NFPA® 472

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

2013 Edition

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An International Codes and Standards Organization

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Standard for

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

2013 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 May 29, 2012, with an effective date of June 18, 2012, and supersedes all previous editions.

This edition of NFPA 472 was approved as an American National Standard on June 18, 2012.

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 Council directed that a proposed scope and start-up roster for the new Committee 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 have 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 E 54 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 Responders 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 views 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 is tasked to respond to the scene of a hazardous materials/WMD incident during the emergency phase, that individual is viewed as an operations level responder. This level includes 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 are required of all emergency responders at this level. This chapter is 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 are optional and are provided so that the authority having jurisdiction (AHJ) can match the expected tasks and duties of its personnel with the competencies required to perform those tasks. Mission-specific competencies are available for operations level responders who are 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 are 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 can now 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 gives 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 are 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 are for responders already trained to the hazardous materials technician level and was 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 are for responders who are 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 Technician with a Radioactive Materials Specialty

In Memoriam and Honor

The Technical Committee would like to dedicate NFPA 472, *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, 2013 edition, to three of our long-time committee members and friends.

John Eversole was an early member of the NFPA Technical Committee on Hazardous Materials Response Personnel and served for 20 years, including nine years as Committee Chairman. Chief Eversole was a 32 year veteran of the Chicago Fire Department and founded that department's Hazardous Materials Incident Team. John retired from active duty in 2001 but continued to serve as the Chairman of both the NFPA and the IAFC Hazardous Materials Committees, as well as a member of the Inter-Agency Board (IAB) until his passing in 2007. John Eversole was a tireless advocate for the fire service and hazardous materials responders and will be truly missed.

Jerry Grey was an original member of the Technical Committee, representing the San Francisco, CA, Fire Department. Jerry served for many years as the Vice Chairman, and is well-known throughout the U.S. for his training and educational efforts in the "early days" of hazmat response. Among his accomplishments were his work with Bob Turkington on The HazCat Kit, and with Chief Hank Howard for sharing their experiences at a 1983 Benicia, CA, tank car incident that ultimately resulted in the development of the NFPA chemical protective clothing standards (NFPA 1991 and 1992). Jerry is now retired and enjoying the good life with his wife, Veronica.

Dieter Heinz was another Californian who joined the Committee in 1987 and was well-known throughout the hazmat response community for his excellent Chemistry of Hazardous Materials programs at the National Fire Academy and other locations. A long-time representative of the California State Firefighters Association, Dieter unexpectedly passed away in 2011. We will long remember his laugh, the "Dieterisms," and his contributions to our profession.

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NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

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

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NFPA 472

Standard for

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2013 Edition

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

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

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.

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 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response,* 2012 edition.

2.3 Other Publications.

2.3.1 U.S. Government Publications. U.S. Government Printing Office, Superintendent of Documents, Washington, DC 20402.

Emergency Response Guidebook, U.S. Department of Transportation, 2004 edition.

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

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

Title 46, Code of Federal Regulations, Office of Federal Register, National Archives and Records Administration, Washington DC 2011.

Hazardous Waste Operations and Emergency Response, 29 CFR 1910, 120, Washington, D.C.: United States Department of Labor, 1994.

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

2.3.2 Other Publications.

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

2.4 References for Extracts in Mandatory Sections. (Reserved)

Chapter 3 Definitions

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

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of

production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.4 Shall. Indicates a mandatory requirement.

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

3.2.6 Standard. A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which 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 *Manual of Style for NFPA Technical Committee Documents*.

3.3 General Definitions.

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

3.3.2 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.

3.3.3 Area of Specialization.

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

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

3.3.4 Awareness Level Personnel. (29 CFR 1910.120: First Responder at the Awareness Level) 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/weapons of mass destruction (WMD), protect themselves, call for trained personnel, and secure the scene. *(See Annex E.)*

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

3.3.6 CHEMTREC. The Chemical Transportation Emergency Response Center, 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.

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

3.3.8* 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.

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

3.3.10 Container. A receptacle used for storing or transporting material of any kind.

3.3.11 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).

3.3.12 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.

3.3.13 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.

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

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

3.3.15* 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.

3.3.15.1 ***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.

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

3.3.15.3 ***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.

3.3.15.4* ***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.

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

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

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

3.3.17.2* ***Gross Decontamination.*** The phase of the decontamination process during which the amount of surface contaminants is significantly reduced.

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

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

3.3.18 Degradation. (1) A chemical action involving the molecular breakdown of a protective clothing material or equipment due to contact with a chemical. (2) The molecular breakdown of the spilled or released material to render it less hazardous during control operations.

3.3.19* Demonstrate. To show by actual performance.

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

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.

3.3.22 Emergency Response Guidebook (ERG). A reference book, written in plain language, to guide emergency responders in their initial actions at the incident scene.

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.

3.3.25 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).

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

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

3.3.28 Hazard/Hazardous. Capable of posing an unreasonable risk to health, safety, or the environment; capable of causing harm.

3.3.29* Hazardous Material. A substance (either 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.

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

3.3.31* Hazardous Materials Officer. (NIMS: Hazardous Materials Branch Director/Group Supervisor.) 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.

3.3.32* 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.

3.3.33* Hazardous Materials Safety Officer. (NIMS: Assistant Safety Officer — Hazardous Material.) The person who works within an incident management system (IMS) (specifically, the hazardous materials branch/group) to ensure that recognized hazardous materials/WMD safe practices are followed at hazardous materials/weapons of mass destruction (WMD) incidents.

3.3.34* Hazardous Materials Technician. 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/weapons of mass destruction (WMD), select applicable decontamination procedures, and control a release using specialized protective clothing and control equipment.

3.3.34.1* ***Hazardous Materials Technician with a Cargo Tank Specialty.*** 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.

3.3.34.2 ***Hazardous Materials Technician with a Flammable Gases Bulk Storage Specialty.*** Person who, in incidents involving flammable gas bulk storage tanks, provide support to the hazardous materials technician and other personnel, provide strategic and tactical recommendations to the on-scene incident commander, provide oversight for fire control and product removal operations, and act as a liaison between technicians, fire-fighting personnel, and other resources.

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

3.3.34.4* ***Hazardous Materials Technician with an Intermodal Tank Specialty.*** 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.

3.3.34.5 ***Hazardous Materials Technician with a Marine Tank and Non-Tank Vessel Specialty.*** 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.

3.3.34.6 ***Hazardous Materials Technician with a Radioactive Material Specialty.*** 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.

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

3.3.35 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.

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

3.3.37* 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.

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

3.3.39* Incident Management System (IMS). A plan 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, multi-agency coordination system, training, and management of resources.

3.3.40 Match. To provide with a counterpart.

3.3.41* Material Safety Data Sheet (MSDS). A form, provided by manufacturers and compounders (blenders) of chemicals, containing information about chemical composition, physical and chemical properties, health and safety hazards, emergency response, and waste disposal of the material.

3.3.42 Monitoring Equipment. Instruments and devices used to identify and quantify contaminants.

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

3.3.44* Packaging. Any container that holds a material (hazardous or nonhazardous).

3.3.44.1* ***Bulk Packaging.*** Any packaging, 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).

3.3.44.2 ***Nonbulk Packaging.*** Any packaging having a liquid capacity of 119 gal (450 L) or less, a solids capacity of 882 lb (400 kg) or less, or a compressed gas water capacity of 1001 lb (454 kg) or less.

3.3.44.3* ***Radioactive Materials Packaging.*** Any packaging for radioactive materials including excepted packaging, industrial packaging, Type A, Type B, and Type C packaging.

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 equipment provided to shield or isolate a person from the chemical, physical, and thermal hazards that can be encountered at hazardous materials/weapons of mass destruction (WMD) incidents.

3.3.48 Plan.

3.3.48.1* ***Emergency Response Plan.*** A plan developed by the authority having jurisdiction, with the cooperation of all participating agencies and organizations, that details specific actions to be performed by all personnel who are expected to respond during an emergency.

3.3.48.2* ***Incident Action Plan.*** An oral or written plan approved by the incident commander containing general objectives reflecting the overall strategy for managing an incident.

3.3.48.3 ***Site Safety and Control Plan.*** A site safety and control plan should be completed and approved by the hazardous materials officer, the hazardous materials safety officer, and the incident commander for inclusion in the incident action plan. The plan must be briefed to personnel operating within the hot zone by the hazardous materials safety officer or the hazardous materials officer prior to entry mission initiation. The initial site safety and control plan for the first operational period can be written or oral. The plan should be documented as soon as resources allow.

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 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 heat and/or from hazardous materials, or from the hazardous component of a weapon of mass destruction contacting the skin or eyes.

3.3.51.1* ***Chemical-Protective Clothing.*** Items made from chemical-resistive materials, such as clothing, hood, boots, and gloves, that are designed and configured to protect the wearer's torso, head, arms, legs, hands, and feet from hazardous materials.

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

3.3.51.3* ***Liquid Splash–Protective Clothing.*** The garment portion of a chemical-protective clothing ensemble that is designed and configured to protect the wearer against chemical liquid splashes but not against chemical vapors or gases.

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.

3.3.51.5* ***Vapor-Protective Clothing.*** The garment portion of a chemical-protective clothing ensemble that is designed and configured to protect the wearer against chemical vapors or gases.

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

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

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

3.3.55 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.

3.3.56 Safely. To perform the assigned tasks without injury to self or others, to the environment, or to property.

3.3.57 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.

3.3.58 SETIQ. The Emergency Transportation System for the Chemical Industry in Mexico.

3.3.59 Specialist Employees.

3.3.59.1* ***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.

3.3.59.2* ***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.

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

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

3.3.61* 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.

3.3.62* 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.

3.3.63* 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.

3.3.63.1* ***Radiological Weapons of Mass Destruction.***

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

3.3.63.1.2* ***Radiation Dispersal Device (RDD).*** A device designed to spread radioactive material through a detonation of conventional explosives or other (non-nuclear) means; also referred to as a "dirty bomb."

3.3.63.1.3* ***Radiation Exposure Device (RED).*** Radioactive material, either as a sealed source or as material within some type of container, or a radiation-generating device, such as an x-ray device, that directly exposes people to ionizing radiation; the term is interchangeable with the term *radiological exposure device* or *radiation emitting device.*

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.

3.4.2 Core Competencies. The knowledge, skills, and judgment needed by operations level responders who respond to releases or potential releases of hazardous materials/weapons of mass destruction (WMD).

3.4.3 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.

3.4.4* 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.

3.4.5 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.

3.4.6 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.

3.4.7 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.

3.4.8 Operations Level Responders Assigned to Perform Mass Decontamination During Hazardous Materials/Weapons of Mass Destruction (WMD) Incidents. Persons, competent at the operations level, who are assigned to implement mass decontamination operations at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.9 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.

3.4.10 Operations Level Responders Assigned to Perform Technical Decontamination During Hazardous Materials/Weapons of Mass Destruction (WMD) Incidents. Persons, competent at the operations level, who are assigned to implement technical decontamination operations at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.11 Operations Level Responders Assigned to Perform Victim Rescue/Recovery During Hazardous Materials/Weapons of Mass Destruction (WMD) Incidents. 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.

3.4.12 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.

3.4.13 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.

3.4.14 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.

3.4.15 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.

3.4.16 Operations Level Responders Assigned to Use Personal Protective Equipment During Hazardous Materials/Weapons of Mass Destruction (WMD) Incidents. Persons, competent at the operations level, who are assigned to use personal protective equipment at hazardous materials/weapons of mass destruction (WMD) incidents.

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 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 already on the scene of a hazardous materials/WMD incident with the knowledge and skills to perform the tasks in 4.1.2.2 safely and effectively.

4.1.2.2 When already on the scene of a hazardous materials/WMD incident, the awareness level personnel shall be able to perform the following tasks:

(1) Analyze the incident to determine both the hazardous materials/WMD present and the basic hazard and response information for each hazardous materials/WMD agent 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, type of placard, or other distinctive marking applied for the hazardous materials/WMD involved.
   (c) Collect hazard information from the current edition of the DOT *Emergency Response Guidebook*.

(2) Implement actions consistent with the authority having jurisdiction (AHJ), and the current edition of the DOT *Emergency Response Guidebook* by completing the following tasks:
   (a) Initiate protective actions
   (b) Initiate the notification process

4.2 Competencies — Analyzing the Incident.

4.2.1* Detecting the Presence of Hazardous Materials/WMD. Given examples of various situations, awareness level personnel shall identify those situations where hazardous materials/WMD are present by completing the following requirements:

(1)*Identify the definitions of both *hazardous material* (or *dangerous goods*, in Canada) and *WMD*
(2) Identify the UN/DOT 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 UN/DOT hazard class and division
(4) Identify the difference 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, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, 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 U.S. and Canadian placards and labels that indicate hazardous materials/WMD
(10) Identify the following basic information on material safety data sheets (MSDS) and shipping papers for hazardous materials:
  (a) Identify where to find MSDS
  (b) Identify major sections of an MSDS
  (c) Identify the entries on shipping papers that indicate the presence of hazardous materials
  (d) Match the name of the shipping papers found in transportation (air, highway, rail, and water) with the mode of transportation
  (e) Identify the person responsible for having the shipping papers in each mode of transportation
  (f) Identify where the shipping papers are found in each mode of transportation
  (g) Identify where the papers can be found in an emergency in each mode of transportation
(11)*Identify examples of clues (other than occupancy/location, container shape, markings/color, placards/labels, MSDS, and shipping papers) to include sight, sound, and odor of which indicate hazardous materials/WMD
(12) Describe the limitations of using the senses in determining the presence or absence of hazardous materials/WMD
(13)*Identify at least four types of locations that could be targets for criminal or terrorist activity using hazardous materials/WMD
(14)*Describe the difference between a chemical and a biological incident
(15)*Identify at least four indicators of possible criminal or terrorist activity involving chemical agents
(16)*Identify at least four indicators of possible criminal or terrorist activity involving biological agents
(17) Identify at least four indicators of possible criminal or terrorist activity involving radiological agents
(18) Identify at least four indicators of possible criminal or terrorist activity involving illicit laboratories (clandestine laboratories, weapons lab, ricin lab)
(19) Identify at least four indicators of possible criminal or terrorist activity involving explosives
(20)*Identify at least four indicators of secondary devices

4.2.2 Surveying Hazardous Materials/WMD Incidents. Given examples of hazardous materials/WMD incidents, 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 fire, explosion, and health hazard information for each material by using the current edition of the DOT *Emergency Response Guidebook* 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.

4.4.1* Initiating Protective Actions. Given examples of hazardous materials/WMD incidents, the emergency response plan, the standard operating procedures, and the current edition of the DOT *Emergency Response Guidebook*, awareness level personnel shall be able to identify the actions to be taken to protect themselves and others and to control access to the scene 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 necessary
  (c) Initial isolation and protective action distances
(5) Given the name of a hazardous material, identify the recommended personal protective equipment from the following list:
  (a) Street clothing and work uniforms
  (b) Structural fire-fighting protective clothing
  (c) Positive pressure self-contained breathing apparatus
  (d) Chemical-protective clothing and equipment
(6) 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
(7) Identify the size and shape of recommended initial isolation and protective action zones
(8) Describe the difference between small and large spills as found in the Table of Initial Isolation and Protective Action Distances in the DOT *Emergency Response Guidebook*
(9) 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
(10) Describe the difference between the isolation distances on the orange-bordered guidebook pages and the protective action distances on the green-bordered ERG *(Emergency Response Guidebook)* pages
(11) Identify the techniques used to isolate the hazard area and deny entry to unauthorized persons at hazardous materials/WMD incidents
(12)*Identify at least four specific actions necessary when an incident is suspected to involve criminal or terrorist activity

4.4.2 Initiating the Notification Process. Given scenarios involving hazardous materials/WMD incidents, awareness level personnel shall identify the initial notifications to be made and how to make them, consistent with the AHJ.

4.5* Competencies — Evaluating Progress. (Reserved)

4.6* Competencies — Terminating the Incident. (Reserved)

Chapter 5 Core 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 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.

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 core competencies in 5.1.2.2 safely.

5.1.2.2 When responding to hazardous materials/WMD incidents, operations level responders shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident to determine the scope of the problem and potential outcomes by completing the following tasks:
  (a) Survey a 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 MSDS; CHEMTREC/CANUTEC/SETIQ; local, state, and federal authorities; and shipper/manufacturer contacts
  (c) Predict the likely behavior of a hazardous material/WMD and its container
  (d) Estimate the potential 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 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 personal protective equipment provided is appropriate 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 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) Demonstrate emergency decontamination
(4) Evaluate the progress of the actions taken at a hazardous materials/WMD incident to ensure that the response objectives are being met safely, effectively, and efficiently 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 Core Competencies — Analyzing the Incident.

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, the surrounding conditions, and whether hazardous materials/WMD have been released by completing the requirements of 5.2.1.1 through 5.2.1.6.

5.2.1.1* Given three examples each of liquid, gas, and solid hazardous material or WMD, including various hazard classes, operations level personnel shall identify the general shapes of containers in which the hazardous materials/WMD are typically found.

5.2.1.1.1 Given examples of the following tank cars, the operations level responder shall identify each tank car by type, as follows:

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

5.2.1.1.2 Given examples of the following intermodal tanks, the operations level responder shall identify each intermodal tank by type, as follows:

(1) Nonpressure intermodal tanks
(2) Pressure intermodal tanks
(3) Specialized intermodal tanks, including the following:
    (a) Cryogenic intermodal tanks
    (b) Tube modules

5.2.1.1.3 Given examples of the following cargo tanks, the operations level responder shall identify each cargo tank by type, as follows:

(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

5.2.1.1.4 Given examples of the following storage tanks, the operations level responder shall identify each tank by type, as follows:

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

5.2.1.1.5 Given examples of the following nonbulk packaging, the operations level responder shall identify each package by type, as follows:

(1) Bags
(2) Carboys
(3) Cylinders
(4) Drums
(5) Dewar flask (cryogenic liquids)

5.2.1.1.6 Given examples of the following packaging, the operations level responder shall identify the characteristics of each container or package by type as follows:

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

5.2.1.1.7* Given examples of the following radioactive material packages, the operations level responder shall identify the characteristics of each container or package by type, as follows:

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

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 the following vehicle or tank identification marking:

(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 containers, 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 The operations level responder shall identify the following information on a pipeline marker:

(1) Emergency telephone number
(2) Owner
(3) Product

5.2.1.3.2 Given a pesticide label, the operations level responder shall identify each of the following pieces of information, then match the piece of information to its significance in surveying hazardous materials incidents:

(1) Active ingredient
(2) Hazard statement
(3) Name of pesticide
(4) Pest control product (PCP) number (in Canada)
(5) Precautionary statement
(6) Signal word

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.

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

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.

5.2.2 Collecting Hazard and Response Information. Given scenarios involving known hazardous materials/WMD, the operations level responder shall collect hazard and response in-

formation using MSDS, CHEMTREC/CANUTEC/SETIQ, governmental authorities, and shippers and manufacturers by completing the following requirements:

(1) Match the definitions associated with the UN/DOT hazard classes and divisions of hazardous materials/WMD, including refrigerated liquefied gases and cryogenic liquids, with the class or division
(2) Identify two ways to obtain an MSDS in an emergency
(3) Using an MSDS for a specified material, identify the following hazard and response information:
  (a) Physical and chemical characteristics
  (b) Physical hazards of the material
  (c) Health hazards of the material
  (d) Signs and symptoms of exposure
  (e) Routes of entry
  (f) Permissible exposure limits
  (g) Responsible party contact
  (h) Precautions for safe handling (including hygiene practices, protective measures, and procedures for cleanup of spills and leaks)
  (i) Applicable control measures, including personal protective equipment
  (j) Emergency and first-aid procedures
(4) Identify the following:
  (a) Type of assistance provided by CHEMTREC/CANUTEC/SETIQ and governmental authorities
  (b) Procedure for contacting CHEMTREC/CANUTEC/SETIQ and governmental authorities
  (c) Information to be furnished to CHEMTREC/CANUTEC/SETIQ and governmental authorities
(5) Identify two methods of contacting the manufacturer or shipper 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
(7) Identify the procedure for contacting local, state, and federal authorities as specified in the emergency response plan and/or standard operating procedures
(8) *Describe the properties and characteristics of the following:
  (a) Alpha radiation
  (b) Beta radiation
  (c) Gamma radiation
  (d) Neutron radiation

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 DOT *Emergency Response Guidebook*, MSDS, CHEMTREC/CANUTEC/SETIQ, governmental authorities, and shipper and manufacturer 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 non-ionizing)
    xi. Specific gravity
    xii. Toxic products of combustion
    xiii. Vapor density
    xiv. Vapor pressure
    xv. Water solubility
  (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 three types of stress that can cause a container system to release its contents
(3) *Identify five ways in which containers can breach
(4) *Identify four ways in which containers can release their contents
(5) *Identify at least four dispersion patterns that can be created upon release of a hazardous material
(6) *Identify the time frames for estimating the duration that hazardous materials/WMD will present an exposure risk
(7) *Identify the health and physical hazards that could cause harm
(8) *Identify the health hazards associated with the following terms:
  (a) Alpha, beta, gamma, and neutron radiation
  (b) Asphyxiant
  (c) *Carcinogen
  (d) Convulsant
  (e) Corrosive
  (f) Highly toxic
  (g) Irritant
  (h) Sensitizer, allergen
  (i) Target organ effects
  (j) Toxic
(9) *Given the following, identify the corresponding UN/DOT hazard class and division:
  (a) Blood agents
  (b) Biological agents and biological toxins
  (c) Choking agents
  (d) Irritants (riot control agents)
  (e) Nerve agents
  (f) Radiological materials
  (g) Vesicants (blister agents)

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

5.3 Core 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
(4)*Describe the potential for secondary attacks and devices at criminal or terrorist events

5.3.2 Identifying Action Options. Given examples of hazardous materials/WMD incidents (facility and transportation), the operations level responder shall identify the 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. 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 personal protective equipment 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. Positive pressure self-contained breathing apparatus (SCBA)
    ii. Positive pressure air-line respirator with required escape unit
    iii. Closed-circuit SCBA
    iv. Powered air-purifying respirator (PAPR)
    v. Air-purifying respirator (APR)
    vi. Particulate respirator
  (b) Identify the required physical capabilities and limitations of personnel working in respiratory protection
(2) Identify the personal protective clothing required for a given 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 such as liquid splash–protective clothing and vapor-protective clothing
    ii. High temperature–protective clothing such as proximity suit and entry suits
    iii. Structural fire-fighting protective clothing

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

(1) Identify ways that people, personal protective equipment, apparatus, tools, and equipment become contaminated
(2) Describe how the potential for secondary contamination determines the need for decontamination
(3) Explain the importance and limitations of decontamination procedures at hazardous materials incidents
(4) Identify the purpose of emergency decontamination procedures at hazardous materials incidents
(5) Identify the methods, advantages, and limitations of emergency decontamination procedures

5.4 Core 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)*Demonstrate the ability to perform emergency decontamination
(5)*Identify the items to be considered in a safety briefing prior to allowing personnel to work at the following:
  (a) Hazardous 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 com-

mand 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. Given the personal protective equipment provided by the AHJ, the operations level responder shall describe considerations for the use of personal protective equipment 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 personal protective equipment provided by the AHJ
(6) Identify the procedures for cleaning, disinfecting, and inspecting personal protective equipment provided by the AHJ
(7) Describe the maintenance, testing, inspection, and storage procedures for personal protective equipment provided by the AHJ according to the manufacturer's specifications and recommendations

5.5 Core 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 considerations for evaluating whether 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

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.

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 AHJ beyond the core competencies at the operations level (*see Chapter 5*):

(1) Operations level responders assigned to use personal protective equipment (*see Section 6.2*)
(2) Operations level responders assigned to perform mass decontamination (*see Section 6.3*)
(3) Operations level responders assigned to perform technical decontamination (*see Section 6.4*)
(4) Operations level responders assigned to perform evidence preservation and sampling (*see Section 6.5*)
(5) Operations level responders assigned to perform product control (*see Section 6.6*)
(6) Operations level responders assigned to perform air monitoring and sampling (*see Section 6.7*)
(7) Operations level responders assigned to perform victim rescue/recovery (*see Section 6.8*)
(8) Operations level responders assigned to respond to illicit laboratory incidents (*see Section 6.9*)
(9) Operational level responders assigned to perform disablement/disruption of improvised explosives devices (IED), improvised WMD dispersal devices, and operations at improvised explosive laboratories. *(see Section 6.10)*

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 core competencies at the operations level *(see Chapter 5)*, and all competencies for the assigned responsibilities in the applicable section(s) 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 safely and effectively.

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

6.1.3.1 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.

6.2.1 General.

6.2.1.1 Introduction.

6.2.1.1.1 The operations level responder assigned to use personal protective equipment shall be that person, competent at the operations level, who is assigned to use personal protective equipment at hazardous materials/WMD incidents.

6.2.1.1.2 The operations level responder assigned to use personal protective equipment at hazardous materials/WMD incidents shall be trained to meet all competencies at the awareness level (*see Chapter 4*), all core 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 personal protective equipment at hazardous materials/WMD incidents shall operate under the guidance of a hazardous materials technician, an allied professional, or standard operating procedures.

6.2.1.1.4* The operations level responder assigned to use personal protective equipment 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 use personal protective equipment with the knowledge and skills to perform the following tasks safely and effectively:

(1) Plan a response within the capabilities of personal protective equipment provided by the AHJ in order to perform mission-specific tasks assigned
(2) Implement the planned response consistent with the standard operating procedures and site safety and control plan by donning, working in, and doffing personal protective equipment provided by the AHJ
(3) Terminate the incident by completing the reports and documentation pertaining to personal protective equipment

6.2.2 Competencies — Analyzing the Incident. (Reserved)

6.2.3 Competencies — Planning the Response.

6.2.3.1 Selecting Personal Protective Equipment. Given scenarios involving hazardous materials/WMD incidents with known and unknown hazardous materials/WMD and the personal protective equipment provided by the AHJ, the operations level responder assigned to use personal protective equipment shall select the personal protective equipment required to support mission-specific tasks at hazardous materials/WMD incidents based on local procedures by completing the following requirements:

(1)*Describe the types of personal protective equipment that are available for response based on NFPA standards and how these items relate to EPA levels of protection
(2) Describe personal protective equipment options for the following hazards:
  (a) Thermal
  (b) Radiological
  (c) Asphyxiating
  (d) Chemical
  (e) Etiological/biological
  (f) Mechanical
(3) Select personal protective equipment for mission-specific tasks at hazardous materials/WMD incidents based on local procedures
  (a) Describe the following terms and explain their impact and significance on the selection of chemical-protective clothing:
    i. Degradation
    ii. Penetration
    iii. Permeation
  (b) Identify at least three indications of material degradation of chemical-protective clothing
  (c) Identify the different designs of vapor-protective and splash-protective clothing and describe the advantages and disadvantages of each type
  (d)*Identify the relative advantages and disadvantages of the following heat exchange units used for the cooling of personnel operating in personal protective equipment:
    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 personal protective equipment
  (f) Describe local procedures for going through the technical decontamination process

6.2.4 Competencies — Implementing the Planned Response.

6.2.4.1 Using Protective Clothing and Respiratory Protection. Given the personal protective equipment provided by the AHJ, the operations level responder assigned to use personal protective equipment shall demonstrate the ability to don, work in, and doff the equipment provided to support mission-specific tasks by completing the following requirements:

(1) Describe at least three safety procedures for personnel wearing protective clothing
(2) Describe at least three emergency procedures for personnel wearing protective clothing
(3) Demonstrate the ability to don, work in, and doff personal protective equipment provided by the AHJ
(4) Demonstrate local procedures for responders undergoing the technical decontamination process
(5) Describe the maintenance, testing, inspection, storage, and documentation procedures for personal protective equipment provided by the AHJ according to the manufacturer's specifications and recommendations

6.2.5 Competencies — Terminating the Incident.

6.2.5.1 Reporting and Documenting the Incident. Given a scenario involving a hazardous materials/WMD incident, the operations level responder assigned to use personal protective equipment shall document use of the personal protective equipment by completing the documentation requirements of the emergency response plan or standard operating procedures regarding personal protective equipment.

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 to implement mass decontamination operations at hazardous materials/WMD incidents.

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 core 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.

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, 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 perform mass decontamination at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 6.3.1.2.2 safely and effectively.

6.3.1.2.2 When responding to hazardous materials/WMD incidents, the operations level responder assigned to perform mass decontamination shall be able to perform the following tasks:

(1) Plan a response within the capabilities of available personnel, personal protective equipment, and control equipment by selecting a mass decontamination process to minimize the hazard
(2) Implement the planned response to favorably change the outcomes consistent with standard operating procedures and the site safety and control plan by completing the following tasks:
    (a) Perform the decontamination duties as assigned
    (b) Perform the mass decontamination functions identified in the incident action plan
(3) Evaluate the progress of the planned response by evaluating the effectiveness of the mass decontamination process
(4) Terminate the incident by providing reports and documentation of decontamination operations

6.3.2 Competencies — Analyzing the Incident. (Reserved)

6.3.3 Competencies — Planning the Response.

6.3.3.1 Selecting Personal Protective Equipment. Given an emergency response plan or standard operating procedures and the personal protective equipment provided by the AHJ, the operations level responder assigned to mass decontamination shall select the personal protective equipment required to support mass decontamination at hazardous materials/WMD incidents based on local procedures *(see Section 6.2)*.

6.3.3.2 Selecting Decontamination Procedures. Given scenarios involving hazardous materials/WMD incidents, the operations level responder assigned to mass decontamination operations shall select a mass decontamination procedure that will minimize the hazard and spread of contamination, determine the equipment required to implement that procedure, and meet the following requirements:

(1) Identify the advantages and limitations of mass decontamination operations
(2) Describe the advantages and limitations of each of the following mass decontamination methods:
    (a) Dilution
    (b) Isolation
    (c) Washing
(3) Identify sources of information for determining the correct mass decontamination procedure and identify how to access those resources in a hazardous materials/WMD incident
(4) Given resources provided by the AHJ, identify the supplies and equipment required to set up and implement mass decontamination operations
(5) Identify procedures, equipment, and safety precautions for communicating with crowds and crowd management techniques that can be used at incidents where a large number of people might be contaminated

6.3.4 Competencies — Implementing the Planned Response.

6.3.4.1 Performing Incident Management Duties. Given a scenario involving a hazardous materials/WMD incident and the emergency response plan or standard operating procedures, the operations level responder assigned to mass decontamination operations shall demonstrate the mass decontamination duties assigned in the incident action plan by describing the local procedures for the implementation of the mass decontamination function within the incident command system.

6.3.4.2 Performing Decontamination Operations Identified in Incident Action Plan. The operations level responder assigned to mass decontamination operations shall demonstrate the ability to set up and implement mass decontamination operations for ambulatory and nonambulatory victims.

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.

6.3.6.1 Reporting and Documenting the Incident. Given a scenario involving a hazardous materials/WMD incident, the operations level responder assigned to mass decontamination

operations shall document the mass decontamination activities as required by the AHJ by completing the following:

(1) Identify the reports and supporting documentation required by the emergency response plan or standard operating procedures
(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

6.4 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 to implement technical decontamination operations at hazardous materials/WMD incidents.

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 core 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.

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 perform technical decontamination at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 6.4.1.2.2 safely and effectively.

6.4.1.2.2 When responding to hazardous materials/WMD incidents, the operations level responder assigned to perform technical decontamination shall be able to perform the following tasks:

(1) Plan a response within the capabilities of available personnel, personal protective equipment, and control equipment by selecting a technical decontamination process to minimize the hazard
(2) Implement the planned response to favorably change the outcomes consistent with standard operating procedures and the site safety and control plan by completing the following tasks:
    (a) Perform the technical decontamination duties as assigned
    (b) Perform the technical decontamination functions identified in the incident action plan
(3) Evaluate the progress of the planned response by evaluating the effectiveness of the technical decontamination process
(4) Terminate the incident by completing the reports and documentation of decontamination operations

6.4.2 Competencies — Analyzing the Incident. (Reserved)

6.4.3 Competencies — Planning the Response.

6.4.3.1 Selecting Personal Protective Equipment. Given an emergency response plan or standard operating procedures and the personal protective equipment provided by the AHJ, the operations level responder assigned to technical decontamination operations shall select the personal protective equipment required to support technical decontamination at hazardous materials/WMD incidents based on local procedures *(see Section 6.2)*.

6.4.3.2 Selecting Decontamination Procedures. Given scenarios involving hazardous materials/WMD incidents, the operations level responder assigned to technical decontamination operations shall select a technical decontamination procedure that will minimize the hazard and spread of contamination and determine the equipment required to implement that procedure by completing the following requirements:

(1) Identify the advantages and limitations of technical decontamination operations
(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 for determining the correct technical decontamination procedure and identify how to access those resources in a hazardous materials/WMD incident
(4) Given resources provided by the AHJ, identify the supplies and equipment required to set up and implement technical decontamination operations
(5) Identify the procedures, equipment, and safety precautions for processing evidence during technical decontamination operations 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 Performing Incident Management Duties. Given a scenario involving a hazardous materials/WMD incident and the emergency response plan or standard operating procedures, the operations level responder assigned to technical decontamination operations shall demonstrate the technical decontamination duties assigned in the incident action plan by completing the following requirements:

(1) Identify the role of the operations level responder assigned to technical decontamination operations during hazardous materials/WMD incidents
(2) Describe the procedures for implementing technical decontamination operations within the incident command system

6.4.4.2 Performing Decontamination Operations Identified in Incident Action Plan. The responder assigned to technical decontamination operations shall demonstrate the ability to set up and implement the following types of decontamination operations:

(1) Technical decontamination operations in support of entry operations
(2) Technical decontamination operations for ambulatory and nonambulatory victims

6.4.5 Competencies — Evaluating Progress.

6.4.5.1 Evaluating the Effectiveness of the Technical Decontamination Process. Given examples of contaminated items that have undergone the required decontamination, the operations level responder assigned to technical 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.

6.4.6 Competencies — Terminating the Incident.

6.4.6.1 Reporting and Documenting the Incident. Given a scenario involving a hazardous materials/WMD incident, the operations level responder assigned to technical decontamination operations shall document the mass decontamination activities as required by the AHJ by completing the following:

(1) Identify the reports and supporting technical documentation required by the emergency response plan or standard operating procedures
(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

6.5 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 sampling shall be that person, competent at the operations level, who is assigned to preserve forensic evidence, take samples, and/or seize evidence at hazardous materials/WMD incidents involving potential violations of criminal statutes or governmental regulations.

6.5.1.1.2 The operations level responder assigned to perform evidence preservation and sampling at hazardous materials/WMD incidents shall be trained to meet all competencies at the awareness level (*see Chapter 4*), all core 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.

6.5.1.1.3 The operations level responder assigned to perform evidence preservation and 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 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 evidence preservation and sampling at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 6.5.1.2.2 safely and effectively.

6.5.1.2.2 When responding to hazardous materials/WMD incidents involving potential violations of criminal statutes or governmental regulations, the operations level responder assigned to perform evidence preservation and 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, personal protective equipment, and control equipment by completing the following tasks:
   (a) Determine the response options to conduct sampling and evidence preservation operations
   (b) Describe how the options are within the legal authorities, capabilities, and competencies of available personnel, personal protective equipment, and control 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

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 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(cies) 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 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 activities 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 sampling tasks
(d) Describe the procedure to notify the agency with investigative authority
(e) Describe the procedure to notify the explosive ordnance disposal (EOD) personnel
(f) Identify potential sample/evidence
(g) Identify the applicable sampling equipment
(h) Describe the procedures to protect samples and evidence from secondary contamination
(i) Describe documentation procedures
(j) Describe evidentiary sampling techniques
(k) Describe field screening protocols for collected 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 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 personal protective equipment, sampling equipment, detection devices, and sample and evidence packaging and transport containers
(c) Describe the sampling options associated with liquid and solid sample and evidence collection
(d) Describe the field screening protocols for collected samples and evidence

(3) Given an example of an environmental crime, the operations level responder assigned to evidence preservation and 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 personal protective equipment, sampling equipment, detection devices, and sample and evidence packaging and transport containers
(c) Describe the sampling options associated with the collection of liquid and solid samples and evidence
(d) Describe the field screening protocols for collected samples and evidence

(4) Given an example of a hazardous materials/WMD suspicious letter, the operations level responder assigned to evidence preservation and 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 personal protective equipment, sampling equipment, detection devices, and sample and evidence packaging and transport containers
(c) Describe the sampling options associated with the collection of liquid and solid samples and evidence
(d) Describe the field screening protocols for collected samples and evidence

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

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

6.5.3.2 Selecting Personal Protective Equipment. Given the personal protective equipment provided by the AHJ, the operations level responder assigned to evidence preservation and sampling shall select the personal protective equipment required to support evidence preservation and sampling at hazardous materials/WMD incidents based on local procedures *(see Section 6.2)*.

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 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 activities associated with the incident
(3) Determine whether responders are within their legal authority to perform evidence collection and sampling tasks
(4) Describe the procedure to notify the agency with investigative authority
(5) Notify the EOD personnel
(6) Identify potential samples and evidence to be collected
(7) Demonstrate procedures to protect samples and evidence from secondary contamination
(8) Demonstrate correct techniques to collect samples utilizing the equipment provided
(9) Demonstrate documentation procedures
(10) Demonstrate sampling protocols
(11) Demonstrate field screening protocols for 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 sampling shall describe local procedures for the technical decontamination process.

6.5.5 Competencies — Implementing the Planned Response. (Reserved)

6.5.6 Competencies — Terminating the Incident. (Reserved)

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 shall be that person, competent at the operations level, who is assigned to implement product control measures at hazardous materials/WMD incidents.

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 core 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.

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, 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 product control at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 6.6.1.2.2 safely and effectively.

6.6.1.2.2 When responding to hazardous materials/WMD incidents, the operations level responder assigned to perform product control shall be able to perform the following tasks:

(1) Plan an initial response within the capabilities and competencies of available personnel, personal protective equipment, and control equipment and in accordance with the emergency response plan or standard operating procedures by completing the following tasks:
   (a) Describe the control options available to the operations level responder
   (b) Describe the control options available for flammable liquid and flammable gas incidents
(2) Implement the planned response to a hazardous materials/WMD incident

6.6.2 Competencies — Analyzing the Incident. (Reserved)

6.6.3 Competencies — Planning the Response.

6.6.3.1 Identifying Control Options. Given examples of hazardous materials/WMD incidents, the operations level responder assigned to perform product control shall identify the options for each response objective by completing the following requirements as prescribed by the AHJ:

(1) Identify the options to accomplish a given response objective
(2) Identify the purpose for and the procedures, equipment, 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

6.6.3.2 Selecting Personal Protective Equipment. Given the personal protective equipment provided by the AHJ, the operations level responder assigned to perform product control shall select the personal protective equipment required to support product control at hazardous materials/WMD incidents based on local procedures *(see Section 6.2)*.

6.6.4 Competencies — Implementing the Planned Response.

6.6.4.1 Performing Control Options. Given an incident action plan for a hazardous materials/WMD incident, within the capabilities and equipment provided by the AHJ, the operations level responder assigned to perform product control shall demonstrate control functions set out in the plan by completing the following requirements as prescribed by the AHJ:

(1) Using the type of special purpose or hazard suppressing foams or agents and foam equipment furnished by the AHJ, demonstrate the application of the foam(s) or agent(s) on a spill or fire involving hazardous materials/WMD
(2) 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
(3) Given the required tools and equipment, demonstrate how to perform the following control activities:
    (a) Absorption
    (b) Adsorption
    (c) Damming
    (d) Diking
    (e) Dilution
    (f) Diversion
    (g) Retention
    (h) Remote valve shutoff
    (i) Vapor dispersion
    (j) Vapor suppression
(4) Identify the location and describe the use of emergency remote shutoff devices on MC/DOT-306/406, MC/DOT-307/407, and MC-331 cargo tanks containing flammable liquids or gases
(5) Describe the use of emergency remote shutoff devices at fixed facilities

6.6.4.2 The operations level responder assigned to perform product control shall describe local procedures for going through the technical decontamination process.

6.6.5 Competencies — Evaluating Progress. (Reserved)

6.6.6 Competencies — Terminating the Incident. (Reserved)

6.7 Mission-Specific Competencies: Air Monitoring and Sampling.

6.7.1 General.

6.7.1.1 Introduction.

6.7.1.1.1 The operations level responder assigned to perform air monitoring and sampling shall be that person, competent at the operations level, who is assigned to implement air monitoring and sampling operations at hazardous materials/WMD incidents.

6.7.1.1.2 The operations level responder assigned to perform air monitoring and sampling at hazardous materials/WMD incidents shall be trained to meet all competencies at the awareness level (*see Chapter 4*), all core 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.

6.7.1.1.3 The operations level responder assigned to perform air monitoring and sampling at hazardous materials/WMD incidents shall operate under the guidance of a hazardous materials technician, an allied professional, 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 When responding to hazardous materials/WMD incidents, the operations level responder assigned to perform air monitoring and sampling shall be able to perform the following tasks:

(1) Plan the air monitoring and sampling activities within the capabilities and competencies of available personnel, personal protective equipment, and control equipment and in accordance with the emergency response plan or standard operating procedures describe the air monitoring and sampling options available to the operations level responder
(2) Implement the air monitoring and sampling activities as specified in the incident action plan

6.7.2 Competencies — Analyzing the Incident. (Reserved)

6.7.3 Competencies — Planning the Response.

6.7.3.1 Given the air monitoring and sampling equipment provided by the AHJ, the operations level responder assigned to perform air monitoring and sampling shall select the detection or monitoring equipment suitable for detecting or monitoring solid, liquid, or gaseous hazardous materials/WMD.

6.7.3.2 Given detection and monitoring device(s) provided by the AHJ, the operations level responder assigned to perform air monitoring and sampling shall describe the operation, capabilities and limitations, local monitoring procedures, field testing, and maintenance procedures associated with each device.

6.7.3.3 Selecting Personal Protective Equipment (PPE). Given the PPE provided by the AHJ, the operations level responder assigned to perform air monitoring and sampling shall select the personal protective equipment required to support air monitoring and sampling at hazardous materials/WMD incidents based on local procedures *(see Section 6.2)*.

6.7.4 Competencies — Implementing the Planned Response.

6.7.4.1 Given a scenario involving hazardous materials/WMD and detection and monitoring devices provided by the AHJ, the operations level responder assigned to perform air monitoring and sampling shall demonstrate the field test and

operation of each device and interpret the readings based on local procedures.

6.7.4.2 The operations level responder assigned to perform air monitoring and sampling shall describe local procedures for decontamination of themselves and their detection and monitoring devices upon completion of the air monitoring mission.

6.7.5 Competencies — Evaluating Progress. (Reserved)

6.7.6 Competencies — Terminating the Incident. (Reserved)

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 shall be that person, competent at the operations level, who is assigned to rescue and recover exposed and contaminated victims at hazardous materials/WMD incidents.

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 core 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.

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, 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 victim rescue and recovery at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in 6.8.1.2.2 safely and effectively.

6.8.1.2.2 When responding to hazardous materials/WMD incidents, the operations level responder assigned to perform victim rescue and recovery shall be able to perform the following tasks:

(1) Plan a response for victim rescue and recovery operations involving the release of hazardous materials/WMD agent within the capabilities of available personnel and personal protective equipment
(2) Implement the planned response to accomplish victim rescue and recovery operations within the capabilities of available personnel and personal protective equipment

6.8.2 Competencies — Analyzing the Incident. (Reserved)

6.8.3 Competencies — Planning the Response.

6.8.3.1 Given scenarios involving hazardous materials/WMD incidents, the operations level responder assigned to victim rescue and recovery shall determine the feasibility of conducting victim rescue and recovery operations at an incident involving hazardous materials/WMD and shall be able to perform the following tasks:

(1) Determine the feasibility of conducting rescue and recovery operations
(2) Describe the safety procedures, tactical guidelines, and incident response considerations to effect a rescue associated with each of the following situations:
    (a) Line-of-sight with ambulatory victims
    (b) Line-of-sight with nonambulatory victims
    (c) Non-line-of-sight with ambulatory victims
    (d) Non-line-of-sight with nonambulatory victims
    (e) Victim rescue operations versus victim recovery operations
(3) Determine if the options are within the capabilities of available personnel and personal protective equipment
(4) Describe the procedures for implementing victim rescue and recovery operations within the incident command system

6.8.3.2 Selecting Personal Protective Equipment (PPE). Given the PPE provided by the AHJ, the operations level responder assigned to perform victim rescue and recovery shall select the personal protective equipment required to support victim rescue and recovery at hazardous materials/WMD incidents based on local procedures *(see Section 6.2)*.

6.8.4 Competencies — Implementing the Planned Response.

6.8.4.1 Given a scenario involving hazardous materials/WMD, the operations level responder assigned to victim rescue and recovery shall perform the following tasks:

(1) Identify the different team positions and describe their main functions
(2) Select and use specialized rescue equipment and procedures provided by the AHJ to support victim rescue and recovery operations
(3) Demonstrate safe and effective methods for victim rescue and recovery
(4) Demonstrate the ability to triage victims
(5) Describe local procedures for performing decontamination upon completion of the victim rescue and removal mission

6.8.5 Competencies — Evaluating Progress. (Reserved)

6.8.6 Competencies — Terminating the Incident. (Reserved)

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 methamphetamines, other 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 methamphetamines, other drugs, or WMD.

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 core 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.

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 safely and effectively.

6.9.1.2.2 When responding to hazardous materials/WMD incidents, 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 and potential outcomes and whether the incident is potentially 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, personal protective equipment, and control 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

6.9.2 Competencies — Analyzing the Incident.

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 potential booby traps that have been encountered by response personnel
(5) Given examples of illicit laboratory operations, describe the agencies that have investigative authority and operational responsibility to support the response

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.

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) Law enforcement securing and preserving the scene
(2) Joint hazardous materials and EOD personnel 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 law enforcement agency having investigative authority
(6) Documenting personnel and scene activities associated with incident

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

(1) Given scenarios involving illicit drug manufacturing or illicit WMD manufacturing, identify the law enforcement 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

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 appropriate personal protective equipment 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

6.9.3.5 Selecting Personal Protective Equipment (PPE). Given the PPE provided by the AHJ, the operations level responder assigned to respond to illicit laboratory incidents shall select the personal protective equipment required to respond to illicit laboratory incidents based on local procedures. *(See Section 6.2.)*

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 safely and effectively.

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 for law enforcement to secure the scene
(2) Demonstrate decontamination procedures for tactical law enforcement personnel (SWAT or K-9) securing an illicit laboratory
(3) Describe methods to identify and avoid potential unique safety hazards found at illicit laboratories such as booby traps and releases of hazardous materials
(4) Describe methods to conduct joint hazardous materials/EOD operations to identify safety hazards and implement control procedures

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) Potential manufacture of illicit drugs
(2) Potential manufacture of illicit WMD materials
(3) Potential environmental crimes associated with the manufacture of illicit drugs/WMD materials

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. (Reserved)

6.10 Mission-Specific Competencies: Disablement/Disruption of Improvised Explosives 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.

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 core competencies at the operations level (*see Chapter 5*), all mission-specific competencies for personal protective equipment (*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 safely and effectively.

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 potentially 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, personal protective equipment, and control equipment by completing the following tasks
    (a) Determine if response options can be effectively 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 (NBSCAB) "A Model for Bomb Squad Standard Operating Procedures," established protocol of military units, or the AHJ

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 is potentially 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, personal protective equipment, 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

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

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 potential 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 nonvehicle 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 personal protective equipment
(c) Describe the procedure for identifying and obtaining the appropriate emergency response elements to support disablement/disruption activities
(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 personal protective equipment
(c) Describe the procedure for identifying and obtaining the appropriate emergency response elements to support disablement/disruption activities
(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 home made 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 explosive laboratory, the operations level responder assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives shall be capable of identifying the unique aspects associated with such incidents by completing the following requirements:

(1) Given a scenario involving an improvised explosive 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 personal protective equipment
   (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 activities

6.10.3.3 Identifying Potential Response Options.

6.10.3.3.1 Given scenarios 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 incident shall identify possible response options.

6.10.3.3.2 Given scenarios 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 incident shall identify possible response options.

6.10.3.4 Selecting Personal Protective Equipment. Given the personal protective equipment provided by the AHJ, the operations level responder assigned to perform disablement/disruption of IEDs, improvised WMD dispersal devices, and operations at improvised explosives laboratories incident, shall select the personal protective equipment 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.

6.10.4.1 Given scenarios 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 laboratory incident 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 activities within the capabilities and competencies of available personnel, personal protective equipment, and control 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

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 at improvised explosives laboratory incident 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 unique 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)

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 by which he or she analyzes a problem involving hazardous materials/WMD, selects applicable decontamination procedures, and controls a release using specialized protective clothing and control equipment (*see 7.1.2.2*).

7.1.1.2 The hazardous materials technician shall be trained to meet all competencies at the awareness level (*see Chapter 4*), all core 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 safely.

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 identify special containers involved, to identify or classify unknown materials, and to verify the presence and concentrations of hazardous materials 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) 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, personal protective equipment, and control 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 personal protective equipment 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, personal protective equipment, and control 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 local incident management system (IMS)
   (b) Don, work in, and doff personal protective clothing, including, but not limited to, both liquid splash– and vapor–protective clothing with correct respiratory protection
   (c) Perform the control functions identified in the incident action plan
   (d) Perform the decontamination functions identified in the incident action plan

(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.

7.2.1 Surveying Hazardous Materials/WMD Incidents. Given examples of hazardous materials/WMD incidents, the hazardous materials technician shall identify containers involved and, given the necessary equipment, 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 7.2.1.1 through 7.2.1.5.

7.2.1.1 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.

7.2.1.1.1 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

7.2.1.1.2 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
   (a) IM-101 portable tanks (IMO Type 1 internationally)
   (b) IM-102 portable tanks (IMO Type 2 internationally)
(2) Pressure intermodal tank (DOT Specification 51; IMO Type 5 internationally)
(3) Specialized intermodal tanks
   (a) Cryogenic intermodal tanks (IMO Type 7 internationally)
   (b) Tube modules

7.2.1.1.3 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

7.2.1.1.4 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

7.2.1.1.5 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

7.2.1.1.6 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

7.2.1.1.7 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

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

7.2.1.2.1 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

7.2.1.2.2 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

7.2.1.3* Given at least three unknown hazardous materials/WMD, one of which is a solid, one a liquid, and one a gas, the hazardous materials technician shall identify or classify by hazard each unknown material.

7.2.1.3.1 The hazardous materials technician shall identify the steps in an analysis process for identifying unknown solid and liquid materials.

7.2.1.3.2 The hazardous materials technician shall identify the steps in an analysis process for identifying an unknown atmosphere.

7.2.1.3.3 The hazardous materials technician shall identify the type(s) of monitoring technology used to determine the following hazards:

(1) Corrosivity
(2) Flammability
(3) Oxidation potential
(4) Oxygen deficiency
(5) Pathogenicity
(6) Radioactivity
(7) Toxicity

7.2.1.3.4* 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) Chemical agent monitors (CAMs)
(3) Colorimetric indicators [colorimetric detector tubes, indicating papers (pH paper and meters), reagents, test strips]
(4) Combustible gas indicator
(5) DNA fluoroscopy
(6) Electrochemical cells (carbon monoxide meter, oxygen meter)
(7) Flame ionization detector
(8) Gas chromatograph/mass spectrometer (GC/MS)
(9) Infrared spectroscopy
(10) Ion mobility spectroscopy
(11) Gamma spectrometer [radioisotope identification device (RIID)]
(12) Metal oxide sensor
(13) Photoionization detectors
(14) Polymerase chain reaction (PCR)
(15) Radiation detection and measurement instruments
(16) Raman spectroscopy
(17) Surface acoustical wave (SAW)
(18) Wet chemistry

7.2.1.3.5* 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, oxygen deficiency, radioactivity, toxicity, and pathogenicity):

(1) Carbon monoxide meter
(2) Colorimetric tubes
(3) Combustible gas indicator
(4) Oxygen meter
(5) Passive dosimeters
(6) pH indicators and/or pH meters
(7) Photoionization and flame ionization detectors
(8) Radiation detection instruments
(9) Reagents
(10) Test strips
(11) WMD detectors (chemical and biological)
(12) Other equipment provided by the AHJ

7.2.1.3.6 Given monitoring equipment, test strips, and reagents provided by the AHJ, the hazardous materials technician shall demonstrate the field maintenance and testing procedures for those items.

7.2.1.4* Given a label for a radioactive material, the hazardous materials technician shall identify the type or category of label, contents, activity, transport index, and criticality safety index as applicable, then describe the radiation dose rates associated with each label.

7.2.1.5 The hazardous materials technician shall demonstrate methods for collecting samples of the following:

(1) Gas
(2) Liquid
(3) Solid

7.2.2 Collecting and Interpreting Hazard and Response Information. Given access to printed and technical resources, computer databases, and monitoring equipment, the hazardous materials technician shall collect and interpret hazard and response information not available from the current edition of the DOT *Emergency Response Guidebook* or an MSDS and shall meet the requirements of 7.2.2.1 through 7.2.2.6.

7.2.2.1* The hazardous materials technician shall identify and interpret the types of hazard and response information available from each of the following resources and explain the advantages and disadvantages of each resource:

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

7.2.2.2 The hazardous materials technician shall describe the following terms and explain their significance in the analysis process:

(1) Corrosive (acids and bases/alkaline)
(2) Air reactivity
(3) Autorefrigeration
(4) Biological agents and biological toxins
(5) Blood agents
(6) Boiling point
(7) Catalyst
(8) Chemical change
(9) Chemical interactions
(10) Compound, mixture
(11) Concentration
(12) Critical temperature and pressure
(13) Dissociation (acid/base)
(14) Dose
(15) Dose response
(16) Expansion ratio
(17) Fire point
(18) Flammable (explosive) range (LEL and UEL)
(19) Flashpoint
(20) Half-life
(21) Halogenated hydrocarbon
(22) Ignition (autoignition) temperature
(23) Inhibitor
(24) Instability
(25) Ionic and covalent compounds
(26) Irritants (riot control agents)
(27) Maximum safe storage temperature (MSST)
(28) Melting point and freezing point
(29) Miscibility
(30) Nerve agents
(31) Organic and inorganic
(32) Oxidation potential
(33) Persistence
(34) pH
(35) Physical change
(36) Physical state (solid, liquid, gas)
(37) Polymerization
(38) Radioactivity
(39) Reactivity
(40) Riot control agents
(41) Saturated, unsaturated (straight and branched), and aromatic hydrocarbons
(42) Self-accelerating decomposition temperature (SADT)
(43) Solubility
(44) Solution and slurry
(45) Specific gravity
(46) Strength
(47) Sublimation
(48) Temperature of product
(49) Toxic products of combustion
(50) Vapor density
(51) Vapor pressure
(52) Vesicants (blister agents)
(53) Viscosity
(54) Volatility

7.2.2.3 The hazardous materials technician shall describe the heat transfer processes that occur as a result of a cryogenic liquid spill.

7.2.2.4* Given five hazardous materials/WMD scenarios and the associated reference materials, the hazardous materials technician shall identify the signs and symptoms of exposure to each material and the target organ effects of exposure to that material.

7.2.2.5 The hazardous materials technician shall identify two methods for determining the pressure in bulk packaging or facility containers.

7.2.2.6 The hazardous materials technician shall identify one method for determining the amount of lading remaining in damaged bulk packaging or facility containers.

7.2.3* Describing the Condition of the Container Involved in the Incident. Given examples of container damage, the hazardous materials technician shall describe the damage by completing the related requirements of 7.2.3.1 through 7.2.3.5.

7.2.3.1* Given examples of containers, including the DOT specification markings for nonbulk and bulk packaging, and associated reference guides, the hazardous materials technician shall identify the basic design and construction features of each container.

7.2.3.1.1 The hazardous materials technician shall identify the basic design and construction features, including closures, of the following bulk containers:

(1) Cargo tanks
    (a) Compressed gas tube trailers
    (b) Corrosive liquid tanks
    (c) Cryogenic liquid tanks
    (d) Dry bulk cargo tanks

(e) High-pressure tanks
(f) Low-pressure liquid tanks
(g) Nonpressure liquid tanks

(2) Fixed facility tanks
(a) Cryogenic liquid tanks
(b) Nonpressure tanks
(c) Pressure tanks

(3) Intermediate bulk containers (also known as tote tanks)
(4) Intermodal tanks
(a) Nonpressure intermodal tanks
i. IM-101 portable tank (IMO Type 1 internationally)
ii. IM-102 portable tank (IMO Type 2 internationally)
(b) Pressure intermodal tanks (DOT Specification 51; IMO Type 5 internationally)
(c) Specialized intermodal tanks
i. Cryogenic intermodal tanks (IMO Type 7 internationally)
ii. Tube modules

(5) One-ton containers (pressure drums)
(6) Pipelines
(7) Railroad cars
(a) Cryogenic liquid tank cars
(b) Nonpressure tank cars
(c) Pneumatically unloaded hopper cars
(d) Pressure tank cars

7.2.3.1.2 The hazardous materials technician shall identify the basic design and construction features, including closures of the following nonbulk containers:

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

7.2.3.1.3 The hazardous materials technician shall identify the basic design features and testing requirements on the following radioactive materials packages:

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

7.2.3.2 The hazardous materials technician shall describe how a liquid petroleum product pipeline can carry different products.

7.2.3.3 Given an example of a pipeline, the hazardous materials technician shall identify the following:

(1) Ownership of the line
(2) Procedures for checking for gas migration
(3) Procedure for shutting down the line or controlling the leak
(4) Type of product in the line

7.2.3.4* Given examples of container stress or damage, the hazardous materials technician shall identify the type of damage in each example and assess the level of risk associated with the damage.

7.2.3.5 Given a scenario involving radioactive materials, the hazardous materials technician, using available survey and monitoring equipment, shall determine if the integrity of any container has been breached.

7.2.4 Predicting Likely Behavior of Materials and Their Containers Where Multiple Materials Are Involved. Given examples of hazardous materials/WMD incidents involving multiple hazardous materials or WMD, the hazardous materials technician shall predict the likely behavior of the material in each case and meet the requirements of 7.2.4.1 through 7.2.4.3.

7.2.4.1 The hazardous materials technician shall identify at least three resources available that indicate the effects of mixing various hazardous materials.

7.2.4.2 The hazardous materials technician shall 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 their 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

7.2.4.3 The hazardous materials technician shall 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 their significance in the analysis process:

(1) Fire protection systems
(2) Monitoring and detection systems
(3) Pressure relief protection
(4) Transfer operations

7.2.5 Estimating the Likely Size of an Endangered Area. Given examples of hazardous materials/WMD incidents, the hazardous materials technician shall estimate the likely size, shape, and concentrations associated with the release of materials involved in an incident by using computer modeling, monitoring equipment, or specialists in this field by completing the requirements of 7.2.5.1 through 7.2.5.4.

7.2.5.1 Given the emergency response plan, the hazardous materials technician shall identify resources for dispersion pattern prediction and modeling, including computers, monitoring equipment, or specialists in the field.

7.2.5.2 Given the quantity, concentration, and release rate of a material, the hazardous materials technician shall identify the steps for determining the likely extent of the physical, safety, and health hazards within the endangered area of a hazardous materials/WMD incident.

7.2.5.2.1 The hazardous materials technician shall describe the following terms and exposure values and explain their 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) Incubation period
(4) Infectious dose
(5) Lethal concentrations (LC_{50})
(6) Lethal dose (LD_{50})
(7) Parts per billion (ppb)
(8) Parts per million (ppm)
(9) Permissible exposure limit (PEL)

(10) Radiation absorbed dose (rad)
(11) Roentgen equivalent man (rem), millirem (mrem), microrem (μrem)
(12) Threshold limit value ceiling (TLV-C)
(13) Threshold limit value short-term exposure limit (TLV-STEL)
(14) Threshold limit value time-weighted average (TLV-TWA)

7.2.5.2.2 The hazardous materials technician shall identify two methods for predicting the areas of potential harm within the endangered area of a hazardous materials/WMD incident.

7.2.5.3* The hazardous materials technician shall identify the steps for estimating the outcomes within an endangered area of a hazardous materials/WMD incident.

7.2.5.4 Given three examples involving 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.

7.3.1.1 Given scenarios involving hazardous materials/WMD incidents, the hazardous materials technician shall describe the response objectives for each problem.

7.3.1.2 Given an analysis of a hazardous materials/WMD incident, the hazardous materials technician shall be able to describe the steps for determining response objectives (defensive, offensive, and nonintervention).

7.3.2 Identifying the Potential Response Options.

7.3.2.1 Given scenarios involving hazardous materials/WMD incidents, the hazardous materials technician shall identify the possible response options (defensive, offensive, and nonintervention) by response objective for each problem.

7.3.2.2 The hazardous materials technician shall be able to identify the possible response options to accomplish a given response objective.

7.3.3 Selecting Personal Protective Equipment. Given scenarios of hazardous materials/WMD incidents with known and unknown hazardous materials/WMD, the hazardous materials technician shall determine the personal protective equipment for the response options specified in the incident action plan in each situation by completing the requirements of 7.3.3.1 through 7.3.3.4.8.

7.3.3.1 The hazardous materials technician shall describe types of personal protective equipment that are available for response based on NFPA standards and how these items relate to EPA levels of protection.

7.3.3.2 The hazardous materials technician shall identify and describe personal protective equipment options available for the following hazards:

(1) Thermal
(2) Radiological
(3) Asphyxiating
(4) Chemical (liquids and vapors)
(5) Etiological (biological)
(6) Mechanical (explosives)

7.3.3.3 The hazardous materials technician shall identify the process to be considered in selecting respiratory protection for a specified action option.

7.3.3.4 The hazardous materials technician shall identify the factors to be considered in selecting chemical-protective clothing for a specified action option.

7.3.3.4.1 The hazardous materials technician shall describe the following terms and explain their impact and significance on the selection of chemical-protective clothing:

(1) Degradation
(2) Penetration
(3) Permeation

7.3.3.4.2 The hazardous materials technician shall identify at least three indications of material degradation of chemical-protective clothing.

7.3.3.4.3* The hazardous materials technician shall identify the different designs of vapor-protective and splash-protective clothing and describe the advantages and disadvantages of each type.

7.3.3.4.4 The hazardous materials technician shall identify the relative advantages and disadvantages of the following heat exchange units used for the cooling of personnel in personal protective equipment:

(1) Air cooled
(2) Ice cooled
(3) Water cooled
(4) Phase change cooling technology

7.3.3.4.5 The hazardous materials technician shall identify the process for selecting protective clothing at hazardous materials/WMD incidents.

7.3.3.4.6 Given three examples of various hazardous materials, the hazardous materials technician shall determine the protective clothing construction materials for a given action option using chemical compatibility charts.

7.3.3.4.7 The hazardous materials technician shall identify the physiological and psychological stresses that can affect users of personal protective equipment.

7.3.3.4.8 Given the personal protective equipment provided by the AHJ, the hazardous materials technician shall identify the process for inspecting, testing, and maintenance of personal protective equipment.

7.3.4 Selecting Decontamination Procedures. Given a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall select a decontamination procedure that will minimize the hazard, shall determine the equipment required to implement that procedure, and shall complete the following tasks:

(1) Describe the advantages and limitations of each of the following decontamination methods:
    (a) Absorption
    (b) Adsorption
    (c) Chemical degradation
    (d) Dilution
    (e) Disinfecting
    (f) Evaporation
    (g) Isolation and disposal
    (h) Neutralization
    (i) Solidification
    (j) Sterilization
    (k) Vacuuming
    (l) Washing

(2) Identify three sources of information for determining the applicable decontamination procedure and identify how to access those resources in a hazardous materials/WMD incident

7.3.5 Developing a Plan of Action. Given scenarios involving hazardous materials/WMD incidents, the hazardous materials technician shall develop a plan of action, including site safety and a control plan, that is consistent with the emergency response plan and standard operating procedures and within the capability of available personnel, personal protective equipment, and control equipment for that incident by completing the requirements of 7.3.5.1 through 7.3.5.5.

7.3.5.1 The hazardous materials technician shall describe the purpose of, procedures for, equipment required for, and safety precautions used with the following techniques for hazardous materials/WMD control:

(1) Absorption
(2) Adsorption
(3) Blanketing
(4) Covering
(5) Damming
(6) Diking
(7) Dilution
(8) Dispersion
(9) Diversion
(10) Fire suppression
(11) Neutralization
(12) Overpacking
(13) Patching
(14) Plugging
(15) Pressure isolation and reduction (flaring; venting; vent and burn; isolation of valves, pumps, or energy sources)
(16) Retention
(17) Solidification
(18) Transfer
(19) Vapor control (dispersion, suppression)

7.3.5.2 Given a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall develop the site safety and control plan that must be included as part of the incident action plan.

7.3.5.2.1 The hazardous materials technician shall list and describe the safety considerations to be included.

7.3.5.2.2 The hazardous materials technician shall identify the points that should be made in a safety briefing prior to working at the scene.

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

7.3.5.4 The hazardous materials technician shall identify the pre-entry activities to be performed.

7.3.5.5 The hazardous materials technician shall 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.

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 branch or group within the incident command system and shall identify the role of the hazardous materials technician during hazardous materials/WMD incidents.

7.4.1.1 Describe the duties of an assigned function in the hazardous materials branch or group within the incident command system.

7.4.1.2 Identify the role of the hazardous materials technician during hazardous materials/WMD incidents.

7.4.2 Using Protective Clothing and Respiratory Protection. The hazardous materials technician shall demonstrate the ability to don, work in, and doff liquid splash–protective, vapor-protective, and chemical-protective clothing and any other specialized personal protective equipment provided by the AHJ, including respiratory protection, and shall complete the following tasks:

(1) Describe three safety procedures for personnel working in chemical-protective clothing
(2)*Describe three emergency procedures for personnel working in chemical-protective clothing
(3) Demonstrate the ability to don, work in, and doff self-contained breathing apparatus in addition to any other respiratory protection provided by the AHJ
(4) Demonstrate the ability to don, work in, and doff liquid splash–protective, vapor-protective, and chemical-protective clothing in addition to any other specialized protective equipment provided by the AHJ

7.4.3 Performing Control Functions Identified in Incident Action Plan. Given scenarios involving hazardous materials/WMD incidents, the hazardous materials technician shall select the tools, equipment, and materials for the control of hazardous materials/WMD incidents and identify the precautions for controlling releases from the packaging/containers and shall complete the following tasks:

(1)*Given a pressure vessel, select the material or equipment and demonstrate a method(s) to contain leaks from the following locations:
  (a) Fusible plug
  (b) Fusible plug threads
  (c) Side wall of cylinder
  (d) Valve blowout
  (e) Valve gland
  (f) Valve inlet threads
  (g) Valve seat
  (h) Valve stem assembly blowout
(2)*Given the fittings on a pressure container, demonstrate the ability to perform the following:
  (a) Close valves that are open
  (b) Replace missing plugs
  (c) Tighten loose plugs
(3) Given a 55 gal (208 L) drum and applicable tools and materials, demonstrate the ability to contain the following types of leaks:
  (a) Bung leak
  (b) Chime leak
  (c) Forklift puncture
  (d) Nail puncture
(4) 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:
  (a) Rolling slide-in
  (b) Slide-in
  (c) Slip-over

(5) 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
(6) Identify three considerations for assessing a leak or spill inside a confined space without entering the area
(7)*Identify three safety considerations for product transfer operations
(8) Given an MC-306/DOT-406 cargo tank and a dome cover clamp, demonstrate the ability to install the clamp on the dome
(9) Identify the methods and precautions used to control a fire involving an MC-306/DOT-406 aluminum shell cargo tank
(10) Describe at least one method for containing each of the following types of leaks in MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412 cargo tanks:
  (a) Dome cover leak
  (b) Irregular-shaped hole
  (c) Puncture
  (d) Split or tear
(11)*Describe three product removal and transfer considerations for overturned MC-306/DOT-406, MC-307/DOT-407, MC-312/DOT-412, MC-331, and MC-338 cargo tanks

7.4.4 Given MC-306/DOT-406, MC-307/DOT-407, MC-312/DOT-412, MC-331, and MC-338 cargo tanks, the hazardous materials technician shall identify the common methods for product transfer from each type of cargo tank.

7.4.5* Performing Decontamination Operations Identified in the Incident Action Plan. The hazardous materials technician shall demonstrate the ability to set up and implement the following types of decontamination operations:

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

7.5 Competencies — Evaluating Progress.

7.5.1 Evaluating the Effectiveness of the Control Functions. Given scenarios involving hazardous materials/WMD incidents and the incident action plan, the hazardous materials technician shall evaluate the effectiveness of any control functions identified in the incident action plan.

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.

7.6.1 Assisting in the Debriefing. Given a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall participate in the debriefing of the incident by completing the following requirements:

(1) Describe three components of an effective debriefing
(2) Describe the key topics of an effective debriefing
(3) Describe when a debriefing should take place
(4) Describe who should be involved in a debriefing

7.6.2 Assisting in the Incident Critique. Given a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall provide operational observations of the activities that were performed in the hot and warm zones during the incident 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 which written documents should be prepared as a result of the critique

7.6.3 Reporting and Documenting the Incident. Given a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall complete reporting and documentation as required by the AHJ by completing the following requirements:

(1) Identify the reports and supporting documentation required by the emergency response plan or standard operating procedures
(2) Demonstrate completion of the reports and supporting documentation
(3) Describe the importance of personnel exposure records
(4) Describe the importance of debriefing records
(5) Describe the importance of critique records
(6) Identify the steps in keeping an activity log and exposure records
(7) Identify the steps to be taken in compiling incident reports that meet federal, state, local, and organizational requirements
(8) Identify the requirements for compiling hot zone entry and exit logs
(9) Identify the requirements for compiling personal protective equipment logs
(10) Identify the requirements for filing documents and maintaining records

Chapter 8 Competencies for Incident Commanders

8.1 General.

8.1.1 Introduction.

8.1.1.1 The incident commander (IC) 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 authority having jurisdiction.

8.1.1.2 The incident commander shall be trained to meet all competencies at the awareness level (*see Chapter 4*), all core 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 safely.

8.1.2.2 In addition to being competent at the awareness and all core 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, computer 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, 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 or standard operating procedures and within the capability of available personnel, personal protective equipment, and control equipment
(3) Implement a response to favorably change the outcome 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 notification and utilization of nonlocal resources (e.g., private, state, and federal government 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 the response objectives are being met safely, effectively, and efficiently and adjust the incident action plan accordingly
(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 monitoring equipment, the incident commander shall ensure the collection and interpretation of hazard and response information not available from the current edition of the DOT *Emergency Response Guidebook* or an MSDS.

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) 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
   (d) Covering
   (e) Contamination isolation
   (f) Damming
   (g) Diking
   (h) Dilution
   (i) Dispersion
   (j) Diversion
   (k) Fire suppression
   (l) Neutralization
   (m) Overpacking
   (n) Patching
   (o) Plugging
   (p) Pressure isolation and reduction (flaring; venting; vent and burn; isolation of valves, pumps, or energy sources)
   (q) Retention
   (r) Solidification
   (s) Transfer
   (t) Vapor control (dispersion, suppression)

8.3.3 Approving the Level of Personal Protective Equipment. Given scenarios involving hazardous materials/WMD with known and unknown hazardous materials/WMD, the incident commander shall approve the personal protective equipment for the response options specified in the incident action plan 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 personal protective equipment

8.3.4 Developing an Incident Action Plan. Given scenarios involving hazardous materials/WMD incidents, the incident commander shall develop an incident action plan, including site safety and control plan, consistent with the emergency response plan or standard operating procedures and within the capability of the available personnel, personal protective equipment, and control 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 incident action plan.

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.

8.3.4.3 Given the emergency response plan or standard operating procedures, the incident commander shall identify which entity 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 safety protective action (evacuation or shelter in-place)
(9) Provide fire suppression services
(10) Provide on-scene medical assistance (ambulance) and medical treatment (hospital)
(11) Provide public notification (warning)
(12) Provide public information (news media statements)
(13) Provide on-scene communications support
(14) Provide emergency on-scene decontamination
(15) Provide operations-level hazard control services
(16) Provide technician-level hazard mitigation services
(17) Provide environmental remedial action (cleanup) services
(18) Provide environmental monitoring
(19) Implement on-site accountability
(20) Provide on-site responder identification
(21) Provide incident command post security
(22) Provide incident or crime scene investigation
(23) Provide evidence collection and sampling

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.

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 (private, state, and federal government 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 their 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 local, state, and federal 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. Given scenarios involving hazardous materials/WMD incidents, the incident commander shall evaluate the progress of the incident action plan 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) Personal protective equipment
(4) Make modifications to the incident action plan as necessary

8.5.2* Transferring Command and Control Both 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 be taken 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 incident action plan 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 conducting incident debriefings at a hazardous materials/WMD incident

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 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 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) 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 local, state, and federal requirements and shall complete the following tasks:

(1) Identify the reporting requirements of the federal, state, and local agencies
(2) Identify the importance of the 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 requirements for compiling hazardous materials/WMD incident reports found in the emergency response plan or standard operating procedures
(5) Identify the requirements for filing documents and maintaining records found in the emergency response plan or standard operating procedures
(6) 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 emergencies 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 chapter 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 safely and effectively.

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 safely:

(1) Assist the incident commander in analyzing the magnitude of an emergency 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 MSDS 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 MSDS 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 local, state, and federal authorities
(3) Identify the resources available from CHEMTREC/CANUTEC/SETIQ and local, state, and federal 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 MSDS 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 personal protective equipment
    (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.

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 safely 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 personal protective equipment 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) *Develop an incident action plan (within the capabilities of the available resources), including site safety and control plan, for handling hazardous materials/WMD, or containers for hazardous materials/WMD, consistent with the emergency response plan and/or standard operating procedures
(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 incident action plan, 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 personal protective equipment 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 MSDS 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 MSDS, 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 personal protective equipment
(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 Personal Protective Equipment Requirements. Given specific hazardous materials/WMD or containers for hazardous materials/WMD within the employee's individual area of specialization and the associated re-

sources, the specialist employee B shall advise the incident commander of the personal protective equipment necessary for various response options by completing the following requirements:

(1) Given a specific chemical and a corresponding MSDS or other chemical-specific resource, identify personal protective equipment, including the materials of construction, that is 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 personal protective equipment 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 personal protective equipment 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 MSDS or other chemical-specific resource, identify the potential methods for removing or neutralizing that chemical
(2) Given a specific chemical and a corresponding MSDS 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 MSDS 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 MSDS 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. 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 incident action plan, 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 incident action plan, 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 incident action plan

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 personal protective equipment), 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 Personal Protective Equipment. 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 personal protective equipment, including the following:
  (a) Buddy system
  (b) Backup personnel
  (c) Symptoms of heat and cold stress
  (d) Limitations of personnel working in personal protective equipment
  (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 personal protective equipment 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 personal protective equipment 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.

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 safely 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 personal protective equipment 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 incident action plan (within the capabilities of the available resources), including 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 personal protective equipment 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.

10.1.1.1 The hazardous materials officer (NIMS: Hazardous Materials Branch Director/Group Supervisor) shall be that person who is responsible for directing and coordinating all operations involving hazardous materials/WMD as assigned by the incident commander.

10.1.1.2 The hazardous materials officer shall be trained to meet all competencies at the awareness level (*see Chapter 4*), all core 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 safely.

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, personal protective equipment, and control 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 personal protective equipment required for a given action option
   (d) Provide recommendations to the incident commander for the development of an incident action plan for the hazardous materials branch/group consistent with the emergency response plan and/or standard operating procedures and within the capability of available personnel, personal protective equipment, and control 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 branch/group operations
   (b) Direct hazardous materials branch/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 branch/group resources
(4) Evaluate the progress of the planned response to ensure that the response objectives are effective, and adjust the incident action plan accordingly
(5) Terminate the incident by completing the following:
   (a) Conduct a debriefing for hazardous materials branch/group personnel
   (b) Conduct a critique for hazardous materials branch/group personnel
   (c) Report and document the hazardous materials branch/group operations

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 Personal Protective Equipment. Given scenarios involving hazardous materials/WMD incidents with known and unknown hazardous materials/WMD, the hazardous materials officer shall select the personal protective equipment for the response options specified in the incident action plan 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 is within the capability of the available personnel, personal protective equipment, and control 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 branch to ensure medical assistance (ambulance) and medical treatment (hospital)
(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

(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.

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 (private, state, and federal government 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 local, state, regional, and federal government agencies and identify 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 branch/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

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 branch/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 local, state, and federal 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

10.5 Competencies — Evaluating Progress. Given scenarios involving hazardous materials/WMD incidents, the hazardous materials officer shall evaluate the progress of the incident action plan 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 being used
(b) Control zones
(c) Personal protective equipment
(d) Control, containment, and confinement operations
(e) Decontamination
(4) Make appropriate modifications to the incident action plan

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 incident action plan 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 conducting incident debriefings at a hazardous materials/WMD incident

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 branch/group 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

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 branch/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 local, state, and federal requirements and shall complete the following tasks:

(1) Identify the reporting requirements of federal, state, and local agencies
(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 requirements found in the emergency response plan and/or standard operating procedures for compiling hazardous materials/WMD incident reports
(5) Identify the requirements for filing documents and maintaining records as defined in the emergency response plan and/or standard operating procedures
(6) 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.

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 branch/group) to ensure that recognized hazardous materials/WMD safe practices are followed at hazardous materials/ WMD incidents.

11.1.1.2 The hazardous materials safety officer shall be trained to meet all competencies at the awareness level (*see Chapter 4*), all core competencies at the operations level (*see Chapter 5*), 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.

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 and ensure that recognized safe operational practices are followed and to perform the tasks in 11.1.2.2 safely.

11.1.2.2 When responding to hazardous materials/WMD incidents, the hazardous materials safety officer shall be able to perform the following tasks safely and effectively:

(1) Analyze a hazardous materials/WMD incident to determine the complexity of the problem in terms of safety by observing a scene and reviewing and evaluating hazard and response information as it pertains to the safety of all persons in the hazardous materials branch/group
(2) Assist in planning a safe response within the capabilities of available response personnel, personal protective equipment, and control 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
   (d) Review the incident action plan and provide recommendations regarding safety
   (e) Review the selection of personal protective equipment required for a given action option
   (f) Review the decontamination plan and procedures
   (g) Ensure that emergency medical services are provided
(3) Ensure the implementation of a safe response consistent with the incident action plan, 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 (personnel and environment)
(4) Evaluate the progress of the planned response to ensure that the response objectives are being met safely by completing the following tasks:
   (a) Identify deviations from the site safety and control plan or other dangerous situations
   (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 followup required of the hazardous materials safety officer
   (b) Assist in the debriefing of hazardous materials branch/group personnel
   (c) Assist in the incident critique

11.2 Competencies — Analyzing the Incident.

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 as it pertains to the safety of all persons within the hazardous materials branch/group, and meet the requirements of 11.2.1.1 through 11.2.1.6.

11.2.1.1 The hazardous materials safety officer 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) Synergistic effects

11.2.1.2* The hazardous materials safety officer shall identify at least three conditions where the hazards from flammability would require chemical-protective clothing with thermal protection.

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

11.2.1.4 Given the names of five hazardous materials/WMD and at least three reference sources, the hazardous materials safety officer shall identify the physical and chemical properties and their potential impact 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 hazardous materials officer in developing a site safety and control plan to respond within the capabilities of available response personnel, personal protective equipment, and control 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 11.2.1.6
(2)*Identify safety precautions associated with search and rescue missions at hazardous materials/WMD incidents

11.3.2 Providing Recommendations Regarding Safety Considerations.

11.3.2.1 Given scenarios involving hazardous materials/WMD incidents, the hazardous materials safety officer shall provide the incident safety officer, hazardous materials officer, and incident commander with observation-based recommendations regarding considerations for the safety of on-site personnel.

11.3.2.2 The hazardous materials safety officer shall develop recommendations for the hazardous materials officer regarding safety considerations of the hazards and risks for each of the hazardous materials/WMD and containers identified in 11.2.1.6.

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 incident action plan and shall complete the following tasks:

(1)*Identify the importance and list five benefits of pre-emergency planning relating to specific sites
(2)*Identify and name five hazards and precautions to be observed when personnel approach a hazardous materials/WMD incident
(3)*List the elements of a site safety and control plan
(4) Given a pre-incident plan and a scenario involving one of the hazardous materials/WMD and containers described in 11.2.1.6, develop safety considerations for the incident

11.3.4 Providing Recommendations Regarding Safety and Reviewing the Incident Action Plan. Given a proposed incident action plan for an incident involving one of the hazardous materials/WMD and containers described in 11.2.1.6, 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 incident action plan and shall complete the following tasks:

(1) Ensure that the site safety and control plan in the proposed incident action plan is consistent with the emergency response plan and/or standard operating procedures
(2) Make recommendations to the incident commander on the safety considerations in the proposed incident action plan

11.3.5 Reviewing Selection of Personal Protective Equipment. Given scenarios involving hazardous materials/WMD incidents, the hazardous materials safety officer shall demonstrate the ability to review the selection of personal protective equipment required for a given action option and shall complete the following tasks:

(1) Identify five safety considerations for personnel working in personal protective equipment
(2) Given the names of five different hazardous materials/WMD and a chemical compatibility chart for chemical-protective clothing, identify the chemical-protective clothing that would provide protection from the identified hazards to the wearer for each of the five substances
(3)*Given the names of five different hazardous materials/WMD, identify the personal protective equipment options for specified response options
(4) Identify the recommended methods for donning, doffing, and using all personal protective equipment 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 incident action plan.

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

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
(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 personal protective equipment
   (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 personal protective equipment
(5) Describe five conditions in which it would be prudent to withdraw from a hazardous materials/WMD incident

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 incident action plan.

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 11.2.1.6, as specified by the emergency response plan and/or standard operating procedures.

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 personal protective clothing and equipment, verify that each team is protected and prepared to safely perform its assigned tasks by completing the following:
   (a) Verify whether the selection of clothing and equipment is consistent with the site safety and control plan
   (b) Verify whether each team has examined the clothing for barrier integrity and the equipment to ensure correct working order
   (c) Verify whether protective clothing and equipment 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 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
(8) 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
(9)*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
(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.

11.4.6.2 The hazardous materials safety officer shall ensure that entry team members regularly 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.

11.4.8 Verifying Exposure Monitoring. The hazardous materials safety officer shall identify that exposure monitoring (personnel and environment), as specified in the emergency response plan and/or standard operating procedures and site safety and control plan considerations, is performed.

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 dangerous conditions, the hazardous materials safety officer shall evaluate the progress of the planned response to ensure that the response objectives are being met safely 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 dangerous 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 personal protective equipment

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 dangerous 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

11.6.2 Debriefing of Hazardous Materials Branch/Group Personnel. Given scenarios involving hazardous materials/WMD incidents, the hazardous materials safety officer shall debrief hazardous materials branch/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.

11.6.2.2 The hazardous materials safety officer shall demonstrate the procedure for debriefing hazardous materials branch/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.

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 generally 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.

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 core 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 safety 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 safely.

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 in an emergency
(2) Plan a response to an emergency involving tank cars within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by determining the response options (offensive, defensive, and 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.

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
(2) Point out the "B" end of the car
(3) Given examples of various tank cars, identify and describe the design and purpose of each of the following tank car components, when present:
  (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)
  (i) Underframe — continuous or stub sill
(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 jacketed and sprayed-on thermal protection on tank cars
(7) Describe the difference between interior and exterior heater coils on tank cars
(8) Given examples of various fittings arrangements for pressure, nonpressure, cryogenic, and carbon dioxide tank cars (including examples of each of the following fittings), identify and describe the design, construction, and operation of each of the following fittings, when present:
  (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, wafersphere, plug)
    iv. Quick-fill hole cover
    v. Carbon dioxide tank car fittings
    vi. Cryogenic liquid tank car fittings
    vii. Excess flow valve
    viii. Flange for manway, valves, and so forth
    ix. Liquid valve and vapor valve (ball versus plug type)
  (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 (pressure relief valve, safety vent, 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)

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

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

(9) 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) Combination pressure relief valve
(f) Flange
(g) Liquid valve and vapor valve (ball versus plug type)
(h) Manway, manway cover plate, hinged and bolted manway cover, protective housing
(i) Open gauging devices (e.g., slip tube)
(j) Pressure regulators on carbon dioxide cars and liquefied atmospheric gases in cryogenic liquid tank cars
(k) Quick-fill hole cover
(l) Combination pressure relief valve
(m) Pressure relief valve
(n) Safety vent disk
(o) Sample line
(p) Thermometer well
(q) Vacuum relief valve (negative pressure or vacuum)
(r) Washout

(10) 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

(11) Given examples (actual or simulated) of scores, gouges, wheel burns, and rail burns, perform each of the following tasks:
(a) Use a depth gauge to measure the depth of each score, gouge, wheel burn, and rail burn
(b) Point out 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

(12) Given examples (actual or simulated) of dents and rail burns, perform each of the following tasks:
(a) Use a dent gauge to determine if the radius of curvature for each dent or rail burn is critical]
(b) Recognize those examples that include cracks at the point of minimum curvature

(13) Given examples of damaged tank car fittings, describe the extent of damage to those fittings
(14) Given examples of tank car tank damage, describe the extent of damage to the tank car tank
(15) 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

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

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) Pneumatically unloaded covered hopper cars
(d) 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:
(a) Alloy steel
(b) Aluminum
(c) Carbon steel

(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) Score, gouge, wheel burn, and 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 critical dent on a tank car in assessing tank damage, including scores, gouges, wheel burns, and rail burns
(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

12.3 Competencies — Planning the Response.

12.3.1 Determining the Response Options. Given the analysis of an emergency 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
(2) Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for leak control techniques on various tank car fittings
(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 emergency involving tank cars and the planned response, technicians with a tank car specialty shall implement or oversee the implementation of the selected response options safely and effectively 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 leak
(5) Given leaking fittings on a pressure tank car, 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 applicable equipment and resources, demonstrate the following:
   (a) Flaring of liquids and vapors
   (b) Transferring of liquids and vapors
   (c) Venting
(8) 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
(9) *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

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.

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 core 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 safely.

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 in an emergency

(2) Plan a response for an emergency involving cargo tanks within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by determining the response options (offensive, defensive, and 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, hydraulic)
  (d) Pressure and vacuum relief protection devices
  (e) Shear-type breakaway 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, 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
(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
(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 emergency, 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 emergency (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 or DOT 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 emergency 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 emergency 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 emergency involving a cargo tank and the planned response, technicians with a cargo tank specialty shall implement or oversee the implementation of the selected response safely and effectively 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, 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.

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 core 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 safely.

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 emergency involving an intermodal tank within the capabilities and competencies of

available personnel, personal protective equipment, and control equipment by determining the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving intermodal tanks

(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:
   (a) Air line connection
   (b) Bottom outlet valve
   (c) Gauging device
   (d) Liquid or vapor valve
   (e) Thermometer
   (f) Manhole cover
   (g) Pressure gauge
   (h) Sample valve
   (i) Spill box
   (j) Thermometer well
   (k) 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 emergency, 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 emergency
   (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.

14.3.1 Determining the Response Options. Given the analysis of an emergency 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)

(2) Describe the purpose of, procedures for, and risks associated with controlling leaks from various fittings on intermodal tanks, including equipment needed and safety precautions

14.4 Competencies — Implementing the Planned Response. Given an analysis of an emergency involving intermodal tanks and the planned response, technicians with an intermodal tank specialty shall implement or oversee the implementation of the selected response options safely and effectively 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) Dome 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 state, local, or provincial 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 safely.

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 safely and effectively 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 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.

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 core 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 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 safely.

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, personal protective equipment, 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, personal protective equipment, 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 its hazardous materials technicians to have in-depth knowledge of flammable liquids 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 gases 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 16.2.1.5.

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 fire-fighting foams 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 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 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, 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 (VRU) and vapor combustion (VCU) units
(12) Loading rack additive tanks
(13) Fixed or semifixed fire protection system

16.2.1.6 Given three 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 three types of incidents 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:

(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 for the following types of incidents:

(1) Flammable liquid spill (no fire)
(2) Flammable liquid spill (with fire)
(3) Flammable liquid storage tank fire

16.3.3 Given examples of different 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

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
(2) Approved application method (both portable and fixed system applications)
(3) Approved application rate and duration
(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
(2) Approved application method (both portable and fixed system applications)
(3) Approved application rate and duration
(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

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
(2) Approved application method (both portable and fixed system applications)
(3) Approved application rate and duration
(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

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
(2) Approved application method (both portable and fixed system applications)
(3) Approved application rate and duration
(4) Amount of Class B foam concentrate and water required
(5) Volume and rate of application of water for cooling involved and exposed tanks

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 safely and effectively completing the tasks in 16.4.1 through 16.4.3.

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

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 the fire by using portable application devices.

16.4.3 Technicians with a flammable liquids bulk storage specialty shall demonstrate grounding and bonding procedures for the transfer of flammable liquids, including the following:

(1) Selection of equipment
(2) Sequence of grounding and bonding connections
(3) Testing of grounding and bonding connections

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

17.1 General.

17.1.1 Introduction.

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, additive tanks, and loading racks commonly found in a flammable gases bulk storage tank facility.

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 core 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 personal protective clothing 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 safely.

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, personal protective equipment, 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, personal protective equipment, 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 gases 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 storage tanks.

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) Pressure relief valve
(3) Gauging device
(4) Tank piping and piping supports
(5) Transfer pumps
(6) Monitoring and detections systems
(7) 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 17.3.6.

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.

17.3.3 Given a flammable gas fire from an elevated structure (e.g., tower or column), technicians with a flammable gases bulk storage specialty shall describe the hazards, safety, and tactical considerations for controlling this type of release.

17.3.4 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

17.3.5 Technicians with a flammable gases bulk storage specialty shall describe the effect that flaring or venting of gas or liquid has on the pressure in the tank (flammable gas or flammable liquid product).

17.3.6 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 safely and effectively 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 the Hazardous Materials Technician 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 control of radiation exposure, conducts hazards assessment, and acts as a liaison between hazardous materials technicians at incidents involving radioactive materials.

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 core 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 safely.

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 incident 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.

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/grav
   (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) Radiation dispersal device (RDD)
(7) Radiation exposure device (RED)
(8) Improvised nuclear device (IND) Using reference documents or computer programs, 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
(9) Given the Chart of Nuclides, trace the decay of a radioactive nuclide and identify the stable end-product
(10) Name examples of materials best suited to shield from the following types of radiation:
   (a) Alpha
   (b) Beta
   (c) Gamma
   (d) Neutron
(11) Explain the concept of linear energy transfer (LET)

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 LD50/30 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 types of the acute radiation syndrome and identify the exposure levels and symptoms associated with each
(8) Describe the risks of radiation exposure to the developing embryo and fetus
(9) Distinguish between the terms *somatic* and *heritable* as they apply to biological effects

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 an electrical signal
(6) Explain the fundamental mechanism by which isotope identification detectors operate and the advantages and disadvantages of the different 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.

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 program
(2) Using the stay time equation, calculate an individual's remaining allowable dose equivalent, or stay time
(3) Identify "distance to radiation sources" techniques for minimizing personnel external exposures
(4) Using the point source equation (inverse square law), calculate the exposure rate or distance for a point source of radiation
(5) Define the unit of *density thickness*
(6) Calculate shielding thickness or exposure rates for gamma and x-ray radiation using the equations or by using a computer program

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
    (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

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* 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 provide 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

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, personal protective equipment, 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 the three factors that determine the actions taken in decontamination of personnel
(5) Describe methods and techniques for performing personnel decontamination

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.

A.3.3.1 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 AHJ. May also be referred to as a subject matter expert (SME) in a mission-specific area.

A.3.3.8 Confined Space. Additionally, a confined space is further defined as having one or more of the following characteristics:

(1) The area contains or has the potential to contain a hazardous atmosphere, including an oxygen-deficient atmosphere.
(2) The area contains a material with the potential to engulf a member.
(3) The area has an internal configuration such that a member could be trapped by inwardly converging walls or a floor that slopes downward and tapers to a small cross section.
(4) The area contains any other recognized serious hazard.

A.3.3.15 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.3.3.15.4 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.

A.3.3.17 Decontamination. There are two types of decontamination (commonly known as "decon") performed by emergency responders: gross and technical.

Gross decontamination is performed on the following:

(1) Entry team members before their technical decontamination
(2) Victims during emergency decontamination
(3) Persons requiring mass decontamination

Technical decontamination is performed on entry team members. Decontamination sometimes performed on victims in a hospital setting is generally referred to as *definitive decontamination*, but is not covered in this standard.

The types of decontamination (except *definitive decontamination*) are further defined in A.3.3.17.1 through A.3.3.17.4.

A.3.3.17.1 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.3.3.17.2 Gross Decontamination. Victims of a hazardous material release that is potentially life threatening due to continued exposure from contamination are initially put through a gross decontamination, which will significantly reduce the amount of additional exposure. This is usually accomplished by mechanical removal of the contaminant or initial rinsing from handheld hose lines, emergency showers, or other nearby sources of water. Responders operating in a contaminated zone in personal protective equipment (PPE) are put through gross decontamination, which will make it safer for them to remove the PPE without exposure and for members assisting them.

A.3.3.17.3 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 is a gross decontamination process utilizing large volumes of low-pressure water to reduce the level of contamination. A soap-and-water solution or uni-

versal decontamination solution would be more effective; however, availability of such solutions in sufficient quantities cannot always be ensured.

Extensive research into mass decontamination operations at terrorist incidents involving hazardous materials and chemical warfare agents has been conducted by the U.S. Army's Research, Development, and Engineering Command (RDECOM), and the resulting guidelines and documents are available on the Internet *(see H.1.2.6)*.

Mass decontamination should be established quickly to reduce the harm being done to the victims by the contaminants. Initial operations will likely be through handheld hose lines or master streams supplied from fire apparatus while a more formal process is being set up. Examples of mass decontamination methods are the ladder pipe decontamination system and the emergency decontamination corridor system, both of which are described in RDECOM's guidelines.

A.3.3.17.4 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 7.3.4)* and is subject to the approval of the incident commander.

A.3.3.19 Demonstrate. This performance can be supplemented by simulation, explanation, illustration, or a combination of these.

A.3.3.26 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.3.3.27 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.

A.3.3.29 Hazardous Material. The following are explanations of several CBRN-related terms:

(1) *CBRN.* An abbreviation for chemicals, biological agents, and radiological particulate hazards.
(2) *CBRN terrorism agents.* Chemicals, biological agents, and radiological particulates that could be released as the result of a terrorist attack. Chemical terrorism agents include solid, liquid, and gaseous chemical warfare agents and toxic industrial chemicals. Chemical warfare agents include, but are not limited to, GB (Sarin), GD (Soman), HD (sulfur mustard), VX, and specific toxic industrial chemicals. Many toxic industrial chemicals (e.g., chlorine and ammonia) are identified as potential chemical terrorism agents because of their availability and the degree of injury they could inflict. Biological agents are bacteria, viruses, or the toxins derived from biological material.
(3) *Chemical terrorism agents.* Liquid, solid, gaseous, and vapor chemical warfare agents and toxic industrial chemicals used to inflict lethal or incapacitating casualties, generally on a civilian population as a result of a terrorist attack.
(4) *Biological terrorism agents.* Liquid or particulate agents that can consist of a biologically derived toxin or pathogen to inflict lethal or incapacitating casualties.
(5) *Radiological particulate terrorism agents.* Particles that emit ionizing radiation in excess of normal background levels used to inflict lethal or incapacitating casualties, generally on a civilian population, as the result of a terrorist attack.
(6) *Toxic industrial chemicals.* Highly toxic solid, liquid, or gaseous chemicals, that have been identified as mass casualty threats that could be used to inflict casualties, generally on a civilian population, during a terrorist attack.

A.3.3.30 Hazardous Materials Branch/Group. This function is directed by a hazardous materials officer and deals principally with the technical aspects of the incident.

A.3.3.31 Hazardous Materials Officer. This individual might also serve as a technical specialist for incidents that involve hazardous materials/WMD.

A.3.3.32 Hazardous Materials Response Team (HMRT). The team members respond to releases or potential releases of hazardous materials/WMD for the purpose of control or stabilization of the incident.

A.3.3.33 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.

A.3.3.34 Hazardous Materials Technician. These persons might have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ.

A.3.3.34.1 Hazardous Materials Technician with a Cargo Tank Specialty. The hazardous materials technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

A.3.3.34.4 Hazardous Materials Technician with an Intermodal Tank Specialty. See A.3.3.34.1.

A.3.3.34.7 Hazardous Materials Technician with a Tank Car Specialty. See A.3.3.34.1.

A.3.3.37 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.3.3.39 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.

A.3.3.41 Material Safety Data Sheet (MSDS). Under the Global Harmonization System, the MSDS is known as an SDS (Safety Data Sheet) and contains more detailed information.

A.3.3.44 Packaging. Packaging for hazardous materials includes bulk and nonbulk packaging.

A.3.3.44.1 Bulk Packaging. Bulk packaging can be either placed on or in a transport vehicle or vessel or constructed as an integral part of the transport vehicle.

A.3.3.44.3 Radioactive Materials Packaging. Excepted packaging is packaging 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 packaging used to transport materials that present limited hazard to the public and environment. Examples of these materials are contaminated equipment and radioactive waste solidified in materials such as concrete. This packaging is grouped into three categories (IP-I, IP-2, IP-3), based on the strength of packaging. 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 waste. 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 98 tons (100 metric tons). 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 these 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 will be 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.3.3.47 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.

A.3.3.48.1 Emergency Response Plan. Emergency response plans can be developed at organizational, agency, local, state, and federal levels.

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.

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.3.3.51.1 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.

A.3.3.51.2 High Temperature–Protective Clothing. This type of clothing is usually of limited use in dealing with chemical commodities.

A.3.3.51.3 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, *Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies.*

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.

A.3.3.51.5 Vapor-Protective Clothing. This type of protective clothing is a component of EPA Level A chemical protection. Vapor-protective clothing should meet the requirements of NFPA 1991, *Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies.*

A.3.3.53 Respiratory Protection. Respiratory protection is divided into three types:

(1) Positive pressure self-contained breathing apparatus
(2) Positive pressure air-line respirators
(3) Air-purifying respirators

A.3.3.54 Response. The activities in the response portion of a hazardous materials/WMD incident include analyzing the incident, planning the response, implementing the planned response, evaluating progress, and terminating the emergency phase of the incident.

A.3.3.59.1 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.3.3.59.2 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.3.3.59.3 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 3.3.15.

A.3.3.61 Termination. Termination is divided into three phases: debriefing the incident, post-incident analysis, and critiquing the incident.

A.3.3.62 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.3.3.63 Weapon of Mass Destruction (WMD). The source of this definition is 18 USC 2332a.

A.3.3.63.1 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.3.3.63.1.1 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.

A.3.3.63.1.2 Radiation Dispersal Device (RDD). Any device that intentionally spreads radioactive material across an area with the intent to cause harm, without a nuclear explosion occurring. An RDD that uses explosives for spreading or dispersing radioactive material is commonly referred to as a "dirty bomb" or "explosive RDD." Nonexplosive RDDs could spread radioactive material using common items such as pressurized containers, fans, building air-handling systems, sprayers, crop dusters, or even spreading by hand.

A.3.3.63.1.3 Radiation Exposure Device (RED). *Sealed source* means radioactive material encased in a capsule or closely bonded to another material in order to contain the radioactive material and prevent its leakage or escape under normal conditions of intended use. Radioactive material may be in a sealed or unsealed (dispersible) form. Shipments of sealed and dispersible forms of radioactive material are made in accordance with Department of Transportation regulations in a variety of packaging dependent on the physical and chemical form of the material, quantity of radioactive material present, and associated radiation levels on the exterior of the packaging.

An RED may cause a few deaths, but normally would not cause widespread radiological contamination. An RED may be concealed in public transportation (under a bus or subway seat), a busy shopping mall (the food court, for example), movie theater, or any other location where a large number of people may sit, stand, or pass close by individuals who come in contact with, touch, or sit on a radioactive material container do not become contaminated. The danger is from exposure, for extended periods of time, to high levels of radiation close to the radioactive material or generating device. If radioactive material was used in the RED and it was to break open, some of the radioactive material could be released, causing contamination. If this occurs, the RED becomes an RDD, and people coming in contact with the radioactive material could spread contamination elsewhere.

A.3.4.4 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(11) 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.

A.4.2.1(13) The following are examples of potential criminal or terrorist targets:

(1) Public assembly areas
(2) Public buildings
(3) Mass transit systems
(4) Places with high economic impact
(5) Telecommunications facilities
(6) Places with historical or symbolic significance
(7) Military installations
(8) Airports
(9) Industrial facilities

A.4.2.1(14) A chemical incident is characterized by a rapid onset of medical symptoms (minutes to hours) and can have observed signatures such as colored residue, dead foliage, pungent odor, and dead insect and animal life. With biological incidents, the onset of symptoms usually requires days to weeks, and there are typically no characteristic signatures because biological agents are usually odorless and colorless. The area affected can be greater due to the migration of infected individuals because of the delayed onset of symptoms. An infected person could transmit the disease to another person.

A.4.2.1(15) The following are examples of indicators of possible criminal or terrorist activity involving chemical agents:

(1) The presence of hazardous materials/WMD or laboratory equipment that is not relevant to the occupancy
(2) Intentional release of hazardous materials/WMD
(3) Unexplained patterns of sudden onset of similar, nontraumatic illnesses or deaths (patterns that might be geographic, by employer, or associated with agent dissemination methods)
(4) Unexplained odors or tastes that are out of character with the surroundings
(5) Multiple individuals exhibiting unexplained signs of skin, eye, or airway irritation
(6) Unexplained bomb- or munitions-like material, especially if it contains a liquid
(7) Unexplained vapor clouds, mists, and plumes
(8) Multiple individuals exhibiting unexplained health problems such as nausea, vomiting, twitching, tightness in chest, sweating, pinpoint pupils (miosis), runny nose (rhinorrhea), disorientation, difficulty breathing, convulsions, or death
(9) Trees, shrubs, bushes, food crops, and/or lawns that are dead, discolored, abnormal in appearance, or withered (not due to a current drought and not just a patch of dead weeds)
(10) Surfaces exhibiting oily droplets/films and unexplained oily film on water surfaces
(11) An abnormal number of sick or dead birds, animals, or fish
(12) Unusual security, locks, bars on windows, covered windows, or barbed wire

A.4.2.1(16) The following are examples of indicators of possible criminal or terrorist activity involving biological agents:

(1) Unusual number of sick or dying people or animals (any number of symptoms; time before symptoms are observed dependent on the agent used but usually days to weeks)
(2) Healthcare facilities reporting multiple casualties with similar signs or symptoms
(3) Unscheduled or unusual spray being disseminated, especially if outdoors during period of darkness
(4) Abandoned spray devices (devices with no distinct odors)

A.4.2.1(20) An evaluation of the scene for secondary devices would include the following safety steps:

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

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(6)(c) "In-place protection," "shelter-in-place," and "protection in-place" all mean the same thing.

A.4.4.1(12) The following are examples of actions that might be taken:

(1) Take the appropriate actions to protect yourself and other personnel
(2) Communicate the suspicion during the notification process
(3) Isolate potentially exposed people or animals
(4) Document the initial observation
(5) Be alert for booby traps and explosive devices

A.4.5 No competencies are currently required at this level.

A.4.6 No competencies are currently required at this level.

A.5.1.1.1 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 core 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.5.2.1.1.7 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.

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

A.5.2.2(8) Radioactive materials transmit energy through space in the form of particles and rays. The energy is the result

Table A.5.1.1.1 NFPA 472 Operations Level Responder Matrix

Responders	Competencies						
	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.

of spontaneous disintegration of atomic nuclei by the emission of subatomic particles. Alpha particles are positively charged nuclear particles consisting of two protons bound to two neutrons that are ejected from the nucleus of a radioactive atom. Alpha particles travel at about ½0th the speed of light but have a very short range [7.6 cm (3 in.)] and little penetration power. Because of the alpha particle's short range and limited penetrating ability, external shielding is not required. The particles can be stopped by clothing or even sheets of paper. Alpha particles cannot penetrate the skin, but they can be harmful if the radioactive material emitting the alpha particles is inhaled or ingested into the body, where they continue to emit alpha particles; at closer range, they can damage body tissue. Inside the body, alpha particles can be the most serious internal radiation hazard. Alpha particles are 7000 times larger than beta particles.

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."

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.

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.

A.5.2.3(8) Terms used to explain health hazards are defined as follows:

(1) *Carcinogen.* A chemical that falls within any of the following categories:
   (a) A chemical that has been evaluated by the International Agency for Research on Cancer (IARC) and found to be a carcinogen or potential carcinogen
   (b) A chemical that is listed as a carcinogen or potential carcinogen in the latest edition of the National Toxicology Program (NTP) "Report on Carcinogens."
   (c) A chemical that is regulated by the Occupational Safety and Health Administration (OSHA) as a carcinogen (can be regulated additionally by states)

(2) *Corrosive.* A chemical that causes visible destruction of or irreversible alterations in living tissue by chemical action at the site of contact

(3) *Highly toxic.* A chemical that falls within any of the following categories:
   (a) A chemical that has a median lethal dose (LD_{50}) of 50 mg or less per kilogram of body weight when administered orally to albino rats weighing between 200 g and 300 g each
   (b) A chemical that has a median lethal dose (LD_{50}) of 200 mg or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 kg and 3 kg each
   (c) A chemical that has a median lethal concentration (LD_{50}) in air of 200 parts per million by volume or less of gas or vapor, or 2 mg per liter or less of mist, fume, or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 g and 300 g each

(4) *Irritant.* A chemical that is not corrosive but that causes a reversible inflammatory effect on living tissue by chemical action at the site of contact

(5) *Sensitizer.* A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical

(6) *Toxic.* A chemical that falls within any of the following categories:
   (a) A chemical that has a median lethal dose (LD_{50}) of more than 50 mg per kilogram but not more than 500 mg per kilogram of body weight when administered orally to albino rats weighing between 200 g and 300 g each
   (b) A chemical that has a median lethal dose (LD_{50}) of more than 200 mg per kilogram but not more than 1000 mg per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 kg and 3 kg each
   (c) A chemical that has a median lethal concentration (LD_{50}) in air of more than 200 parts per million but not more than 3000 parts per million by volume of gas or vapor or more than 2 mg per liter but not more than 200 mg per liter of mist, fume, or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 g and 300 g each

(7) *Target organ effects.* A target organ categorization of effects that can occur, including examples of signs and symptoms and chemicals that have been found to cause such effects. The following examples illustrate the range and diversity of effects and hazards that can be encountered and are not intended to be all-inclusive:
   (a) *Hepatotoxins.* Chemicals that produce liver damage (signs and symptoms: jaundice, liver enlargement; examples: carbon tetrachloride, nitrosamines)
   (b) *Nephrotoxins.* Chemicals that produce kidney damage (signs and symptoms: edema, protein urea; examples: halogenated hydrocarbons, uranium)
   (c) *Neurotoxin.* Chemicals that produce their primary toxic effects on the nervous system:
      i. *Central nervous system hazards.* Chemicals that cause depression or stimulation of consciousness or otherwise injure the brain (signs and symptoms: drooping of upper eyelids, respiratory difficulty, seizures, unconsciousness)
      ii. *Peripheral nervous system hazards.* Chemicals that damage the nerves that transmit messages to and from the brain and the rest of the body (signs and symptoms: numbness, tingling, decreased sensation, change in reflexes, decreased motor strength; examples: arsenic, lead, toluene, styrene)
   (d) Agents that decrease hemoglobin in the blood of function and deprive the hematopoietic body tissues of oxygen (signs and symptoms: cyanosis, loss of consciousness; examples: carbon monoxide, benzene)
   (e) Agents that irritate the lung or damage the pulmonary tissue [signs and symptoms: cough, tightness in chest, shortness of breath; examples: silica, asbestos, hydrochloric acid (HCl)]
   (f) *Reproductive Toxins.* Chemicals that affect the reproductive capabilities, including chromosomal damage (mutations) and effects on fetuses (teratogenesis) (signs and symptoms: birth defects, sterility; examples: lead, DBCP)
   (g) *Cutaneous hazards.* Chemicals that affect the dermal layer of the body (signs and symptoms: defatting of the skin, rashes, irritation; examples: ketones, chlorinated compounds)
   (h) *Eye hazards.* Chemicals that affect the eye or visual capacity (signs and symptoms: conjunctivitis, corneal damage; examples: organic solvents, acids)

A.5.2.3(8)(c) Chronic health hazards include carcinogen, mutagen, and teratogen.

A.5.2.3(9) Some examples of hazard class are given in Table A.5.2.3(9).

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,

Table A.5.2.3(9) Examples of Hazard Class

Common Name	Military Abbreviation	UN/DOT Hazard Class
Nerve agents		
Tabun	GA	6.1
Sarin	GB	6.1
Soman	GD	6.1
V agent	VX	6.1
Vesicants (blister agents)		
Mustard	H	6.1
Distilled mustard	HD	6.1
Nitrogen mustard	HN	6.1
Lewisite	L	6.1
Blood agents		
Hydrogen cyanide	AC	6.1
Cyanogen chloride	CK	2.3
Choking agents		
Chlorine	CL	2.3
Phosgene	CG	2.3
Irritants		
Tear gas	CS	6.1
Dibenzoxazepine	CR	6.1
Chloroacetophone	CN	6.1
Pepper spray, Mace	OC	2.2 (subsequent risk 6.1)
Mace, phenylchloro-methylketone, chloropicrin	PS	6.1
Biological agents and toxins	—	
Anthrax	—	6.2
Mycotoxin	—	6.1 or 6.2
Plague	—	6.2
Viral hemorrhagic fevers	—	6.2
Smallpox	—	6.2
Ricin	—	6.2

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.

A.5.3.1(4) Consideration should be given to the possibility that criminal suspects may still be on scene during hazardous materials/WMD incidents. The potential hazards presented by human threats or secondary explosive devices demonstrate the need for multiple response disciplines to prioritize, plan, and conduct response operations concurrently.

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.

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).

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 (effective on August 17, 2006) 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 (effective August 17, 2006) 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.

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).

A.6.2.3.1(3)(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.7.2.1.3 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).

A.7.2.1.3.4 These factors include, but are not limited to, operation, calibration, response time, detection range, relative response, sensitivity, selectivity, inherent safety, environmental conditions, and nature of hazard. Also refer to NIOSH/OSHA/USCG/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.*

A.7.2.1.3.5 Equipment that may be available to technicians may vary by agency and jurisdiction. However the technician should have the working knowledge and ability to operate the equipment to identify the hazards that may be present during a hazardous materials/WMD incident. For example, the techniques for use of the monitoring equipment should include monitoring for 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.

A.7.2.1.4 Examples of radioactive material labels include:

(1) *Radioactive White I.* The Radioactive White I label is attached to packages with extremely low levels of external radiation. The maximum contact radiation level associated with this level is 0.5 mrem/hour.
(2) *Radioactive Yellow II.* The Radioactive Yellow II label is attached to packages with external contact radiation levels ranging from greater than 0.5 mrem/hour to no more than 50 mrem/hour. The Radioactive II level also has a box for the transport index. The maximum allowable transport index for this label is 1.

(3) *Radioactive Yellow III.* The Radioactive Yellow III label is attached to packages with external contact radiation levels ranging from greater than 50 mrem/hour to a maximum of 200 mrem/hour.
(4) *Empty.* Applied to packages that have been emptied of their contents as far as practical but that might still contain regulated amounts of internal contamination and radiation levels of less than 0.5 mrem/hour detectable outside the package.
(5) *Fissile.* Applied to packages that contain fissile materials. The criticality safety index for each package will be noted on the label. The criticality safety index is displayed on the label to assist the shipper in controlling how many fissile packages can be grouped on a conveyance. Where applicable, the fissile label will appear adjacent to the Radioactive White I, Radioactive Yellow II, or Radioactive Yellow III label.

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.

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. This selection can be based on historical local records or any of the materials listed in Table A.5.2.3(9) that are commonly spilled throughout the country (i.e., chlorine, anhydrous ammonia, mineral acids, bases, and aliphatic and aromatic solvents).
(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

A.7.2.3.1 See Annex H for the appropriate reference guides.

A.7.2.3.4 Some of the types of damage that containers can incur include the following:

(1) *Cracks.* A crack is a narrow split or break in the container metal that can penetrate through the metal of the container.
(2) *Scores.* A score is a reduction in the thickness of the container shell. It is an indentation in the container made by a relatively blunt object. A score is characterized by the relocation of the container or weld metal in such a way that the metal is pushed aside along the track of contact with the blunt object.
(3) *Gouges.* A gouge is a reduction in the thickness of the container. It is an indentation in the shell made by a sharp, chisel-like object. A gouge is characterized by the cutting and complete removal of the container or weld metal along the track of contact.
(4) *Dents.* A dent is a deformation of the container metal. It is caused by impact with a relatively blunt object. With a sharp radius, there is the possibility of cracking.

A.7.2.5.3 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.7.3.3.4.3 Refer to the American Chemistry Council and Association of American Railroads Hazardous Materials Technical Bulletin *Recommended Terms for Personal Protective Equipment,* issued in October 1985. Also refer to NFPA 1991, *Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies*; NFPA 1992, *Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies*; and NFPA 1994, *Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents.* It is important to remember that the EPA levels of protection are not "performance based," as are NFPA 1991, NFPA 1992, and NFPA 1994.

A.7.3.5.3 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.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

A.7.4.2(2) Emergency procedures for personnel working in vapor-protective clothing should include procedures for the following:

(1) Loss of air supply
(2) Loss of suit integrity
(3) Loss of verbal communications
(4) Buddy down in hot zone

A.7.4.3(1) Contact the Chlorine Institute for assistance in obtaining training on the use of the various chlorine kits (Chlorine Institute, 1300 Wilson Blvd., Arlington, VA 22209; www.chlorineinstitute.org).

A.7.4.3(2) See A.7.4.3(1).

A.7.4.3(7) The safety considerations for product transfer operations should include the following:

(1) Bonding
(2) Grounding
(3) Elimination of ignition sources and shock hazards

A ground resistance tester and an ohmmeter should be utilized for grounding and bonding. 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. In some cases, isolation would be a better option than bonding or grounding. In all cases involving vessels, the responder should consult appropriate vessel personnel who are familiar with the potential risks involved with electrical systems on marine tank vessels.

A.7.4.3(11) Product removal and transfer considerations should include the following:

(1) Inherent risks associated with such operations
(2) Procedures and safety precautions
(3) Equipment required

A.7.4.5 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 3.3.17.3 and 3.3.17.4.

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

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).

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

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, *Standard System for the Identification of the Hazards of Materials for Emergency Response.*

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.8.4.2 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