NFPA® 472

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

2008 Edition



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NFPA® 472

Standard for

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

2008 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 June 4, 2007, with an effective date of June 24, 2007, and supersedes all previous editions.

A tentative interim amendment (TIA) to Section 3.3 was issued on June 4, 2007. For further information on tentative interim amendments see Section 5 of the NFPA Regulations Governing Committee Projects available at http://www.nfpa.org/assets/files/PDF/CodesStandards/TIAErrataFI/TIARegs.pdf.

This edition of NFPA 472 was approved as an American National Standard on June 24, 2007.

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.

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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 has 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 E54 Committee on Homeland Security Applications — Emergency Preparedness, Training, and Procedures; the Interagency Board for Equipment Standardization and Interoperability (IAB); the FBI; U.S. Capitol Police; the National Association of Bomb Squad Commanders; and the National Sheriffs Association.

As a result of discussions among those organizations, the Committee established a Working Group whose task it 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 is 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 may 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* has been 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 have been 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:

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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* has been modified to reflect the usage of a risk-based response process and the definition of *hazardous materials response team* has been changed to specifically reference the performance of technician-level skills, there are 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 has been 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 has been modified to reflect that in some response organizations this individual may 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 non-mandatory 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 have been provided for chemical, biological, and radiological agents. The Technical Committee decided to place these non-mandatory competencies in the annexes for informational purposes at this time.

In Memoriam

The Technical Committee on Hazardous Materials Response Personnel dedicates the 2008 edition of NFPA 472 to Chief John M. Eversole of the Chicago Fire Department (retired), who passed away on May 20, 2007. Chief Eversole was an initial member of the NFPA 472 Committee and served as its Chair from 1998 to 2007.

John Eversole was the consummate teacher, not only in the fire service and the hazmat world, but about life. He taught all of us that with dedication, hard work, and perseverance, one person can continue to make a difference.

Some people wonder all their lives if they have made a difference to the world. John Eversole never had that problem. He will be missed.

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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 the professional competence, training, procedures, and equipment for emergency responders to hazardous materials incidents.

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

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

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,* 2007 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."

Title 29, Code of Federal Regulations, Part 1910.12.

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 shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

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The text of Section 3.3 has been revised by a tentative interim amendment (TIA). See page 1.

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 1910.12: 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 H).*

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 material/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 incidents within an established/a 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 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 (ALARA).

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.

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

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

3.3.23 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.

3.3.24 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).

3.3.25* 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).

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

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

3.3.28* 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.

3.3.29* 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.

3.3.30* 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.

3.3.31* 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.

3.3.32* 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.

3.3.33* 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.

3.3.33.1* *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.

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

3.3.33.3* *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.

3.3.33.4* *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.

3.3.34 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.

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

3.3.36* 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.

3.3.37 Incident Command System. 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.

3.3.38* 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.

3.3.39 Match. To provide with a counterpart.

3.3.40* 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.

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

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

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

3.3.43.1* ***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).

3.3.43.2 ***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.

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

3.3.44 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.

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

3.3.46* Personal Protective Equipment. 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.

3.3.47 Plan.

3.3.47.1* ***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.

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

3.3.47.3 ***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.

3.3.48* 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 material/weapon of mass destruction (WMD) incident.

3.3.49 Predict. The process of estimating or forecasting the future behavior of a hazardous materials/weapons of mass destruction (WMD) container and/or its contents within the training and capabilities of the emergency responder.

3.3.50* 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.

3.3.50.1* ***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.

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

3.3.50.3* ***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.

3.3.50.4* ***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.

3.3.50.5* ***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.

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

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

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

3.3.54 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.

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

3.3.56 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.

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

3.3.58 Specialist Employees.

3.3.58.1* ***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.

3.3.58.2* ***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.

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

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3.3.59 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.

3.3.60* 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.

3.3.61* 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.

3.3.62* 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 above; (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.

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

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

3.4.7 Operations Level Responders Assigned to Perform Mass Decontamination 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.

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

3.4.9 Operations Level Responders Assigned to Perform Technical Decontamination 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.

3.4.10 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.

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

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

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

3.4.14 Operations Level Responders Assigned Responsibilities for Radioactive Material Response. Persons, competent at the operations level, who, at hazardous materials/weapons of mass destruction (WMD) incidents involving radioactive materials, are assigned to support the hazardous materials technician and other personnel, provide strategic and tactical recommendations to the on-scene incident commander, serve in a technical specialist capacity to provide technical oversight for operations, and act as a liaison between the hazardous material technician, response personnel, and other outside resources regarding radioactive material issues.

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

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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 at the awareness level 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 material/WMD present and the basic hazard and response information for each hazardous material/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 emergency response plan, the standard operating procedures, and the current edition of the DOT *Emergency Response Guidebook* by completing the following tasks:
   (a) Initiate protective actions.
   (b) Initiate the notification process.

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 and shall meet 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) the 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 hazard-

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ous material(s)/WMD involved in each situation by name, UN/NA identification number, or type placard applied and shall meet 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* and shall meet 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 and shall meet 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)*Sheltering 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 emergency response plan and/or standard operating procedures.

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 (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 at this level shall be to provide operations level responders with the knowledge and skills to perform the core competencies in 5.1.2.2 safely.

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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 survey the incident to identify the containers and materials involved, determine whether hazardous materials/WMD have been released, and evaluate the surrounding conditions and shall meet 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 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.

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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 give examples of 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 information using MSDS, CHEMTREC/CANUTEC/SETIQ, governmental authorities, and shippers and manufacturers and shall meet 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 predict the likely behavior of the material or agent and its container and shall meet the following requirements:

(1) Interpret 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

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(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 estimate the potential harm within the endangered area at each incident and shall meet 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, estimate the number and type of exposures within that endangered area.
(3) Identify resources available for determining the concentrations of a released hazardous material/WMD within an endangered area.
(4)*Given the concentrations of the released material, identify 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 and shall meet the following requirements:

(1) Given an analysis of a hazardous materials/WMD incident and the exposures, determine 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)*Assess 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 name of the hazardous material/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 and shall meet 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: liquid splash–protective clothing and vapor-protective clothing
    ii. High temperature–protective clothing: proximity suit and entry suits
    iii. Structural fire-fighting protective clothing

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

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(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 factors that should be considered in emergency decontamination.
(6) Identify the advantages and limitations of emergency decontamination procedures.

5.4 Core Competencies — Implementing the Planned Response.

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

(1) Identify the procedures for establishing scene control through control zones.
(2) Identify the criteria for determining the locations of the control zones at hazardous materials/WMD incidents.
(3) Identify the basic techniques for the following protective actions at hazardous materials/WMD incidents:
   (a) Evacuation
   (b) Sheltering-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 initiate the incident command system specified in the emergency response plan and/or standard operating procedures and shall meet 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. The operations level responder shall describe considerations for the use of personal protective equipment provided by the AHJ, and shall meet 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 evaluate the status 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 the Planned Response. Given two scenarios involving hazardous materials/WMD incidents, including the incident action plan, the operations level responder shall communicate the status of the planned response through the normal chain of command and shall meet the following requirements:

(1) Identify the methods for communicating 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

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responsibilities at hazardous materials/WMD incidents by the authority having jurisdiction beyond the core competencies at the operations level (Chapter 5):

(1) Operations level responders assigned to use personal protective equipment
(2) Operations level responders assigned to perform mass decontamination
(3) Operations level responders assigned to perform technical decontamination
(4) Operations level responders assigned to perform evidence preservation and sampling
(5) Operations level responders assigned to perform product control
(6) Operations level responders assigned to perform air monitoring and sampling
(7) Operations level responders assigned to perform victim rescue/recovery
(8) Operations level responders assigned to respond to illicit laboratory incidents

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 (Chapter 4), all core competencies at the operations level (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 of 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 (Chapter 4), all core competencies at the operations level (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, 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 and shall meet the following requirements:

(1)*Describe the types of protective clothing and 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.

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(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 and shall meet 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 identify and complete the reporting and documentation requirements consistent with 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 (Chapter 4), all core competencies at the operations level (Chapter 5), all mission-specific competencies for personal protective equipment (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, 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.

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(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 complete the reporting and documentation requirements consistent with the emergency response plan or standard operating procedures and shall meet the following requirements:

(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 (Chapter 4), all core competencies at the operations level (Chapter 5), all mission-specific competencies for personal protective equipment (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 providing 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, the operations level responder assigned to technical decon-

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tamination 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 and shall meet 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 and shall meet 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 complete the reporting and documentation requirements consistent with the emergency response plan or standard operating procedures and shall meet the following requirements:

(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 (Chapter 4), all core competencies at the operations level (Chapter 5), all mission-specific competencies for personal protective equipment (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 theadditional training necessary to meet specific needs of the jurisdiction.

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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 and shall meet the following requirements:

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

6.5.3 Competencies — Planning the Response.

6.5.3.1 Identifying Unique Aspects of Criminal Hazardous Materials/WMD Incidents. The operations level responder assigned to evidence preservation and sampling shall be capable of identifying the unique aspects associated with illicit laboratories, hazardous materials/WMD incidents, and environmental crimes and shall meet 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 to secure, characterize, and preserve 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.

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(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 material/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. 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 or oversee the implementation of the selected response actions safely and effectively and shall meet the following requirements:

(1) Secure, characterize, and preserve the scene.
(2) Document personnel and scene activities associated with the incident.
(3) Describe whether the responders are within their legal authority to perform evidence preservation and sampling tasks.
(4) Notify the agency with investigative authority.
(5) Notify the EOD personnel.
(6) Identify potential samples and evidence to be collected.
(7) Demonstrate the procedures to protect samples and evidence from secondary contamination.
(8) Demonstrate the correct techniques to collect samples utilizing the equipment provided.
(9) Demonstrate the documentation procedures.
(10) Demonstrate the sampling protocols.
(11) Demonstrate field screening protocols for samples and evidence collected.
(12) Demonstrate evidence labeling and packaging procedures.
(13) Demonstrate evidence decontamination procedures.
(14) Demonstrate evidence packaging procedures for evidence transportation.

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 (Chapter 4), all core competencies at the operations level (Chapter 5), all mission-specific competencies for personal protective equipment (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

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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 and shall meet 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. 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 and shall meet 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 (Chapter 4), all core competencies at the operations level (Chapter 5), all mission-specific competencies for personal protective equipment (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

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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. The operations level responder assigned to perform air monitoring and sampling shall identify the local procedures for selecting personal protective equipment to support air monitoring and sampling at hazardous materials/WMD incidents.

6.7.3.4 Selecting Personal Protective Equipment. 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 (Chapter 4), all core competencies at the operations level (Chapter 5), all mission-specific competencies for personal protective equipment (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 a hazardous material/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.

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(4) Describe the procedures for implementing victim rescue and recovery operations within the incident command system.

6.8.3.2 Selecting Personal Protective Equipment. 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 a hazardous material/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 (Chapter 4), all core competencies at the operations level (Chapter 5), all mission-specific competencies for personal protective equipment (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 and shall meet 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

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(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 and shall meet the following requirements:

(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. 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.

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) Demonstrate methods to identify and avoid potential unique safety hazards found at illicit laboratories such as booby traps and releases of hazardous materials.
(4) Demonstrate 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 demonstrate methods of identifying the following during reconnaissance operations:

(1) The potential manufacture of illicit drugs
(2) The 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 be able to 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)

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(1)]*.

7.1.1.2 The hazardous materials technician shall be trained to meet all competencies at the awareness level (Chapter 4), all core competencies at the operations level (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, and equipment and training as determined by the AHJ.

7.1.2 Goal.

7.1.2.1 The goal of the competencies at this level shall be to provide the hazardous materials technician with the knowledge and skills to perform the tasks in 7.1.2.2 safely.

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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, determine the concentration of hazardous materials, and shall meet 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 (DOT Specification 51; 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

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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

7.2.1.2 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) Mass channel analyzer
(12) Metal oxide sensor
(13) Photoionization detectors
(14) Polymerase chain reaction (PCR)
(15) Radiation detection and emasurement 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 the following monitoring equipment, test strips, and reagents, 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 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

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

(1) Acid, caustic
(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 and corrosivity
(14) Dose
(15) Dose response
(16) Expansion ratio
(17) Fire point
(18) Flammable (explosive) range (LEL and UEL)
(19) Flash point
(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 and shall meet 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 chemical 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 (DOT Specification 51; 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

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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 and shall meet 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.

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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 and shall meet the requirements of 7.3.3.1 through 7.3.3.4.7.

7.3.3.1 The hazardous materials technician shall identify and describe the four levels of personal protective equipment as specified by the Environmental Protection Agency (EPA) and the National Institute for Occupational Safety and Health (NIOSH).

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.

7.3.4 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, and shall meet 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

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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.

7.4.2 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

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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 and shall meet 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 the reporting and documentation requirements consistent with the emergency response plan or standard operating procedures and shall meet 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 required by the emergency response plan or standard operating procedures.
(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.

8.1.1.2 The incident commander shall be trained to meet all competencies at the awareness level (Chapter 4), all core competencies at the operations level (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 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 at this level 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 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/unified command, 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.

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(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 collect and interpret hazard and response information not available from the current edition of the DOT *Emergency Response Guidebook* or an MSDS.

8.2.1.2 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)

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

8.3.3 Approving the Level of 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:

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(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 agency 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), and shall meet the following requirements:

(1) Identify the role of the incident commander 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.

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(6) Identify the elements of the incident management system 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 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.

8.6 Competencies — Terminating the Incident.

8.6.1* Transferring Command and Control. 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 and shall be able to demonstrate the transfer of command and control.

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

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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 (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 at this level 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

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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 (Chapter 4) relative to the organization's area of specialization, all competencies at the specialist employee C level (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 and shall meet 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 and shall meet 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.

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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 resources, the specialist employee B shall advise the incident commander of the personal protective equipment necessary for various response options and shall meet 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

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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 Command System 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 (Chapter 4) relative to the organization's area of specialization, all competencies at the specialist employee C level (Section 9.2), and all competencies at the hazardous materials technician level (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:

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(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 Command System, 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 (Chapter 4), all core competencies at the operations level (Chapter 5), all competencies at the technician level (Chapter 7), and all competencies of this chapter.

10.1.1.3 The hazardous materials officer shall also receive training to meet governmental occupational health and safety regulations.

10.1.2 Goal.

10.1.2.1 The goal of the competencies at this level 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:

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(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) Command 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 incident commander or the public information officer for distribution to the media and local, state, and federal officials and shall complete the following tasks:

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(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, the hazardous materials officer shall demonstrate the ability 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) Identify the steps required for terminating the emergency phase of a hazardous materials/WMD incident.
(2) Identify 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) shall be that person who works within an incident management system (IMS) (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 (Chapter 4), all core competencies at the operations level (Chapter 5), all competencies at the technician level (Chapter 7), and all competencies of this chapter.

11.1.1.3 The hazardous materials safety officer shall receive additional training to meet applicable governmental occupational health and safety regulations.

11.1.2 Goal.

11.1.2.1* The goal of the competencies at this level 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

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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:

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(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.

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(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) Determine whether the selection of clothing and equipment is consistent with the site safety and control plan.
   (b) Determine whether each team has examined the clothing for barrier integrity and the equipment to ensure correct working order.
   (c) Determine whether protective clothing and equipment have been donned in accordance with the standard operating procedures and the manufacturer's recommendations.
(4) Determine 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) Determine whether a backup team is prepared at all times for immediate entry into the hot zone during entry team operations.
(6) Determine 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.

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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 (Chapter 4), all core competencies at the operations level (Chapter 5), all competencies at the technician level (Chapter 7), and all competencies of this chapter.

12.1.1.3 The hazardous materials technician with a tank car specialty shall receive training to meet governmental occupational health and safety regulations.

12.1.2 Goal.

12.1.2.1 The goal of the competencies at this level 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 Technicians operating within the bounds of their training as listed in Chapter 7 of this standard 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:

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(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, point out and explain the design and purpose of each of the following tank car components, when present:
  (a) Body bolster
  (b) Head shield
  (c) Heater coils — interior versus exterior
  (d) Jacket
  (e) Lining and cladding
  (f) Shelf couplers
  (g) Tank (including shell) and head
  (h) Trucks (pin and bowl)
  (i) Underframe — continuous versus stub sill
(4) Given examples of tank cars (some jacketed and some not jacketed), point out 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), point out and explain 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)
    iv. Carbon dioxide tank car fittings
    v. Cryogenic liquid tank car fittings
    vi. Excess flow valve
    vii. Flange for manway, valves, and so forth
    viii. Liquid valve and vapor valve (ball versus plug type)
    ix. Quick-fill hole cover
  (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)
  (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
(9) Given examples of various fitting arrangements on tank cars (including carbon dioxide and cryogenic liquid tank cars) with the following fittings included, point out 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 for manway, valves, and so forth
  (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 (with rupture or frangible) 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:
  (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 measure the radius of curvature for each dent or rail burn.
  (b) Identify 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.

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(15) Given a tank car and the applicable equipment and reference material, determine the pressure in the tank car, 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 amount of liquid in it.

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) Discuss 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, 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 scores, gouges, wheel burns, and rail burns crossing a weld on a pressure tank car in assessing tank damage.

(12) Describe the significance of damage to the heat-affected zone of a weld on a tank car in assessing tank damage.

(13) Describe the significance of a condemning dent of a tank car in assessing tank damage.

(14) Given various types of tank cars, describe the significance of pressure increases in assessing tank damage.

(15) Given various types of tank cars, describe the significance of the amount of lading in the tank in assessing tank damage.

(16) Describe the significance of flame impingement on 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 (flammable gas or flammable liquid product).

(4) Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for lifting of 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 chlorine tank car, use the Chlorine C 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) Irregular-shaped hole
   (c) 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

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(8) Given the applicable resources, perform the following tasks:
   (a) Set and release brakes on rail cars.
   (b) Shut off locomotives using the fuel shutoff and the battery disconnect.
   (c) Uncouple rail cars.

(9)*Demonstrate bonding and grounding procedures for the transfer of flammable and combustible products from tank cars or other products that can give off flammable gases or vapors when heated or contaminated, including the following:
   (a) Selection of equipment
   (b) Sequence of bonding and grounding connections
   (c) Testing of bonding and grounding connections

(10) Given an example of a flammable liquid spill from a tank car, describe the procedures for site safety and fire control during cleanup and removal operations.

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 (Chapter 4), all core competencies at the operations level (Chapter 5), all competencies at the technician level (Chapter 7), and all competencies of this chapter.

13.1.1.3 The hazardous materials technician with a cargo tank specialty shall also receive training to meet governmental occupational health and safety regulations.

13.1.2 Goal.

13.1.2.1 The goal of competencies at this level 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 emergency 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 of this standard shall be able to intervene in cargo tank incidents.

13.1.3.2 If a hazardous materials response team decides 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 (some jacketed and some not jacketed), point out 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 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, point out and explain the design, construction, and operation of each of the following safety devices:
   (a) Dome cover design
   (b) Emergency remote shutoff device
   (c) Internal safety valve or external valve with accident protection, including method of activation (air, cable, hydraulic)
   (d) Pressure and vacuum relief protection devices
   (e) Shear-type breakaway piping

(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 safety valve or external valve with accident protection, including method of activation (air, 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

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(9) Given the following types of cargo tank trucks and tube trailer, 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 truck valve systems:
   (a) Air
   (b) Cable
   (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) Container 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) Type of tank metal (e.g., aluminum versus stainless steel)

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 (including a tube trailer), 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 jacket on cargo tanks in assessing tank damage.

(4) Describe the significance of each of the following types of damage on different types of cargo tanks in assessing tank damage:
   (a) Corrosion (internal and external)
   (b) Crack
   (c) Dent
   (d) Flame impingement
   (e) Puncture
   (f) Scrape, score, gouge, or loss of metal

(5) Given examples of damage to the heat-affected zone on an MC-331 cargo tank, describe the significance of the damage in assessing tank damage.

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 incident involving a cargo tank, describe the methods, procedures, risks, safety precautions, and equipment that are required to implement spill and leak control procedures.

(2) Given an overturned cargo tank, describe the factors to be evaluated for uprighting, 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 options 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) Irregular-shaped hole
   (c) Pressure relief devices (e.g., vents, burst disc)
   (d) Puncture
   (e) Split or tear
   (f) 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, burst disc)
   (c) Piping failure

(3)*Demonstrate bonding and grounding procedures for the transfer of flammable and combustible products from cargo tanks, or other products that can give off flammable gases or vapors when heated or contaminated, including the following:
   (a) Selection of equipment
   (b) Sequence of bonding and grounding connections
   (c) Testing of bonding and grounding connections

(4) Given the following product transfer and recovery equipment, demonstrate the safe application and use of each of the following:
   (a) Portable pumps (air, electrical, gasoline, diesel)
   (b) Pressure transfer
   (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 safety 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 product removal and transfer.

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(7) Given a scenario involving an overturned MC-331 cargo tank, demonstrate the safe procedures for product removal and transfer.
(8) Given the necessary resources, demonstrate the flaring of an MC-331 flammable gas cargo tank.
(9) Given a scenario involving a flammable liquid spill from a cargo tank, describe the procedures for site safety and fire control during cleanup and removal operations.

Chapter 14 Competencies for 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 hazardous materials technician and other 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 (Chapter 4), all core competencies at the operations level (Chapter 5), all competencies at the technician level (Chapter 7), and all competencies of this chapter.

14.1.1.3 The hazardous materials technician with an intermodal tank specialty shall receive training to meet governmental occupational health and safety regulations.

14.1.2 Goal.

14.1.2.1 The goal of the competencies at this level 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 of this standard shall be able to intervene in intermodal tank incidents.

14.1.3.2 If a hazardous materials response team decides 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 (some jacketed and some not jacketed), point out the jacketed intermodal tanks.
(3) Given examples of various intermodal tanks, point out and explain the design and purpose of each of the following intermodal tank components, where 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

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(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) Demonstrate approved procedures for the following types of emergency product removal:
   (a) Gas and liquid transfer (pressure and pump)
   (b) Flaring
   (c) Venting
(3) *Demonstrate bonding and grounding procedures for the transfer of flammable and combustible products from an intermodal tank or other products that can give off flammable gases or vapors when heated or contaminated, including the following:
   (a) Selection of equipment
   (b) Sequence of bonding and grounding connections
   (c) Testing of bonding and grounding connections
(4) 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, burst disc)
   (d) Puncture
   (e) Split or tear
   (f) Valves and piping
(5) Describe the methods for containing the following leaks in pressure intermodal tanks:
   (a) Crack
   (b) Failure of pressure relief device (e.g., relief valve, burst disc)
   (c) Piping failure
(6) Given the following product transfer and recovery equipment, demonstrate the safe and correct application and use of the following:
   (a) Portable pumps (air, electrical, gasoline, diesel)
   (b) Pressure transfer
   (c) Vacuum trucks
   (d) Vehicles with power-takeoff driven pumps
(7) *Given a scenario involving an overturned liquid intermodal tank, demonstrate the safe procedures for product removal and transfer.
(8) *Given a scenario involving an overturned pressure intermodal tank, demonstrate the safe procedures for product removal and transfer.
(9) *Given the necessary resources, demonstrate the flaring of a pressure flammable gas intermodal tank.
(10) Given a scenario involving a flammable liquid spill from an intermodal tank, describe the procedures for site safety and fire control during cleanup and removal operations.

Chapter 15 Competencies for Technicians with a Marine Tank Vessel Specialty

15.1* General.

15.1.1 Introduction.

15.1.1.1 The hazardous materials technician with a marine tank vessel specialty shall be that person who provides technical support pertaining to marine tank vessels, provides oversight for product removal and movement of damaged marine

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tank vessels, and acts as a liaison between technicians and outside resources.

15.1.1.2 The hazardous materials technician with a marine tank vessel specialty shall be trained to meet all competencies at the awareness level (Chapter 4), all core competencies at the operations level (Chapter 5), all competencies at the technician level (Chapter 7), and all competencies of this chapter.

15.1.1.3 The hazardous materials technician with a marine tank vessel specialty shall receive training to meet governmental occupational health and safety regulations.

15.1.2 Goal.

15.1.2.1 The goal of the competencies at this level shall be to provide the hazardous materials technician with a marine 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 technician level, the hazardous materials technician with a marine tank vessel specialty shall be able to perform the following tasks:

(1) Analyze a hazardous materials incident involving a marine tank vessel 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 a marine tank vessel and its cargo systems.
   (b)*Predict the likely behavior of a marine tank vessel and its contents in an emergency.
   (c)*Establish initial approved 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 hazardous materials technicians with a marine tank vessel specialty.

15.1.3.1 Hazardous materials technicians operating within the scope of their training as listed in Chapter 7 of this standard shall be able to intervene in marine tank vessel incidents.

15.1.3.2 If a hazardous materials response team decides to train some or all its hazardous materials technicians to have in-depth knowledge of marine 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 Tank Vessels. Given examples of damaged marine tank vessels, hazardous materials technicians with a marine tank vessel specialty shall describe the type and extent of damage to each marine tank vessel and its cargo systems and shall complete the following tasks:

(1)*Given examples of marine tank vessels, describe a marine tank vessel's basic construction and arrangement features.
(2)*Given examples of various marine tank vessels, point out and explain the design and purpose of each of the various types of marine tank vessel cargo compartment design, structure, and components.
(3)*Given examples of various fittings arrangements for marine tank vessels, point out and explain the design, construction, and operation of each.
(4) Given a barge or tank ship, identify and describe the normal methods of cargo transfer.
(5) Given a barge or tank ship, describe the following systems and processes used during cargo transfer:
   (a) Vapor recovery system
   (b) Vapor balancing
   (c) Pressuring cargo
   (d) Vacuum systems
   (e) Padding tanks
   (f) Inert gas system (tank ships only)
(6) Given the following types of cargo compartment damage on marine tank 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
(7) Given examples of the types of emergency situations a marine tank vessel can experience that might result in damage to the vessel or its cargo transfer system, describe the following types of marine tank 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/boiling liquid expanding vapor explosion (BLEVE)
(8) Given a marine vessel involved in an emergency, identify the factors to be evaluated as part of the marine tank vessel damage assessment process, including the following:
   (a) Type of marine tank vessel
   (b) Pressurized or nonpressurized cargo system
   (c) Number of cargo compartments
   (d) Type of cargoes in the damaged cargo system
   (e) Type of other cargoes on the marine tank vessel (outside the damaged area)
   (f) Cargo compatibility (and incompatibility)
   (g) Stability and stresses applied to the marine tank vessel
   (h) Type and nature of cargo system damage
   (i) Amount of product released and amount remaining in the cargo compartment
(9) 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 Tank Vessel and Its Contents. Hazardous materials technicians with a marine tank vessel specialty shall understand the likely behavior of the marine tank vessel and its contents and shall complete the following tasks:

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(1) Given the following types of marine tank vessels, provide examples of probable causes of releases:
   (a) Chemical ships
      i. Product/chemical tank ships
      ii. Sophisticated parcel chemical ships
      iii. Specialized chemical ships
   (b) Liquefied gas ships
      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
   (c) Barges
(2) Describe the significance of lining and cladding on cargo compartments in assessing marine tank vessel damage.
(3) Describe the significance of coated and uncoated cargo compartments in assessing marine tank vessel damage.
(4) Describe the significance of insulation or thermal protection on cargo compartments in assessing marine tank vessel damage.
(5) Describe the significance of heating and refrigeration coils in cargo compartments in assessing marine tank vessel damage.
(6) Given the following examples of damage to the cargo compartments and cargo transfer systems on marine tank vessels, describe their significance in the risk analysis process:
   (a) Cargo spills or releases
   (b) Tank leakage within the vessel
   (c) Vacuum damage (liquefied gases highly soluble in water)
(7) Describe the significance of the following types of internal and external forces on a marine tank vessel's stability in assessing marine tank vessel damage:
   (a) Wind, waves, tides, and currents
   (b) Movement of nearby vessels
   (c) Shifting, adding, or removing weight
   (d) Reduction of reserve buoyancy
   (e) Free surface effects
   (f) Free communication effects in a flooded compartment

15.3 Competencies — Planning the Response.

15.3.1 Determining the Response Options. Given the analysis of an emergency involving marine tank vessels, hazardous materials technicians with a marine tank vessel specialty shall determine the response options for each marine tank vessel involved and shall complete the following tasks:

(1) Given an incident involving a marine tank vessel, describe the methods, procedures, risks, safety precautions, and equipment that are required to implement hazardous cargo spill, release, and leak control procedures.
(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 liquids and gases:
   (a) Vessel-to-shore transfer
   (b) Vessel-to-vessel transfer
   (c) Vessel-to-tank truck transfer
   (d) Vessel-to-rail car transfer
   (e) Internal transfer within the vessel
   (f) Other types of transfers [e.g., portable liquid storage tanks (frac tanks)]
(3) Describe the purpose of, procedures for, and risks associated with controlling leaks from various fittings on marine tank vessel cargo systems, including equipment needed and safety precautions.

15.4 Competencies — Implementing the Planned Response. Given an analysis of an emergency involving marine tank vessels and the planned response, hazardous materials technicians with a marine tank vessel 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 marine tank vessels, describe approved methods and procedures for controlling the leaks:
   (a) Tank hatch/expansion trunk
   (b) Liquid/vapor valve or fitting
   (c) Cargo compartment vent
   (d) Pressure relief device
   (e) Cargo system manifold or pipeline
(2) Describe approved procedures for the following types of emergency cargo removal:
   (a) Gas/liquid transfer (pressure/pump)
   (b) Flaring
   (c) Venting
(3)*Describe the importance of bonding and grounding procedures for the transfer of flammable and combustible cargoes from a marine tank vessel or other products that can give off flammable gases or vapors when heated or contaminated.
(4) Demonstrate the methods for containing the following leaks on marine tank vessels:
   (a) Puncture
   (b) Irregular-shaped hole
   (c) Split or tear
   (d) Dome cover leak
   (e) Valves and piping failure
   (f) Pressure relief devices (e.g., vents, burst disc)
(5) 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) Pressure transfer
   (d) Vacuum trucks
(6)*Given the necessary resources, describe the flaring of a pressure flammable gas from a liquefied gas tank vessel (ship or barge, as applicable).
(7) 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.

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 H)*. Weapons of mass destruction (WMD) are known by many different abbrevia-

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tions 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 AHJ 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 AHJ 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 police chief, sheriff, 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 are a Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP), Certified Health Physicist (CHP), Certified Hazardous Materials Manager (CHMM), and similar credentialed or competent individuals as determined by the AHJ.

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 universal 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 K.1.2.5)*.

Mass decontamination should be established quickly to reduce the harm being done to the victims by the contaminants.

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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.3.3.25 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.3.3.26 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.3.3.28 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.3.3.29 Hazardous Materials Branch/Group. This function is directed by a hazardous materials officer and deals principally with the technical aspects of the incident.

A.3.3.30 Hazardous Materials Officer. This individual might also serve as a technical specialist for incidents that involve hazardous materials/WMD.

A.3.3.31 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.3.3.32 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.3.3.33 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.3.3.33.1 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.3.3.33.3 Hazardous Materials Technician with an Intermodal Tank Specialty. See A.3.3.33.1.

A.3.3.33.4 Hazardous Materials Technician with a Tank Car Specialty. See A.3.3.33.1.

A.3.3.36 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.3.3.38 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

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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.3.3.40 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.3.3.43 Packaging. Packaging for hazardous materials includes bulk and nonbulk packaging.

A.3.3.43.1 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.3.3.43.3 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, Part 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 Title 49, CFR 173.431. Type B packaging ranges from small drums [208 L (55 gal)], to heavily shielded steel casks that sometimes weigh more than 100 metric tons (98 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 321.8 km/hr (200 mph) impact onto an unyielding target is required instead of the 9.1 m (30 ft) 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.3.3.46 Personal Protective Equipment. 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.3.3.47.1 Emergency Response Plan. Emergency response plans can be developed at organizational, agency, local, state, and federal levels.

A.3.3.47.2 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.3.3.48 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.3.3.50 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.3.3.50.1 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.3.3.50.2 High Temperature–Protective Clothing. This type of clothing is usually of limited use in dealing with chemical commodities.

A.3.3.50.3 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.*

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A.3.3.50.4 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.3.3.50.5 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.3.3.52 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.3.3.53 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.3.3.58.1 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.3.3.58.2 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 3.3.47.1.

A.3.3.58.3 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.3.3.60 Termination. Termination is divided into three phases: debriefing the incident, post incident analysis, and critiquing the incident.

A.3.3.61 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.3.3.62 Weapon of Mass Destruction (WMD). The source of this definition is 18 USC 2332a.

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 I.

A.4.2.1(3) See Annex J.

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

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(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," "sheltering 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.

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

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

A.5.1.1.1 Operations level responders need only be trained to meet the competencies in Chapter 5. The competencies listed in Chapters 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.5.2.1.1.6 See A.3.3.43.3.

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

Table A.5.1.1.1 NFPA 472 Operations Level Responder Matrix

	Competencies						
Responders	**Use PPE**	**Perform Technical or Mass Decontamination***	**Perform Product Control**	**Perform Air Monitoring**	**Perform Victim Rescue and Removal**	**Preserve Evidence and Perform Sampling**	**Respond to Illicit Lab Incident**
Fire fighters expected to perform basic defensive product control measures	X	X	X	—	—	—	—
Emergency responders assigned to a decontamination company or decontamination strike force	X	X	—	—	—	—	—
Emergency responders assigned to a unit tasked with providing rapid rescue and extraction from a contaminated environment	X	X	—	X	X	—	—
Emergency responders assigned to provide staffing or support to a hazardous materials response team	X	X	X	X	X	—	—
Law enforcement personnel involved in investigation of criminal events where hazardous materials are present	X	X	—	X	—	X	X
Law enforcement personnel involved in investigation of incidents involving illicit laboratories	X	X	—	X	—	X	X
Public health personnel involved in the investigation of public health emergencies	X	X	—	—	—	X	—
Environmental health and safety professionals who provide air monitoring support	X	X	—	X	—	—	—

*The scope of the decontamination competencies would be based on whether the mission involves the responder being the "customer" of the decontamination services being provided or is part of those responders who are responsible for the set-up and implementation of the decontamination operation.

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

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(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, 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.

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, phenylchloromethylketone, 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

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

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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*, 2008 ed.

A.5.4.1(4) Refer to *Hazardous Materials/Weapons of Mass Destruction Response Handbook*, 2008 ed.

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 Chapters 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

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Operations and Emergency Response" (HAZWOPER), Appendix B, as follows:

(1) Level A — To be selected when the greatest level of skin, respiratory, and eye protections is required
(2) Level B — To be selected when the highest level of respiratory protection is necessary but a lesser level of skin protection is needed
(3) Level C — To be selected when the concentration(s) and type(s) of airborne substances are known and the criteria for using air-purifying respirators (APRs) are met

Except for the inflation and inward leakage tests on Level A garments, HAZWOPER does not specify minimum performance criteria of protective clothing and respirators required for specific threats, such as chemical permeation resistance and physical property characteristics. The use of these general levels of protection does not ensure that the wearer is adequately protected from CBRN-specific hazards.

Relying solely on OSHA/EPA nomenclatures in selection of personal protective equipment could result in exposure above acceptable limits or an unnecessary reduction in operational effectiveness through lack of mobility, decreased dexterity, or reduced operational mission duration.

The clothing and ensemble standards developed by the NFPA Technical Committee on Hazardous Materials Protective Clothing and Equipment establish minimum performance requirements for physical and barrier performance during hazardous materials emergencies, including those involving chemical, biological, and radioactive terrorism materials. These standards are integrated with the NIOSH and NFPA standards on respiratory equipment.

Table A.6.2.3.1(1) is provided to assist emergency response organizations in transitioning from the OSHA/EPA Levels A, B, and C to protection-based standards terminology. Because the OSHA/EPA levels are expressed in more general terms than the standards and do not include testing to determine protection capability, it is not possible to "map" those levels to specific standards. However, it is possible to look at specific configurations and infer their OSHA/EPA levels based on the definitions of those levels. Examples of ensembles and conservative interpretations of their corresponding levels are provided in Table A.6.2.3.1(1).

All purchasers of personal protective equipment are cautioned to examine their hazard and mission requirements closely and to select appropriate performance standards. All personal protective equipment must be used in accordance with 29 CFR 1910.120 (or equivalent EPA or state regulations). Also applicable in states with OSHA-approved health and safety programs and for Federal employers is 29 CFR 1910.134, "Respiratory Protection" (or an equivalent EPA or state regulation). Both 29 CFR 1910.120 and 29 CFR 1910.134 include requirements for formal plans, medical evaluation, and training to ensure the safety and health of emergency responders. Additional information, a list of allowable equipment, and information on related standards, certifications, and products are available on the Department of Homeland Security (DHS)–sponsored Responder Knowledge Base (http://www.rkb.mipt.org).

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.

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.

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 (form ICS 208 HM):

(1) Site description
(2) Entry objectives

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(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 For example, the techniques for use of the monitoring equipment should include monitoring for lighter-than-air gases in a confined area, 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 K 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:

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(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

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

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A.8.3.4.5.5 Safety hazards associated with confined spaces could include the following:

(1) Atmospheric hazards
  (a) Oxygen-deficient atmosphere
  (b) Oxygen-enriched atmosphere
  (c) Flammable and explosive atmospheres
  (d) Toxic atmosphere
(2) Physical hazards
  (a) Engulfment hazards
  (b) Falls and slips
  (c) Electrical hazards
  (d) Structural hazards
  (e) Mechanical hazards

A.8.4.2 Criteria and factors should include the following:

(1) Task assignment (based on strategic and tactical options)
(2) Operational safety
(3) Operational effectiveness
(4) Planning support
(5) Logistical support
(6) Administrative support

A.8.6.1 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.9.3.1.2 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) Appropriate personal protective clothing not available
(7) No effective action to be taken
(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

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(4) Gasoline leaking from a hole in the side of an aluminum tank truck
(5) Carbaryl, a powdered insecticide, found stored in a broken cardboard drum

A.11.3.1 Potential response options are either defensive or offensive in nature. The site safety and control plan is integrated into the formal incident action plan.

A.11.3.1(1) Safety precautions to be observed during mitigation of hazards or conditions can include the following:

(1) Elimination of ignition sources
(2) Use of monitoring instruments
(3) Stabilizing the container
(4) Establishing emergency evacuation procedures
(5) Ensuring availability of hose lines and foam, when appropriate
(6) Evacuating exposures
(7) Isolating the area
(8) Protecting in place
(9) Working in proper protective equipment

A.11.3.1(2) Safety precautions to be observed during search and rescue missions at hazardous materials/WMD incidents can include the following:

(1) Ensuring availability of appropriate personal protective equipment for all personnel
(2) Use of monitoring instruments
(3) Maintaining an escape path
(4) Knowledge of approved hand signals by all personnel
(5) Ensuring availability of communications equipment for each team
(6) Preplanning the search sequence prior to entry

A.11.3.3(1) Benefits of pre-emergency planning include the following:

(1) Identification and mitigation of hazards during the planning process
(2) Familiarization of personnel with facility
(3) Identification of 24-hour responsible parties
(4) Identification of built-in containment systems
(5) Identification of the location of utility and other shutoff/shutdown valves and switches
(6) Identification of location of facility map
(7) Identification of location and quantities of hazardous materials/WMD
(8) Identification of vulnerable populations
(9) Identification of facility response capabilities

A.11.3.3(2) Hazards that should be observed when personnel approach a hazardous materials/WMD incident include the following:

(1) Inhalation hazards
(2) Dermal hazards
(3) Flammable hazards
(4) Reactive hazards
(5) Electrical hazards
(6) Mechanical hazards

A.11.3.3(3) The following elements of a site safety plan are from the EPA *Standard Operating Safety Guides*:

(1) Site description
(2) Entry objectives
(3) On-site organization
(4) On-site control
(5) Hazard evaluation
(6) Personal protective equipment
(7) On-site work plans
(8) Communication procedures
(9) Decontamination procedures
(10) Site safety and health plan

A.11.3.5(3) Response options can include surveying the scene, sampling, monitoring, plugging, and patching.

A.11.3.7(1) The elements of an emergency medical services plan according to NFPA 473, *Standard for Competencies for EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents*, include the following:

(1) EMS control activities
(2) EMS component of an incident management system
(3) Medical monitoring of personnel utilizing chemical-protective and high temperature–protective clothing
(4) Triage of hazardous materials/WMD victims
(5) Medical treatment for chemically contaminated individuals
(6) Product and exposure information gathering and documentation

A.11.4.4(9) Safety considerations that can minimize secondary contamination include the following:

(1) Control zones are established and enforced.
(2) All people and equipment exiting the hot zone are decontaminated.
(3) Personnel performing decontamination are properly trained.
(4) Personnel performing decontamination are properly protected.

See NFPA 473, *Standard for Competencies for EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents*.

A.11.4.5(1) Communications systems include in-suit radio communications, hand-held portable radios, emergency signaling devices, and hand signals.

A.11.5.2(1)(a) Examples of such situations or conditions can include, but are not limited to, the following:

(1) Fire or explosion
(2) Container failure
(3) Sudden change in weather conditions
(4) Failure of entry team's personal protective clothing and/or equipment
(5) Updated information on identification of hazardous material(s) involved that warrants reassessment of level of protective clothing and equipment being used

A.11.6.2.1 Topics can include, but are not limited to, the following:

(1) Identity of the hazardous materials/WMD agent to which personnel have been or might have been exposed
(2) Signs and symptoms of exposure to the hazardous material(s) involved in the incident
(3) Signs and symptoms of critical incident stress
(4) Duration of recommended observation period for such signs and symptoms
(5) Procedures to follow in the event of delayed presentation of such signs or symptoms
(6) Name of the individual responsible for post-incident medical contact
(7) Safety and health hazards remaining at the site

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A.12.2.1(11)(d) The heat-affected zone is an area in the metal next to the actual weld. This zone is less ductile than either the weld or the metal due to the effect of the welding process. The heat-affected zone is vulnerable to cracks.

A.12.2.1(16) Other methods for determining the amount of liquid include shipping papers, the presence of frost line, the use of touch to feel for the colder liquid level, and the use of heat sensors.

A.12.4.1(9) When bonding and grounding are performed, a ground resistance tester and an ohmmeter should be used. The ground resistance tester measures the earth's resistance to a ground rod, and the ohmmeter measures the resistance of the connections to ensure electrical continuity. One ground rod might not be enough; more might have to be driven and connected to the first to ensure a good ground. Resistance varies with types of soils.

A.13.1.3 Technicians operating within the bounds of their training as listed in Chapter 6 of this standard are able to intervene in cargo tank incidents. However, if a hazardous materials response team decides to train some or all of the technicians to have in-depth knowledge of cargo tanks, this chapter sets out the required competencies.

A.13.2.1(5) See A.12.2.1(16).

A.13.4.1(3) See A.12.4.1(9).

A.14.2.1(9) Methods for determining the amount of liquid include the use of gauges, shipping papers, the presence of frost line, the use of touch or feel for the colder liquid level, and the use of heat sensors.

A.14.2.1(10) See A.12.2.1(11)(d).

A.14.4(3) See A.12.4.1(9).

A.14.4(7) See A.12.4.1(9).

A.14.4(8) See A.12.4.1(9).

A.14.4(9) See A.12.4.1(9).

A.15.1 Marine tank vessels are used to transport a wide range of different hazardous cargoes in bulk, including oils, chemicals, and liquefied gases. Many marine tank vessels are designed to carry a large number of segregated products simultaneously and can carry significantly greater volumes of cargo than other modes of transport. The operation of marine tank vessels differs from operation of other bulk cargo transportation. On a single voyage, a large number of cargoes with different properties, characteristics, and inherent hazards can be carried. Marine tank vessels are constructed in various types, sizes, and arrangements. Responders to hazardous material spills or releases from marine tank vessels face unique challenges. Marine tank vessels might be located at a dock, pier, or anchorage or might be underway, presenting special logistics issues. Marine tank vessels might be crewed with foreign nationals. Specialized equipment might be needed to properly respond to hazardous material spills and releases from marine tank vessels. In areas where hazardous materials are transported on waterways, responders to hazardous material incidents require a minimum level of specialized competency.

For the purposes of this chapter, a marine tank vessel is defined as a vessel that is constructed or adapted to carry or carries oil or hazardous material in bulk as cargo or cargo residue and operates on international navigable waters or that transfers oil or hazardous material in a port or place subject to international jurisdiction.

The term *tank ship* means a self-propelled tank vessel constructed or adapted primarily to carry oil or hazardous material in bulk in the cargo spaces.

The term *tank barge* means a non-self-propelled tank vessel.

The term *chemical carrier* means a tank ship or tank barge constructed or adapted and used for the carriage in bulk of any hazardous product listed in Chapter 17 of the *International Bulk Chemical Code*.

The term *liquefied gas carrier* means a tank ship or tank barge constructed or adapted and used for the carriage in bulk of any liquefied gas or other product listed in Chapter 19 of the *International Gas Carrier Code*.

Marine tank vessel responders should be familiar with the regulations that affect marine transportation, including, but not limited to, the following:

(1) 33 CFR, "Navigation and Navigatable Waters"
(2) 46 CFR, "Shipping"
(3) *MARPOL 73/78*
(4) *International Maritime Dangerous Goods Code* (IMDG Code)
(5) *Safety of Life at Sea (SOLAS)*
(6) *Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* (BCH Code)
(7) *International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* (IBC Code)
(8) *International Code for the Construction and Equipment of Ships Carrying Dangerous Liquefied Gases in Bulk* (IGC Code)
(9) Additional maritime industry standards and codes of practice that provide useful information include, but are not limited to, the following:
    (a) *International Safety Guide for Oil Tankers and Terminals*
    (b) *International Chamber of Shipping Tanker Safety Guide* (chemicals)
    (c) *International Chamber of Shipping Tanker Safety Guide* (liquefied gases)
    (d) *OCIMF Ship to Ship Transfer Safety Guide* (petroleum) (liquefied gases)
    (e) *SIGTTO Liquefied Gas Handling Principles on Ships and in Terminals*
(10) Additional response reference material that provide useful information include, but are not limited to, the following:
    (a) *Emergency Response Guidebook*, DOT
    (b) *Chemical Data Guide for Bulk Shipment by Water*, U.S. Coast Guard
    (c) Chemical Hazards Response Information System (CHRIS), U.S. Coast Guard
    (d) Bulk Cargo Finding Aid Web Site, U.S. Coast Guard
    (e) Material Safety Data Sheets
    (f) CAMEO® (Computer-Aided Management of Emergency Operations), EPA and NOAA

A.15.1.2.2(1)(b) External parameters that could affect the incident, including, but not limited to, weather, currents, and tides, should be monitored.

A.15.1.2.2(1)(c) Examples of appropriate controls in the marine environment include securing the vessel (i.e., anchoring or mooring), stabilizing the vessel, establishing exclusion zones, and precautions for public and personnel safety.

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A.15.1.3 Responders need to be trained in the competencies to address only the types of marine tank vessels to which they are expected to respond. For example, if a company ships cargo only by barges, their personnel need to be trained only to the competencies appropriate for barges and need not be trained to meet the competencies on other types of vessels. Competencies for responders are divided into barges and tankships.

A.15.2.1(1) Examples of marine tank vessels include the following:

(1) Barges
  (a) Oil/chemical tank barges
  (b) Liquefied gas barges
(2) Tank ships
  (a) Oil/product ships
  (b) Chemical ships
(3) Product/chemical marine tank ships
(4) Sophisticated parcel chemical ships
(5) Specialized chemical ships
  (a) Liquefied gas ships
(6) Fully pressurized marine tank ships
(7) Semipressurized marine tank ships
(8) Fully refrigerated marine tank ships
  (a) Liquefied natural gas (LNG) ships

A.15.2.1(2) Types of marine tank vessel cargo compartments include the following:

(1) Barge cargo compartments
  (a) Oil/chemical tank barges
  (b) Liquefied gas barges
(2) Oil/product ship cargo compartments
(3) Chemical ship cargo compartments
  (a) Typical tank construction
  (b) Irregular shaped tank construction
  (c) Tank-within-a-tank construction
  (d) Baffled tank construction
(4) Liquefied gas ship cargo compartments
  (a) Independent type A
  (b) Independent type B
  (c) Independent type C
  (d) Membrane
  (e) Semimembrane
  (f) Internal insulation type 1
  (g) Internal insulation type 2
  (h) Integral
(5) Cargo compartment containment types (for barges and tank ships)
  (a) Coated, lined, uncoated, or cladded
  (b) Stainless steel or carbon steel
  (c) Insulated/thermal protection
(6) Other spaces (for barges and tank ships)
  (a) Cofferdams
  (b) Double bottoms and/or double sides
  (c) Pump rooms
  (d) Other void spaces adjacent to the cargo area

Responders to hazardous materials spills and releases from marine tank vessels should acquire all available information related to the physical characteristics of the vessel. In most cases, responders should work closely and consult with individuals who are experts in the construction of the vessel, its tanks, and other applicable details (the owner, operator, officers, crew, cargo owner, or other individuals as appropriate). Sources of information regarding a particular vessel can include, but are not limited to, the following:

(1) General arrangement plan
(2) Procedures and arrangement (P&A) manual
(3) Fire and emergency plan

A.15.2.1(3) Examples of fittings arrangements for tank vessels include the following:

(1) Cargo system valves
  (a) Gate valves
  (b) Globe valves
  (c) Butterfly valves
  (d) Ball valves
  (e) Check valves
  (f) Angle valves
  (g) Pneumatic, hydraulic, or electrically operated valves
(2) Cargo pipeline systems
  (a) Single loop (single line connected to all tanks)
  (b) Branch (multiple lines capable of operating in a segregated or common system of tanks)
  (c) Single tank (dedicated, fully segregated piping system)
(3) Cargo pumps
  (a) Centrifugal
  (b) Positive displacement
  (c) Screw drive
  (d) Deepwell
  (e) Portable emergency/backup pumps
  (f) Stripping systems
  (g) Systems for providing power to the pumps — hydraulic, electric, steam, direct diesel
(4) Cargo compartment fittings
  (a) Tank hatch/expansion trunk
  (b) Tank gauging/sampling points
  (c) Vents
  (d) Pressure gauges
  (e) Cleaning ports (Butterworth hatches)
  (f) Spill valves
(5) Emergency shutdown systems
  (a) Manual or automatic/integrated
  (b) Electrical
  (c) Pneumatic
  (d) Remote-actuated/radio
  (e) Thermal
(6) Pressure relief systems
  (a) Safety relief valves
  (b) Pressure relief valves
  (c) Vacuum relief valves
  (d) Regulator valves
  (e) Rupture discs
(7) Cargo temperature control systems
  (a) Steam/water
  (b) Thermal oil
  (c) Liquefaction systems (e.g., glycol)
  (d) Heat exchanger
(8) Cargo cooling (chemical ships) or refrigeration systems (liquefied gas ships)
(9) Cargo compressors (liquefied gas ships)
(10) Cargo vapor handling systems and piping
(11) Inert systems

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(a) Flue gas (tank ships only)
(b) Inert gas generator (tank ships only)
(c) Nitrogen generation/bottle supplied systems

(12) Cargo measurement systems
(a) Open gauging systems
(b) Closed gauging systems
(c) Restricted gauging systems
(d) Automatic gauging and high level alarm systems
(e) Level indicating devices (slip tubes, sticks, etc.)

(13) Fire-fighting and fire protection equipment (see NFPA 1405, *Guide for Land-Based Fire Fighters Who Respond to Marine Vessel Fires*)

A.15.4(3) See A.12.4.1(9).

A.15.4(6) See A.12.4.1(9).

Annex B Competencies for Responders Assigned Biological Agent–Specific Tasks

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

B.1 General.

B.1.1 Introduction.

B.1.1.1 The responder assigned biological agent–specific tasks by the AHJ at hazardous materials/WMD incidents is that person, competent at the operations level, who, at hazardous materials/WMD incidents involving biological materials, is assigned to support the hazardous materials technician and other personnel, provides strategic and tactical recommendations to the on-scene incident commander, serves as a technical advisor to provide technical oversight for operations, and acts as a liaison between the hazardous material technician, response personnel, and outside resources regarding biological issues.

B.1.1.2 The responder assigned biological agent-specific tasks at hazardous materials/WMD incidents should be trained to meet all competencies at the awareness level (Chapter 4), all core competencies at the operations level (Chapter 5), all mission-specific competencies for personal protective equipment (Section 6.2), and all competencies in this annex.

B.1.1.3 The responder assigned biological agent–specific tasks at hazardous materials/WMD incidents should operate under the guidance of a hazardous materials technician, an allied professional, or standard operating procedures.

B.1.1.4 The responder assigned biological agent–specific tasks at hazardous materials/WMD incidents should receive the additional training necessary to meet specific needs of the jurisdiction.

B.1.2 Goal.

B.1.2.1 The goal of this section is to provide the responder assigned biological agent–specific tasks at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in paragraph B.1.2.2 safely and effectively.

B.1.2.2 When responding to hazardous materials/WMD incidents, the responder assigned biological agent–specific tasks should be able to perform the following tasks:

(1) Analyze an incident involving biological agents threat to determine the credibility and magnitude of the problem by completing the following tasks:
(a) Understand biological-threat agents, methods of production, and potential harm from biological-threat agents involved in an incident.
(b) Understand methods of threat agent dissemination, detection, laboratory testing, and surveillance systems.

(2) Plan a response for an incident involving biological threat agents within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by completing the following tasks:
(a) Determine the response options (offensive, defensive, and nonintervention) for an incident involving biological threat agents.
(b) Ensure that the options are within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.

(3) Implement the planned response to a hazardous materials incident involving biological threat agents

B.1.3 Mandating of Competencies. This standard does not mandate that response organizations perform biological agent–specific tasks.

B.1.3.1 The responders assigned biological agent-specific tasks at hazardous materials/WMD incidents, operating within the scope of their training, should be able to perform their assigned biological agent–specific tasks.

B.1.3.2 If a response organization decides to train some or all its responders to perform biological agent–specific tasks at hazardous materials/WMD incidents, this annex sets out the minimum required competencies.

B.2 Competencies — Analyzing the Incident.

B.2.1 The responder assigned biological agent–specific tasks should understand biological threat agents, methods of dissemination, and potential harm from biological threat agents involved in an incident.

B.2.1.1 Given examples of biological threat agents, the responder assigned biological agent–specific tasks should be able to perform the following tasks:

(1) Define the type of biological threat agent.
(2) Provide examples of each group.
(3) Identify potential sources of biological threat agents in industry and business.
(4) Describe potential methods of biological agent production.

B.2.1.2 The responder assigned biological agent–specific tasks should be able to perform the following tasks:

(1) Define the following terms germane to biological agents and biological incidents:
(a) Infectious
(b) Contagious
(c) Pathogen
(d) Endemic
(e) Zoonotic
(f) Morbidity
(g) Mortality
(h) Particle size
(i) Spore
(j) Infectious dose
(k) Pandemic
(l) Incubation period

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(m) Antibiotic
(n) Prophylaxis
(o) Syndromic surveillance
(p) Index case

(2) Given the following types of biological threat agents, define each category and provide examples for each group:
(a) Bacteria
(b) Viruses
(c) Fungi
(d) Toxins

(3) Identify potential sources of microorganisms in the following:
(a) Business
(b) Industry
(c) Academia
(d) Government
(e) Criminal enterprises
(f) Natural reservoirs

(4) Provide examples of components used in biological threat agent production and describe the item and its potential use in agent production.

(5) Provide examples of items found in clandestine biological agent production laboratories that differ from items found in the production of illicit drugs and chemicals.

(6) Given the following types of biological pathogens, identify the potential harm associated with each agent as it relates to potential criminal use:
(a) Variola virus (smallpox)
(b) *Botulinum* toxin
(c) *E. coli*
(d) Ricin toxin
(e) *B. anthracis* (anthrax)
(f) Venezuelan equine encephalitis virus
(g) Rickettsia
(h) Q fever
(i) *Yersinia pestis* (plague)
(j) *Franciscella tularensis* (tularemia, rabbit fever)
(k) Viral hermoraic fever
(l) Any other CDC Category A, B, or C organisms

B.2.2 Identify Methods of Dissemination and Identification of Biological Threat Agents.

B.2.2.1 The responder assigned biological agent–specific tasks should be able to predict likely methods of dissemination of biological threat agents and methods for identification.

B.2.2.2 The responder assigned biological agent–specific tasks should be able to perform the following tasks:

(1) Given examples of the four types of exposure, identify the following potential routes of infection by biological agents:
(a) Inhalation
(b) Absorption
(c) Ingestion
(d) Injection

(2) Given examples of fixed surveillance, detection, or collection systems, define the method of operation, potential location for use, and detection technology utilized in each of the following specific systems:
(a) Particle size detector
(b) Automated biological agent detection system
(c) Dry filter units
(d) Liquid impinger
(e) Slit-to-agar air sampler

(3) Given examples of field detection systems, identify factors to be evaluated as part of the use of these systems, including system validation, capability, limitations, detection levels, operator training, interpretation of results, purity of sample, and destruction of evidence for confirmatory analysis for the following:
(a) Hand-held assays
(b) Fourier transform infrared spectroscopy
(c) Screening tests kits
(d) Protein assays
(e) Field microscopy

(4) Explain the United States Laboratory Response Network (LRN) system and describe each of the following components as it relates to the network (for responders outside the United States, the applicable and equivalent laboratory network operating in their country is to be used wherever LRN references are made in this section):
(a) Access to introduce samples into the laboratories in the network
(b) Sampling procedures and required sampling equipment
(c) Procedures for field screening items to be sent to network laboratories
(d) Packaging requirements for items to be sent to network laboratories

(5) Given the following terms for analysis of biological threat agents, explain the methodology of agent identification:
(a) Polymerase chain reaction
(b) Culture tests
(c) Gram stain
(d) Morphology
(e) Motility
(f) Immunoassays (ELISA, Western blot, Southern blot, surface acoustic wave)
(g) Time-resolved fluorescence

B.3 Competencies — Planning the Response.

B.3.1 Determining the Response Options. Given an analysis of an incident involving biological threat agents, the responder assigned biological agent–specific tasks should be able to determine the response options for the incident.

B.3.2 The responder assigned biological agent–specific tasks should be able to perform the following tasks:

(1) Given a release of biological agents, describe the considerations for establishing a hot zone for the following scenarios:
(a) Biological agent release from a dissemination device or air-handling system
(b) Biological agent release from an envelope or package
(c) Biological agent spill or container breach of a liquid agent

(2) Describe the factors to be evaluated in selecting personal protective equipment for use at an incident involving biological threat agents.

(3) Given the following scenarios, describe the considerations for selecting personal protective clothing:
(a) Biological agent release from a dissemination device or air-handling system
(b) Biological agent release from an envelope or a package
(c) Biological agent spill or container breach of a liquid agent

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(4) Describe the factors to be considered in selecting decontamination procedures for use at an incident involving biological threat agents.
(5) Given the following scenarios, describe the considerations for selecting decontamination procedures:
  (a) Equipment exposed to the release of a dry or liquid biological agent
  (b) Hard surfaces exposed to the release of a dry or liquid biological agent
  (c) Victim exposed to a localized release, (e.g., hands or arms) of a dry or liquid biological agent
  (d) Victim exposed to a significant release of a dry or liquid biological agent
(6) Describe the factors to be considered in identification of biological threat agents, including the following:
  (a) Field screening and packaging consistent with LRN protocols
  (b) Field test limitations, accuracy, and interpretation
  (c) Preservation of forensic evidence
  (d) Preservation of material for LRN testing
  (e) Role of law enforcement agencies
  (f) Role of the LRN
  (g) Role of public health agencies
  (h) Sampling of biological agents

B.4 Competencies — Implementing the Planned Response.

B.4.1 Given an analysis involving the release or potential release of a WMD, the responder assigned biological agent–specific tasks should be able to determine the safety and effective response options.

B.4.2 The responder assigned biological agent–specific tasks should be able to perform the following tasks:

(1) Given a simulated incident involving a biological release from a dissemination device or air-handling system, describe the procedures for the following:
  (a) Identification of hot zone
  (b) Managing exposed victims
  (c) Selection of protective clothing
  (d) Decontamination
  (e) Sampling, field screening, and packaging
  (f) Laboratory analysis
(2) Given a simulated incident involving a biological release from an envelope or a package, describe the procedures for the following:
  (a) Identification of hot zone
  (b) Managing exposed victims
  (c) Selection of protective clothing
  (d) Decontamination
  (e) Sampling, field screening, and packaging
  (f) Laboratory analysis
(3) Given a simulated incident involving a biological agent spill or container breach of a liquid agent, describe the procedures for the following:
  (a) Identification of hot zone
  (b) Managing exposed victims
  (c) Selection of protective clothing
  (d) Decontamination
  (e) Sampling, field screening, and packaging
  (f) Laboratory analysis

B.5 Competencies — Evaluating Progress. (Reserved)

B.6 Competencies — Terminating the Incident. (Reserved)

Annex C Competencies for Responders Assigned Chemical Agent–Specific Tasks

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

C.1 General.

C.1.1 Introduction.

C.1.1.1 The responder assigned chemical agent–specific tasks by the AHJ at hazardous materials/WMD incidents is that person, competent at the operations level, who, at hazardous materials/WMD incidents involving chemical materials, is assigned to support the hazardous materials technician and other personnel, provides strategic and tactical recommendations to the on-scene incident commander, serves as a technical advisor to provide technical oversight for operations, and acts as a liaison between the hazardous material technician, response personnel, and outside resources regarding chemical issues.

C.1.1.2 The responder assigned chemical agent–specific tasks at hazardous materials/WMD incidents should be trained to meet all competencies at the awareness level (Chapter 4), all core competencies at the operations level (Chapter 5), all mission-specific competencies for personal protective equipment (Section 6.2), and all competencies in this annex.

C.1.1.3 The responders assigned chemical agent–specific tasks at hazardous materials/WMD incidents should operate under the guidance of a hazardous materials technician, an allied professional, or standard operating procedures.

C.1.1.4 The responder assigned chemical agent–specific tasks at hazardous materials/WMD incidents should receive the additional training necessary to meet specific needs of the jurisdiction.

C.1.2 Goal.

C.1.2.1 The goal of the competencies in this annex is to provide the responder assigned chemical agent–specific tasks at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in C.1.2.2 safely and effectively.

C.1.2.2 When responding to hazardous materials/WMD incidents, the responder assigned chemical agent–specific tasks should be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving potential release of WMD agents and determine the complexity of the problem and potential outcomes by completing the following tasks:
  (a) Determine if the incident is a potential dispersal of a WMD agent and identify the agent within the capabilities of the detection equipment available.
  (b) Identify unique aspects of a potential dispersal of a hazardous material/WMD agent incident.
(2) Within the capabilities and competencies of available personnel, personal protective equipment, and detection and monitoring equipment, plan a response for an incident where there is potential release of WMD agents by completing the following tasks:
  (a) Determine the response options necesssary to conduct detection and monitoring operations.

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(b) Ensure that the options are within the legal authorities, capabilities, and competencies of available personnel, personal protective equipment, and detection equipment.

(3) Implement the planned response to a WMD incident involving potential criminal intent.

C.1.3 Mandating of Competencies. This standard does not mandate that response organizations perform chemical agent–specific tasks.

C.1.3.1 Responders assigned chemical agent–specific tasks at hazardous materials/WMD incidents, operating within the scope of their training in this annex, should be able to perform their assigned chemical agent–specific tasks.

C.1.3.2 If a response organization decides to train some or all its responders to perform chemical agent–specific tasks at hazardous materials/WMD incidents, this annex sets out the minimum required competencies.

C.2 Competencies — Analyzing the Incident.

C.2.1 The responder assigned chemical agent–specific tasks should be able to determine if the incident has the potential for the release of a WMD and the type of detection devices to use based on the signs and symptoms of victims.

C.2.2 Given examples of WMD incidents involving potential release, the responder assigned chemical agent–specific tasks should be able to describe the type of detection devices to use based on the signs and symptoms of victims and chemical and physical properties observed.

C.2.3 The responder assigned chemical agent-specific tasks should be able to perform the following tasks:

(1) Given examples of various types of WMD chemicals, describe the products that might be encountered, chemical and physical properties of those chemicals, and the incident response considerations associated with each.
(2) Given examples of the following potential releases at WMD incidents, describe products potentially encountered and the incident response considerations associated with each situation.
   (a) WMD with no release but product present in container
   (b) WMD with release of visible vapor cloud, liquid pooling, solid dispersion
   (c) WMD with release of visible vapor cloud, liquid pooling, or solid dispersion with suspected victims (patients)
   (d) WMD with suspected victims (patients) but no apparent chemical release

C.2.4 The responder assigned chemical agent-specific tasks should be capable of identifying the unique aspects associated with chemical/WMD releases.

C.2.5 Given an incident involving the release or potential release of a WMD, the responder assigned chemical agent–specific tasks should be able to identify and implement the following tasks:

(1) Secure and isolate the scene
(2) Identify the correct detection device(s)
(3) Deploy the applicable detection device and interpret readings
(4) Notify appropriate explosive ordnance disposal (EOD) personnel if an explosive device has been used to disseminate product

C.3 Competencies — Planning the Response.

C.3.1 Given an analysis of an incident involving release or potential release of a WMD, the responder assigned chemical agent–specific tasks should be able to determine possible response options.

C.3.2 The responder assigned chemical agent–specific tasks should be able to perform the following tasks:

(1) Describe the hazards, safety procedures, and tactical guidelines for responding to the following:
   (a) Environmental crime involving a hazardous materials/WMD incident
   (b) Illicit drug manufacturing
   (c) Release of or attack with a WMD agent
   (d) WMD clandestine laboratory
   (e) WMD suspicious package
   (f) WMD threatening communication
(2) Describe the factors to be evaluated in selecting the correct personal protective equipment, detection devices, and decontamination for the following types of incidents:
   (a) Environmental crime involving a hazardous materials/WMD incident
   (b) Illicit drug manufacturing
   (c) Release of or attack with a WMD agent
   (d) WMD clandestine laboratory
   (e) WMD suspicious package
   (f) WMD threatening communication
(3) Describe the detection options for gases, liquids, and solids found at the following types of incidents:
   (a) Environmental crime involving a hazardous materials/WMD incident
   (b) Illicit drug manufacturing
   (c) Release of or attack with a WMD agent
   (d) WMD clandestine laboratory
   (e) WMD suspicious package
   (f) WMD threatening communication
(4) Given examples of releases or potential releases involving a WMD, identify and describe the application, use, and limitations of the types of detection devices that can be utilized, including the following:
   (a) Combustible gas indicators
   (b) Electrochemical cells
   (c) Photoionization detector
   (d) Flame ionization detector
   (e) FT infrared spectrometer
   (f) Alpha, beta, gamma radiation detector
   (g) Colorimetric detection devices
   (h) Mass spectrometer, gas chromatograph
   (i) Any new technology or instrumentation utilized by the AHJ
(5) Describe the potential negative impact associated with detection devices that use destructive technologies.

C.4 Competencies — Implementing the Planned Response.

C.4.1 Given an analysis involving the release or potential release of a WMD, the responder assigned chemical agent–specific tasks should determine the safety and effective response options.

C.4.2 The responder assigned chemical agent–specific tasks should be able to perform the following tasks:

(1) Given a simulated WMD incident involving a release or potential release, demonstrate the safe and effective methods for identifying the following:

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(a) Illicit drug manufacturing process
(b) WMD threatening communication
(c) WMD suspicious package
(d) WMD clandestine laboratory
(e) Release of or attack with a WMD agent
(f) Environmental crime involving a hazardous material/WMD incident

(2) Given a simulated hazardous material/WMD incident involving release or potential release, demonstrate the methods for selecting the correct personal protective equipment, sampling equipment, detection devices, and decontamination for the following:
(a) An illicit drug manufacturing process
(b) A hazardous material/WMD threatening communication
(c) A hazardous material/WMD suspicious package
(d) A hazardous material/WMD clandestine laboratory
(e) Release of or attack with a WMD agent
(f) An environmental crime involving a hazardous material/WMD incident

(3) Given a simulated WMD incident involving a release or potential release, demonstrate the safe and effective methods for nondestructive detection of WMD products.

(4) Given a simulated WMD incident involving a release or potential release, demonstrate the safe and effective methods for detection of gas, liquid, and solid samples.

(5) Given an example of a WMD incident involving a release or potential release, demonstrate the different detection technologies that can be used with the following:
(a) An illicit drug manufacturing process
(b) A WMD threatening communication
(c) A WMD suspicious package
(d) A WMD clandestine laboratory
(e) Release of or attack with a WMD agent
(f) An environmental crime involving a hazardous material/WMD incident

(6) Given an example of a potential WMD incident, demonstrate the safe and effective methods for decontaminating detection instrumentation.

C.5 Competencies — Evaluating Progress. (Reserved)

C.6 Competencies — Terminating the Incident. (Reserved)

Annex D Competencies for Responders Assigned Radiological Agent–Specific Tasks

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

D.1 General.

D.1.1 Introduction.

D.1.1.1 The responder assigned radiological agent–specific tasks by the AHJ at hazardous materials/WMD incidents is that person, competent at the operations level, who, at hazardous materials/WMD incidents involving radiological materials, is assigned to support the hazardous materials technician and other personnel, provides strategic and tactical recommendations to the on-scene incident commander, serves as a technical advisor to provide technical oversight for operations, and acts as a liaison between the hazardous material technician, response personnel, and outside resources regarding radiological issues.

D.1.1.2 The responder assigned radiological agent–specific tasks at hazardous materials/WMD incidents should be trained to meet all competencies at the awareness level (Chapter 4), all core competencies at the operations level (Chapter 5), all mission-specific competencies for personal protective equipment (Section 6.2), and all competencies in this annex.

D.1.1.3 The responder assigned radiological agent–specific tasks at hazardous materials/WMD incidents should operate under the guidance of a hazardous materials technician, an allied professional, or standard operating procedures.

D.1.1.4 The responder assigned radiological agent–specific tasks at hazardous materials/WMD incidents should receive additional training necessary to meet specific needs of the jurisdiction.

D.1.2 Goal.

D.1.2.1 The goal of the competencies in this annex is to provide the responder assigned radiological agent–specific tasks at hazardous materials/WMD incidents with the knowledge and skills to perform the tasks in D.1.2.2 safely and effectively.

D.1.2.2 When responding to hazardous materials/WMD incidents, the responder assigned radiological agent–specific tasks should be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving radioactive material to determine the complexity of the problem and potential outcomes by completing the following tasks:
(a) Understand types of radiation and potential harm of each type at an incident.
(b) Predict the direct exposure pathways, including inhalation, ingestion, injection, and absorption.

(2) Plan a response for an emergency involving radioactive material within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by determining the response options for a hazardous materials/WMD emergency involving radioactive material.

(3) Implement or oversee the implementation of the planned response to a hazardous materials/WMD incident involving radioactive material.

D.1.3 Mandating of Competencies. This standard does not mandate that response organizations perform radiological agent–specific responsibilities.

D.1.3.1 Responders assigned radiological agent–specific tasks at hazardous materials/WMD incidents, operating within the scope of their training in this chapter, should be able to perform their assigned radiological agent–specific tasks.

D.1.3.2 If a response organization decides to train some or all its responders to perform radiological agent–specific tasks at hazardous materials/WMD incidents, this annex sets out the minimum required competencies.

D.2 Competencies — Analyzing the Incident.

D.2.1 Given examples of radiation, the responder assigned radiological agent–specific tasks should be able to define the types of radiation and provide examples of radiation sources, natural, manmade and other potential sources.

D.2.2 The responder assigned radiological agent–specific tasks should be able to the perform the following tasks:

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(1) Define the following terms associated with radiological material:
   (a) Ionizing radiation
   (b) Nonionizing radiation
   (c) Radioactivity
   (d) Half-life
   (e) Dose, dose rate
   (f) Units of measure for radiation and radioactivity
   (g) Special nuclear material
   (h) Electromagnetic radiation, pulse
   (i) Radiological dispersion device (RDD)
   (j) Improvised nuclear device (IND)
(2) Identify the following types of radiation:
   (a) Alpha radiation
   (b) Beta radiation
   (c) Gamma radiation, X-ray
   (d) Neutron radiation
(3) Identify the following potential sources of radiation:
   (a) Naturally occurring
   (b) Manmade
   (c) Medical facilities
   (d) Research laboratories
   (e) Nuclear power plant
   (f) Uranium mines
   (g) Fuel processing plant
   (h) Radioactive material/waste shipments
   (i) Department of Defense facilities
   (j) Department of Energy facilities
   (k) Industrial applications
(4) Given the following types of radiation, identify the potential harm associated with each of the following:
   (a) Alpha radiation
   (b) Beta radiation
   (c) Gamma radiation, X-ray
   (d) Neutron radiation
(5) Identify the following terms related to a nuclear detonation from an IND:
   (a) Blast and thermal effects
   (b) Prompt radiation effects
   (c) Fallout and ground shine

D.2.3 The responder assigned radiological agent–specific tasks should be able to identify the potential misuses of radioactive material, including radiological dispersal device, concealed source, improvised nuclear device, and nuclear bomb, and should be able to do the following:

(1) Given examples of the four exposure pathways for radioactive material, identify potential routes of exposure from the following:
   (a) Inhalation
   (b) Absorption
   (c) Ingestion
   (d) Injection
(2) Given examples of the classes of radiation detection systems, identify factors to be evaluated as part of the use of these systems, including system validation, capability, limitations, detection levels, operator training, and interpretation of results, for the following:
   (a) Personal radiation detectors
   (b) Radiation exposure survey meters
   (c) Contamination survey meters
   (d) Radioisotope identification meters
   (e) Portal monitor systems
   (f) Dosimetry devices

D.3 Competencies — Planning the Response.

D.3.1 Given an analysis of an incident involving radiological material, the responder assigned radiological agent–specific tasks should be able to determine response options for the incident.

D.3.2 The responder assigned radiological agent–specific tasks should be able to perform the following tasks:

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

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(8) Identify the local, state, and federal resources available to assist the operations level responder identify a radioactive material and manage the incident.

D.4 Competencies — Implementing the Planned Response.

D.4.1 Given an analysis of an incident involving radioactive material, the responder assigned radiological agent–specific tasks should implement or oversee the implementation of the selected response options safely and effectively.

D.4.2 The responder assigned radiological agent–specific tasks should be able to perform the following tasks:

(1) Given a simulated incident involving the concealment of a radioactive material source in a public area, describe the procedures for the following:
   (a) Locating the source
   (b) Identifying initial isolation zone
   (c) Identifying the source [i.e., isotope(s) involved]
   (d) Determining source exposure rate
   (e) Dose estimation for affected personnel

(2) Given a simulated incident involving a release of radioactive material from a dissemination device or air-handling system, describe the procedures for the following:
   (a) Identification of hot, warm, and cold zones
   (b) Managing exposed and contaminated victims
   (c) Selection of protective clothing
   (d) Decontamination
   (e) Sampling and identification of the material involved
   (f) Field screening and packaging the material involved
   (g) Laboratory analysis of the material involved

(3) Given a simulated incident involving a release of radioactive material from an envelope or a package, describe the procedures for the following:
   (a) Identification of hot, warm, and cold zones
   (b) Managing exposed and contaminated victims
   (c) Selection of protective clothing
   (d) Decontamination
   (e) Sampling and identification of the material involved
   (f) Field screening and packaging the material involved
   (g) Laboratory analysis of the material involved

(4) Given a simulated incident involving a release of radioactive material from a radiological dispersion device or a container breach, describe the procedures for the following:
   (a) Identification of hot, warm, and cold zones
   (b) Managing exposed and/or contaminated victims
   (c) Selection of protective clothing
   (d) Decontamination
   (e) Sampling and identification of the material involved
   (f) Field screening and packaging the material involved
   (g) Laboratory analysis of the material involved

(5) Given a simulated incident involving a release of radioactive material from a spill of a liquid agent, describe the procedures for the following:
   (a) Identification of hot, warm, and cold zones
   (b) Managing exposed and/or contaminated victims
   (c) Selection of protective clothing
   (d) Decontamination
   (e) Sampling and identifying of the material involved
   (f) Field screening and packaging the material involved
   (g) Laboratory analysis of the material involved

(6) Given a simulated incident involving a release of radioactive material from the detonation of an IND, describe the procedures for the following:
   (a) Identification of hot, warm, and cold zones
   (b) Managing exposed and contaminated victims
   (c) Selecting of protective clothing
   (d) Decontamination
   (e) Sampling and identifying of the material involved
   (f) Field screening and packaging the material involved
   (g) Laboratory analysis of the material involved

D.5 Competencies — Evaluating Progress. (Reserved)

D.6 Competencies — Terminating the Incident. (Reserved)

Annex E Competencies for Technicians with a Flammable Liquids Bulk Storage Specialty

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

E.1 General.

E.1.1 Introduction. Technicians with a flammable liquids bulk storage specialty should meet all requirements of the awareness, operations, and hazardous materials technician levels and the competencies of this annex. The technician with a flammable liquids bulk storage specialty also should receive additional training to meet applicable United States Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and other applicable state, local, or provincial occupational health and safety regulations.

E.1.2 The technician with a flammable liquids bulk storage specialty is that person who, in incidents involving bulk flammable liquid storage tanks, provides support to the hazardous materials technician and other personnel, provides strategic and tactical recommendations to the on-scene incident commander, provides oversight for fire control and product removal operations, and acts as a liaison between technicians, response personnel, and outside resources.

These technicians are expected to use appropriate personal protective clothing and specialized fire, leak, and spill control equipment.

E.1.3 Goal. The goal of this annex is to provide the technicians with a flammable liquids bulk storage specialty with the knowledge and skills to perform the following tasks safely. In addition to being competent at the technician levels, the technician with a flammable liquids bulk storage specialty should 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.

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(3) Implement the planned response to a hazardous materials/WMD incident involving a flammable liquid bulk storage tank.

E.1.4 Mandating of Competencies. This standard does not mandate that hazardous materials response teams performing offensive operations on flammable liquids bulk storage tanks have technicians with a flammable liquids bulk storage specialty. Technicians operating within the bounds of their training as listed in Chapter 6 of this standard are able to intervene in flammable liquids bulk storage incidents. However, if a hazardous materials response team decides to train some or all its technicians to have in-depth knowledge of flammable liquids bulk storage facilities, this annex sets out the recommended competencies.

E.2 Competencies — Analyzing the Incident.

E.2.1 Determining the Type and Extent of Damage to the Bulk Storage Tank. Given examples of storage tank incidents, technicians with a flammable liquids bulk storage specialty should describe the type of storage tank and the type and extent of damage to the tank and its associated piping and fittings. The technician with a flammable liquids bulk storage specialty should be able to perform the tasks in E.2.1.1 through E.2.1.5.

E.2.1.1 Given examples of various flammable liquid bulk storage operations, the technician should 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 should be based on local or regional facilities and could include marketing terminals, pipeline operations and terminals, refineries, and bulk storage facilities.

E.2.1.2 Given examples of the following atmospheric pressure bulk liquid storage tanks, 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

According to NFPA 30, *Flammable and Combustible Liquids Code*, atmospheric tanks are defined as storage tanks operating at pressures from atmospheric through a gauge pressure of 6.9 kPa (1.0 psi). The floating roof on an open floating roof tank can be a pan roof or a pontoon floating roof, while the floating roof on a covered floating roof tank can be constructed of aluminum, steel, or fiberglass.

E.2.1.3 Given examples of the following types of low pressure horizontal and vertical bulk liquid storage tanks, the technician should be able to describe the tank's uses and design and construction features.

(1) Horizontal tank
(2) Dome roof tank

According to NFPA 30, *Flammable and Combustible Liquids Code*, low pressure tanks are defined as storage tanks operating at internal pressure above a gauge pressure of 1.0 psi (6.9 kPa) but not more than 15 psi or 1 bar gauge (103.4 kPa).

E.2.1.4 Given examples of various atmospheric and low pressure bulk liquid storage tanks, 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) Tank piping and piping supports
(10) Fixed or semifixed fire protection system

E.2.1.5 Given three examples of primary and secondary spill confinement measures, describe the design, construction, and incident response considerations associated with each method provided.

E.2.2 Predicting the Likely Behavior of the Bulk Storage Tank and Contents. Technicians with a flammable liquids bulk storage specialty should predict the likely behavior of the tank and its contents. The technician with a flammable liquids bulk storage specialty should be able to perform the tasks in E.2.2.1 through E.2.2.4.

E.2.2.1 Given examples of different types of flammable liquid bulk storage tank facilities, 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

E.2.2.2 Given a flammable liquid bulk storage tank involved in a fire, 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

E.2.2.3 Given three types of incidents involving flammable liquid bulk storage tanks, describe the likely fire and spill behavior for each incident. Examples of fire and spill incidents include tank overfills, seal fires on floating roof tanks, floating roof with a sunken internal roof, tank or piping failures, and full-surface fire.

E.2.2.4 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

For additional information, see NFPA 30, *Flammable and Combustible Liquids Code*, and API 2021, *Guide for Fighting Fires in and Around Flammable and Combustible Atmospheric Petroleum Storage Tanks.*

E.3 Competencies — Planning the Response. Given an analysis of an incident involving flammable liquid bulk storage tanks, technicians with a flammable liquids bulk storage specialty should determine response options for the storage tank

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involved. The technician with a flammable liquids bulk storage specialty should be able to perform the tasks in E.3.1 through E.3.11.

E.3.1 Describe the factors to be considered in evaluating and selecting Class B fire-fighting foam concentrates for use on flammable liquids.

E.3.2 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

E.3.3 Given examples of different types of flammable liquid bulk storage tanks, 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 system
(4) Fixed foam monitors
(5) Foam and water sprinkler systems

E.3.4 Describe the hazards, safety procedures, and tactical guidelines for handling an accumulated (in-depth) flammable liquid-spill fire.

E.3.5 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.

E.3.6 Describe the hazards, safety procedures, and tactical guidelines for handling a flammable liquid bulk storage tank with a sunken floating roof.

E.3.7 Given a flammable liquid bulk storage tank fire, 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

E.3.8 Given the size, dimensions, and products involved for a flammable liquid spill fire, 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

For additional information, see NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam.*

E.3.9 Given the size, dimensions, and product involved for a flammable liquid bulk storage tank fire, 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

For additional information, see NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam.*

E.3.10 Given the size, dimensions, and product involved for a fire involving a single flammable liquid bulk storage tank and its dike area, 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

For additional information, see NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam.*

E.3.11 Given the size, dimensions, and product involved for multiple flammable liquid bulk storage tanks burning within a common dike area, 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

For additional information, see NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam.*

E.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 should implement or oversee the implementation of the selected response options safely and effectively. The technician with a flammable liquids bulk storage specialty should be able to perform the tasks in E.4.1 through E.4.4.

E.4.1 Given a scenario involving a flammable liquid fire, 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) Storage tank fire

E.4.2 Given a scenario involving a three-dimensional flammable liquid fire, demonstrate the safe and effective method for controlling the fire by using portable application devices.

E.4.3 Demonstrate bonding and grounding procedures for the transfer of flammable liquids, including the following:

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

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E.4.4 Given a scenario involving a flammable liquid spill from a bulk storage tank or pipeline, describe the procedures for site safety and fire control during cleanup and removal operations.

Annex F Competencies for the Technician with a Flammable Gases Bulk Storage Specialty

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

F.1 General.

F.1.1 Introduction. Technicians with a flammable gases bulk storage specialty should meet all requirements of the first responder awareness, operations, and hazardous materials technician levels and the competencies of this annex. The technician with a flammable gases bulk storage specialty also should receive additional training to meet applicable United States Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and other appropriate state, local, or provincial occupational health and safety regulatory requirements.

F.1.2 Definition. Technicians with a flammable gases bulk storage specialty are those persons 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. These technicians are expected to use applicable personal protective clothing and specialized fire, leak, and spill control equipment.

F.1.3 Goal. The goal of this annex is to provide the technicians with a flammable gases bulk storage specialty with the knowledge and skills to perform the following tasks safely:

(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.

F.1.4 Mandating of Competencies. This standard does not mandate that hazardous materials response teams performing offensive operations on flammable gas bulk storage tanks have technicians with a flammable gases bulk storage specialty. Technicians operating within the bounds of their training as listed in Chapter 6 of this standard are able to intervene in flammable gas bulk storage incidents. However, if a hazardous materials response team decides to train some or all its technicians to have in-depth knowledge of flammable gas bulk storage facilities, this annex sets out the recommended competencies.

F.2 Competencies — Analyzing the Incident.

F.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 should describe the type of storage tank and extent of damage to the tank and its associated piping and fittings. The technician with a flammable gases bulk storage specialty should be able to perform the tasks in F.2.1.1 through F.2.1.3.

F.2.1.1 Given examples of various flammable gas bulk storage operations, identify and describe the procedures for the normal movement and transfer of product(s) into and out of the facility storage tanks. Examples should be based on local or regional facilities and could include marketing terminals, pipeline operations and terminals, refineries, bulk storage facilities, and underground storage caverns.

F.2.1.2 Given examples of the following types of high pressure bulk gas storage tanks, describe the tank's uses and design and construction features:

(1) Horizontal (bullet) tank
(2) Spherical tank

Additional information on the design and construction of high pressure bulk gas storage tanks can be referenced from NFPA 58, *Liquefied Petroleum Gas Code*, and API 2510-A, *Fire Protection Considerations for the Design and Operation of Liquefied Petroleum Gas (LPG) Storage Facilities*.

F.2.1.3 Given examples of various high pressure bulk gas storage tanks, 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) Fixed or semifixed fire protection system

F.2.2 Predicting the Likely Behavior of the Bulk Storage Tank and Contents. Technicians with a flammable gases bulk storage specialty should predict the likely behavior of the tank and its contents. The technician with a flammable gases bulk storage specialty should be able to perform the tasks in F.2.2.1 through F.2.2.3.

F.2.2.1 Given examples of different types of bulk flammable gas storage tank facilities, 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

F.2.2.2 Given examples of different types of flammable gas bulk storage tanks, identify and describe the application, use,

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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 foam monitors
(3) Fixed hydrocarbon monitoring systems

F.2.2.3 Given a flammable gas bulk storage tank and its associated piping, describe the likely breach or release mechanisms and fire scenarios.

F.3 Competencies — Planning the Response. Given an analysis of an emergency involving flammable gas storage tanks, technicians with a flammable gases bulk storage specialty should determine response options for the storage tank involved. The technician with a flammable gases bulk storage specialty should be able to perform the tasks in F.3.1 through F.3.6.

F.3.1 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)

F.3.2 Given a flammable gas storage tank with a liquid leak from the pressure relief valve, describe the hazards, safety, and tactical considerations for controlling this type of leak.

F.3.3 Given a flammable gas fire from an elevated structure (e.g., tower or column), describe the hazards, safety, and tactical considerations for controlling this type of release.

F.3.4 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

F.3.5 Describe the effect flaring or venting of gas or liquid has on the pressure in the tank (flammable gas or flammable liquid product).

F.3.6 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.

F.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 should implement or oversee the implementation of the selected response options safely and effectively. The technician with a flammable gases bulk storage specialty should be able to perform the tasks in F.4.1 through F.4.4.

F.4.1 Given a scenario involving a flammable gas incident, 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)

F.4.2 Given a scenario involving the simultaneous release of both flammable liquids and flammable gases, 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

F.4.3 Demonstrate bonding and grounding procedures for the transfer of flammable gases, including the following:

(1) Selection of proper equipment
(2) Sequence of bonding and grounding connections
(3) Proper testing of bonding and grounding connections

F.4.4 Given a scenario involving a flammable gas incident from a bulk storage tank or pipeline, describe the procedures for site safety and fire control during cleanup and removal operations.

Annex G Competencies for the Technician with a Radioactive Material Specialty

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

G.1 General.

G.1.1 Introduction. Technicians with a radioactive material specialty should be trained to meet all competencies of the first responder awareness, operations, and hazardous materials technician levels and the competencies of this annex. The technician with a radioactive material specialty also should receive additional training to meet a United States Department of Transportation (DOT), United States Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and other applicable state, local, or provincial occupational health and safety regulatory requirements.

G.1.2 Definition. Technicians with a radioactive material specialty are those persons who provide support to the hazardous materials technician on the use of radiation detection instruments and are expected to have the ability to manage the control of radiation exposure and conduct hazards assessment at an incident involving radioactive materials. These technicians are expected to use specialized protective clothing and survey instrumentation.

G.1.3 Goal. The goal of this annex is be to provide the technician with a radioactive material specialty with the knowledge and skills to perform the following tasks safely:

(1) Analyze a hazardous materials 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 incident involving radioactive material.

G.1.4 Mandating of Competencies. This standard does not mandate that hazardous materials response teams performing offensive operations on radioactive material incidents have technicians with a radioactive material specialty. Technicians

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operating within the bounds of their training as listed in this standard are able to intervene in radioactive material incidents. However, if a hazardous materials response team decides to train some or all of its technicians to have an in-depth knowledge and understanding of radioactive material, this annex sets out the required competencies.

G.2 Competencies — Analyzing the Incident.

G.2.1 Understanding Nuclear Science and Radioactivity. Technicians with a radioactive material specialty should have an understanding of nuclear science and radioactivity, including the units and terms used to describe radiation and radioactive material. The technician with a radioactive material specialty should be able to perform 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
(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) Identify the characteristics of alpha, beta, and gamma radiations.
(6) Given simple equations, the technician with a radioactive material specialty should be able to identify the following radioactive decay modes:
   (a) Alpha decay
   (b) Beta decay
   (c) Positron decay
   (d) Electron capture
(7) Identify two aspects associated with the decay of a radioactive nuclide.
(8) Identify the differences between natural and artificial radioactivity.
(9) Explain why fission products are unstable.
(10) Given a nuclide, locate its block on the Chart of the Nuclides and identify the following for that nuclide:
   (a) Atomic number
   (b) Atomic mass
   (c) Natural percent abundance
   (d) Stability
   (e) Half-life
   (f) Types and energies of radioactive emissions
(11) Given the Chart of Nuclides, trace the decay of a radioactive nuclide and identify the stable end-product.
(12) Define the following units:
   (a) Curie
   (b) Becquerel
(13) Define *specific activity*.
(14) Define *half-life*.
(15) Calculate activity, time of decay, and radiological half-life using the formula for radioactive decay.
(16) Define the following terms:
   (a) Exposure
   (b) Absorbed dose
   (c) Dose equivalent
   (d) Quality factor
(17) Define the following units:
   (a) Roentgen
   (b) Rad, gray
   (c) Rem, sievert
(18) Identify the characteristics of materials best suited to shield from the following types of radiation:
   (a) Alpha
   (b) Beta
   (c) Gamma
   (d) Neutron

G.2.2 Understanding the Biological Effects of Ionizing Radiation. Technicians with a radioactive material specialty should have an understanding of how ionizing radiation affects the human body. The technician with a radioactive material specialty should be able to perform the following tasks:

(1) Define the law of Bergonie and Tribondeau.
(2) Identify 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) Explain primary and secondary reactions on cells produced by ionizing radiation.
(5) Define the following terms and give examples of each:
   (a) Stochastic effect
   (b) Nonstochastic effect
(6) Identify the $LD_{50/30}$ value for humans.
(7) Identify the possible somatic effects of chronic exposure to radiation.
(8) Distinguish among the three types of acute radiation syndrome and identify the exposure levels and symptoms associated with each.
(9) Identify the risks of radiation exposure to the developing embryo and fetus.
(10) Distinguish between the terms *somatic* and *heritable* as they apply to biological effects.

G.2.3 Radiation Detector Theory. Technicians with a radioactive material specialty should have an understanding of radiation detector theory in order to select the correct type of radiological survey instrument at an incident involving radioactive material. The technician with a radioactive material specialty should be able to perform the following tasks:

(1) Select the function of the detector and readout circuitry components in a radiation measurement system.
(2) Identify the parameters that affect the number of ion pairs collected in a gas-filled detector.
(3) Given a graph of the gas amplification curve, identify the regions of the curve.
(4) Identify the characteristics of a detector operated in each of the useful regions of the gas amplification curve.
(5) Explain the methods employed with gas-filled detectors to discriminate among various types of radiation and various radiation energies.
(6) Explain how a scintillation detector and associated components operate to detect and measure radiation.
(7) Explain how neutron detectors detect neutrons and provide an electrical signal.

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(8) Explain the principles of detection and the advantages and disadvantages of a GeLi detector and an HPGe detector.

G.2.4 Radioactive Material Transportation. Technicians with a radioactive material specialty should have an understanding of how radioactive material is transported and how to identify this material in an accident situation. The technician with a radioactive material specialty should be able to perform the following tasks:

(1) List the applicable agencies that have regulations governing the transport of radioactive material.
(2) Describe methods that can be used to determine the radionuclide contents of a package.
(3) Describe the radiation and contamination surveys that are performed on radioactive material packages and state the applicable limits.
(4) Describe the radiation and contamination surveys that are performed on exclusive-use vehicles and state the applicable limits.
(5) Identify the approved placement of placards on a transport vehicle.

G.3 Competencies — Planning the Response.

G.3.1 External Exposure Control. Given the analysis of an incident involving radioactive material, technicians with a radioactive material specialty should be able to determine the response options needed to minimize external exposure to radioactive material. The technician with a radioactive material specialty should be able to perform the following tasks:

(1) Using the equation Exposure Rate = 6CEN, calculate the gamma exposure rate for specific radionuclides.
(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) Using the line source equation, calculate the exposure rate or distance for a line source of radiation.
(6) Define *density thickness* and give its units.
(7) Calculate shielding thickness or exposure rates for gamma and X-ray radiation using the equations.

G.3.2 Internal Exposure Control. Given the analysis of an incident involving radioactive material, technicians with a radioactive material specialty should determine the response options needed to minimize internal exposure to radioactive material. The technician with a radioactive material specialty should be able to perform the following tasks:

(1) Define and distinguish between the terms *annual limit on intake* (ALI) and *derived air concentration* (DAC).
(2) Identify the basis for determining annual limit on intake (ALI).
(3) Define the term *reference man*.
(4) Identify three factors that govern the behavior of radioactive materials in the body.
(5) Identify the two natural mechanisms that reduce the quantity of a radionuclide in the body.
(6) Identify the relationship of physical, biological, and effective half-lives.
(7) Given the physical and biological half-lives, calculate the effective half-life.
(8) Given a method used by medical personnel to increase the elimination rate of radioactive materials from the body, identify how and why that method works.

G.3.3 Radiation Survey Instrumentation. Given the analysis of an incident involving radioactive material, technicians with a radioactive material specialty should be able to determine the correct instrument to use for radiation and contamination monitoring. The technician with a radioactive material specialty should be able to perform the following tasks:

(1) List the factors that affect the selection of a portable radiation survey instrument and identify appropriate instruments for external radiation surveys.
(2) Identify the following features of and specifications for ion chamber instruments:
   (a) Detector type
   (b) Instrument operating range
   (c) Detector shielding
   (d) Detector window
   (e) Types of radiation detected and measured
   (f) Operator-adjustable controls
   (g) Markings for detector effective center
   (h) Specific limitations and characteristics
(3) List the factors that affect the selection of a portable contamination monitoring instrument.
(4) Describe the following features of and specifications for commonly used count rate meter probes used for beta/gamma and alpha surveys:
   (a) Detector type
   (b) Detector shielding and window
   (c) Types of radiation detected and measured
   (d) Energy response for measured radiation
   (e) Specific limitations and characteristics.
(5) Describe the following features of and specifications for commonly used count rate instruments.
   (a) Types of detectors available
   (b) Operator-adjustable controls
   (c) Specific limitations and characteristics

G.4 Competencies — Implementing the Planned Response.

G.4.1 Radiological Incidents. Given an analysis of an incident involving radioactive material and the planned response, technicians with a radioactive material specialty should implement or oversee the response to a given radiological emergency. The technician with a radioactive material specialty should be able to perform the following tasks:

(1) Describe the general response and responsibilities of a specialist during any radiological incident.
(2) Identify the emergency equipment and facilities that are available, including the location and contents of emergency equipment kits.
(3) Describe the specialist's response to personnel contamination.
(4) Describe the specialist's response to off-scale or lost dosimetry.
(5) Describe the specialist's response to rapidly increasing, unanticipated radiation levels in an area.
(6) Describe the specialist's response to a dry or liquid radioactive material spill.
(7) Describe the specialist's response to a fire in a radiological area or involving radioactive materials.

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(8) Describe specific procedures for documenting radiological incidents.
(9) Identify the available federal responder resources and explain the assistance that each group can provide.

G.4.2 Contamination Control. Given an analysis of an incident involving radioactive material and the planned response, technicians with a radioactive material specialty should be able to implement or oversee contamination control techniques to minimize the spread of radiological contamination. The technician with a radioactive material specialty should be able to perform the following tasks:

(1) Define the terms *removable* and *fixed surface contamination*, state the difference between them, and list the common methods used to measure each.
(2) State the basic principles of contamination control and list examples of implementation methods.
(3) State the purpose of using protective clothing in radiologically contaminated areas.
(4) List the basic factors that determine protective clothing requirements for personnel protection.

G.4.3 Personnel Decontamination. Given an analysis of an incident involving radioactive material and the planned response, technicians with a radioactive material specialty should be able to implement or oversee decontamination techniques for equipment and personnel. The technician with a radioactive material specialty should be able to perform 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) List the three factors that determine the actions taken in decontamination of personnel.
(5) Identify methods and techniques for performing personnel decontamination.

Annex H Overview of Responder Levels and Tasks at Hazardous Materials/WMD Incidents

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

H.1 Responder Levels.

H.1.1 Awareness Level. Awareness level personnel are those persons who, in the course of their normal duties, can be the first on the scene of an emergency involving hazardous materials. Awareness level personnel are expected to recognize the presence of hazardous materials/WMD, protect themselves, call for trained personnel, and secure the area.

H.1.2 Operations Level. Operations level responders are those persons who respond to hazardous materials/WMD incidents for the purpose of protecting nearby persons, the environment, or property from the effects of the release. They should be trained to respond in a defensive fashion to control the release from a safe distance and keep it from spreading.

Operations level responders can have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ.

H.1.3 Technician Level. Hazardous materials technicians are those persons who respond to releases or potential releases of hazardous materials for the purpose of controlling the release. Hazardous materials technicians are expected to use specialized chemical protective clothing and specialized control equipment.

Hazardous materials technicians respond to hazardous materials/WMD incidents using a risk-based response process *[see 7.1.2.2(1)]* with the ability to analyze a problem involving hazardous materials/WMD, select appropriate decontamination procedures, and control a release using specialized protective clothing and control equipment. Hazardous materials technicians can have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ.

H.1.4 Command Level. The incident commander is that person who is responsible for all decisions relating to the management of the incident. The incident commander is in charge of the incident site.

H.2 Responder Tasks.

H.2.1 Analysis Tasks. The list of analysis tasks by responder level is as follows:

(1) *Awareness Level.* Awareness level personnel analyze an incident to determine both the hazardous materials/WMD present and the basic hazard and response information for each hazardous materials/WMD by completing the following tasks:
   (a) Detect the presence of hazardous materials/WMD.
   (b) Survey a hazardous materials/WMD incident from a safe location to identify the name, UN/NA identification number, or type placard applied for any hazardous materials/WMD involved.
   (c) Collect hazard and response information from the current edition of the DOT *Emergency Response Guidebook*.
(2) *Operations Level.* Operations level responders must be competent at the awareness level and be able to analyze a hazardous materials/WMD incident to determine the scope of the problem and potential outcomes by completing the following tasks:
   (a) Survey the hazardous materials/WMD incident to identify the containers and materials involved, determine whether hazardous materials/WMD have been released, and evaluate the surrounding conditions.
   (b) Collect hazard and response information from material safety data sheets (MSDS), CHEMTREC/CANUTEC/SETIQ, and shipper and manufacturer contacts.
   (c) Predict the likely behavior of a hazardous materials/WMD agent as well as its container.
   (d) Estimate the potential harm at a hazardous materials/WMD incident.
(3) *Technician Level.* Hazardous materials technicians must be competent at the awareness and operations levels and be able to analyze a hazardous materials/WMD incident to determine the complexity of the problem and potential outcomes by completing the following tasks:
   (a) Survey the hazardous materials/WMD incident to identify special containers involved, identify or classify unknown materials, and verify the presence and concentrations of hazardous materials/WMD through the use of monitoring equipment.

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(b) Collect and interpret hazard and response information from printed and technical resources, computer databases, and monitoring equipment.
(c) Determine the type and extent of damage to containers.
(d) Where multiple materials are involved, predict the likely behavior of released materials and their containers.
(e) Estimate the size of an endangered area using computer modeling, monitoring equipment, or specialists in this field.

(4) *Command Level.* The incident commander analyzes a hazardous materials/WMD incident to determine the complexity of the problem and potential outcomes by completing the following tasks:
(a) Collect and interpret hazard and response information from printed and technical resources, computer databases, and monitoring equipment.
(b) Estimate the potential outcomes within the endangered area at a hazardous materials/WMD incident.

H.2.2 Planning Tasks. The list of planning tasks by responder level is as follows:

(1) *Awareness Level.* No requirements.
(2) *Operations Level.* The operations level responder must be competent at the first responder awareness level and be able to plan an initial response within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by completing the following tasks:
(a) Describe the response objectives for hazardous materials/WMD incidents.
(b) Describe the defensive options available by response objective.
(c) Determine whether the personal protective equipment provided is appropriate for implementing each action option.
(d) Identify the emergency decontamination process.
(3) *Technician Level.* The hazardous materials technician must be competent at both the first responder awareness and operations levels and be able to plan a response within the capabilities of available personnel, personal protective equipment, and control equipment by completing the following tasks:
(a) Identify the response objectives for hazardous materials/WMD incidents.
(b) Identify the potential response options available by response objective.
(c) Select the personal protective equipment required for a given action option.
(d) Select the applicable technical decontamination process.
(e) Develop an incident action plan, including site safety and control plan, consistent with the emergency response plan and/or standard operating procedures and within the capability of the available personnel, personal protective equipment, and control equipment.
(4) *Command Level.* The incident commander plans response operations within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by completing the following tasks:
(a) Identify the response objectives for hazardous materials/WMD incidents.
(b) Identify the potential response options (defensive, offensive, and nonintervention) available by response objective.
(c) Approve the level of personal protective equipment required for a given action option.
(d) Develop an incident action plan, including site safety and control plan, consistent with the emergency response plan and/or standard operating procedures and within the capability of available personnel, personal protective equipment, and control equipment.

H.2.3 Implementation Tasks. The list of implementation tasks by responder level is as follows:

(1) *Awareness Level.* The awareness level personnel must be able to implement actions consistent with the emergency response plan, standard operating procedures, and the current edition of the DOT *Emergency Response Guidebook* by completing the following tasks:
(a) Initiate protective actions.
(b) Initiate the notification process.
(2) *Operations Level.* The operations level responder must be competent at the awareness level and be able to implement the planned response to favorably change the outcomes consistent with the emergency response plan and/or standard operating procedures by completing the following tasks:
(a) Establish and enforce scene control procedures, including control zones, decontamination, and communications.
(b) Establish a means of evidence preservation where criminal or terrorist acts are suspected.
(c) Initiate an incident management system (IMS).
(d) Don, work in, and doff personal protective equipment provided by the authority having jurisdiction.
(e) Perform the defensive control actions identified in the incident action plan.
(f) Perform mass decontamination as required.
(3) *Technician Level.* The hazardous materials technician must be competent at both the first responder awareness and operations levels and be able to implement the planned response to favorably change the outcomes consistent with the standard operating procedures or site safety and control plan by completing the following tasks:
(a) Perform the duties of an assigned position within the local IMS.
(b) Don, work in, and doff appropriate personal protective clothing, including, but not limited to, liquid splash– and vapor-protective clothing with approved respiratory protection.
(c) Perform the control functions identified in the incident action plan.
(4) *Command Level.* The incident commander must be competent at the operations level and be able to implement a response to favorably change the outcomes consistent with the emergency response plan and/or standard operating procedures by completing the following tasks:
(a) Implement the IMS including the specified procedures for notification and utilization of nonlocal resources (including private, state, and federal government personnel).

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(b) Direct resources (private, governmental, and others) with expected task assignments and on-scene activities and provide management overview, technical review, and logistical support to private and governmental sector personnel.
(c) Provide a focal point for information transfer to media and local elected officials through the IMS structures.

H.2.4 Evaluation Tasks. The list of evaluation tasks by responder level is as follows:

(1) *Awareness Level.* No requirements.
(2) *Operations Level.* The operations level responder must be competent at the awareness level and be able to evaluate the progress of the actions taken to ensure that the response objectives are being met safely, effectively, and efficiently by completing the following tasks:
   (a) Evaluate the status of the defensive actions taken in accomplishing the response objectives.
   (b) Communicate the status of the planned response.
(3) *Technician Level.* The hazardous materials technician must be competent in evaluating the progress of the planned response by completing the following tasks:
   (a) Evaluate the effectiveness of the control functions.
   (b) Evaluate the effectiveness of the decontamination process.
(4) *Command Level.* The incident commander must be competent at the operations level and be able to evaluate the progress of the planned response to ensure the response objectives are being met safely, effectively, and efficiently and adjust the incident action plan accordingly by evaluating the effectiveness of the control functions.

H.2.5 Termination Tasks. The list of termination tasks by responder level is as follows:

(1) *Awareness Level.* No requirements.
(2) *Operations Level.* No requirements.
(3) *Technician Level.* The hazardous materials technician must be competent to terminate an incident by completing the following tasks:
   (a) Assist in the incident debriefing.
   (b) Assist in the incident critique.
   (c) Provide reports and documentation of the incident.
(4) *Command Level.* The incident commander must be competent to terminate an incident by completing the following tasks:
   (a) Transfer command (control) when appropriate.
   (b) Conduct an incident debriefing.
   (c) Conduct a multi-agency critique.
   (d) Report and document the hazardous materials/WMD incident and submit the reports to the proper entity.

Annex I Definitions of Hazardous Materials

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

I.1 General. Many definitions and descriptive names are used for the term *hazardous material*, each of which depends on the nature of the problem being addressed. Unfortunately, no one list or definition covers everything. U.S. government agencies, as well as state and local governments, have different purposes for regulating hazardous materials that, under certain circumstances, pose a risk to the public or the environment.

I.2 Hazardous Materials Terms. The following hazardous materials terms, as used by the indicated government agencies, show the variety of definitions that can be applied.

I.2.1 Hazardous Materials. The U.S. Department of Transportation (DOT) uses the term *hazardous materials* to cover 11 hazard classes, some of which have subcategories called divisions. DOT includes in its regulations hazardous substances and hazardous wastes as Class 9 (Miscellaneous Hazardous Materials), both of which are regulated by the U.S. Environmental Protection Agency (EPA), if their inherent properties would not otherwise be covered.

I.2.2 Hazardous Substances. EPA uses the term *hazardous substances* for chemicals that if released into the environment above a certain amount must be reported, and, depending on the threat to the environment, federal involvement in handling the incident can be authorized. A list of the hazardous substances is published in Table 302.4 of 40 CFR 302. The U.S. Occupational Safety and Health Administration (OSHA) uses the term *hazardous substances* in 29 CFR 1910.120, which resulted from Title I of the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355) and covers emergency response. Unlike EPA, OSHA uses the term *hazardous substances* to cover every chemical regulated by both DOT and EPA.

I.2.3 Extremely Hazardous Substances. EPA uses the term *extremely hazardous substances* for chemicals that must be reported to the appropriate authorities if released above the threshold reporting quantity. Each substance has a threshold reporting quantity. The list of extremely hazardous substances is identified in Title III of SARA (40 CFR 355).

I.2.4 Toxic Chemicals. EPA uses the term *toxic chemicals* for chemicals whose total emissions or releases must be reported annually by owners and operators of certain facilities that manufacture, process, or otherwise use a listed toxic chemical. The toxic chemicals are listed in Title III of SARA (40 CFR 355).

I.2.5 Hazardous Wastes. EPA uses the term *hazardous wastes* for chemicals that are regulated under the Resource, Conservation, and Recovery Act (40 CFR 261.33). Hazardous wastes in transportation are regulated by DOT (49 CFR 170–180).

I.2.6 Hazardous Chemicals. OSHA uses the term *hazardous chemicals* for any chemical that would be a risk to employees if they were exposed in the workplace. The term *hazardous chemicals* covers a broader group of chemicals than the other chemical terms.

I.2.7 Dangerous Goods. In United Nations model codes and regulations, hazardous materials are called *dangerous goods*.

I.2.8 Highly Hazardous Chemicals. OSHA uses the term *highly hazardous chemicals* for those chemicals that fall under the requirements of 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals." Highly hazardous chemicals are those chemicals that possess toxic, reactive, flammable, or explosive properties. A list of covered substances is published in Annex A of 29 CFR 1910.119.

Annex J UN/DOT Hazard Classes and Divisions

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

J.1 General. The definitions of UN/DOT hazard classes and divisions (49 CFR 170–180) are as follows.

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J.2 Class 1 — Explosives. An explosive is any substance or article, including a device, that is designed to function by explosion (i.e., an extremely rapid release of gas and heat) or that, by chemical reaction within itself, is able to function in a similar manner even if not designed to function by explosion. Explosives in Class 1 are divided into six divisions. Each division has a letter designation.

J.2.1 Division 1.1. Division 1.1 consists of explosives that have a mass explosion hazard. A mass explosion is one that affects almost the entire load instantaneously. Examples of Division 1.1 explosives include black powder trinitrotoluene, dynamite, and trinitrofoluene (TNT).

J.2.2 Division 1.2. Division 1.2 consists of explosives that have a projection hazard but not a mass explosion hazard. Examples of Division 1.2 explosives include aerial flares, detonating cord, and power device cartridges.

J.2.3 Division 1.3. Division 1.3 consists of explosives that have a fire hazard and a minor blast hazard, a minor projection hazard, or both, but not a mass explosion hazard. Examples of Division 1.3 explosives include liquid-fueled rocket motors and propellant explosives.

J.2.4 Division 1.4. Division 1.4 consists of explosive devices that present a minor explosion hazard. No device in the division can contain more than 0.9 oz (25 g) of a detonating material. The explosive effects are largely confined to the package, and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. Examples of Division 1.4 explosives include line-throwing rockets, practice ammunition, and signal cartridges.

J.2.5 Division 1.5. Division 1.5 consists of very insensitive explosives. This division comprises substances that have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport. Examples of Division 1.5 explosives include pilled ammonium nitrate fertilizer–fuel oil mixtures (blasting agents).

J.2.6 Division 1.6. Division 1.6 consists of extremely insensitive articles that do not have a mass explosive hazard. This division comprises articles that contain only extremely insensitive detonating substances and that demonstrate a negligible probability of accidental initiation or propagation.

J.3 Class 2 — Gases.

J.3.1 Division 2.1. Division 2.1 (flammable gas) consists of materials that are a gas at 68°F (20°C) or less and 14.7 psi (101.3 kPa) of pressure, have a boiling point of 68°F (20°C) or less at 14.7 psi (101.3 kPa), and have the following properties:

(1) Are ignitable at 14.7 psi (101.3 kPa) when in a mixture of 13 percent or less by volume with air
(2) Have a flammable range at 14.7 psi (101.3 kPa) with air of at least 12 percent regardless of the lower limit

Examples of Division 2.1 gases include inhibited butadienes, methyl chloride, and propane.

J.3.2 Division 2.2. Division 2.2 (nonflammable, nonpoisonous compressed gas, including compressed gas, liquefied gas, pressurized cryogenic gas, and compressed gas in solution, asphyxiant gas, and oxidizing gas) consists of materials (or mixtures) that exert in the packaging an absolute pressure of 41 psi (280 kPa) at 68°F (20°C). A cryogenic liquid is a refrigerated liquefied gas having a boiling point colder than –130°F (–90°C) at 14.7 psi (101.3 kPa).

Examples of Division 2.2 gases include anhydrous ammonia, cryogenic argon, carbon dioxide, and compressed nitrogen.

J.3.3 Division 2.3. Division 2.3 (gas poisonous by inhalation) consists of materials that are a gas at 68°F (20°C) or less and a pressure of 14.7 psi, or 1 atm (101.3 kPa), have a boiling point of 68°F (20°C) or less at 14.7 psi (101.3 kPa), and have the following properties:

(1) Are known to be so toxic to humans as to pose a hazard to health during transportation
(2) In the absence of adequate data on human toxicity, are presumed to be toxic to humans because, when tested on laboratory animals, they have an LC_{50} value of not more than 5000 ppm. Examples of Division 2.3 gases include anhydrous hydrogen fluoride, arsine, chlorine, and methyl bromide.

Hazard zones associated with Division 2.3 materials are the following:

(1) Hazard zone A — LC_{50} less than or equal to 200 ppm
(2) Hazard zone B — LC_{50} greater than 200 ppm and less than or equal to 1000 ppm
(3) Hazard zone C — LC_{50} greater than 1000 ppm and less than or equal to 3000 ppm
(4) Hazard zone D — LC_{50} greater than 3000 ppm and less than or equal to 5000 ppm

J.4 Class 3 — Flammable Liquids. Flammable liquids are liquids having a flash point of not more than 140°F (60°C) or materials in a liquid phase with a flash point at or above 100°F (37.8°C) that are intentionally heated and offered for transportation or transported at or above their flash point in a bulk packaging.

Examples of Class 3 liquids include acetone, amyl acetate, gasoline, methyl alcohol, and toluene.

J.4.1 Combustible Liquids. Combustible liquids are liquids that do not meet the definition of any other hazard class and that have a flash point above 140°F (60°C) and below 200°F (93°C). Flammable liquids with a flash point above 100°F (38°C) can be reclassified as combustible liquids.

Examples of combustible liquids include mineral oil, peanut oil, and No. 6 fuel oil.

J.5 Class 4 — Flammable Solids.

J.5.1 Division 4.1. Division 4.1 (flammable solids) comprises the following three types of materials:

(1) Desensitized explosives — explosives wetted with sufficient water, alcohol, or plasticizers to suppress explosive properties
(2) Self-reactive materials — materials that are thermally unstable and that can undergo a strongly exothermic decomposition even with participation of oxygen (air)
(3) Readily combustible solids — solids that can cause a fire through friction and any metal powders that can be ignited.

Examples of Division 4.1 materials include magnesium (pellets, turnings, or ribbons) and nitrocellulose.

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J.5.2 Division 4.2. Division 4.2 (spontaneously combustible material) comprises the following materials:

(1) Pyrophoric materials — liquids or solids that, even in small quantities and without an external ignition source, can ignite within 5 minutes after coming in contact with air
(2) Self-heating materials — materials that, when in contact with air and without an energy supply, are liable to self-heat

Examples of Division 4.2 materials include aluminum alkyls, charcoal briquettes, magnesium alkyls, and phosphorus.

J.5.3 Division 4.3. Division 4.3 (dangerous-when-wet materials) comprises of materials that, by contact with water, are liable to become spontaneously flammable or to give off flammable or toxic gas at a rate greater than 1 L/kg of the material per hour. Examples of Division 4.3 materials include calcium carbide, magnesium powder, potassium metal alloys, and sodium hydride.

J.6 Class 5 — Oxidizers and Organic Peroxides.

J.6.1 Division 5.1. Division 5.1 (oxidizers) comprises materials that can, generally by yielding oxygen, cause or enhance the combustion of other materials. Examples of Division 5.1 materials include ammonium nitrate, bromine trifluoride, and calcium hypochlorite.

J.6.2 Division 5.2. Division 5.2 (organic peroxides) comprises organic compounds that contain oxygen (O) in the bivalent -O-O- structure that can be considered a derivative of hydrogen peroxide, where one or more of the hydrogen atoms have been replaced by organic radicals. Examples of Division 5.2 materials include dibenzoyl peroxide, methyl ethyl ketone peroxide, and peroxyacetic acid. Division 5.2 (organic peroxide) materials are assigned to one of the following seven types:

(1) Type A — organic peroxides that can detonate or deflagrate rapidly as packaged for transport. Transportation of Type A organic peroxides is forbidden.
(2) Type B — organic peroxides that neither detonate nor deflagrate rapidly but that can undergo a thermal explosion.
(3) Type C — organic peroxides that neither detonate nor deflagrate rapidly and that cannot undergo a thermal explosion.
(4) Type D — organic peroxides that detonate only partially or deflagrate slowly, with medium to no effect when heated under confinement.
(5) Type E — organic peroxide that neither detonate nor deflagrate and that show low or no effect when heated under confinement.
(6) Type F — organic peroxides that will not detonate, do not deflagrate, show only a low or no effect if heated when confined, and have low or no explosive power.
(7) Type G — organic peroxides that will not detonate, do not deflagrate, show no effect if heated when confined, have no explosive power, are thermally stable, and are desensitized

J.7 Class 6 — Poisonous Materials.

J.7.1 Division 6.1. Division 6.1 (poisonous materials) comprises materials other than gases that either are known to be so toxic to humans as to afford a hazard to health during transportation or in the absence of adequate data on human toxicity are presumed to be toxic to humans, including materials that cause irritation. Examples of Division 6.1 materials include aniline, arsenic compounds, carbon tetrachloride, hydrocyanic acid, and tear gas.

J.7.2 Division 6.2. Division 6.2 (infectious substances) comprises materials known to contain or suspected of containing a pathogen. A pathogen is a micro-organism (including viruses, plasmids, and other genetic elements) or a proteinaceous infectious particle (prion) that has the potential to cause disease in humans or animals. The terms *infectious substance* and *etiologic agent* are synonymous. Examples of Division 6.2 materials include anthrax, botulism, rabies, and tetanus. Hazard zones associated with Class 6 materials are as follows:

(1) Hazard zone A — LC_{50} less than or equal to 200 ppm
(2) Hazard zone B — LC_{50} greater than 200 ppm and less than or equal to 1000 ppm

J.8 Class 7 — Radioactive Materials. Radioactive material is any material containing radionuclides where both the activity concentration and the total activity in the consignment exceed specified values. Examples of Class 7 materials include cobalt, uranium hexafluoride, and "yellow cake."

J.9 Class 8 — Corrosive Materials. Corrosive materials are liquids or solids that cause full-thickness destruction of skin at the site of contact within a specified period of time. A liquid that has a severe corrosion rate on steel or aluminum is also a corrosive material. Examples of Class 8 materials include nitric acid, phosphorus trichloride, sodium hydroxide, and sulfuric acid.

J.10 Class 9 — Miscellaneous Hazardous Materials. Miscellaneous hazardous materials are materials that present a hazard during transport but that do not meet the definition of any other hazard class. Miscellaneous hazardous materials, include the following:

(1) Any material that has an anesthetic, noxious, or other similar property that could cause extreme annoyance or discomfort to a flight crew member so as to prevent the correct performance of assigned duties
(2) Any material that is not included in any other hazard class but that is subject to DOT requirements (e.g. elevated-temperature material, hazardous substance, hazardous waste, marine pollutant). Examples of Class 9 materials include adipic acid, hazardous substances (e.g., PCBs), and molten sulfur.

J.11 ORM-D Material. ORM-D materials are materials that present a limited hazard during transportation due to their form, quantity, and packaging. Examples of ORM-D materials include consumer commodities and small arms ammunition.

J.12 Forbidden. *Forbidden* means prohibited from being offered or accepted for transportation. Prohibition does not apply if these materials are diluted, stabilized, or incorporated into devices.

J.13 Marine Pollutant. A marine pollutant is a material that has an adverse effect on aquatic life.

J.14 Elevated-Temperature Material. Elevated temperature materials are materials that, when offered for transportation in a bulk packaging, meet one of the following conditions:

(1) Are liquid at or above 212°F (100°C)
(2) Are liquid with a flash point at or above 100°F (37.8°C) and are intentionally heated and transported at or above their flash point
(3) Are solid at or above 464°F (240°C)

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Annex K Informational References

K.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

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K.2 Informational References. The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

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K.3 References for Extracts in Informational Sections. (Reserved)

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- Committee meets to act on Proposals, to develop its own Proposals, and to prepare its Report.
- Committee votes by written ballot on Proposals. If two-thirds approve, Report goes forward. Lacking two-thirds approval, Report returns to Committee.
- Report on Proposals (ROP) is published for public review and comment.

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- Committee meets to act on Public Comments to develop its own Comments, and to prepare its report.
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3.3.78 Effective Ground-Fault Current Path. An intentionally constructed, permanent, low impedance electrically conductive path designed and intended to carry ~~underground~~ electric fault current ~~conditions~~ from the point of a ground fault on a wiring system to the electrical supply source.

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