Safety Officer to complete the following tasks:
   (a) Analyze potential health concerns, which could include environmental concerns.
   (b) Plan for treatment and services delivery for patients and responders.

47.2 Competencies — Analyzing the Hazardous Materials Incident.

47.2.1 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.

47.2.1.1 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

47.2.1.2 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 (RSO)
   (c) Occupational physicians and nurses
   (d) Site emergency response teams
   (e) Specialized experts

47.2.1.3 The ALS responder shall identify 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

47.2.1.4 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 shall 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.

47.2.1.5* Given examples of the following biological threat agents, the ALS responder shall define the various types of biological threat agents, including the routes of exposure, signs and symptoms of exposure, virulence, 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

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

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

47.2.1.7* 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)

47.2.1.8* 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 route of exposure 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.

47.2.1.9 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

47.2.2 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/manufacturer contacts
(9) Agency for Toxic Substances and Disease Registry (ATSDR) medical management guidelines
(10) Allied professionals
(11) Electronic databases
(12) Radiation safety officer (RSO)

47.2.2.1 Identifying Secondary Devices. Given scenarios involving hazardous materials/WMD, the ALS responder 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

47.3 Competencies — Planning the Response.

47.3.1 AEMT and paramedic certified personnel shall describe protocols and SOPs developed by the AHJ for their level of certifications.

47.3.2 Identifying High-Risk Areas for Potential Exposures.

47.3.2.1 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.

47.3.3 Determining the Capabilities of the Local Hospital Network.

47.3.3.1 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

47.3.3.2 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.

47.3.3.3 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.

47.3.3.4 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-fatality capability
(3) Regional decontamination units
(4) Replenishment of medical supplies during long-term incidents
(5) Locations and availability of mass-casualty therapeutic modalities and resources 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

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

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

47.3.4 Identifying Incident Communications.

47.3.4.1 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.

47.3.4.2 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
    (a) Air monitoring and detection values
    (b) Any advanced detection information identified
(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, including the effectiveness of antidotes administered
(13) Estimated time of arrival

47.3.5 Identifying the Role of the ALS Level Responder.

47.3.5.1 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 as 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.

47.3.5.2 Describe the hazardous materials/WMD ALS responder's role in the hazardous materials/WMD incident action 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 dosage — exposure.
(10) Estimate dosage — treatment.
(11) Train in appropriate diagnostic monitoring:
    (a) SaO_2
    (b) Capnography
    (c) Rainbow technology

47.3.6 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.

47.3.6.1 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)

47.4 Competencies — Implementing the Planned Response.

47.4.1 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, 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 following basic toxicological terms as they relate to the treatment of an exposed patient:

(a) *Threshold limit value — time weighted average* (TLV-TWA)
(b) *Lethal doses* and *lethal* concentrations, as follows:

i. LD_{lo}
ii. LD_{50}
iii. LC_{lo}
iv. LC_{50}

(c) *Parts per million/parts per billion/parts per trillion* (ppm/ppb/ppt)
(d) *Milligrams per meter cubed* (mg/m^3)
(e) *Immediately dangerous to life and health* (IDLH)
(f) *Permissible exposure limit* (PEL)
(g) *Recommended exposure limit* (REL)
(h) *Threshold limit value — short-term exposure limit* (TLV-STEL)
(i) *Threshold limit value — ceiling* (TLV-C)
(j) *Solubility*
(k) *Poison* — a substance that causes injury, illness, or death
(l) *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 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 and strategies at periodic intervals to ensure that patient care is being carried out within the overall incident action plan (IAP) (if in conflict with IAP, provide notification to the IC or direct supervisor).
(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.

47.4.2* 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 the criticality and urgency of 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.

47.4.3 Evaluating the Need for Medical Supplies. Given examples of single-patient and multicasualty hazardous materials/WMD incidents, the ALS responder shall determine whether 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.

47.4.4 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 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 to the law enforcement agency having investigative jurisdiction.

47.4.5 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) Chemical 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 response plan and the SOP developed by the AHJ. Consideration shall be given to excluding responders from working in PPE if they exhibit any significant abnormalities in the following areas:
    (a)* 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 dehydration, heat stress, heat exhaustion, and heat stroke.
    (c) Determine the ALS needs for responders exhibiting the effects of dehydration, 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
    (g) Pulse oximetry
    (h) Capnography
(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).

47.5 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 PPE 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 48 Competencies for Hazardous Materials/WMD Advanced Life Support (ALS) Responders Assigned Mission-Specific Responsibilities (NFPA 473)

48.1 General.

48.1.1 Introduction.

48.1.1.1 This chapter shall address competencies for the following advanced life support (ALS) level responders who are assigned mission-specific responsibilities at hazardous materials/weapons of mass destruction (WMD) incidents by the authority having jurisdiction (AHJ) beyond the competencies of the hazardous materials/WMD ALS responder *(see Chapter 47)*:

(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 responder assigned to treatment of smoke inhalation victims

48.1.1.2 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 *(Chapter 46)*, all competencies at the advanced life support (ALS) responder level *(Chapter 47)*, and all competencies for the assigned responsibilities in the applicable section(s) in this chapter.

48.1.1.3 The ALS responder assigned mission-specific responsibilities at hazardous materials/WMD incidents shall also be trained to meet all competencies at the awareness level (Chapter 4) and operations level (Chapter 6).

48.1.1.4 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.

48.1.1.5 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 incident action plan (IAP), or standard operating procedures.

48.1.1.6 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.

48.1.2 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.

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

48.1.3.1 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.

48.1.3.2 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.

48.2 Mission-Specific Competencies — Advanced Life Support (ALS) Responder Assigned to a Hazardous Materials/WMD Team.

48.2.1 General.

48.2.1.1 Introduction.

48.2.1.1.1 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.

48.2.1.1.2 The ALS responder assigned to a hazardous materials team shall be trained to meet all competencies for the assigned responsibilities in Chapters 46 and 47 and all competencies in this section.

48.2.1.1.3 The ALS responder assigned to a hazardous materials team shall be trained to meet all competencies in Chapters 4 and 6.

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

48.2.1.1.5 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.

48.2.1.1.6 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 IAP, or standard operating procedures.

48.2.1.1.7 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.

48.2.1.2 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.

48.2.2 Competencies — Analyzing the Incident. (Reserved)

48.2.3 Competencies — Planning the Response.

48.2.3.1 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 the US Occupational Safety and Health Administration (OSHA) requirements for confidentiality.

48.2.3.2 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 for team members.

48.2.3.3 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.

48.2.3.4 Given the IAP 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 could be involved with hazardous materials team medical care.

48.2.3.5 Given the IAP 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.

48.2.3.6 Given the IAP and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall develop a list of the following healthcare 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

48.2.3.7 Given a list of healthcare 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 clinical interventions

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

48.2.3.9 Given a list of regional emergency medical services (EMS) responders, the ALS responder assigned to a hazardous materials team shall establish and maintain a matrix of responder capabilities to include the following:

(1) Patient decontamination capabilities
(2) Contaminated patient transportation capabilities
(3) Staff hazardous materials training levels
(4) Access to advanced hazardous materials clinical interventions
(5) Protective clothing inventories

48.2.3.10 Given the IAP 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.

48.2.3.11 Given the IAP 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.

48.2.3.12 Given the IAP 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.

48.2.4 Competencies — Implementing the Planned Response.

48.2.4.1 Given the IAP 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.

48.2.4.2 Given the IAP 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.

48.2.4.3 Given the IAP 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.

48.2.4.4 Given the IAP 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).

48.2.4.5 Given the IAP 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 clothing provided by the AHJ.

48.2.4.6 Given the IAP 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

48.2.4.7 Given the IAP 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

48.2.4.8 Given the IAP 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.

48.2.4.9 Given the IAP 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

48.2.4.10 Given the IAP 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 healthcare facility for treatment
(2) Assisting healthcare responders as necessary with information regarding the patient's injury and/or illness

48.2.4.11 Given the IAP and existing guidance from the AHJ, the ALS responder assigned to a hazardous materials team shall describe the following:

(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

48.2.5 Competencies — Evaluating Progress. (Reserved)

48.2.6 Competencies — Terminating the Incident.

48.2.6.1 Given the IAP 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.

48.2.6.2 Given the IAP, 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.

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

48.3.1 General.

48.3.1.1 Introduction.

48.3.1.1.1 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.

48.3.1.1.2 The ALS responder assigned to provide clinical interventions at a hazardous materials incident shall be trained to meet all competencies in Chapter 46 and Chapter 47 and the competencies in this section.

48.3.1.1.3 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 awareness level (Chapter 4) and operations level (Chapter 6).

48.3.1.1.4 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.

48.3.1.1.5 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.

48.3.1.1.6 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 IAP, or standard operating procedures.

48.3.1.1.7 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.

48.3.1.2 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

48.3.2 Competencies — Analyzing the Incident. (Reserved)

48.3.3 Competencies — Planning the Response.

48.3.3.1 Given the IAP 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.

48.3.3.2 Given the IAP 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 could require clinical intervention skills and/or equipment.

48.3.4 Competencies — Implementing the Planned Response.

48.3.4.1* Given the IAP 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

48.3.4.2* Given the IAP 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) Calcium chloride
(6) Amyl nitrite
(7) Sodium nitrite
(8) Sodium thiosulphate
(9) Hydroxocobalamin
(10) Methylene blue
(11) Sodium bicarbonate
(12) Naloxone
(13) Dimercaprol
(14) Polyethylene glycol
(15) Zinc EDTA
(16) Calcium EDTA
(17) Prussian blue
(18) Water
(19) Magnesium sulfate
(20) Prednisone
(21) Tetracaine (pontocaine)

48.3.4.3 Given the IAP 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

48.3.5 Competencies — Evaluating Progress.

48.3.5.1 The following features of the rehabilitation process shall be evaluated:

(1) Rehabilitation delegated from IC to a member and 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) Monitoring of activity levels that include, but are not limited to, length of time on air/within protective clothing
(5) Environmental conditions monitored in and around the rehabilitation area
(6) 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

48.3.5.2 Describe the following situations that could require medical intervention:

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

48.3.6 Competencies — Terminating the Incident. (Reserved)

48.4 Mission-Specific Competencies — Advanced Life Support (ALS) Responder Assigned to Treatment of Smoke Inhalation Victims.

48.4.1 General.

48.4.1.1 Introduction.

48.4.1.1.1 The ALS responder assigned to treatment of smoke inhalation victims shall be trained to meet at least the competencies of the Operations Level Responders as defined in Chapter 6, and all competencies of this section.

48.4.1.1.2 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.

48.4.1.2 Goal.

48.4.1.2.1 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 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 care 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 could be candidates for hyperbaric therapy.
(b) Identify receiving hospitals with Food and Drug Administration FDA-approved or authorized 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 emergency 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 or authorized 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.

48.4.2 Competencies — Analyzing the Incident.

48.4.2.1 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 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

48.4.2.2 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 identify those patients who might require clinical interventions, including antidotes for associated cyanide poisoning.

48.4.3 Competencies — Planning to Deliver ALS Patient Care.

48.4.3.1 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 or authorized cyanide antidotes
(8) Hospitals or medical centers with the capability of performing whole blood cyanide testing

48.4.4 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.

48.4.5 Competencies — Evaluating Progress. (Reserved)

48.4.6 Competencies — Terminating the Incident.

48.4.6.1 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.1.1 The committee recognizes that emergency services organizations might have to invest considerable resources to provide the equipment and training needed to respond to incidents involving hazardous materials or weapons of mass destruction (WMD) in a safe and efficient manner. The committee does not mean to imply that organizations with limited resources cannot provide response services, only that the

individuals charged with responsibilities are qualified to specific levels according to this standard.

Outside the United States, hazardous materials might be called dangerous goods (see Annex E). Weapons of mass destruction (WMD) are known by many different abbreviations and acronyms, including CBRNE (chemical, biological, radiological, nuclear, explosive), B-NICE (biological, nuclear, incendiary, chemical, explosive), COBRA (chemical, ordinance, biological, radiological agents), and NBC (nuclear, biological, chemical).

A.1.2.2.3 Organization and management responsibilities should be addressed by the agency that personnel represent. The authority having jurisdiction should define the agency requirements for progression to positions of management responsibility.

A.1.2.2.5 The committee recognizes the importance of formal and continuing education and training programs to ensure that personnel at the various response levels — awareness, operations, operations mission-specific, Hazardous Materials Technician, and Incident Commander — have maintained and updated the necessary skills and knowledge for the level of qualification. Continuing education and training programs can be developed or administered by local, state, provincial, or federal agencies as well as by professional associations and accredited institutions of higher education. The methods of learning would include areas of technology, refresher training, skills practices, and knowledge application to standards. The subject matter should directly relate to the requirements of this standard.

A.1.2.3.1 The CDC categories of bioterrorism diseases and agents are as follows (for more information, see the CDC website 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 US 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.1.3 Any AHJs incorporating NFPA 1072, NFPA 472, NFPA 473, or any combination of the three, can replace references to those standards with the applicable chapters in NFPA 470 and still reference the similar content. For example, if an AHJ incorporated the 2017 edition of NFPA 1072 (i.e., in accordance with the 2017 edition of NFPA 1072) and wishes to update to the latest information, the AHJ can do so by incorporating odd numbered Chapters 5 through 1345 of the 2022 edition of NFPA 470 (i.e., in accordance with odd numbered Chapters 5 through 45 of the 2022 edition of NFPA 470).

A.1.3.1.2 It is recommended, where practical, that evaluators be individuals who were not directly involved as instructors for the requirement being evaluated.

A.1.3.1.8 Remaining professionally competent is important for any practitioner in a field. In the rapidly changing and developing field of the fire service this is particularly important. The AHJ could consider establishing a path by which members can demonstrate continued JPR compliance and competency through continuing education or practice within the field consistent with current duties. It is recommended that any such program consider the following factors:

(1) Demonstrated and documented knowledge and competence of additions and/or revisions to the latest edition of the standards
(2) Documented training and education (including online) related to the standards since the last certification
(3) Documented experience in the field (i.e., emergency operational experience for firefighters, fire officers, instructors)
(4) Demonstrated and documented successful performance of duties, which might include skills assessment
(5) Annual performance appraisals

(6) Documented teaching and instruction related to the field
(7) Commendations, awards, and/or recognition for the performance of related duties

Other items for consideration can include the following:

(1) Memberships in professional organizations, including any positions held or special activities involved in the organization membership
(2) Published articles in trade journals, web-based publications, and other information distribution avenues
(3) Research and development activities related to the field
(4) Documented attendance at relevant conferences and training events
(5) Requirements for annual refresher training vary between different countries based on regulations (currently existing within the hazardous materials emergency response community in the United States: an annual refresher training requirement under OSHA 29 CFR 1910.120(q) and US EPA 40 CFR 311)

The preceding list is not all inclusive and other factors specific to the field should be considered for inclusion.

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.3.2.4 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 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 authority having jurisdiction (AHJ). Can also be referred to as a technical specialist or subject matter expert (SME).

A.3.3.7 Backup Team. The size of a backup team can be increased based on the number of members in the entry team or if the risk assessment indicates the need for additional technicians. The backup team should wear the same class PPE/CPC as the entry team unless approved by the Incident Commander based on a risk assessment for the specific hazard and documented in the incident action plan. Structural firefighter protective clothing, NFPA 1994 Class 5 gear, NFPA 2112, or other ensembles not designed for chemical protection should only be used for flammable environments where the chemical is not toxic via skin exposure (see NFPA 1891 for specific guidance on selection of protective ensembles for Hazmat/CBRN environments). The protective ensembles meet the requirements of NFPA 1994, incorporated in the 2022 edition of NFPA 1990.

Based on the hazard-specific risk assessment the backup team might need to be on air and in close proximity to the entry team, but not within the hazardous area of the hot zone, whenever the backup team is physically a long distance from where the entry team is working, or the entry team will be operating in a large building, or the entry team will be operating above grade or below grade. The backup team should commence entry toward the stricken entry team member within one minute of an entry team member declaring a mayday. When the backup team needs to be deployed further toward the hot zone, a second backup team should be ready to go 90 percent dressed.

The backup team could be used to assist the entry team if help is needed assisting with equipment requests or more hands on task like working on top of a rail car. If a backup team goes in to assist the entry team another backup team is put in place. If the entry team mission cannot be completed by the initial entry team the backup team can become the next entry team after a briefing where mission tasks are identified, and another backup team is in place. The backup team should possess any equipment necessary to support safe and effective removal operations for a member in PPE/CPC [rescue dragging device, explosion-proof (XP) hand lights, spare SCBA cylinder with buddy hose, suit cutter, etc.]. The backup team is not a rapid intervention team (RIT) or rapid intervention crew (RIC).

Refer to NFPA 1006, 1407, 1410, 1500, 1521, 1710, and 1720 for additional information on the definitions of RIT and RIC.

A.3.3.8.1 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.3.3.12 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.3.3.13 Confined Space. Additionally, a confined space is further defined as having one or more of the following characteristics:

(1) The area contains or has the potential to contain a hazardous atmosphere, including an oxygen-deficient atmosphere.
(2) The area contains a material with the potential to engulf a member.
(3) The area has an internal configuration such that a member could be trapped by inwardly converging walls or a floor that slopes downward and tapers to a small cross section.
(4) The area contains any other recognized serious hazard.

A.3.3.14.1 Bulk Transportation Containers. While MEGCs were originally certified only for nonrefrigerated compressed gases, they are also used for other nonrefrigerated liquefied compressed gases. Note that these are all higher pressure products.

A.3.3.14.7 Radioactive Materials Containers. *Excepted packaging* is used to transport materials with extremely low levels of radioactivity that meet only general design requirements for any hazardous material. Excepted packaging ranges from a product's fiberboard box to a sturdy wooden or steel crate, and typical shipments include limited quantities of materials, instruments, and articles such as smoke detectors. Excepted packaging will contain non-life-endangering amounts of radioactive material.

Industrial packaging is used to transport materials that present limited hazard to the public and the environment. Examples of these materials are contaminated equipment and radioactive waste solidified in materials such as concrete. This packaging is grouped into three categories based on the strength of packaging: IP-1, IP-2, and IP-3. Industrial packaging will contain non-life-endangering amounts of radioactive material.

Type A packaging is used to transport radioactive materials with concentrations of radioactivity not exceeding the limits established in 49 CFR 173.431. Typically, Type A packaging has an inner containment vessel made of glass, plastic, or metal and packing material made of polyethylene, rubber, or vermiculite. Examples of materials shipped in Type A packaging include radiopharmaceuticals and low-level radioactive wastes. Type A packaging will contain non-life-endangering amounts of radioactive material.

Type B packaging is used to transport radioactive materials with radioactivity levels higher than those allowed in Type A packaging, such as spent fuel and high-level radioactive waste. Limits on activity contained in Type B packaging are provided in 49 CFR 173.431. Type B packaging ranges from small drums [55 gal (208 L)] to heavily shielded steel casks that sometimes weigh more than 100 tons (90.7 metric tonnes). Type B packaging can contain potentially life-endangering amounts of radioactive material.

Type C packaging is used for consignments transported by aircraft of high-activity radioactive materials that have not been certified as "low dispersible radioactive material" (including plutonium). They are designed to withstand severe accident conditions associated with air transport without loss of containment or significant increase in external radiation levels. The Type C packaging performance requirements are significantly more stringent than those for Type B packaging. Type C packaging is not authorized for domestic use but can be authorized for international shipments of high-activity radioactive material consignments. Regulations require that both Type B and Type C packaging be marked with a trefoil symbol to ensure that the package can be positively identified as carrying radioactive material. The trefoil symbol must be resistant to the effects of both fire and water so that it is likely to survive a severe accident and serve as a warning to emergency responders.

The performance requirements for Type C packaging include those applicable to Type B packaging with enhancements on some tests that are significantly more stringent than those for Type B packaging. For example, a 200 mph (321.8 km/hr) impact onto an unyielding target is required instead of the 30 ft (9.1 m) drop test required for Type B packaging; a 60-minute fire test is required instead of the 30-minute test for Type B packaging; and a puncture/tearing test is required. These stringent tests are expected to result in packaging designs that will survive more severe aircraft accidents than Type B packaging designs.

A.3.3.19 Decontamination. There are three types of decontamination (also known as "decon") performed by emergency responders: emergency, mass, and technical.

Gross decontamination is performed on the following:

(1) Team members before their technical decontamination
(2) Emergency responders before leaving the incident scene
(3) Victims during emergency decontamination
(4) Persons requiring mass decontamination
(5) Personal protective equipment used by emergency responders before leaving the scene

A.3.3.19.1 Emergency Decontamination. This process can be as simple as removal of outer or all garments from the person to washing down with water from a fire hose or emergency safety shower. The sole purpose is to quickly separate as much of the contaminant as possible from the person to minimize exposure and injury.

A.3.3.19.2 Gross Decontamination. Victims of a hazardous material release that is potentially life threatening due to continued exposure from contamination are initially put through a gross decontamination, which will significantly reduce the amount of additional exposure. This is usually accomplished by mechanical removal of the contaminant or initial rinsing from handheld hose lines, emergency showers, or other nearby sources of water. Responders operating in a contaminated zone in personal protective equipment (PPE) are put through gross decontamination, which will make it safer for them to remove the PPE without exposure and for members assisting them.

A.3.3.19.3 Mass Decontamination. Mass decontamination is initiated where the number of victims and time constraints do not allow the establishment of an in-depth decontamination process.

Mass decontamination should be established at once to reduce the harm being done to the victims by the contaminants. Initial operations are most often performed with handheld hose lines or master streams supplied from fire apparatus while a more formal process is being set up. A formal technical decontamination might be necessary if it is determined through detection, observation, or concern that the initial emergency decontamination was not effective. For example, this could be the case for victims exposed to a radiological dispersal device (RDD) or an aerosolized biological agent.

A.3.3.19.4 Technical Decontamination. Technical decontamination is the process subsequent to gross decontamination designed to remove contaminants from responders, their equipment, and victims. It is intended to minimize the spread of contamination and ensure responder safety. Technical decontamination is normally established in support of emergency responder entry operations at a hazardous materials incident, with the scope and level of technical decontamination based on the type and properties of the contaminants involved. In non-life-threatening contamination incidents, technical decontamination can also be used on victims of the initial release. Examples of technical decontamination methods are the following:

(1) Absorption
(2) Adsorption
(3) Chemical degradation
(4) Dilution
(5) Disinfecting
(6) Evaporation
(7) Isolation and disposal
(8) Neutralization
(9) Solidification
(10) Sterilization
(11) Vacuuming
(12) Washing

The specific decontamination procedure to be used at an incident is typically selected by a Hazardous Materials Technician *(see 11.3.3)* and is subject to the approval of the Incident Commander.

A.3.3.21 Demonstrate. This performance can be supplemented by simulation, explanation, illustration, or a combination of these.

A.3.3.28 Entry Team. The size of an entry team could be increased based on the risk assessment or tasks to be performed. The level of PPE/CPC is based on risk assessment and approved by the Incident Commander.

A.3.3.33 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.3.3.36 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. Containers used for fissile material are designed and tested to prevent a fission reaction from occurring during normal transport conditions as well as hypothetical accident conditions.

A.3.3.37 Harm. Harm can adversely affect life, property, and the environment. Every hazardous materials/WMD response should be handled using a systematic process that identifies the potential threat(s) or hazard(s) early and throughout the process. If responders can identify the hazard and the potential harm, they can take steps to protect the public, the community, and all responders. The identification of harm is critical to protective action decisions throughout the incident.

A.3.3.38 Hazard. A hazard is a condition involving a hazardous material/WMD incident's product, container, or environment that can cause harm. The relationship between hazard and harm is a cause and effect relationship. If the hazard can be identified through a comprehensive analysis, then the harm can be anticipated, and protective actions can be implemented to lower vulnerabilities and reduce risk. "Hazard" and "threat" are sometimes used synonymously. A "threat" is generally an individual or group attempting or executing an intentional act that is likely to cause harm. Threats, hazards, and harms are not always the same for all incidents. These vary based on the facts, the science, and the circumstances of the incident.

A.3.3.39 Hazard Control Zones. Law enforcement agencies might use different terminology for site control, for example, *inner* and *outer* perimeters as opposed to *hot* and *cold* zones. The Operations Level Responder should be familiar with the terminology and procedures used by the authority having jurisdiction (AHJ) and coordinate on-scene site control operations with law enforcement. Many terms are used to describe these control zones; however, for the purposes of this standard, zones are defined as hot, warm, and cold zones.

The establishment and maintenance of hazard control zones is a continuous process that should be re-evaluated throughout the incident. Environmental monitoring is a critical element of this process. Among the factors that should be considered when establishing hazard control zones are the following:

(1) Chemical and physical properties of the product(s)
    (a) Radioactivity
    (b) Corrosivity
    (c) Oxygen concentrations
    (d) Reactivity
    (e) Flammability
    (f) Toxicity
(2) Atmospheric conditions
    (a) Temperature
    (b) Humidity
    (c) Wind direction and speed
    (d) Dewpoint
(3) Geographical topography
    (a) Indoors
    (b) Outdoors
(4) State of the product
    (a) Solid
    (b) Liquid
    (c) Gas
(5) Container
    (a) Design and construction
    (b) Mechanism of damage
    (c) Damage assessment
(6) Life safety issues
(7) Available resources
(8) Environmental concerns

A.3.3.39.4 Warm Zone. The warm zone includes control points for the decontamination corridor, thus helping to reduce the spread of contamination. This support can include staging of backup personnel and equipment, staging of evidence, and personnel and equipment decontamination. Additionally, portions of this area can be used as a safe refuge for initial patient evacuation and triage.

A.3.3.40 Hazardous Material. In United Nations model codes and regulations, hazardous materials are called *dangerous goods*.

See also 3.3.70 and A.3.3.88, Weapons of Mass Destruction (WMD).

A.3.3.41 Hazardous Materials Branch/Group. This function is directed by a Hazardous Materials Officer and deals principally with the technical aspects of the incident.

A.3.3.42 Hazardous Materials Response Team (HMRT). The team members respond to releases or potential releases of hazardous materials/WMD for the purpose of control or stabilization of the incident.

A.3.3.43 Hazardous Materials Technician. This person might have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the authority having jurisdiction (AHJ).

A.3.3.48 Incident Objectives. Incident objectives focus on protecting lives; reducing the immediate hazard; protecting property, critical infrastructure, and the environment; establishing situational control; and restoring normal operations. They are necessary for the selection of strategy(s) and tactical activities of resources for an incident. Incident objectives are derived from the management goals or incident priorities of the authority having jurisdiction (AHJ).

Incident objectives are developed and approved by the Incident Commander and should be attainable and measurable, yet flexible enough to allow for strategic and tactical alternatives. They should be designed using the S.M.A.R.T. method: Specific, Measurable, Achievable, Realistic, and Time-Based.

Example: Incident Objective — To contain and stop the leak in the #14 propylene tank in the mixing room by 18:00 hours today.

A.3.3.49 Job Performance Requirements (JPR). See Annex B for further information.

A.3.3.51 Mayday. Any member can declare a mayday when these conditions exist. Early identification of a mayday situation is critical. The member declaring a mayday should announce "MAYDAY, MAYDAY, MAYDAY" to ensure priority radio traffic. The member should speak clearly and slowly to make sure that they are heard. Without unkeying the mic, the member should provide the following information:

(1) Who: Your identity
(2) What: The cause of the mayday
(3) Where: Your current location
(4) Needs: What is needed that will help resolve the mayday

The member should stay calm and begin self-assessment/self-rescue techniques, conserve their air and activate their PASS device if that will help the mayday situation, and maintain radio contact with command. Command will immediately acknowledge the mayday and initiate the mayday protocol by activating both the backup team and rescue team. Command will order all other hazmat team members to switch to an alternate radio frequency to prevent interference on the mayday frequency. When a mayday is declared, another backup team should be formed immediately.

A.3.3.55.1 Nonintervention Mode. This operating mode is typically employed after a risk-based response evaluation determines that the risk to emergency responders is greater than the benefit of operating in a defensive or offensive mode.

A.3.3.55.2 Defensive Mode. This operating mode is typically employed when a risk-based response evaluation determines that some risk to emergency responders is justified to safely complete the incident objectives.

A.3.3.55.3 Offensive Mode. This operating mode is typically employed when a risk-based response evaluation determines that the increased risk to emergency responders is justified to safely complete the incident objectives.

A.3.3.60 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.

A.3.3.61.1 Emergency Response Plan (ERP). Emergency response plans can be developed at organizational and governmental levels (agency, local, state, regional, provincial, territorial, tribal, and federal).

A.3.3.61.2 Incident Action Plan (IAP). It can include the identification of operational resources and assignments. It can also include attachments that provide direction and important information for management of the incident during one or more operational periods.

A.3.3.61.2.1 Action Plan. The creation of action plans supports incident response actions and tasks. Some action plans are initially verbal and later might be written. Action plans include, but are not limited to, the incident site safety and control plan, the communications and medical plans, the decontamination plan, the hazard mitigation plan, the rescue plan, the evidence sampling plan, and so forth. These plans might not correspond with a specific ICS form or other formal planning document. Responders who assume decision-making roles within an incident command system should possess the knowledge and skills to create action plans involving the strategies, tactics, and tasks necessary to accomplish the incident objectives safely.

A.3.3.61.3 Site Safety and Control Plan. Reflective of the incident objectives identified in the IAP, the site safety and control plan is used to communicate incident conditions, incident hazards, and branch operations to the hazardous materials team during the safety briefing. Components of a typical site safety and control plan include an overview of the hazardous materials branch organization; personnel assignments; summary of incident hazards, both physical and chemical; branch tactical objectives; site control practices; identification of personal protective equipment or ensembles; hazardous materials branch communications; identification of decontamination practices and medical care; and monitoring of the identified hazards.

A.3.3.62 Planned Response. The following site safety plan considerations are from the EPA's *Standard Operating Safety Guides*:

(1) Site description
(2) Entry objectives
(3) On-site organization
(4) On-site control
(5) Hazard evaluations
(6) Personal protective equipment
(7) On-site work plans
(8) Communication procedures
(9) Decontamination procedures
(10) Site safety and health plan

A.3.3.65 Protective Clothing. Protective clothing is divided into four types:

(1) Ballistic protective clothing
(2) Chemical-protective clothing
    (a) Liquid splash–protective clothing
    (b) Vapor-protective clothing
(3) High temperature–protective clothing
(4) Structural firefighting protective clothing

A.3.3.65.1 Ballistic Protective Clothing (BPC). Personal body armor is classified into five types (IIA, II, IIIA, III, and IV) by level of ballistic performance in the National Institute of Justice's Standard 0101.06 for Ballistic Resistance of Body Armor. The hierarchy of protection, from highest to lowest, is Type IV (armor piercing rifle), Type III (Rifles), Type IIIA (.357 SIG and .44 Magnum), Type II (9 mm and .357 Magnum), and Type IIA (9 mm and .40 S&W). The classification of any armor panels providing two or more levels of protection at different locations receives the typing of the minimum ballistic protection provided.

A.3.3.65.2 Chemical-Protective Clothing (CPC). Chemical-protective clothing (garments) can be constructed as a single- or multipiece garment. The garment can completely enclose the wearer either by itself or in combination with the wearer's respiratory protection, attached or detachable hood, gloves, and boots.

A.3.3.65.2.1 Liquid Splash–Protective Ensemble. Ensembles and ensemble elements certified against NFPA 1991, 1992, and 1994 provide varying levels of liquid splash protection. The hierarchy of protection, from highest to lowest, against chemical splash from liquids is NFPA 1991, NFPA 1994 Class 1, NFPA 1994 Class 2, NFPA 1992, NFPA 1994 Class 3, NFPA 1994 Class 5, and NFPA 1994 Class 4. Traditional "EPA Level B" garments are certified against NFPA 1992. The protective ensembles meet the requirements of NFPA 1991, 1992, and 1994, incorporated in the 2022 edition of NFPA 1990.

A.3.3.65.2.2 Vapor-Protective Ensemble. Ensembles certified against NFPA 1991 and NFPA 1994 provide varying levels of vapor protection. The hierarchy of protection, from highest to lowest, against chemical vapors is NFPA 1991, NFPA 1994 Class 1, NFPA 1994 Class 2, and NFPA 1994 Class 3. OSHA recognizes NFPA 1991 and NFPA 1994 Class 1 as "EPA Level A" chemical protection. The protective ensembles meet the requirements of NFPA 1991, 1992, and 1994, incorporated in the 2022 edition of NFPA 1990.

A.3.3.65.3 High Temperature–Protective Clothing. This type of clothing is usually of limited use in dealing with chemical commodities; however, it could be recommended for limited situations where the chemical flammability hazard supersedes the dermal toxicity hazard. Ensembles certified against NFPA 1951, NFPA 1971, NFPA 1977, and NFPA 2112 are often used for their flame resistance properties.

A.3.3.65.4 Structural Firefighting Protective Clothing. Structural firefighting protective clothing provides limited protection from heat but might not provide adequate protection from the harmful gases, vapors, liquids, or dusts that are encountered during hazardous materials/WMD incidents. However, there are times when structural firefighting protective clothing could be recommended for use when the chemical flammability hazard supersedes the dermal toxicity hazard.

A.3.3.67 Public Safety Bomb Technician. In the US, civilian Public Safety Bomb Technicians are those who are trained at the FBI Hazardous Devices School.

A.3.3.71 Rescue Team. The rescue team should be prepared to receive the stricken member from the backup team within one minute of activation unless otherwise instructed by incident command. The rescue team should be responsible for initiating emergency decontamination and life-saving measures immediately after handoff by the backup team. The rescue team possesses the equipment required to rescue the member from the chemical protective clothing such as suit cutters. The rescue team hands off the stricken member to EMS. A rescue team should be considered on all hazardous materials/WMD incidents.

A.3.3.72 Respiratory Protection. Respiratory protection is divided into four types:

(1) Self-contained breathing apparatus (should meet the requirements of NFPA 1981 or NFPA 1986, which also incorporate the Statement of Standard for NIOSH CBRN SCBA Testing)
(2) Supplied air respirators
(3) Powered air-purifying respirators (should meet the Statement of Standard for NIOSH CBRN PAPR Testing)
(4) Air-purifying respirators (should meet the Statement of Standard for NIOSH CBRN APR Testing)

A.3.3.73 Response. The activities in the response portion of a hazardous materials/WMD incident include analyzing the incident, planning the response, implementing the planned response, evaluating progress, and terminating the emergency phase of the incident.

A.3.3.74 Risk. The term *risk* is a probability of a dangerous or adverse condition. The level of risk is variable and will change from incident to incident. Factors that influence the level of risk include the hazardous nature of the materials involved, the quantity of the material involved, containment systems and the type of stress applied to the container, proximity of exposures, environmental conditions, and the availability of adequate resources. Every incident requires that risk be determined early in the response and throughout the incident until termination. It is the foundation of a risk-based response.

The process of determining risk can generally be broken down into the following four main steps:

(1) Identify the threat or the hazard and whether it is accidental or intentional — the cause typically involves the product, container, or environment.
(2) Assess vulnerability.
    (a) Identify the harm caused by the hazard and protect against that harm.
    (b) Consider time, distance, shielding, and detection.
    (c) Assess the capabilities and limitations of equipment and personnel.
(3) Evaluate the consequences of implementing an operational mode: defensive, offensive, or nonintervention.
(4) Estimate the likelihood of occurrence — subjective, but based on a focused analysis, experience, and history.

A.3.3.75 Risk-Based Response. A risk-based response is not a procedural, or linear, response process. A risk-based response is a continual process and begins on arrival and ends at transfer of command or termination. Consideration of the facts, science, and circumstances of the incident is applied to every

element of the process. A risk-based response considers all aspects of the hazard or threat through a comprehensive analysis of the problem and an assessment of the hazard or threat. With the hazard or threat identified, responders can plan the best possible actions within the capabilities and limitations of the response team. Continuous evaluation of the effectiveness of the incident action plan (IAP) is conducted, and adjustments are made to the plan to provide the best possible outcome.

Responders should consider the facts, science, and circumstances of the incident throughout the following four main stages of the risk-based response:

(1) Analyze the problem — assess the hazards and consequences.
(2) Plan the response — determine incident objectives, strategies, and tactics.
(3) Implement the planned response.
(4) Evaluate the effectiveness of actions — adjust as necessary.

A.3.3.76 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 in 1992. It replaces 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 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.3.3.77 Sampling. During a hazardous materials incident, sampling can be used to determine requirements for public protective actions, decontamination, medical treatments, mitigation, or other related functions.

The collection of evidence for the purposes of investigation is a form of sampling that has extensive enhanced requirements determined by the law enforcement authority having jurisdiction (AHJ).

A.3.3.82 Strategies. Strategies are developed or approved by the Incident Commander or designee, such as the Operations Section Chief, Branch Directors, or the Hazmat Group Supervisor, depending on the size of the incident.

A.3.3.84 Tactics. Tactics are developed and approved by Company Officers, Unit Leaders, single resource units, or individual responders or resources.

A.3.3.86 UN/NA Identification Number. United Nations (UN) numbers are four-digit numbers used in international commerce and transportation to identify hazardous chemicals or classes of hazardous materials. These numbers generally range between 0000 and 3500 and usually are preceded by the letters "UN" (e.g., "UN1005") to avoid confusion with number codes.

North American (NA) numbers are identical to UN numbers. If a material does not have a UN number, it may be assigned an NA number. These usually are preceded by "NA" followed by a four-digit number starting with 8 or 9.

A.3.3.88 Weapon of Mass Destruction (WMD). The United Nations (UN) describes weapons of mass destruction (WMD) as constituting a class of weaponry with the potential to produce in a single moment an enormous destructive effect capable of killing millions of civilians, jeopardizing the natural environment, and fundamentally altering the lives of future generations through their catastrophic effects; cause death or serious injury of people through toxic or poisonous chemicals; disseminate disease-causing organisms or toxins to harm or kill humans, animals, or plants; and deliver nuclear explosive devices, chemical, biological, or toxin agents to use them for hostile purposes or in armed conflict. Examples of agents include the following:

(1) *Chemical terrorism agents* are materials used to inflict lethal or incapacitating casualties, generally on a civilian population, and include chemical warfare agents and toxic industrial chemicals:
    (a) *Chemical warfare agents* are solid, liquid, gaseous, and vapor agents, including, but not limited to, GB (Sarin), GD (Soman), HD (sulfur mustard), and VX.
    (b) *Toxic industrial chemicals* include chlorine and ammonia, which have been identified as mass casualty threats.
(2) *Biological terrorism agents* are liquid or particulate agents that can consist of a biologically derived toxin or pathogen to inflict lethal or incapacitating casualties, such as bacteria, viruses, or the toxins derived from biological material.
(3) *Radiological particulate terrorism agents* are particles that emit ionizing radiation in excess of normal background levels used to inflict lethal or incapacitating casualties, generally on a civilian population, as the result of a terrorist attack.

A.3.3.88.1 Radiological Weapons of Mass Destruction. The intent of this 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.3.3.88.1.1 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 could spread and deposit over very large areas. 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 radiological dispersal device (RDD).

A.3.3.88.1.2 Radiation Exposure Device (RED). An RED (used interchangeably with the terms *radiological exposure device* or *radiation emitting device*) is a device consisting of radioactive material, either as a sealed source or as material within some type of container or radiation-generating device, that causes harm by exposure to ionizing radiation.

A.3.3.88.1.3 Radiological Dispersal Device (RDD). An RDD is any device that intentionally spreads radioactive material across an area with the intent to cause harm, without a nuclear explo-

sion 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 by hand.

A.3.4.2.1.3 Operations Level Responders. The source of this definition is OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response." These responders can have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the authority having jurisdiction (AHJ).

A.3.4.4.1 Hazardous Materials Officer. This individual might also serve as a technical specialist for incidents that involve hazardous materials/WMD. The *National Incident Management System (NIMS)* identifies this person as the Hazardous Materials Branch Director/Supervisor.

A.3.4.4.2 Hazardous Materials Safety Officer. The Hazardous Materials Safety Officer will be called on to provide technical advice or assistance regarding safety issues to the Hazardous Materials Officer and Incident Safety Officer at a hazardous materials/WMD incident. The National Incident Management System (NIMS) identifies this person as the Assistant Safety Officer — Hazardous Materials.

A.3.4.4.3 Incident Commander (IC). This position is equivalent to the on-scene Incident Commander as defined in OSHA 1910.120(8), "Hazardous Waste Operations and Emergency Response." The Incident Commander (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.3.4.5.1 Specialist Employee A. Consistent with the organization's emergency response plan and/or standard operating procedures, the Specialist Employee A is able to analyze an incident involving chemicals within the organization's area of specialization, plan a response to that incident, implement the planned response within the capabilities of the resources available, and evaluate the progress of the planned response. Specialist Employees are those persons who, in the course of their regular job duties, work with or are trained in the hazards of specific chemicals or containers within their organization's area of specialization. In response to emergencies involving hazardous materials/WMD in their organization's area of specialization, they could be called on to provide technical advice or assistance to the Incident Commander relative to specific chemicals or containers for chemicals. Specialist Employees should receive training or demonstrate competency in their area of specialization annually. Specialist Employees also should receive additional training to meet applicable DOT, OSHA, EPA, and other appropriate state, local, or provincial occupational health and safety regulatory requirements. Specialist Employees respond to hazardous materials/WMD incidents under differing circumstances. They respond to incidents within their facility, inside and outside their assigned work area, and outside their facility. Persons responding away from the facility or within the facility outside their assigned work area respond as members of a Hazardous Materials Response Team or as Specialist Employees as outlined in this definition and in Chapter 14. When responding to incidents away from their assigned work area, Specialist Employees should be permitted to perform only at the response level at which they have been trained.

Persons responding to a hazardous materials/WMD incident within their work area are not required to be trained to the levels specified by this chapter. Persons within their work area who have informed the incident management structure of an emergency as defined in the emergency response plan who have adequate personal protective equipment and adequate training in the procedures they are to perform and who have employed the buddy system can take limited action in the danger area (e.g., turning a valve) before the emergency response team arrives. The limited action taken should be addressed in the emergency response plan. Once the emergency response team arrives, these persons should be restricted to the actions that their training level allows and should operate under the incident command structure.

A.3.4.5.2 Specialist Employee B. Because of the employee's education, training, or work experience, the Specialist Employee B can be called on to respond to incidents involving specific chemicals or containers. The Specialist Employee B can be used to gather and record information, provide technical advice, and provide technical assistance (including work within the hot zone) at the incident consistent with the organization's emergency response plan and/or standard operating procedures and the emergency response plan. *(See 3.4.5.2.)*

A.3.4.5.3 Specialist Employee C. Consistent with the organization's emergency response plan and/or standard operating procedures, the Specialist Employee C can be called on to gather and record information, provide technical advice, and/or arrange for technical assistance. A Specialist Employee C does not enter the hot or warm zone at an emergency. *(See 3.3.39.)*

A.4.2.3 It is the intent of this standard that the Awareness Level Personnel be taught the noted competency to a specific task level. This task level is required to have knowledge of the contents of the current edition of the DOT *Emergency Response Guidebook* or other reference material provided.

Awareness Level Personnel should be familiar with the information provided in those documents so they can use it to assist with accurate notification of an incident and take protective actions.

If other sources of response information, including the MSDS, are provided to the hazardous materials/WMD responder at the awareness level in lieu of the current edition of the DOT *Emergency Response Guidebook*, the responder should identify hazard information similar to that found in the current edition of the DOT *Emergency Response Guidebook*.

Methods for determining the appropriate guidebook page include the following:

(1) Numerical index for UN/NA identification numbers (yellow-bordered pages)
(2) Alphabetical index for chemical names (blue-bordered pages)
(3) Table of Markings, Labels, and Placards
(4) Container identification charts

A.4.3 No competencies are currently required at this level.

A.4.4.1 Jurisdictions that have not developed an emergency response plan can refer to the National Response Team (NRT) document NRT-1, *Hazardous Materials Emergency Planning Guide*.

The National Response Team, composed of 15 federal agencies having major responsibilities in environmental, transporta-

tion, emergency management, worker safety, and public health areas, is the national body responsible for coordinating federal planning, preparedness, and incident tactics related to oil discharges and hazardous substance releases.

Under the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986, the NRT is responsible for publishing guidance documents for the preparation and implementation of hazardous substance emergency plans.

A.4.4.1(3)(c) These include, but are not limited to, thermal, mechanical, poisonous, corrosive, asphyxiating, radiation, biological, and psychological.

A.4.4.1(3)(d) General routes of entry for human exposure are contact, absorption, inhalation, and ingestion. Absorption includes entry through the eyes and through punctures.

A.4.4.1(4) If other sources of response information, including the SDS, are provided to the hazardous materials/WMD responder at the awareness level in lieu of the current edition of the DOT *Emergency Response Guidebook*, the responder should identify response information similar to that found in the current edition of the DOT *Emergency Response Guidebook*.

A.4.4.1(5)(c) "In-place protection," "shelter-in-place," and "protection in-place" all mean the same thing.

A.4.5 No competencies are currently required at this level.

A.4.6 No competencies are currently required at this level.

A.5.1.2 Awareness Level Personnel include public works employees, maintenance workers, and others who might see or encounter an incident involving hazardous materials/WMD occur while performing their regular assignment.

A.5.2 While the purpose of the JPR is to require the *Emergency Response Guidebook* (ERG) as the minimum reference at the awareness level, other reference sources can be provided as necessary, including an equivalent guide to the ERG; safety data sheets (SDS); manufacturer, shipper, and carrier (highway, rail, water, air, and pipeline) documents (shipping papers) and contacts; and the DOT Chart–16, *Hazardous Materials Markings, Labeling and Placarding Guide*. If provided, responders should be able to use these sources to accomplish the goals of the JPR.

In transportation, the name, placard applied, or identification number of the material provides access to information in the ERG or an equivalent document.

A.5.2.1(A) The requisite knowledge in this section is derived from the competencies in Section 4.1.

Instructors should include indicators of terrorist attacks and other potentials, emphasizing that "if you can smell it, taste it, or feel it, you are now (or might be) part of the problem."

While this is a minimum requirement, the AHJ has the option to select additional information from the operations chapter (Chapter 5) regarding container and hazard information as necessary, based on local conditions and circumstances.

Awareness Level Personnel should be able to match the hazard classes and divisions with the primary hazards and examples.

Indicators of the presence of hazardous materials include occupancy and locations, including facilities and transportation; container shape (general shape of the container); container owner/operator signage; placards and labels; markings, including NFPA 704 markings, military markings, transportation markings such as identification number marks, marine pollutant marks, elevated temperature marks, commodity markings, inhalation hazard marks, and pipe and pipeline markings and colors; GHS markings; shipping papers and emergency response information and SDS; and sensory clues (dead birds or fish, color of vapors, unusual odors, sheen, hissing noise, dead vegetation, etc.). Other items, such as fume hood exhaust stacks and vents on the exterior of a building, could indicate hazardous materials and can be identified in advance through pre-incident survey activities.

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 in 1992. It replaces 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.5.2.1(B) These requisite skills can be assessed through cognitive testing.

A.5.3 People not directly involved in emergency response operations should be kept away from the hazard area, and control should be established over the area of operations. Unprotected emergency responders should not be allowed to enter the isolation zone.

At the awareness level, approved reference sources include the current edition of the *Emergency Response Guidebook* (ERG), safety data sheets (SDS), shipping papers with emergency response information, and other approved reference sources.

A.5.3.1(A) The requisite knowledge in this section is derived from the competencies in Section 4.4.

Recommended precautions found on numbered guides in the ERG include public safety issues; recommended protective clothing; evacuation; emergency response to fire, spill, and leak; and first aid sections.

Examples of required knowledge include (1) precautions for providing emergency medical care to victims; typical ignition sources; ways hazardous materials/WMD are harmful to people, the environment, and property; general routes of entry for human exposure; emergency action (fire, spill, or leak; first aid); actions recommended not to be performed (e.g., closing of pipeline valves); protective actions (isolation of area and denial of entry, evacuation, shelter-in-place); size and shape of recommended initial isolation and protective action distances; difference between small and large spills; conditions that require the use of the ERG Table of Initial Isolation and Protective Action Distances and the isolation distances in the ERG numbered guide; techniques for isolating the hazard area and denying entry to unauthorized persons; how to recognize and protect evidence; and use of approved tools and equipment; (2) basic personal protective actions: staying clear of vapors, fumes, smoke, and spills; keeping vehicle at a safe distance from the scene; approaching from upwind, uphill, and upstream; and (3) types of protective actions and their purpose

(e.g., isolate hazard area and deny entry, evacuation, and shelter-in-place); basic factors involved in the choice of protective actions (e.g., hazardous materials/WMD involved, population threatened, and weather conditions).

A.5.3.1(B) The requisite skills can be assessed through cognitive testing.

A.5.4.1(A) The requisite knowledge in this section is derived from the competencies in 4.4.2.

A.6.1.1.1 Operations Level Responders need only be trained to meet the competencies in Chapter 6. The competencies listed in Chapter 8 (mission-specific competencies) are not required and should be viewed as optional at the discretion of the AHJ based on an assessment of local risks. The purpose of Chapter 8 is to provide a more effective and efficient process so that the AHJ can match the expected tasks and duties of its personnel with the required competencies to perform those tasks. Table A.6.1.1.1 is a sample Operations Level Responder matrix.

Table A.6.1.1.1 is designed to help users of this standard determine which competencies in Chapters 6 and 8 can be utilized to ensure that Operations Level Responders have the appropriate knowledge and skills to perform their expected tasks. These competencies are above the competencies contained in Chapter 6 and are optional. This matrix is provided only as a sample. The selection of competencies should always be based on the expected mission and tasks, as assigned by the AHJ.

A.6.1.1.3 Operations Level Responders who are expected to perform additional missions should work under the direction of a Hazardous Materials Technician, a written emergency response plan or standard operating procedures, or an allied professional.

A.6.1.2.2 Operations Level Responders can respond either as an individual or as a member of a unit/team operating under the direction of a supervisor. Regardless of how Operations Level Responders respond to a hazardous materials/WMD incident, the following tasks should be completed:

(1) Predict the likely behavior of a hazardous material/WMD and its container, including hazards associated with that behavior.
(2) Estimate the potential outcomes hard at a hazardous materials/WMD incident.

Table A.6.1.1.1 Operations Level Responder Matrix

	Competencies						
Responders	Use PPE	Perform Technical or Mass Decontamination*	Perform Product Control	Perform Air Monitoring	Perform Victim Rescue and Removal	Preserve Evidence and Perform Sampling	Respond to Illicit Lab Incident
Firefighters expected to perform basic defensive product control measures	X	X	X	—	—	—	—
Emergency responders assigned to a decontamination company or decontamination strike force	X	X	—	—	—	—	—
Emergency responders assigned to a unit tasked with providing rapid rescue and extraction from a contaminated environment	X	X	—	X	X	—	—
Emergency responders assigned to provide staffing or support to a Hazardous Materials Response Team	X	X	X	X	X	—	—
Law enforcement personnel involved in investigation of criminal events where hazardous materials are present	X	X	—	X	—	X	X
Law enforcement personnel involved in investigation of incidents involving illicit laboratories	X	X	—	X	—	X	X
Public health personnel involved in the investigation of public health emergencies	X	X	—	—	—	X	—
Environmental health and safety professionals who provide air monitoring support	X	X	—	X	—	—	—

*The scope of the decontamination competencies would be based on whether the mission involves the responder being the "customer" of the decontamination services being provided or is part of those responders who are responsible for the set-up and implementation of the decontamination operation.

A.6.2.1 The survey of the incident should include an inventory of the type of containers involved, identification markings on containers, quantity in or capacity of containers, materials involved, release information, and surrounding conditions. The accuracy of the data should be verified.

A.6.2.1.1.1 Examples should include all containers, including nonbulk packaging, bulk packaging, vessels, and facility containers such as piping, open piles, reactors, and storage bins.

A.6.2.1.3.2 Examples of pest control product registration numbers include the US EPA registration number, Canadian PCP registration number, or an equivalent.

A.6.2.1.6 Examples of indicators involving laboratories include narcotics, explosives, and chemical and biological laboratories.

A.6.2.3 Predicting the likely behavior of a hazardous material and its container requires the ability to identify the types of stress involved and the ability to predict the type of breach, release, dispersion pattern, length of contact, and the health and physical hazards associated with the material and its container. References can be made to the National Fire Academy program, *Hazardous Materials Incident Analysis,* or the *Fire Protection Handbook* chapter titled "Managing the Response to Hazardous Material Incidents."

A.6.2.3(1)(a) Bioterrorism Agent Categories. The CDC has separated biological threat agents into three categories, depending on how easily they can be spread and the severity of illness or death they cause. Category A agents are considered the highest risk and Category C agents are those that are considered emerging threats for disease.

Category A

These high-priority agents include organisms or toxins that pose the highest risk to the public and national security for the following reasons:

(1) They can be easily spread or transmitted from person to person.
(2) They result in high death 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

These agents are the second highest priority for the following reasons:

(1) They are moderately easy to spread.
(2) They result in moderate illness rates and low death rates.
(3) They require specific enhancements of CDC's laboratory capacity and enhanced disease monitoring.

Category C

These third highest priority agents include emerging pathogens that could be engineered for mass spread in the future for the following reasons:

(1) They are easily available.
(2) They are easily produced and spread.
(3) They have potential for high morbidity and mortality rates and major health impact.

Examples of Category A priority pathogens are as follows:

(1) *Bacillus anthracis* (anthrax)
(2) *Clostridium botulinum toxin* (botulism)
(3) *Yersinia pestis* (plague)
(4) Variola major (smallpox) and other related pox viruses
(5) *Francisella tularensis* (tularemia)
(6) Viral hemorrhagic fevers (Arenaviruses, Junin, Machupo, Guanarito, Chapare Lassa, Lujo)
(7) Bunyaviruses (Hantaviruses causing Hanta Pulmonary syndrome, Rift Valley Fever, Crimean Congo Hemorrhagic Fever)
(8) Flaviviruses (Dengue)
(9) Filoviruses (Ebola, Marburg)

Examples of Category B priority pathogens are as follows:

(1) *Burkholderia pseudomallei* (melioidosis)
(2) *Coxiella burnetii* (Q fever)
(3) *Brucella species* (brucellosis)
(4) *Burkholderia mallei* (glanders)
(5) *Chlamydia psittaci* (Psittacosis)
(6) Ricin toxin (Ricinus communis)
(7) Epsilon toxin (Clostridium perfringens)
(8) Staphylococcus enterotoxin B (SEB)
(9) Typhus fever (Rickettsia *prowazekii*)
(10) Food- and waterborne pathogens
(11) Bacteria (Diarrheagenic E.coli, Pathogenic Vibrios, Shigella species, Salmonella, Listeria monocytogenes, Campylobacter jejuni, Yersinia enterocolitica)
(12) Viruses (Caliciviruses, Hepatitis A)
(13) Protozoa *(Cryptosporidium parvum, Cyclospora cayatanensis, Giardia lamblia, Entamoeba histolytica, Toxoplasma gondii, Naegleria fowleri, Balamuthia mandrillaris)*
(14) Fungi (Microsporidia)
(15) Mosquito-borne encephalitis viruses [West Nile virus (WNV), LaCrosse encephalitis (LACV), California encephalitis, Venezuelan equine encephalitis (VEE), Eastern equine encephalitis (EEE), Western equine encephalitis (WEE), Japanese encephalitis virus (JE), St. Louis encephalitis virus (SLEV)]

Examples of Category C priority pathogens are as follows:

(1) Nipah and Hendra viruses
(2) Additional hantaviruses
(3) Tickborne hemorrhagic fever viruses
    (a) Bunyaviruses [Severe Fever with Thrombocytopenia Syndrome virus (SFTSV), Heartland virus]
    (b) Flaviviruses (Omsk Hemorrhagic Fever virus, Alkhurma virus, Kyasanur Forest virus)
(4) Tickborne encephalitis complex flaviviruses
    (a) Tickborne encephalitis viruses
    (b) European subtype
    (c) Far Eastern subtype
    (d) Siberian subtype
    (e) Powassan/Deer Tick virus
(5) Yellow fever virus
(6) Tuberculosis, including drug-resistant TB
(7) Influenza virus
(8) Other Rickettsias
(9) Rabies virus
(10) Prions
(11) Chikungunya virus
(12) Coccidioides spp.

(13) Severe acute respiratory syndrome associated coronavirus (SARS-CoV), MERS-CoV, and other highly pathogenic human coronaviruses
(14) Antimicrobial resistance, excluding research on sexually transmitted organisms, unless the resistance is newly emerging
  (a) Research on mechanisms of antimicrobial resistance
  (b) Studies of the emergence and/or spread of antimicrobial resistance genes within pathogen populations
  (c) Studies of the emergence and/or spread of antimicrobial-resistant pathogens in human populations
  (d) Research on therapeutic approaches that target resistance mechanisms
  (e) Modification of existing antimicrobials to overcome emergent resistance
(15) Antimicrobial research, as related to engineered threats and naturally occurring drug-resistant pathogens, focused on development of broad-spectrum antimicrobials

More information on bioterrorism agents can be located at https://emergency.cdc.gov/bioterrorism/overview.asp.

The example listing of agents is referenced from http://www.niaid.nih.gov/topics/biodefenserelated/biodefense/pages/cata.aspx.

A.6.2.3(3) The five ways in which containers can breach are disintegration, runaway cracking, closures opening up, punctures, and splits or tears. The performance objectives contained in 6.2.3(3) through 6.2.3(5) should be taught in a manner and language understandable to the audience. The intent is to convey the simple concepts that containers of hazardous materials/WMD under stress can open up and allow the contents to escape. This refers to both pressurized and nonpressurized containers. This content release will vary in type and speed. A pattern will be formed by the escaping product that will possibly expose people, the environment, or property, creating physical and/or health hazards. This overall concept is often referred to as a *general behavior model* and is used to estimate the behavior of the container and its contents under emergency conditions.

A.6.2.3(4) The four ways in which containment systems can release their contents are detonation, violent rupture, rapid relief, and spill or leak.

A.6.2.3(5) Seven dispersion patterns can be created upon release of agents: hemisphere, cloud, plume, cone, stream, pool, and irregular.

A.6.2.3(6) The three general time frames for predicting the length of time that an exposure can be in contact with hazardous materials/WMD in an endangered area are short-term (minutes and hours), medium-term (days, weeks, and months), and long-term (years and generations).

A.6.2.3(7) The health and physical hazards and their associated types of harm anticipated during a hazardous materials/WMD incident are determined by a comprehensive evaluation of risks within the jurisdiction or community.

A.6.2.4 The process for estimating the potential outcomes within an endangered area at a hazardous materials/WMD incident includes determining the dimensions of the endangered area; estimating the number of exposures within the endangered area; measuring or predicting concentrations of materials within the endangered area; estimating the physical, health, and safety hazards within the endangered area; identifying the areas of potential harm within the endangered area; and estimating the potential outcomes within the endangered area.

A.6.2.4(1) Resources for determining the size of an endangered area of a hazardous materials/WMD incident are the current edition of the DOT *Emergency Response Guidebook* and plume dispersion modeling results from facility pre-incident plans.

A.6.2.4(4) The factors for determining the extent of physical, health, and safety hazards within an endangered area at a hazardous materials/WMD incident are surrounding conditions, an indication of the behavior of the hazardous materials/WMD and its container, and the degree of hazard.

A.6.3.4(1) The minimum requirement for respiratory protection at hazardous materials/WMD incidents (emergency operations until concentrations have been determined) is positive pressure self-contained breathing apparatus (SCBA).

The respiratory hazards presented by the hazardous materials to which the first responder at the operational level might be exposed can vary widely. A risk-based method of selecting respiratory protection is therefore needed.

For most materials, positive pressure SCBA is appropriate and readily available. However, lower-risk incidents such as a powder spilled from an envelope might warrant downgrading respiratory protection to air-purifying respirators, in accordance with protocols set out by the AHJ.

Similarly, long-duration reduced-risk activities such as mass decontamination might warrant downgrading respiratory protection to powered air-purifying respirators or supplied-air respirators. Choices in respiratory protection are many and must be matched to the risk faced by the responder.

In all cases, the respiratory protective device should be approved under the applicable respiratory protection program legislation such as 29 CFR 1910.134 or local equivalent. Where exposure to chemical, biological, or radiological warfare agents is possible, the respiratory protective device should have CBRN certification under NIOSH or under a local equivalent agency in jurisdictions where NIOSH does not apply.

A.6.3.5 Refer to the *Hazardous Materials/Weapons of Mass Destruction Response Handbook*.

A.6.4.1(4) Refer to the *Hazardous Materials/Weapons of Mass Destruction Response Handbook*.

A.6.4.1(5) Refer to NIOSH/OSHA/USCG/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*.

A.6.4.1(5)(b) The following are examples of such hazards:

(1) Secondary events intended to incapacitate or delay emergency responders
(2) Armed resistance
(3) Use of weapons
(4) Booby traps
(5) Secondary contamination from handling patients

A.6.4.2 Preservation of evidence is essential to the integrity and credibility of an incident investigation. Preservation techniques must be acceptable to the law enforcement agency having jurisdiction; therefore, it is important to get their agreement ahead of time for the techniques that are set out in the local emergency response plan or the organization's standard operating procedures.

General procedures to follow for these types of incidents include the following:

(1) Secure and isolate any incident area where evidence is located. This can include discarded personal protection equipment, specialized packaging (shipping or workplace labels and placards), biohazard containers, glass or metal fragments, containers (e.g., plastic, pipes, cylinders, bottles, fuel containers), and other materials that appear relevant to the occurrence, such as roadway flares, electrical components, fluids, and chemicals.
(2) Leave fatalities and body parts in place and secure the area in which they are located.
(3) Isolate any apparent source location of the event (e.g., blast area, spill release point).
(4) Leave in place any explosive components or housing materials.
(5) Place light-colored tarpaulins on the ground of access and exit corridors, decontamination zones, treatment areas, and rehabilitation sectors to allow possible evidence that might drop during decontamination and doffing of clothes to be spotted and collected.
(6) Secure and isolate all food vending locations in the immediate area. Contaminated food products will qualify as primary or secondary evidence in the event of a chemical or biological incident.

The collection (as opposed to preservation) of evidence is usually conducted by law enforcement personnel, unless other protocols are in place. If law enforcement personnel are not equipped or trained to enter the hot zone, Hazardous Materials Technicians should be trained to collect samples in such a manner as to maintain the integrity of the samples for evidentiary purposes and to document the chain of evidence.

A.6.4.3 Jurisdictions that have not developed an emergency response plan can refer to the National Response Team document NRT-1, *Hazardous Materials Emergency Planning Guide*.

The National Response Team, composed of 16 federal agencies having major responsibilities in environmental, transportation, emergency management, worker safety, and public health areas, is the national body responsible for coordinating federal planning, preparedness, and tactics related to oil discharges and hazardous substance releases.

Under the Superfund Amendments and Reauthorization Act of 1986, the NRT is responsible for publishing guidance documents for the preparation and implementation of hazardous substance emergency plans.

A.6.4.3(4)(a) The Incident Safety Officer monitors incident operations and advises the Incident Commander on all matters relating to incident health and safety of emergency responder personnel. The safety officer has emergency authority to stop and/or prevent unsafe acts during incident operations.

On a hazardous materials incident the safety officer or an assistant safety officer must be trained and familiar with the operations, strategies, and tactics being deployed within the hazardous materials group's scope of operations.

The Hazardous Materials Assistant Safety Officer reports to the Incident Commander or safety officer (if activated) and coordinates with the hazardous materials group supervisor or hazardous materials branch director (if activated). The Hazardous Materials Assistant Safety Officer coordinates safety-related activities directly relating to the hazardous materials group operations as mandated by 29 CFR 1910.120 and applicable state and local laws. This position advises the hazardous materials group supervisor (or hazardous materials branch director) on all aspects of health and safety, continuously monitors for modifying conditions, and has the authority to stop or prevent unsafe acts. It is mandatory that a Hazardous Materials Assistant Safety Officer be appointed at all hazardous materials incidents. The Hazardous Materials Assistant Safety Officer does not act as the safety officer for the overall incident.

A.6.4.4(6) NPFA 1891 is the selection, care, and maintenance standard for chemical protective clothing. Requirements for inspection are included in Chapter 6. Requirements for cleaning and decontamination are in Chapter 7.

A.6.6 No competencies are currently required at this level.

A.7.2 At the operations level, approved reference sources should include, as a minimum, the *Emergency Response Guidebook* (ERG), safety data sheets (SDS), shipping papers, including emergency response information, and other approved reference sources such as CHEMTREC, CANUTEC, and SETIQ; governmental authorities; and manufacturers, shippers, carriers (highway, rail, water, air, and pipeline), and contacts.

A.7.2.1(A) The requisite knowledge in this section is derived from the competencies in 6.2.1.

At the operations level, responders should be able to recognize the following containers and identify them by name: rail tank cars (pressure, nonpressure, and cryogenic tank cars); highway cargo tanks (compressed gas tube trailers, corrosive liquid tanks, cryogenic tanks, dry bulk cargo tanks, high-pressure tanks, low-pressure chemical tanks, and nonpressure liquid tanks); UN portable tanks/intermodal tanks (nonpressure, pressure, cryogenic, and tube modules); storage tanks (nonpressure, pressure, and cryogenic storage tanks); piping and pipelines; intermediate bulk containers (IBC) and ton containers; radioactive materials packages (excepted, industrial, Type A, and Type B packages); and nonbulk containers (bags, carboys, cylinders, drums, and Dewar flasks for cryogenic liquids).

To ensure that Operations Level Responders also understand how to obtain information pertaining to a pipeline-involved incident, line markers or pipeline markers are added to supplement the list of information sources. In a pipeline incident, the pipeline markers would be the source of information used since no shipping papers, placards, UN numbers, or other information would be available.

Hazardous materials incident survey information. This includes location, weather conditions, topography, populated buildings, bodies of water, other buildings, remedial actions taken, container/package, contents, release, container damage, time of day, and other factors that help determine the scope of the problem.

Physical and chemical properties. Predicting the behavior of hazardous materials/WMD relies on understanding certain characteristics of the material. Information identifying the following characteristics should be collected and interpreted: boiling point, chemical reactivity, corrosivity (pH), flammable (explosive) range [LFL (LEL) and UFL(UEL)], flash point, ignition (autoignition) temperature, particle size, persistence, physical state (solid, liquid, gas), radiation (ionizing and nonionizing), specific gravity, toxic products of combustion, vapor density, vapor pressure, and water solubility.

Identifying hazards. The process for predicting/identifying the behavior of a hazardous material/WMD and its container under emergency conditions is based on the simple concepts that containers of hazardous materials/WMD under stress can open up and allow the contents to escape. The release of contents will vary in type and speed. A dispersion pattern will be formed by the escaping contents, potentially exposing people, the environment, or property to physical and health hazards.

This overall concept for identifying the likely behavior of a container and its contents under emergency conditions is often referred to as a general behavior model. The general behavior model considers the type of stress on the container involved and the potential type of breach, release, dispersion pattern, length of contact, and the health and physical hazards associated with the material and its container, as follows:

(1) *Stress.* The three types of stress that could cause a container to release its contents are thermal stress, mechanical stress, and chemical stress.
(2) *Breach.* The five ways in which containers can breach are disintegration, runaway cracking, closures opening up, punctures, and splits or tears.
(3) *Release.* The four ways in which containment systems can release their contents are detonation, violent rupture, rapid relief, and spill or leak.
(4) *Dispersion.* Seven dispersion patterns can be created upon release of agents: hemisphere, cloud, plume, cone, stream, pool, and irregular.
(5) *Contact.* The three general time frames for predicting the length of time that an exposure can be in contact with hazardous materials/WMD in an endangered area are short term (minutes and hours), medium term (days, weeks, and months), and long term (years and generations).
(6) *Hazards.* The six primary health and physical hazards that could cause these types of harm in a hazardous materials/WMD incident include, but are not limited to, thermal, radiation, asphyxiation, chemical, biological, and mechanical.

Identifying outcomes. The process for identifying the potential harm and associated outcomes within an endangered area at a hazardous materials/WMD incident includes identifying the size and shape of the endangered area, the number of exposures (people, property, environment, and major systems) within the endangered area, and the physical, health, and safety hazards within the endangered area as determined from approved resources.

Resources for determining the size of an endangered area of a hazardous materials/WMD incident are the current edition of the ERG and plume dispersion modeling results from facility pre-incident plans.

The factors for determining the extent of physical, health, and safety hazards within an endangered area at a hazardous materials/WMD incident are victim presentation (including nonclinical indicators or clues of a material's presence), surrounding conditions, indication of the behavior of the hazardous material and its container, and the degree of hazard.

A.7.2.1(B) The requisite skills can be assessed through cognitive testing.

A.7.3 At the operations level, approved information sources should include a minimum of ERG; SDS; CHEMTREC, CANUTEC, or SETIQ; local, state, and governmental authorities; and manufacturers', shippers', and carriers' documents (shipping papers) and contacts.

A.7.3.1(A) The requisite knowledge in this section is derived from the competencies in Section 9.3

Modes of operation are offensive, defensive, and nonintervention and include the following:

(1) Common strategies, for example, product control; fire control; protection of people, the environment, and property; identification and isolation; evidence protection; rescue; recovery; and termination
(2) Common tactics, for example, spill control, leak control, foam, control exposures, evacuation, isolation, shelter-in-place, and establishment of product control zones
(3) Contamination types: primary, secondary, and tertiary

A.7.3.1(B) The requisite skills can be assessed through cognitive testing.

A.7.4 Operations Level Responders should be able to identify their role during hazardous materials/WMD incidents as specified in the emergency response plan and/or standard operating procedures; the levels of hazardous materials/WMD incidents as defined in the emergency response plan; the purpose, need, benefits, and elements of the incident command system for hazardous materials/WMD incidents; the duties and responsibilities of the Incident Safety Officer and Hazardous Materials Branch or Group; considerations for determining the location of the incident command post; procedures for requesting additional resources; and the role and strategies of other responding agencies.

Preliminary Exposure Reduction

Over the past decade, research has been published linking higher rates of cancer in fire service personnel to repeated, chronic exposure to the by-products of smoke and particulates from structure fires. Various studies have proven that firefighters are experiencing higher rates of certain types of cancers and that they are more likely to have rare forms of cancers than the general population. See NIOSH *Study of Cancer among U.S. Fire Fighters* at www.cdc.gov/niosh/firefighters/ffcancerstudy.html.

The fire service has begun to adapt to these findings by changing organizational practices in order to minimize exposures to known and suspected carcinogenic by-products in structure fires. Evolving adaptations include decontamination processes relating to fireground activities. Changes include, but are not limited to, forced air and water decontamination of structural firefighting PPE, modifying station practices, such as mandating that structural PPE be laundered after exposure to fire contaminants, and personal hygiene changes, such as mandating personnel to shower as soon as possible after inte-

rior firefighting activities at structure fires. In some instances, fire departments are assigning hazardous materials response assets to structure fire incidents to assist with scene (field) decontamination tasks.

During the recent meeting of the NFPA Technical Committee on Hazardous Materials Response Personnel (HCZ-AAA), lengthy discussions regarding the role of emergency responders during field decontamination practices took place. These discussions led the technical committee to a decision that expanded technical language was needed in relation to JPRs. Secondly, the committee decided that decontamination management does fit within one or more of the technical documents under the purview of the committee. Of specific focus was NFPA 1072. A small task group was formed to further research this subject and develop suggested language for possible inclusion into the upcoming version of NFPA 1072, which is currently in the second draft phase.

On January 19, 2016, the task group met via teleconference and determined that information about the previously referenced decontamination practices does indeed fall within the scope of the JPRs that have been developed as part of NFPA 1072. The task group reached a consensus that additional language should be crafted and inserted into the working copy of the second draft in support of the fire service's efforts to reduce or prevent cancer among firefighters. The task group believes that the expanded information should be added to the existing language that deals with the use of PPE. The three specific areas include gross decontamination, action plan implementation, and decontamination.

As more information becomes available and this movement gains momentum and as best practices are developed, it is projected that field decontamination of personnel will remain a high priority as will the means for minimizing firefighter exposures to carcinogens. As such, it is incumbent upon the fire service that such practices become standardized and documented to ensure that the goals of supporting firefighter health and safety are met by the broadest base of fire service organizations. If the referenced recommendations are accepted by the technical committee, it will place the NFPA in a position to play an integral role in addressing firefighter decontamination and cancer concerns.

A.7.4.1(A) The requisite knowledge in this section is derived from the competencies in Section 9.4.

Evidence preservation. Preservation of evidence is essential to the integrity and credibility of an incident investigation. Preservation techniques must be acceptable to the law enforcement agency having jurisdiction; therefore, it is important to get that agency's input ahead of time on the techniques specified in the AHJ emergency response plan or the organization's standard operating procedures.

General procedures for preserving evidence include the following:

(1) Secure and isolate any incident area where evidence is located. This can include discarded personal protection equipment, specialized packaging (shipping or workplace labels and placards), biohazard containers, glass or metal fragments, containers (e.g., plastic, pipes, cylinders, bottles, fuel containers), and other materials that appear relevant to the occurrence, such as roadway flares, electrical components, fluids, and chemicals.
(2) Leave fatalities and body parts in place and secure the area in which they are located.
(3) Isolate any apparent source location of the event (e.g., blast area, spill release point).
(4) Leave in place any explosive components or housing materials.
(5) Place light-colored tarpaulins on the ground of access and exit corridors, decontamination zones, treatment areas, and rehabilitation sectors to allow possible evidence that might drop during decontamination and doffing of clothes to be spotted and collected.
(6) Secure and isolate all food vending locations in the immediate area. Contaminated food products will qualify as primary or secondary evidence in the event of a chemical or biological incident.

The collection (as opposed to preservation) of evidence is usually conducted by law enforcement personnel, unless other protocols are in place. If law enforcement personnel are not equipped or trained to enter the hot zone, Hazardous Materials Technicians should be trained to collect samples in such a manner as to maintain the integrity of the samples for evidentiary purposes and to document the chain of evidence.

Safety precautions. Safety precautions should include buddy systems, backup systems, accountability systems, safety briefing, and evacuation/escape procedures. The following items should be considered in a safety briefing prior to allowing personnel to work at hazardous materials/WMD incidents:

(1) Preliminary evaluation
(2) Hazard identification
(3) Description of the site
(4) Task(s) to be performed
(5) Length of time for task(s)
(6) Required PPE
(7) Monitoring requirements
(8) Notification of identified risk

A.7.4.1(B) The Operations Level Responder should implement the incident command system as required by the AHJ by completing the following requirements:

(1) Identify the role of the Operations Level Responder during hazardous materials/WMD incidents as specified in the emergency response plan and/or standard operating procedures
(2) Identify the levels of hazardous materials/WMD incidents as defined in the emergency response plan
(3) Identify the purpose, need, benefits, and elements of the incident command system for hazardous materials/WMD incidents
(4) Identify the duties and responsibilities of the following functions within the incident command system:
    (a) Incident Safety Officer
    (b) Hazardous materials branch or group
(5) Identify the considerations for determining the location of the incident command post for a hazardous materials/WMD incident
(6) Identify the procedures for requesting additional resources at a hazardous materials/WMD incident
(7) Describe the role and strategies of other agencies that respond to hazardous materials/WMD incidents

A.7.5.1(A) The requisite knowledge in this section is derived from the competencies in 10.3.5.

A.7.6 All responders should understand why their efforts must be evaluated. If they are not making progress, the plan must be re-evaluated to determine why. The evaluation should include what changes have occurred with the circumstances of the incident (behavior of container or its contents).

To decide whether the actions being taken at an incident are effective and the incident objectives are being achieved, the responder must determine whether the incident is stabilizing or increasing in intensity. Factors to be considered include reduction of potential impact to persons or the environment and status of resources available to manage the incident. The evaluation should take place upon initiation of the IAP, and the IC/unified command and general staff should constantly monitor the status of the incident. The actions taken should be leading to a desirable outcome, with minimal loss of life and property. Changes in the status of the incident should influence the development of the IAP for the next operational period.

A.7.6.1(A) The requisite knowledge in this section is derived from the competencies in Section 6.5.

Remaining in the immediate vicinity of an incident when nothing can be done to mitigate it and the situation is about to deteriorate is pointless. If flames are impinging on an LP-Gas vessel, for example, and providing the necessary volume of water to cool it is impossible, it would be prudent to withdraw to a safe distance. ICs should always evaluate the benefit of operations against the risk. Refer to the ERG or other references to determine appropriate action to be taken under the circumstances.

A.7.6.1(B) The proper methods for communicating the status of the planned response lie within the guidelines of the ICS and are dictated by the incident-specific IAP. The ICS identifies two types of communication at an incident, formal and informal. Formal communication should be used for all policy-related communication, using the ICS principles of unity of command and chain of command, while maintaining span of control. Ideally, all critical information should be communicated face-to-face.

The format for communications within the ICS must be established by the IC/unified command with input from the general staff.

A procedure should be established to allow responders to notify the IC immediately when conditions become critical and personnel are threatened. For example, the notification could take the form of a pre-established emergency radio message or tone that signifies danger, or it might be repeated blasts on an air horn. The message should not be delayed while responders try to locate a specific person in the chain of command.

A.8.1.1.1 Operations Level Responders need only be trained to meet the competencies in Chapter 6. All of the competencies listed in Chapter 9 (mission-specific competencies) are not required and should be viewed as optional at the discretion of the AHJ based on an assessment of local risks. The purpose of Chapter 8 is to provide a more effective and efficient process so that the AHJ can match the expected tasks and duties of its personnel with the required competencies to perform those tasks.

A.8.1.1.3 Additional training sources might include, but are not limited to, local, regional, national, and international emergency response training agencies and organizations.

A.8.2.3.1(1) A written PPE program should be established in accordance with 29 CFR 1910.120 and NFPA 1981. Elements of the program should include PPE selection and use; storage, maintenance, and inspection; and training consideration.

The responder must be provided with appropriate respiratory and dermal protection from suspect or known hazards. The amount of protection required is material and hazard specific. The protective ensembles must be sufficiently strong and durable to maintain protection during operations. According to 29 CFR 1910.120(q)(3)iii, the individual in charge of the ICS ensures that the personal protective ensemble worn is appropriate for the hazards to be encountered.

Currently, no single personal protective ensemble can protect the wearer from exposure to all hazards. It is important that the appropriate combination of respirator, ensemble, and other equipment be selected based on a hazard assessment at the scene.

The OSHA/EPA categories of PPE are defined in 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response" (HAZWOPER), Appendix B, as follows:

(1) Level A — To be selected when the greatest level of skin, respiratory, and eye protections is required
(2) Level B — To be selected when the highest level of respiratory protection is necessary but a lesser level of skin protection is needed
(3) Level C — To be selected when the concentration(s) and type(s) of airborne substances are known and the criteria for using air-purifying respirators (APRs) are met

While these definitions provide guidelines and a framework for discussing PPE, the descriptive narrative in these levels does not set minimum performance criteria required for specific threats, such as chemical permeation resistance and physical property characteristics. Thus the use of these general levels of protection does not accurately describe the protective ability of such ensembles and does not ensure that the wearer is adequately protected from any specific hazards. Relying solely on these nomenclatures could result in exposure above acceptable exposure limits, or an unnecessary reduction in operational effectiveness through lack of mobility, decreased dexterity, or reduced operational mission duration. Proper selection of PPE for emergency response should be based on a careful assessment of the following two factors:

(1) The expected hazards and anticipated exposures to be present at the scene
(2) The probable impact of those hazards based on the mission role of the emergency response organization

Homeland Security Presidential Directive (HSPD) 8 defines PPE in terms of nationally recognized standards and NIOSH standards. The NFPA standards require third-party certification of products; product manufacturers cannot claim compliance with them unless their product is fully certified and listed and labeled by an independent third-party certification organization in accordance with the standard. The NIOSH standards require government certification and product manufacturers cannot claim compliance with them unless their product is certified, listed, and labeled by NIOSH. Several of these standards have already been officially adopted by the Department of Homeland Security.

The following information is provided to assist emergency response organizations in transitioning from levels A, B, and C

to compliant protection-based standards terminology. Because the OSHA/EPA levels are expressed in more general terms than the standards and do not include testing to determine protection capability, it is not possible to map the levels to specific standards. However, it is possible to look at specific configurations and suggest their OSHA/EPA level based on the definitions provided above.

Table A.8.2.3.1(1) is provided to assist emergency response organizations in transitioning from the OSHA/EPA Levels A, B, and C to compliant protection-based standards terminology. Because the OSHA/EPA levels are expressed in more general terms than the standards and do not include testing to determine protection capability, it is not possible to "map" those levels to specific standards. However, it is possible to look at specific configurations and infer their OSHA/EPA levels based on the definitions of those levels. Examples of ensembles and conservative interpretations of their corresponding levels are provided in Table A.8.2.3.1(1).

Emergency response organizations are cautioned to examine their hazard and mission requirements closely and select appropriate performance standards. All PPE should be employed in accordance with federal OSHA standards, including those in 29 CFR 1910, Subpart H — "Hazardous Materials" (including 29 CFR 1910.120 — "Hazardous Waste Operations and Emergency Response"); 29 CFR 1910, Subpart I — "Personal Protective Equipment" (including 29 CFR 1901.134 — "Respiratory Protection") that include requirements for safety and health plans, medical evaluation, and training.

Table A.8.2.3.1(1) Protective Clothing Standards That Correspond to OSHA/EPA Levels

Ensemble Description Using Performance-Based Standard(s)	OSHA/EPA Level
NFPA 1991 worn with NFPA 1981 or NFPA 1986 SCBA	A
NFPA 1994 Class 1 worn with NFPA 1981 or NFPA 1986 SCBA	A
NFPA 1994 Class 2/2R worn with NFPA 1981 or NFPA 1986 SCBA	B
NFPA 1992 worn with NFPA 1981 or NFPA 1986 SCBA	B
NFPA 1994 Class 2/2R worn with NIOSH CBRN APR or PAPR	C
NFPA 1992 worn with NIOSH CBRN APR or PAPR	C
NFPA 1994 Class 3/3R worn with NFPA 1981 or NFPA 1986 SCBA	B
NFPA 1994 Class 3/3R worn with NIOSH CBRN APR or PAPR	C
NFPA 1994 Class 4/4R worn with NFPA 1981 or NFPA 1986 SCBA	B
NFPA 1994 Class 4/4R worn with NIOSH CBRN APR or PAPR	C
NFPA 1994 Class 5 worn with NFPA 1981 or NFPA 1986 SCBA	B
NFPA 1994 Class 5 worn with NIOSH CBRN APR or PAPR	C

Note: NFPA 1991, 1992, and 1994 have been incorporated in the 2022 edition of NFPA 1990.

A.8.2.3.1(4)(d) Phase change technology creates a constant temperature vest and is a completely unique body management device. The unique cooling formulation encapsulated in an anatomically designed device makes a change in minutes from a clear liquid to a semisolid, white waxy form and maintains a temperature of 59°F (15°C). Unlike the extremely cold temperatures of ice and gel, the higher temperature formulation in these devices works in harmony with the body. When an energized cool vest is worn, the cool phase change material absorbs the excessive heat the body creates when wearing protective clothing or encapsulating suits.

A.8.3.1.1.4 Additional training opportunities can be available through local and state law enforcement, public health agencies, the Federal Bureau of Investigation (FBI), the Drug Enforcement Administration (DEA), and the Environmental Protection Agency (EPA).

A.8.4.1.1.4 See A.8.3.1.1.4.

A.8.8.1.1.4 See A.8.3.1.1.4.

A.8.9.1.1.4 See A.8.3.1.1.4.

A.8.11.1.2.2(3) Examples of operational procedures include, but are not limited to, the FBI Hazardous Devices School "logic tree" and the current edition of the National Bomb Squad Commanders Advisory Board's (NBSCAB) "A Model for Bomb Squad Standard Operating Procedures."

A.8.11.3.1(1)(b) NFPA 1891 is the selection, care, and maintenance standard for chemical protective clothing. It covers the selection, inspection, testing, cleaning, decontamination, service, repair, storage, retirement, documentation, and records necessary for a chemical protective clothing program. Annex B in NFPA 1891 contains the selection matrix for hazardous materials/WMD/emergency medical operations protective clothing.

A.8.11.3.4 *National Guidelines for Bomb Technicians,* FBI Bomb Data Center Special Technicians Bulletin 87-4, provides PPE selection criteria specific to disablement/disruption of IEDs. NFPA 1891 provides the guidance on the selection of PPE for hazardous materials emergencies and CBRN incidents. The two documents, together, should be evaluated when selecting PPE for explosive devices.

A.8.11.4.1(3) In the United States, the FBI Hazardous Devices School "logic tree" and Special Technicians Bulletin 2010-1, *A Model for Bomb Squad Standard Operating Procedures*, are used.

A.8.12.2.1(1) Examples include, but are not limited to, Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response Compensation and Liability Act (CERCLA, aka "Superfund"), and Superfund Amendment and Reauthorization Act (SARA).

A.9.1.6 Operations Level Responders need only be trained to meet the competencies in Chapter 5. All the competencies listed in Chapter 6 (mission-specific competencies) are not required for qualification as Operations Level Responders and should be viewed as optional at the discretion of the AHJ, based on an assessment of local risks. The purpose of Chapter 6 is to provide a more effective and efficient process so that the AHJ can match the expected tasks and duties of its personnel with the required competencies to perform those tasks.

A.9.1.7 Although some of the mission-specific JPRs in this chapter are taken from Chapter 7 of NFPA 472, the technical

committee wants to clearly state that Operations Mission-Specific Responders are not replacements for or qualified as Hazardous Materials Technicians. Operations Mission-Specific Responders can perform some technician skills, but they do not have the broader skills and competencies required of a Hazardous Materials Technician, particularly regarding risk assessment and the selection of control options. The following two options are examples of how guidance can be provided to ensure that Operations Mission-Specific Responders do not go beyond their level of training and equipment:

Direct guidance. Operations Mission-Specific Responders are working under the control of a Hazardous Materials Technician or an allied professional who has the ability to (1) continuously assess and/or observe their actions and (2) provide immediate feedback. Guidance by a Hazardous Materials Technician or an allied professional can be provided through direct visual observation or through assessment reports communicated by the Operations Mission-Specific Responders to them.

Written guidance. Written standard operating procedures or similar guidance should clearly state the rules of engagement for Operations Mission-Specific Responders' competency. Emphasis should be placed on the following:

(1) Tasks expected of Operations Level Responders
(2) Tasks beyond the capability of Operations Level Responders
(3) Required PPE and equipment to perform the expected tasks
(4) Procedures for ensuring coordination within the AHJ ICS

A.9.2 At this level, PPE refers to personal protective equipment that would be used in situations where contact with hazardous materials/WMD is possible or expected. Such equipment can include chemical-protective clothing, bomb suits, respirators, or other equipment that typically would not be worn by Operations Level Responders. Specialized PPE also refers to Operations Level Responders' PPE that requires changes to donning, doffing, and usage procedures — for example, taping gaps in firefighter protective clothing, doffing in a decontamination corridor, or working in the hot zone as a member of a buddy system. Personnel should be able to describe the types of PPE available and the options for thermal hazards, radiological hazards, asphyxiation hazards, chemical hazards, biological hazards, and mechanical hazards. *(See also A.9.1.7.)*

A.9.2.1 NFPA 1891 is the selection, care, and maintenance standard for chemical protective clothing. It covers the selection, inspection, testing, cleaning, decontamination, service, repair, storage, retirement, documentation, and records necessary for a chemical protective clothing program.

A.9.2.1(A) The requisite knowledge in this section is derived from the competencies in Section 8.2.

Limitations of PPE include permeation, penetration, and degradation of protective clothing and limitations of respiratory protective equipment, such as air-purifying respirators.

Requisite knowledge includes the ability to describe the types of PPE that are available for response based on NFPA standards and the PPE options for thermal hazards, radiological hazards, asphyxiating hazards, chemical hazards, biological hazards, and mechanical hazards.

A.9.2.1(B) See Table A.9.2.1(B) for a comparison of NFPA standards and OSHA/EPA levels for respiratory protection.

A.9.3 See A.9.1.6.

A.9.3.1(A) The requisite knowledge in this section is derived from the competencies in Section 8.3.

In the United States, policies and procedures for performing mass decontamination include containment of runoff according to the following EPA guidance: "During a hazardous materials incident (including a chemical/biological agent terrorist event), first responders should undertake any necessary emergency actions to save lives and protect the public and themselves. Once any imminent threats to human health and life are addressed, first responders should immediately take all reasonable efforts to contain the contamination and avoid or mitigate environmental consequences. EPA will not pursue enforcement actions against state and local responders for the environmental consequences of necessary and appropriate emergency response actions. First responders would not be protected under CERCLA from intentional contamination such as washing hazardous materials down the storm-sewer during a response action as an alternative to costly and problematic disposal or in order to avoid extra effort."

A.9.3.1(B) Methods that can be useful in assessing the effectiveness of decontamination (determining if entry personnel, tools and equipment, and victims have been decontaminated) include the following:

(1) Visual observation (stains, discolorations, corrosive effects, etc.)
(2) Monitoring devices [such as photoionization detectors (PIDs), detector tubes, radiation monitors, and pH paper strips/meters] that show whether contamination levels are at least below the device's detection limit]
(3) Wipe sampling, which provides after-the-fact information on the effectiveness of decontamination (Once a wipe swab is taken, it is analyzed by chemical means, usually in a laboratory. Protective clothing, equipment, and skin can be tested using wipe samples.)

A.9.4 See A.9.1.7.

A.9.4.1(A) The requisite knowledge in this section is derived from the competencies in Section 8.4.

See A.9.3.1(A).

A.9.4.1(B) See A.9.3.1(B).

A.9.5 See A.9.1.7.

A.9.5.1(A) The requisite knowledge in this section is derived from the competencies in Section 8.5.

A.9.6 See A.9.1.7.

For the purposes of this section, the intent is to focus on confining or containing the release with limited risk of personal exposure. The applicable techniques include absorption, adsorption, damming, diking, dilution, diversion, remote valve shutoff, retention, vapor dispersion, and vapor suppression. Product control also includes techniques for controlling flammable liquid incidents and flammable gas incidents.

Table A.9.2.1(B) Comparison of NFPA Standards and OSHA/EPA Levels for Respiratory Protection

					Expected Dermal Protection from Suit(s)[e]			
NFPA Standard[a]	Minimum OSHA/EPA Level	Respirator[b]	NFPA Barrier Method(s)[c]	Type of Challenge[d]	Chemical Vapor	Chemical Liquid	Particulate	Liquid-Borne Viruses
1991 (2022)	A	SCBA	Permeation resistance	24 toxic industrial chemicals, 2 CWAs	X	X	X	X
1994 Class 1 (2022)	A	SCBA	Permeation resistance	10 toxic industrial chemicals, 2 CWAs	X	X	X	X
1994 Class 2 or 2R (2022)	B	SCBA	Permeation resistance; viral penetration resistance	5 toxic industrial chemicals, 2 CWAs; bacteriophage	X	X	X	X
1992 (2022)	B	SCBA	Penetration resistance	10 toxic industrial chemicals		X		
1994 Class 3 or 3R (2022)	C	CBRN APR or CBRN PAPR	Permeation resistance; viral penetration resistance	5 toxic industrial chemicals, 2 CWAs; bacteriophage	X	X	X	X
1994 Class 4 or 4R (2022)	C	CBRN APR or CBRN PAPR	Viral penetration resistance	Bacteriophage			X	X
1994 Class 5 (2022)	C	SCBA	Liquid repellency	4 toxic industrial chemicals		X		
1999 single use or multiple use (2018)	C	APR with P100 filter or PAPR with HEPA filter	Viral penetration resistance	Bacteriophage				X

Note: NFPA 1991, 1992, and 1994 have been incorporated in the 2022 edition of NFPA 1990.

[a]NFPA standard refers to current edition of the NFPA standard that defines complete ensemble (suit or garment, gloves, footwear, and respirator). NFPA 1991 also includes options for liquefied protection and flash fire protection. NFPA 1992 includes option for flash fire protection and addresses both encapsulating and nonencapsulating ensembles. In NFPA 1994, there are five classes of ensembles ranging from Class 1 (highest level of protection) to Class 5 (lowest level of protection). Type R or ruggedized protection is defined for Class 2, 3, and 4 for additional physical protection and durability over baseline ensembles. NFPA 1999 defines two types of ensembles for single use and multiple use (higher level of physical protection and durability).

[b]SCBA: self-contained breathing apparatus; APR: air-purifying respirator; PAPR: powered air-purifying respirator. All SCBA are certified to at least NFPA 1981 or NFPA 1986 for open-circuit SCBA with mandatory CBRN protection. Where specified, APR or PAPR are certified as providing CBRN protection; NFPA 1999 does not require CBRN protection and only addresses particulate protection.

[c]Permeation resistance measures molecular transfer of chemical through materials and seams over a 1-hour period; depending on standard, different chemical challenge concentrations are applied. NFPA 1991 specifies 100 g/m^2 for liquid challenges and 100 percent for gas challenges; NFPA 1994, Class 1 specifies 20 g/m^2 for liquid challenges and 1 percent for gas challenges; NFPA 1994 Class 2 or 2R specifies 10 g/m^2 for liquid challenges and 350 ppm for gas challenges; NFPA 1994 Class 3 or 3R specifies 10 g/m^2 liquid challenge with air flowing and 40 ppm for gas challenges; penetration resistance testing determines if bulk liquid chemical passes through in a 1-hour period, where part of exposure is at 13.8 kPa (2 psi) pressure. Viral penetration resistance determines if bacteriophage (a virus surrogate for hepatitis virus and HIV) suspended in a liquid passes through material over a 1-hour period where part of the exposure is at 13.8 kPa (2 psi) as determined using a microbiological assay procedure. Liquid repellency testing entails measuring the proportion of liquid chemical dispensed at the top of an inclined specimen that runs off into a collection chamber.

[d]Different challenge substances are used for the different standards to represent a broad range of chemical exposures and properties. Where chemical warfare agents (CWAs) are indicated, distilled mustard (HD) and Soman (GD) are evaluated. NFPA 1991 involves the 21 liquid and gaseous chemicals specified in ASTM F1001, less acetonitrile, plus acrolein (liquid), acrylonitrile (liquid), and dimethyl sulfate (liquid); NFPA 1994, Class 1 specifies testing against 10 toxic industrial chemicals that include acrolein (vapor), acrylonitrile (vapor), ammonia (gas), chlorine (gas), diethylamine (vapor), dimethyl sulfate (liquid), ethyl acetate (vapor), sulfuric acid (liquid), tetrachloroethylene (liquid), and toluene (liquid). NFPA 1992 entails only liquids that include butyl acetate, dimethyl formamide, Fuel H (synthetic gasoline), isopropyl alcohol (91 percent), methyl isobutyl ketone, nitrobenzene, sodium hydroxide (50 percent), sodium hypochlorite (10 percent), sulfuric acid (93 percent), and tetrachloroethylene (95 percent). Chemicals for NFPA 1994 Class 2, 2R, 3, and 3R include acrolein (vapor), acrylonitrile (vapor), ammonia (gas), chlorine (gas), and dimethyl sulfate (liquid).

[e]In addition to material and seam testing for barrier performance, ensembles compliant to NFPA standards are evaluated for their integrity to different types of exposures. NFPA 1991 and NFPA 1994 Class 1, 2, 2R, 3, and 3R ensembles are evaluated for man-in-simulant testing (MIST) to determine protection for vapor exposures where different levels of performance are specified for each standard and class. Liquid chemical protection is demonstrated by passing performance using a full ensemble liquid integrity test where the exposure time is varied with the particular standard or class. With the exception of NFPA 1994 Class 4 or 4R, particulate protection is demonstrated through ensembles passing both vapor (MIST) and liquid integrity tests. For NFPA 1994 Class 4 or 4R ensembles, an inward particulate leakage test is conducted. Protection from liquid-borne viruses (and other microorganisms) is demonstrated by the combination of material/seam viral penetration resistance and liquid integrity testing with the exception that NFPA 1994 Class 4 or 4R ensembles are only evaluated for material viral penetration resistance. NFPA Class 5 ensembles are expected to offer minimum dermal protection through the application of the liquid repellency test.

Tools and equipment include such items as Class B foam application equipment, diking equipment, damming equipment, approved absorbent materials and products, shovels and other hand tools, piping, heavy equipment (such as backhoes), floats, and spill booms.

Control agents can include Class B foam, dispersal agents, and so on.

A.9.6.1(A) The requisite knowledge in this section is derived from the competencies in Section 8.6.

Product control techniques that focus on confining/containing the release with limited risk of personal exposure include absorption, adsorption, damming, diking, dilution, diversion, remote valve shutoff, retention, vapor dispersion, and vapor suppression. Product control also includes techniques for controlling flammable liquid incidents and flammable gas incidents.

Remote/emergency shutoff devices include those for MC-306/DOT-406, MC-407/DOT-407, MC-331 cargo tanks, and intermodal tanks.

A.9.6.1(B) Product control techniques that focus on confining/containing the release with limited risk of personal exposure include absorption, adsorption, damming, diking, dilution, diversion, remote valve shutoff, retention, vapor dispersion, and vapor suppression. Techniques for controlling flammable liquid incidents and flammable gas incidents (e.g., hose handling, nozzle patterns, and attack operations) can be found in NFPA 1001.

A.9.7 See A.9.1.7.

A.9.7.1(A) The requisite knowledge in this section is derived from the competencies in Section 8.7.

Field tests include bump tests, calibration, and other tests performed at the incident scene to prepare the equipment for use.

A.9.8 See A.9.1.7.

A.9.8.1(A) The requisite knowledge in this section is derived from the competencies in Section 8.8.

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.

A.9.9 See A.9.1.7.

A.9.9.1(A) The requisite knowledge in this section is derived from the competencies in Section 8.9.

Types of illicit laboratories include chemical, biological, explosive, and drug manufacturing. Booby traps found at illicit laboratories include antipersonnel devices. Clearance of such devices is carried out by explosive ordnance disposal (EOD) personnel trained for these procedures.

Law enforcement agencies having investigative jurisdiction might differ based on whether the situation involves illicit drug manufacturing, illicit WMD manufacturing, or environmental crimes resulting from illicit laboratory operations. Agency jurisdiction, investigative guidelines, and investigative priorities are complex and dynamic. Specific jurisdictional situations should be identified with governmental investigative agencies.

Considerations for decontaminating and contaminate neutralization tactical law enforcement personnel include being aware of specialized equipment used by law enforcement, including weapons; ammunition; concussion devices; persons in custody; procedures for securing evidence, weapons, and ammunition; and coordination to ensure a safe operating zone.

A.9.10.1(A) The requisite knowledge in this section is derived from the competencies in Section 8.10.

A.10.1.1.3 Additional training sources might include, but are not limited to, local, regional, national, and international emergency response training agencies and organizations.

A.10.1.2.2(3) The following site safety and control plan considerations are from the NIMS *Site Safety and Control Plan* (ICS 208 HM):

(1) Site description
(2) Entry objectives
(3) On-site organization
(4) On-site control
(5) Hazard evaluation
(6) PPE
(7) On-site work plans
(8) Communication procedures
(9) Decontamination procedures
(10) Site safety and health plan

A.10.2.1.2 Suggested materials to identify can include the most commonly released materials that are identified annually by local, regional, national, and international agencies.

A.10.2.1.2(1)(a) Examples of basic hazard categories are biological, corrosivity, energy (explosivity, radioactivity, reactivity), flammability, oxygen concentration, thermal (heat and cold), and toxicity.

A.10.2.1.2(1)(c) Examples of colorimetric monitoring equipment are tubes, chips, papers, strips, and reagents. Examples of electrochemical cells are toxic gas sensors. Examples of biological detection are immunoassays and protein tests.

A.10.2.1.2(1)(c)ii The term *ionization energy* (IE) is preferred over the term *ionization potential* (IP). The use of ionization energy is more scientifically correct. When using photoionization detection (PID) devices, the user must know the ionization energy of the target chemical to determine whether the PID can detect the target chemical.

A.10.2.1.2(2) Examples of colorimetric monitoring equipment are tubes, strips, papers, chips, and reagents. Examples of electrochemical cells are toxic gas sensors. Examples of radiation detection monitoring devices are a contamination measuring instrument or instruments able to measure alpha, beta, and gamma radiation, pancake Geiger-Mueller. Examples of an exposure rate instrument are instruments able to measure a range of exposure rate. Examples of dosimetry devices are personnel radiation monitors/devices.

A.10.2.1.2(3) For example, the US Federal Bureau of Investigation (FBI) is the point of contact for access to laboratories that have the ability to test and analyze potential WMD material. This system is known as the Laboratory Response Network (LRN). Each FBI field office has a WMD Coordinator who is the regional lead for these efforts.

A.10.2.2.1 For example, the significance of high concentrations of three airborne hazardous materials/WMD readings at scenarios relative to the hazards and harmful effects of the hazardous materials/WMD on the responders and the general public should be known.

A.10.2.2.2(13)(e) The US Department of Transportation (DOT) uses the self-accelerated polymerization temperature (SAPT) to describe a package containing a material that is likely to decompose with a self-accelerated decomposition temperature (SADT) or polymerize with a self-accelerated polymerization temperature (SAPT) of 122°F (50°C) or less, with an evolution of a dangerous quantity of heat or gas when decomposing or polymerizing, unless the material is stabilized or inhibited in a manner to preclude such evolution.

A package meeting the criteria listed previously might be required to be shipped under controlled temperature conditions. The control temperature and emergency temperature for a package should be as specified by the DOT based on the SADT or SAPT of the material. The control temperature is the temperature above which a package of the material cannot be offered for transportation or transported. The emergency temperature is the temperature at which, due to imminent danger, emergency measures must be initiated.

A.10.2.2.4 The selection of scenarios to test the knowledge and ability to identify exposure symptoms should include the following:

(1) Select materials common to the AHJ's area of responsibility.
(2) Select concentrations and formulation of the materials common to the AHJ's area of responsibility. It is especially important with pesticides to select realistic scenarios because the state of matter, behavior, and exposure routes can vary considerably from technical-grade materials to common-use formulations.
(3) Select weather conditions and release conditions appropriate to the jurisdiction because the behavior and the exposure hazards can vary considerably from summer conditions in the deep south to winter conditions in the north.

A.10.2.3 The condition of the container should be described using one of the following terms:

(1) Undamaged, no product release
(2) Damaged, no product release
(3) Damaged, product release
(4) Undamaged, product release

A.10.2.5(4)(e)i

Protective Action Criteria (PAC)

The United Sates National Institute for Occupational Safety and Health (NIOSH) and the United States Environmental Protection Agency (EPA) provide further information on public exposure guidelines.

The PAC's dataset is a hierarchy-based system of the following three common public exposure guideline systems:

(1) *Acute Exposure Guideline Levels (AEGLs)*

AEGLs are exposure guidelines designed to help responders deal with emergencies involving chemical spills or other catastrophic events where members of the general public are exposed to a hazardous airborne chemical. (Acute exposures are single, nonrepetitive exposures that do not exceed 8 hours.)

AEGLs estimate the concentrations at which most people — including sensitive individuals such as old, sick, or very young people — will begin to experience health effects if they are exposed to a hazardous chemical for a specific length of time (duration). For a given exposure duration, a chemical could have up to three AEGL values, each of which corresponds to a specific tier of health effects. The three AEGL tiers are defined as follows:

(a) **AEGL-3** is the airborne concentration, expressed as parts per million (ppm) or milligrams per cubic meter (mg/m^3), of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.
(b) **AEGL-2** is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
(c) **AEGL-1** is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

All three tiers (AEGL-1, AEGL-2, and AEGL-3) are developed for five exposure periods: 10 minutes, 30 minutes, 60 minutes, 4 hours, and 8 hours.

(2) *Emergency Response Planning Guidelines (ERPG)*

ERPGs estimate the concentrations at which most people will begin to experience health effects if they are exposed to a hazardous airborne chemical for 1 hour. (Sensitive members of the public — such as old, sick, or very young people — are not covered by these guidelines, and they might experience adverse effects at concentrations below the ERPG values.) A chemical could have up to three ERPG values, each of which corresponds to a specific tier of health effects. The three ERPG tiers are defined as follows:

(a) **ERPG-3** is the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.
(b) **ERPG-2** is the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair an individual's ability to take protective action.
(c) **ERPG-1** is the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing more than mild, transient adverse health effects or without perceiving a clearly defined objectionable odor.

(3) *Temporary Emergency Exposure Limits (TEEL)*

TEELs estimate the concentrations at which most people will begin to experience health effects if they are exposed to a hazardous airborne chemical for a given duration. TEELs are used in similar situations as the 60-minute AEGLs and ERPGs. A chemical could have up to three TEEL values, each of which corresponds to a specific tier of health effects. The three TEEL tiers are defined as follows:

(a) **TEEL-3** is the airborne concentration [expressed as ppm (parts per million) or mg/m^3 (milligrams per cubic meter)] of a substance above which it is predicted that the general population, including susceptible individuals, when exposed for more than one hour, could experience life-threatening adverse health effects or death.

(b) **TEEL-2** is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, when exposed for more than one hour, could experience irreversible or other serious, long-lasting, adverse health effects or an impaired ability to escape.

(c) **TEEL-1** is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, when exposed for more than one hour, could experience notable discomfort, irritation, or certain asymptomatic, nonsensory effects. However, these effects are not disabling and are transient and reversible upon cessation of exposure. A particular hazardous substance might have values in any — or all — of these systems. The PAC's dataset implements the following hierarchy when choosing which values to use for the PACs:

A particular hazardous substance might have values in any — or all — of these systems. The PAC's dataset implements the following hierarchy when choosing which values to use for the PACs:

(1) Final, 60-minute AEGL values (preferred)
(2) Interim, 60-minute AEGL values
(3) ERPG values
(4) TEEL values

A.10.2.5(5) The process for estimating the potential outcomes within an endangered area at hazardous materials/WMD incidents includes determining the dimensions of the endangered area; estimating the number of exposures within the endangered area; measuring or predicting concentrations of materials within the endangered area; estimating the physical, health, and safety hazards within the endangered area; identifying the areas of potential harm within the endangered area; and estimating the potential outcomes within the endangered area.

A.10.3.2.3(1) NFPA 1891 is the selection, care, and maintenance standard for chemical protective clothing. It covers the selection, inspection, testing, cleaning, decontamination, service, repair, storage, retirement, documentation, and records necessary for a chemical protective clothing program.

A.10.3.2.3(5) The use of chemical compatibility charts (sometimes called *chemical permeability charts* or *chemical breakthrough charts*) alone can be misleading as most charts only demonstrate permeation information related to the barrier material itself. The seams, interfaces, and visors are generally the lowest common denominator and are where permeation and penetration are most likely to occur. In addition, the NFPA standards for chemical protective clothing changed from using the concept of breakthrough time to cumulative permeation to account for limitations in the breakthrough data.

A.10.4.1 The functions within the hazardous materials group or branch are based on the available resources and needs of the incident, and they should include but are not limited to the following:

(1) Hazardous materials branch director/group supervisor
(2) Assistant safety officer — hazardous materials
(3) Site access control
(4) Decontamination leader
(5) Science/reference member
(6) Safe refuge area manager
(7) Entry leader
(8) Medical leader

A.10.4.2 NFPA 1891 is the selection, care, and maintenance standard for chemical protective clothing. It covers the selection, inspection, testing, cleaning, decontamination, service, repair, storage, retirement, document, and records necessary for a chemical protective clothing program.

A.10.4.5 The decontamination processes identified in the incident action plan might be emergency, mass decontamination, and technical decontamination. See 6.3.4, 8.3.3.1, 8.4.6.1, 10.4.5, and 10.5.2.

When discussing ambulatory and nonambulatory victims, time, consideration, and discussion should be given to describing these processes for victims with access and functional needs, especially if there are populations with specific needs in the AHJ's areas of operation.

A.11.2.1 Approved reference sources beyond the ERG and SDS should include hazardous materials computer databases; information obtained from detection, monitoring, and sampling; reference manuals; technical information centers, including CHEMTREC, CANUTEC, or SETIQ; governmental authorities; and technical information specialists.

Equipment includes, but is not limited to, monitoring and detection equipment, computers, printers, and communication equipment.

A.11.2.1(A) The requisite knowledge in this section is derived from the competencies in 10.2.2.

A.11.2.1(B) The requisite skills can be assessed through cognitive testing.

A.11.2.2 The committee determined that basic hazard categories include, but are not limited to, corrosivity, energy, explosivity, radioactivity, reactivity, flammability, oxygen concentration, thermal (heat and cold), and toxicity and are core components of a Hazardous Materials Technician's requisite knowledge.

When sampling or using methods to identify materials, including those in containers, methods should be used to avoid cross-contaminating the material. These methods are critical when sampling materials, which could be evidentiary in nature.

A.11.2.2(A) The requisite knowledge in this section is derived from the competencies in 10.2.1.2.

The committee determined that the basic hazard categories include, but are not limited to, thermal, radiological, asphyxia-

tion, chemical, biological, and mechanical. These are core components of a Hazardous Materials Technician's requisite knowledge.

In the United States, the FBI is the point of contact for access to laboratories that have the ability to test and analyze potential WMD material. This system is known as the Laboratory Response Network (LRN). Each FBI field office has a WMD coordinator who is the regional lead for these efforts.

A.11.2.2(B) All Hazardous Materials Technicians must be able to protect themselves and the public from basic everyday response hazards. Therefore, the committee determined that all Hazardous Materials Technicians must have the knowledge and skills necessary to operate each of the following pieces of detection and monitoring equipment: colorimetrics (e.g., tubes, chips, papers, strips, reagents); electrochemical cells (e.g., toxic gas sensors), flammable gas/LEL noncontact thermal detection, oxygen concentration, and photoionization detector (PID) devices; and radiation detection and monitoring devices.

A.11.2.3 The condition of a container can be damaged with no product release, undamaged with no product release, damaged with product release, and undamaged with product release.

Containers include bulk, nonbulk, bulk facility containers, radioactive materials containers, and pipelines and piping, as well as their closures.

Required markings include specification markings for bulk transportation containers, including tank cars (cryogenic liquid, nonpressure, pneumatically unloaded covered hopper cars, and pressure), intermodal tanks/UN portable tanks (nonpressure, pressure, cryogenic liquid, and tube modules), and cargo tanks (compressed gas tube trailers, corrosive liquid, cryogenic liquid, dry bulk, high-pressure, low-pressure chemical, and nonpressure liquid).

Approved resources include printed and technical resources, computer databases, and specialists in the field.

Types of damage to containers include cracks, scores, gouges, dents, closures problems (closures not secure, worn, damaged, or missing), and structural damage to container.

Types of stress on containers include thermal, mechanical, and chemical.

A.11.2.3(A) Types of containers are as follows:

(1) Bulk containers
   (a) Cargo tanks, including compressed gas tube trailers, corrosive liquid tanks, cryogenic liquid tanks, dry bulk cargo tanks, high-pressure tanks, low-pressure liquid tanks, and nonpressure liquid tanks
   (b) Intermodal tanks, including those for liquids and solids, nonrefrigerated liquefied compressed gases, refrigerated liquefied gases, and nonrefrigerated compressed gases (high pressure)
   (c) Facility tanks, including nonpressure tanks, pressure tanks, and cryogenic liquid tanks
   (d) Intermediate bulk containers (IBCs)
   (e) Piping and pipelines
   (f) Railroad cars (nonpressure tank cars, pressure tank cars, cryogenic liquid tank cars, and pneumatically unloaded hopper cars)
   (g) Special containers found in the AHJ area
(2) Nonbulk containers, to include bags, carboys, drums, and cylinders
(3) Radioactive material packages to include excepted, industrial, Type A, and Type B
(4) Piping and pipelines
(5) Specifications for rail tank cars, highway cargo tanks, and intermodal tank containers (UN Portable Tanks)

The capacity of a container is determined using the markings on the container, the shipping papers accompanying the shipment in transportation, or the facility documentation or resources. If the container has more than one compartment, the pressure and the quantity remaining in all compartments should be determined.

A.11.2.4 Surrounding conditions include topography; land use, including utilities and fiber optic cables; accessibility; weather condition; bodies of water, including recharge ponds; public exposure potential; overhead and underground wires and pipelines; storm and sewer drains; possible ignition sources; adjacent land use such as rail lines, highways, and airports; and the nature and extent of injuries. Building information, such as floor drains, ventilation ducts, and air returns, also should be included where appropriate.

Approved reference sources include printed and technical resources, computer databases, specialists in the field, and approved resources available at the awareness, operations, and technician levels.

Behavior of the container includes the effects of damage and stress on the container and the expected breach type.

Behavior of the contents include the expected release type, dispersion pattern, length of contact, time with exposures, and potential hazards.

Also see A.7.2.1(A).

A.11.2.4(A) The requisite knowledge in this section is derived from the competencies in 10.2.4.

The process for predicting behavior should take into consideration the following factors: stress on the container in addition to damage on the container, breach of the container, release of contents, dispersion pattern of released matter or energy, contact time, hazards creating harm, and synergistic effects of mixing multiple materials. The following are the types of conditions to be aware of:

(1) Types of stresses (thermal, mechanical, chemical)
(2) Types of potential breaches (disintegration, runaway cracking, closures opening up, punctures, and splits or tears)
(3) Types of potential releases (detonation, violent rupture, rapid relief, and spill or leak)
(4) Types of potential dispersion patterns (hemisphere, cloud, plume, cone, stream, pool, and irregular)
(5) Length of potential contact time (short term, medium term, long term)
(6) Potential hazards that could cause harm (include, but are not limited to, thermal, radiological, asphyxiation, chemical, biological, and mechanical)

Fire and safety features to be considered for incidents at facilities include fire protection systems, monitoring and detection systems, pressure relief and vacuum relief protection, product spillage and control (impoundment and diking), tank

spacing, and transfer operations. Should transportation containers be involved at facilities, fire and safety features should be considered where appropriate.

A.11.2.4(B) The process for predicting behavior should take into consideration the following factors: damage to the container, stress on the container in addition to the damage on the container, breach of the container, release of contents, dispersion pattern of released matter or energy, contact time, hazards creating harm, and synergistic effects of mixing multiple materials.

A.11.2.5 Results of the incident analysis include weather conditions (current and projected); terrain; time of day; buildings; people; bodies of water; hazard and response information collected; results of detection, monitoring, and sampling; condition of container; and predicted behavior of the container and its contents.

Approved resources include printed and technical resources, computer databases, and specialists in the field.

A.11.3.1(A) The requisite knowledge in this section is derived from the competencies in 10.3.1.

A.11.3.2 PPE includes both respiratory protection and liquid splash–protective ensembles, vapor-protective clothing, high temperature–protective ensembles, and structural fire-fighting protective ensembles.

A.11.3.2(A) The requisite knowledge in this section is derived from the competencies in 10.3.2.

See A.17.3.2(A).

A.11.3.2(B) PPE includes dermal and respiratory protection elements. If CPC is selected, determine the effectiveness of protective ensemble construction material using chemical compatibility charts.

A.11.3.3(A) The requisite knowledge in this section is derived from the competencies in 10.3.3.

Decontamination operations include emergency decontamination, gross decontamination, mass decontamination, and technical decontamination. Gross decontamination is the phase of the decontamination process during which the amount of surface contaminants is significantly reduced.

Decontamination methods include absorption, adsorption, chemical degradation, dilution, disinfecting, evaporation, isolation and disposal, neutralization, solidification, sterilization, vacuuming, and washing.

A.11.3.4 The Hazardous Materials Technician's responsibility is to develop a plan of action for an assignment, including site safety and control, that is consistent with the emergency response plans and standard operating procedures and within the capability of available personnel, PPE, and control equipment.

A.11.3.4(A) The requisite knowledge in this section is derived from the competencies in 10.3.4.

Components of an IAP and subplans should include site safety and control tasks.

Techniques for hazardous materials/WMD (product) control include absorption; adsorption; blanketing; covering, damming, diking, dilution, dispersion, diversion; fire suppression; neutralization; overpacking, patching; plugging; sealing closures; pressure isolation and reduction (flaring, venting, vent, and burn; isolation of valves, pumps, or energy sources); remote valve shut-off; retention; sealing closures [valves, pressure relief devices (pressure relief valves, rupture disks, fusible plugs)]; solidification; transfer; and vapor control (dispersion, suppression).

A.11.4.1(A) The requisite knowledge in this section is derived from the competencies in 10.4.1.

The functions of the hazardous materials branch or group include hazardous materials branch director/group supervisor, assistant safety officer—hazardous materials, site access control group supervisor, decontamination group supervisor, technical specialist—hazardous materials reference, entry team group supervisor, and safe refuge group supervisor.

A.11.4.2 PPE at this level includes chemical-protective clothing (liquid splash–protective and vapor-protective clothing) and respiratory protection as well as any other specialized protective clothing provided by the AHJ.

A.11.4.2(A) The requisite knowledge in this section is derived from the competencies in 10.4.2.

Safety procedures for personnel working in CPC should address: keeping the individual cool and protected from heat exposure, prevention of dehydration, medical monitoring, and stringent accounting of time spent on air and in the suit.

Safety concerns of working in the hot zone include visibility, mobility, and communications issues; emergency procedures for personnel working in chemical-protective clothing; loss of suit integrity; loss of verbal communications; the buddy system; and use of backup personnel wearing the same level of PPE.

A.11.4.3.1 Product control techniques include absorption, adsorption, blanketing, damming, diking, dilution, dispersion, diversion, neutralization, overpacking, patching, plugging, sealing closures, retention, remote valve shutoff, vapor dispersion, and vapor suppression. Note: It will be necessary for nonfirefighters to develop firefighting skills (hose handling, nozzle control, application techniques, etc.) before performing firefighting operations.

Tools and equipment include such items as Class B foam application equipment, diking equipment, damming equipment, approved absorbent materials and products, shovels and other hand tools, piping, dispersal agents, heavy equipment (such as backhoes), floats, and spill booms.

Product control agents can include Class B foam, dispersal agents, and so forth.

Safety procedures can include grounding, bonding, and monitoring as necessary.

A.11.4.3.1(A) The requisite knowledge in this section is derived from the competencies in 10.4.3.

See A.11.4.3.1.

Remote/emergency shutoff devices include emergency shutoff devices for MC-306/DOT-406, MC-307/DOT-407, and MC-331 cargo tanks as well as remote shutoff valves at fixed facilities.

A.11.4.3.1(B) See A.11.4.3.1.

A.11.4.3.2 Containers include nonbulk containers (bags, barrels, bottles, boxes, jerry cans, pails, drums, and cylinders,

including UN pressure receptacles and "y" cylinders) radioactive materials containers (excepted; industrial, Type A, Type B).

Closures include valves, pressure relief devices (pressure relief valves, rupture discs, fusible plugs), manways, flanged fittings, screwed caps, plugs, packing glands, drum bungs, and drum lids.

Leaks include punctures (nail holes, fork truck punctures); rips, tears, splits, cracks, and ruptures; chime leaks; and leaking closures [screwed fitting leaks (bung leaks), open valves, missing plugs, packing gland leaks, flange leaks, gasket leaks, blown rupture discs].

A.11.4.3.2(A) The requisite knowledge in this section is derived from the competencies in 10.4.3.2.

See A.11.4.3.2.

A.11.4.3.2(B) See A.11.4.3.2.

A.11.4.3.3 For example, there are three overpack methods for a leaking 55 gal (208 L) drum: rolling slide-in, slip-over, or other approved method.

A.11.4.3.3(A) The requisite knowledge in this section is derived from the competencies in 10.4.3.3.

A.11.4.3.4(A) The requisite knowledge in this section is derived from the competencies in 10.4.3.4.

A.11.4.4.2(A) Victim prioritization uses 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.

A.11.4.5.1(A) The requisite knowledge in this section is derived from the competencies in 10.4.4.

See A.9.3.1(A).

A.11.4.5.1(B) See A.9.3.1(B).

A.11.4.5.2(A) The requisite knowledge in this section is derived from the competencies in 10.4.4.

See A.9.3.1(A).

A.11.4.5.2(B) See A.9.3.1(B).

A.11.5.1(A) The requisite knowledge in this section is derived from the competencies in Section 10.5.

A.11.6 Documentation and reporting requirements include ensuring that required reports (e.g., incident reports and critique reports) and records (e.g., training records, exposure records, activity logs, hot zone entry and exit logs, and PPE logs) are completed and verified; supporting documentation is provided; reports, records, and supporting documentation are forwarded as required; reports, records, and supporting documentation are filed as required; and files are maintained as required.

A.11.6.1(A) The requisite knowledge in this section is derived from the competencies in Section 10.6.

A.12.1.2.2(2)(e) The following site safety and control plan considerations are from the EPA *Standard Operating Safety Guides*:

(1) Site description
(2) Entry objectives
(3) On-site organization
(4) On-site control
(5) Hazard evaluation
(6) Personal protective equipment
(7) On-site work plans
(8) Communication procedures
(9) Decontamination procedures
(10) Site safety and health plan

A.12.2.2(2)(e)i See A.10.2.5(4)(e)i.

A.12.2.2(3) Methods for predicting areas of potential harm can include use of the DOT *Emergency Response Guidebook* table, Initial Isolation and Protective Action Distance; computer dispersion models; and portable and fixed air-monitoring systems.

A.12.2.2(6) Some examples are shown in Table A.12.2.2(6)(a) and Table A.12.2.2(6)(b).

A.12.3.3(1) NFPA 1990, which consolidates NFPA 1991, NFPA 1992, and NFPA 1994, is the performance-based standard for chemical protective clothing. NFPA 1891 is the selection, care, and maintenance standard for chemical protective clothing. NFPA 1981 and NFPA 1987 are the respiratory protection standards.

Table A.12.2.2(6)(a) Examples of Health Risks Associated with Chemical Agents

Common Name of Chemical Agent	Military Abbreviation	NFPA 704* Ratings		
		H	F	R
Nerve agents				
Sarin	GB	4	1	1
Soman	GD	4	1	1
Tabun	GA	4	2	1
V agent	VX	4	1	1
Vesicants (blister agents)				
Mustard	H, HD	4	1	1
Lewisite	L	4	1	1
Blood agents				
Hydrogen cyanide	AC	4	4	2
Cyanogen chloride	CK	3	0	2
Choking agents				
Chlorine	CL	3	0	0
Phosgene	CG	4	0	0

H: health hazard, F: flammability hazard, R: reactivity hazard.
*NFPA 704.

Table A.12.2.2(6)(b) Examples of Health Risks Associated with Biological Agents and Toxins

Common Name of Biological Agent or Toxin	Latency Period	Fatal?
Anthrax	1–5 days	Yes
Mycotoxin	2–4 hours	Often
Plague	1–3 days	Yes
Ricin	18–24 days	Yes
Viral hemorrhagic fevers	4–21 days	Yes
Smallpox	7–17 days	Yes

A.12.3.3(2) The EPA/OSHA levels of protection are design specifications while NFPA 1990 is a performance-based standard; therefore, the crosswalk between the two is not always evident. Table A.8.2.3.1(1) demonstrates this crosswalk.

A.12.3.4.5.3 Safety precautions should include the following:

(1) Buddy systems
(2) Backup team
(3) Personal protective equipment

A.12.3.4.5.5 Safety hazards associated with confined spaces could include the following:

(1) Atmospheric hazards
    (a) Oxygen-deficient atmosphere
    (b) Oxygen-enriched atmosphere
    (c) Flammable and explosive atmospheres
    (d) Toxic atmosphere
(2) Physical hazards
    (a) Engulfment hazards
    (b) Falls and slips
    (c) Electrical hazards
    (d) Structural hazards
    (e) Mechanical hazards

A.12.4.2 Criteria and factors should include the following:

(1) Task assignment (based on strategic and tactical options)
(2) Operational safety
(3) Operational effectiveness
(4) Planning support
(5) Logistical support
(6) Administrative support

A.12.4.4 The appropriate steps to transfer command and control of the incident include the following:

(1) Command can be transferred only to an individual who is on-scene.
(2) Fully brief the incoming command and control person on the details of the incident, including strategies and priorities, resources committed, unmet needs, and safety issues.

A.13.1.5 The requisite knowledge in this section is derived from the competencies in Section 12.1.

A.13.2.1(A) The requisite knowledge in this section is derived from the competencies in Section 12.2.

A.13.3.1(A) The requisite knowledge in this section is derived from the competencies in Section 12.3.

Hazardous materials control techniques include absorption, adsorption, blanketing, covering, contamination isolation, damming, diking, dilution, dispersion, diversion, fire suppression, neutralization, overpacking, patching, plugging, pressure isolation and reduction (flaring, venting, vent and burn, isolation of valves, pumps, or energy sources), retention, solidification, transfer, and vapor control (dispersion and suppression).

Approving the level of PPE requires knowledge of the four levels of chemical-protective clothing (CPC), the equipment required for each level, and conditions under which each level is used; impact and significance of degradation, penetration, and permeation on CPC; safety considerations for personnel working in vapor-protective, liquid splash–protective, and high temperature–protective clothing; and physiological and psychological stresses that can affect users of PPE.

Tactical assignments include the following:

(1) Receive the initial notification.
(2) Provide secondary notification and activation of response agencies.
(3) Make ongoing assessments of the situation.
(4) Command on-scene personnel (incident command system).
(5) Coordinate support and mutual aid.
(6) Provide law enforcement and on-scene security (crowd control).
(7) Provide traffic control and rerouting.
(8) Provide resources for public safety protective action (evacuation or shelter-in-place).
(9) Provide fire suppression services.
(10) Provide on-scene medical assistance (ambulance) and medical treatment (hospital).
(11) Provide public notification (warning).
(12) Provide public information (news media statements).
(13) Provide on-scene communications support.
(14) Provide emergency on-scene decontamination.
(15) Provide operations-level hazard control services.
(16) Provide technician-level hazard mitigation services.
(17) Provide environmental remedial action (cleanup) services.
(18) Provide environmental monitoring.
(19) Implement on-site accountability.
(20) Provide on-site responder identification.
(21) Provide incident command post security.
(22) Provide incident or crime scene investigation.
(23) Provide evidence collection and sampling.

Safe operating practices and procedures include pre-incident planning; safety briefings; buddy system; backup teams; safety precautions for search, rescue, and recovery missions; advantages and limitations of decontamination methods; and hazardous materials atmospheric and physical safety hazards in confined spaces.

Decontamination methods include the following:

(1) Absorption
(2) Adsorption
(3) Chemical degradation
(4) Dilution
(5) Disinfection
(6) Evaporation
(7) Isolation and disposal
(8) Neutralization
(9) Solidification
(10) Sterilization
(11) Vacuuming
(12) Washing

A.13.4.1(A) The requisite knowledge in this section is derived from the competencies in Section 12.4.

Functions include the following:

(1) Decontamination
(2) Entry (backup)
(3) Hazardous materials branch director or group supervisor
(4) Hazardous materials safety
(5) Information and research

A.13.5 Effectiveness of tactics include control, containment, confinement, and extinguishment operations; decontamina-

tion process; established control zones; personnel being used; and PPE.

A.13.5.1(A) The requisite knowledge in this section is derived from the competencies in Section 12.5.

A.13.6 Final documentation and reporting requirements include ensuring that required reports (e.g., incident reports and critique reports) and records (e.g., training records, exposure records, activity logs, hot zone entry and exit logs, and personal protective equipment logs) are completed and verified; supporting documentation is provided; reports, records, and supporting documentation are forwarded as required; reports, records, and supporting documentation are filed as required; and files are maintained as required.

A.13.6.1(A) The requisite knowledge in this section is derived from the competencies in Section 12.6.

Explain what makes a scene safe versus unsafe and what must be accomplished to achieve scene safety.

A.14.3.1.1.1 An example of a Specialist Employee B is a person who regularly loads and unloads tank trucks of the specific chemical involved in the incident as part of his or her regular job. At a hazardous materials/WMD incident, this person would be assigned the task of transferring the contents of the damaged tank truck into another container. The Specialist Employee B would not be involved with chemicals for which he or she has not been trained and would leave the hot or warm zone when this work is completed.

A.14.3.1.2.2(2)(e) The following site safety plan considerations are from the EPA *Standard Operating Safety Guides:*

(1) Site description
(2) Entry objectives
(3) On-site organization
(4) On-site control
(5) Hazard evaluation
(6) PPE
(7) On-site work plans
(8) Communication procedures
(9) Decontamination procedures
(10) Site safety and health plan

A.14.3.3.2(1) NFPA 1891 is the selection, care, and maintenance standard for chemical protective clothing. It covers the selection, inspection, testing, cleaning, decontamination, service, repair, storage, retirement, documentation, and records necessary for a chemical protective clothing program.

A.14.3.4.1(2) Such factors include heat, cold, working in a confined space, working in PPE, working in a flammable or toxic atmosphere, and pre-existing health conditions.

A.16.4.2 These abilities should include the following:

(1) Task assignment (based on strategic and tactical options)
(2) Operational safety
(3) Operational effectiveness
(4) Planning support
(5) Information and research
(6) Logistical support
(7) Administrative support

A.17.1.7 The requisite knowledge in this section is derived from the competencies in Section 11.1.

A.17.2.1 Approved reference sources beyond the ERG and SDS should include hazardous materials computer databases; information obtained from detection, monitoring, and sampling; reference manuals; technical information centers, including CHEMTREC, CANUTEC, or SETIQ; governmental authorities; and technical information specialists.

Equipment includes monitoring and detection equipment, computers, printers, communication equipment, and so forth. Policies and procedures include SOPs, SOGs and regulations relative to the local jurisdiction.

A.17.2.1(A) The requisite knowledge in this section is derived from the competencies in 10.2.1.

A.17.2.1(B) The requisite skills can be assessed through cognitive testing.

A.17.2.2 The committee determined that basic hazard categories include, but are not limited to, corrosivity, energetic, explosivity, radioactivity, reactivity, oxidizers, polymerization, flammability, oxygen concentration, thermal (heat and cold), and toxicity. The consideration of these potential hazards are core components of a Hazardous Materials Technician's requisite knowledge.

When sampling or using methods to identify materials, including those in containers, methods should be used to avoid cross-contaminating the material. These methods are critical when sampling materials, which could be evidentiary in nature.

A.17.2.2(A) The requisite knowledge in this section is derived from the competencies in 10.2.1.2.

The committee determined that basic hazard categories include, but are not limited to, corrosivity, energetic, explosivity, radioactivity, reactivity, oxidizers, polymerization, flammability, oxygen concentration, thermal (heat and cold), and toxicity. The consideration of these hazards are core components of a Hazardous Materials Officer's requisite knowledge.

A.17.2.2(B) All Hazardous Materials Technicians must be able to protect themselves and the public from basic everyday response hazards. Therefore, the committee determined that all Hazardous Materials Technicians must have the knowledge and skills necessary to operate each of the following pieces of detection and monitoring equipment: colorimetrics (e.g., tubes, chips, papers, strips, reagents), electrochemical cells (e.g., toxic gas sensors), flammable gas/LEL noncontact thermal detection, oxygen concentration, and photoionization detector (PID) devices; and radiation detection and monitoring devices. To properly supervise the proficiency of Hazardous Materials Technicians working with the Hazardous Materials Officer, they must be competent in the same knowledge and skills.

A.17.2.3 The condition of a container can be damaged with no product release, undamaged with no product release, damaged with product release, and undamaged with product release.

Containers include bulk, nonbulk, bulk facility containers, radioactive materials containers, and pipelines and piping, as well as their closures. Required markings include specification markings for bulk transportation containers, including tank cars (cryogenic liquid, nonpressure, pneumatically unloaded covered hopper cars, and pressure), intermodal tanks for liquid and solids, intermodal tanks for compressed liquefied gases, intermodal tanks for refrigerated liquefied gases,

multiple-element gas containers (MEGC) for nonrefrigerated, liquefied and nonliquefied compressed gases, and cargo tanks (compressed gas tube trailers, corrosive liquid, cryogenic liquid, dry bulk, high-pressure, low-pressure chemical, and nonpressure liquid). Approved resources include printed and technical resources, computer databases, and specialists in the field.

Types of damage to containers include cracks, scores, gouges, dents, closure problems (closures not secure, worn, damaged, or missing), and structural damage to containers.

Types of stress on containers include thermal, mechanical, and chemical.

A.17.2.3(A) The requisite knowledge in this section is derived from the competencies in 10.2.3.

A.17.2.4 Surrounding environmental conditions include topography; land use, including utilities and fiber optic cables; accessibility; weather conditions; bodies of water, including recharge ponds; public exposure potential; overhead and underground wires and pipelines; storm and sewer drains; possible ignition sources; adjacent land use such as rail lines, highways, and airports; and the nature and extent of injuries. Building information, such as floor drains, ventilation ducts, and air returns, also should be included where appropriate.

Approved reference sources include printed and technical resources, computer databases, specialists in the field, and approved resources available at the awareness, operations, and technician levels.

Behavior of the container includes the effects of damage and stress on the container and the expected breach type.

Behavior of the contents include the expected release type, dispersion pattern, length of contact time with exposures, and potential hazards.

A.17.2.4(A) The requisite knowledge in this section is derived from the competencies in 10.2.4.

The process for predicting behavior should take into consideration the following factors: stress on the container in addition to damage on the container, breach of the container, release of contents, dispersion pattern of released matter or energy, contact time, hazards creating harm, and synergistic effects of mixing multiple materials. The following are the types of conditions to be aware of:

(1) Types of stresses (thermal, mechanical, chemical)
(2) Types of potential breaches (disintegration, runaway cracking, closures opening up, punctures, and splits or tears)
(3) Types of potential releases (detonation, violent rupture, rapid relief, and spill or leak)
(4) Types of potential dispersion patterns (hemisphere, cloud, plume, cone, stream, pool, and irregular)
(5) Length of potential contact time (short term, medium term, long term)
(6) Potential hazards that could cause harm (thermal, radiological, asphyxiation, chemical, biological, and mechanical)

Fire and safety features to be considered for incidents at facilities include fire protection systems, monitoring and detection systems, pressure relief and vacuum relief protection, product spillage and control (impoundment and diking), tank spacing, and transfer operations. Should transportation containers be involved at facilities, fire and safety features should be considered where appropriate.

A.17.2.4(B) The process for predicting behavior should take into consideration the following factors: damage to the container, stress on the container in addition to the damage on the container, breach of the container, release of contents, dispersion pattern of released matter or energy, contact time, hazards creating harm, and synergistic effects of mixing multiple materials.

A.17.2.5 Results of the incident analysis include weather conditions (current and projected); terrain; time of day; buildings; people; bodies of water; hazard and response information collected; results of detection, monitoring, and sampling; condition of container; and predicted behavior of the container and its contents. Approved resources include printed and technical resources, computer databases, and specialists in the field.

A.17.2.5(A) The requisite knowledge in this section is derived from the competencies in 10.2.5.

A.17.3.1(A) The requisite knowledge in this section is derived from the competencies in 10.3.1.

A.17.3.2 PPE includes both respiratory protection and liquid splash–protective ensembles, vapor-protective clothing, high temperature–protective ensembles, and structural firefighting protective ensembles.

A.17.3.2(A) The requisite knowledge in this section is derived from the competencies in 10.3.2.

Levels of protection specified by the OSHA/EPA are Level A, Level B, Level C, and Level D with explanations. Table A.17.3.2(A) cross-references the OSHA/EPA level with the NFPA PPE standards.

A.17.3.2(B) PPE includes dermal and respiratory protection elements.

A.17.3.3(A) The requisite knowledge in this section is derived from the competencies in 10.3.3.

A.17.3.4(A) The requisite knowledge in this section is derived from the competencies in 16.3.4.

A.17.4.1(A) The requisite knowledge in this section is derived from the competencies in 10.4.1 and Section 16.5.

The functions of the Hazardous Materials Branch or Group include Hazardous Materials Branch Director/Group Supervisor, Assistant Safety Officer–Hazardous Materials, Site Access Control Group Supervisor, Decontamination Group Supervisor, Medical Group Supervisor, Technical Specialist–Hazardous Materials Reference, Entry Team Group Supervisor, and Safe Refuge Group Supervisor. These functions are staffed as necessary.

A.18.1.1 If the functions and responsibilities of the Hazardous Materials Safety Officer are performed by the overall Incident Safety Officer or on-scene Incident Commander, that individual should meet the competencies of this chapter.

A.18.1.2.1 Under this section, Hazardous Materials Safety Officers are given specific responsibilities. It should be understood that even though these duties are to be carried out by Hazard-

Table A.17.3.2(A) Ensemble Description

Ensemble Description Using Performance-Based Standard(s)	OSHA/EPA Level
NFPA 1991 worn with NFPA 1981 or NFPA 1986 SCBA	A
NFPA 1994 Class 1 worn with NFPA 1981 or NFPA 1986 SCBA	A
NFPA 1994 Class 2/2R worn with NFPA 1981 or NFPA 1986 SCBA	B
NFPA 1992 worn with NFPA 1981 or NFPA 1986 SCBA	B
NFPA 1994 Class 2/2R worn with NIOSH CBRN APR or PAPR	C
NFPA 1992 worn with NIOSH CBRN APR or PAPR	C
NFPA 1994 Class 3/3R worn with NFPA 1981 or NFPA 1986 SCBA	B
NFPA 1994 Class 3/3R worn with NIOSH CBRN APR or PAPR	C
NFPA 1994 Class 4/4R worn with NFPA 1981 or NFPA 1986 SCBA	B
NFPA 1994 Class 4/4R worn with NIOSH CBRN APR or PAPR	C
NFPA 1994 Class 5 worn with NFPA 1981 or NFPA 1986 SCBA	B

Note: NFPA 1991, 1992, and 1994 have been incorporated in the 2022 edition of NFPA 1990.

ous Materials Safety Officers, the Incident Commander has overall responsibility for the implementation of these tasks.

Hazardous Materials Safety Officers should meet all the competencies for the responder at the level of operations being performed. Hazardous Materials Safety Officers direct the safety of operations in the hot and the warm zones. Hazardous Materials Safety Officers should be designated specifically at all hazardous material incidents (29 CFR 1910.120) and are responsible for the following tasks:

(1) Obtain a briefing from the Incident Commander or Incident Safety Officer.
(2) Participate in the preparation of and monitor the implementation of the incident site safety and control plan (including medical monitoring of entry team personnel before and after entry).
(3) Advise the Incident Commander/sector officer of deviations from the incident site safety and control plan and of any dangerous situations.
(4) Alter, suspend, or terminate any activity that is judged to be unsafe.

A.18.2.1.2 Conditions where protective clothing with thermal protection could be required if entry was made into an area where flammability was a concern can include the following:

(1) Unknown materials involved
(2) Oxygen-enriched atmosphere
(3) Detectable percentage of LEL on monitoring instruments
(4) Materials with a flammable range present
(5) Reactive materials present

A.18.2.1.3 Conditions under which personnel would not be allowed in the hot zone include the following:

(1) Decontamination procedures not established or not in place
(2) Advanced first-aid and transportation not available
(3) Flammable or explosive atmosphere present
(4) Oxygen-enriched atmosphere of 23.5 percent or greater present
(5) Runaway reaction occurring
(6) Required personal protective equipment not available
(7) No identified tactical options that can positively influence the outcome of the incident
(8) Risk outweighing benefit
(9) Personnel not properly trained
(10) Insufficient personnel to perform tasks

A.18.2.1.4 Examples of scenarios that emergency responders might encounter in the field include the following:

(1) Ammonia leaking from a fitting or valve of a railroad tank car
(2) Chlorine leaking from the valve stem of a 150 lb (68 kg) cylinder
(3) Lacquer thinner leaking from a hole in a 55 gal (208 L) drum
(4) Gasoline leaking from a hole in the side of an aluminum tank truck
(5) Carbaryl, a powdered insecticide, found stored in a broken cardboard drum

A.18.3.1 Potential tactics are either defensive or offensive in nature. The site safety and control plan is integrated into the formal incident action plan.

A.18.3.1(1) Safety precautions to be observed during mitigation of hazards or conditions can include the following:

(1) Elimination of ignition sources
(2) Use of monitoring instruments
(3) Stabilizing the container
(4) Establishing emergency evacuation procedures
(5) Ensuring availability of hose lines and foam, when appropriate
(6) Evacuating exposures
(7) Isolating the area
(8) Protecting in place
(9) Working in proper protective equipment

A.18.3.1(2) Safety precautions to be observed during search and rescue missions at hazardous materials/WMD incidents can include the following:

(1) Ensuring availability of appropriate personal protective equipment for all personnel
(2) Use of monitoring instruments
(3) Maintaining an escape path
(4) Knowledge of approved hand signals by all personnel
(5) Ensuring availability of communications equipment for each team
(6) Preplanning the search sequence prior to entry

A.18.3.3(1) Benefits of pre-emergency planning include the following:

(1) Identification and mitigation of hazards during the planning process
(2) Familiarization of personnel with facility
(3) Identification of 24-hour responsible parties
(4) Identification of built-in containment systems
(5) Identification of the location of utility and other shutoff/shutdown valves and switches

(6) Identification of location of facility map
(7) Identification of location and quantities of hazardous materials/WMD
(8) Identification of vulnerable populations
(9) Identification of facility response capabilities

A.18.3.3(3) The following examples of elements of a site safety plan can be found in OSHA 1910.120:

(1) Site description
(2) Entry objectives
(3) On-site organization
(4) On-site control
(5) Hazard evaluation
(6) PPE
(7) On-site work plans
(8) Communication procedures
(9) Decontamination procedures
(10) Site safety and health plan

A.18.3.5(3) Tactics can include surveying the scene, sampling, monitoring, plugging, and patching.

A.18.3.5(5) The use of chemical compatibility charts (sometimes called *chemical permeability charts* or *chemical breakthrough charts*) alone can be misleading as most charts only demonstrate permeation information related to the barrier material itself. The seams, interfaces, and visors are generally the lowest common denominator and are where permeation and penetration are most likely to occur. In addition, the NFPA standards for chemical protective clothing changed from using the concept of breakthrough time to cumulative permeation to account for limitations in the breakthrough data.

A.18.3.7(1) Chapter 10 of NFPA 475 contains comprehensive guidance on medical surveillance programs. This includes pre- and post-incident, monitoring of personnel, and the guidance from OSHA 1910.120. As a matter of practice, standardizing medical requirements is challenging in the absence of data or a law supporting a specific medical requirement.

The elements of an emergency medical plan according to Chapter 46 include the following:

(1) EMS control activities
(2) EMS component of an incident command system
(3) Medical monitoring of personnel utilizing chemical-protective and high-temperature-protective clothing
(4) Triage of hazardous materials/WMD victims
(5) Medical treatment for chemically contaminated individuals
(6) Product and exposure information gathering and documentation

A.18.4.2(6) Examples include partner extraction and backup team deployment.

A.18.4.4 Chapter 10 of NFPA 475 contains comprehensive guidance on medical surveillance programs. This includes pre- and post-incident, monitoring of personnel and the guidance from OSHA 1910.120. As a matter of practice, standardizing medical requirements is challenging in the absence of data or a law supporting a specific medical requirement.

A.18.4.4(10) Safety considerations that can minimize secondary contamination include but are not limited to the following:

(1) Control zones are established and maintained.
(2) All personnel and resources exiting the hot zone are decontaminated.
(3) Personnel performing decontamination are properly trained.
(4) Personnel performing decontamination are properly protected.

See also NFPA 473.

A.18.5.2(1)(a) Examples of such situations or conditions can include, but are not limited to, the following:

(1) Fire or explosion
(2) Container failure
(3) Sudden change in weather conditions
(4) Failure of entry team's personal protective clothing and/or equipment
(5) Updated information on identification of hazardous material(s) involved that warrants reassessment of level of protective clothing and equipment being used

A.18.6.2.1 Topics can include, but are not limited to, the following:

(1) Identity of the hazardous materials/WMD agent to which personnel have been or might have been exposed
(2) Signs and symptoms of exposure to the hazardous material(s) involved in the incident
(3) Signs and symptoms of critical incident stress
(4) Duration of recommended observation period for such signs and symptoms
(5) Procedures to follow in the event of delayed presentation of such signs or symptoms
(6) Name of the individual responsible for post-incident medical contact
(7) Safety and health hazards remaining at the site

A.19.1.1 If the functions and responsibilities of the Hazardous Materials Safety Officer are performed by the overall Incident Safety Officer or on-scene Incident Commander, that individual should meet the competencies of this chapter.

A.19.3.1(A) The following examples of elements of a site safety and control plan can be found in OSHA 1910.120:

(1) Site description
(2) Entry objectives
(3) On-site organization
(4) On-site control
(5) Hazard evaluation
(6) PPE required
(7) On-site work plans
(8) Communication procedures
(9) Decontamination procedures
(10) Site safety and health plan

A.20.2.1(14)(d) The heat-affected zone is an area in the metal next to the actual weld. This zone is less ductile than either the weld or the metal due to the effect of the welding process. The heat-affected zone is vulnerable to cracks.

A.20.2.1(19) Other methods for determining the amount of liquid include shipping papers, the presence of frost line, the use of touch to feel for the colder liquid level, and the use of heat sensors.

A.20.4.1(10) When grounding and bonding are performed, a ground resistance tester and an ohmmeter should be used. The ground resistance tester measures the earth's resistance to a ground rod, and the ohmmeter measures the resistance of the