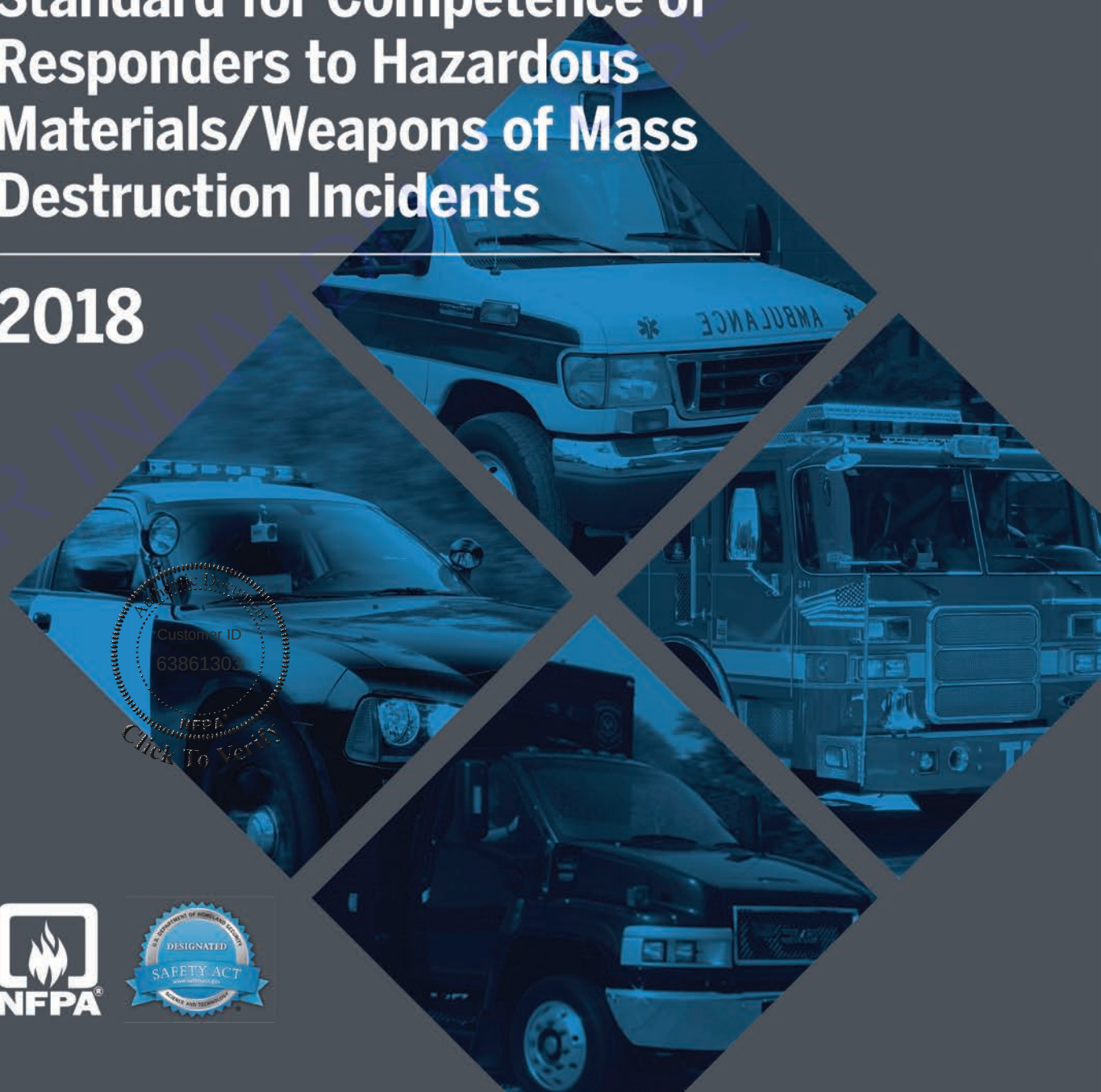
# NFPA® 472

## Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents

## 2018



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**NFPA® 472**

**Standard for**

# Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents

**2018 Edition**

This edition of NFPA 472, *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, was prepared by the Technical Committee on Hazardous Materials Response Personnel. It was issued by the Standards Council on August 1, 2017, with an effective date of August 21, 2017, and supersedes all previous editions.

This edition of NFPA 472 was approved as an American National Standard on August 21, 2017.

## Origin and Development of NFPA 472

At the July 1985 NFPA Standards Council meeting, approval was given to the concept of a new project on Hazardous Materials Response Personnel. The Standards Council directed that a proposed scope and start-up roster for the new Technical Committee on Hazardous Materials Response Personnel be prepared, taking into account the need to expand the committee membership beyond the fire service and the people beyond "professional qualifications."

When establishment of the committee was formally announced, many requests for membership were received, and similar requests continued to arrive during the first year of its existence. The first meeting of the committee took place in October 1986.

Interest in the subject of hazardous materials, especially as it relates to the emergency responder, continued at a high level. Some of the interest was due to an increased awareness of the wide proliferation of hazardous materials, while much of the interest could be credited to federal regulations that have an impact on all responders.

In 1990, the committee began reviewing the document for the purpose of revising it. The committee established a task group that conducted a task analysis relating to hazardous materials response. Based on the task group's recommendations, the committee revised the original document. The 1992 edition changed the original format and presented the competencies in a more complete manner. During the same time period, the committee developed a related document, NFPA 473, *Standard for Competencies for EMS Personnel Responding to Hazardous Materials Incidents*, which was also released as a 1992 edition.

Since 1992, several task groups created two new levels, the Hazardous Materials Branch Officer and the Safety Officer, which were incorporated into the 1997 edition. Three new specialty levels, for tank cars, cargo tanks, and intermodal tanks, were added to the standard. The committee found it necessary to make changes to clarify existing requirements, especially for the technician level.

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

The TIA added paragraphs on recognizing criminal and terrorist activities, actions to take when criminal or terrorist activity is suspected, differentiating between chemical and biological agents, identification of body substance isolation and decontamination procedures when faced with an incident involving biological warfare, and other similar competencies.

In the 2002 edition, the TIA material was updated and moved into the body of the text with modifications and additions, along with updates to coordinate with a similar TIA and other new material in NFPA 473. The events of September 11, 2001, which occurred after the committee had

completed its development work on the 2002 edition, demonstrated the necessity of increasing awareness and preparation for terrorist incidents involving hazardous materials of all kinds.

In addition to new coverage of weapons of mass destruction, the 2002 edition contained material on responding to transportation or other incidents involving radioactive materials. This content began as a suggestion from the U.S. Department of Energy (DOE). A task group with DOE representation worked on a draft for committee consideration. One addition included Annex D, "Competencies for the Technician with a Radioactive Material Specialty."

The committee dedicated the 2002 edition of the standard to the fallen heroes of the September 11th terrorist attack. Many lives were saved because of their efforts. These individuals gave the ultimate sacrifice in the line of duty and stand alone in their bravery and dedication to their jobs and their country. Our thoughts and prayers remain with their families, friends, and co-workers. Let us never forget these brave individuals and other emergency responders who have died in the line of duty. The committee also honored committee member John J. Fanning, FDNY, who died in the line of duty on September 11.

As work began on the 2008 edition of the standard, the growing threat of terrorism using weapons of mass destruction and the use of hazardous materials as both a weapon and in criminal activities had significantly changed the traditional philosophies of hazardous materials emergency response. In addition, the development of various tactical and operational procedures to meet the anticipated demands created by these response scenarios blurred the classical distinction between offensive and defensive response operations that had been the cornerstone of both NFPA 472 and 29 CFR 1910.120(q) since their inception.

In preparing the 2008 edition, the committee worked with a number of organizations, including the ASTM E54 Committee on Homeland Security Applications — Emergency Preparedness, Training, and Procedures, the Interagency Board for Equipment Standardization and Interoperability (IAB), the FBI, U.S. Capitol Police, the National Association of Bomb Squad Commanders, and the National Sheriffs Association.

As a result of discussions among those organizations, the committee established a working group whose task was to conduct a review of the 2002 edition to determine how the standard could better meet the "traditional" hazardous materials response issues and the emerging issues created by terrorism and criminal use of hazardous materials scenarios, evaluate opportunities for making NFPA 472 more responsive to the needs and response concerns of nonfire service disciplines, and recommend a path forward.

As a result of this process, the 2008 edition was based on the following operational philosophies:

(1) Emergency response operations to a terrorism or criminal scenario using hazardous materials are based on the basic concepts of hazardous materials response. In simple terms, responders cannot safely and effectively respond to a terrorism or criminal scenario involving hazardous materials/weapons of mass destruction (WMD) if they do not first understand hazardous materials response.
(2) The scope of the standard applies to all emergency responders, regardless of response discipline, who could respond to the emergency phase of a hazardous materials/WMD incident.
(3) Emergency responders, regardless of their discipline and organizational affiliation, should be trained to perform their expected tasks. Given the real-world demands of limited time and resources, training should focus on an individual's expected duties and tasks.
(4) Personnel not directly involved in providing on-scene emergency response services (e.g., hospital first-receivers) are not covered under the scope of this standard.
(5) Competencies for emergency medical services personnel remain in NFPA 473, *Standard for Competence of EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents*.

Key changes in the 2008 edition can be summarized as follows:

(1) *Awareness level personnel.* The term *responders* was dropped from the definition of awareness level and replaced with *awareness level personnel.* The committee viewed these individuals as those who, in the course of their normal duties, might be first on-scene. However, they might not be emergency responders.
(2) *Operations level responders.* If an individual was tasked to respond to the scene of a hazardous materials/WMD incident during the emergency phase, that individual was viewed as an operations level responder. This level included fire, rescue, law enforcement, emergency medical services, private industry, and other allied professionals. Competencies for operations level responders were broken into two categories:

    (a) *Core competencies* (Chapter 5). These competencies were required of all emergency responders at this level. This chapter was essentially the competencies from the 2002 edition Chapter 5, minus the product control and personal protective clothing competencies.
    (b) *Mission-specific competencies* (Chapter 6). These competencies were optional and were provided so that the authority having jurisdiction (AHJ) could match the expected tasks and duties of its personnel with the competencies required to perform those tasks. Mission-specific competencies were available for operations level responders who were assigned to perform the following tasks:

        i. Use personal protective equipment, as provided by the AHJ

ii. Perform technical decontamination
iii. Perform mass decontamination
iv. Perform product control
v. Perform air monitoring and sampling
vi. Perform victim rescue and recovery operations
vii. Preserve evidence and perform sampling
viii. Respond to illicit laboratory incidents

(c) *Operations level mission-specific competencies.* These competencies were to be performed under the guidance of a hazardous materials technician, allied professional, or standard operating procedure. The competencies for personnel previously trained to the operations level of the 2002 edition could be referenced as follows:

i. Chapter 5 — Core Competencies
ii. Section 6.2 — Personal Protective Equipment
iii. Section 6.5 — Product Control Table A.5.1.1.1, Operations Level Responder Matrix, gave examples of the application and use of the operations level core and mission-specific competencies.

(3) *Hazardous Materials Technician.* Although the definition of a *hazardous materials technician* was modified to reflect the usage of a risk-based response process, and the definition of *hazardous materials response team* was changed to specifically reference the performance of technician-level skills, there were no major changes to this section. Given that hazardous materials response teams are a typed resource under the National Incident Management System (NIMS) and to ensure consistency in operational capabilities, the committee felt strongly that the concept of "mission-specific" could not be applied to the hazardous materials technician level.

(4) *Specialist Employee.* Although there are no competency changes, the title was changed from *private sector specialist employee* to *specialist employee* for consistency with the 29 CFR 1910.120(q) terminology and usage of the term in the field.

(5) *Hazardous Materials Officer.* Although there were no significant competency changes, the definition was modified to reflect that in some response organizations this individual could function as an advisor to the incident commander or as a technical specialist.

(6) *Competencies for hazardous materials technician with a radioactive material specialty.* These new competencies were for responders already trained to the hazardous materials technician level and were developed by a working group representing the DOE and state and local radiation emergency responders. The technical committee decided to place these nonmandatory competencies in the annexes for informational purposes at this time.

(7) *Competencies for operations level responders assigned agent-specific responsibilities.* These agent-specific competencies were for responders who were already trained to Chapter 5, Core Competencies for Operations Level Responders, and Section 6.2, Personal Protective Equipment. Agent-specific competencies were provided for chemical, biological, and radiological agents. The technical committee decided to place these nonmandatory competencies in the annexes for informational purposes at this time.

The technical committee made several significant changes to the 2013 edition. Chapter 6 was expanded to include Section 6.10, Perform Disablement/Disruption of Improvised Explosives Devices (IEDs), Improvised WMD Dispersal Devices, and Operations at Improvised Explosives Laboratories. Chapter 15 was expanded to include non-tank vessel information and was renamed Competencies for Hazardous Materials Technicians with a Marine Tank and Non-Tank Vessel Specialty. The following annex material from the 2008 edition was formalized and moved to the main body of the document:

- Chapter 16, Competencies for Hazardous Materials Technicians with a Flammable Liquids Bulk Storage Specialty
- Chapter 17, Competencies for Hazardous Materials Technicians with a Flammable Gases Bulk Storage Specialty
- Chapter 18, Competencies for Hazardous Materials Technicians with a Radioactive Material Specialty

For the 2018 edition of NFPA 472, the technical committee made significant revisions to the document to align with the other hazardous materials response personnel documents (NFPA 473, 475, and 1072). While the technical committee supports NFPA 472 as the "parent" document, the revision cycles for the other documents came ahead of this document. The technical committee will request a revision cycle change ahead of the next revision. Many of the changes to the document are for clarification and consistency. Significant modifications were made to the competency baseline of hazardous materials technician, and several new chapters were added with specialty or advanced specialty competencies for the technician level, including monitoring and detection, consequence analysis and planning, chemical risk assessment and analysis, product control, weapons of mass destruction, and decontamination. Revisions were made to the awareness and operations level chapters to better align with and for consistency with the other documents. Two new operation level responder mission-specific competencies for diving in contaminated water environment and evidence collection were added.

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

## Contents

**NFPA 472**

**Standard for**

# Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents

**2018 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. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex H. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

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

## Chapter 1 Administration

### 1.1 Scope.

**1.1.1*** This standard shall identify the minimum levels of competence required by responders to emergencies involving hazardous materials/weapons of mass destruction (WMD).

**1.1.2** This standard shall apply to any individual or member of any organization who responds to hazardous materials/WMD incidents.

**1.1.3** This standard shall 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.

### 1.2 Purpose.

**1.2.1** The purpose of this standard shall be to specify minimum competencies required for those who respond to hazardous materials/WMD incidents and necessary for a risk-based response to these incidents.

**1.2.2** The competencies contained herein shall 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.

N **1.2.3** This document is also intended to further clarify competencies with the associated job performance requirements (JPRs) established in NFPA 1072.

**1.3 Application.** It shall not be the intent of this standard to restrict any jurisdiction from exceeding these minimum requirements.

## Chapter 2 Referenced Publications

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

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

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam,* 2016 edition.

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

NFPA 1001, *Standard for Fire Fighter Professional Qualifications,* 2013 edition.

NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications,* 2017 edition.

### 2.3 Other Publications.

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

ASTM A240/A240M-07, *Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.* November 1, 2015.

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

*Emergency Planning and Community Right-to-Know Act,* Public Law 99–499, 1986.

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

*FBI Bomb Data Center, Special Technicians Bulletin 2010-1,* "A Model for Bomb Squad Standard Operating Procedures," Washington, DC, July 22, 2011.

National Bomb Squad Commanders Advisory Board (NBSCAB), *National Guidelines for Bomb Technicians.*

*Superfund Amendments and Reauthorization Act (SARA),* National Guidelines for Bomb Technicians, March 2014, U.S. Department of Justice.

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

Title 46, Code of Federal Regulations, Subchapter C, Parts 24–28.

Title 46, Code of Federal Regulations, Subchapter D, Parts 30–39.

Title 46, Code of Federal Regulations, Subchapter I, Parts 90–105.

Title 46, Code of Federal Regulations, Subchapter I-A, Parts 107–109.

Title 46, Code of Federal Regulations, Subchapter H, Parts 70–79.

Title 46, Code of Federal Regulations, Subchapter L, Parts 125–134.

Title 46, Code of Federal Regulations, Subchapter O, Parts 150–154.

Title 46, Code of Federal Regulations, Subchapter T, Parts 175–185.

**2.3.3 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®,* 2017 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* Listed.** Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

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

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

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

**3.3 General Definitions.**

*N* **3.3.1 Action Options.** Tasks responders perform to meet response objectives at hazardous materials/weapons of mass destruction (WMD) incidents.

Δ **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.** The process of identifying a hazardous materials/weapons of mass destruction (WMD) problem and determining likely behavior and harm within the training and capabilities of the emergency responder.

**3.3.4 Area of Specialization.**

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

**3.3.4.2** ***Organization's Area of Specialization.*** Any chemicals or containers used by the specialist employee's employer.

Δ **3.3.5 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. *(See Annex E.)*

**3.3.6 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.

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

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

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

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

N **3.3.10.1** ***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 **a.** 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 tanks — MC-338 or equivalent **b.** Portable tanks such as intermodal tanks, including nonpressure tanks, pressure tanks, cryogenic tanks, and tube modules **c.** Tank cars including nonpressure tank cars, pressure tanks cars, and cryogenic tank cars **d.** Ton containers.

N **3.3.10.2** ***Facility Storage Tanks.*** Atmospheric and low-pressure storage tanks, pressurized storage tanks, and cryogenic storage tanks.

N **3.3.10.3** ***Intermediate Bulk Containers (IBCs).*** Pressure, nonpressure, and cryogenic rigid or flexible portable containers, other than cylinders or portable tanks, designed for mechanical lifting.

N **3.3.10.4** ***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.

N **3.3.10.5** ***Pipeline.*** A length of pipe including pumps, valves, flanges, control devices, strainers, and/or similar equipment for conveying fluids. [**70,** 2017]

N **3.3.10.6** ***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,** 2013]

N **3.3.10.7*** ***Radioactive Materials Containers.*** Excepted packaging, industrial packaging, Type A, Type B, and Type C packaging for radioactive materials.

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**3.3.11 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.

**3.3.12 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, that can act as a carrier.

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

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

N **3.3.13.1** ***Confinement.*** Those procedures taken to keep a material, once released, in a defined or local area.

N **3.3.13.2** ***Containment.*** The actions taken to keep a material in its container (e.g., stop a release of the material or reduce the amount being released).

N **3.3.13.3** ***Extinguishment.*** To cause to cease burning.

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

**3.3.14.1** ***Cold Zone.*** The 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.

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

**3.3.14.3** ***Hot Zone.*** The 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 the assigned work are permitted to enter.

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

**3.3.15 Coordination.** The process used to get people, who could represent different agencies, to work together integrally and harmoniously in a common action or effort.

**3.3.16* 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.

Δ **3.3.16.1*** ***Emergency Decontamination.*** The process of immediately reducing contamination of individuals in potentially life-threatening situations with or without the formal establishment of a decontamination corridor.

**3.3.16.2*** ***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.

Δ **3.3.16.3*** ***Mass Decontamination.*** The process of reducing or removing surface contaminants from large numbers of victims in potentially life-threatening situations in the fastest time possible.

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

Δ **3.3.17 Degradation.** A chemical action involving the molecular breakdown of a protective clothing material or equipment due to contact with a chemical.

**3.3.18* Demonstrate.** To show by actual performance.

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

*N* **3.3.20 Detection and Monitoring Equipment.** Instruments and devices used to detect, classify, or quantify materials.

**3.3.21 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.

Δ **3.3.22** ***Emergency Response Guidebook*** **(ERG).** The reference book, written in plain language, to guide emergency responders in their actions at the incident scene, specifically the *Emergency Response Guidebook* from the U.S. Department of Transportation; Transport Canada; and the Secretariat of Transportation and Communications, Mexico.

**3.3.23 Endangered Area.** The actual or potential area of exposure associated with the release of a hazardous material/weapon of mass destruction (WMD).

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

*N* **3.3.25 Evidence Preservation.** Deliberate and specific actions taken with the intention of protecting potential evidence from contamination, damage, loss, or destruction.

**3.3.26 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).

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

*N* **3.3.28 Exposures.** The people, animals, environment, property, and equipment that might become exposed at a hazardous materials/weapons of mass destruction (WMD) incident.

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

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*N* **3.3.30 Harm.** Adverse effect created by being exposed to a hazard.

*N* **3.3.31 Hazard.** Capable of causing harm or posing an unreasonable risk to life, health, property, or the environment.

Δ **3.3.32* Hazardous Material.** Matter (solid, liquid, or gas) or energy that when released is capable of creating harm to people, the environment, and property, including weapons of mass destruction (WMD) as defined in 18 U.S. Code, Section 2332a, as well as any other criminal use of hazardous materials, such as illicit labs, environmental crimes, or industrial sabotage.

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

Δ **3.3.34* 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).

**3.3.35* 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 material technician level skills at hazardous materials/weapons of mass destruction (WMD) incidents.

Δ **3.3.36* Hazardous Materials Safety Officer.** The person who works within an incident management system (IMS) (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.

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**3.3.37 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.

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

*N* **3.3.39 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/outcomes associated with that behavior.

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

**3.3.41 Incident Command System (ICS).** A component of an incident management system (IMS) 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.

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

**3.3.43 Match.** To provide with a counterpart.

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

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**3.3.45 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.

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

**3.3.47* 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.

**3.3.48 Plan.**

**3.3.48.1* *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 objectives for that emergency type, agency roles, and overall strategies.

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

**3.3.48.3* *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.

**3.3.49* 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/weapon of mass destruction (WMD) incident.

**3.3.50 Predict.** The process of estimating or forecasting 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.

**3.3.51* Protective Clothing.** Equipment designed to protect the wearer from thermal hazards, hazardous materials, or from the hazardous component of a weapon of mass destruction contacting the skin or eyes.

*N* **3.3.51.1 *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 the penetration to the body from bullets and steel fragments from handheld weapons and exploding munitions.

**3.3.51.2* *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.

**3.3.51.2.1* *Liquid Splash–Protective Clothing.*** 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.

**3.3.51.2.2* *Vapor-Protective Clothing.*** 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.

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

**3.3.51.4* *Structural Fire-Fighting Protective Clothing.*** The fire-resistant protective clothing normally worn by fire fighters during structural fire-fighting 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.

*N* **3.3.52 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.

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

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

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

*N* **3.3.56 Risk.** The probability or threat of suffering harm or loss.

**3.3.57 Risk-Based Response Process.** Systematic process by which responders analyze a problem involving hazardous materials/weapons of mass destruction (WMD), assess the hazards, evaluate the potential consequences, and determine appropriate response actions based upon facts, science, and the circumstances of the incident.

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*N* **3.3.58* Safety Data Sheet (SDS).** Formatted information provided by chemical manufacturers and distributors of hazardous products that contains information about chemical composition, physical and chemical properties, health and safety hazards, emergency response, and waste disposal of the material.

*N* **3.3.59* Sampling.** The process of selecting materials to analyze.

**3.3.60 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.

**3.3.61 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).

**3.3.62 Specialist Employees.**

**3.3.62.1* *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.

**3.3.62.2* *Specialist Employee B.*** That person who, in the course of 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.

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

**3.3.63 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.

*N* **3.3.64 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.

*N* **3.3.65 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.

**3.3.66* 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: critique, debriefing, and post-incident analysis.

*N* **3.3.66.1** ***Critique.*** An element of incident termination that examines the overall effectiveness of the emergency response effort and develops recommendations for improvement.

*N* **3.3.66.2** ***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.

*N* **3.3.66.3** ***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.

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

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

**3.3.68.1*** ***Radiological Weapons of Mass Destruction.***

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

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

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

**3.4 Operations Level Responders Definitions.**

**3.4.1 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 to respond to releases or potential releases of a specific group of WMD agents.

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**3.4.2 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 to perform mission-specific tasks, such as decontamination, victim/hostage rescue and recovery, evidence preservation, and sampling.

**3.4.3* 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, the environment, or property from the effects of the release.

**3.4.4 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.

**3.4.5 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.

**3.4.6 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.

**3.4.7 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.

**3.4.8 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.

**3.4.9 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.

**3.4.10 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.

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

**3.4.12 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.

**3.4.13 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 material technician, response personnel, and other outside resources regarding chemical issues.

**3.4.14 Operations Level Responders Assigned Responsibilities for Radioactive Material Response.** Persons, competent at the operations level, who, at hazardous materials/weapons of mass destruction (WMD) incidents involving radioactive 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 material technician, response personnel, and other outside resources regarding radioactive material issues.

**3.4.15 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.

***N* 3.5 Hazardous Materials Technician.** A person who responds to hazardous materials/weapons of mass destruction (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 and adjust accordingly, and assist in terminating the incident.

***N* 3.5.1 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.

***N* 3.5.2 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, fire-fighting personnel, and other resources.

***N* 3.5.3 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.

***N* 3.5.4 Hazardous Materials Technician with an Intermodal Tank Specialty.** A person who provides technical support pertaining to intermodal tanks, 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.

***N* 3.5.5 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.

***N* 3.5.6 Hazardous Materials Technician with a Radioactive Material Specialty.** A person who provides support 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.

***N* 3.5.7 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.

## Chapter 4 Competencies for Awareness Level Personnel

### 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 4.2 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.

Δ **4.1.2.2** Given a hazardous materials/WMD incident, policies and procedures, approved reference sources, and approved communications equipment, the 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, UN/NA identification number, type of placard, 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 *Emergency Response Guidebook* (ERG), safety data sheets (SDS), shipping papers, and other approved reference sources.

(2) Implement actions consistent with the authority having jurisdiction (AHJ), and the current edition of the ERG or an equivalent document by completing the following tasks:
   (a) Isolate the hazard area
   (b) Initiate required notifications

### 4.2 Competencies — Analyzing the Incident.

Δ **4.2.1* Recognizing the Presence of Hazardous Materials/WMD.** Given a hazardous materials/WMD incident 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* (or *dangerous goods*, in Canada) 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 associated 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 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 on safety data sheets (SDS) and shipping papers for hazardous materials:
   (a) Identify where to find SDS
   (b) Identify major sections of SDS

(11) Identify the following basic information on shipping papers for hazardous materials:
   (a) Identify the entries on shipping papers that indicate the presence of hazardous materials
   (b) Match the name of the shipping papers found in transportation (air, highway, rail, and water) with the mode of transportation
   (c) Identify the person responsible for having the shipping papers in each mode of transportation
   (d) Identify where the shipping papers are found in each mode of transportation
   (e) Identify where the papers can be found in an emergency in each mode of transportation

(12)* 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 incident, awareness level personnel shall, from a safe location, identify the hazardous material(s)/WMD involved in each situation by name, UN/NA identification number, or type placard applied 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, or types of placard 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 the identity of various hazardous materials/WMD (name, UN/NA identification number, or type placard), awareness level personnel shall identify the basic hazard information for each material by using the current edition of the ERG or equivalent document; safety data sheet (SDS); manufacturer, shipper, and carrier documents (including shipping papers); and contacts by completing the following requirements:

(1)* Identify the three methods for determining the guidebook page for a hazardous material/WMD
(2) Identify the two general types of hazards found on each guidebook page

**4.3* Competencies — Planning the Response. (Reserved)**

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

Δ **4.4.1* Isolate the Hazard Area.** Given examples of hazardous materials/WMD incidents, the emergency response plan, the standard operating 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, 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, or type placard), identify the following response information:
  (a) Emergency action (fire, spill, or leak and first aid)
  (b) Personal protective equipment (PPE) recommended:
    (i) Street clothing and work uniforms
    (ii) Structural fire-fighting 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 a 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 techniques 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, completing the following requirements:

(1) Identify policies and procedures for notification, reporting, and communications
(2) Identify types of approved communications equipment
(3) Describe how to operate approved communications equipment

**4.5* Competencies — Evaluating Progress. (Reserved)**

**4.6* Competencies — Terminating the Incident. (Reserved)**

## Chapter 5 Competencies for Operations Level Responders

**5.1 General.**

**5.1.1 Introduction.**

**5.1.1.1*** The operations level responder shall be that person who responds to hazardous materials/weapons of mass destruction (WMD) incidents for the purpose of protecting nearby persons, the environment, or property from the effects of the release.

**5.1.1.2** The operations level responder shall be trained to meet all competencies at the awareness level *(see Chapter 4)* and the competencies defined in Sections 5.2 through 5.5 of this chapter.

**5.1.1.3*** The operations level responder shall receive additional training to meet applicable governmental occupational health and safety regulations.

**5.1.2 Goal.**

Δ **5.1.2.1** 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 5.1.2.2 in a safe manner.

**5.1.2.2** 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 and potential hazards, harm, and outcomes by completing the following tasks:
  (a) Survey a hazardous materials/WMD incident to identify the containers and materials involved and to identify 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 with emergency response information and shipper/manufacturer/carrier contacts
(c) Predict the likely behavior of a hazardous material/WMD and its container, including hazards associated with that behavior
(d) Estimate the potential outcomes harm at a hazardous materials/WMD incident

(2) Plan an initial response to a hazardous materials/WMD incident within the capabilities and competencies of available personnel and personal protective equipment (PPE) by completing the following tasks:
(a) Describe the response objectives for the hazardous materials/WMD incident
(b) Describe the response options available for each objective
(c) Determine whether the PPE provided is suitable for implementing each option
(d) Describe emergency decontamination procedures
(e) Develop a plan of action, including safety considerations

(3) Implement the planned response for a hazardous materials/WMD incident to favorably change the outcomes consistent with the emergency response plan and/or standard operating procedures by completing the following tasks:
(a) Establish and enforce scene control procedures, including control zones, emergency decontamination, 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

(4) Evaluate and report the progress of the assigned tasks taken at a hazardous materials/WMD incident to ensure that the response objectives 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 response objectives
(b) Communicate the status of the planned response

**5.2 Competencies — Analyzing the Incident.**

Δ **5.2.1* Surveying Hazardous Materials/WMD Incidents.** Given scenarios involving hazardous materials/WMD incidents, the operations level responder shall collect information about the incident to identify the containers, the materials involved, leaking containers, and the surrounding conditions released by completing the requirements of 5.2.1.1 through 5.2.1.6.

Δ **5.2.1.1*** Given examples of the following pressure containers, the operations level responder shall identify each container by type, as follows:

(1) Bulk fixed facility pressure containers
(2) Pressure tank cars
(3) High-pressure cargo tanks
(4) Compressed gas tube trailers
(5) High-pressure intermodal tanks
(6) Ton containers
(7) Y-cylinders
(8) Compressed gas cylinders
(9) Portable and horizontal propane cylinders
(10) Vehicle-mounted pressure containers

**5.2.1.1.1** Given examples of the following cryogenic containers, the operations level responder shall identify each container by type, as follows:

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

**5.2.1.1.2** Given examples of the following liquids-holding containers, the operations level responder shall identify each container by type, as follows:

(1) Bulk fixed facility tanks
(2) Low-pressure tank cars
(3) Nonpressure liquid cargo tanks
(4) Low-pressure chemical cargo tanks
(5) 101 and 102 intermodal tanks
(6) Flexible intermediate bulk containers/rigid intermediate bulk containers (FIBCs/RIBCs)
(7) Flexible bladders
(8) Drums
(9) Bottles, flasks, carboys

**5.2.1.1.3** Given examples of the following solids-holding containers, the operations level responder shall identify each container by type, as follows:

(1) Bulk fixed facilities
(2) Railway gondolas, coal cars
(3) Dry bulk cargo trailers
(4) Intermodal tanks (reactive solids)
(5) FIBCs/RIBCs
(6) Drums
(7) Bags, bottles, boxes

**5.2.1.1.4** Given examples of the following mixed-load containers, the operations level responder shall identify each container by type, as follows:

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

Δ **5.2.1.1.5** Given examples of the following containers, the operations level responder shall identify the characteristics of each container by type as follows:

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

Δ **5.2.1.1.6*** Given examples of the following radioactive material containers, the operations level responder shall identify the characteristics of each container by type, as follows:

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

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**5.2.1.2** Given examples of containers, the operations level responder shall identify the markings that differentiate one container from another.

**5.2.1.2.1** Given examples of the following marked transport vehicles and their corresponding shipping papers, the operations level responder shall identify marking used for identifying the specific transport vehicle:

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

**5.2.1.2.2** Given examples of facility storage tanks, the operations level responder shall identify the markings indicating container size, product contained, and/or site identification numbers.

**5.2.1.3** Given examples of hazardous materials incidents, the operations level responder shall identify the name(s) of the hazardous material(s) in 5.2.1.3.1 through 5.2.1.3.3.

**5.2.1.3.1** Given a pipeline marker, the operations level responder shall identify the emergency telephone number, owner, and product as applicable.

**5.2.1.3.2** Given a pesticide label, the operations level responder shall identify the active ingredient, hazard statement, name of pesticide, and pest control product (CPC) number (in Canada).

**5.2.1.3.3** Given a label for a radioactive material, the operations level responder shall identify the type or category of label, contents, activity, transport index, and criticality safety index as applicable.

Δ **5.2.1.4*** The operations level responder shall identify and list the surrounding conditions that should be noted when surveying a hazardous materials/WMD incident.

**5.2.1.5** The operations level responder shall describe ways to verify information obtained from the survey of a hazardous materials/WMD incident.

**5.2.1.6*** The operations level responder shall identify at least three additional hazards that could be associated with an incident involving terrorist or criminal activities.

*N* **5.2.1.6.1** Identify at least four types of locations that could be targets for criminal or terrorist activity using hazardous materials/WMD.

*N* **5.2.1.6.2** Describe the difference between a chemical and a biological incident.

*N* **5.2.1.6.3** Identify at least four indicators of possible criminal or terrorist activity involving chemical agents.

*N* **5.2.1.6.4** Identify at least four indicators of possible criminal or terrorist activity involving biological agents.

*N* **5.2.1.6.5** Identify at least four indicators of possible criminal or terrorist activity involving radiological agents.

*N* **5.2.1.6.6** Identify at least four indicators of possible criminal or terrorist activity involving illicit laboratories (e.g., clandestine laboratories, weapons lab, explosive lab, or biological lab).

*N* **5.2.1.6.7** Identify at least four indicators of possible criminal or terrorist activity involving explosives.

*N* **5.2.1.6.8** Identify at least four indicators of secondary devices.

*N* **5.2.1.6.9** Identify at least four specific actions necessary when an incident is suspected to involve criminal or terrorist activity.

*N* **5.2.1.7** The operations level responder shall describe ways in which emergency responders are exposed to toxic products of combustion.

Δ **5.2.2 Collecting Hazard and Response Information.** Given scenarios involving known hazardous materials/WMD, the operations level responder shall collect hazard and response information from SDS, CHEMTREC/CANUTEC/SETIQ, governmental authorities, and manufacturers, shippers, and carriers by completing the following requirements:

(1) Match the definitions associated with the hazard classes and divisions of hazardous materials/WMD with the designated class or division.
(2) Identify two ways to obtain an SDS in an emergency.
(3) 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) Fire-fighting 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
(4) Identify the types of assistance provided by, procedure for contacting, and information to be provided to CHEMTREC/CANUTEC/SETIQ and governmental authorities.
(5) Identify two methods of contacting manufacturers, shippers, and carriers (highway, rail, marine, air, and pipeline) to obtain hazard and response information.
(6) 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.

Δ **5.2.3* Predicting the Likely Behavior of a Material and Its Container.** Given scenarios involving hazardous materials/WMD incidents, each with a single hazardous material/WMD, the operations level responder shall describe the likely behavior of the material or agent and its container by completing the following requirements:

(1) Use the hazard and response information obtained from the current edition of the ERG, SDS, CHEMTREC/CANUTEC/SETIQ, governmental authorities, and manufacturer, shipper, and carrier contacts, as follows:
   (a)* Match the following chemical and physical properties with their significance and impact on the behavior of the container and its contents:
      i. Boiling point
      ii. Chemical reactivity
      iii. Corrosivity (pH)

iv. Flammable (explosive) range [lower explosive limit (LEL) and upper explosive limit (UEL)]
v. Flash point
vi. Ignition (autoignition) temperature
vii. Particle size
viii. Persistence
ix. Physical state (solid, liquid, gas)
x. Radiation (ionizing and nonionizing)
xi. Specific gravity
xii. Toxic products of combustion
xiii. Vapor density
xiv. Vapor pressure
xv. Water solubility
xvi. Polymerization
xvii. Expansion ratio
xviii. Biological agents and toxins

(b) Identify the differences between the following terms:

i. *Contamination* and *secondary contamination*
ii. *Exposure* and *contamination*
iii. *Exposure* and *hazard*
iv. *Infectious* and *contagious*
v. *Acute effects* and *chronic effects*
vi. *Acute exposures* and *chronic exposures*

(2)* Identify types of stress that can cause a container system to release its contents (thermal, mechanical, and chemical).
(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.

**5.2.4* Estimating Potential Harm.** Given scenarios involving hazardous materials/WMD incidents, the operations level responder shall describe the potential harm within the endangered area at each incident 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 area 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 material, 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 threats and devices at criminal or terrorist events

**5.3 Competencies — Planning the Response.**

**5.3.1 Describing Response Objectives.** Given at least two scenarios involving hazardous materials/WMD incidents, the operations level responder shall describe the response objectives for each example by completing the following requirements:

(1) Given an analysis of a hazardous materials/WMD incident and the exposures, describe the number of exposures that could be saved with the resources provided by the AHJ
(2) Given an analysis of a hazardous materials/WMD incident, describe the steps for determining response objectives
(3) Describe how to assess the risk to a responder for each hazard class in rescuing injured persons at a hazardous materials/WMD incident

**5.3.2 Identifying Action Options.** Given examples of hazardous materials/WMD incidents (facility and transportation), the operations level responder shall identify the action options for each response objective and shall meet the following requirements:

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

**5.3.3 Determining Suitability of Personal Protective Equipment (PPE).** Given examples of hazardous materials/WMD incidents, including the names of the hazardous materials/WMD involved and the anticipated type of exposure, the operations level responder shall determine whether available PPE is applicable to performing assigned tasks by completing the following requirements:

(1)* Identify the respiratory protection required for a given response option 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 the personal protective clothing, required for a given action option and the following:

(a) Identify skin contact hazards encountered at hazardous materials/WMD incidents
(b) Identify the purpose, advantages, and limitations of the following types of protective clothing at hazardous materials/WMD incidents:

i. Chemical-protective clothing, including liquid splash–protective ensembles and vapor-protective ensembles

ii. High temperature–protective clothing, including proximity suits and entry suits
iii. Structural fire-fighting protective clothing

**5.3.4* Identifying Emergency Decontamination Issues.** Given scenarios involving hazardous materials/WMD incidents, the operations level responder shall identify when emergency decontamination is needed by completing the following requirements:

(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.

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

**5.4.1 Establishing Scene Control.** Given two scenarios involving hazardous materials/WMD incidents, the operations level responder shall explain how to 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

**5.4.2* Preserving Evidence.** Given two scenarios involving hazardous materials/WMD incidents, the operations level responder shall describe the process to preserve evidence as listed in the emergency response plan and/or standard operating procedures.

**5.4.3* Initiating the Incident Command System.** Given scenarios involving hazardous materials/WMD incidents, the operations level responder shall 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 management 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 response objectives of other agencies that respond to hazardous materials/WMD incidents

**5.4.4 Using Personal Protective Equipment (PPE).** Given the PPE provided by the AHJ, the operations level responder shall describe considerations for the use of 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 personnel
(3) Identify the safety precautions to be observed when approaching and working at hazardous materials/WMD incidents
(4) Identify the signs and symptoms of heat and cold 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 cleaning, disinfecting, and inspecting PPE provided by the AHJ
(7) Maintain and store PPE following the instructions provided by the manufacturer on the care, use, and maintenance of the protective ensemble elements

**5.5 Competencies — Evaluating Progress.**

**5.5.1 Evaluating the Status of Planned Response.** Given two scenarios involving hazardous materials/WMD incidents, including the incident action plan, the operations level responder shall determine the effectiveness of the actions taken in accomplishing the response objectives and shall meet the following requirements:

(1) Identify the factors to be evaluated to determine if actions taken were effective in accomplishing the objectives
(2) Describe the circumstances under which it would be prudent to withdraw from a hazardous materials/WMD incident

Δ **5.5.2 Communicating the Status of Planned Response.** Given two scenarios involving hazardous materials/WMD incidents, including the incident action plan, the operations level responder shall report the status of the planned response through the normal chain of command 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

**5.6* Competencies — Terminating the Incident. (Reserved)**

## Chapter 6 Competencies for Operations Level Responders Assigned Mission-Specific Responsibilities

### 6.1 General.

#### 6.1.1 Introduction.

Δ **6.1.1.1*** This chapter shall address competencies for the following operations level responders assigned mission-specific responsibilities at hazardous materials/WMD incidents by the authority having jurisdiction (AHJ) beyond the competencies at the operations level *(see Chapter 5)*. Operations mission-specific responders will be identified by the specialty area as follows:

(1) Personal protective equipment (PPE) *(see Section 6.2)*
(2) Mass decontamination *(see Section 6.3)*
(3) Technical decontamination *(see Section 6.4)*
(4) Evidence preservation and public safety sampling *(see Section 6.5)*
(5) Product control *(see Section 6.6)*
(6) Detection, monitoring, and sampling *(see Section 6.7)*
(7) Victim rescue/recovery *(see Section 6.8)*
(8) Illicit laboratory incidents *(see Section 6.9)*
(9) Disablement/disruption of improvised explosive devices (IED), improvised WMD dispersal devices, and operations at improvised explosives laboratories *(see Section 6.10)*
(10) Diving in contaminated water environment *(see Section 6.11)*
(11) Evidence collection *(see Section 6.12)*

Δ **6.1.1.2** The operations level responder who is assigned mission-specific responsibilities 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 5)*, and all competencies in Section 6.2 of this chapter, and all competencies for each assigned responsibility in Sections 6.3 through 6.10 in this chapter.

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

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

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

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

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

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

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

### 6.2 Mission-Specific Competencies: Personal Protective Equipment (PPE).

#### 6.2.1 General.

##### 6.2.1.1 Introduction.

**6.2.1.1.1** The operations level responder assigned to use PPE at hazardous materials/WMD incidents shall be that person, competent at the operations level, who is assigned by the AHJ to select, inspect, don, work in, go through decontamination while wearing, and doff PPE at hazardous materials/WMD incidents.

Δ **6.2.1.1.2** The operations level responder assigned to use PPE 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 5)*, and all competencies in this section.

**6.2.1.1.3** The operations level responder assigned to use PPE at hazardous materials/WMD incidents shall operate under the guidance of a hazardous materials technician, an allied professional, an emergency response plan, or standard operating procedures.

**6.2.1.1.4*** The operations level responder assigned to use PPE shall receive the additional training necessary to meet specific needs of the jurisdiction.

**6.2.1.2 Goal.** The goal of the competencies in this section shall be to provide the operations level responder assigned to select, inspect, don, work in, go through decontamination while wearing, and doff PPE with the knowledge and skills to perform the tasks in a safe and effective manner.

*N* **6.2.1.2.1** Given a hazardous materials/WMD incident, a mission-specific assignment in an incident action plan (IAP) that requires use of PPE; the scope of the problem; response objectives and options 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, the operations level responder assigned to use 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

**6.2.2 Competencies — Analyzing the Incident. (Reserved)**

**6.2.3 Competencies — Planning the Response.**

Δ **6.2.3.1 Selecting Personal Protective Equipment (PPE).** Given scenarios involving hazardous materials/WMD incidents with known and unknown hazardous materials/WMD and the PPE provided by the AHJ, the operations level responder assigned to use PPE provided by the AHJ shall select the PPE required to support assigned mission-specific tasks at hazardous materials/WMD incidents 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 for the following hazards:

(a) Thermal
(b) Radiological
(c) Asphyxiating
(d) Chemical (corrosive, toxic)
(e) Etiological/biological
(f) Mechanical

(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 at least three 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

**6.2.4 Competencies — Implementing the Planned Response.**

**6.2.4.1 Using Personal Protective Equipment (PPE).** Given the PPE provided by the AHJ, the operations level responder assigned to use PPE shall demonstrate the ability to inspect, don, work in, go through decontamination while wearing, and doff the PPE provided to support assigned mission-specific tasks by completing the following requirements:

(1) Describe safety precautions 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 following safety procedures, protecting exposures and personnel, 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

*N* **6.2.5 Competencies — Evaluating Progress. (Reserved)**

**6.2.6 Competencies — Terminating the Incident.**

**6.2.6.1 Reporting and Documenting Personal Protective Equipment (PPE) Use.** Given a scenario involving a hazardous materials/WMD incident and AHJ policies and procedures, the operations level responder assigned to use PPE shall report and document use of the PPE as required by the AHJ by completing the following:

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

**6.3 Mission-Specific Competencies: Mass Decontamination.**

**6.3.1 General.**

**6.3.1.1 Introduction.**

**6.3.1.1.1** The operations level responder assigned to perform mass decontamination at hazardous materials/WMD incidents shall be that person, competent at the operations level, who is assigned by the AHJ to select, set up, implement, evaluate, and terminate mass decontamination for ambulatory and nonambulatory victims at hazardous materials/WMD incidents.

Δ **6.3.1.1.2** The operations level responder 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 5)*, all mission-specific competencies for PPE *(see Section 6.2)*, and all competencies in this section.

**6.3.1.1.3** The operations level responder 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.

**6.3.1.1.4*** The operations level responder assigned to perform mass decontamination at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

**6.3.1.2 Goal.**

**6.3.1.2.1** The goal of the competencies in this section shall be to provide the operations level responder 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 6.3.1.2.2 in a safe and effective manner.

Δ **6.3.1.2.2** Given a hazardous materials/WMD incident that requires mass decontamination; an assignment in an IAP; the 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 responding to hazardous materials/WMD incidents, the operations level responder 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 personnel, PPE, and response equipment provided by the AHJ
(2) Set up and implement the selected mass decontamination process to decontaminate victims, personnel, 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 personnel
(3) Evaluate the effectiveness of the mass decontamination process
(4) Report and document mass decontamination activities

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

**6.3.3 Competencies — Planning the Response.**

Δ **6.3.3.1 Selecting a Mass Decontamination Process.** Given scenarios involving hazardous materials/WMD incidents requiring mass decontamination, the operations level responder 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

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

Δ **6.3.4.1 Performing Decontamination Operations Identified in the Incident Action Plan.** Given the selected mass decontamination process and the tools, equipment, and PPE provided by the AHJ, the operations level responder 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 personnel, and avoiding or minimizing hazards.

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**6.3.5 Competencies — Evaluating Progress.**

**6.3.5.1 Evaluating the Effectiveness of the Mass Decontamination Process.** Given examples of contaminated items that have undergone the required decontamination, the operations level responder 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.

**6.3.6 Competencies — Terminating the Incident.**

Δ **6.3.6.1 Reporting and Documenting Mass Decontamination Operations.** Given a scenario involving a hazardous materials/WMD incident involving mass decontamination operations/activities and AHJ policies and procedures, the operations level responder assigned to perform mass decontamination shall report and document the mass decontamination operations/activities as required by the AHJ by completing the following:

(1) Identify the reports and supporting documentation required by the AHJ pertaining to mass decontamination operations/activities

**6.4 Mission-Specific Competencies: Technical Decontamination.**

**6.4.1 General.**

**6.4.1.1 Introduction.**

**6.4.1.1.1** The operations level responder assigned to perform technical decontamination at hazardous materials/WMD incidents shall be that person, competent at the operations level, who is 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.

Δ **6.4.1.1.2** The operations level responder 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 5)*, all mission-specific competencies for PPE *(see Section 6.2)*, and all competencies in this section.

**6.4.1.1.3** The operations level responder 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.

**6.4.1.1.4*** The operations level responder assigned to perform technical decontamination at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

**6.4.1.2 Goal.**

**6.4.1.2.1** The goal of the competencies in this section shall be to provide the operations level responder 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 6.4.1.2.2 in a safe and effective manner.

Δ **6.4.1.2.2** Given a hazardous materials/WMD incident that requires technical decontamination; an assignment in an IAP; the 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, the operations level responder 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 personnel, 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 personnel
(3) Evaluate the effectiveness of the technical decontamination process
(4) Report and document the technical decontamination operations

**6.4.2 Competencies — Analyzing the Incident. (Reserved)**

**6.4.3 Competencies — Planning the Response.**

Δ **6.4.3.1 Selecting a Technical Decontamination Process.** Given a hazardous materials/WMD incident that requires technical decontamination; an assignment in an IAP; the 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, the operations level responder 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 a hazardous materials/WMD incident
(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 tools, equipment, weapons, criminal suspects, and law enforcement/search canines brought to the decontamination corridor at hazardous materials/WMD incidents

• **6.4.4 Competencies — Implementing the Planned Response.**

**6.4.4.1 Setting Up and Implementing Technical Decontamination.** Given the selected technical decontamination operations and methods and the tools, equipment, and PPE provided by the AHJ, the operations level responder 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.

• **6.4.5 Competencies — Evaluating Progress.**

**6.4.5.1 Evaluating the Effectiveness of the Technical Decontamination Process.** Given examples of contaminated victims, personnel, tools, equipment, and PPE that have undergone the selected technical decontamination operations and methods, the operations level responder assigned to perform technical decontamination shall evaluate the effectiveness of the technical decontamination process consistent with AHJ policies and procedures or the incident action plan (IAP) by completing the following:

(1) Describe the procedures for evaluating effectiveness of the technical decontamination process by visual observations, monitoring device, ultraviolet light, wipe sampling, and chemical analysis

**6.4.6 Competencies — Terminating the Incident.**

Δ **6.4.6.1 Reporting and Documenting Technical Decontamination Operations.** Given a scenario involving a hazardous materials/WMD incident involving technical decontamination operations/activities and AHJ policies and procedures, the operations level responder assigned to perform technical decontamination shall report and document the technical decontamination operations/activities as required by the AHJ by completing the following:

(1) Identify the reports and technical documentation required by the AHJ pertaining to technical decontamination operations/activities

**6.5 Mission-Specific Competencies: Evidence Preservation and Sampling.**

**6.5.1 General.**

**6.5.1.1 Introduction.**

**6.5.1.1.1** The operations level responder assigned to perform evidence preservation and public safety sampling shall be that person, competent at the operations level, who is assigned by the AHJ to preserve forensic evidence and take public safety samples 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.

Δ **6.5.1.1.2** The operations level responder 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 5)*, all mission-specific competencies for PPE *(see Section 6.2)*, and all competencies in this section.

**6.5.1.1.3** The operations level responder 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.

**6.5.1.1.4*** The operations level responder 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 jurisdiction.

**6.5.1.2 Goal.**

**6.5.1.2.1** The goal of the competencies in this section shall be to provide the operations level responder assigned to perform evidence preservation and public safety sampling at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 6.5.1.2.2 in a safe and effective manner.

**6.5.1.2.2** Given a hazardous materials/WMD incident 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, the operations level responder assigned to perform evidence preservation and public safety sampling 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 if the incident is potentially criminal in nature, and identify the law enforcement agency having investigative jurisdiction
   (b) Identify unique aspects of criminal hazardous materials/WMD incidents
(2) Plan a response for an incident where there is potential criminal intent involving hazardous materials/WMD within the capabilities and competencies of available personnel, PPE, and response equipment by completing the following tasks:
   (a) Determine the response options to conduct public safety sampling and evidence preservation operations
   (b) Describe how the options are within the legal authorities, capabilities, and competencies of available personnel, 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) Preserve forensic evidence
   (b) Take samples
   (c) Seize evidence
(4) Report and document evidence preservation and public safety sampling operations

**6.5.2 Competencies — Analyzing the Incident.**

**6.5.2.1 Determining If the Incident Is Potentially Criminal in Nature and Identifying the Law Enforcement Agency That Has Investigative Jurisdiction.** Given examples of hazardous materials/WMD incidents involving potential criminal intent, the operations level responder assigned to evidence preservation and public safety sampling shall describe the potential criminal violation and identify the law enforcement agency having investigative jurisdiction by completing the following requirements:

(1) Given examples of the following hazardous materials/WMD incidents, the operations level responder shall describe products that might be encountered in the incident associated with each situation:
   (a) Hazardous materials/WMD suspicious letter
   (b) Hazardous materials/WMD suspicious package
   (c) Hazardous materials/WMD illicit laboratory
   (d) Release/attack with a WMD agent
   (e) Environmental crimes
(2) Given examples of the following hazardous materials/WMD incidents, the operations level responder shall identify the agency(s) with investigative authority and the incident response considerations associated with each situation:
   (a) Hazardous materials/WMD suspicious letter
   (b) Hazardous materials/WMD suspicious package
   (c) Hazardous materials/WMD illicit laboratory
   (d) Release/attack with a WMD agent
   (e) Environmental crimes

**6.5.3 Competencies — Planning the Response.**

**6.5.3.1 Identifying Unique Aspects of Criminal Hazardous Materials/WMD Incidents.** The operations level responder 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 an incident involving illicit laboratories, a hazardous materials/WMD incident, or an environmental crime, the operations level responder shall perform the following tasks:
   (a) Describe the procedure for securing the scene and characterizing and preserving evidence at the scene
   (b) Describe the procedure to document personnel and scene operations associated with the incident
   (c) Describe the procedure to determine whether the operations level responders are within their legal authority to perform evidence preservation and public safety sampling tasks
   (d) Describe the procedure to notify the agency with investigative authority
   (e) Describe the procedure to notify the hazardous devices technician
   (f) Identify potential sample/evidence
   (g) Identify the applicable public safety sampling equipment
   (h) Describe the procedures to protect public safety samples and evidence from secondary contamination
   (i) Describe documentation procedures
   (j) Describe evidentiary sampling techniques

(k) Describe field screening protocols for collected public safety samples and evidence
(l) Describe evidence labeling and packaging procedures
(m) Describe evidence decontamination procedures
(n) Describe evidence packaging procedures for evidence transportation
(o) Describe chain-of-custody procedures

(2) Given an example of an illicit laboratory, the operations level responder 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 associated with liquid and solid public safety sample and evidence collection
(d) Describe the field screening protocols for collected public safety samples and evidence

(3) Given an example of an environmental crime, the operations level responder 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 associated with the collection of liquid and solid public safety samples and evidence
(d) Describe the field screening protocols for collected public safety samples and evidence

(4) Given an example of a hazardous materials/WMD suspicious letter, the operations level responder assigned to evidence preservation and public safety sampling shall be able to perform the following tasks:
(a) Describe the factors to be evaluated in selecting the PPE, sampling equipment, detection devices, and public safety sample and evidence packaging and transport containers
(b) Describe the sampling options associated with the collection of liquid and solid public safety samples and evidence
(c) Describe the field screening protocols for collected public safety samples and evidence

(5) Given an example of a hazardous materials/WMD suspicious package, the operations level responder 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 associated with liquid and solid public safety sample and evidence collection
(d) Describe the field screening protocols for collected public safety samples and evidence

(6) Given an example of a release/attack involving a hazardous materials and WMD agent, the operations level responder 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 associated with the collection of liquid and solid public safety samples and evidence
(d) Describe the field screening protocols for collected public safety samples and evidence

(7) Given examples of different types of potential criminal hazardous materials/WMD incidents, the operations level responder shall identify and describe the application, use, and limitations of the various types of field screening tools that can be utilized for screening the following:
(a) Corrosivity
(b) Flammability
(c) Oxidation
(d) Radioactivity
(e) Volatile organic compounds (VOC)

(8) Describe the potential adverse impact of using destructive field screening techniques
(9) Describe the procedures for maintaining the evidentiary integrity of any item removed from the crime scene

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**6.5.4 Competencies — Implementing the Planned Response.**

**6.5.4.1 Implementing the Planned Response.** Given the incident action plan for a criminal incident involving hazardous materials/WMD, the operations level responder 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) Demonstrate how to secure the scene and characterize and preserve evidence at the scene
(2) Document personnel and scene operations associated with the incident
(3) Determine whether responders are within their legal authority to perform evidence collection and public safety sampling tasks
(4) Describe the procedure to notify the agency with investigative authority
(5) Notify the hazardous devices technician
(6) Identify potential public safety samples and evidence to be collected
(7) Demonstrate procedures to protect samples and evidence from secondary contamination
(8) Demonstrate correct techniques to collect public safety samples utilizing the equipment provided

(9) Demonstrate documentation procedures
(10) Demonstrate public safety sampling protocols
(11) Demonstrate field screening protocols for public safety samples and evidence collected
(12) Demonstrate evidence/sample labeling and packaging procedures
(13) Demonstrate evidence/sample decontamination procedures
(14) Demonstrate evidence/sample packaging procedures for evidence transportation
(15) Describe chain of custody procedures for evidence/sample preservation

**6.5.4.2** The operations level responder assigned to evidence preservation and public safety sampling shall describe AHJ policies and procedures for the technical decontamination process.

**6.5.5 Competencies — Evaluating Progress. (Reserved)**

**6.5.6 Competencies — Terminating the Incident. (Reserved)**

*N* **6.5.6.1 Reporting and Documenting Evidence Preservation and Public Safety Sampling Operations.** Given a scenario involving a hazardous materials/WMD incident involving evidence preservation and public safety sampling operations and AHJ policies and procedures, the operations level responder assigned to perform evidence preservation and public safety sampling shall report and document the evidence preservation and public safety sampling operations as required by the AHJ by completing the following:

(1) Identify the reports and supporting documentation required by the AHJ pertaining to evidence preservation and public safety sampling operations.

**6.6 Mission-Specific Competencies: Product Control.**

**6.6.1 General.**

**6.6.1.1 Introduction.**

**6.6.1.1.1** The operations level responder assigned to perform product control with limited risk of personal exposure shall be that person, competent at the operations level, who is assigned by the AHJ to confine and contain releases of hazardous materials/WMD and control flammable liquid and flammable gas releases at hazardous materials/WMD incidents.

Δ **6.6.1.1.2** The operations level responder 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 5)*, all mission-specific competencies for PPE *(see Section 6.2)*, and all competencies in this section.

**6.6.1.1.3** The operations level responder 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.

**6.6.1.1.4*** The operations level responder assigned to perform product control at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

**6.6.1.2 Goal.**

**6.6.1.2.1** The goal of the competencies in this section shall be to provide the operations level responder 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 6.6.1.2.2 in a safe and effective manner.

**6.6.1.2.2** Given a hazardous materials/WMD incident with release of product; an assignment in an IAP; the 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, the operations level responder 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 personnel, tools and equipment, control agents, 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 personnel exposure at the incident following safety procedures, avoiding or minimizing hazards, and protecting exposures and personnel.
(3) Report and document product control operations.

**6.6.2 Competencies — Analyzing the Incident. (Reserved)**

**6.6.3 Competencies — Planning the Response.**

Δ **6.6.3.1 Selecting Product Control Techniques.** Given examples of hazardous materials/WMD incidents, the operations level responder 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 personnel, tools and equipment, PPE, and control agents and equipment 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 the operations level responder.
(4) Describe the application, necessary tools, equipment, control agents, 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 tools and equipment provided by the AHJ for product control, including 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 and control agents, including Class B foam and dispersal agents.
(6) Identify the characteristics and applicability of the following Class B foams if supplied by the AHJ:
(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.

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**6.6.4 Competencies — Implementing the Planned Response.**

**6.6.4.1 Performing Product Control Techniques.** Given the selected product control technique and the tools and equipment, PPE, and control agents and equipment provided by the AHJ at a hazardous materials/WMD incident, the operations level responder 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 the tools and equipment provided by the AHJ, perform the following product control techniques following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards:
(a) 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

*N* **6.6.4.2** Given the required tools and equipment provided by the AHJ, perform product control techniques following safety procedures, protecting exposures and personnel, 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 Class B foams or agents and equipment provided by the AHJ, control the spill or fire involving flammable liquids by application of the foam(s) or agent(s).

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**6.6.5 Competencies — Evaluating Progress. (Reserved)**

**6.6.6 Competencies — Terminating the Incident.**

*N* **6.6.6.1 Reporting and Documenting Product Control Operations.** Given a scenario involving a hazardous materials/WMD incident involving product control, the operations level responder assigned to perform product control shall document the product control operations as required by the AHJ by completing the following requirement:

(1) Identify the reports and supporting documentation required by the AHJ pertaining to product control operations

**6.7 Mission-Specific Competencies: Detection, Monitoring, and Sampling.**

**6.7.1 General.**

**6.7.1.1 Introduction.**

**6.7.1.1.1** The operations level responder assigned to perform detection, monitoring, and sampling shall be that person, competent at the operations level, who is assigned by the AHJ to detect, monitor, and sample at hazardous materials/WMD incidents.

Δ **6.7.1.1.2** The operations level responder 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 5)*, all mission-specific competencies for PPE *(see Section 6.2)*, and all competencies in this section.

**6.7.1.1.3** The operations level responder 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.

**6.7.1.1.4*** The operations level responder assigned to perform air monitoring and sampling at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

**6.7.1.2 Goal.**

**6.7.1.2.1** The goal of the competencies in this section shall be to provide the operations level responder assigned to air monitoring and sampling at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 6.7.1.2.2 safely and effectively.

**6.7.1.2.2** Given a hazardous materials/WMD incident; an assignment in an IAP; 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, the operations level responder 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 incident within the capabilities and competencies of available personnel; 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 incident following safety procedures, avoiding or minimizing hazards, and protecting exposures and personnel
(3) Report and document detection, monitoring, and sampling operations

**6.7.2 Competencies — Analyzing the Incident. (Reserved)**

**6.7.3 Competencies — Planning the Response.**

**6.7.3.1 Selecting Detection, Monitoring, and Sampling Equipment.** Given a hazardous materials/WMD incident and the detection, monitoring, and sampling equipment provided by the AHJ, the operations level responder assigned to perform detection, monitoring, and sampling hazardous materials/WMD at the incident 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 personnel 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

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**6.7.4 Competencies — Implementing the Planned Response.**

Δ **6.7.4.1 Operating Detection, Monitoring, and Sampling Equipment.** Given a hazardous materials/WMD incident and the selected detection, monitoring, and sampling equipment, the operations level responder assigned to perform detection, monitoring, and sampling 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 personnel
(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

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**6.7.5 Competencies — Evaluating Progress. (Reserved)**

**6.7.6 Competencies — Terminating the Incident.**

*N* **6.7.6.1 Reporting and Documenting Detection, Monitoring, and Sampling Operations.** Given a scenario involving a hazardous materials/WMD incident involving detection, monitoring, and sampling operations and AHJ policies and procedures, the operations level responder assigned to perform detection, monitoring, and sampling shall report and document the detection, monitoring, and sampling operations as required by the AHJ by completing the following:

(1) Identify the reports and supporting documentation required by the AHJ pertaining to detection, monitoring, and sampling operations

**6.8 Mission-Specific Competencies: Victim Rescue and Recovery.**

**6.8.1 General.**

**6.8.1.1 Introduction.**

**6.8.1.1.1** The operations level responder assigned to perform victim rescue and recovery at hazardous materials/WMD incidents shall be that person, competent at the operations level, who is assigned to rescue and recover exposed and/or contaminated victims at hazardous materials/WMD incidents.

Δ **6.8.1.1.2** The operations level responder 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 5)*, all mission-specific competencies for PPE *(see Section 6.2)*, and all competencies in this section.

**6.8.1.1.3** The operations level responder 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.

**6.8.1.1.4*** The operations level responder 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.

**6.8.1.2 Goal.**

**6.8.1.2.1** 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 6.8.1.2.2 in a safe and effective manner.

**6.8.1.2.2** Given a hazardous materials/WMD incident involving exposed and/or contaminated victims; an assignment in an IAP; the 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, the operations level responder 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 personnel 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 personnel
(3) Report and document victim rescue and/or recovery operations

**6.8.2 Competencies — Analyzing the Incident. (Reserved)**

**6.8.3 Competencies — Planning the Response.**

Δ **6.8.3.1 Selecting Rescue and Recovery Options.** Given a hazardous materials/WMD incident involving exposed and/or contaminated victims; an assignment in an IAP; the 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, the 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 personnel, approved tools, equipment, special rescue equipment, and PPE for the situation at hand
   (a) Describe both rescue and recovery options for 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
(4) Describe the procedures for implementing victim rescue and recovery operations within the incident command system
(5) 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
(6) Identify the PPE protection options required to protect victims during rescue and recovery operations

• **6.8.4 Competencies — Implementing the Planned Response.**

Δ **6.8.4.1 Searching for Rescuing and Recovering Victims.** Given a hazardous materials/WMD incident and the recommended victim rescue and recovery option(s) for the incident, the operations level responder 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 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

**6.8.5 Competencies — Evaluating Progress. (Reserved)**

**6.8.6 Competencies — Terminating the Incident.**

*N* **6.8.6.1 Reporting and Documenting Victim Rescue and Recovery Operations.** Given a scenario involving a hazardous materials/WMD incident involving victim rescue and recovery operations and AHJ policies and procedures, the operations level responder assigned to perform victim rescue and recovery shall report and document the victim rescue and recovery operations as required by the AHJ by completing the following:

(1) Identify the reports and supporting documentation required by the AHJ pertaining to victim rescue and recovery operations

**6.9 Mission-Specific Competencies: Response to Illicit Laboratory Incidents.**

**6.9.1 General.**

**6.9.1.1 Introduction.**

**6.9.1.1.1** The operations level responder assigned to respond to illicit laboratory incidents shall be that person, competent at the operations level, who, at hazardous materials/WMD incidents involving potential violations of criminal statutes specific to the illegal manufacture of drugs or WMD, is assigned to secure the scene, identify the laboratory or process, and preserve evidence at hazardous materials/WMD incidents involving potential violations of criminal statutes specific to the illegal manufacture of drugs or WMD.

Δ **6.9.1.1.2** The operations level responder who responds 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 5)*, all mission-specific competencies for PPE *(see Section 6.2)*, and all competencies in this section.

**6.9.1.1.3** The operations level responder who responds to illicit laboratory incidents shall operate under the guidance of a hazardous materials technician, an allied professional, or standard operating procedures.

**6.9.1.1.4*** The operations level responder who responds to illicit laboratory incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

**6.9.1.2 Goal.**

**6.9.1.2.1** The goal of the competencies in this section shall be to provide the operations level responder assigned to respond to illicit laboratory incidents with the knowledge and skills to perform the tasks in 6.9.1.2.2 in a safe and effective manner.

**6.9.1.2.2** 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, an emergency response plan, or standard operating procedures, the operations level responder assigned to respond to illicit laboratory incidents 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 personnel, 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

**6.9.2 Competencies — Analyzing the Incident.**

Δ **6.9.2.1 Determining If a Hazardous Materials/WMD Incident Is an Illicit Laboratory Operation.** Given examples of hazardous materials/WMD incidents involving illicit laboratory operations, the operations level responder assigned to respond to illicit laboratory incidents shall identify the potential drugs/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 personnel
(5) Given examples of illicit laboratory operations, describe the agencies that have investigative authority and operational responsibility to support the response

**6.9.3 Competencies — Planning the Response.**

**6.9.3.1 Determining the Response Options.** Given an analysis of hazardous materials/WMD incidents involving illicit laboratories, the operations level responder assigned to respond to illicit laboratory incidents shall identify possible response options.

**6.9.3.2 Identifying Unique Aspects of Criminal Hazardous Materials/WMD Incidents.**

**6.9.3.2.1** The operations level responder assigned to respond to illicit laboratory incidents shall identify the unique operational aspects associated with illicit drug manufacturing and illicit WMD manufacturing.

Δ **6.9.3.2.2** Given an incident involving illicit drug manufacturing or illicit WMD manufacturing, the operations level responder assigned to illicit laboratory incidents shall describe the following tasks:

(1) Securing and preserving the scene
(2) Joint hazardous materials and hazardous devices 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 personnel and scene operations associated with the incident

Δ **6.9.3.3 Identifying the Agency That Has Investigative Jurisdiction.** The operations level responder assigned to respond to illicit laboratory incidents shall identify the agency having investigative jurisdiction by completing the following:

(1) Given scenarios involving illicit drug manufacturing or illicit WMD manufacturing, identify the agency(s) with investigative authority for the following situations:
    (a) Illicit drug manufacturing
    (b) Illicit WMD manufacturing
    (c) Environmental crimes resulting from illicit laboratory operations
    (d) Improvised explosive devices, improvised WMD dispersal devices, and improvised explosives laboratories

**6.9.3.4 Identifying Unique Tasks and Operations at Sites Involving Illicit Laboratories.**

**6.9.3.4.1** The operations level responder assigned to respond to illicit laboratory incidents shall identify and describe the unique tasks and operations encountered at illicit laboratory scenes.

**6.9.3.4.2** Given scenarios involving illicit drug manufacturing or illicit WMD manufacturing, 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

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**6.9.4 Competencies — Implementing the Planned Response.**

**6.9.4.1 Implementing the Planned Response.** Given scenarios involving an illicit drug/WMD laboratory operation involving hazardous materials/WMD, the operations level responder assigned to respond to illicit laboratory incidents shall implement or oversee the implementation of the selected response options in a safe and effective manner.

Δ **6.9.4.1.1** Given a simulated illicit drug/WMD laboratory incident, the operations level responder assigned to respond to illicit laboratory incidents shall be able to perform the following tasks:

(1) Describe safe and effective methods to secure the scene
(2) Demonstrate decontamination procedures for tactical law enforcement personnel to include weapons and law enforcement K-9s securing an illicit laboratory
(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

**6.9.4.1.2** Given a simulated illicit drug/WMD laboratory entry operation, the operations level responder assigned to respond to illicit laboratory incidents 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

**6.9.4.1.3** Given a simulated illicit drug/WMD laboratory incident, the operations level responder assigned to respond to illicit laboratory incidents shall describe joint agency crime scene operations, including support to forensic crime scene processing teams.

**6.9.4.1.4** Given a simulated illicit drug/WMD laboratory incident, the operations level responder assigned to respond to illicit laboratory incidents shall describe the policy and procedures for post–crime scene processing and site remediation operations.

**6.9.4.1.5** The operations level responder assigned to respond to illicit laboratory incidents shall describe local procedures for performing decontamination upon completion of the illicit laboratory mission.

**6.9.5 Competencies — Evaluating Progress. (Reserved)**

**6.9.6 Competencies — Terminating the Incident.**

*N* **6.9.6.1 Reporting and Documenting Illicit Laboratory Response Operations.** Given a scenario involving a hazardous materials/WMD incident involving illicit laboratory response operations and AHJ policies and procedures, the operations level responder assigned to perform illicit laboratory response shall report and document the illicit laboratory response operations as required by the AHJ by completing the following:

(1) Identify the reports and supporting documentation required by the AHJ pertaining to illicit laboratory response operations

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

**6.10.1 General.**

**6.10.1.1 Introduction.**

**6.10.1.1.1** The operations level responder assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall be that person, competent at the operations level, who is assigned to interrupt the functioning of an IED or an improvised WMD dispersal device or conduct operations at improvised explosives laboratories.

**6.10.1.1.2** The operations level responder 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.

Δ **6.10.1.1.3** The operations level responder 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 5)*, all mission-specific competencies for PPE *(see Section 6.2)*, mission-specific competencies for response to illicit laboratories *(see Section 6.9)*, and all competencies in this section.

**6.10.1.1.4** The operations level responder 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.

**6.10.1.1.5** The operations level responder 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 jurisdiction and/or agency.

**6.10.1.2 Goal.**

**6.10.1.2.1** The goal of the competencies in this section shall be to provide the operations level responder 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 6.10.1.2.2 and 6.10.1.2.3 in a safe and effective manner.

Δ **6.10.1.2.2** When responding to hazardous materials/WMD incidents involving a potential IED or improvised WMD dispersal device, the operations level responder 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 personnel, PPE and response equipment by completing the following tasks:
   (a) Determine if response options 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 completing the following tasks under the guidance of the senior hazardous devices technician (HDT) present:
   (a) Employ disablement/disruption techniques in accordance with the FBI Hazardous Devices School "logic tree," the current edition of the National Bomb Squad Commanders Advisory Board's (NBSCAB) "A Model for Bomb Squad Standard Operating Procedures," established protocol of military units, or the AHJ
(4) Report and document potential IED or improvised WMD dispersal device operations

**6.10.1.2.3** When responding to hazardous materials/WMD incidents involving potential improvised explosives laboratories, the operations level responder 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 personnel, 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

**6.10.2 Competencies — Analyzing the Incident.**

**6.10.2.1 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, the operations level responder 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:

(1) Given examples of the following hazardous materials/WMD incidents involving an IED or improvised WMD dispersal device, describe products that might be encountered in the incident associated with each situation:
   (a) Letter/package-based improvised dispersal device
   (b) Briefcase/backpack-based improvised dispersal device
   (c) Transportation-borne WMD dispersal device
   (d) Fixed location hazards where an IED has been placed to cause the deliberate release of a material

Δ **6.10.2.2 Determining If the Hazardous Materials/WMD Incident Involves an Improvised Explosives Laboratory Operation.** Given examples of hazardous materials/WMD incidents involving improvised explosives laboratories, the operations level responder 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 personnel
(3) Given examples of improvised explosives laboratory operations, describe the agencies that have investigative authority and operational responsibility to support the response

**6.10.3 Competencies — Planning the Response.**

**6.10.3.1 Identifying Unique Aspects of Improvised WMD Dispersal Device Related Hazardous Materials/WMD Incidents.** When responding to hazardous materials/WMD incidents, the operations level responder 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, shall 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, shall 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

(3) Given examples of different types of incidents involving an improvised WMD dispersal device, shall 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 and neutron radiation
(b) Explosive materials [commercial and homemade explosives (HME)]

**6.10.3.2 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, the operations level responder 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:

(1) Given a scenario involving an improvised explosives laboratory and detection devices provided by the AHJ, complete the following:
(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 application, use, and limitations of various types of field screening tools that can be utilized for determining the presence of the following materials:
i. Radioactive materials that emit alpha, beta, gamma, or neutron radiation, including radionuclide identification of gamma emitting radioactive materials
ii. Explosive materials (commercial and HME)
(d) Demonstrate the field test and operation of each detection device and interpret the readings based on local procedures
(e) Describe local procedures for decontamination of themselves and their detection devices upon completion of the material detection mission
(f) Describe the procedure for identifying and obtaining the appropriate emergency response elements to support disablement/disruption or mitigation operations

**6.10.3.3 Identifying Potential Response Options.**

Δ **6.10.3.3.1** Given scenarios of an incident involving a potential IED or improvised WMD materials dispersal device, the operations level responder assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall identify possible response options.

Δ **6.10.3.3.2** Given scenarios of an incident involving a potential improvised explosives laboratories, the operations level responder assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories shall identify possible response options.

Δ **6.10.3.4 Selecting Personal Protective Equipment.** Given the PPE provided by the AHJ, the operations level responder assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at an incident at improvised explosives laboratories shall select the PPE required to support such operations at hazardous materials/WMD incidents based on the *National Guidelines for Bomb Technicians* adopted by the National Bomb Squad Commanders Advisory Board (NBSCAB) *(see Section 6.2)*.

**6.10.4 Competencies — Implementing the Planned Response.**

Δ **6.10.4.1** Given scenarios of an incident involving a potential IED or improvised WMD dispersal device, the operations level responder 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 local or agency 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 the FBI Hazardous Devices School "logic tree," the NBSCAB "A Model for Bomb Squad Standard Operating Procedures," established protocol for military units, or established protocol of the AHJ
(4) Assist in planning the air monitoring and sampling operations within the capabilities and competencies of available personnel, 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, shall 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

Δ **6.10.4.2** Given a simulated improvised explosives laboratory incident, the operations level responder assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations 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

**6.10.4.3** The operations level responder 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 6.10.2.1 and 6.10.2.2.

**6.10.4.4** The operations level responder 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.

**6.10.5 Competencies — Evaluating Progress. (Reserved)**

**6.10.6 Competencies — Terminating the Incident. (Reserved)**

**N 6.11 Diving in Contaminated Water Environments.**

**N 6.11.1 General.**

**N 6.11.1.1 Introduction.**

**N 6.11.1.1.1** The operations level responder assigned to perform diving in contaminated water environments shall be that person, competent at the operations level, who is 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.

**N 6.11.1.1.2** The operations level responder 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.

**N 6.11.1.1.3** The operations level responder 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.

**N 6.11.1.1.4** The operations level responder 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 5)*, all mission-specific competencies for personal protective equipment *(see Section 6.2)*, and all competencies in this section.

**N 6.11.1.1.5** The operations level responder 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.

**N 6.11.1.1.6** The operations level responder 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 jurisdiction and/or agency.

**N 6.11.1.2 Goal.**

**N 6.11.1.2.1** The goal of the competencies in this section shall be to provide the operations level responder assigned to perform contaminated water diving or dive surface support operations with the knowledge and skills to perform the tasks in 6.11.1.2.2 in a safe and effective manner.

**N 6.11.1.2.2** When responding to emergency incidents involving water potentially contaminated with hazardous materials, the operations level responder 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 personnel, PPE, and control equipment by completing the following tasks:
   (a) Determine if response options 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 completing the following tasks under the guidance of a hazardous materials technician, allied professional, or standard operating procedures:
   (a) Employ diving operations in accordance with the policies of the AHJ
(4) Evaluate the response to a contaminated water diving operation by completing the following tasks:
   (a) Determine the effectiveness of protective equipment and efficiency of decontamination
(5) Terminate the response to a contaminated water diving operation by completing the following tasks:
   (a) Document the incident and determine the levels of contamination on diving equipment

**N 6.11.2 Competencies — Analyzing the Incident.**

**N 6.11.2.1 Performing a Pre-Dive Assessment of the Dive Location.** Given a dive location, the operations level responder assigned to perform contaminated water diving or dive surface support operations during emergency response shall perform a risk assessment to determine the presence of hazards to divers and dive surface support personnel by completing the following:

(1) Given examples of potential hazards at planned dive locations, describe the hazards that might be associated with each situation:
   (a) Hazards associated with dive locations documented in available reference materials such as, but not limited to, Emergency Planning and Community Right-to-Know Act (EPCRA) Tier II reporting, Combined Sewer Overflow reports, state environmental reports, fish advisories, and identified

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, aka Superfund) reporting
(b) Historical releases of hazardous materials near or upstream from the dive location
(c) Knowledge of hazardous materials containers or vessels near or upstream from the dive location

*N* **6.11.2.2 Determining If the Incident Involves Potential Contamination of the Water.** Given examples of hazardous materials/WMD incidents involving the potential contamination of water, the operations level responder assigned to perform contaminated water diving or dive surface support operations during emergency response shall identify and/or categorize the hazard by completing the following:

(1) Given examples of the following hazardous materials/WMD incidents involving potentially contaminated water, describe the hazards that might be encountered from the incident associated with each situation:
(a) Chemicals floating on the surface of the water
(b) Chemicals stratified in the water column or infiltrated in bottom sediment
(c) Pathogenic biological materials in the water
(d) Radiological particulates or radioactive sources in the water
(e) Hazmat containers floating on the surface of the water
(f) Hazmat containers below the surface of the water

*N* **6.11.2.3 Determining the Risk from Hazards at the Dive Location.** Given examples of hazardous materials/WMD at the dive location, the operations level responder assigned to perform contaminated water diving or dive surface support operations during emergency response shall identify the potential risk to divers and dive surface support personnel by completing the following requirements:

(1) Given examples of hazardous materials/WMD identified at the dive location, describe the hazards to divers and dive surface support personnel 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 the dive location, describe the secondary hazards, including mechanical hazards, to divers and dive surface support personnel 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

*N* **6.11.3 Competencies — Planning the Response.**

*N* **6.11.3.1 Identifying Unique Aspects of Dive Related Hazardous Materials/WMD Incidents.** When responding to hazardous materials/WMD incidents, the operations level responder assigned to perform contaminated water diving or dive surface support operations during emergency response shall be capable of identifying the unique aspects associated with such incidents by completing the following requirements:

(1) Given an incident 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 personal protective equipment for surface support personnel
(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 personnel
(g) Describe the factors to be evaluated in selecting decontamination procedures and solutions
(h) Describe the factors to be evaluated by medical personnel 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:
(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 personnel 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

**N 6.11.3.2 Identifying Potential Response Options.**

**N 6.11.3.2.1** Given scenarios involving a potential contaminated water dive emergency response operation, the operations level responder assigned to contaminated water diving or dive surface support operations shall identify possible response options.

**N 6.11.3.2.2** Given PPE provided by the AHJ, the operations level responder 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.

**N 6.11.4 Competencies — Implementing the Planned Response.**

**N 6.11.4.1** 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) 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

**N 6.11.4.2** Given scenarios involving a contaminated water dive operation, the operations level responder 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

**N 6.11.4.3** The operations level responder 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 6.11.2.2 and 6.11.2.3.

**N 6.11.4.4** The operations level responder assigned to perform contaminated water surface support operations during emergency response shall demonstrate the AHJ procedures for technical decontamination.

**N 6.11.5 Competencies — Evaluating Progress.**

**N 6.11.5.1** 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 diver protective clothing
(2) Evaluate the effectiveness of the technical decontamination process

**N 6.11.6 Competencies — Terminating the Incident.**

**N 6.11.6.1** 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) 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

**N 6.12 Mission-Specific Competencies — Evidence Collection.**

**N 6.12.1 General.**

**N 6.12.1.1 Introduction.**

**N 6.12.1.1.1** The operations level responder assigned to perform evidence collection at hazardous materials/WMD incidents shall be that person, competent at the operations level, who is assigned by the AHJ to collect evidence at hazardous materials/WMD incidents involving potential violations of criminal statutes or governmental regulations.

**N 6.12.1.1.2** The operations level responder 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.

**N 6.12.1.1.3** The operations level responder 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 5)*, all mission-specific competencies for PPE *(see Section 6.2)*, and all competencies in this section.

**N 6.12.1.1.4** The operations level responder 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.

**N 6.12.1.1.5** The operations level responder assigned to perform evidence collection at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

**N 6.12.1.2 Goal.**

**N 6.12.1.2.1** The goal of the competencies in this section shall be to provide the operations level responder assigned to perform evidence collection at hazardous materials/WMD incidents with the knowledge and skills to perform the following tasks in a safe and effective manner:

(1) Determine if the incident has a potential for being criminal in nature, and identify the agency that has investigative jurisdiction
(2) Identify unique aspects of criminal hazardous materials/WMD incidents

(3) Determine the response options to conduct evidence collection operations within the capabilities and competencies of available personnel, PPE, and response equipment
(4) Describe how the response options are within the legal authorities, capabilities, and competencies of available personnel, PPE, and response equipment
(5) 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
(6) Report and document evidence collection operations

**N 6.12.2 Competencies — Analyzing the Incident.**

**N 6.12.2.1 Determining If the Incident Is Criminal in Nature.** Given examples of the following hazardous materials/WMD incidents, the operations level responder shall describe clues for the presence of hazards that might be encountered in the incident 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

**N 6.12.2.2 Identifying the Agency That Has Investigative Jurisdiction.** Given examples of hazardous materials/WMD incidents involving potential criminal intent, the operations level responder assigned to collect evidence shall describe the potential criminal violation and identify the agency having investigative jurisdiction 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

**N 6.12.3 Competencies — Planning the Response.**

**N 6.12.3.1 Identifying Unique Aspects of Criminal Hazardous Materials/WMD Incidents.** The operations level responder 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 an incident involving illicit laboratories, a hazardous materials/WMD incident, or an environmental crime, the operations level responder shall perform the following tasks:
   (a) Describe the procedure for securing the scene
   (b) Describe the procedure for characterizing and preserving evidence at the scene
   (c) Describe the procedure for documenting personnel and scene operations associated with the incident
   (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 notifying the agency with investigative authority
   (f) Describe the procedure for notifying hazardous device technician
   (g) Identify the need to collect public safety samples for the protection of responders
   (h) Identify potential evidentiary samples
   (i) Identify applicable equipment for collecting evidence
   (j) Describe the procedures to protect evidence from secondary contamination
   (k) Describe the AHJ documentation procedures for collection of evidence
   (l) Describe evidentiary sampling techniques
   (m) Describe field screening protocols for evidence to be collected
   (n) Describe evidence labeling and packaging procedures
   (o) Describe evidence decontamination procedures
   (p) Describe packaging procedures for evidence transportation
   (q) Describe evidence chain-of-custody procedures
(2) Given an example of an illicit laboratory, the operations level responder 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, sampling equipment, detection devices, evidence packaging, and evidence transport containers
   (c) Describe the sampling options associated with liquid sample and solid sample evidence collection
   (d) Describe the field screening protocols for collected evidence
(3) Given an example of an environmental crime, the operations level responder 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, sampling equipment, detection devices, evidence packaging, and evidence transport containers
   (c) Describe the sampling options associated with the collection of liquid sample and solid sample evidence
   (d) Describe the field screening protocols for collected evidence
(4) Given an example of a hazardous materials/WMD suspicious letter, the operations level responder 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, sampling equipment, detection devices, evidence packaging, and evidence transport containers
(c) Describe the sampling options associated with the collection of liquid sample and solid sample evidence
(d) Describe the field screening protocols for collected evidence

(5) Given an example of a hazardous materials/WMD suspicious package, the operations level responder 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, sampling equipment, detection devices, evidence packaging, and evidence transport containers
(c) Describe the sampling options associated with liquid sample and solid sample evidence
(d) Describe the field screening protocols for collected evidence

(6) Given an example of a release/attack involving a hazardous material/WMD agent, the operations level responder 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, sampling equipment, detection devices, evidence packaging, and evidence transport containers
(c) Describe the sampling options associated with the collection of liquid sample and solid sample evidence
(d) Describe the field screening protocols for collected evidence

(7) Given examples of different types of potential criminal hazardous materials/WMD incidents, the operations level responder shall identify and describe the application, use, and limitations of the various types field screening tools that can be utilized for screening evidence for the following prior to collection:
(a) Corrosivity
(b) Flammability
(c) Oxidizers
(d) Radioactivity
(e) Volatile organic compounds (VOC)
(f) Fluorides

(8) Describe the potential adverse impact of using destructive field screening techniques on evidence prior to collection
(9) Describe the procedures for maintaining the evidentiary integrity of any item removed from the scene

*N* **6.12.3.2 Selecting Personal Protective Equipment (PPE).** Given the PPE provided by the AHJ, the operations level responder assigned to evidence collection shall select the PPE required to support evidence collection at hazardous materials/WMD incidents based on local procedures *(see Section 6.2)*.

*N* **6.12.4 Competencies — Implementing the Planned Response.**

*N* **6.12.4.1 Implementing the Planned Response.** Given the incident action plan for a criminal incident involving hazardous materials/WMD, the operations level responder assigned to collect evidence shall implement selected response actions consistent with the emergency response plan or standard operating procedures by completing the following requirements:

(1) Demonstrate how to secure the scene and characterize and preserve evidence at the scene
(2) Demonstrate documentation of personnel and scene operations associated with the incident
(3) Determine whether responders are within their legal authority to perform evidence collection tasks
(4) Describe the procedure to notify the agency with investigative authority
(5) Describe the procedure to notify hazardous device technician
(6) Identify potential evidence to be collected
(7) Demonstrate procedures to protect evidence from secondary contamination
(8) Demonstrate field screening protocols for evidence prior to collection
(9) Demonstrate AHJ approved techniques to collect evidence utilizing the equipment provided
(10) Demonstrate evidence documentation procedures
(11) Demonstrate evidence labeling and packaging procedures
(12) Demonstrate evidence decontamination procedures
(13) Demonstrate packaging procedures for evidence transportation
(14) Describe chain-of-custody procedures for evidence

*N* **6.12.4.2** The operations level responder assigned to evidence collection shall describe local procedures for the technical decontamination process.

*N* **6.12.5 Competencies — Evaluation Progress. (Reserved)**

*N* **6.12.6 Competencies — Terminating the Incident.**

*N* **6.12.6.1 Reporting and Documenting Evidence Collection Operations.** Given a scenario involving a hazardous materials/WMD incident involving evidence collection operations and AHJ policies and procedures, the operations level responder assigned to perform evidence collection shall report and document the evidence collection operations as required by the AHJ by completing the following:

(1) Identify the reports and supporting documentation required by the AHJ pertaining to evidence collection operations

## Chapter 7 Competencies for Hazardous Materials Technicians

### 7.1 General.

#### 7.1.1 Introduction.

**7.1.1.1** The hazardous materials technician shall be that person who responds to hazardous materials/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 as needed, and assist in terminating the incident.

Δ **7.1.1.2** The hazardous materials technician shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, and all competencies of this chapter.

**7.1.1.3*** The hazardous materials technician shall receive additional training to meet applicable governmental occupational health and safety regulations.

**7.1.1.4** The hazardous materials technician shall be permitted to have additional competencies that are specific to the response mission, expected tasks, equipment, and training as determined by the AHJ.

**7.1.2 Goal.**

**7.1.2.1** The goal of the competencies in this chapter shall be to provide the hazardous materials technician with the knowledge and skills to perform the tasks in 7.1.2.2 in a safe manner.

**7.1.2.2** In addition to being competent at both the awareness and the operations levels, the hazardous materials technician 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:
      (i) Identify by name, specification, typical contents, and capacity of containers
      (ii) Classify hazardous materials/WMD, verify the presence of hazardous materials, and determine the concentrations of hazardous materials through the use of detection, monitoring, and sampling equipment
   (b) Collect and interpret hazard and response information from printed and technical resources, computer databases, and monitoring equipment
   (c) Describe the type and extent of damage to containers
   (d) Predict the likely behavior of released materials and their containers when multiple materials are involved
   (e) Estimate the size of an endangered area using computer modeling, monitoring equipment, or specialists in this field
(2) Plan a response within the capabilities of available personnel, PPE, and response equipment by completing the following tasks:
   (a) Describe the response objectives for hazardous materials/WMD incidents
   (b) Describe the potential response options available by response objective
   (c) Select the PPE required for a given action option
   (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
(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 AHJ incident management system (IMS)
   (b) Inspect, don, work in, and go through decontamination while wearing PPE
   (c) Perform product control techniques including:
      (i) Product control (confinement) of released materials — adsorption, adsorption, blanketing, damming, diking, dilution, dispersion, diversion, neutralization, retention, vapor dispersion, and vapor suppression
      (ii) Product control (containment) from 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 of liquids from nonpressure containers
      (v) Perform decontamination functions identified in the incident action plan (IAP)
(4) Evaluate the progress of the planned response by completing the following tasks:
   (a) Evaluate the effectiveness of the control functions
   (b) Evaluate the effectiveness of the decontamination process
(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

**7.2 Competencies — Analyzing the Incident.**

Δ **7.2.1 Surveying Hazardous Materials/WMD Incidents.** Given examples of hazardous materials/WMD incidents, the hazardous materials technician shall:

(1) Identify containers involved by name, specification, and typical contents by name, hazard class, and capacity
(2) Classify hazardous materials/WMD involved, verify the presence of hazardous materials and concentration of hazardous materials through detection, monitoring, and sampling by completing the requirements of 7.2.1.1 through 7.2.1.1.9

**7.2.1.1 Identifying Containers and Contents.**

*N* **7.2.1.1.1** Given examples of various containers for hazardous materials/WMD, the hazardous materials technician shall identify each container by name and specification and identify the typical contents by name and hazard class.

**7.2.1.1.2** Given examples of the following railroad cars, the hazardous materials technician 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

Δ **7.2.1.1.3** 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) Nonpressure intermodal tanks
(2) Pressure intermodal tank
(3) Specialized intermodal tanks
(4) Cryogenic intermodal tanks
(5) Tube modules

**7.2.1.1.4** Given examples of the following cargo tanks, the hazardous materials technician 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

**7.2.1.1.5** Given examples of the following facility storage tanks, the hazardous materials technician 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

**7.2.1.1.6** Given examples of the following nonbulk packaging, the hazardous materials technician shall identify the package by name and identify the typical contents by name and hazard class:

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

**7.2.1.1.7** Given examples of the following radioactive materials packages, the hazardous materials technician 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

**7.2.1.1.8** Given examples of the following packaging, the hazardous materials technician shall identify the package by name and identify the typical contents by name and hazard class:

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

**7.2.1.1.9** Given examples of three facility and three transportation containers, the hazardous materials technician shall identify the approximate capacity of each container.

**7.2.1.1.10** Using the markings on the container, the hazardous materials technician shall identify the capacity (by weight or volume) of the following examples of transportation vehicles:

(1) Cargo tanks
(2) Tank cars
(3) Tank containers

**7.2.1.1.11** Using the markings on the container and other available resources, the hazardous materials technician 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

**7.2.1.2* Detection, Monitoring, and Sampling.** Given a hazardous materials/WMD incident with released identified and unidentified hazardous materials, an assignment in an IAP, policies and procedures, and approved resources, detection and monitoring equipment, and PPE, the hazardous materials technician shall, through detection, monitoring, and sampling, classify hazardous materials/WMD by the basic categories; verify the presence of hazardous material; determine the concentration of hazardous materials in the atmosphere; collect samples of solids, liquids, and gases; and read, interpret, record, and communicate the results of detection and monitoring equipment by completing the following tasks:

(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.
   (a) Identify the basic hazard categories and their definitions — for example, biological, corrosivity, energy (explosivity, radioactivity, reactivity), flammability, oxygen concentration, thermal (heat and cold), and toxicity.
   (b) Describe monitoring technologies.
   (c) Describe the types of detection and monitoring equipment including colorimetric (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 (e.g., immunoassays, protein tests), and radiation detection and monitoring including the following:
      (i) Application, capabilities, and limitations
      (ii) Application of ionization potential (ip) 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 background, rate, and dose.
  (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.

(2) Using the selected detection and monitoring equipment [colorimetric (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 (if provided by the AHJ), radiation detection monitoring devices (e.g., a contamination measuring instrument or instruments able to measure alpha, beta, and gamma radiation, pancake Geiger-Mueller), exposure rate instrument (e.g., instruments able to measure a range of exposure rate), dosimetry devices (e.g., personnel radiation monitors/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 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.

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**7.2.2 Collecting and Interpreting Hazard and Response Information.** Given a hazardous materials/WMD incident, an assignment in an IAP, policies and procedures, access to approved reference sources (technical resources, computer databases, and results of monitoring equipment), and approved tools and equipment access to approved resources (technical resources, computer databases, and results of monitoring equipment), and approved tools and equipment, the hazardous materials technician shall collect, interpret, and communicate hazard and response information not available from the current edition of the ERG or an SDS and shall meet the requirements of 7.2.2.1 through 7.2.2.5.

Δ **7.2.2.1*** 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

Δ **7.2.2.2** Describe the following hazard and response terms including chemical and physical properties, radiation, exposure; the significance in the risk analysis process; and application of hazard and response:
(1) Air reactivity
(2) Autorefrigeration
(3) Boiling point
(4) Catalyst
(5) Chemical change
(6) Chemical interactions
(7) Compound, mixture
(8) Concentration
(9) Corrosive (acids and bases/alkaline)
(10) Critical temperature
(11) Cryogenic liquid heat transfer processes (conduction, convection, radiation, and direct contact)
(12) Liquid heat transfer processes; conduction, convection, radiation, and direct contact (e.g., with cryogenic)
(13) Decomposition temperature
(14) Dose
(15) Dose response
(16) Endothermic
(17) Evaporization rate
(18) Exothermic
(19) Expansion ratio
(20) Half-life
(21) Inhibitor
(22) Maximum safe storage temperature (MSST)
(23) Melting point and freezing point
(24) Miscibility
(25) Odor and odor threshold
(26) Organic and inorganic
(27) pH
(28) Physical change
(29) Radioactivity
(30) Reactivity
(31) Relative density
(32) Self-accelerating decomposition temperature (SADT)
(33) Solubility
(34) Solution and slurry
(35) Strength
(36) Sublimation

(37) Temperature of product
(38) Volatility
(39) Viscosity

**7.2.2.3** Identify the signs and symptoms, and target organ effects of exposure to hazardous materials/WMD.

**7.2.2.4*** Identify hazardous and response information to be communicated.

**7.2.2.5** Collect and interpret hazardous and response information.

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**7.2.3* Describing the Condition of the Container Involved in the Incident.** Given an incident involving hazardous materials/WMD; an assignment in an IAP; 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 identify 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 7.2.3.1 through 7.2.3.3.

*N* **7.2.3.1** 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.

*N* **7.2.3.2** Identify the typical types of damage for bulk, intermediate bulk, and nonbulk containers; facilities containers; radioactive 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

*N* **7.2.3.3** Assess the condition of the container and its contents following safety procedures, avoiding and minimizing hazards, and protecting exposures and personnel.

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

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**7.2.4 Predicting Likely Behavior of Materials and Their Containers Where Multiple Materials Are Involved.** Given an incident involving multiple hazardous materials/WMD; an assignment in an IAP; 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, the hazardous materials technician shall identify 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:
    (1) Fire protection systems
    (2) Monitoring and detection systems
    (3) Pressure relief and vacuum relief protection
    (4) Product spillage and control (impoundment and diking)
    (5) Tank spacing
    (6) 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:
    (1) Fire protection systems
    (2) Monitoring and detection systems
    (3) Pressure relief protection
    (4) Transfer operations

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Δ **7.2.5 Estimating the Likely Size of an Endangered Area.** Given a hazardous materials/WMD incident, an assignment in an IAP, policies and procedures, the likely behavior of the container and its contents, and approved resources and equipment, the hazardous materials technician 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:

**7.2.5.1** Identify resources for dispersion pattern prediction and modeling, including computers, monitoring equipment, or specialists in the field.

**7.2.5.2** Identify the methods for measuring and predicting concentrations of materials within the endangered area to determine public protective response options and the areas to be protected.

*N* **7.2.5.3** Identify the methods for identifying the physical, safety, and health hazards within the endangered area.

**7.2.5.4** Describe the following health hazard terms and exposure values, and explain the significance in the analysis process:

(1) Counts per minute (cpm) and kilocounts per minute (kcpm)
(2) Immediately dangerous to life and health (IDLH) value
(3) Incapacitating concentration 50 percent
(4) Incubation period
(5) Infectious dose
(6) Lethal concentrations ($LC_{50}$)
(7) Lethal dose ($LD_{50}$)
(8) Parts per billion (ppb)
(9) Parts per million (ppm)
(10) Permissible exposure limit (PEL)
(11) Radiation absorbed dose (rad)
(12) Roentgen equivalent man (rem), millirem (mrem), microrem (μrem)
(13) Sievert, millsievert (mSv), microsivert (μSv)
(14) Threshold limit value ceiling (TLV-C)
(15) Threshold limit value short-term exposure limit (TLV-STEL)
(16) Threshold limit value time-weighted average (TLV-TWA)

Δ **7.2.5.5** Identify methods for determining the areas of potential harm within the endangered area.

Δ **7.2.5.6*** Identify methods for determining the outcomes within an endangered area.

Δ **7.2.5.7** Given a hazardous materials/WMD release and the corresponding instrument monitoring readings, the hazardous materials technician shall determine the applicable public protective response options and the areas to be protected.

**7.3 Competencies — Planning the Response.**

**7.3.1 Identifying Response Objectives and Options.**

**7.3.1.1** Given a hazardous materials/WMD incident; an assignment in an IAP; results of the incident analysis including incident-related information, life safety risks, environmental risks, and property risks; available resources; and policies and procedures, the hazardous materials technician shall develop and recommend to the incident commander (IC) or hazardous materials officer response objectives and options by completing the following requirements:

(1) Describe the considerations for identifying response objectives (defensive, offensive, and nonintervention)
(2) Describe the considerations for identifying the possible response options to accomplish a given response objective

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*N* **7.3.2 Selecting Personal Protective Equipment PPE.** Given a hazardous materials/WMD incident, results of the incident analysis, response objectives and options for the incident, approved references, and policies and procedures, the hazardous materials technician shall select the PPE required for the specified response option(s) by completing the following requirements:

*N* **7.3.2.1** Identify types of PPE available for response based on NFPA standards and classifications levels, the OSHA/EPA levels of PPE (A, B, C, D) and the advantages of using certified PPE.

*N* **7.3.2.2** Describe the types of PPE available for the following hazards:

(1) Thermal
(2) Radiological
(3) Asphyxiating
(4) Chemical
(5) Etiological
(6) Mechanical

*N* **7.3.2.3** Identify the factors to be considered in selecting PPE for the following specified action options:

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

*N* **7.3.2.4** Identify the effects of physiological and psychological stresses on users of PPE.

*N* **7.3.2.5** Identify the process for inspecting, testing, and maintenance of PPE.

Δ **7.3.3 Selecting Decontamination Procedures.** Given a hazardous materials/WMD incident, results of the incident analysis, response objectives and options for the incident, available resources, and policies and procedures, the hazardous materials technician shall select the decontamination procedure for a given response action, 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 a hazardous materials/WMD incident
(3) Identify equipment required to implement each of the decontamination methods

Δ **7.3.4 Developing a Plan of Action.** Given a hazardous materials/WMD incident, an assignment in an IAP, results of the incident analysis, response objectives and options for the given incident, available resources, and policies and procedures, the hazardous materials technician shall prepare an action including site safety and a control plan, safety briefing materials, and pre-entry activities; identify atmospheric and physical safety hazards when incident involved a confined space; and 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

*N* **7.3.4.1** Describe the difference between control, confinement, containment, and extinguishment.

Δ **7.3.4.2** Describe the purpose of, procedures for, required tools and equipment for, and safety precautions for following techniques for hazardous materials/WMD (product) control:

(1) Absorption
(2) Adsorption
(3) Blanketing
(4) Damming
(5) Diking
(6) Dilution
(7) Dispersion
(8) Diversion
(9) Neutralization
(10) Overpacking
(11) Patching
(12) Plugging
(13) Pressure isolation and reduction (isolation of valves, pumps, or energy sources)
(14) Retention
(15) Remote valve shutoff

(16) Sealing closures
(17) Vapor dispersion
(18) Vapor suppression

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**7.3.4.3** Describe the atmospheric physical safety hazards associated with hazardous materials/WMD incidents involving confined spaces.

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Δ **7.3.4.4** Identify the procedures, equipment, and safety precautions for preserving and collecting legal evidence at hazardous materials/WMD incidents.

**7.4 Competencies — Implementing the Planned Response.**

Δ **7.4.1* Performing Incident Command Duties.** Given the emergency response plan or standard operating procedures and a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall demonstrate the duties of an assigned function in the hazardous materials group within the incident command system and shall identify the role of the hazardous materials technician during hazardous materials/WMD incidents.

(1) Identify the various positions in the hazardous materials group within the incident command system (ICS) and describe the main functions
(2) Identify the role of the hazardous materials technician during hazardous materials/WMD incidents

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Δ **7.4.2 Using Personal Protective Equipment (PPE).** Given a hazardous materials/WMD incident, an assignment in an IAP, policies and procedures, results of the incident analysis, response objectives and options for the incident, and PPE ensembles as identified in the IAP, the hazardous materials technician 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

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*N* **7.4.3 Performing Product Control Techniques.** Given the selected product control technique and the tools and equipment, PPE, and control agents and equipment provided by the AHJ at a hazardous materials/WMD incident, the hazardous materials technician 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 following requirements:

*N* **7.4.3.1 Product Control.** Given a hazardous materials/WMD incident with release of product; an assignment in an IAP; results of the incident analysis; policies and procedures for product control; response objectives and options for the incident; and approved tools, equipment, control agents, and PPE; the hazardous materials technician shall perform the control techniques by completing the following requirements *[following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards]*:

(1) Identify and implement product control techniques to confine released hazardous materials/WMD including:
    (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 use of Class B foams or agents, 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)

*N* **7.4.3.2 Controlling Leaks from Containers.**

*N* **7.4.3.2.1** Given a hazardous materials/WMD incident; an assignment in an IAP; 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; the hazardous materials technician shall control leaks from the containers and their closures, monitoring for hazards as necessary, by completing the following requirements *[following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards]*:

(1) Identify the product control techniques to contain leaking hazardous materials/WMD including:
    (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 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

*N* **7.4.3.2.2** 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

*N* **7.4.3.3 Overpacking Nonbulk and Radioactive Materials Containers.**

*N* **7.4.3.3.1** Given a hazardous materials/WMD incident; an assignment in an IAP; results of the incident analysis; a loaded damaged or leaking container; a suitable overpack container; policies and procedures; and approved tools, equipment, and PPE; the hazardous materials technician shall place the damaged or leaking nonbulk or radioactive materials container is placed into a suitable overpack and the overpack is closed, marked, and labeled by completing the following requirements: *[following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards]*:

(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

*N* **7.4.3.3.2** 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

*N* **7.4.3.4 Liquid Product Transfer.**

*N* **7.4.3.4.1** Given a hazardous materials/WMD incident; an assignment in an IAP; 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; the hazardous materials technician shall monitor for hazards, ground and bond the containers, transfer the liquid product from the leaking container to the recovery container, suppress vapors as necessary, decontaminate tools and equipment, and inspect and maintain tools and equipment by completing performing the following requirements: *[following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards]*:

(1) Select a compatible recovery container
(2) Monitor for hazards
(3) Transfer liquid product
(4) Grounding and bonding the containers
(5) Perform vapor suppression
(6) Select the required tools and equipment and their proper use for transferring liquid product
(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 three considerations for assessing a leak or spill inside a confined space without entering the area

*N* **7.4.3.4.2** 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.

*N* **7.4.3.4.3** Identify three considerations for assessing a leak or spill inside a confined space without entering the area.

**7.4.4* Performing Decontamination Operations Identified in the Incident Action Plan.** Given a hazardous materials/WMD incident requiring decontamination; an assignment in an IAP; results of the incident analysis; policies and procedures; and approved PPE, tools, and equipment; the hazardous materials technician shall implement, evaluate the effectiveness of, and terminate the following decontamination operations as assigned:

(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

**7.5 Competencies — Evaluating Progress.**

**7.5.1 Evaluating the Effectiveness of the Control Functions.** Given a hazardous materials/WMD incident, an assignment in an IAP, current incident conditions, response options and actions taken, and approved communication equipment, the hazardous materials technician shall compare the actual behavior of the material and container to that predicted, determine the effectiveness of response options and actions in accomplishing response objectives, make modifications to the response options and actions as necessary, and communicate the results by completing the following requirements:

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

**7.5.2 Evaluating the Effectiveness of the Decontamination Process.** Given an incident action plan for a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall evaluate the effectiveness of any decontamination procedures identified in the incident action plan.

**7.6 Competencies — Terminating the Incident.**

Δ **7.6.1 Assisting in the Debriefing and Critiques.** Given a hazardous materials/WMD incident, an assignment in an IAP, policies and procedures, operational observations of activities

(incident information), and approved forms for documentation and reporting, the hazardous materials technician 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

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## Chapter 8 Competencies for Incident Commanders

### 8.1 General.

#### 8.1.1 Introduction.

**8.1.1.1** The incident commander (IC) at hazardous materials/WMD incidents shall be that person responsible for all incident activities, including the development of strategies and tactics and the ordering and release of resources as designated by the AHJ.

Δ **8.1.1.2** The incident commander shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, and all competencies in this chapter.

**8.1.1.3** The incident commander shall receive any additional training necessary to meet applicable governmental response and occupational health and safety regulations.

**8.1.1.4** The incident commander shall receive any additional training necessary to meet specific needs of the jurisdiction.

#### 8.1.2 Goal.

**8.1.2.1** The goal of the competencies in this chapter shall be to provide the incident commander with the knowledge and skills to perform the tasks in 8.1.2.2 in a safe manner.

Δ **8.1.2.2** In addition to being competent at the awareness and all competencies at the operations levels, the incident commander 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 outcomes within the endangered area at a hazardous materials/WMD incident
(2) Plan response operations within the capabilities and competencies of available personnel, PPE, and response equipment by completing the following tasks:
   (a) Identify the response objectives for hazardous materials/WMD incidents
   (b) Identify the potential response options (defensive, offensive, and nonintervention) available by response objective
   (c) Approve the level of PPE required for a given action option
   (d)* Develop an incident action plan (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 a response 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 incident command system, 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 incident command system structure
(4) Evaluate the progress of the planned response to ensure that the response objectives are met in a safe, effective, and efficient manner, and adjust the IAP as needed
(5) Terminate the emergency phase of the 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

### 8.2 Competencies — Analyzing the Incident.

#### 8.2.1 Collecting and Interpreting Hazard and Response Information.

**8.2.1.1** Given access to printed and technical resources, computer databases, and detection and monitoring equipment, the incident commander shall ensure the collection and interpretation of hazard and response information not available from the current edition of the ERG or an SDS.

**8.2.1.2** Given access to printed and technical resources, computer databases, and monitoring equipment, the incident commander shall be able to 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

**8.2.2 Estimating Potential Outcomes.** Given scenarios involving hazardous materials/WMD incidents, the surrounding conditions, and the predicted behavior of the container and its contents, the incident commander shall estimate the potential outcomes within the endangered area and shall complete 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) Counts per minute (cpm) and kilocounts per minute (kcpm)
   (b) Immediately dangerous to life and health (IDLH) value
   (c) Infectious dose
   (d) Lethal concentrations ($LC_{50}$)
   (e) Lethal dose ($LD_{50}$)
   (f) Parts per billion (ppb)
   (g) Parts per million (ppm)
   (h) Permissible exposure limit (PEL)
   (i) Radiation absorbed dose (rad)
   (j) Roentgen equivalent man (rem), millirem (mrem), microrem (μrem)
   (k) Threshold limit value ceiling (TLV-C)
   (l) Threshold limit value short-term exposure limit (TLV-STEL)
   (m) Threshold limit value time-weighted average (TLV-TWA)
   (n) Other toxicological terms or exposure values as determined by the AHJ

(3)* Identify two methods for predicting the areas of potential harm within the endangered area of a hazardous materials/WMD incident

(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)

**8.3 Competencies — Planning the Response.**

**8.3.1 Identifying Response Objectives.** Given an analysis of a hazardous materials/WMD incident, the incident commander shall be able to describe the steps for determining response objectives (defensive, offensive, and nonintervention).

**8.3.2 Identifying the Potential Response Options.** Given scenarios involving hazardous materials/WMD, the incident commander shall identify the possible response options (defensive, offensive, and nonintervention) by response objective for each problem and shall complete the following tasks:

(1) Identify the possible response options to accomplish a given response objective.

(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) Vapor control (dispersion, suppression)

**8.3.3 Approving the Level of PPE.** Given scenarios involving hazardous materials/WMD with known and unknown hazardous materials/WMD, the incident commander shall approve the PPE for the response options specified in the IAP in each situation and shall complete the following tasks:

(1) Identify the four levels of chemical protection (EPA/OSHA) and describe the equipment required for each level and the conditions under which each level is used

(2) Describe the following terms and explain their impact and significance on the selection of chemical-protective clothing:
   (a) Degradation
   (b) Penetration
   (c) Permeation

(3) Describe three safety considerations for personnel working in vapor-protective, liquid splash–protective, and high temperature–protective clothing

(4) Identify the physiological and psychological stresses that can affect users of PPE

**8.3.4 Developing an Incident Action Plan (IAP).** Given scenarios involving hazardous materials/WMD incidents, the incident commander 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 8.3.4.1 through 8.3.4.5.5.

**8.3.4.1** The incident commander shall identify the steps for developing an IAP.

**8.3.4.2** The incident commander shall identify the factors to be evaluated in selecting public protective actions, including evacuation and sheltering-in-place.

Δ **8.3.4.3** Given the emergency response plan or standard operating procedures, the incident commander 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 management 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

**8.3.4.4** The incident commander shall identify the process for determining the effectiveness of a response option based on the potential outcomes.

**8.3.4.5** The incident commander shall identify the safe operating practices and procedures that are required to be followed at a hazardous materials/WMD incident.

**8.3.4.5.1** The incident commander shall identify the importance of pre-incident planning relating to safety during responses to specific sites.

**8.3.4.5.2** The incident commander shall identify the procedures for presenting a safety briefing prior to allowing personnel to work on a hazardous materials/WMD incident.

**8.3.4.5.3*** The incident commander shall identify at least three safety precautions associated with search and rescue missions at hazardous materials/WMD incidents.

**8.3.4.5.4** The incident commander 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

**8.3.4.5.5*** The incident commander shall identify the atmospheric and physical safety hazards associated with hazardous materials/WMD incidents involving confined spaces.

**8.4 Competencies — Implementing the Planned Response.**

Δ **8.4.1 Implementing an Incident Command System.** Given a copy of the emergency response plan and annexes related to hazardous materials/WMD, the incident commander 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 the emergency response planning documents, identify the elements of each of the documents
(6) Identify the elements of the incident management system/incident command system (IMS/ICS) necessary to coordinate response activities at hazardous materials/WMD incidents
(7) Identify the primary government agencies and identify the scope of the regulatory authority (including the regulations) pertaining to the production, transportation, storage, and use of hazardous materials and the disposal of hazardous wastes
(8) Identify the governmental agencies and resources that can offer assistance during a hazardous materials/WMD incident and identify their role and the type of assistance or resources that might be available

**8.4.2* Directing Resources (Private and Governmental).** Given a scenario involving a hazardous materials/WMD incident and the necessary resources to implement the planned response, the incident commander shall demonstrate the ability to direct the resources in a safe and efficient manner consistent with the capabilities of those resources.

**8.4.3 Providing a Focal Point for Information Transfer to the Media and Elected Officials.** Given a scenario involving a hazardous materials/WMD incident, the incident commander 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 incident
(3) Describe the concept of a joint information center (JIC) and its application and use at a hazardous materials/WMD incident

**8.5 Competencies — Evaluating Progress.**

**8.5.1 Evaluating Progress of the Incident Action Plan (IAP).** Given scenarios involving hazardous materials/WMD incidents, the incident commander shall evaluate the progress of the IAP

to determine whether the efforts are accomplishing the response objectives and shall complete the following tasks:

(1) Identify the procedures for evaluating whether the response options are effective in accomplishing the objectives
(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) Control, containment, or confinement operations
    (b) Decontamination process
    (c) Established control zones
    (d) Personnel being used
    (e) PPE
(4) Make modifications to the IAP as necessary

**8.5.2* Transferring Command and Control During the Response Phase and the Post-Response Phase.** Given a scenario involving a hazardous materials/WMD incident, the emergency response plan, and standard operating procedures, the incident commander shall be able to identify the steps to take to transfer command and control of the incident.

**8.6 Competencies — Terminating the Incident.**

**8.6.1 Terminating Response Operations.** Given a scenario involving a hazardous materials/WMD incident in which the IAP objectives have been achieved, the hazardous materials incident commander 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 (PERO)

**8.6.2 Conducting a Debriefing.** Given scenarios involving a hazardous materials/WMD incident, the incident commander shall conduct a debriefing of the incident and shall complete the following tasks:

(1) Describe three 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

**8.6.3 Conducting a Post-Incident Critique.** Given details of a scenario involving a multiagency hazardous materials/WMD incident, the incident commander 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

**8.6.4 Reporting and Documenting the Hazardous Materials/WMD Incident.** Given a scenario involving a hazardous materials/WMD incident, the incident commander shall demonstrate the ability to report and document the incident consistent with governmental requirements and shall complete the following tasks:

(1) Identify the reporting requirements of the governmental agencies
(2) Identify the requirements for compiling incident reports, filing documents, and maintaining records as defined in the emergency response plan and/or standard operating procedures
(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 and continuity described in the standard operating procedures or the emergency response plan

## Chapter 9 Competencies for Specialist Employees

**9.1 General.**

**9.1.1 Introduction.**

**9.1.1.1** This chapter shall address competencies for the following specialist employees:

(1) Specialist employee C
(2) Specialist employee B
(3) Specialist employee A

**9.2 Specialist Employee C.**

**9.2.1 General.**

**9.2.1.1 Introduction.**

**9.2.1.1.1** The specialist employee C shall be that person who responds 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.

**9.2.1.1.2** 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 9.2.

**9.2.1.2 Goal.**

**9.2.1.2.1** 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 9.2.1.2.2 in a safe and effective manner.

**9.2.1.2.2** 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 response options for hazardous materials/WMD or containers for hazardous materials/WMD

**9.2.2 Competencies — Analyzing the Incident.**

**9.2.2.1 Providing Information on the Hazards and Harmful Effects of Specific Hazardous Materials/WMD.** Given a 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

**9.2.2.2 Providing Information on the Characteristics of Specific Containers.** Given examples of containers for hazardous materials/WMD in the organization's area 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

**9.2.3 Competencies — Planning the Response.**

**9.2.3.1 Providing Information on Potential Response Options for Specific Hazardous Materials/WMD.** Given a specific chemical 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

**9.2.3.2 Providing Information on Potential Response Options for Specific Containers.** Given a specific facility or transportation container 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

**9.3 Specialist Employee B.**

**9.3.1 General.**

**9.3.1.1 Introduction.**

**9.3.1.1.1*** The specialist employee B shall be that person who, in the course of regular job duties, works 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 the employee's 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.

**9.3.1.1.2** 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 9.2)*, and all additional competencies in Section 9.3.

**9.3.1.2 Goal.**

Δ **9.3.1.2.1** 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 9.3.1.2.2.

**9.3.1.2.2** 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 response options 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 incident action plan (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 response options 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 response options
(4) Assist the incident commander to evaluate the results of implementing the planned response by completing the following tasks:
   (a) Provide feedback on the effectiveness of the response options taken
   (b) Provide reporting and subsequent documentation of the incident involving hazardous materials/WMD as required

**9.3.2 Competencies — Analyzing the Incident.**

**9.3.2.1 Providing and Interpreting Information on Hazards of Specific Hazardous Materials/WMD.** Given a specific chemical 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

**9.3.2.2 Providing Information on Characteristics of Specific Containers.** Given a container 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

**9.3.2.3 Providing Information on Concentrations of Hazardous Materials/WMD.**

**9.3.2.3.1** Given a chemical 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.

**9.3.2.3.2** 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

**9.3.3 Competencies — Planning the Response.**

**9.3.3.1 Providing Information on Potential Response Options and Consequences for Specific Hazardous Materials/WMD.** Given 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 response options 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 the emergency response plan 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 response options for a specific chemical
(4) Given the emergency response plan 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

**9.3.3.2 Providing Information on PPE Requirements.** Given specific hazardous materials/WMD or containers for hazardous materials/WMD within the employee's individual area of specialization and the associated resources, the specialist employee B shall advise the incident commander of the PPE necessary for various response options by completing the following requirements:

(1) Given a specific chemical and a corresponding SDS or other chemical-specific resource, identify PPE, including the construction materials that are compatible with that chemical
(2) Given the emergency response plan 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 response options for that incident, determine whether the PPE is appropriate for the options presented

**9.3.3.3 Providing Information on Decontamination Methods.** Given a specific chemical within the employee's individual area of specialization and the available resources, the specialist employee B shall identify the technical decontamination process for various response options and shall complete the following tasks:

(1) Given a specific chemical and a corresponding SDS or other chemical-specific resource, identify the potential methods for removing or neutralizing that chemical
(2) Given a specific chemical and a corresponding SDS or other chemical-specific resource, identify the circumstances under which disposal of contaminated equipment would be necessary
(3) Given the emergency response plan and/or standard operating procedures, identify resources (including a method of contact) capable of identifying potential decontamination methods

**9.3.3.4 Providing Information on Handling and Disposal Regulations.** Given a specific chemical 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 a specific chemical 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 a specific chemical 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 the emergency response plan 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

**9.3.3.5 Developing an Incident Action Plan (IAP).** Given a scenario 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 the emergency response plan and/or standard operating procedures, identify the process for development of an IAP, including roles and responsibilities under the incident management system/incident command system (IMS/ICS) site safety and control plan
(2) Include a site safety and control plan in the IAP

**9.3.4 Competencies — Implementing the Planned Response.**

**9.3.4.1 Performing Response Options Specified in the Incident Action Plan.** Given an assignment 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

**9.3.4.2 Using PPE.** Given an assignment 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
(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

**9.3.5 Competencies — Evaluating Progress.**

**9.3.5.1 Providing an Evaluation of the Effectiveness of Selected Response Options.** Given an incident 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 response options and shall complete the following tasks:

(1) Identify the criteria for evaluating whether the selected response options are effective in accomplishing the objectives
(2) Identify the circumstances under which it would be prudent to withdraw from a chemical incident

**9.3.5.2 Reporting and Documenting the Incident.** Given a scenario 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

**9.4 Specialist Employee A.**

**9.4.1 General.**

**9.4.1.1 Introduction.**

**9.4.1.1.1** The specialist employee A shall be that person who is 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 plan 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 that incident, implement the planned response within the capabilities of the resources available, and evaluate the progress of the planned response.

**9.4.1.1.2** 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 9.2)*, and all competencies at the hazardous materials technician level *(see Chapter 7)* relative to the hazardous materials/WMD and containers used in the organization's area of specialization.

**9.4.1.2 Goal.**

Δ **9.4.1.2.1** 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.

**9.4.1.2.2** 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 response objectives for an incident involving hazardous materials/WMD and containers for hazardous materials/WMD
(b) Identify the potential response options for each response objective for an incident involving hazardous materials/WMD and containers for hazardous materials/WMD
(c) Select the PPE required for a given response option 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 the incident management system/incident command system (IMS/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

**9.4.2 Competencies — Analyzing, Planning, Implementing, and Evaluating.** The specialist employee A shall demonstrate competencies at the specialist employee C level *(see Section 9.2)* and the hazardous materials technician level *(see Chapter 7)* relative to hazardous materials/WMD and containers used in the organization's area of specialization.

## Chapter 10 Competencies for Hazardous Materials Officers

### 10.1 General.

#### 10.1.1 Introduction.

Δ **10.1.1.1** The hazardous materials officer (National Incident Management System: Hazardous Materials Group Supervisor) at hazardous materials/WMD incidents shall be that person who is responsible for directing and coordinating all operations involving hazardous materials/WMD as assigned by the incident commander.

Δ **10.1.1.2** The hazardous materials officer shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies of this chapter.

**10.1.1.3** Hazardous materials officers shall also receive training to meet governmental response and occupational health and safety regulations.

#### 10.1.2 Goal.

**10.1.2.1** The goal of the competencies in this chapter shall be to provide the hazardous materials officer with the knowledge and skills to perform the tasks in 10.1.2.2 in a safe manner.

Δ **10.1.2.2** When responding to hazardous materials/WMD incidents, the hazardous materials officer 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 response objectives (defensive, offensive, and nonintervention) for hazardous materials/WMD incidents
(b) Identify the potential response options (defensive, offensive, and nonintervention) available by response objective
(c) Determine the level of PPE required for a given action option
(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 response objectives 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-incident operations (PIRO)

**10.2 Competencies — Analyzing the Incident.** Given scenarios involving hazardous materials/WMD incidents, including the surrounding conditions and the predicted behavior of the container and its contents, the hazardous materials officer shall estimate the potential outcomes within the endangered area.

**10.3 Competencies — Planning the Response.**

**10.3.1** Given a scenario involving a hazardous materials/WMD incident, the hazardous materials officer shall identify the response objectives (defensive, offensive, and nonintervention) for each incident.

**10.3.2** Given a scenario involving hazardous materials/WMD incidents, the hazardous materials officer shall identify the potential response options (defensive, offensive, and nonintervention) for each incident.

**10.3.3 Selecting the Level of PPE and Resources.** Given scenarios involving hazardous materials/WMD incidents with known and unknown hazardous materials/WMD, the hazardous materials officer shall select the PPE for the response options specified in the IAP in each situation.

**10.3.4 Developing a Plan of Action.** Given scenarios involving hazardous materials/WMD incidents, the hazardous materials officer 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 an action option 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

**10.4 Competencies — Implementing the Planned Response.**

Δ **10.4.1 Implementing the Functions in the Incident Management System.** Given a copy of the emergency response plan, the hazardous materials officer shall identify the requirements of the plan, including the required procedures for notification and utilization of nonlocal resources (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 SARA, Title III, Section 303, of the federal regulations or other emergency response planning legislation
(3) Given the local emergency planning documents, identify the elements of each of the documents
(4) Identify the elements of the local incident management system necessary to coordinate response activities at hazardous materials/WMD incidents
(5) Identify the primary governmental agencies 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 governmental agencies 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 governmental 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

Δ **10.4.2* Directing Resources (Private and Governmental).** Given a scenario involving a hazardous materials/WMD incident and the necessary resources to implement the planned response, the hazardous materials officer shall demonstrate the ability to direct the hazardous materials group resources in a safe and efficient manner consistent with the capabilities of those resources.

**10.4.3 Providing a Focal Point for Information Transfer to Media and Elected Officials.** Given a scenario involving a hazardous materials/WMD incident, the hazardous materials officer 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

Δ **10.5 Competencies — Evaluating Progress.** Given scenarios involving hazardous materials/WMD incidents, the hazardous materials officer shall evaluate the progress of the IAP to determine whether the efforts are accomplishing the response objectives and shall complete the following tasks:

(1) Identify the procedures for evaluating whether the response options are effective in accomplishing the objectives
(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

**10.6 Competencies — Terminating the Incident.**

**10.6.1 Terminating the Emergency Phase of the Incident.** Given a scenario involving a hazardous materials/WMD incident in which the IAP objectives have been achieved, the hazardous materials officer 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 PIRO

Δ **10.6.2 Conducting a Debriefing.** Given a scenario involving a hazardous materials/WMD incident, the hazardous materials officer 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

Δ **10.6.3 Conducting a Critique.** Given the details of a scenario involving a hazardous materials/WMD incident, the hazardous materials officer 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

**10.6.4 Reporting and Documenting the Incident.** Given an example of a hazardous materials/WMD incident, the hazardous materials officer 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 11 Competencies for Hazardous Materials Safety Officers

**11.1 General.**

**11.1.1* Introduction.**

Δ **11.1.1.1** The hazardous materials safety officer (NIMS: Assistant Safety Officer — Hazardous Material in the United States) shall be that person who works within an incident management system/incident command system (IMS/ICS) (specifically, the hazardous material group) to ensure that recognized hazardous materials/WMD safe practices are followed at hazardous materials/WMD incidents.

Δ **11.1.1.2** The hazardous materials safety officer shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, all competencies for mission-specific operations *(see Chapter 6)*,all competencies at the technician level *(see Chapter 7)*, and all competencies of this chapter.

**11.1.1.3** Hazardous materials safety officers shall also receive training to meet governmental response and occupational health and safety regulations.

**11.1.2 Goal.**

Δ **11.1.2.1*** The goal of the competencies in this chapter shall be to provide the hazardous materials safety officer with the knowledge and skills to evaluate a hazardous materials/WMD incident for safety, ensure that recognized safe operational practices are followed, and perform the tasks in 11.1.2.2 in a safe manner.

Δ **11.1.2.2** When responding to hazardous materials/WMD incidents, the hazardous materials safety officer shall be able to perform the following tasks in a safe and effective manner:

(1) Use a risk-based response to analyze a hazardous materials/WMD incident to determine the complexity of the problem in terms of safety by observing a scene, 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 a safe response 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 response options
   (b) Provide recommendations regarding the site safety and control plan
   (c) Assist in the development of an incident action plan (IAP)
   (d) Review the IAP and provide recommendations regarding safety
   (e) Review the IAP for the action objectives as they pertain to:
      (i) Personnel and resources
      (ii) Control zones
      (iii) PPE
      (iv) Control, containment, and confinement operations
      (v) Decontamination
      (vi) Medical branch

(3) Ensure the implementation of a safe response consistent with the IAP, the emergency response plan, and/or standard operating procedures by completing the following tasks:
   (a) Perform the duties of the hazardous materials safety officer within the incident command system
   (b) Identify safety considerations for personnel performing the control functions identified in the site safety and control plan
   (c) Conduct safety briefings for personnel performing the control functions identified in the site safety and control plan
   (d) Assist in the implementation and enforcement of the site safety and control plan
   (e) Maintain communications within the incident command structure during the incident
   (f) Monitor status reports of activities in the hot and the warm zones
   (g) Ensure the implementation of exposure monitoring, (and decontamination of personnel and the environment)

(4) Evaluate the progress of the planned response to ensure that the response objectives 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 re-evaluated tasks
   (b) Alter, suspend, or terminate any activity that can be judged to be unsafe

(5) Assist in terminating the incident 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

**11.2 Competencies — Analyzing the Incident.**

Δ **11.2.1 Determining the Magnitude of the Problem in Terms of Safety.** Given scenarios involving hazardous materials/WMD incidents, the hazardous materials safety officer 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 11.2.1.1 through 11.2.1.4.

**11.2.1.1** The hazardous materials safety officer 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)

**11.2.1.2*** The hazardous materials safety officer shall identify at least three conditions using 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

**11.2.1.3*** The hazardous materials safety officer shall identify at least three conditions using the following factors where personnel would not be allowed to enter the hot zone:

(1) Decontamination plan not established or not in place
(2) Advanced first-aid and EMS transportation 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

**11.2.1.4** Given the names of at least three hazardous materials/WMD agents, a description of the containers, and at least three reference sources, the hazardous materials safety officer shall identify the hazards, physical and chemical properties, health concerns, and the potential impacts on the safety of personnel at an incident involving each of the materials or agents.

**11.2.1.5** Given the names of five hazardous materials/WMD and at least three reference sources, the hazardous materials safety officer shall identify the health concerns and their potential impact on the safety and health of personnel at an incident involving each of the materials or agents.

**11.2.1.6*** Given the names of five hazardous materials and a description of their containers, the hazardous materials safety officer shall identify five hazards or physical conditions that would affect the safety of personnel at an incident involving each of the materials or agents.

**11.3 Competencies — Planning the Response.**

**11.3.1* Identifying the Safety Precautions for Potential Response Options.** Given scenarios involving hazardous materials/WMD incidents, the hazardous materials safety officer 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 11.2.1.1 through 11.2.1.3
(2)* Identify safety precautions associated with search and rescue missions at hazardous materials/WMD incidents

**11.3.2 Providing Recommendations Regarding Safety Considerations.**

Δ **11.3.2.1** Given scenarios involving hazardous materials/WMD incidents, the hazardous materials safety officer shall develop risk-based recommendations for the protection of responders for each of the hazardous materials/WMD identified in 11.2.1.4.

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Δ **11.3.3 Assisting in the Development of a Site Safety and Control Plan for Inclusion in the Incident Action Plan.** Given scenarios involving hazardous materials/WMD incidents, the hazardous materials safety officer 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
  (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 at least five hazards and precautions to be observed in the following factors when personnel approach a hazardous materials/WMD incident:
  (a) Inhalation hazards
  (b) Dermal hazards
  (c) Flammable hazards
  (d) Reactive hazards
  (e) Electrical hazards
  (f) Mechanical hazards
(3)* List the elements of a site safety and control plan:
  (a) Site description
  (b) Entry objectives
  (c) On-site organization
  (d) Hazard evaluation
  (e) PPE
  (f) On-site work plans
  (g) Communication procedures
  (h) Decontamination procedures
(4) Given an IAP and a scenario involving one of the hazardous materials/WMD described in 11.2.1.4, develop a list of safety considerations for the incident

**11.3.4 Providing Recommendations Regarding Safety and Reviewing the Incident Action Plan.** Given a proposed IAP for an incident involving one of the hazardous materials/WMD and containers described in 11.2.1.4, the hazardous materials safety officer shall identify to the incident safety officer, the hazardous materials officer, and the incident commander, the safety precautions for the IAP 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

**11.3.5 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 action option and shall complete the following tasks:

(1) Identify six safety considerations using 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 a chemical compatibility chart for chemical-protective clothing provided by the AHJ, identify the chemical-protective clothing that would provide protection from the identified hazards to the wearer for each of the three substances
(3)* Given the names of three hazardous materials/WMD agents, identify the PPE options for specified response options
(4) Identify the recommended methods for donning, doffing, and using all PPE provided by the AHJ for use in hazardous materials/WMD response activities

**11.3.6 Reviewing the Proposed Decontamination Procedures.** Given site-specific decontamination procedures by the hazardous materials officer or incident commander for a scenario involving a hazardous materials/WMD incident, the hazardous materials safety officer shall review the procedures to ensure that applicable safety considerations are included prior to implementation of the IAP.

**11.3.7 Ensuring Provision of Emergency Medical Services.** Given a scenario involving a hazardous materials/WMD incident, the hazardous materials safety officer 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 an emergency medical services 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

*N* **11.3.8 Reviewing the Control Procedures.** Given site-specific control procedures by the hazardous materials officer or incident commander for a scenario involving a hazardous materials/WMD incident, the hazardous materials safety officer shall review the procedures to ensure that applicable safety considerations are included prior to implementation of the IAP.

*N* **11.3.9 Reviewing the Proposed Control Zones.** Given site-specific control zones by the hazardous materials officer or incident commander for a scenario involving a hazardous materials/WMD incident, the hazardous materials safety officer 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.

*N* **11.3.10 Reviewing the Credentials of Personnel Within Assigned Positions.** Given site-specific personnel (internal and external resources) at the hazardous materials/WMD incident, the hazardous materials officer or incident commander authorizes the personnel working at the event. The hazardous materials safety officer shall review the credentials to ensure that applicable safety considerations are included prior to implementation of the IAP.

**11.4 Competencies — Implementing the Planned Response.**

**11.4.1 Performing the Duties of the Hazardous Materials Safety Officer.** Given a scenario involving hazardous materials/WMD incidents, the hazardous materials safety officer 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 the hazardous materials safety officer as defined in the emergency response plan and/or standard operating procedures. Determine the safety issues of the following:
   (a) Personnel
   (b) Control zones
   (c) PPE
   (d) Control, containment, and confinement operations
   (e) Decontamination
   (f) Medical branch
(2) Demonstrate performance of the duties of the hazardous materials safety officer as defined in the emergency response plan and/or standard operating procedures

**11.4.2 Monitoring Safety of Response Personnel.** Given scenarios involving a hazardous materials/WMD incident, the hazardous materials safety officer shall ensure that personnel perform their tasks in a safe manner by identifying the safety considerations for the control functions identified in the site safety and control plan and shall complete the following tasks:

(1) Identify the safe operating practices that are required to be followed at a hazardous materials/WMD incident as stated in the emergency response plan and/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 five conditions in which it would be prudent to withdraw from a hazardous materials/WMD incident
   (a) Fire or explosion
   (b) Container failure
   (c) PPE incompatibility with chemical
   (d) Thermal insult
   (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:
   (a) Partner extraction
   (b) Backup/rapid intervention crew (RIC), also known as a rapid intervention team (RIT), extraction

**11.4.3 Conducting Safety Briefings.**

**11.4.3.1** Given a scenario involving a hazardous materials/WMD incident and site safety and control plan, the hazardous materials safety officer shall conduct safety briefings for personnel performing the functions identified in the IAP.

**11.4.3.2** The hazardous materials safety officer shall be able to demonstrate the procedure for conducting a safety briefing to personnel for an incident involving one of the hazardous materials/WMD and its container identified in 11.2.1.4, as specified by the emergency response plan and/or standard operating procedures.

Δ **11.4.4 Implementing and Enforcing the Site Safety and Control Plan.** Given a scenario involving a hazardous materials/WMD incident and site safety and control plan, the hazardous materials safety officer shall assist the incident commander, the incident safety officer, and the hazardous materials officer in implementing and enforcing the safety considerations and shall complete the following tasks:

(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 immediate 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 each person exiting the hot zone and each tool or piece of equipment is decontaminated in accordance with the site safety and control plan and the degree of hazardous materials/WMD contamination
(9) Demonstrate the procedure for recording the names of the individuals exiting the hot zone, as specified in the emergency response plan and/or standard operating procedures
(10)* Identify three safety considerations that can minimize secondary contamination

**11.4.5 Maintaining Communications.** Given a scenario involving a hazardous materials/WMD incident and the site safety and control plan, the hazardous materials safety officer 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 three types of communications systems used at hazardous materials/WMD incident sites:
(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 considerations prior to entry into the hot zone

**11.4.6 Monitoring Status Reports.**

**11.4.6.1** Given a scenario involving a hazardous materials/WMD incident and the site safety and control plan, the hazardous materials safety officer shall monitor routine and emergency communications within the incident command structure at all times during the incident.

Δ **11.4.6.2** The hazardous materials safety officer shall ensure that entry team members communicate the status of their work assignment to the hazardous materials officer.

**11.4.7 Implementing Exposure Monitoring.** Given a scenario involving a hazardous materials/WMD incident and the site safety and control plan, the hazardous materials safety officer shall assist the incident commander, the incident safety officer, and the hazardous materials officer in implementing exposure monitoring.

Δ **11.4.8 Verifying Exposure Monitoring.** The hazardous materials safety officer 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.

**11.5 Competencies — Evaluating Progress.**

**11.5.1 Identifying Deviations from Safety Considerations or Other Dangerous Situations.** Given scenarios involving hazardous materials/WMD incidents and given deviations from the site safety and control plan for activities in both the hot and warm zones and high-risk conditions, the hazardous materials safety officer shall evaluate the progress of the planned response to ensure that the response objectives 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 physical stresses on personnel wearing PPE

Δ **11.5.2 Taking Corrective Actions.** Given scenarios involving hazardous materials/WMD incidents and given deviations from the site safety and control plan for activities in both the hot and warm zones and high-risk conditions, the hazardous materials safety officer 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:
(a)* Given a hazardous situation or condition that has developed or been identified following initial 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 a 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 unsafe, as specified in the emergency response plan and/or standard operating procedures
(3) Demonstrate the procedure for notifying the appropriate individual of the unsafe action and for directing alternative safe actions, in accordance with the site safety and control plan and standard operating procedures
(4) Demonstrate the procedure for suspending or terminating an action that could result in an imminent hazard condition in accordance with the emergency response plan and standard operating procedures

**11.6 Competencies — Terminating the Incident.**

**11.6.1 Reporting and Documenting the Incident.** Given scenarios involving hazardous materials/WMD incidents, the hazardous materials safety officer 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 and/or standard operating procedures
(2) Demonstrate completion of the safety reports required by the emergency response plan and/or standard operating procedures
(3) Describe the importance of personnel exposure records

Δ **11.6.2 Debriefing of Hazardous Materials Group Personnel.** Given scenarios involving hazardous materials/WMD incidents, the hazardous materials safety officer shall debrief hazardous materials group personnel regarding site-specific occupational safety and health issues.

**11.6.2.1*** The hazardous materials safety officer shall be able to identify five health and safety topics to be addressed in an incident debriefing.

Δ **11.6.2.2** The hazardous materials safety officer 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.

**11.6.3 Assisting in the Incident Critique.** Given scenarios involving hazardous materials/WMD incidents and the site safety and control plan, the hazardous materials safety officer shall provide safety and health-related critical observations of the activities that were performed in the hot and warm zones during the incident.

Δ **11.6.3.1 Information to Be Presented.** Given the site safety and control plan and the hazardous materials safety officer's report for a scenario involving a hazardous materials/WMD incident, the hazardous materials safety officer shall demonstrate the procedure for verbally presenting the following information in accordance with the emergency response plan and/or standard operating procedures:

(1) Safety and health-related critical observations of the activities that were performed in the hot and warm zones during the incident
(2) Recorded violations of the site safety and control plan or accepted safe operating practices, organizational policies, or applicable occupational safety and health laws, regulations, codes, standards, or guidelines
(3) Injuries or deaths that occurred as a result of reasonably unforeseen dangerous conditions that developed during the incident
(4) Injuries or deaths that occurred as a result of violations of the site safety and control plan, generally accepted safe operating practices, organizational policies, or applicable occupational safety and health laws, regulations, codes, standards, or guidelines
(5) The course of action(s) that likely would have prevented the injuries or deaths that occurred as a result of the safety violations identified in 11.6.3.1(4)
(6) Deficiencies or weaknesses in the site safety and control plan, emergency response plan, and standard operating procedures that were noted during or following the incident

## Chapter 12 Competencies for Hazardous Materials Technicians with a Tank Car Specialty

**12.1 General.**

**12.1.1 Introduction.**

**12.1.1.1** The hazardous materials technician with a tank car specialty shall be that 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 technicians and outside resources on tank car issues.

Δ **12.1.1.2** The hazardous materials technician 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 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies of this chapter.

**12.1.1.3** Hazardous materials technicians with a tank car specialty shall also receive training to meet governmental response and occupational health and other regulations.

**12.1.2 Goal.**

**12.1.2.1** The goal of the competencies in this chapter shall be to provide the hazardous materials technician with a tank car specialty with the knowledge and skills to perform the tasks in 12.1.2.2 in a safe manner.

**12.1.2.2** When responding to hazardous materials/WMD incidents, the hazardous materials technician 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, personal protective equipment, and control equipment by determining the response options (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

**12.1.3 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.

**12.1.3.1** Hazardous materials technicians operating within the bounds of their training as listed in Chapter 7 shall be able to intervene in railroad incidents.

**12.1.3.2** 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.

**12.2 Competencies — Analyzing the Incident.**

Δ **12.2.1 Determining the Type and Extent of Damage to Tank Cars.** Given examples of damaged tank cars, 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 the specification mark for a tank car 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 and pressure tank cars; P and R for DOT-117 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 12.2.1.

(2) Given an example of a tank car, 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) Head shield
(c) Heater coils — interior or exterior
(d) Jacket
(e) Lining and cladding
(f) Shelf couplers
(g) Tank
(h) Trucks (pin and bowl assembly)
(i) Underframe — continuous or stub sill
(j) Safety appliances

(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

(6) Describe the difference between interior and exterior heater coils on tank cars

(7) Given examples of various fittings arrangements for pressure, nonpressure, cryogenic, and carbon dioxide tank cars (including examples of each of the following fittings), identify each fitting present by name, and describe the design, construction, and operation of each of the following fittings:

(a) Fittings for loading and unloading tank cars, including the following:
i. Air valve
ii. Bottom outlet nozzle
iii. Bottom outlet valves (top operated with stuffing box, bottom operated — internal or external ball, wafer-sphere, plug)
iv. Quick-fill hole cover
v. Carbon dioxide tank car fittings
vi. Cryogenic liquid tank car fittings
vii. Excess flow valve (product activated)
viii. Excess flow check valve (spring activated)
ix. Flange for manway and valves
x. Liquid valve and vapor valve (ball versus plug type)
xi. Indicator device (needle valve, tricock, and telltale indicator)
xii. Eduction piping

(b) Fittings for pressure relief, including the following:
i. Pressure regulators on carbon dioxide cars and liquefied atmospheric gases in cryogenic liquid tank cars
ii. Pressure relief devices [reclosing pressure relief device (pressure relief valve), nonclosing pressure relief device (safety vent), or a nonclosing pressure relief device used in combination with a reclosing pressure relief device combination pressure relief valve]
iii. Staged pressure relief system for a carbon dioxide car
iv. Vacuum relief valve (negative pressure or vacuum)
v. Breather vent (continuous vent) for hydrogen peroxide tank cars

(c) Fittings for gauging, including the following:
i. Closed gauging devices (e.g., magnetic)
ii. Other gauging devices (T-bar, long pole, short pole)

(d) Miscellaneous fittings, including the following:
i. Manway, hinged and bolted manway cover, manway cover bolts, pressure plates, and protective housing
ii. Sample line
iii. Sump
iv. Thermometer well
v. Washout
vi. GPS transponders

(8) Given examples of various fitting arrangements on tank cars (including carbon dioxide and cryogenic liquid tank cars) with the following fittings included, identify the location(s) where each fitting is likely to leak and a reason for the leak:

(a) Air valve
(b) Bottom outlet nozzle
(c) Bottom outlet valve and top-operated bottom outlet valve (with stuffing box)
(d) Closed gauging devices (e.g., magnetic)
(e) Flange
(f) Liquid valve and vapor valve (ball versus plug type)
(g) Manway, manway cover plate, hinged and bolted manway cover, protective housing
(h) Non-reclosing pressure relief devices (safety vent with rupture disc)
(i) Pressure regulators on carbon dioxide cars and liquefied atmospheric gases in cryogenic liquid tank cars
(j) Quick-fill hole cover
(k) Reclosing pressure relief device (pressure relief valves and combination pressure relief valves)
(l) Sample line
(m) Thermometer well
(n) Vacuum relief valve (negative pressure or vacuum)
(o) Washout

(9) Given examples of each of the following types of tank car damage, identify the type of damage in each example:
   (a) Corrosion
   (b) Crack
   (c) Dent
   (d) Flame impingement
   (e) Puncture
   (f) Score, gouge, wheel burn, rail burn

(10) 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 crosses 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 crosses a weld
   (d)* Given examples (actual or simulated) of where a score, gouge, wheel burn, and rail burn crosses a weld, determine if the heat-affected zone has been damaged

(11) 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

(12) Given examples of damaged tank car fittings, describe the extent of damage to those fittings

(13) Given examples of tank car tank damage, describe the extent of damage to the tank car tank

(14) Given a tank car, its contents, and the applicable equipment and reference material, determine the pressure in the tank, using either of the following methods:
   (a) Pressure gauge
   (b) Temperature of the contents

(15)* Given a tank car, use the tank car's gauging device to determine the outage in the tank

**N Table 12.2.1 Current Tank Car Specifications**

| Tank Car Types | DOT Specifications | AAR Specifications |
|---|---|---|
| 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 |

**12.2.2 Predicting the Likely Behavior of the Tank Car and Its Contents.** 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 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 12.2.2:
   (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:
   (a) Corrosion
   (b) Crack
   (c) Dent
   (d) Flame impingement
   (e) Puncture
   (f) Tank thinning caused by a score, gouge, wheel burn, or 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 various types of tank cars, describe the significance of pressure increases in assessing tank damage

(14) Given 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

N **Table 12.2.2 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, 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 |

**12.3 Competencies — Planning the Response.**

**12.3.1 Determining the Response Options.** Given the analysis of an incident involving tank cars, technicians with a tank car specialty shall determine the response options 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

**12.4 Competencies — Implementing the Planned Response.**

**12.4.1 Implementing the Planned Response.** Given an analysis of an incident involving tank cars and the planned response, technicians with a tank car specialty shall implement or oversee the implementation of the selected response options in a safe and effective manner and shall complete the following tasks:

(1) Given a leaking manway cover plate (loose bolts), control the leak
(2) Given leaking packing on the following tank car fittings, control the leak:
   (a) Gauging device packing nut
   (b) Liquid or vapor valve packing nut
   (c) Top-operated bottom outlet valve packing gland
(3) Given an open bottom outlet valve with a defective gasket in the cap, control the leak
(4) Given a leaking top-operated bottom outlet valve, close valve completely to control the leak
(5) Given leaking fittings on a pressure tank car, repair the leak or use an applicable capping kit to control the leak
(6) Given 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 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 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

N **12.5 Competencies — Evaluating Progress. (Reserved)**

N **12.6 Competencies —– Terminating the Incident. (Reserved)**

## Chapter 13 Competencies for Hazardous Materials Technicians with a Cargo Tank Specialty

**13.1 General.**

**13.1.1 Introduction.**

**13.1.1.1** The hazardous materials technician with a cargo tank specialty shall be that 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 technicians and outside resources.

Δ **13.1.1.2** The hazardous materials technician 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 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies of this chapter.

**13.1.1.3** Hazardous materials technicians with a cargo tank specialty shall also receive training to meet governmental response and occupational health and safety regulations.

**13.1.2 Goal.**

**13.1.2.1** The goal of competencies in this chapter shall be to provide the technician with a cargo tank specialty with the knowledge and skills to perform the tasks in 13.1.2.2 in a safe manner.

**13.1.2.2** When responding to hazardous materials/WMD incidents, the hazardous materials technician 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, personal protective equipment (PPE), and control equipment by determining the response options (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

**13.1.3* Mandating of Competencies.** This standard shall not mandate that hazardous materials response teams performing offensive operations on cargo tanks have technicians with a cargo tank specialty.

**13.1.3.1** Hazardous materials technicians operating within the scope of their training as listed in Chapter 7 shall be able to intervene in cargo tank incidents.

**13.1.3.2** 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.

**13.2 Competencies — Analyzing the Incident.**

**13.2.1 Determining the Type and Extent of Damage to Cargo Tanks.** Given examples of damaged cargo tanks, 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 the specification mark for a cargo tank 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 MC-331 cargo tank containing a compressed liquefied gas, determine the amount of liquid in the tank
(6) Given 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 MC-331 and MC-338 cargo tanks, point out and explain the design, 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 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 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 a cargo tank 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)

**13.2.2 Predicting the Likely Behavior of the Cargo Tank and Its Contents.** 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 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

**13.3 Competencies — Planning the Response.**

**13.3.1 Determining the Response Options.** Given the analysis of an incident involving cargo tanks, technicians with a cargo tank specialty shall determine the response options for each cargo tank involved and shall complete the following tasks:

(1) Given an incident involving a cargo tank, describe the methods, procedures, risks, safety precautions, and equipment required to implement spill and leak control procedures
(2) Given an overturned cargo tank, 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

**13.4 Competencies — Implementing the Planned Response.**

**13.4.1 Implementing the Planned Response.** Given an analysis of an incident involving a cargo tank and the planned response, 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 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 a scenario involving an overturned MC-306/DOT-406 cargo tank, demonstrate the safe procedures for the following methods of product removal and transfer:
   (a) Drilling
   (b) Internal self-closing stop valve
   (c) Unloading lines
   (d) Vapor recovery lines
(6) Given a scenario involving 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 a scenario involving an overturned MC-331 cargo tank, demonstrate the safe procedures for product removal and transfer:
   (a) Vapor line
   (b) Liquid line
   (c) Hot tap
(8) Given the necessary resources, demonstrate the flaring of an MC-331 flammable gas cargo tank

## Chapter 14 Competencies for Hazardous Materials Technicians with an Intermodal Tank Specialty

**14.1 General.**

**14.1.1 Introduction.**

**14.1.1.1** The hazardous materials technician with an intermodal tank specialty shall be that person who provides technical support pertaining to intermodal tanks, provides oversight for product removal and movement of damaged intermodal tanks, and acts as a liaison between the technicians and outside resources.

Δ **14.1.1.2** The hazardous materials technician 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 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies of this chapter.

**14.1.1.3** Hazardous materials technicians with an intermodal tank specialty shall also receive training to meet governmental response and occupational health and safety regulations.

**14.1.2 Goal.**

**14.1.2.1** The goal of the competencies in this chapter shall be to provide the technician with an intermodal tank specialty with the knowledge and skills to perform the tasks in 14.1.2.2 in a safe manner.

**14.1.2.2** When responding to a hazardous materials/WMD incident, the hazardous materials technician with an intermodal tank specialty shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving an intermodal tank to determine the complexity of the problem and potential outcomes by completing the following tasks:
   (a) Determine the type and extent of damage to an intermodal tank
   (b) Predict the likely behavior of an intermodal tank and its contents in an emergency
(2) Plan a response for an incident involving an intermodal tank within the capabilities and competencies of available personnel, PPE, and control equipment by determining the response options (offensive, defensive, or nonintervention) for the incident
(3) Implement or oversee the implementation of the planned response to a hazardous materials/WMD incident involving intermodal tanks

**14.1.3 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.

**14.1.3.1** Hazardous materials technicians operating within the scope of their training as listed in Chapter 7 shall be able to intervene in intermodal tank incidents.

**14.1.3.2** 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.

**14.2 Competencies — Analyzing the Incident.**

**14.2.1 Determining the Type and Extent of Damage to Intermodal Tanks.** Given examples of damaged intermodal tanks, the hazardous materials technician 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 the specification mark for an intermodal tank and the reference materials, describe the tank's basic construction and features
(2) Given examples of intermodal tanks (jacketed and not jacketed), identify the jacketed intermodal tanks
(3) 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 (steam and electric)
   (d) Insulation
   (e) Jacket
   (f) Refrigeration unit
   (g) Supporting frame
(4) Given examples of various fittings arrangements for pressure, nonpressure, and cryogenic intermodal tanks, point out and explain the design, construction, and operation of each of the following fittings, where present, in air line connections:
   (a) Bottom outlet valve
   (b) Gauging device
   (c) Liquid or vapor valve
   (d) Thermometer
   (e) Manhole cover
   (f) Pressure gauge
   (g) Sample valve
   (h) Spill box
   (i) Thermometer well
   (j) Top outlet
(5) Given examples of various safety devices for pressure, nonpressure, and cryogenic intermodal tanks, point out and explain the design, construction, and operation of each of the following safety devices, where present:
   (a) Emergency remote shutoff device
   (b) Excess flow valve
   (c) Fusible link/nut assemblies
   (d) Regulator valve
   (e) Rupture disc
   (f) Pressure relief valve
(6) Given 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
(7) Given three examples of damage to the framework of intermodal tanks, describe the damage in each example and explain its significance in the analysis process
(8) Given an intermodal tank involved in an incident, 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 nature of tank damage
   (g) Type of intermodal tank
   (h) Type of tank metal
(9)* Given a pressurized intermodal tank containing a liquefied gas, determine the amount of liquid in the tank
(10)* Given examples of damage to a pressurized intermodal tank, determine the extent of damage to the heat-affected zone

**14.2.2 Predicting the Likely Behavior of the Intermodal Tank and Its Contents.** Technicians with an intermodal tank specialty shall predict the likely behavior of the intermodal tank and its contents and shall complete the following tasks:

(1) Given the following types of intermodal tanks, describe the likely breach/release mechanisms:
   (a) IMO Type 1/IM-101
   (b) IMO Type 2/IM-102
   (c) IMO Type 5/DOT-51
   (d) DOT-56
   (e) DOT-57
   (f) DOT-60
   (g) Cryogenic (IMO Type 7)

(2) Describe the difference in types of construction materials used in intermodal tanks relative to assessing tank damage

**14.3 Competencies — Planning the Response.**

Δ **14.3.1 Determining the Response Options.** Given the analysis of an incident involving intermodal tanks, technicians with an intermodal tank specialty shall determine the response options for each intermodal tank 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 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

Δ **14.4 Competencies — Implementing the Planned Response.** Given an analysis of an incident involving intermodal tanks and the planned response, technicians with an intermodal tank specialty shall implement or oversee the implementation of the selected response options in a safe and effective manner and shall complete the following tasks:

(1) Given 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 approved procedures for the following types of emergency product removal:
   (a) Gas and liquid transfer (pressure and pump)
   (b) Flaring
   (c) Venting

(4)* Demonstrate grounding and bonding procedures for the 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

(5) Demonstrate the methods for containing the following leaks on liquid intermodal tanks (e.g., IM-101 and IM-102):
   (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

(6) Describe the methods for containing the following leaks in pressure intermodal tanks:
   (a) Crack
   (b) Failure of pressure relief device (e.g., relief valve, rupture disc)
   (c) Valves and piping

(7) 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) Pressure transfers
   (c) Vacuum trucks
   (d) Vehicles with power-takeoff driven pumps

(8)* Given a scenario involving an overturned liquid intermodal tank, demonstrate the safe procedures for product removal and transfer

(9)* Given a scenario involving an overturned pressure intermodal tank, demonstrate the safe procedures for product removal and transfer

(10)* Given the necessary resources, demonstrate the flaring of a pressure flammable gas intermodal tank

## Chapter 15 Competencies for Hazardous Materials Technicians with a Marine Tank and Non-Tank Vessel Specialty

**15.1 General.**

**15.1.1* Introduction.**

**15.1.1.1** Technicians with a marine tank and non-tank vessel specialty shall be trained to meet all competencies of the first responder awareness, operational, and hazardous materials technician levels, and the competencies of this chapter.

**15.1.1.2*** The technician 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.

**15.1.1.3** Hazardous materials technicians with a marine tank vessel specialty shall also receive training to meet governmental response and occupational health and safety regulations.

**15.1.2 Goal.**

**15.1.2.1** The goal of the competencies in this chapter shall be to provide the hazardous materials technician with a marine tank and non-tank vessel specialty with the knowledge and skills to perform the tasks in 15.1.2.2 in a safe manner.

**15.1.2.2** In addition to being competent at the hazardous materials technician level, the 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, personal protective equipment, and control equipment by completing the following tasks:
   (a) Determine the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving marine tank vessels
   (b) Ensure that the options are within the capabilities and competencies of available personnel, personal protective equipment, and control equipment
(3) Implement the planned response to a hazardous materials incident involving marine tank vessels

**15.1.3 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.

**15.1.3.1** Hazardous materials technicians operating within the bounds of their training as listed in Chapter 7 shall be able to respond to marine vessel incidents.

**15.1.3.2*** 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.

**15.2 Competencies — Analyzing the Incident.**

**15.2.1 Determining the Type and Extent of Damage to Marine Vessels, Tank and Non-Tank.** Given examples of damaged marine vessels, the technician 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 a marine tank and non-tank vessel, identify and describe the normal methods of cargo transfer
(5) Given a marine non-tank vessel, describe the following systems processes used in conjunction with cargo transfer:
   (a) Cargo transfer system (including liquid and vent piping arrangements)
   (b) Mechanical systems (cranes, booms, belts, etc.)
   (c) Pressure systems
   (d) Vacuum systems
   (e) Cargo securing system components (tie-downs, lashings, twist-locks, etc.)
(6) Given a marine tank vessel, 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 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 (i.e., welded areas)
(8) Given examples of the types of emergency situations a marine vessel may experience that may 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 a marine vessel 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

**15.2.2 Predicting the Likely Behavior of the Marine Vessel and Its Contents.** The hazardous materials technician 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 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

**15.3 Competencies — Planning the Response.**

**15.3.1 Determining the Response Options.** Given the analysis of an emergency involving marine vessels, the technician with a marine tank and non-tank vessel specialty shall determine the response options 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

**15.4 Competencies — Implementing the Planned Response.**

**15.4.1 Implementing the Planned Response.** Given an analysis of an emergency involving marine vessels and the planned response, the technician with a marine tank and non-tank vessel specialty shall implement or oversee the implementation of the selected response options 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 the necessary resources, describe the flaring of a pressure flammable gas from a liquefied gas tank vessel (ship or barge, as applicable)

(8) Given a scenario involving flammable liquid spill from a marine tank vessel, describe the procedures for site safety and fire control during cleanup and removal operations

## Chapter 16 Competencies for Hazardous Materials Technicians with a Flammable Liquids Bulk Storage Specialty

**16.1 General.**

**16.1.1 Introduction.**

**16.1.1.1** The hazardous material technician with a flammable liquids bulk storage specialty shall be that person who, in incidents involving bulk flammable liquid storage tanks and related facilities, provides support to the hazardous materials technician and other emergency response 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. For the purposes of this chapter, flammable liquid bulk storage tanks also include the related pipelines, piping, transfer pumps, additive tanks, and loading racks commonly found in a flammable liquid bulk storage tank facility.

Δ **16.1.1.2** The hazardous materials technician 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 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies of this chapter.

**16.1.1.3** Hazardous materials technicians with a flammable liquids bulk storage specialty shall also receive training to meet governmental response and occupational health and safety regulations.

**16.1.1.4** The hazardous materials technicians with a flammable liquids bulk storage specialty are expected to use appropriate personal protective clothing (PPE) and specialized fire, leak, and spill control equipment.

**16.1.2 Goals.**

**16.1.2.1** The goal of the competencies in this chapter shall be to provide the hazardous materials technician with a flammable liquid bulk storage specialty with the knowledge and skills to perform the tasks in 16.1.2.2 in a safe manner.

**16.1.2.2** In addition to being competent at the hazardous materials technician level, the hazardous materials technician 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 response options (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

**16.1.3 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.

**16.1.3.1** Hazardous materials technicians operating within the bounds of their training as listed in Chapter 7 shall be able to respond to incidents involving flammable liquids bulk storage tanks and related facilities.

**16.1.3.2** 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.

**16.2 Competencies — Analyzing the Incident.**

**16.2.1 Determining the Type and Extent of Damage to the Bulk Storage Tank.** Given examples of incidents involving bulk flammable liquid storage tanks, 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 16.2.1.1 through 16.2.1.6.

**16.2.1.1** Given examples of various hydrocarbon and polar solvent fuels, 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.

**16.2.1.2** Given examples of various flammable liquid bulk storage operations, 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.

**16.2.1.3*** Given examples of the following atmospheric pressure bulk liquid storage tanks, 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

**16.2.1.4*** Given examples of the following types of low pressure horizontal and vertical bulk liquid storage tanks, the technician shall be able to describe the tank's basic uses and design and construction features:

(1) Horizontal tank
(2) Dome roof tank

**16.2.1.5** Given examples of various atmospheric and low pressure bulk liquid storage tanks and related facilities (e.g., loading racks), 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

Δ **16.2.1.6** Given examples of primary and secondary spill confinement measures, technicians with a flammable liquids bulk storage specialty shall describe the design, construction, and incident response considerations associated with each method provided.

**16.2.2 Predicting the Likely Behavior of the Bulk Storage Tank and Contents.** Technicians with a flammable liquids bulk storage specialty shall predict the likely behavior of the tank and its contents by completing the tasks in 16.2.2.1 through 16.2.2.4.

**16.2.2.1** Given examples of different types of flammable liquid bulk storage tank facilities, 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

**16.2.2.2** Given a flammable liquid bulk storage tank involved in a fire, 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

**16.2.2.3*** Given examples of scenarios involving flammable liquid bulk storage tanks, technicians with a flammable liquids

bulk storage specialty shall describe the likely fire and spill behavior for each incident.

**16.2.2.4*** 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

**16.3 Competencies — Planning the Response.** Given an analysis of an incident involving flammable liquid bulk storage tanks, technicians with a flammable gases bulk storage specialty shall determine response options for the storage tank involved by completing the tasks in 16.3.1 through 16.3.11.

**16.3.1** 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.

**16.3.2** 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

Δ **16.3.3** Given examples of types of flammable liquid bulk storage tanks, 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

**16.3.4** 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.

**16.3.5** 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.

**16.3.6** 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.

**16.3.7** Given a flammable liquid bulk storage tank fire, 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

**16.3.8*** Given the size, dimensions, and products involved for a flammable liquid spill fire, 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

**16.3.9*** Given the size, dimensions, and product involved for a flammable liquid bulk storage tank fire, 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

**16.3.10*** Given the size, dimensions, and product involved for a fire involving a single flammable liquid bulk storage tank and its dike area, 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

**16.3.11*** Given the size, dimensions, and product involved for multiple flammable liquid bulk storage tanks burning within a common dike area, 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

Δ **16.4 Competencies — Implementing the Planned Response.** Given an analysis of an incident involving flammable liquid bulk storage tanks, technicians with a flammable liquids bulk storage specialty shall implement or oversee the implementation of the selected response options completing the tasks in 16.4.1and 16.4.2in a safe and effective manner.

**16.4.1** Given a scenario involving a flammable liquid fire, 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

Δ **16.4.2** Given a scenario involving a three-dimensional flammable liquid fire, technicians with a flammable liquids bulk storage specialty shall demonstrate the safe and effective method for controlling and extinguishing the fire.

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## Chapter 17 Competencies for Hazardous Materials Technicians with a Flammable Gases Bulk Storage Specialty

### 17.1 General.

#### 17.1.1 Introduction.

Δ **17.1.1.1** The hazardous material technician with a flammable gases bulk storage specialty shall be that person who, in incidents involving bulk flammable gases 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. For the purposes of this chapter, flammable gases bulk storage tanks also include the related pipelines, piping, transfer pumps, and loading racks commonly found in a flammable gases bulk storage tank facility.

Δ **17.1.1.2** The hazardous materials technician 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 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies of this chapter.

**17.1.1.3** Hazardous materials technicians with a flammable gases bulk storage specialty shall also receive training to meet governmental response and occupational health and safety regulations.

**17.1.1.4** The hazardous materials technicians with a flammable gases bulk storage specialty are expected to use appropriate PPE and specialized fire, leak, and spill control equipment.

#### 17.1.2 Goal.

**17.1.2.1** The goal of the competencies in this chapter shall be to provide the hazardous materials technician with a flammable gases bulk storage specialty with the knowledge and skills to perform the tasks in 17.1.2.2 in a safe manner.

**17.1.2.2** In addition to being competent at the hazardous materials technician level, the hazardous materials technician with a flammable gases bulk storage specialty shall be able to perform the following tasks:

(1) Analyze an incident involving a flammable gas bulk 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 storage tank
   (b) Predict the likely behavior of the bulk storage tank and its contents in an incident
(2) Plan a response for an incident involving a flammable gas bulk storage tank within the capabilities and competencies of available personnel, PPE, and control equipment by completing the following tasks:
   (a) Determine the response options (offensive, defensive, and nonintervention) for a hazardous materials/WMD incident involving flammable gas 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 gas bulk storage tank

**17.1.3 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.

**17.1.3.1** Hazardous materials technicians operating within the bounds of their training as listed in Chapter 7 shall be able to respond to incidents involving flammable gases bulk storage tanks and related facilities.

**17.1.3.2** 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.

### 17.2 Competencies — Analyzing the Incident.

**17.2.1 Determining the Type and Extent of Damage to the Bulk Storage Tank.** Given examples of storage tank incidents, 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 17.2.1.1 through 17.2.1.3.

**17.2.1.1** Given examples of various flammable gas bulk storage operations, 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. Examples include distribution terminals, pipeline operations, loading/unloading facilities, gas plants, and petrochemical facilities.

**17.2.1.2*** Given examples of the following types of high pressure bulk gas storage tanks, 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

**17.2.1.3** Given examples of various high pressure bulk gas storage tanks, 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

**17.2.2 Predicting the Likely Behavior of the Bulk Storage Tank and Contents.** Technicians with a flammable gases bulk storage specialty shall predict the likely behavior of the tank and its contents by completing the tasks in 17.2.2.1 through 17.2.2.3.

**17.2.2.1** Given examples of different types of bulk flammable gas storage tank facilities, 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

**17.2.2.2** Given examples of different types of flammable gas bulk storage tanks, 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

**17.2.2.3** Given a flammable gas bulk storage tank and its associated piping, technicians with a flammable gases bulk storage specialty shall describe the likely breach or release mechanisms and fire scenarios.

**17.3 Competencies — Planning the Response.** Given an analysis of an emergency involving flammable gas storage tanks, technicians with a flammable gases bulk storage specialty shall determine response options for the storage tank involved. The technician with a flammable gases bulk storage specialty shall be able to perform the tasks in 17.3.1 through 17.3.5.

**17.3.1** 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)

**17.3.2** Given a flammable gas storage tank with a liquid leak from the pressure relief valve, technicians with a flammable gases bulk storage specialty shall describe the hazards, safety, and tactical considerations for controlling this type of leak.

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**17.3.3** 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

**17.3.4** 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).

**17.3.5** 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.

**17.4 Competencies — Implementing the Planned Response.** Given an analysis of an emergency involving flammable gas bulk storage tanks, technicians with a flammable gases bulk storage specialty shall implement or oversee the implementation of the selected response options in a safe and effective manner by completing the tasks in 17.4.1 through 17.4.4.

**17.4.1** Given a scenario involving a flammable gas incident, 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)

**17.4.2** Given a scenario involving the simultaneous release of both flammable liquids and flammable gases, 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

**17.4.3** 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

**17.4.4** Given a scenario involving a flammable gas incident from a bulk storage tank or pipeline, technicians with a flammable gases bulk storage specialty shall describe the procedures for site safety and fire control during cleanup and removal operations.

## Chapter 18 Competencies for Hazardous Materials Technicians with a Radioactive Material Specialty

### 18.1 General.

#### 18.1.1 Introduction.

**18.1.1.1** The hazardous materials technician with a radioactive material specialty shall be that person who provides support to the hazardous materials technician on the use of radiation detection instruments, manages the spread of contamination and control of radiation exposure, conducts hazards assessment, and acts as a liaison between hazardous materials technicians at incidents involving radioactive materials.

Δ **18.1.1.2** The hazardous materials technician with a radioactive material specialty shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, all competencies at the hazardous materials technician level *(see Chapter 7)*, and the competencies of this chapter.

**18.1.1.3** Hazardous materials technicians with a radioactive material specialty shall also receive training to meet governmental response and occupational health and safety regulations.

**18.1.1.4** The hazardous materials technicians with a radioactive material specialty shall be expected to use specialized protective clothing and survey instrumentation.

#### 18.1.2 Goal.

**18.1.2.1** The goal of the competencies in this chapter shall be to provide the hazardous materials technician with a radioactive material specialty with the knowledge and skills to perform the tasks in 18.1.2.2 in a safe manner.

**18.1.2.2** In addition to being competent at the hazardous materials technician level, the hazardous materials technician with a radioactive material specialty shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving radioactive materials to determine the complexity of the problem and potential outcomes
(2) Plan a response for an emergency involving radioactive material within the capabilities and competencies of available personnel, personal protective equipment, and control equipment based on an analysis of the radioactive material incident
(3) Implement the planned response to a hazardous materials/WMD incident involving radioactive material

**18.1.3 Mandating of Competencies.** This standard shall not mandate that hazardous materials response teams performing offensive operations on radioactive material incidents have hazardous materials technicians with a radioactive material specialty.

**18.1.3.1** Hazardous materials technicians operating within the bounds of their training as listed in Chapter 7 shall be able to respond to incidents involving radioactive materials.

**18.1.3.2** If a hazardous materials response team elects to train some or all its hazardous materials technicians to have in-depth knowledge of radioactive materials, this chapter shall set out the minimum required competencies.

### 18.2 Competencies — Analyzing the Incident.

Δ **18.2.1 Understanding Nuclear Science and Radioactivity.** Technicians with a radioactive material 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) Ionization
   (b) Nucleon
   (c) Nuclide
   (d) Isotope
   (e) Excitation
   (f) Bremsstrahlung
   (g) Fission
   (h) Fusion
   (i) Criticality
   (j) Curie
   (k) Becquerel
   (l) Specific activity
   (m) Half-life
   (n) Exposure
   (o) Absorbed dose
   (p) Dose equivalent
   (q) Quality factor
   (r) Roentgen
   (s) Rad/gray
   (t) Rem/sievert
(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, 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
   (d) Neutron
(11) Explain the concept of linear energy transfer (LET).

Δ **18.2.2 Understanding the Biological Effects of Ionizing Radiation.** Technicians with a radioactive material 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

Δ **18.2.3 Radiation Detector Theory.** Technicians with a radioactive material 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 radioactive material 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

**18.2.4 Radioactive Material Transportation.** Technicians with a radioactive material specialty shall have an understanding of how radioactive material 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 radioactive material
(2) Identify the types of packages used in the transport of radioactive material and list examples of material shipped in each type of shipping package
(3) Identify terminology and acronyms associated with shipments of radioactive material
(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 radioactive material
(6) Describe the radiation and contamination surveys that are performed on radioactive material 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

**18.3 Competencies — Planning the Response.**

Δ **18.3.1 External Exposure Control.** Given the analysis of an incident involving radioactive material, technicians with a radioactive material specialty shall be able to determine the response options needed to minimize external exposure to radioactive material 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 *unit of density thickness*
(6) Calculate shielding thickness or exposure rates for gamma and x-ray radiation using the equations or by using a computer application

**18.3.2 Internal Exposure Control.** Given the analysis of an incident involving radioactive material, technicians with a radioactive material specialty shall determine the response options 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

**18.3.3 Radiation Survey Instrumentation.** Given the analysis of an incident involving radioactive material, technicians with a radioactive material 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 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

**18.4 Competencies — Implementing the Planned Response.**

**18.4.1 Radiological Incidents.** Given an analysis of an incident involving radioactive material and the planned response, technicians with a radioactive material 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 specialist during any radiological incident
(2) Describe the specialist's response to personnel contamination
(3) Describe the specialist's response to off-scale or lost dosimetry
(4) Describe the specialist's response to rapidly increasing or unanticipated radiation levels
(5) Describe the specialist's response to a radioactive material spill
(6) Describe the specialist's 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

Δ **18.4.2 Contamination Control.** Given an analysis of an incident involving radioactive material and the planned response, technicians with a radioactive material 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

Δ **18.4.3 Personnel Decontamination.** Given an analysis of an incident involving radioactive material and the planned response, technicians with a radioactive material specialty shall be able to implement or oversee decontamination techniques for equipment and personnel 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

## *N* Chapter 19 Competencies for Hazardous Materials Technicians with an Advanced Monitoring and Detection Specialty

*N* **19.1 General.**

*N* **19.1.1 Introduction.**

*N* **19.1.1.1** The technician level responder assigned to perform advanced monitoring and detection shall be that person, competent at the technician level, who is assigned to implement advanced monitoring and detection operations at hazardous materials/WMD incidents.

*N* **19.1.1.2** The technician level responder assigned to perform advanced monitoring and detection 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 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies in this chapter.

*N* **19.1.1.3** The technician level responder assigned to perform advanced monitoring and detection at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

*N* **19.1.2 Goal.**

*N* **19.1.2.1** The goal of the competencies in this chapter shall be to provide the technician level responder assigned to advanced monitoring and detection at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 19.1.2.2 in a safe and effective manner.

*N* **19.1.2.2** When responding to hazardous materials/WMD incidents, the technician level responder assigned to perform advanced monitoring and detection 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.

*N* **19.2 Competencies — Analyzing the Incident. (Reserved)**

*N* **19.3 Competencies — Planning the Response.**

*N* **19.3.1** Given the monitoring and detection equipment provided by the AHJ, the technician level responder assigned to perform monitoring and detection shall select the detection or monitoring equipment suitable for detecting or monitoring solid, liquid, or gaseous hazardous materials/WMD.

*N* **19.3.2** Given the monitoring and detection equipment provided by the AHJ, the technician level responder assigned to perform monitoring and detection shall survey the hazardous materials/WMD incident to presumptively identify or classify unknown materials and to verify the presence and concentrations of hazardous materials.

*N* **19.3.3** Given examples of hazardous materials/WMD incidents, the hazardous materials technician 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 19.3.4 through 19.3.10.

*N* **19.3.4** The hazardous materials technician shall identify the steps in an analysis process for characterizing and presumptively identifying an unidentified contaminant in the atmosphere.

*N* **19.3.5** The hazardous materials technician 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 indicating device

*N* **19.3.6** The hazardous materials technician shall identify the capabilities and limiting factors associated with the selection and use of the following monitoring equipment, test strips, and reagents:

(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 spectroscopy
(16) Surface acoustical wave (SAW)
(17) Ultrasound detection
(18) Wet chemistry
(19) Thermal indicating device (i.e., infrared thermometer)

*N* **19.3.7** Given three hazardous materials/WMD, one of which is a solid, one a liquid, and one a gas, and using equipment, test strips, and reagents, provided by the AHJ as applicable, the hazardous materials technician 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

*N* **19.3.8** The hazardous materials technician shall demonstrate methods for collecting samples of the following:

(1) Gas
(2) Liquid
(3) Solid

*N* **19.3.9** Given detection and monitoring device(s) provided by the AHJ, the technician level responder assigned to perform monitoring and sampling shall describe the operation, capabilities and limitations, local monitoring procedures, field testing, calibration, and maintenance procedures associated with each device.

*N* **19.3.10** Given detection and monitoring device(s) provided by the AHJ, the technician level responder shall describe the correction factors and other information that could impact the accuracy of the results associated with the devices.

*N* **19.3.11 Selecting Personal Protective Equipment (PPE).** Given the PPE provided by the AHJ, the technician level responder assigned to perform monitoring and sampling shall select the PPE required to support monitoring and sampling at hazardous materials/WMD incidents based on local procedures.

*N* **19.4 Competencies — Implementing the Planned Response.**

*N* **19.4.1** Given a scenario involving hazardous materials/WMD and detection and monitoring devices provided by the AHJ, the technician level responder assigned to perform monitoring and detection shall demonstrate the field test and operation of each device and interpret the readings based on local procedures.

*N* **19.4.2** The technician level responder assigned to perform monitoring and detection shall describe local procedures for decontamination of themselves and their detection and monitoring devices upon completion of the monitoring mission.

*N* **19.5 Competencies — Evaluating Progress. (Reserved)**

## *N* Chapter 20 Competencies for Hazardous Materials Technicians with a Consequence Analysis and Planning Specialty

*N* **20.1 General.**

*N* **20.1.1 Introduction.**

*N* **20.1.1.1** The technician level responder assigned to perform consequence analysis and planning shall be that person, competent at the technician level, who is assigned to implement consequence analysis and planning operations at hazardous materials/WMD incidents.

*N* **20.1.1.2** The technician level responder assigned to perform advanced risk assessment and analysis 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 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies in this chapter.

*N* **20.1.1.3** The technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

*N* **20.1.2 Goal.**

*N* **20.1.2.1** The goal of the competencies in this chapter shall be to provide the technician level responder assigned to perform consequence analysis 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.

*N* **20.1.2.2** The goal of the competencies in this chapter shall be to provide the technician level responder assigned to perform consequence analysis and planning with the knowledge and skills to perform the tasks in Sections 20.2 through 20.7 in a safe and effective manner.

*N* **20.2 Competencies — Analyzing the Incident.**

*N* **20.2.1** Given a scenario, the technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents 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

*N* **20.2.2** Given a scenario that includes a map, the technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents 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)

*N* **20.2.3** The technician level responder assigned to perform consequence analysis and planning 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) U.S. Department of Transportation (DOT) National Pipeline Mapping System (NPMS)
(9) Global positioning system

*N* **20.2.4** Given a scenario, the technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents 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

*N* **20.2.5** Given a scenario, the technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents shall describe potential sources of weather forecasting information, including the limitations of open source weather stations.

*N* **20.2.6** Given a scenario, the technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents shall describe the process to deploy an incident weather station.

*N* **20.2.7** Given a scenario, the technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents shall describe the process to make local weather observations (manual weather).

*N* **20.2.8** Given a scenario, the technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents 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
        (i) Liquefied compressed gas clouds
        (ii) Expansion ratio
        (iii) Autorefrigeration
(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

*N* **20.3 Public Protection Actions.**

*N* **20.3.1** Given a scenario, the technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents 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)

*N* **20.3.2** Given a scenario, the technician level responder assigned to perform consequence analysis and planning at

hazardous materials/WMD incidents 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)

**N 20.4 Wide Area Monitoring and Sampling.**

**N 20.4.1** Given a scenario, the technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents 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

**N 20.5 Drinking Water Contamination.**

**N 20.5.1** Given a scenario, the technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents 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

**N 20.6 Open Sources Information.**

**N 20.6.1** Given a scenario, the technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents shall describe potential sources of open source incident information.

**N 20.6.2** The technician 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

**N 20.7 Operational Security (OPSEC).**

**N 20.7.1** Given a scenario, the technician level responder assigned to perform consequence analysis and planning at hazardous materials/WMD incidents 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

**N 20.8 Competencies — Evaluating Progress. (Reserved)**

**N 20.9 Competencies — Terminating the Incident. (Reserved)**

## N Chapter 21 Competencies for Hazardous Materials Technicians with an Advanced Chemical Risk Assessment and Analysis Specialty

**N 21.1 General.**

**N 21.1.1 Introduction.**

**N 21.1.1.1** The technician level responder assigned to perform advanced chemical risk assessment and analysis shall be that person, competent at the technician level, who is assigned to implement advanced chemical risk assessment and analysis operations at hazardous materials/WMD incidents.

**N 21.1.1.2** The technician level responder assigned to perform advanced chemical risk assessment and analysis 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 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies in this chapter.

**N 21.1.1.3** The technician level responder assigned to perform advanced chemical risk assessment and analysis at hazardous materials/WMD incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

**N 21.1.2 Goal.**

**N 21.1.2.1** The goal of the competencies in this chapter shall be to provide the technician level responder assigned to perform advanced chemical risk assessment and analysis at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 21.2.1 through 21.2.6 in a safe and effective manner.

**N 21.2 Competencies — Analyzing the Incident.**

**N 21.2.1** The technician level responder assigned to perform advanced chemical risk assessment and analysis shall include the use of chemical and physical properties in their decision-making process.

**N 21.2.2** The technician level responder assigned to perform advanced chemical risk assessment and analysis shall describe the following terms and their impact on the risk assessment process:

(1) Periodic table
(2) Metals and nonmetals

(3) Transition metals
(4) Metalloids
(5) Electropositive and electronegative
(6) Noble gases
(7) Halogens
(8) Alkali metals
(9) Alkali earth metals
(10) Organic and inorganic

*N* **21.2.3** The hazardous materials technician assigned to perform advanced chemical risk assessment and analysis 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) Sulfide salt
(6) Oxy-salt
(7) Ammonium salt

*N* **21.2.4** The hazardous materials technician assigned to perform advanced chemical risk assessment and analysis shall describe the following hydrocarbons and explain their significance in the analysis process:

(1) Saturated
(2) Unsaturated
(3) Aromatic
(4) Isomers

*N* **21.2.5** The hazardous materials technician assigned to perform advanced chemical risk assessment and analysis shall describe the following inorganic nonsalts and explain their significance in the analysis process:

(1) Binary nonsalt
(2) Binary acids
(3) Oxyacids
(4) Hydrogen peroxide
(5) Bases

*N* **21.2.6** The hazardous materials technician assigned to perform advanced chemical risk assessment and analysis 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 (nitrates, nitrites, nitro compounds)
(9) Halogenated hydrocarbons
(10) Organic peroxides
(11) Nitriles
(12) Thiols and mercaptans
(13) Isocyanates
(14) Carbamates

*N* **21.3 Competencies — Planning the Response.**

*N* **21.3.1** The hazardous materials technician assigned to perform advanced chemical risk assessment and analysis shall describe the following terms and explain their significance in the analysis process:

(1) Chemical reaction
(2) Disassociation
(3) Exothermic
(4) Endothermic
(5) Ionic and 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

*N* **21.3.2** The hazardous materials technician assigned to perform advanced chemical risk assessment and analysis shall describe the heat transfer process that occurs as a result of a cryogenic liquid spill.

*N* **21.3.3** The hazardous materials technician assigned to perform advanced chemical risk assessment and analysis shall describe the following chemical reaction types:

(1) Oxidation and reduction
(2) Decomposition
(3) Replacement reactions
(4) Neutralization
(5) Polymerization

*N* **21.3.4** The hazardous materials technician assigned to perform advanced chemical risk assessment and analysis shall describe the use of ionization potential when planning a detection and monitoring strategy.

*N* **21.3.5** The hazardous materials technician assigned to perform advanced chemical risk assessment and analysis shall describe the risks within the four categories of oxidizers as well as the following oxidizers and the risks associated with each of them:

(1) Ammonium nitrate
(2) Hydrogen peroxide >91 percent by weight
(3) Ammonium permanganate
(4) Ammonium perchlorate
(5) Perchloric acid >72.5 percent by weight
(6) Tetranitromethane
(7) Nitric acid fuming concentration >86 percent
(8) Calcium chlorate

*N* **21.4 Competencies — Evaluating Progress. (Reserved)**

*N* **21.5 Competencies — Terminating the Incident. (Reserved)**

## *N* Chapter 22 Competencies for Hazardous Materials Technicians with an Advanced Product Control Specialty

*N* **22.1 General.**

*N* **22.1.1 Introduction.**

*N* **22.1.1.1** The technician level responder assigned to perform advanced product control shall be that person, competent at the technician level, who is assigned to apply advanced knowledge of product control applications, technology, and procedures during response to hazardous materials/WMD incidents.

*N* **22.1.1.2** The technician level responder assigned to perform advanced product control shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, the operations level mission-specific competencies for product control *(see Section 6.6)*, all competencies at the technician level *(see Chapter 7)*, and all competencies in this chapter.

*N* **22.1.1.3** The technician level responder assigned to perform advanced product control shall receive the additional training necessary to meet specific needs of the jurisdiction.

*N* **22.1.2 Goal.**

*N* **22.1.2.1** The goal of the competencies in this chapter shall be to provide the technician level responder assigned to perform advanced product control with the knowledge and skills to perform the tasks in 22.1.2.2 in a safe and effective manner.

*N* **22.1.2.2** When responding, the technician level responder assigned to perform advanced product control 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

*N* **22.1.2.3** Given the selected product control technique and the tools and equipment, PPE, and control agents and equipment provided by the AHJ at a hazardous materials/WMD incident, the hazardous materials technician shall confine and contain the release from bulk pressure containers and their closures and bulk liquid containers/closures, following safety procedures, protecting exposures and personnel, and avoiding or minimizing hazards, by completing the requirements in 22.1.2.3.1 and 22.1.2.3.2.

*N* **22.1.2.3.1 Product Control.** Given a hazardous materials/WMD incident with release of product, an assignment in an IAP, results of the incident analysis, policies and procedures for product control, response objectives and options for the incident, and approved tools, equipment, control agents, and PPE, the hazardous materials technician 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) Flaring
    (h) Retention
    (i) Transfer
    (j) Vapor dispersion
    (k) 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

*N* **22.1.2.3.2 Controlling Leaks from Containers.** Given a hazardous materials/WMD incident; an assignment in an IAP; results of the incident analysis; three scenarios, including 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 approved tools, equipment, and PPE, the hazardous materials technician 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 to contain leaking hazardous 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

*N* **22.1.2.4** Given the selected product control technique and the tools and equipment, PPE, and control agents and equipment provided by the AHJ at a hazardous materials/WMD incident, the hazardous materials technician 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 22.1.2.4.1.

*N* **22.1.2.4.1 Product Control.** Given a hazardous materials/WMD incident with release of product, an assignment in an IAP, results of the incident analysis, policies and procedures for product control, response objectives and options for the incident, and approved tools, equipment, control agents, and PPE, the hazardous materials technician 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) Removal
    (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 confining released materials

**N 22.2 Competencies — Analyzing the Incident. (Reserved)**

**N 22.3 Competencies — Planning the Response. (Reserved)**

**N 22.4 Competencies — Implementing the Planned Response. (Reserved)**

**N 22.5 Competencies — Evaluating Progress. (Reserved)**

**N 22.6 Competencies — Terminating the Incident. (Reserved)**

## N Chapter 23 Competencies for Hazardous Materials Technicians with a Weapons of Mass Destruction Specialty

**N 23.1 General.**

**N 23.1.1 Introduction.**

**N 23.1.1.1** The technician level responder assigned to respond to weapons of mass destruction (WMD) incidents shall be that person, competent at the technician level, who is assigned to apply advanced knowledge of WMD agents, response equipment, and response procedures during the intentional release of hazardous materials or WMD.

**N 23.1.1.2** The technician level responder assigned to respond to WMD incidents shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies in this chapter.

**N 23.1.1.3** The technician level responder assigned to respond to WMD incidents shall receive the additional training necessary to meet specific needs of the jurisdiction.

**N 23.1.2 Goal.**

**N 23.1.2.1** The goal of the competencies in this chapter shall be to provide the technician level responder assigned to respond to WMD incidents with the knowledge and skills to perform the tasks in 23.1.2.2 in a safe and effective manner.

**N 23.1.2.2** When responding, the technician level responder assigned to respond to WMD incidents 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 WMD response options available to the technician level responder in accordance with the emergency response plan or standard operating procedures
(3) Implement the WMD response activities as specified in the emergency response plan or standard operating procedures

**N 23.2 Competencies — Analyzing the Incident.**

**N 23.2.1** Given examples of the following military chemical warfare agent categories, the technician level responder assigned to respond to WMD incidents shall generally describe the potential for illicit use, chemical properties, physical properties, toxicity, and health effects for each category listed:

(1) Nerve agents
(2) Blood agents
(3) Blister agents
(4) Choking agents
(5) Harassing (riot control) agents
(6) Incapacitating agents

**N 23.2.2** Given examples of the following toxic industrial chemicals, the technician level responder 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)

**N 23.2.3** Given examples of radioactive material and radiation exposure devices, the technician level responder assigned to respond to WMD incidents shall describe the potential for illicit use and potential health effects from each.

**N 23.2.4** Given examples of the following explosive materials, the technician level responder assigned to respond to WMD incidents 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) Peroxide-based explosives

**N 23.2.5** Given examples of the following biological agents, the technician level responder assigned to respond to WMD incidents 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

**N 23.3 Competencies — Planning the Response.**

**N 23.3.1** Given an incident involving the intentional use of hazardous materials/WMD, the technician level responder assigned to respond to WMD incidents 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

**N 23.3.2** Given the detection, monitoring, and sampling equipment provided by the AHJ, the technician level responder assigned to respond to WMD incidents shall describe the application and limitations of the following types of WMD detection and monitoring equipment:

(1) Ion mobility spectroscopy
(2) Surface acoustic wave
(3) Flame photo spectrometry
(4) Fourier transform infrared spectroscopy
(5) Raman spectroscopy
(6) Colorimetric tubes
(7) Gas chromatography/mass spectroscopy

(8) Polymerase chain reaction
(9) Immunological assays
(10) Protein tests
(11) Nuclide identification devices
(12) Ultrasound detection

*N* **23.3.3** Given examples of hazardous materials/WMD incidents requiring the collection of samples, the hazardous materials technician assigned to respond to WMD incidents shall describe the difference between the collection of samples for public safety purposes and the collection of evidence for law enforcement purposes.

*N* **23.3.4** Given an example of an intentional WMD incident, the hazardous materials technician assigned to respond to WMD incidents shall describe the following response considerations while operating at a crime scene:

(1) Notification of law enforcement
(2) Coordination with law enforcement within the site incident management system
(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

*N* **23.3.5 Selecting Personal Protective Equipment (PPE).** Given the PPE provided by the AHJ, the technician level responder assigned to respond to WMD incidents shall select the PPE required to support site operations, including the collection of public safety samples.

*N* **23.4 Competencies — Implementing the Planned Response.**

*N* **23.4.1** Given a scenario involving hazardous materials/WMD, the technician level responder assigned to respond to WMD incidents 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

*N* **23.4.2** Given a scenario involving hazardous materials/WMD, the technician level responder assigned to respond to WMD incidents 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, and so forth 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
(8) Assist law enforcement with preparation of samples for LRN submission as defined by the AHJ

*N* **23.4.2.1** The technician level responder assigned to respond to WMD incidents shall describe local procedures for decontamination of themselves and their detection and monitoring devices upon completion of the sampling mission.

*N* **23.4.3** The technician level responder assigned to respond to WMD incidents shall describe the AHJ procedures for response to a post-blast scene involving the potential use of hazardous materials to include the following:

(1) Identify the governmental authorities with either jurisdictional or legislative responsibilities for presence in the incident command post
(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

*N* **23.4.4** The technician level responder assigned to respond to WMD incidents 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

*N* **23.5 Competencies — Evaluating Progress. (Reserved)**

*N* **23.6 Competencies — Terminating the Incident. (Reserved)**

## *N* Chapter 24 Competencies for Hazardous Materials Technicians with an Advanced Decontamination Specialty

*N* **24.1 General.**

*N* **24.1.1 Introduction.**

*N* **24.1.1.1** The technician level responder assigned to perform advanced decontamination shall be that person, competent at the technician level, who is assigned to apply advanced knowledge of decontamination applications, technology, and procedures during response to hazardous materials/WMD incidents.

**N 24.1.1.2** The technician level responder assigned to perform advanced decontamination shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, the operations level mission-specific competencies for mass decontamination *(see Section 6.3)* and technical decontamination *(see Section 6.4)*, all competencies at the technician level *(see Chapter 7)*, and all competencies in this chapter.

**N 24.1.1.3** The technician level responder assigned to perform advanced decontamination shall receive the additional training necessary to meet specific needs of the jurisdiction.

**N 24.1.2 Goal.**

**N 24.1.2.1** The goal of the competencies in this chapter shall be to provide the technician level responder assigned to perform decontamination with the knowledge and skills to perform the tasks in 24.1.2.2 in a safe and effective manner.

**N 24.1.2.2** When responding, the technician level responder assigned to perform decontamination 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

**N 24.2 Competencies — Analyzing the Incident.**

**N 24.2.1** Given examples of the following contamination types, the technician level responder assigned to perform decontamination 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

**N 24.2.2** Given examples of the following decontamination technologies, the technician level responder assigned to perform advanced decontamination 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

**N 24.3 Competencies — Planning the Response.**

**N 24.3.1** Given an incident involving hazardous materials/WMD, the technician level responder assigned to perform advanced decontamination 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 (law enforcement) decontamination
(5) Canine (law enforcement and search) decontamination
(6) Equine (law enforcement) decontamination
(7) Decontamination of collected sample packaging

**N 24.3.2** Given the detection, monitoring, and disclosure technologies provided by the AHJ, the technician level responder assigned to perform advanced decontamination shall describe the procedures for confirming the effectiveness of decontamination.

**N 24.4 Competencies — Implementing the Planned Response.**

**N 24.4.1** Given a scenario involving hazardous materials/WMD, the technician level responder assigned to perform advanced decontamination 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

**N 24.4.2** Given a scenario involving hazardous materials/WMD, the technician level responder assigned to perform advanced decontamination shall describe local procedures for decontamination of themselves and their decontamination equipment upon completion of the operation.

**N 24.5 Competencies — Evaluating Progress. (Reserved)**

**N 24.6 Competencies — Terminating the Incident. (Reserved)**

## 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.1.1.1** 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.3.2.1 Approved.** The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

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

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

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

**A.3.3.9 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.

*N* **A.3.3.10.7 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 a 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 138 tons (125 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 of a 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.3.3.14 Control Zones.** Law enforcement agencies might utilize different terminology for site control, for example, *inner* and *outer perimeters* as opposed to *hot* or *cold zones*. The operations level responder should be familiar with the terminology and procedures used by the 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, these zones are defined as the hot, warm, and cold zones.

**A.3.3.14.4 Warm Zone.** The warm zone includes control points for the decontamination corridor, thus helping to reduce the spread of contamination. This support may include staging of backup personnel and equipment, staging of evidence, and personnel and equipment decontamination. Additionally, portions of this area may be used as a safe refuge for initial patient evacuation and triage.

Δ **A.3.3.16 Decontamination.** There are three types of decontamination (commonly known as "decon") performed by emergency responders: emergency, mass, and technical.

Gross decontamination is a phase of decontamination where significant reduction of the amount surface contamination takes place as quickly as possible. 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.

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

Decontamination sometimes performed on victims in a hospital setting is generally referred to as *definitive decontamination* but is not covered in this standard.

**A.3.3.16.1 Emergency Decontamination.** This process can be as simple as removal of outer or all garments from the individual 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 individual to minimize exposure and injury.

**A.3.3.16.2 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.

Δ **A.3.3.16.3 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 [e.g., victims exposed to a radiological dispersal device (RDD) or an aerosolized biologic agent].

**A.3.3.16.4 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 7.3.3)* and is subject to the approval of the incident commander.

**A.3.3.18 Demonstrate.** This performance can be supplemented by simulation, explanation, illustration, or a combination of these.

**A.3.3.27 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, animal, the environment, or a piece of equipment. The exposure can be external, internal, or both.

**A.3.3.29 Fissile Material.** Department of Transportation (DOT) regulations define fissile material as plutonium-239, plutonium-242, uranium-233, uranium-235, or any combination of these radionuclides. This material is usually transported with additional shipping controls that limit the quantity of material in any one shipment. Packaging used for fissile material is designed and tested to prevent a fission reaction from occurring during normal transport conditions as well as hypothetical accident conditions.

Δ **A.3.3.32 Hazardous Material.** In United Nations model codes and regulations, hazardous materials are called dangerous goods. See also 3.3.68 and A.3.3.68, Weapon of Mass Destruction (WMD).

**A.3.3.33 Hazardous Materials Branch/Group.** This function is directed by a hazardous materials officer and deals principally with the technical aspects of the incident.

**A.3.3.34 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.3.3.35 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.

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*N* **A.3.3.36 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.3.3.40 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 IC has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site.

**A.3.3.42 Incident Management System (IMS).** The IMS provides a consistent approach for all levels of government, private sector, and volunteer organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. An IMS provides for interoperability and compatibility among all capability levels of government, the private sector, and volunteer organizations. The IMS includes a core set of concepts, principles, terminology, and technologies covering the incident command system, multiagency coordination systems, training, and identification and management of resources.

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**A.3.3.47 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.

Δ **A.3.3.48.1 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.3.3.48.2 Incident Action Plan.** 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.

*N* **A.3.3.48.3 Site Safety and Control Plan.** Reflective of the 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.3.3.49 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.3.3.51 Protective Clothing.** Protective clothing is divided into three types:

(1) Structural fire-fighting protective clothing
(2) High temperature–protective clothing
(3) Chemical-protective clothing
    (a) Liquid splash–protective clothing
    (b) Vapor-protective clothing

**A.3.3.51.2 Chemical-Protective Clothing.** 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.

Δ **A.3.3.51.2.1 Liquid Splash–Protective Clothing.** This type of protective clothing is a component of EPA Level B chemical protection. Liquid splash–protective clothing should meet the requirements of NFPA 1992.

Δ **A.3.3.51.2.2 Vapor-Protective Clothing.** This type of protective clothing is a component of Level A chemical protection. Vapor-protective clothing should meet the requirements of NFPA 1991 or NFPA 1994.

**A.3.3.51.3 High Temperature–Protective Clothing.** This type of clothing is usually of limited use in dealing with chemical commodities.

**A.3.3.51.4 Structural Fire-Fighting Protective Clothing.** Structural fire-fighting 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. The NFPA 1971 CBRN option is intended to add chemical protection to structural fire-fighting protective clothing.

**A.3.3.54 Respiratory Protection.** Respiratory protection is divided into four types:

(1) Self-contained breathing apparatus (should meet the requirements of NFPA 1981, which also incorporates 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.3.3.55 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.

*N* **A.3.3.58 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 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.

*N* **A.3.3.59 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 AHJ.

**A.3.3.62.1 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 9. 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.3.3.62.2 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 3.3.48.1.

**A.3.3.62.3 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 3.3.14.

**A.3.3.66 Termination.** Termination is divided into three phases: debriefing the incident, post-incident analysis, and critiquing the incident.

**A.3.3.67 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.3.3.68 Weapon of Mass Destruction (WMD).** The source of this definition is 18 USC 2332a. Weapons of mass destruction (WMD) are known by many different abbreviations and acronyms, the most common of which is CBRNE, which is the acronym for chemical, biological, radiological, nuclear, and explosive problems that could be released as the result of a terrorist attack.

**A.3.3.68.1 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.3.3.68.1.1 Improvised Nuclear Device (IND).** The nuclear explosion from an IND produces extreme heat, powerful shockwaves, and prompt radiation that would be acutely lethal for a significant distance. It also produces potentially lethal radioactive fallout, which may spread and deposit over very large areas. A nuclear detonation in an urban area could result in over 100,000 fatalities (and many more injured), massive infrastructure damage, and thousands of square kilometers of contaminated land. If the IND fails to work correctly and does not create a nuclear explosion, then the detonation of the conventional explosives would likely disperse radioactive material like an explosive RDD.

Δ **A.3.3.68.1.2 Radiation Dispersal Device (RDD).** Any device that intentionally spreads radioactive material across an area with the intent to cause harm, without a nuclear explosion occurring. An RDD that uses explosives for spreading or dispersing radioactive material is commonly referred to as a "dirty bomb" or "explosive RDD." Nonexplosive RDDs could spread radioactive material using common items such as pressurized containers, fans, building air-handling systems, sprayers, crop dusters, or even by hand.

**A.3.3.68.1.3 Radiation Exposure Device (RED).** A device, used interchangeably with the term "radiological exposure device" or "radiation emitting device," consisting of radioactive material, either as a sealed source or as material within some

type of container, or a radiation-generating device, to cause harm by exposure to ionizing radiation.

**A.3.4.3 Operations Level Responders.** The source of this definition is 29 CFR 1910.120. These responders can have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ.

**A.4.2.1** The AHJ should identify local situations where hazardous materials/WMD might be encountered. This can include areas where hazardous materials are transported, local industries and facilities where hazardous materials are used or stored, and locations where illicit laboratories might be likely.

**A.4.2.1(1)** See Annex F.

**A.4.2.1(3)** See Annex G.

**A.4.2.1(7)(c)** The responder should understand the standard military fire hazard and chemical hazard markings.

**A.4.2.1(12)** These clues include odors, gas leaks, fire or vapor cloud, visible corrosive actions or chemical reactions, pooled liquids, hissing of pressure releases, condensation lines on pressure tanks, injured victims, or casualties.

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**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*.

**A.4.2.3(1)** Three methods for determining the appropriate guidebook page include the following:

(1) Using the numerical index for UN/NA identification numbers
(2) Using the alphabetical index for chemical names
(3) Using the Table of Placards and Initial Response Guides

**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 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 response actions 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.4.4.1(3)(c)** These include thermal, mechanical, poisonous, corrosive, asphyxiating, radiological, and etiologic. They can also include psychological harm.

**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 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 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.

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**A.4.5** No competencies are currently required at this level.

**A.4.6** No competencies are currently required at this level.

Δ **A.5.1.1.1** Operations level responders need only be trained to meet the competencies in Chapter 5. The competencies listed in Chapter 6 (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 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. Table A.5.1.1.1 is a sample operations level responder matrix.

Table A.5.1.1.1 is designed to help users of this standard determine which competencies in Chapters 5 and 6 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 5 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.5.1.1.3** 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.5.2.1** 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.5.2.1.1** Examples should include all containers, including nonbulk packaging, bulk packaging, vessels, and facility containers such as piping, open piles, reactors, and storage bins.

**A.5.2.1.1.6** See A.3.3.44.3.

**A.5.2.1.4** The list of surrounding conditions should include topography; land use; accessibility; weather conditions; bodies of water; 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 nature and extent of injuries. Building information, such as floor drains, ventilation ducts, and air returns, also should be included where appropriate.

**Table A.5.1.1.1 NFPA 472 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** |
| Fire fighters 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.5.2.1.6** 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

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**A.5.2.3** 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."

*N* **A.5.2.3(1)(a)** Bioterrorism Agent Categories. The following material applies to 5.2.3(1)(a)xviii., Biological agents and toxins: 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.5.2.3(2)** The three types of stress that could cause a container to release its contents are thermal stress, mechanical stress, and chemical stress.

Δ **A.5.2.3(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 5.2.3(3) through 5.2.3(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.5.2.3(4)** The four ways in which containment systems can release their contents are detonation, violent rupture, rapid relief, and spill or leak.

**A.5.2.3(5)** Seven dispersion patterns can be created upon release of agents: hemisphere, cloud, plume, cone, stream, pool, and irregular.

**A.5.2.3(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.5.2.3(7)** The health and physical hazards that could cause harm in a hazardous materials/WMD incident are thermal, mechanical, poisonous, corrosive, asphyxiating, radiological, and etiologic.

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**A.5.2.4** 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.5.2.4(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.5.2.4(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.

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**A.5.3.3(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.5.3.4** Refer to *Hazardous Materials/Weapons of Mass Destruction Response Handbook*.

**A.5.4.1(4)** Refer to *Hazardous Materials/Weapons of Mass Destruction Response Handbook*.

**A.5.4.1(5)** Refer to NIOSH/OSHA/USCG/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*.

**A.5.4.1(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.5.4.2** 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.5.4.3** 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 response actions 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.5.6** No competencies are currently required at this level.

**A.6.1.1.1** Operations level responders need only be trained to meet the competencies in Chapter 5. All of the competencies listed in Chapter 6 (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 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.6.1.1.3** 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.6.2.1.1.4** See A.6.1.1.3.

Δ **A.6.2.3.1(1)** A written personal protective equipment program should be established in accordance with 29 CFR 1910.120. Elements of the program should include personal protective equipment (PPE) selection and use; storage, maintenance, and inspection; and training consideration.

Proper selection of PPE for individual responders during a specific emergency must be based on a careful assessment of two factors:

(1) The hazards anticipated to be present at the scene
(2) The probable impact of those hazards, based on the mission role of the individual

The emergency 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 personal protective equipment 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

Except for the inflation and inward leakage tests on Level A garments, HAZWOPER does not specify minimum performance criteria of protective clothing and respirators required for specific threats, such as chemical permeation resistance and physical property characteristics. The use of these general levels of protection does not ensure that the wearer is adequately protected from CBRN-specific hazards.

Relying solely on OSHA/EPA nomenclatures in selection of personal protective equipment could result in exposure above acceptable limits or an unnecessary reduction in operational effectiveness through lack of mobility, decreased dexterity, or reduced operational mission duration.

The clothing and ensemble standards developed by the NFPA Technical Committee on Hazardous Materials Protective Clothing and Equipment establish minimum performance requirements for physical and barrier performance during hazardous materials emergencies, including those involving chemical, biological, and radioactive terrorism materials. These standards are integrated with the NIOSH and NFPA standards on respiratory equipment.

Table A.6.2.3.1(1) is provided to assist emergency response organizations in transitioning from the OSHA/EPA Levels A, B, and C to 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.6.2.3.1(1).

All purchasers of personal protective equipment are cautioned to examine their hazard and mission requirements closely and to select appropriate performance standards. All personal protective equipment must be used in accordance with 29 CFR 1910.120 (or equivalent EPA or state regulations). Also applicable in states with OSHA-approved health and safety programs and for federal employers is 29 CFR 1910.134, "Respiratory Protection" (or an equivalent EPA or state regulation). Both 29 CFR 1910.120 and 29 CFR 1910.134 include requirements for formal plans, medical evaluation, and training to ensure the safety and health of emergency responders. Additional information, a list of allowable equipment, and information on related standards, certifications, and products are available on the Department of Homeland Security (DHS)–sponsored Responder Knowledge Base (http://www.rkb.mipt.org).

**Table A.6.2.3.1(1) Protective Clothing Standards That Correspond to OSHA/EPA Levels**

| Ensemble Description Using Performance-Based Standard(s)[a] | OSHA/EPA Level |
|---|---|
| NFPA 1991 worn with NIOSH CBRN SCBA | A |
| NFPA 1994 Class 2 worn with NIOSH CBRN SCBA[b] | B |
| NFPA 1971 with CBRN option worn with NIOSH CBRN SCBA[c] | B |
| NFPA 1994 Class 3 worn with NIOSH CBRN APR[b] | C |
| NFPA 1994 Class 4 worn with NIOSH CBRN APR | C |

[a] The 2007 edition of NFPA 1994 eliminated the Class 1 requirements, relying instead on NFPA 1991 as the standard for vapor protective ensembles. The 2007 edition of NFPA 1994 also included a new Class 4 requirement for biological and radiological particulate protective ensembles.

[b] Vapor protection for NFPA 1994, Class 2 and Class 3, is based on challenge concentrations established for certification of CBRN open-circuit SCBA and APR respiratory equipment. Class 2 and Class 3 do not require the use of totally encapsulating garments.

[c] The 2007 edition of NFPA 1971 included options for protection from CBRN hazards. Only complete ensembles certified against these additional optional requirements provide this protection. The protection levels set in the NFPA 1971 CBRN option are based on the Class 2 requirements contained in NFPA 1994.

**A.6.2.3.1(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.6.3.1.1.4** 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.6.4.1.1.4** See A.6.3.1.1.4.

**A.6.5.1.1.4** See A.6.3.1.1.4.

**A.6.6.1.1.4** See A.6.3.1.1.4.

**A.6.7.1.1.4** See A.6.3.1.1.4.

**A.6.8.1.1.4** See A.6.3.1.1.4.

**A.6.9.1.1.4** See A.6.3.1.1.4.

**A.7.1.1.3** Additional training sources might include, but are not limited to, local and state public health agencies and the Centers for Disease Control and Prevention (CDC). Additional training options include, but are not limited to, programs offered at the Center for Domestic Preparedness in Anniston, Alabama, and at the U.S. Army Dugway Proving Grounds in Utah.

**A.7.1.2.2(3)** The following site safety and control plan considerations are from the NIMS *Site Safety and Control Plan* (formerly ICS 208 HM):

(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.7.2.1.2** Suggested materials to identify can include the most commonly released materials that are identified annually on several lists, such as those from the federal EPA or the California Environmental Protection Agency (Cal/EPA).

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**A.7.2.2.1** 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.

Δ **A.7.2.2.4** The selection of scenarios to test the knowledge and ability to identify exposure symptoms should include the following:

(1) Select materials common to the jurisdiction.
(2) Select concentrations and formulation of the materials common to the jurisdiction. 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.7.2.3** 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

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**A.7.2.5.6** 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.

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**A.7.4.1** The functions within the hazardous materials group or branch can include the following:

(1) Hazardous materials branch director/group supervisor
(2) Assistant safety officer — hazardous materials
(3) Site access control leader
(4) Decontamination leader
(5) Technical specialist — hazardous materials leader
(6) Safe refuge area manager

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**A.7.4.4** The decontamination processes identified in the incident action plan might be technical decontamination, mass decontamination, or both, depending on the circumstances of the incident. See 3.3.16.3 and 3.3.16.4.

**A.8.1.2.2(2)(d)** 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.8.2.2(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.

Δ **A.8.2.2(6)** Some examples are shown in Table A.8.2.2(6)(a) and Table A.8.2.2(6)(b).

Δ **Table A.8.2.2(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.

Δ **Table A.8.2.2(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.8.3.4.5.3** Safety precautions should include the following:

(1) Buddy systems
(2) Backup team
(3) Personal protective equipment

**A.8.3.4.5.5** 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.8.4.2** 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.8.5.2** 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 response objectives and priorities, resources committed, unmet needs, and safety issues.

**A.9.3.1.1.1** 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.9.3.1.2.2(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) Personal protective equipment
(7) On-site work plans
(8) Communication procedures
(9) Decontamination procedures
(10) Site safety and health plan

**A.9.3.4.1(2)** Such factors include heat, cold, working in a confined space, working in personal protective equipment, working in a flammable or toxic atmosphere, and pre-existing health conditions.

**A.10.4.2** 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.11.1.1** 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.11.1.2.1** Under this section, the hazardous materials safety officer is given specific responsibilities. It should be understood that even though these duties are to be carried out by the hazardous materials safety officer, the incident commander has overall responsibility for the implementation of these tasks.

The hazardous materials safety officer should meet all the competencies for the responder at the level of operations being performed. A hazardous materials safety officer directs the safety of operations in the hot and the warm zones. A hazardous materials safety officer should be designated specifically at all hazardous material incidents (29 CFR 1910.120) and is 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.11.2.1.2** 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 wide flammable range present
(5) Reactive materials present

**A.11.2.1.3** 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.11.2.1.6** 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.11.3.1** Potential response options are either defensive or offensive in nature. The site safety and control plan is integrated into the formal incident action plan.

**A.11.3.1(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.11.3.1(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.11.3.3(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.11.3.3(2)** Hazards that should be observed when personnel approach a hazardous materials/WMD incident include the following:

(1) Inhalation hazards
(2) Dermal hazards
(3) Flammable hazards
(4) Reactive hazards
(5) Electrical hazards
(6) Mechanical hazards

**A.11.3.3(3)** The following elements of a site safety plan 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.11.3.5(3)** Response options can include surveying the scene, sampling, monitoring, plugging, and patching.

Δ **A.11.3.7(1)** The elements of an emergency medical services plan according to NFPA 473 include the following:

(1) EMS control activities
(2) EMS component of an incident management 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

Δ **A.11.4.4(10)** Safety considerations that can minimize secondary contamination include the following:

(1) Control zones are established and enforced.
(2) All people and equipment exiting the hot zone are decontaminated.
(3) Personnel performing decontamination are properly trained.
(4) Personnel performing decontamination are properly protected.

See NFPA 473.

**A.11.4.5(1)** Communications systems include in-suit radio communications, hand-held portable radios, emergency signaling devices, and hand signals.

**A.11.5.2(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.11.6.2.1** 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.12.2.1(10)(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.12.2.1(15)** 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.12.4.1(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 connections to ensure electrical continuity. One ground rod might not be enough; more might have to be driven and connected to the first to ensure a good ground. Resistance varies with types of soils.

**A.13.1.3** Technicians operating within the bounds of their training as listed in Chapter 6 are able to intervene in cargo tank incidents. However, if a hazardous materials response team decides to train some or all of the technicians to have in-depth knowledge of cargo tanks, this chapter sets out the required competencies.

**A.13.2.1(5)** See A.12.2.1(15).

**A.13.4.1(3)** See A.12.4.1(10).

**A.14.2.1(9)** Methods for determining the amount of liquid include the use of gauges, shipping papers, the presence of frost line, the use of touch or feel for the colder liquid level, and the use of heat sensors.

**A.14.2.1(10)** See A.12.2.1(10)(d).

**A.14.4(4)** See A.12.4.1(10).

**A.14.4(8)** See A.12.4.1(10)

**A.14.4(9)** See A.12.4.1(10)

**A.14.4(10)** See A.12.4.1(10).

**A.15.1.1** Marine vessels, to include tank vessels and non-tank vessels, are used to transport a wide range of different hazardous cargoes in bulk, including oils, chemicals, and liquefied gases. Many marine vessels are designed to carry a large number of segregated products simultaneously, and can carry significantly greater volumes of cargo than other modes of transport. The operation of marine vessels differs from of any other bulk cargo transportation operation. On a single voyage, a large number of cargoes with different properties, characteristics, and inherent hazards may be carried. Marine vessels are constructed in various types, sizes, and arrangements. Persons responding to hazardous material spills or releases from marine tank vessels face unique challenges. Marine vessels may or may not be located at a dock, pier, or anchorage or may be underway, presenting special logistics issues. Marine vessels may be crewed with diverse nationalities. Specialized equipment may be needed to properly respond to hazardous material spills and releases from marine vessels, both tank and non-tank. In areas where hazardous materials are transported on waterways, responders to hazardous material incidents require a minimum level of specialized competency.

For the purposes of this chapter, a marine tank vessel is defined as a vessel that is constructed or adapted to carry or carries oil or hazardous material in bulk as cargo or cargo residue and operates on international navigable waters or that transfers oil or hazardous material in a port or place subject to international jurisdiction.

The term *tank ship* means a self-propelled tank vessel constructed or adapted primarily to carry oil or hazardous material in bulk in the cargo spaces.

The term *tank barge* means a non-self-propelled tank vessel.

The term *chemical carrier* means a tank ship or tank barge constructed or adapted and used for the carriage in bulk of any hazardous product listed in Chapter 17 of the *International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* (IBC Code).

The term *liquefied gas carrier* means a tank ship or tank barge constructed or adapted and used for the carriage in bulk of any liquefied gas or other product listed in Chapter 19 of the *International Gas Carrier Code* (IGC Code).

Δ **A.15.1.1.2** Marine tank vessel responders should be familiar the following:

(1) Title 33, Code of Federal Regulations — U.S. Coast Guard — navigation
(2) Title 46, Code of Federal Regulations — U.S. Coast Guard — shipping
(3) International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)
(4) International Convention for Safety of Life at Sea (SOLAS)
(5) OSHA HAZWOPER Regulation (29 CFR 1910.120)
(6) Resources applicable for marine tank vessels include:
    (a) *Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* (BCH Code)
    (b) *International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* (IBC Code)
    (c) *International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk* (IGC Code)
    (d) NFPA 1405
    (e) NFPA 1005
(7) Resources applicable for marine non-tank vessels include:
    (a) *International Maritime Dangerous Goods Code* (IMDG Code)
    (b) Local emergency response plan (LERP)
    (c) Area contingency plan
    (d) NFPA 1405
    (e) NFPA 1005
(8) Additionally, the following maritime industry standards and codes of practice will provide useful information regarding marine tank vessels, including but not limited to:
    (a) *International Safety Guide for Oil Tankers and Terminals*
    (b) *International Chamber of Shipping Tanker Safety Guide* (chemicals)
    (c) *International Chamber of Shipping Tanker Safety Guide* (liquefied gases)
    (d) SIGTTO *Ship to Ship Transfer (petroleum) (liquefied gases)*
    (e) SIGTTO *Liquefied Gas Handling Principles on Ships and in Terminals*
    (f) *Provisional Categorization of Liquid Substances*, MEPC. 2/Circ.10
(9) Additionally the following resources may provide useful information:
    (a) DOT *Emergency Response Guidebook*
    (b) *Bulk Chemical Data Guide*
    (c) Chemical Hazards Response Information System (CHRIS)
    (d) U.S. Coast Guard Bulk Cargo Finding Aid
    (e) Material safety data sheet
    (f) CAMEO (Computer Aided Management of Emergency Operations)
    (g) CHEMTREC
    (h) National Institute for Occupational Safety and Health (NIOSH) *Pocket Guide to Chemical Hazards*
    (i) ACGIH

**A.15.1.2.2(1)(b)** External parameters that could affect the incident, including, but not limited to, weather, currents, and tides, should be monitored.

**A.15.1.2.2(1)(c)** Examples of appropriate controls in the marine environment include securing the vessel (i.e., anchoring or mooring), stabilizing the vessel, establishing exclusion zones, and precautions for public and personnel safety.

**A.15.1.3.2** Responders who acquire the marine tank and non-tank vessel specialty are best prepared to respond to hazardous material incidents on a wide variety of marine vessel types. However, there may be occasions where a responder may only be expected to respond to an incident for a select type of marine vessel that is operating within the area of the authority having jurisdiction. For example, if a company only ships cargo by barges, their responders only need to be trained to the tank vessel competencies, and need not be trained to meet the competencies for non-tank vessels.

**A.15.2.1(1)** Examples of marine vessels include the following:

(1) Certain bulk dangerous cargo ships
  (a) Chemical tank ships
  (b) Sophisticated parcel chemical tank ships
  (c) Specialized chemical tank ships
  (d) Chemical tank barges
(2) Liquefied gas tank ships
  (a) Fully pressurized tank ships
  (b) Semi-pressurized tank ships
  (c) Ethylene (LPG and chemical gas) ships
  (d) Fully refrigerated tank ships
  (e) Liquefied natural gas (LNG) ships
  (f) Liquefied gas barges
(3) Tank ships
  (a) Oil tank barges
  (b) Oil tank ships
(4) Cargo and miscellaneous vessels
  (a) Container vessels
  (b) Break bulk
  (c) Roll on roll off (RoRo) vessels
  (d) Dry bulk cargo ships or barges
(5) Offshore supply vessels
(6) Passenger vessels
  (a) Cruise ship
  (b) Ferries
(7) Other vessels
  (a) Tug boats
  (b) Fishing vessels
  (c) Crew boat
  (d) Mobile offshore drilling unit

**A.15.2.1(2)** Types of marine tank vessel cargo compartments include the following:

(1) Barge cargo compartments
  (a) Oil/chemical tank barges
  (b) Liquefied gas barges
(2) Oil/product ship cargo compartments
(3) Chemical ship cargo compartments
  (a) Typical tank construction
  (b) Irregular-shaped tank construction
  (c) Tank-within-a-tank construction
  (d) Baffled tank construction
(4) Liquefied gas ship cargo compartments
  (a) Independent type A
  (b) Independent type B
  (c) Independent type C
  (d) Membrane
  (e) Semimembrane
  (f) Internal insulation type 1
  (g) Internal insulation type 2
  (h) Integral
(5) Cargo compartment containment types (for barges and tank ships)
  (a) Coated, lined, uncoated, or cladded
  (b) Stainless steel or carbon steel
  (c) Insulated/thermal protection
(6) Other spaces (for barges and tank ships)
  (a) Cofferdams
  (b) Double bottoms and/or double sides
  (c) Pump rooms
  (d) Other void spaces adjacent to the cargo area

Responders to hazardous materials spills and releases from marine tank vessels should acquire all available information related to the physical characteristics of the vessel. In most cases, responders should work closely and consult with individuals who are experts in the construction of the vessel, its tanks, and other applicable details (the owner, operator, officers, crew, cargo owner, or other individuals as appropriate). Sources of information regarding a particular vessel can include, but are not limited to, the following:

(1) General arrangement plan
(2) Procedures and arrangement (P&A) manual
(3) Fire and emergency plan

Δ **A.15.2.1(3)** Examples of fittings arrangements for tank vessels include the following:

(1) Cargo system valves
  (a) Gate valves
  (b) Globe valves
  (c) Butterfly valves
  (d) Ball valves
  (e) Check valves
  (f) Angle valves
  (g) Pneumatic, hydraulic, or electrically operated valves
(2) Cargo pipeline systems
  (a) Single loop (single line connected to all tanks)
  (b) Branch (multiple lines capable of operating in a segregated or common system of tanks)
  (c) Single tank (dedicated, fully segregated piping system)
(3) Cargo pumps
  (a) Centrifugal
  (b) Positive displacement
  (c) Screw drive
  (d) Deepwell
  (e) Portable emergency/backup pumps
  (f) Stripping systems
  (g) Systems for providing power to the pumps — hydraulic, electric, steam, direct diesel
(4) Cargo compartment fittings
  (a) Tank hatch/expansion trunk
  (b) Tank gauging/sampling points
  (c) Vents
  (d) Pressure gauges
  (e) Cleaning ports (Butterworth hatches)
  (f) Spill valves
(5) Emergency shutdown systems
  (a) Manual or automatic/integrated
  (b) Electrical
  (c) Pneumatic
  (d) Remote-actuated/radio
  (e) Thermal
(6) Pressure relief systems
  (a) Safety relief valves
  (b) Pressure relief valves
  (c) Vacuum relief valves
  (d) Regulator valves
  (e) Rupture discs

(7) Cargo temperature control systems
  (a) Steam/water
  (b) Thermal oil
  (c) Liquefaction systems (e.g., glycol)
  (d) Heat exchanger
(8) Cargo cooling (chemical ships) or refrigeration systems (liquefied gas ships)
(9) Cargo compressors (liquefied gas ships)
(10) Cargo vapor handling systems and piping
(11) Inert systems
  (a) Flue gas (tank ships only)
  (b) Inert gas generator (tank ships only)
  (c) Nitrogen generation/bottle supplied systems
(12) Measurement and sampling systems
  (a) Open gauging systems
  (b) Closed gauging systems
  (c) Restricted gauging systems
  (d) Automatic gauging and high level alarm systems
  (e) Level indicating devices (slip tubes, sticks, etc.)
  (f) Closed sampling systems
(13) Fire-fighting and fire protection equipment (see NFPA 1405)

**A.15.2.2(2)** The stress and stability of a vessel may be affected by the following, which the responder should be aware of:

(1) Wind, waves, tides, and currents
(2) Movement of nearby vessels
(3) Shifting, adding, or removing weight
(4) Reduction of reserve buoyancy
(5) Free surface effects in ballast or cargo compartments
(6) Free communication effects in a flooded compartment
(7) Down flooding

**A.15.4.1(7)** See A.12.4.1(10).

Δ **A.16.2.1.3** According to NFPA 30, atmospheric tanks are defined as storage tanks operating at pressures from atmospheric through a gauge pressure of 6.9 kPa (1.0 psi). The floating roof on an open floating roof tank can be a pan roof or a pontoon floating roof, while the floating roof on a covered floating roof tank can be constructed of aluminum, steel, or fiberglass.

Δ **A.16.2.1.4** According to NFPA 30, low pressure tanks are defined as storage tanks operating at internal pressure above a gauge pressure of 1.0 psi (6.9 kPa) but not more than 15 psi or 1 bar gauge (103.4 kPa).

**A.16.2.2.3** Examples of fire and spill incidents include tank overfills, seal fires on floating roof tanks, floating roof with a sunken internal roof, tank or piping failures, and full-surface fire.

**A.16.2.2.4** For additional information, see NFPA 30 and API 2021, *Guide for Fighting Fires in and Around Flammable and Combustible Liquid Atmospheric Petroleum Storage Tanks.*

Δ **A.16.3.8** For additional information, see NFPA 11.

**A.16.3.9** See A.16.3.8.

**A.16.3.10** See A.16.3.8.

**A.16.3.11** See A.16.3.8.

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Δ **A.17.2.1.2** Additional information on the design and construction of high pressure bulk gas storage tanks can be referenced from NFPA 58 and API 2510-A, *Fire Protection Considerations for the Design and Operation of Liquefied Petroleum Gas (LPG) Storage Facilities.*

## Annex B Competencies for Operations Level Responders Assigned Biological Agent–Specific Tasks

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

### B.1 General.

#### B.1.1 Introduction.

**B.1.1.1** The operations level responder assigned biological agent–specific tasks by the AHJ at hazardous materials/WMD incidents is that person, competent at the operations level, who, at hazardous materials/WMD incidents involving biological materials, is assigned to support the hazardous materials technician and other personnel, provides strategic and tactical recommendations to the on-scene incident commander, serves as a technical advisor to provide technical oversight for operations, and acts as a liaison between the hazardous material technician, response personnel, and outside resources regarding biological issues.

Δ **B.1.1.2** The operations level responder assigned biological agent–specific tasks at hazardous materials/WMD incidents should be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, all mission-specific competencies for personal protective equipment *(see Section 6.2)*, and all competencies in this annex.

**B.1.1.3** The operations level responder assigned biological agent–specific tasks at hazardous materials/WMD incidents should operate under the guidance of a hazardous materials technician, an allied professional, or standard operating procedures.

**B.1.1.4** The operations level responder assigned biological agent–specific tasks at hazardous materials/WMD incidents should receive the additional training necessary to meet specific needs of the jurisdiction.

#### B.1.2 Goal.

**B.1.2.1** The goal of this section is to provide the operations level responder assigned biological agent–specific tasks at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in B.1.2.2 safely and effectively.

**B.1.2.2** When responding to hazardous materials/WMD incidents, the operations level responder assigned biological agent–specific tasks should be able to perform the following tasks:

(1) Analyze an incident involving biological agents threat to determine the credibility and magnitude of the problem by completing the following tasks:
  (a) Understand biological-threat agents, methods of production, and potential harm from biological-threat agents involved in an incident
  (b) Understand methods of threat agent dissemination, detection, laboratory testing, and surveillance systems

(2) Plan a response for an incident involving biological threat agents within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by completing the following tasks:
   (a) Determine the response options (offensive, defensive, and nonintervention) for an incident involving biological threat agents
   (b) Ensure that the options are within the capabilities and competencies of available personnel, personal protective equipment, and control equipment
(3) Implement the planned response to a hazardous materials incident involving biological threat agents

**B.1.3 Mandating of Competencies.** This standard does not mandate that response organizations perform biological agent–specific tasks.

**B.1.3.1** Operations level responders operating within the bounds of their operations level training should be able to respond to hazardous materials/WMD incidents involving biological agent–specific tasks.

**B.1.3.2** If a response organization decides to train some or all its operations level responders to perform biological agent–specific tasks at hazardous materials/WMD incidents, this annex sets out the minimum required competencies.

**B.2 Competencies — Analyzing the Incident.**

**B.2.1** The operations level responder assigned biological agent–specific tasks should understand biological threat agents, methods of dissemination, and potential harm from biological threat agents involved in an incident.

**B.2.1.1** Given examples of biological threat agents, the operations level responder assigned biological agent–specific tasks should be able to perform the following tasks:

(1) Define the type of biological threat agent
(2) Provide examples of each group
(3) Identify potential sources of biological threat agents in industry and business
(4) Describe potential methods of biological agent production

**B.2.1.2** The operations level responder assigned biological agent–specific tasks should be able to perform the following tasks:

(1) Define the following terms germane to biological agents and biological incidents:
   (a) Infectious
   (b) Contagious
   (c) Pathogen
   (d) Endemic
   (e) Zoonotic
   (f) Morbidity
   (g) Mortality
   (h) Particle size
   (i) Spore
   (j) Infectious dose
   (k) Pandemic
   (l) Incubation period
   (m) Antibiotic
   (n) Prophylaxis
   (o) Syndromic surveillance
   (p) Index case
(2) Given the following types of biological threat agents, define each category and provide examples for each group:
   (a) Bacteria
   (b) Viruses
   (c) Fungi
   (d) Toxins
(3) Identify potential sources of microorganisms in the following:
   (a) Business
   (b) Industry
   (c) Academia
   (d) Government
   (e) Criminal enterprises
   (f) Natural reservoirs
(4) Provide examples of components used in biological threat agent production and describe the item and its potential use in agent production
(5) Provide examples of items found in clandestine biological agent production laboratories that differ from items found in the production of illicit drugs and chemicals
(6) Given the following types of biological pathogens, identify the potential harm associated with each agent as it relates to potential criminal use:
   (a) Variola virus (smallpox)
   (b) *Botulinum* toxin
   (c) *E. coli*
   (d) Ricin toxin
   (e) *B. anthracis* (anthrax)
   (f) Venezuelan equine encephalitis virus
   (g) Rickettsia
   (h) Q fever
   (i) *Yersinia pestis* (plague)
   (j) *Franciscella tularensis* (tularemia, rabbit fever)
   (k) Viral hermoraic fever
   (l) Any other CDC Category A, B, or C organisms

**B.2.2 Identify Methods of Dissemination and Identification of Biological Threat Agents.**

**B.2.2.1** The operations level responder assigned biological agent–specific tasks should be able to predict likely methods of dissemination of biological threat agents and methods for identification.

**B.2.2.2** The operations level responder assigned biological agent–specific tasks should be able to perform the following tasks:

(1) Given examples of the four types of exposure, identify the following potential routes of infection by biological agents:
   (a) Inhalation
   (b) Absorption
   (c) Ingestion
   (d) Injection
(2) Given examples of fixed surveillance, detection, or collection systems, define the method of operation, potential location for use, and detection technology utilized in each of the following specific systems:
   (a) Particle size detector
   (b) Automated biological agent detection system
   (c) Dry filter units

(d) Liquid impinger
(e) Slit-to-agar air sampler

(3) Given examples of field detection systems, identify factors to be evaluated as part of the use of these systems, including system validation, capability, limitations, detection levels, operator training, interpretation of results, purity of sample, and destruction of evidence for confirmatory analysis for the following:
(a) Hand-held assays
(b) Fourier transform infrared spectroscopy
(c) Screening tests kits
(d) Protein assays
(e) Field microscopy

(4) Explain the United States Laboratory Response Network (LRN) system and describe each of the following components as it relates to the network (for operations level responders outside the United States, the applicable and equivalent laboratory network operating in their country is to be used wherever LRN references are made in this section):
(a) Access to introduce samples into the laboratories in the network
(b) Sampling procedures and required sampling equipment
(c) Procedures for field screening items to be sent to network laboratories
(d) Packaging requirements for items to be sent to network laboratories

(5) Given the following terms for analysis of biological threat agents, explain the methodology of agent identification:
(a) Polymerase chain reaction
(b) Culture tests
(c) Gram stain
(d) Morphology
(e) Motility
(f) Immunoassays (ELISA, Western blot, Southern blot, surface acoustic wave)
(g) Time-resolved fluorescence

**B.3 Competencies — Planning the Response.**

**B.3.1 Determining the Response Options.** Given an analysis of an incident involving biological threat agents, the operations level responder assigned biological agent–specific tasks should be able to determine the response options for the incident following standardized protocols such as ASTM E2770, *Standard Guide for Operational Guidelines for Initial Response to a Suspected Biothreat Agent*.

**B.3.2** The operations level responder assigned biological agent–specific tasks should be able to perform the following tasks:

(1) Given a release of biological agents, describe the considerations for establishing a hot zone for the following scenarios:
(a) Biological agent release from a dissemination device or air-handling system
(b) Biological agent release from an envelope or package
(c) Biological agent spill or container breach of a liquid agent

(2) Describe the factors to be evaluated in selecting personal protective equipment for use at an incident involving biological threat agents

(3) Given the following scenarios, describe the considerations for selecting personal protective clothing:
(a) Biological agent release from a dissemination device or air-handling system
(b) Biological agent release from an envelope or a package
(c) Biological agent spill or container breach of a liquid agent

(4) Describe the factors to be considered in selecting decontamination procedures for use at an incident involving biological threat agents

(5) Given the following scenarios, describe the considerations for selecting decontamination procedures:
(a) Equipment exposed to the release of a dry or liquid biological agent
(b) Hard surfaces exposed to the release of a dry or liquid biological agent following a standardized protocol, such as ASTM E2458, *Standard Practices for Bulk Sample Collection and Swab Sample Collection of Visible Powders Suspected of Being Biothreat Agents from Nonporous Surfaces*
(c) Victim exposed to a localized release (e.g., hands or arms) of a dry or liquid biological agent
(d) Victim exposed to a significant release of a dry or liquid biological agent

(6) Describe the factors to be considered in identification of biological threat agents, including the following:
(a) Field screening and packaging consistent with LRN protocols
(b) Field test limitations, accuracy, and interpretation
(c) Preservation of forensic evidence
(d) Preservation of material for LRN testing
(e) Role of law enforcement agencies
(f) Role of the LRN
(g) Role of public health agencies
(h) Sampling of biological agents

**B.4 Competencies — Implementing the Planned Response.**

**B.4.1** Given an analysis involving the release or potential release of a WMD, the operations level responder assigned biological agent–specific tasks should be able to determine the safety and effective response options.

**B.4.2** The operations level responder assigned biological agent–specific tasks should be able to perform the following tasks:

(1) Given a simulated incident involving a biological release from a dissemination device or air-handling system, describe the procedures for the following:
(a) Identification of hot zone
(b) Managing exposed victims
(c) Selection of protective clothing
(d) Decontamination
(e) Sampling, field screening, and packaging
(f) Laboratory analysis

(2) Given a simulated incident involving a biological release from an envelope or a package, describe the procedures for the following:
(a) Identification of hot zone
(b) Managing exposed victims
(c) Selection of protective clothing

(d) Decontamination
(e) Sampling, field screening, and packaging
(f) Laboratory analysis

(3) Given a simulated incident involving a biological agent spill or container breach of a liquid agent, describe the procedures for the following:

(a) Identification of hot zone
(b) Managing exposed victims
(c) Selection of protective clothing
(d) Decontamination
(e) Sampling, field screening, and packaging
(f) Laboratory analysis

**B.5 Competencies — Evaluating Progress. (Reserved)**

**B.6 Competencies — Terminating the Incident. (Reserved)**

## Annex C Competencies for Operations Level Responders Assigned Chemical Agent–Specific Tasks

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

**C.1 General.**

**C.1.1 Introduction.**

**C.1.1.1** The operations level responder assigned chemical agent–specific tasks by the AHJ at hazardous materials/WMD incidents is that person, competent at the operations level, who, at hazardous materials/WMD incidents involving chemical materials, is assigned to support the hazardous materials technician and other personnel, provides strategic and tactical recommendations to the on-scene incident commander, serves as a technical advisor to provide technical oversight for operations, and acts as a liaison between the hazardous material technician, response personnel, and outside resources regarding chemical issues.

Δ **C.1.1.2** The operations level responder assigned chemical agent–specific tasks at hazardous materials/WMD incidents should be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, all mission-specific competencies for personal protective equipment *(see Section 6.2)*, and all competencies in this annex.

**C.1.1.3** The operations level responders assigned chemical agent–specific tasks at hazardous materials/WMD incidents should operate under the guidance of a hazardous materials technician, an allied professional, or standard operating procedures.

**C.1.1.4** The operations level responder assigned chemical agent–specific tasks at hazardous materials/WMD incidents should receive the additional training necessary to meet specific needs of the jurisdiction.

**C.1.2 Goal.**

**C.1.2.1** The goal of the competencies in this annex is to provide the operations level responder assigned chemical agent–specific tasks at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in C.1.2.2 safely and effectively.

**C.1.2.2** When responding to hazardous materials/WMD incidents, the operations level responder assigned chemical agent–specific tasks should be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving potential release of hazardous materials/WMD agents and determine the complexity of the problem and potential outcomes by completing the following tasks:

(a) Determine if the incident is a potential dispersal of a hazardous materials/WMD agent and identify the agent within the capabilities of the detection equipment available
(b) Identify unique aspects of a potential dispersal of a hazardous materials/WMD agent incident

(2) Within the capabilities and competencies of available personnel, personal protective equipment, and detection and monitoring equipment, plan a response for an incident where there is potential release of hazardous materials/WMD agents by completing the following tasks:

(a) Determine the response options necesssary to conduct detection and monitoring operations
(b) Ensure that the options are within the legal authorities, capabilities, and competencies of available personnel, personal protective equipment, and detection equipment

(3) Implement the planned response to a hazardous materials/WMD incident involving potential criminal intent

**C.1.3 Mandating of Competencies.** This standard does not mandate that response organizations perform chemical agent–specific tasks.

**C.1.3.1** Operations level responders operating within the bounds of their operations level training should be able to respond to hazardous materials/WMD incidents involving chemical agent–specific tasks.

**C.1.3.2** If a response organization decides to train some or all its operations level responders to perform chemical agent–specific tasks at hazardous materials/WMD incidents, this annex sets out the minimum required competencies.

**C.2 Competencies — Analyzing the Incident.**

**C.2.1** The operations level responder assigned chemical agent–specific tasks should be able to determine if the incident has the potential for the release of hazardous materials/WMD and the type of detection devices to use based on the signs and symptoms of victims.

**C.2.2** Given examples of hazardous materials/WMD incidents involving potential release, the operations level responder assigned chemical agent–specific tasks should be able to describe the type of detection devices to use based on the signs and symptoms of victims and chemical and physical properties observed.

**C.2.3** The operations level responder assigned chemical agent-specific tasks should be able to perform the following tasks:

(1) Given examples of various types of hazardous materials/WMD chemicals, describe the products that might be encountered, chemical and physical properties of those chemicals, and the incident response considerations associated with each

(2) Given examples of the following potential releases at hazardous materials/WMD incidents, describe products potentially encountered and the incident response considerations associated with each situation:
   (a) Hazardous materials/WMD with no release but product present in container
   (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 (patients)
   (d) Hazardous materials/WMD with suspected victims (patients) but no apparent chemical release

**C.2.4** The operations level responder assigned chemical agent–specific tasks should be capable of identifying the unique aspects associated with hazardous materials/WMD releases.

**C.2.5** Given an incident involving the release or potential release of hazardous materials/WMD, the operations level responder assigned chemical agent–specific tasks should be able to identify and implement the following tasks:

(1) Secure and isolate the scene
(2) Identify the correct detection device(s)
(3) Deploy the applicable detection device and interpret readings
(4) Notify appropriate explosive ordnance disposal (EOD) personnel if an explosive device has been used to disseminate product

**C.3 Competencies — Planning Response.**

**C.3.1** Given an analysis of an incident involving release or potential release of hazardous materials/WMD, the operations level responder assigned chemical agent–specific tasks should be able to determine possible response options.

Δ **C.3.2** The operations level responder assigned chemical agent–specific tasks should be able to perform the following tasks:

(1) Describe the hazards, safety procedures, and tactical guidelines for responding to the following:
   (a) Environmental crime involving a hazardous materials/WMD incident
   (b) Illicit drug manufacturing
   (c) Release of or attack with a hazardous materials/WMD agent
   (d) Hazardous materials/WMD clandestine laboratory
   (e) Hazardous materials/WMD suspicious package
   (f) Hazardous materials/WMD threatening communication
(2) Describe the factors to be evaluated in selecting the correct personal protective equipment, detection devices, and decontamination for the following types of incidents:
   (a) Environmental crime involving a hazardous materials/WMD incident
   (b) Illicit drug manufacturing
   (c) Release of or attack with a hazardous materials/WMD agent
   (d) Hazardous materials/WMD clandestine laboratory
   (e) Hazardous materials/WMD suspicious package
(3) Describe the detection options for gases, liquids, and solids found at the following types of incidents:
   (a) Environmental crime involving a hazardous materials/WMD incident
   (b) Illicit drug manufacturing
   (c) Release of or attack with a hazardous materials/WMD agent
   (d) Hazardous materials/WMD clandestine laboratory
   (e) Hazardous materials/WMD suspicious package
(4) Given examples of releases or potential releases involving a hazardous material(s)/WMD, identify and describe the application and use of the types of detection devices that can be utilized, including the following:
   (a) Combustible gas indicators
   (b) Electrochemical cells
   (c) Photoionization detector
   (d) Flame ionization detector
   (e) FT infrared spectrometer
   (f) Alpha, beta, and gamma radiation detector
   (g) Colorimetric detection devices
   (h) Mass spectrometer and gas chromatograph
   (i) Raman spectrometer
   (j) Any new technology or instrumentation utilized by the AHJ
(5) Describe the potential negative impact associated with detection devices that use destructive technologies. For each detection device listed in C.3.2(4), describe the limitations of the technology
(6) For each detection device listed in C.3.2(4), describe if the detector technology is destructive to the material being detected, and the significance that destruction has for potential evidence

**C.4 Competencies — Implementing Planned Response.**

**C.4.1** Given an analysis involving the release or potential release of hazardous materials/WMD, the operations level responder assigned chemical agent–specific tasks should determine the safety and effective response options.

**C.4.2** The operations level responder assigned chemical agent–specific tasks should be able to perform the following tasks:

(1) Given a simulated hazardous materials/WMD incident involving a release or potential release, demonstrate the safe and effective methods for identifying the following:
   (a) Illicit drug manufacturing laboratory
   (b) Hazardous materials/WMD threatening communication
   (c) Hazardous materials/WMD suspicious package
   (d) Hazardous materials/WMD clandestine laboratory
   (e) Release of or attack with a hazardous materials/WMD agent
   (f) Environmental crime involving a hazardous materials/WMD incident
(2) Given a simulated hazardous materials/WMD incident involving release or potential release, demonstrate the methods for selecting the correct personal protective equipment, sampling equipment, detection devices, and decontamination for the following:
   (a) Illicit drug manufacturing laboratory
   (b) Hazardous materials/WMD threatening communication
   (c) Hazardous materials/WMD suspicious package

(d) Hazardous materials/WMD clandestine laboratory
(e) Release of or attack with a hazardous materials/WMD agent
(f) Environmental crime involving a hazardous materials/WMD incident

(3) Given a simulated hazardous materials/WMD incident involving a release or potential release, demonstrate the safe and effective methods for nondestructive detection of hazardous materials/WMD products
(4) Given a simulated hazardous materials/WMD incident involving a release or potential release, demonstrate the safe and effective methods for detection of gas, liquid, and solid samples
(5) Given an example of a hazardous materials/WMD incident involving a release or potential release, demonstrate the different detection technologies that can be used with the following:

(a) Illicit drug manufacturing laboratory
(b) Hazardous materials/WMD suspicious package
(c) Hazardous materials/WMD clandestine laboratory
(d) Release of or attack with a hazardous materials/WMD agent
(e) Environmental crime involving a hazardous materials/WMD incident

(6) Given an example of a potential hazardous materials/WMD incident, demonstrate the safe and effective methods for decontaminating detection instrumentation

**C.5 Competencies — Evaluating Progress. (Reserved)**

**C.6 Competencies — Terminating the Incident. (Reserved)**

## Annex D Competencies for Operations Level Responders Assigned Radiological Agent–Specific Tasks

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

**D.1 General.**

**D.1.1 Introduction.**

**D.1.1.1** The operations level responder assigned radiological agent–specific tasks by the AHJ at hazardous materials/WMD incidents is that person, competent at the operations level, who, at hazardous materials/WMD incidents involving radiological materials, is assigned to support the hazardous materials technician and other personnel, provides strategic and tactical recommendations to the on-scene incident commander, serves as a technical advisor to provide technical oversight for operations, and acts as a liaison between the hazardous material technician, response personnel, and outside resources regarding radiological issues.

Δ **D.1.1.2** The operations level responder assigned radiological agent–specific tasks at hazardous materials/WMD incidents should be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, all mission-specific competencies for personal protective equipment *(see Section 6.2)*, and all competencies in this annex.

**D.1.1.3** The operations level responder assigned radiological agent–specific tasks at hazardous materials/WMD incidents should operate under the guidance of a hazardous materials technician, an allied professional, or standard operating procedures.

**D.1.1.4** The operations level responder assigned radiological agent–specific tasks at hazardous materials/WMD incidents should receive additional training necessary to meet specific needs of the jurisdiction.

**D.1.2 Goal.**

**D.1.2.1** The goal of the competencies in this annex is to provide the operations level responder assigned radiological agent–specific tasks at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in D.1.2.2 safely and effectively.

**D.1.2.2** When responding to hazardous materials/WMD incidents, the operations level responder assigned radiological agent–specific tasks should be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving radioactive material 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 an emergency involving radioactive material within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by determining the response options for a hazardous materials/WMD emergency involving radioactive material
(3) Implement or oversee the implementation of the planned response to a hazardous materials/WMD incident involving radioactive material

**D.1.3 Mandating of Competencies.** This standard does not mandate that response organizations perform radiological agent–specific responsibilities.

**D.1.3.1** Operations level responders operating within the bounds of their operations level training should be able to respond to hazardous materials/WMD incidents involving radioactive material agent–specific tasks.

**D.1.3.2** If a response organization decides to train some or all its operations level responders to perform radiological agent–specific tasks at hazardous materials/WMD incidents, this annex sets out the minimum required competencies.

**D.2 Competencies — Analyzing the Incident.**

**D.2.1** Given examples of radiation, the operations level responder assigned radiological agent–specific tasks should be able to define the types of radiation and provide examples of radiation sources, natural, manmade, and other potential sources.

Δ **D.2.2** The operations level responder assigned radiological agent–specific tasks should be able to perform the following tasks:

(1) Define the following terms associated with radiological material:

(a) Ionizing radiation
(b) Nonionizing radiation
(c) Radioactivity
(d) Half-life
(e) Dose, dose rate

(f) Units of measure for radiation and radioactivity
(g) Special nuclear material
(h) Electromagnetic radiation, pulse
(i) Radiological dispersion device (RDD)
(j) Improvised nuclear device (IND)
(k) Radiation exposure device (RED)

(2) Identify the following types of radiation:
(a) Alpha radiation
(b) Beta radiation
(c) Gamma radiation, X-ray
(d) Neutron radiation

(3) Identify the following potential sources of radiation:
(a) Naturally occurring
(b) Manmade
(c) Medical facilities
(d) Research laboratories
(e) Nuclear power plants
(f) Industrial/commercial facilities
(g) Government facilities
(h) Radioactive material/waste shipments
(i) Industrial applications

(4) Given the following types of radiation, identify the potential harm associated with each of the following:
(a) Alpha radiation
(b) Beta radiation
(c) Gamma radiation, X-ray
(d) Neutron radiation

(5) Identify the following terms related to a nuclear detonation from an IND:
(a) Blast and thermal effects
(b) Prompt radiation effects
(c) Fallout and ground shine

**D.2.3** The operations level responder assigned radiological agent–specific tasks should be able to identify the potential misuses of radioactive material, including radiological dispersal device, concealed source, improvised nuclear device, and nuclear bomb, and should be able to do the following:

(1) Given examples of the four exposure pathways for radioactive material, identify potential routes of exposure from the following:
(a) Inhalation
(b) Absorption
(c) Ingestion
(d) Injection

(2) Given examples of the classes of radiation detection systems, identify factors to be evaluated as part of the use of these systems, including system validation, capability, limitations, detection levels, operator training, and interpretation of results, for the following:
(a) Personal radiation detectors (PRDs)
(b) Radiation exposure rate survey meters
(c) Contamination survey meters
(d) Radioisotope identification detectors (RIIDs)
(e) Portal monitor systems
(f) Dosimetry devices

**D.3 Competencies — Planning the Response.**

**D.3.1** Given an analysis of an incident involving radiological material, the operations level responder assigned radiological agent–specific tasks should be able to determine response options for the incident.

**D.3.2** The operations level responder assigned radiological agent–specific tasks should be able to perform the following tasks:

(1) Given the concealment of a radioactive material source in a public area, describe the considerations for the following:
(a) Identification of the source
(b) Determination of exposure rate and isolation distance
(c) Estimation of personnel exposure from the source

(2) Given a release of a radiological material, 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 dispersion/dispersal device (RDD), dirty bomb
(e) Improvised nuclear device (IND)

(3) Describe the factors to be evaluated in selecting personal protective equipment for use at an incident involving radioactive material

(4) Given the following scenarios, describe the considerations for selecting personal protective clothing:
(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 dispersion/dispersal device (RDD), dirty bomb
(e) Radiation exposure device (RED)
(f) 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 radioactive material and manage the incident

**D.4 Competencies — Implementing the Planned Response.**

**D.4.1** Given an analysis of an incident involving radioactive material, the operations level responder assigned radiological agent–specific tasks should implement or oversee the implementation of the selected response options safely and effectively.

**D.4.2** The operations level responder assigned radiological agent–specific tasks should 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 personnel

(2) Given a simulated incident involving a release of radioactive material from a dissemination or dispersion device, 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 a simulated incident involving a release of radioactive material from a package, 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 a simulated incident involving a release of radioactive material from a spill, 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 a simulated incident involving a release of radioactive material from the detonation of an 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

**D.5 Competencies — Evaluating Progress. (Reserved)**

**D.6 Competencies — Terminating the Incident. (Reserved)**

## Annex E Overview of Responder Levels and Tasks at Hazardous Materials/WMD Incidents

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

**E.1 Responder Levels.**

**E.1.1 Awareness Level.** Awareness level personnel are those persons who, in the course of their normal duties, can be the first on the scene of an emergency involving hazardous materials. Awareness level personnel are expected to recognize the presence of hazardous materials/WMD, protect themselves, call for trained personnel, and secure the area.

**E.1.2 Operations Level.** Operations level responders are those persons who respond to hazardous materials/WMD incidents for the purpose of protecting nearby persons, the environment, or property from the effects of the release. They should be trained to respond in a defensive fashion to control the release from a safe distance and keep it from spreading.

Operations level responders can have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ.

**E.1.3 Technician Level.** Hazardous materials technicians are those persons who respond to releases or potential releases of hazardous materials for the purpose of controlling the release. Hazardous materials technicians are expected to use specialized chemical protective clothing and specialized control equipment.

Hazardous materials technicians respond to hazardous materials/WMD incidents using a risk-based response process *(see 7.1.2.2)* with the ability to analyze a problem involving hazardous materials/WMD, select appropriate decontamination procedures, and control a release using specialized protective clothing and control equipment. Hazardous materials technicians can have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ.

**E.1.4 Command Level.** The incident commander is that person who is responsible for all decisions relating to the management of the incident. The incident commander is in charge of the incident site.

**E.2 Responder Tasks.**

**E.2.1 Analysis Tasks.** The list of analysis tasks by responder level is as follows:

(1) *Awareness Level.* Awareness level personnel analyze an incident to determine both the hazardous materials/WMD present and the basic hazard and response information for each hazardous materials/WMD by completing the following tasks:
   (a) Detect the presence of hazardous materials/WMD
   (b) Survey a hazardous materials/WMD incident from a safe location to identify the name, UN/NA identification number, or type placard applied for any hazardous materials/WMD involved

(c) Collect hazard and response information from the current edition of the DOT *Emergency Response Guidebook*

(2) *Operations Level.* Operations level responders must be competent at the awareness level and be able to analyze a hazardous materials/WMD incident to determine the scope of the problem and potential outcomes by completing the following tasks:

(a) Survey the hazardous materials/WMD incident to identify the containers and materials involved, determine whether hazardous materials/WMD have been released, and evaluate the surrounding conditions
(b) Collect hazard and response information from material safety data sheets (MSDS), CHEMTREC/ CANUTEC/ SETIQ, and shipper and manufacturer contacts
(c) Predict the likely behavior of a hazardous materials/WMD agent as well as its container
(d) Estimate the potential harm at a hazardous materials/WMD incident

(3) *Technician Level.* Hazardous materials technicians must be competent at the awareness and operations levels and be able to 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 identify special containers involved, identify or classify unknown materials, and verify the presence and concentrations of hazardous materials/WMD through the use of monitoring equipment
(b) Collect and interpret hazard and response information from printed and technical resources, computer databases, and monitoring equipment
(c) Determine the type and extent of damage to containers
(d) Where multiple materials are involved, predict the likely behavior of released materials and their containers
(e) Estimate the size of an endangered area using computer modeling, monitoring equipment, or specialists in this field

(4) *Command Level.* The incident commander analyzes 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, computer databases, and monitoring equipment
(b) Estimate the potential outcomes within the endangered area at a hazardous materials/WMD incident

**E.2.2 Planning Tasks.** The list of planning tasks by responder level is as follows:

(1) *Awareness Level.* No requirements.

(2) *Operations Level.* The operations level responder must be competent at the first responder awareness level and be able to plan an initial response within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by completing the following tasks:

(a) Describe the response objectives for hazardous materials/WMD incidents
(b) Describe the defensive options available by response objective
(c) Determine whether the personal protective equipment provided is appropriate for implementing each action option
(d) Identify the emergency decontamination process

(3) *Technician Level.* The hazardous materials technician must be competent at both the first responder awareness and operations levels and be able to plan a response within the capabilities of available personnel, personal protective equipment, and control equipment by completing the following tasks:

(a) Identify the response objectives for hazardous materials/WMD incidents
(b) Identify the potential response options available by response objective
(c) Select the personal protective equipment required for a given action option
(d) Select the applicable technical decontamination process
(e) Develop an incident action plan, including site safety and control plan, consistent with the emergency response plan and/or standard operating procedures and within the capability of the available personnel, personal protective equipment, and control equipment

(4) *Command Level.* The incident commander plans response operations within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by completing the following tasks:

(a) Identify the response objectives for hazardous materials/WMD incidents
(b) Identify the potential response options (defensive, offensive, and nonintervention) available by response objective
(c) Approve the level of personal protective equipment required for a given action option
(d) Develop an incident action plan, including site safety and control plan, consistent with the emergency response plan and/or standard operating procedures and within the capability of available personnel, personal protective equipment, and control equipment

**E.2.3 Implementation Tasks.** The list of implementation tasks by responder level is as follows:

(1) *Awareness Level.* The awareness level personnel must be able to implement actions consistent with the emergency response plan, standard operating procedures, and the current edition of the DOT *Emergency Response Guidebook* by completing the following tasks:

(a) Initiate protective actions
(b) Initiate the notification process

(2) *Operations Level.* The operations level responder must be competent at the awareness level and be able to implement the planned response to favorably change the outcomes consistent with the emergency response plan and/or standard operating procedures by completing the following tasks:

(a) Establish and enforce scene control procedures, including control zones, decontamination, and communications

(b) Establish a means of evidence preservation where criminal or terrorist acts are suspected
(c) Initiate an incident management system (IMS)
(d) Don, work in, and doff personal protective equipment provided by the authority having jurisdiction
(e) Perform the defensive control actions identified in the incident action plan
(f) Perform mass decontamination as required

(3) *Technician Level.* The hazardous materials technician must be competent at both the first responder awareness and operations levels and be able to implement the planned response to favorably change the outcomes consistent with the standard operating procedures or site safety and control plan by completing the following tasks:

(a) Perform the duties of an assigned position within the local IMS
(b) Don, work in, and doff appropriate personal protective clothing, including, but not limited to, liquid splash– and vapor-protective clothing with approved respiratory protection
(c) Perform the control functions identified in the incident action plan

(4) *Command Level.* The incident commander must be competent at the operations level and be able to 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 IMS including the specified procedures for notification and utilization of nonlocal resources (including private, state, and federal government personnel)
(b) Direct resources (private, governmental, and others) with expected task assignments and on-scene activities and provide management overview, technical review, and logistical support to private and governmental sector personnel
(c) Provide a focal point for information transfer to media and local elected officials through the IMS structures

**E.2.4 Evaluation Tasks.** The list of evaluation tasks by responder level is as follows:

(1) *Awareness Level.* No requirements.
(2) *Operations Level.* The operations level responder must be competent at the awareness level and be able to evaluate the progress of the actions taken to ensure that the response objectives are being met safely, effectively, and efficiently by completing the following tasks:

(a) Evaluate the status of the defensive actions taken in accomplishing the response objectives
(b) Communicate the status of the planned response

(3) *Technician Level.* The hazardous materials technician must be competent in evaluating the progress of the planned response by completing the following tasks:

(a) Evaluate the effectiveness of the control functions
(b) Evaluate the effectiveness of the decontamination process

(4) *Command Level.* The incident commander must be competent at the operations level and be able to evaluate the progress of the planned response to ensure the response objectives are being met safely, effectively, and efficiently and adjust the incident action plan accordingly by evaluating the effectiveness of the control functions

**E.2.5 Termination Tasks.** The list of termination tasks by responder level is as follows:

(1) *Awareness Level.* No requirements.
(2) *Operations Level.* No requirements.
(3) *Technician Level.* The hazardous materials technician must be competent to terminate an 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

(4) *Command Level.* The incident commander must be competent to terminate an incident by completing the following tasks:

(a) Transfer command (control) when appropriate
(b) Conduct an incident debriefing
(c) Conduct a multi-agency critique
(d) Report and document the hazardous materials/WMD incident and submit the reports to the proper entity

## Annex F Definitions of Hazardous Materials

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

**F.1 General.** Many definitions and descriptive names are used for the term *hazardous material*, each of which depends on the nature of the problem being addressed. Unfortunately, no one list or definition covers everything. U.S. government agencies, as well as state and local governments, have different purposes for regulating hazardous materials that, under certain circumstances, pose a risk to the public or the environment.

**F.2 Hazardous Materials Terms.** The following hazardous materials terms, as used by the indicated government agencies, show the variety of definitions that can be applied.

**F.2.1 Hazardous Materials.** The U.S. Department of Transportation (DOT) uses the term *hazardous materials* to cover 11 hazard classes, some of which have subcategories called divisions. DOT includes in its regulations hazardous substances and hazardous wastes as Class 9 (Miscellaneous Hazardous Materials), both of which are regulated by the U.S. Environmental Protection Agency (EPA), if their inherent properties would not otherwise be covered.

**F.2.2 Hazardous Substances.** EPA uses the term *hazardous substances* for chemicals that if released into the environment above a certain amount must be reported, and, depending on the threat to the environment, federal involvement in handling the incident can be authorized. A list of the hazardous substances is published in Table 302.4 of 40 CFR 302. The U.S. Occupational Safety and Health Administration (OSHA) uses the term *hazardous substances* in 29 CFR 1910.120, which resulted from Title I of the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355) and covers emergency response. Unlike EPA, OSHA uses the term *hazardous substances* to cover every chemical regulated by both DOT and EPA.

**F.2.3 Extremely Hazardous Substances.** EPA uses the term *extremely hazardous substances* for chemicals that must be reported to the appropriate authorities if released above the threshold reporting quantity. Each substance has a threshold reporting quantity. The list of extremely hazardous substances is identified in Title III of SARA (40 CFR 355).

**F.2.4 Toxic Chemicals.** EPA uses the term *toxic chemicals* for chemicals whose total emissions or releases must be reported annually by owners and operators of certain facilities that manufacture, process, or otherwise use a listed toxic chemical. The toxic chemicals are listed in Title III of SARA (40 CFR 355).

**F.2.5 Hazardous Wastes.** EPA uses the term *hazardous wastes* for chemicals that are regulated under the Resource, Conservation, and Recovery Act (40 CFR 261.33). Hazardous wastes in transportation are regulated by DOT (49 CFR 170–180).

**F.2.6 Hazardous Chemicals.** OSHA uses the term *hazardous chemicals* for any chemical that would be a risk to employees if they were exposed in the workplace. The term *hazardous chemicals* covers a broader group of chemicals than the other chemical terms.

**F.2.7 Dangerous Goods.** In United Nations model codes and regulations, hazardous materials are called *dangerous goods.*

**F.2.8 Highly Hazardous Chemicals.** OSHA uses the term *highly hazardous chemicals* for those chemicals that fall under the requirements of 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals." Highly hazardous chemicals are those chemicals that possess toxic, reactive, flammable, or explosive properties. A list of covered substances is published in Annex A of 29 CFR 1910.119.

## Annex G UN/DOT Hazard Classes and Divisions

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

**G.1 General.** The definitions of UN/DOT hazard classes and divisions (49 CFR 170–180) are as follows.

**G.2 Class 1 — Explosives.** An explosive is any substance or article, including a device, that is designed to function by explosion (i.e., an extremely rapid release of gas and heat) or that, by chemical reaction within itself, is able to function in a similar manner even if not designed to function by explosion. Explosives in Class 1 are divided into six divisions. Each division has a letter designation.

**G.2.1 Division 1.1.** Division 1.1 consists of explosives that have a mass explosion hazard. A mass explosion is one that affects almost the entire load instantaneously. Examples of Division 1.1 explosives include black powder trinitrotoluene, dynamite, and trinitrotoluene (TNT).

**G.2.2 Division 1.2.** Division 1.2 consists of explosives that have a projection hazard but not a mass explosion hazard. Examples of Division 1.2 explosives include aerial flares, detonating cord, and power device cartridges.

**G.2.3 Division 1.3.** Division 1.3 consists of explosives that have a fire hazard and a minor blast hazard, a minor projection hazard, or both, but not a mass explosion hazard. Examples of Division 1.3 explosives include liquid-fueled rocket motors and propellant explosives.

**G.2.4 Division 1.4.** Division 1.4 consists of explosive devices that present a minor explosion hazard. No device in the division can contain more than 0.9 oz (25 g) of a detonating material. The explosive effects are largely confined to the package, and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. Examples of Division 1.4 explosives include line-throwing rockets, practice ammunition, and signal cartridges.

**G.2.5 Division 1.5.** Division 1.5 consists of very insensitive explosives. This division comprises substances that have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport. Examples of Division 1.5 explosives include pilled ammonium nitrate fertilizer–fuel oil mixtures (blasting agents).

**G.2.6 Division 1.6.** Division 1.6 consists of extremely insensitive articles that do not have a mass explosive hazard. This division comprises articles that contain only extremely insensitive detonating substances and that demonstrate a negligible probability of accidental initiation or propagation.

**G.3 Class 2 — Gases.**

**G.3.1 Division 2.1.** Division 2.1 (flammable gas) consists of materials that are a gas at 68°F (20°C) or less and 14.7 psi (101.3 kPa) of pressure, have a boiling point of 68°F (20°C) or less at 14.7 psi (101.3 kPa), and have the following properties:

(1) Are ignitable at 14.7 psi (101.3 kPa) when in a mixture of 13 percent or less by volume with air
(2) Have a flammable range at 14.7 psi (101.3 kPa) with air of at least 12 percent regardless of the lower limit

Examples of Division 2.1 gases include inhibited butadienes, methyl chloride, and propane.

**G.3.2 Division 2.2.** Division 2.2 (nonflammable, nonpoisonous compressed gas, including compressed gas, liquefied gas, pressurized cryogenic gas, and compressed gas in solution, asphyxiant gas, and oxidizing gas) consists of materials (or mixtures) that exert in the packaging an absolute pressure of 41 psi (280 kPa) at 68°F (20°C). A cryogenic liquid is a refrigerated liquefied gas having a boiling point colder than –130°F (–90°C) at 14.7 psi (101.3 kPa).

Examples of Division 2.2 gases include anhydrous ammonia, cryogenic argon, carbon dioxide, and compressed nitrogen.

**G.3.3 Division 2.3.** Division 2.3 (gas poisonous by inhalation) consists of materials that are a gas at 68°F (20°C) or less and a pressure of 14.7 psi, or 1 atm (101.3 kPa), have a boiling point of 68°F (20°C) or less at 14.7 psi (101.3 kPa), and have the following properties:

(1) Are known to be so toxic to humans as to pose a hazard to health during transportation.
(2) In the absence of adequate data on human toxicity, are presumed to be toxic to humans because, when tested on laboratory animals, they have an $LC_{50}$ value of not more than 5000 ppm. Examples of Division 2.3 gases include anhydrous hydrogen fluoride, arsine, chlorine, and methyl bromide.

Hazard zones associated with Division 2.3 materials are the following:

(1) Hazard zone A — $LC_{50}$ less than or equal to 200 ppm
(2) Hazard zone B — $LC_{50}$ greater than 200 ppm and less than or equal to 1000 ppm
(3) Hazard zone C — $LC_{50}$ greater than 1000 ppm and less than or equal to 3000 ppm
(4) Hazard zone D — $LC_{50}$ greater than 3000 ppm and less than or equal to 5000 ppm

**G.4 Class 3 — Flammable Liquids.** Flammable liquids are liquids having a flash point of not more than 140°F (60°C) or materials in a liquid phase with a flash point at or above 100°F (37.8°C) that are intentionally heated and offered for transportation or transported at or above their flash point in a bulk packaging.

Examples of Class 3 liquids include acetone, amyl acetate, gasoline, methyl alcohol, and toluene.

**G.4.1 Combustible Liquids.** Combustible liquids are liquids that do not meet the definition of any other hazard class and that have a flash point above 140°F (60°C) and below 200°F (93°C). Flammable liquids with a flash point above 100°F (38°C) can be reclassified as combustible liquids.

Examples of combustible liquids include mineral oil, peanut oil, and No. 6 fuel oil.

**G.5 Class 4 — Flammable Solids.**

**G.5.1 Division 4.1.** Division 4.1 (flammable solids) is comprised of the following three types of materials:

(1) Desensitized explosives — explosives wetted with sufficient water, alcohol, or plasticizers to suppress explosive properties
(2) Self-reactive materials — materials that are thermally unstable and that can undergo a strongly exothermic decomposition even with participation of oxygen (air)
(3) Readily combustible solids — solids that can cause a fire through friction and any metal powders that can be ignited

Examples of Division 4.1 materials include magnesium (pellets, turnings, or ribbons) and nitrocellulose.

**G.5.2 Division 4.2.** Division 4.2 (spontaneously combustible material) is comprised of the following materials:

(1) Pyrophoric materials — liquids or solids that, even in small quantities and without an external ignition source, can ignite within 5 minutes after coming in contact with air
(2) Self-heating materials — materials that, when in contact with air and without an energy supply, are liable to self-heat

Examples of Division 4.2 materials include aluminum alkyls, charcoal briquettes, magnesium alkyls, and phosphorus.

**G.5.3 Division 4.3.** Division 4.3 (dangerous-when-wet materials) is comprised of materials that, by contact with water, are liable to become spontaneously flammable or to give off flammable or toxic gas at a rate greater than 1 L/kg of the material per hour. Examples of Division 4.3 materials include calcium carbide, magnesium powder, potassium metal alloys, and sodium hydride.

**G.6 Class 5 — Oxidizers and Organic Peroxides.**

**G.6.1 Division 5.1.** Division 5.1 (oxidizers) is comprised of materials that can, generally by yielding oxygen, cause or enhance the combustion of other materials. Examples of Division 5.1 materials include ammonium nitrate, bromine trifluoride, and calcium hypochlorite.

**G.6.2 Division 5.2.** Division 5.2 (organic peroxides) is comprised of organic compounds that contain oxygen (O) in the bivalent -O-O- structure that can be considered a derivative of hydrogen peroxide, where one or more of the hydrogen atoms have been replaced by organic radicals. Examples of Division 5.2 materials include dibenzoyl peroxide, methyl ethyl ketone peroxide, and peroxyacetic acid. Division 5.2 (organic peroxide) materials are assigned to one of the following seven types:

(1) Type A — organic peroxides that can detonate or deflagrate rapidly as packaged for transport. Transportation of Type A organic peroxides is forbidden.
(2) Type B — organic peroxides that neither detonate nor deflagrate rapidly but that can undergo a thermal explosion.
(3) Type C — organic peroxides that neither detonate nor deflagrate rapidly and that cannot undergo a thermal explosion.
(4) Type D — organic peroxides that detonate only partially or deflagrate slowly, with medium to no effect when heated under confinement.
(5) Type E — organic peroxides that neither detonate nor deflagrate and that show low or no effect when heated under confinement.
(6) Type F — organic peroxides that will not detonate, do not deflagrate, show only a low or no effect if heated when confined, and have low or no explosive power.
(7) Type G — organic peroxides that will not detonate, do not deflagrate, show no effect if heated when confined, have no explosive power, are thermally stable, and are desensitized.

**G.7 Class 6 — Poisonous Materials.**

**G.7.1 Division 6.1.** Division 6.1 (poisonous materials) is comprised of materials other than gases that either are known to be so toxic to humans as to afford a hazard to health during transportation or in the absence of adequate data on human toxicity are presumed to be toxic to humans, including materials that cause irritation. Examples of Division 6.1 materials include aniline, arsenic compounds, carbon tetrachloride, hydrocyanic acid, and tear gas.

**G.7.2 Division 6.2.** Division 6.2 (infectious substances) is comprised of materials known to contain or suspected of containing a pathogen. A pathogen is a micro-organism (including viruses, plasmids, and other genetic elements) or a proteinaceous infectious particle (prion) that has the potential to cause disease in humans or animals. The terms *infectious substance* and *etiologic agent* are synonymous. Examples of Division 6.2 materials include anthrax, botulism, rabies, and tetanus. Hazard zones associated with Class 6 materials are as follows:

(1) Hazard zone A — $LC_{50}$ less than or equal to 200 ppm
(2) Hazard zone B — $LC_{50}$ greater than 200 ppm and less than or equal to 1000 ppm

**G.8 Class 7 — Radioactive Materials.** Radioactive material is any material containing radionuclides where both the activity concentration and the total activity in the consignment exceed specified values. Examples of Class 7 materials include cobalt, uranium hexafluoride, and "yellow cake."

**G.9 Class 8 — Corrosive Materials.** Corrosive materials are liquids or solids that cause full-thickness destruction of skin at the site of contact within a specified period of time. A liquid that has a severe corrosion rate on steel or aluminum is also a corrosive material. Examples of Class 8 materials include nitric acid, phosphorus trichloride, sodium hydroxide, and sulfuric acid.

**G.10 Class 9 — Miscellaneous Hazardous Materials.** Miscellaneous hazardous materials are materials that present a hazard during transport but that do not meet the definition of any other hazard class. Miscellaneous hazardous materials include the following:

(1) Any material that has an anesthetic, noxious, or other similar property that could cause extreme annoyance or discomfort to a flight crew member so as to prevent the correct performance of assigned duties.
(2) Any material that is not included in any other hazard class but that is subject to DOT requirements (e.g., elevated-temperature material, hazardous substance, hazardous waste, marine pollutant). Examples of Class 9 materials include adipic acid, hazardous substances (e.g., PCBs), and molten sulfur.

**G.11 ORM-D Material.** ORM-D materials are materials that present a limited hazard during transportation due to their form, quantity, and packaging. Examples of ORM-D materials include consumer commodities and small arms ammunition.

**G.12 Forbidden.** *Forbidden* means prohibited from being offered or accepted for transportation. Prohibition does not apply if these materials are diluted, stabilized, or incorporated into devices.

**G.13 Marine Pollutant.** A marine pollutant is a material that has an adverse effect on aquatic life.

**G.14 Elevated-Temperature Material.** Elevated temperature materials are materials that, when offered for transportation in a bulk packaging, meet one of the following conditions:

(1) Are liquid at or above 212°F (100°C)
(2) Are liquid with a flash point at or above 100°F (37.8°C) and are intentionally heated and transported at or above their flash point
(3) Are solid at or above 464°F (240°C)

## Annex H Informational References

**H.1 Referenced Publications.** The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

**H.1.1 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2016 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 2018 edition.

NFPA 58, *Liquefied Petroleum Gas Code*, 2017 edition.

NFPA 473, *Standard for Competencies for EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents*, 2018 edition.

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

NFPA 1005, *Standard for Professional Qualifications for Marine Fire Fighting for Land-Based Fire Fighters*, 2014 edition.

NFPA 1405, *Guide for Land-Based Fire Departments That Respond to Marine Vessel Fires*, 2016 edition.

NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, 2018 edition.

NFPA 1991, *Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies*, 2016 edition.

NFPA 1992, *Standard on Liquid Splash–Protective Ensembles and Clothing for Hazardous Materials Emergencies*, 2018 edition.

NFPA 1994, *Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents*, 2018 edition.

*Hazardous Materials/Weapons of Mass Destruction Response Handbook*, 2013.

Wright, Charles J., "Managing the Response to Hazardous Materials Incidents," Section 13, Chapter 8, *Fire Protection Handbook*, 20th edition, 2008.

**H.1.2 Other Publications.**

**H.1.2.1 ASTM Publications.** ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA, 19428-2959.

ASTM E2601, *Standard Practice for Radiological Emergency Response*, 2015.

**H.1.2.2 API Publications.** American Petroleum Institute, 1220 L Street, N.W., Washington, DC 20005-4070.

API 2021, *Guide for Fighting Fires in and Around Flammable and Combustible Liquid Atmospheric Petroleum Storage Tanks*, 2015.

API 2510-A, *Fire Protection Considerations for the Design and Operation of Liquefied Petroleum Gas (LPG) Storage Facilities*, 2015.

**H.1.2.3 ASTM Publications.** ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM E2770, *Standard Guide for Operational Guidelines for Initial Response to a Suspected Biothreat Agent*, 2010.

ASTM E2458, *Standard Practices for Bulk Sample Collection* and *Swab Sample Collection of Visible Powders Suspected of Being Biothreat Agents from Nonporous Surfaces*, 2015.

Δ **H.1.2.4 IMO Publications.** International Maritime Organization, 4 Albert Embankment, London, SEI 7SR, UK.

*Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* (BCH Code).

*International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* (IBC Code).

*International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk* (IGC Code).

*International Maritime Dangerous Goods Code* (IMDG Code).

*International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78.*

*International Convention for the Safety of Life at Sea (SOLAS).*

**H.1.2.5 NRT Publications.** U.S. National Response Team, Washington, DC 20593, www.nrt.org.

NRT-1, *Hazardous Materials Emergency Planning Guide*, 2001.

Δ **H.1.2.6 U.S. Government Publications.** U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

*Bulk Chemical Data Guide*, 1990.

Department of Homeland Security (DHS), Responder Knowledge Base. www.rkb.mipt.org.

Environmental Protection Agency, *Standard Operating Safety Guides*, June 1992.

National Incident Management System (NIMS), *Site Safety and Control Plan* (formerly ICS 208 HM).

National Incident Management System (NIMS), March 2004, www.fema.gov/nims/nims_compliance.shtm#nimsdocument.

NIOSH/OSHA/USCG/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, October 1985.

NIOSH *Pocket Guide to Chemical Hazards*, DHHS (NIOSH) Publication No. 2007-149, September 2007, www.cdc.gov/niosh.npg.

OSHA 1910.120(8), *Hazardous Waste Operations and Emergency Response*.

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

Title 29, Code of Federal Regulations, Parts 1910.119–1910.120.

Title 29, Code of Federal Regulations, Part 1910.134.

Title 33, Code of Federal Regulations, "Navigation and Navigable Waters."

Title 40, Code of Federal Regulations, Part 261.33.

Title 40, Code of Federal Regulations, Part 302.

Title 40, Code of Federal Regulations, Part 355.

Title 46, Code of Federal Regulations, "Shipping."

Title 49, Code of Federal Regulations, Parts 170–180.

Title 49, Code of Federal Regulations, Part 173.431.

U.S. Army Research, Development, and Engineering Command (RDECOM), Edgewood Chemical Biological Center, Emergency Response, Command, and Planning Guidelines (various documents) for terrorist incidents involving chemical and biological agents. http://www.ecbc.army.mil/hld.

U.S. Department of Transportation, *Emergency Response Guidebook*, 2004 edition.

Δ **H.1.2.7 Additional Publications.**

*International Safety Guide for Oil Tankers and Terminals*, Witherby Seamanship International, 5th edition, 2006.

*International Chamber of Shipping Tanker Safety Guide*(chemicals), 4th edition, Witherby and Co., London, 2014.

*International Chamber of Shipping Tanker Safety Guide* (liquefied gases), 2nd edition, Witherby and Co., London, 1996.

*Provisional Categorization of Liquid Substances*, MEPC.2/Circ.10 2004, International Maritime Organization, London.

SIGTTO *Liquefied Gas Handling Principles on Ships and in Terminals*, 3rd edition, McGuire and White (Authors) London, 2000, Witherby Seamanship International.

SIGTTO *Ship to Ship Transfer Guide for Petroleum, Chemicals, and Liquefied Gases*, 2013.

• **H.2 Informational References.** The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

**H.2.1 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2017 edition.

NFPA 306, *Standard for the Control of Gas Hazards on Vessels*, 2014 edition.

NFPA 424, *Guide for Airport/Community Emergency Planning*, 2018 edition.

NFPA 600, *Standard on Facility Fire Brigades*, 2015 edition.

NFPA 1404, *Standard for Fire Service Respiratory Protection Training*, 2013 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, 2018 edition.

NFPA 1561, *Standard on Emergency Services Incident Management System and Command Safety*, 2014 edition.

NFPA 1581, *Standard on Fire Department Infection Control Program*, 2015 edition.

NFPA 1951, *Standard on Protective Ensembles for Technical Rescue Incidents*, 2018 edition.

*N* **H.2.2 American Chemistry Council (formerly Chemical Manufacturers Association) Publications.** American Chemistry Council, 1300 Wilson Blvd., Arlington, VA 22209.

*Recommended Terms for Personal Protective Equipment*, 1985.

*N* **H.2.3 Government Publications.** U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

*Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*, P.L. 107-377, December 31, 2002.

*Emergency Response Guidebook*, U.S. Department of Transportation, 2016.

*Hazardous Materials Incident Analysis*, National Fire Academy, U.S. Fire Administration, 2014.

National Preparedness Goal, March 2005, https://llis.dhs.gov.

National Preparedness Guidance, April 2005, https://www.llis.dhs.gov.

National Response Plan, December 2004, www.dhs.gov/Xprepresp/committees/editorial_0566.shtm.

National Toxicology Program, U.S. Department of Health and Human Services, *12th Report on Carcinogens*, Washington, DC, 2011.

Target Capabilities List, May 2005, https://www.llis.dhs.gov.

Title 49, Code of Federal Regulations, "Transportation."

Universal Task List, May 2005, https://www.llis.dhs.gov.

**H.2.4 Other Publications.**

Association of American Railroads, *Field Guide to Tank Cars*, Bureau of Explosions, Pueblo, CO 2010.

Grey, G. L., et al., *Hazardous Materials/Waste Handling for the Emergency Responder*, Fire Engineering Publications, New York, 1989.

Maslansky, C. J., and Stephen P. Maslansky, *Air Monitoring Instrumentation*, New York, Van Nostrand Reinhold, 1993.

Noll, G., and M. Hildebrand, *Hazardous Materials: Managing the Incident*, 4th edition, Fire Protection Publications, Stillwater, OK, 2012.

**H.3 References for Extracts in Informational Sections. (Reserved)**

# Index

## *Sequence of Events for the Standards Development Process*

*Once the current edition is published, a Standard is opened for Public Input.*

**Step 1 – Input Stage**

- Input accepted from the public or other committees for consideration to develop the First Draft
- Technical Committee holds First Draft Meeting to revise Standard (23 weeks); Technical Committee(s) with Correlating Committee (10 weeks)
- Technical Committee ballots on First Draft (12 weeks); Technical Committee(s) with Correlating Committee (11 weeks)
- Correlating Committee First Draft Meeting (9 weeks)
- Correlating Committee ballots on First Draft (5 weeks)
- First Draft Report posted on the document information page

**Step 2 – Comment Stage**

- Public Comments accepted on First Draft (10 weeks) following posting of First Draft Report
- If Standard does not receive Public Comments and the Technical Committee chooses not to hold a Second Draft meeting, the Standard becomes a Consent Standard and is sent directly to the Standards Council for issuance (see Step 4) or
- Technical Committee holds Second Draft Meeting (21 weeks); Technical Committee(s) with Correlating Committee (7 weeks)
- Technical Committee ballots on Second Draft (11 weeks); Technical Committee(s) with Correlating Committee (10 weeks)
- Correlating Committee Second Draft Meeting (9 weeks)
- Correlating Committee ballots on Second Draft (8 weeks)
- Second Draft Report posted on the document information page

**Step 3 – NFPA Technical Meeting**

- Notice of Intent to Make a Motion (NITMAM) accepted (5 weeks) following the posting of Second Draft Report
- NITMAMs are reviewed and valid motions are certified by the Motions Committee for presentation at the NFPA Technical Meeting
- NFPA membership meets each June at the NFPA Technical Meeting to act on Standards with "Certified Amending Motions" (certified NITMAMs)
- Committee(s) vote on any successful amendments to the Technical Committee Reports made by the NFPA membership at the NFPA Technical Meeting

**Step 4 – Council Appeals and Issuance of Standard**

- Notification of intent to file an appeal to the Standards Council on Technical Meeting action must be filed within 20 days of the NFPA Technical Meeting
- Standards Council decides, based on all evidence, whether to issue the standard or to take other action

**Notes:**

1. Time periods are approximate; refer to published schedules for actual dates.
2. Annual revision cycle documents with certified amending motions take approximately 101 weeks to complete.
3. Fall revision cycle documents receiving certified amending motions take approximately 141 weeks to complete.

## *Committee Membership Classifications*[1,2,3,4]

The following classifications apply to Committee members and represent their principal interest in the activity of the Committee.

1. M *Manufacturer:* A representative of a maker or marketer of a product, assembly, or system, or portion thereof, that is affected by the standard.
2. U *User:* A representative of an entity that is subject to the provisions of the standard or that voluntarily uses the standard.
3. IM *Installer/Maintainer:* A representative of an entity that is in the business of installing or maintaining a product, assembly, or system affected by the standard.
4. L *Labor:* A labor representative or employee concerned with safety in the workplace.
5. RT *Applied Research/Testing Laboratory:* A representative of an independent testing laboratory or independent applied research organization that promulgates and/or enforces standards.
6. E *Enforcing Authority:* A representative of an agency or an organization that promulgates and/or enforces standards.
7. I *Insurance:* A representative of an insurance company, broker, agent, bureau, or inspection agency.
8. C *Consumer:* A person who is or represents the ultimate purchaser of a product, system, or service affected by the standard, but who is not included in (2).
9. SE *Special Expert:* A person not representing (1) through (8) and who has special expertise in the scope of the standard or portion thereof.

NOTE 1: "Standard" connotes code, standard, recommended practice, or guide.

NOTE 2: A representative includes an employee.

NOTE 3: While these classifications will be used by the Standards Council to achieve a balance for Technical Committees, the Standards Council may determine that new classifications of member or unique interests need representation in order to foster the best possible Committee deliberations on any project. In this connection, the Standards Council may make such appointments as it deems appropriate in the public interest, such as the classification of "Utilities" in the National Electrical Code Committee.

NOTE 4: Representatives of subsidiaries of any group are generally considered to have the same classification as the parent organization.

## Submitting Public Input / Public Comment Through the Online Submission System

Soon after the current edition is published, a Standard is open for Public Input.

Before accessing the Online Submission System, you must first sign in at www.nfpa.org. *Note: You will be asked to sign-in or create a free online account with NFPA before using this system:*

a. Click on Sign In at the upper right side of the page.
b. Under the Codes and Standards heading, click on the "List of NFPA Codes & Standards," and then select your document from the list or use one of the search features.

*OR*

a. Go directly to your specific document information page by typing the convenient shortcut link of www.nfpa.org/document# (Example: NFPA 921 would be www.nfpa.org/921). Sign in at the upper right side of the page.

To begin your Public Input, select the link "The next edition of this standard is now open for Public Input" located on the About tab, Current & Prior Editions tab, and the Next Edition tab. Alternatively, the Next Edition tab includes a link to Submit Public Input online.

At this point, the NFPA Standards Development Site will open showing details for the document you have selected. This "Document Home" page site includes an explanatory introduction, information on the current document phase and closing date, a left-hand navigation panel that includes useful links, a document Table of Contents, and icons at the top you can click for Help when using the site. The Help icons and navigation panel will be visible except when you are actually in the process of creating a Public Input.

Once the First Draft Report becomes available there is a Public Comment period during which anyone may submit a Public Comment on the First Draft. Any objections or further related changes to the content of the First Draft must be submitted at the Comment stage.

To submit a Public Comment you may access the online submission system utilizing the same steps as previously explained for the submission of Public Input.

For further information on submitting public input and public comments, go to: http://www.nfpa.org/publicinput.

## Other Resources Available on the Document Information Pages

**About tab:** View general document and subject-related information.

**Current & Prior Editions tab:** Research current and previous edition information on a Standard.

**Next Edition tab:** Follow the committee's progress in the processing of a Standard in its next revision cycle.

**Technical Committee tab:** View current committee member rosters or apply to a committee.

**Technical Questions tab:** For members and Public Sector Officials/AHJs to submit questions about codes and standards to NFPA staff. Our Technical Questions Service provides a convenient way to receive timely and consistent technical assistance when you need to know more about NFPA codes and standards relevant to your work. Responses are provided by NFPA staff on an informal basis.

**Products & Training tab:** List of NFPA's publications and training available for purchase.

## Information on the NFPA Standards Development Process

**I. Applicable Regulations.** The primary rules governing the processing of NFPA standards (codes, standards, recommended practices, and guides) are the NFPA *Regulations Governing the Development of NFPA Standards (Regs)*. Other applicable rules include NFPA *Bylaws*, NFPA *Technical Meeting Convention Rules*, NFPA *Guide for the Conduct of Participants in the NFPA Standards Development Process*, and the NFPA *Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council*. Most of these rules and regulations are contained in the *NFPA Standards Directory*. For copies of the *Directory*, contact Codes and Standards Administration at NFPA Headquarters; all these documents are also available on the NFPA website at "www.nfpa.org."

The following is general information on the NFPA process. All participants, however, should refer to the actual rules and regulations for a full understanding of this process and for the criteria that govern participation.

**II. Technical Committee Report.** The Technical Committee Report is defined as "the Report of the responsible Committee(s), in accordance with the Regulations, in preparation of a new or revised NFPA Standard." The Technical Committee Report is in two parts and consists of the First Draft Report and the Second Draft Report. (See *Regs* at Section 1.4.)

**III. Step 1: First Draft Report.** The First Draft Report is defined as "Part one of the Technical Committee Report, which documents the Input Stage." The First Draft Report consists of the First Draft, Public Input, Committee Input, Committee and Correlating Committee Statements, Correlating Notes, and Ballot Statements. (See *Regs* at 4.2.5.2 and Section 4.3.) Any objection to an action in the First Draft Report must be raised through the filing of an appropriate Comment for consideration in the Second Draft Report or the objection will be considered resolved. [See *Regs* at 4.3.1(b).]

**IV. Step 2: Second Draft Report.** The Second Draft Report is defined as "Part two of the Technical Committee Report, which documents the Comment Stage." The Second Draft Report consists of the Second Draft, Public Comments with corresponding Committee Actions and Committee Statements, Correlating Notes and their respective Committee Statements, Committee Comments, Correlating Revisions, and Ballot Statements. (See *Regs* at 4.2.5.2 and Section 4.4.) The First Draft Report and the Second Draft Report together constitute the Technical Committee Report. Any outstanding objection following the Second Draft Report must be raised through an appropriate Amending Motion at the NFPA Technical Meeting or the objection will be considered resolved. [See *Regs* at 4.4.1(b).]

**V. Step 3a: Action at NFPA Technical Meeting.** Following the publication of the Second Draft Report, there is a period during which those wishing to make proper Amending Motions on the Technical Committee Reports must signal their intention by submitting a Notice of Intent to Make a Motion (NITMAM). (See *Regs* at 4.5.2.) Standards that receive notice of proper Amending Motions (Certified Amending Motions) will be presented for action at the annual June NFPA Technical Meeting. At the meeting, the NFPA membership can consider and act on these Certified Amending Motions as well as Follow-up Amending Motions, that is, motions that become necessary as a result of a previous successful Amending Motion. (See 4.5.3.2 through 4.5.3.6 and Table 1, Columns 1-3 of *Regs* for a summary of the available Amending Motions and who may make them.) Any outstanding objection following action at an NFPA Technical Meeting (and any further Technical Committee consideration following successful Amending Motions, see *Regs* at 4.5.3.7 through 4.6.5.3) must be raised through an appeal to the Standards Council or it will be considered to be resolved.

**VI. Step 3b: Documents Forwarded Directly to the Council.** Where no NITMAM is received and certified in accordance with the Technical Meeting Convention Rules, the standard is forwarded directly to the Standards Council for action on issuance. Objections are deemed to be resolved for these documents. (See *Regs* at 4.5.2.5.)

**VII. Step 4a: Council Appeals.** Anyone can appeal to the Standards Council concerning procedural or substantive matters related to the development, content, or issuance of any document of the NFPA or on matters within the purview of the authority of the Council, as established by the Bylaws and as determined by the Board of Directors. Such appeals must be in written form and filed with the Secretary of the Standards Council (see *Regs* at Section 1.6). Time constraints for filing an appeal must be in accordance with 1.6.2 of the *Regs*. Objections are deemed to be resolved if not pursued at this level.

**VIII. Step 4b: Document Issuance.** The Standards Council is the issuer of all documents (see Article 8 of *Bylaws*). The Council acts on the issuance of a document presented for action at an NFPA Technical Meeting within 75 days from the date of the recommendation from the NFPA Technical Meeting, unless this period is extended by the Council (see *Regs* at 4.7.2). For documents forwarded directly to the Standards Council, the Council acts on the issuance of the document at its next scheduled meeting, or at such other meeting as the Council may determine (see *Regs* at 4.5.2.5 and 4.7.4).

**IX. Petitions to the Board of Directors.** The Standards Council has been delegated the responsibility for the administration of the codes and standards development process and the issuance of documents. However, where extraordinary circumstances requiring the intervention of the Board of Directors exist, the Board of Directors may take any action necessary to fulfill its obligations to preserve the integrity of the codes and standards development process and to protect the interests of the NFPA. The rules for petitioning the Board of Directors can be found in the *Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council* and in Section 1.7 of the *Regs*.

**X. For More Information.** The program for the NFPA Technical Meeting (as well as the NFPA website as information becomes available) should be consulted for the date on which each report scheduled for consideration at the meeting will be presented. To view the First Draft Report and Second Draft Report as well as information on NFPA rules and for up-to-date information on schedules and deadlines for processing NFPA documents, check the NFPA website (www.nfpa.org/docinfo) or contact NFPA Codes & Standards Administration at (617) 984-7246.

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