

NFPA 472

Standard for Professional Competence of Responders to Hazardous Materials Incidents

2002 Edition



NFPA, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Codes and Standards Organization

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NFPA 472

Standard for

Professional Competence of Responders to Hazardous Materials Incidents

2002 Edition

This edition of NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*, was prepared by the Technical Committee on Hazardous Materials Response Personnel and acted on by NFPA at its November Association Technical Meeting held November 10–14, 2001, in Dallas, TX. It was issued by the Standards Council on January 11, 2002, with an effective date of January 31, 2002, and supersedes all previous editions.

This edition of NFPA 472 was approved as an American National Standard on January 31, 2002.

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, continues at a high level. Some of the interest is due to an increased awareness of the wide proliferation of hazardous materials, while much of the interest can 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 have created two new levels, the Hazardous Materials Branch Officer and the Safety Officer. These new levels 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 Murrah Building in Oklahoma City and other national and international incidents.

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

In this 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 this new 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, this 2002 edition contains 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 includes Annex D, "Competencies for the Technician with a Radioactive Material Specialty."

The gratitude of the Committee is extended to all who assisted in the development of this standard, and especially to those non-Committee members who participated so fully in this process.

The Committee would like to dedicate this standard to the fallen heroes of the terrorist attack on September 11, 2001. 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 job and their country. Our thoughts and prayers are with their families, friends and co-workers. Let us never forget these brave individuals and the other emergency responders who have died in the line of duty. The Committee especially wishes to honor Committee member John J. Fanning, FDNY, who died in the line of duty on September 11.

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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.

This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

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.

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Hazardous Materials Incidents****2002 Edition**

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

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, Annex H lists the complete title and edition of the source documents for both mandatory and nonmandatory extracts. Editorial changes to extracted material consist of revising references to an appropriate division in this document or the inclusion of the document number with the division number when the reference is to the original document. Requests for interpretations or revisions of extracted text shall be sent to the appropriate technical committee.

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

Chapter 1 Administration**1.1 Scope.**

1.1.1 This standard shall identify the levels of competence required of responders to hazardous materials incidents.

1.1.2 This standard shall cover the competencies for first responders at the awareness level, first responders at the operational level, hazardous materials technicians, incident commanders, hazardous materials branch officers, hazardous materials branch safety officers, and other specialist employees.

1.2 Purpose.

1.2.1 The purpose of this standard shall be to specify minimum competencies for those who will respond to hazardous materials incidents.

1.2.2 One purpose of the competencies contained herein shall be to reduce the numbers of accidents, injuries, and illnesses during response to hazardous materials incidents and to help prevent exposure to hazardous materials to reduce the possibility of fatalities, illness, and disabilities affecting 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, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 471, *Recommended Practice for Responding to Hazardous Materials Incidents*, 2002 edition.

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, 2001 edition.

2.3 Other Publications.

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

Emergency Response Guidebook, U.S. Department of Transportation, 2000 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not included, common usage of the terms shall apply.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). The organization, office, or individual responsible 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.

3.3 General Definitions.

3.3.1 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 incidents.

3.3.2 Chemical. Regulated and nonregulated hazardous materials (solids, liquids, and gases, whether natural or man-made, including petroleum products) with the potential for creating harm to people, the environment, and property when released. [306:1.5]

3.3.3 CHEMTREC. The Chemical Transportation Emergency Center is 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 incidents.

3.3.4 Cold Zone. See 3.3.13, Control Zones.

3.3.5 Competence. Possessing knowledge, skills, and judgment needed to perform indicated objectives satisfactorily. [473:3.3]

3.3.6* 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. [1500:3.3]

3.3.7 Confinement. Those procedures taken to keep a material, once released, in a defined or local area. [471:3.3]

3.3.8* Container. Any vessel or receptacle that holds material, including storage vessels, pipelines, and packaging (*see definition of Packaging*). [30:1.6]

3.3.9 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). [471:3.3]

3.3.10 Contaminant. A hazardous material 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. [1500:3.3]

3.3.11 Contamination. The process of transferring a hazardous material from its source to people, animals, the environment, or equipment, which may act as a carrier. [471:3.3]

3.3.12 Control. The procedures, techniques, and methods used in the mitigation of a hazardous materials incident, including containment, extinguishment, and confinement.

3.3.13* Control Zones. The areas at a hazardous materials incident that are designated based upon safety and the degree of hazard. [471:3.3]

3.3.13.1 Cold Zone. The control zone of a hazardous materials incident that contains the command post and such other support functions as are deemed necessary to control the incident.

3.3.13.2 Hot Zone. The control zone immediately surrounding a hazardous materials incident, which extends far enough to prevent adverse effects from hazardous materials releases to personnel outside the zone.

3.3.13.3* Warm Zone. The control zone at a hazardous materials incident site where personnel and equipment decontamination and hot zone support takes place.

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

3.3.15 Decontamination. The physical or chemical process of reducing and preventing the spread of contaminants from persons and equipment used at a hazardous materials incident.

3.3.16 Decontamination Corridor. The area usually located within the warm zone where decontamination procedures take place.

3.3.17 Degradation. (a) A chemical action involving the molecular breakdown of a protective clothing material or equipment due to contact with a chemical (b) The molecular breakdown of the spilled or released material to render it less hazardous during control operations. [471:3.3]

3.3.18* Demonstrate. To show by actual performance.

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

3.3.20 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.

3.3.21 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 Emergency Response Plan. A plan developed by an agency, with the cooperation of all participating agencies, that details specific actions to be performed by all personnel who are expected to respond during an emergency.

3.3.23 Endangered Area. The actual or potential area of exposure from a hazardous material.

3.3.24* Exposure. The process by which people, animals, the environment, and equipment are subjected to or come in contact with a hazardous material.

3.3.25 First Responder at the Awareness Level. Those persons who, in the course of their normal duties, could be the first on the scene of an emergency involving hazardous materials and who are expected to recognize the presence of hazardous materials, protect themselves, call for trained personnel, and secure the area. (*See Annex E.*)

3.3.26 First Responder at the Operational Level. Those persons who respond to releases or potential releases of hazardous materials as part of the initial response to the incident for the purpose of protecting nearby persons, the environment, or property from the effects of the release and who are expected to respond in a defensive fashion to control the release from a safe distance and keep it from spreading. (*See Annex E.*)

3.3.27* Gross Decontamination. The initial phase of the decontamination process during which the amount of surface contaminant is significantly reduced. [471:3.3]

3.3.28 Hazard/Hazardous. Capable of posing an unreasonable risk to health, safety, or the environment; capable of causing harm. [471:3.3]

3.3.29 Hazardous Material. A substance (solid, liquid, or gas) that when released is capable of creating harm to people, the environment, and property. (*See Annex F.*)

3.3.30* Hazardous Materials Branch. The function within an overall incident management system that deals with the mitigation of the hazardous materials portion of a hazardous materials incident.

3.3.31 Hazardous Materials Branch Officer. The person who is responsible for directing and coordinating all operations assigned to the hazardous materials branch by the incident commander.

3.3.32* Hazardous Materials Branch Safety Officer. The person who works within an incident management system (IMS) to ensure that recognized safe practices are followed within the hazardous materials branch.

3.3.33* Hazardous Materials Response Team. An organized group of trained response personnel operating under an emergency response plan and appropriate standard operating procedures who handle and control actual or potential leaks or spills of hazardous materials requiring possible close approach to the material.

3.3.34 Hazardous Materials Technician. Person who responds to releases or potential releases of hazardous materials for the purpose of controlling the release using specialized protective clothing and control equipment. (*See Annex E.*)

3.3.34.1 Hazardous Materials Technician with a Cargo Tank Specialty. Person who provides support to the hazardous materials technician, provides oversight for product removal and movement of damaged cargo tanks, and acts as a liaison between technicians and other outside resources.

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

3.3.34.3* Hazardous Materials Technician with an Intermodal Tank Specialty. Person who provides support to the hazardous materials technician, provides oversight for product removal and movement of damaged intermodal tanks, and acts as a liaison between technicians and other outside resources.

3.3.35 Hot Zone. See 3.3.13, Control Zones.

3.3.36 Identify. To select or indicate verbally or in writing using standard terms to establish the identity of; the fact of being the same as the one described.

3.3.37 Incident. An emergency involving the release or potential release of a hazardous material, with or without fire. [295:1.3]

3.3.38* Incident Commander. The person who is responsible for all decisions relating to the management of the incident and is in charge of the incident site. (*See Annex E.*)

3.3.39* Incident Management System. A system 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.

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

3.3.41 Local Emergency Response Plan. The plan promulgated by the authority having jurisdiction, such as the local emergency planning committee for the community or a facility.

3.3.42 Match. To provide with a counterpart.

3.3.43 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.

3.3.44 Monitoring Equipment. Instruments and devices used to identify and quantify contaminants. [471:3.3]

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

3.3.46 Organization's Area of Specialization. Any chemicals and containers used by the private sector specialist employee's employer.

3.3.47* Packaging. Any container that holds a material (hazardous and nonhazardous).

3.3.47.1* Bulk Packaging. Any packaging, including transport vehicles, having a liquid capacity of more than 450 L (119 gal), a solids capacity of more than 400 kg (882 lb), or a compressed gas water capacity of more than 454 kg (1001 lb).

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

3.3.47.3 Radioactive Materials Packaging. Any packaging for radioactive materials having a use or capacity meeting one of the criteria in 3.3.47.3.1 through 3.3.47.3.5.

3.3.47.3.1 Excepted Packaging. Range from product's fiberboard box to a sturdy wooden or steel crate, and may include limited quantities of materials, instruments, and articles such as smoke detectors.

3.3.47.3.2 Industrial Packaging. Packaging grouped into three categories based on the strength of the packaging.

3.3.47.3.3 Strong-tight Packaging. Used for domestic shipment of materials with low levels of radioactivity with a low hazard and historical safety record such as depleted or natural uranium and rubble.

3.3.47.3.4 Type A. Packaging for radioactive materials such as radiopharmaceuticals and low level materials typically having an inner containment vessel of glass, plastic, or metal, and packaging materials made of polyethylene, rubber or vermiculite.

3.3.47.3.5 Type B. Packaging for radioactive materials such as spent fuel, high-level radioactive waste, and high concentrations of radioisotopes ranging from small drums (208 liter), Tru-Packs, to heavily shielded steel casks that can weigh more than 100 metric tons.

3.3.48 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. [471:3.3]

3.3.49 Permeation. A chemical action involving the movement of a chemical, on a molecular level, through intact material. [471:3.3]

3.3.50* Personal Protective Equipment. The equipment provided to shield or isolate a person from the chemical, physical, and thermal hazards that can be encountered at a hazardous materials incident. [1581:1.3]

3.3.51* Planned Response. The plan of action, with safety considerations, consistent with the local emergency response plan and an organization's standard operating procedures for a specific hazardous materials incident.

3.3.52* Private Sector 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. Consistent with the organization's emergency response plan and standard operating procedures, the private sector specialist employee A is able to analyze an incident involving chemicals within their 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.

3.3.53* Private Sector Specialist Employee B. That person who, in the course of their regular job duties, works with or is trained in the hazards of specific chemicals or containers within the individual's area of specialization. Because of the employee's education, training, or work experience, the private sector specialist employee B can be called upon to respond to incidents involving these chemicals or containers.

The private sector 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 standard operating procedures and the local emergency response plan.

3.3.54* Private Sector Specialist Employee C. That person who responds to emergencies involving chemicals and/or containers within the organization's area of specialization. Consistent with the organization's emergency response plan and standard operating procedures, the private sector specialist employee C can be called upon to gather and record information, provide technical advice, and/or arrange for technical assistance. A private sector specialist employee C does not enter the hot or warm zone at an emergency.

3.3.55* Protective Clothing. Equipment designed to protect the wearer from heat and/or hazardous materials contacting the skin or eyes.

3.3.55.1* Structural Fire-Fighting Protective Clothing. The protective clothing normally worn by fire fighters during structural fire-fighting operations, which includes a helmet, coat, pants, boots, gloves, PASS device, and a hood to cover parts of the head not protected by the helmet and facepiece.

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

3.3.55.3* 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.

3.3.55.3.1* 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.

3.3.55.3.2* 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.

3.3.56 Qualified. Having knowledge of the installation, construction, or operation of apparatus and the hazards involved. [25:3.3]

3.3.57 Radioactive Material. Any material that spontaneously emits ionizing radiation.

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

3.3.59* Response. That portion of incident management in which personnel are involved in controlling a hazardous materials incident.

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

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

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

3.3.63 Stabilization. The point in an incident at which the adverse behavior of the hazardous material is controlled. [424:1.3]

3.3.64* State. Any outlying U.S. areas where this standard is in effect.

3.3.65* Termination. That portion of incident management in which personnel are involved in documenting safety procedures, site operations, hazards faced, and lessons learned from the incident.

3.3.66 UN/NA Identification Number. The four-digit number assigned to a hazardous material, which is used to identify and cross-reference products in the transportation mode.

3.3.67 Warm Zone. See 3.3.13, Control Zones.

Chapter 4 Competencies for the First Responder at the Awareness Level

4.1 General.

4.1.1 Introduction.

4.1.1.1 First responders at the awareness level shall be trained to meet all competencies of this chapter.

4.1.1.2 They also shall receive any additional training to meet applicable United States Department of Transportation (DOT), United States Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and other state, local, or provincial occupational health and safety regulatory requirements.

4.1.2 Goal.

4.1.2.1 The goal of the competencies at the awareness level shall be to provide first responders with the knowledge and skills to perform the tasks in 4.1.2.2 safely.

4.1.2.2 When first on the scene of an emergency involving hazardous materials, the first responder at the awareness level shall be able to perform the following tasks:

- (1) Analyze the incident to determine both the hazardous materials present and the basic hazard and response information for each hazardous material by completing the following tasks:
 - (a) Detect the presence of hazardous materials
 - (b) Survey a hazardous materials incident from a safe location to identify the name, UN/NA identification number, or type placard applied for any hazardous materials involved
 - (c) Collect hazard information from the current edition of the *Emergency Response Guidebook*
- (2) Implement actions consistent with the local emergency response plan, the organization's standard operating procedures, and the current edition of the *Emergency Response Guidebook* by initiating and completing the following tasks:
 - (a) Protective actions
 - (b) Notification process

4.2 Competencies — Analyzing the Incident.

4.2.1 Detecting the Presence of Hazardous Materials. Given various facility or transportation situations, or both, with and without hazardous materials present, the first responder at the awareness level shall identify those situations where hazardous

materials are present and also shall meet the following requirements:

- (1)*Identify the definition of hazardous materials (or dangerous goods, in Canada).
- (2) Identify the UN/DOT hazard classes and divisions of hazardous materials and identify common examples of materials in each hazard class or division.
- (3)*Identify the primary hazards associated with each of the UN/DOT hazard classes and divisions of hazardous materials by hazard class or division.
- (4) Identify the difference between hazardous materials incidents and other emergencies.
- (5) Identify typical occupancies and locations in the community where hazardous materials are manufactured, transported, stored, used, or disposed of.
- (6) Identify typical container shapes that can indicate the presence of hazardous materials.
- (7) Identify facility and transportation markings and colors that indicate hazardous materials, 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 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.
- (10) Identify the following basic information on material safety data sheets (MSDS) and shipping papers that indicates hazardous materials:
 - (a) Identify where to find MSDS.
 - (b) Identify entries on an MSDS that indicate the presence of hazardous materials.
 - (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) that use the senses of sight, sound, and odor to indicate hazardous materials.
- (12) Describe the limitations of using the senses in determining the presence or absence of hazardous materials.
- (13)*Identify at least four types of locations that could become targets for criminal or terrorist activity using hazardous materials.
- (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.

4.2.2 Surveying the Hazardous Materials Incident from a Safe Location. Given examples of facility and transportation situations involving hazardous materials, the first responder at the awareness level shall identify the hazardous material(s) in each situation by name, UN/NA identification number, or type placard applied, and also shall meet the following requirements:

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

4.2.3* Collecting Hazard Information. Given the identity of various hazardous materials (name, UN/NA identification number, or type placard), the first responder at the awareness level shall identify the fire, explosion, and health hazard information for each material by using the current edition of the *Emergency Response Guidebook* and also shall meet the following requirements:

- (1)*Identify the three methods for determining the guide page for a hazardous material.
- (2) Identify the two general types of hazards found on each guide page.

4.3* Competencies — Planning the Response. (Reserved)

4.4 Competencies — Implementing the Planned Response.

4.4.1* Initiating Protective Actions. Given examples of facility and transportation hazardous materials incidents, the local emergency response plan, the organization's standard operating procedures, and the current edition of the *Emergency Response Guidebook*, first responders at the awareness level shall be able to identify the actions to be taken to protect themselves and others and to control access to the scene and shall also meet the following requirements:

- (1) Identify the location of both the local emergency response plan and the organization's standard operating procedures.
- (2) Identify the role of the first responder at the awareness level during a hazardous materials incident.
- (3) Identify the following basic precautions to be taken to protect themselves and others in a hazardous materials incident:
 - (a) Identify the precautions necessary when providing emergency medical care to victims of hazardous materials incidents.
 - (b) Identify typical ignition sources found at the scenes of hazardous materials incidents.
 - (c)*Identify the ways hazardous materials are harmful to people, the environment, and property at hazardous materials incidents.
 - (d)*Identify the general routes of entry for human exposure to hazardous materials for each hazard class.
- (4)*Given the identity of various hazardous materials (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) First responders at the awareness level shall 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 protection
- (7) First responders at the awareness level shall identify the shapes of recommended initial isolation and protective action zones.
- (8) First responders at the awareness level shall describe the difference between small and large spills as found in the table of initial isolation and protective action distances in the *Emergency Response Guidebook*.
- (9) First responders at the awareness level shall identify the circumstances under which the following distances are used at a hazardous materials incident:
 - (a) Table of initial isolation and protective action distances
 - (b) Isolation distances in the numbered guides
- (10) First responders at the awareness level shall describe the difference between the isolation distances in the orange-bordered guide pages and the protective action distances in the green-bordered pages in the document.
- (11) First responders at the awareness level shall identify the techniques used to isolate the hazard area and deny entry to unauthorized persons at hazardous materials 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 either a facility or transportation scenario involving hazardous materials, regardless of the presence of criminal or terrorist activities, the first responder at the awareness level shall identify the initial notifications to be made and how to make them, consistent with the local emergency response plan or the organization's standard operating procedures.

4.5* Competencies — Evaluating Progress. (Reserved)

4.6* Competencies — Terminating the Incident. (Reserved)

Chapter 5 Competencies for the First Responder at the Operational Level

5.1 General.

5.1.1 Introduction.

5.1.1.1 First responders at the operational level shall be trained to meet all competencies at the first responder awareness levels and the competencies of this chapter.

5.1.1.2 First responders at the operational level also shall receive any additional training to meet applicable DOT, EPA,

OSHA, and other state, local, or provincial occupational health and safety regulatory requirements.

5.1.2 Goal. The goal of the competencies at the operational level shall be to provide first responders with the knowledge and skills to perform the tasks in 5.1.2.1 safely.

5.1.2.1 The first responder at the operational level shall be able to perform the following tasks:

- (1) Analyze a hazardous materials incident to determine the magnitude of the problem in terms of outcomes by completing the following tasks:
 - (a) Survey the hazardous materials incident to identify the containers and materials involved, determine whether hazardous materials 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 material as well as its container
 - (d) Estimate the potential harm at a hazardous materials incident
- (2) 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 incidents
 - (b) Describe the defensive options available for a given response objective
 - (c) Determine whether the personal protective equipment provided is appropriate for implementing each defensive option
 - (d) Identify the emergency decontamination procedures
- (3) Implement the planned response to favorably change the outcomes consistent with the local emergency response plan and the organization's standard operating procedures by completing the following tasks:
 - (a) Establish and enforce scene control procedures including control zones, emergency decontamination, and communications
 - (b) Initiate an incident management system (IMS) for hazardous materials incidents
 - (c) Don, work in, and doff personal protective equipment provided by the authority having jurisdiction
 - (d) Perform defensive control functions identified in the plan of action
- (4) 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

5.2 Competencies — Analyzing the Incident.

5.2.1* Surveying the Hazardous Materials Incident. Given examples of both facility and transportation scenarios involving hazardous materials, the first responder at the operational level shall survey the incident to identify the containers and materials involved, determine whether hazardous materials have been released, and evaluate the surrounding conditions and also shall meet the requirements in 5.2.1.1 through 5.2.1.6.

5.2.1.1* Given three examples each of liquid, gas, and solid hazardous materials, including various hazard classes, the first responder at the operational level shall identify the general shapes of containers in which the hazardous materials are typically found.

(A) Given examples of the following tank cars, the first responder at the operational level shall identify each tank car by type as follows:

- (1) Cryogenic liquid tank cars
- (2) High-pressure tube cars
- (3) Nonpressure tank cars
- (4) Pneumatically unloaded hopper cars
- (5) Pressure tank cars

(B) Given examples of the following intermodal tanks, the first responder at the operational level shall identify each intermodal tank by type and identify at least one material and its hazard class that is typically found in each tank as follows:

- (1) Nonpressure intermodal tanks, such as the following:
 - (a) IM-101 (IMO Type 1 internationally) portable tank
 - (b) IM-102 (IMO Type 2 internationally) portable tank
- (2) Pressure intermodal tanks
- (3) Specialized intermodal tanks, such as the following:
 - (a) Cryogenic intermodal tanks
 - (b) Tube modules

(C) Given examples of the following cargo tanks, the first responder at the operational level shall identify each cargo tank by type as follows:

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

(D) Given examples of the following tanks, the first responder at the operational level shall identify at least one material, and its hazard, that is typically found in each tank as follows:

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

(E) Given examples of the following nonbulk packages, the first responder at the operational level shall identify each package by type as follows:

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

(F) Given examples of the following radioactive material containers, the first responder at the operational level shall identify each container/package by type as follows:

- (1) Type A
- (2) Type B
- (3) Industrial
- (4) Excepted
- (5) Strong, tight containers

5.2.1.2 Given examples of facility and transportation containers, the first responder at the operational level shall identify the markings that differentiate one container from another.

(A) Given examples of the following marked transport vehicles and their corresponding shipping papers, the first responder at the operational level shall identify the vehicle or tank identification marking as follows:

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

(B) Given examples of facility containers, the first responder at the operational level shall identify the markings indicating container size, product contained, and/or site identification numbers.

5.2.1.3 Given examples of facility and transportation situations involving hazardous materials, the first responder at the operational level shall identify the name(s) of the hazardous material(s) in each situation.

(A) The first responder at the operational level shall identify the following information on a pipeline marker:

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

(B) Given a pesticide label, the first responder at the operational level shall identify each of the following pieces of information, then match the piece of information to its significance in surveying the hazardous materials incident:

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

(C) Given a label for a radioactive material, the first responder at the operational level shall identify vertical bars, contents, activity, and transport index.

5.2.1.4* The first responder at the operational level shall identify and list the surrounding conditions that should be noted by the first responders when surveying hazardous materials incidents.

5.2.1.5 The first responder at the operational level shall give examples of ways to verify information obtained from the survey of a hazardous materials incident.

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

5.2.2 Collecting Hazard and Response Information. Given known hazardous materials, the first responder at the operational level shall collect hazard and response information using MSDS; CHEMTREC/CANUTEC/SETIQ; local, state, and federal authorities; and contacts with the shipper/manufacturer and also shall meet the following requirements:

- (1) Match the definitions associated with the UN/DOT hazard classes and divisions of hazardous materials, 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, procedures for cleanup of spills or 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 local, state, and federal authorities
 - (b) Procedure for contacting CHEMTREC/CANUTEC/SETIQ and local, state, and federal authorities
 - (c) Information to be furnished to CHEMTREC/CANUTEC/SETIQ and local, state, and federal 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 local, state, and federal authorities with respect to criminal or terrorist activities involving hazardous materials.
- (7) Identify the procedure for contacting local, state, and federal authorities as specified in the local emergency response plan (ERP) or the organization's standard operating procedures.
- (8) Describe the properties and characteristics of the following:
 - (a) Alpha particles
 - (b) Beta particles
 - (c) Gamma rays
 - (d) Neutrons

5.2.3* Predicting the Behavior of a Material and its Container.

Given an incident involving a single hazardous material, the first responder at the operational level shall predict the likely behavior of the material and its container and also shall meet the following requirements:

- (1) Given two examples of scenarios involving known hazardous materials, interpret the hazard and response information obtained from the current edition of the *Emergency Response Guidebook*; MSDS; CHEMTREC/CANUTEC/SETIQ; local, state, and federal authorities; and shipper/manufacturer contacts as follows:
 - (a) Match the following chemical and physical properties with their significance and impact on the behavior of the container and/or its contents:
 - i. Boiling point
 - ii. Chemical reactivity
 - iii. Corrosivity (pH)
 - iv. Flammable (explosive) range (LEL and UEL)
 - v. Flash point
 - vi. Ignition (autoignition) temperature
 - vii. Physical state (solid, liquid, gas)
 - viii. Specific gravity
 - ix. Toxic products of combustion
 - x. Vapor density
 - xi. Vapor pressure
 - xii. Water solubility
 - xiii. Radiation (ionizing and non-ionizing)

- (b) Identify the differences between the following pairs of terms:
 - i. Exposure and hazard
 - ii. Exposure and contamination
 - iii. Contamination and secondary contamination
 - iv. Radioactive material exposure (internal and external) and radioactive contamination
- (2)*Identify three types of stress that could 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 three general time frames for predicting the length of time that exposures can be in contact with hazardous materials in an endangered area.
- (7)*Identify the health and physical hazards that could cause harm.
- (8)*Identify the health hazards associated with the following terms:
 - (a) Asphyxiant
 - (b)*Chronic health hazard
 - (c) Convulsant
 - (d) Irritant/corrosive
 - (e) Sensitizer/allergen
 - (f) Alpha, beta, gamma, and neutron radiation
- (9)*Given the following types of warfare agents, identify the corresponding UN/DOT hazard class and division:
 - (a) Nerve agents
 - (b) Vesicants (blister agents)
 - (c) Blood agents
 - (d) Choking agents
 - (e) Irritants (riot control agents)
 - (f) Biological agents and toxins

5.2.4* Estimating the Potential Harm. The first responder at the operational level shall estimate the potential harm within the endangered area at a hazardous materials incident and also shall meet the following requirements:

- (1)*Identify a resource for determining the size of an endangered area of a hazardous materials incident.
- (2) Given the dimensions of the endangered area and the surrounding conditions at a hazardous materials 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 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 incident.
- (5) Describe the impact that time, distance, and shielding have on exposure to radioactive materials specific to the expected dose rate.
- (6) Describe the prioritization of emergency medical care and removal of victims from the hazard area relative to exposure and contamination concerns.

5.3 Competencies — Planning the Response.

5.3.1 Describing Response Objectives for Hazardous Materials Incidents. Given at least two scenarios involving hazardous materials incidents (one facility and one transportation), the

first responder at the operational level shall describe the first responder's response objectives for each problem and also shall meet the following requirements:

- (1) Given an analysis of a hazardous materials problem and the exposures already lost, identify the steps for determining the number of exposures that could be saved by the first responder with the resources provided by the authority having jurisdiction and operating in a defensive fashion.
- (2) Given an analysis of a hazardous materials incident, describe the steps for determining defensive response objectives.
- (3) Describe how to assess the risk to a responder for each hazard class in rescuing injured persons at a hazardous materials incident.

5.3.2 Identifying Defensive Options. Given simulated facility and transportation hazardous materials problems, the first responder at the operational level shall identify the defensive options for each response objective and shall meet the following requirements:

- (1) Identify the defensive options to accomplish a given response objective.
- (2) Identify the purpose for, and the procedures, equipment, and safety precautions used with, each of the following control techniques:
 - (a) Absorption
 - (b) Dike, dam, diversion, retention
 - (c) Dilution
 - (d) Remote valve shutoff
 - (e) Vapor dispersion
 - (f) Vapor suppression

5.3.3 Determining Appropriateness of Personal Protective Equipment. Given the name of the hazardous material involved and the anticipated type of exposure, the first responder at the operational level shall determine whether available personal protective equipment is appropriate for implementing a defensive option and also shall meet the following requirements:

- (1)*Identify the respiratory protection required for a given defensive option and the following:
 - (a) Identify the three types of respiratory protection and the advantages and limitations presented by the use of each at hazardous materials incidents.
 - (b) Identify the required physical capabilities and limitations of personnel working in positive pressure self-contained breathing apparatus.
- (2) Identify the personal protective clothing required for a given defensive option and the following:
 - (a) Identify skin contact hazards encountered at hazardous materials incidents.
 - (b) Identify the purpose, advantages, and limitations of the following levels of protective clothing at hazardous materials incidents:
 - i. Structural fire-fighting protective clothing
 - ii. High temperature-protective clothing
 - iii. Chemical-protective clothing
 - iv. Liquid splash-protective clothing
 - v. Vapor-protective clothing

5.3.4* Identifying Emergency Decontamination Procedures. The first responder at the operational level shall identify

emergency decontamination procedures and shall meet the following requirements:

- (1) Identify ways that personnel, personal protective equipment, apparatus, tools, and equipment become contaminated.
- (2) Describe how the potential for secondary contamination determines the need for emergency decontamination procedures.
- (3) Identify the purpose of emergency decontamination procedures at hazardous materials incidents.
- (4) Identify the advantages and limitations of emergency decontamination procedures.
- (5) Describe the procedure listed in the local emergency response plan or the organization's standard operating procedures for decontamination of a large number of people exposed to hazardous materials.
- (6) Describe procedures, such as those listed in the local emergency response plan or the organization's standard operating procedures, to preserve evidence at hazardous materials incidents involving suspected criminal or terrorist acts.

5.4 Competencies — Implementing the Planned Response.

5.4.1 Establishing and Enforcing Scene Control Procedures. Given scenarios for facility and/or transportation hazardous materials incidents, the first responder at the operational level shall identify how to establish and enforce scene control including control zones, emergency decontamination, and communications 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 incidents.
- (3) Identify the basic techniques for the following protective actions at hazardous materials incidents:
 - (a) Evacuation
 - (b) Sheltering in-place protection
- (4) Identify the considerations associated with locating emergency decontamination areas.
- (5)*Demonstrate the ability to perform emergency decontamination.
- (6)*Identify the items to be considered in a safety briefing prior to allowing personnel to work at the following:
 - (a) Hazardous materials incident
 - (b)*Hazardous materials incident involving criminal or terrorist activities

5.4.2* Initiating the Incident Management System. Given simulated facility and/or transportation hazardous materials incidents, the first responder at the operational level shall initiate the incident management system specified in the local emergency response plan and the organization's standard operating procedures and shall meet the following related requirements:

- (1) Identify the role of the first responder at the operational level during hazardous materials incidents as specified in the local emergency response plan and the organization's standard operating procedures.
- (2) Identify the levels of hazardous materials incidents as defined in the local emergency response plan.
- (3) Identify the purpose, need, benefits, and elements of an incident management system at hazardous materials incidents.

- (4) Identify the considerations for determining the location of the command post for a hazardous materials incident.
- (5) Identify the procedures for requesting additional resources at a hazardous materials incident.
- (6)*Identify the authority and responsibilities of the safety officer.

5.4.3 Using Personal Protective Equipment. The first responder at the operational level shall demonstrate the ability to don, work in, and doff the personal protective equipment provided by the authority having jurisdiction, and shall meet the following related requirements:

- (1) Identify the importance of the buddy system in implementing the planned defensive options.
- (2) Identify the importance of the backup personnel in implementing the planned defensive options.
- (3) Identify the safety precautions to be observed when approaching and working at hazardous materials incidents.
- (4) Identify the symptoms of heat and cold stress.
- (5) Identify the physical capabilities required for, and the limitations of, personnel working in the personal protective equipment as provided by the authority having jurisdiction.
- (6) Match the function of the operational components of the positive pressure self-contained breathing apparatus provided to the hazardous materials responder with the name of the component.
- (7) Identify the procedures for cleaning, disinfecting, and inspecting respiratory protective equipment.
- (8) Identify the procedures for donning, working in, and doffing positive pressure self-contained breathing apparatus.
- (9) Demonstrate donning, working in, and doffing positive pressure self-contained breathing apparatus.

5.4.4 Performing Defensive Control Actions. Given a plan of action for a hazardous materials incident within their capabilities, the first responder at the operational level shall demonstrate defensive control actions set out in the plan and shall meet the following related requirements:

- (1) Using the type of fire-fighting foam or vapor suppressing agent and foam equipment furnished by the authority having jurisdiction, demonstrate the effective application of the fire-fighting foam(s) or vapor suppressing agent(s) on a spill or fire involving hazardous materials.
- (2) Identify the characteristics and applicability of the following foams:
 - (a) Protein
 - (b) Fluoroprotein
 - (c) Special purpose
 - i. Polar solvent alcohol-resistant concentrates
 - ii. Hazardous materials concentrates
 - (d) Aqueous film-forming foam (AFFF)
 - (e) High expansion
- (3) Given the required tools and equipment, demonstrate how to perform the following defensive control activities:
 - (a) Absorption
 - (b) Damming
 - (c) Diking
 - (d) Dilution
 - (e) Diversion
 - (f) Retention
 - (g) Vapor dispersion
 - (h) Vapor suppression

- (4) Identify the location and describe the use of the mechanical, hydraulic, and air emergency remote shutoff devices as found on cargo tanks.
- (5) Describe the objectives and dangers of search and rescue missions at hazardous materials incidents.
- (6) Describe methods for controlling the spread of contamination to limit impacts of radioactive materials.

5.5 Competencies — Evaluating Progress.

5.5.1 Evaluating the Status of Defensive Actions. Given simulated facility and/or transportation hazardous materials incidents, the first responder at the operational level shall evaluate the status of the defensive actions taken in accomplishing the response objectives and shall meet the following related requirements:

- (1) Identify the considerations for evaluating whether defensive options are effective in accomplishing the objectives.
- (2) Describe the circumstances under which it would be prudent to withdraw from a hazardous materials incident.

5.5.2 Communicating the Status of the Planned Response. The first responder at the operational level shall communicate the status of the planned response to the incident commander and other response personnel and shall meet the following related requirements:

- (1) Identify the methods for communicating the status of the planned response to the incident commander 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 the Hazardous Materials Technician

6.1 General.

6.1.1 Introduction.

6.1.1.1 Hazardous materials technicians shall be trained to meet all competencies at the first responder awareness and operational levels and the competencies of this chapter.

6.1.1.2 Hazardous materials technicians also shall receive any additional training to meet applicable DOT, EPA, OSHA, and other state, local, or provincial occupational health and safety regulatory requirements.

6.1.2* Goal.

6.1.2.1 The goal of this chapter shall be to provide the hazardous materials technician with the knowledge and skills to perform the tasks in 6.1.2.2 safely.

6.1.2.2 In addition to being competent at both the first responder awareness and operational levels, the hazardous materials technician shall be able to perform the following tasks:

- (1) Analyze a hazardous materials incident to determine the magnitude of the problem in terms of outcomes by completing the following tasks:
 - (a) Survey the hazardous materials incident to identify special containers involved, to identify or classify unknown materials, and to verify the presence and con-

- centrations of hazardous materials through the use of monitoring equipment
- (b) Collect and interpret hazard and response information from printed resources, technical resources, computer databases, and monitoring equipment
- (c) Determine the 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) Identify the response objectives for hazardous materials incidents
 - (b) Identify the potential action options available by response objective
 - (c) Select the personal protective equipment required for a given action option
 - (d) Select the appropriate decontamination procedures
 - (e) Develop a plan of action, including safety considerations, consistent with the local emergency response plan and the organization's 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 organization's standard operating procedures and safety considerations by completing the following tasks:
 - (a) Perform the duties of an assigned hazardous materials branch 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 appropriate respiratory protection
 - (c) Perform the control functions identified in the plan of action
- (4) Evaluate the progress of the planned response by evaluating the effectiveness of the control functions
- (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

6.2 Competencies — Analyzing the Incident.

6.2.1 Surveying the Hazardous Materials Incident. The hazardous materials technician shall identify special containers involved and, given the appropriate equipment, identify or classify unknown materials, verify the identity of the hazardous materials, determine the concentration of hazardous materials, and meet the related requirements in 6.2.1.1 through 6.2.1.4.

6.2.1.1 Given examples of various specialized containers, the hazardous materials technician shall identify each container by name and identify the material, and its hazard class that is typically found in the container.

(A) Given examples of the following railroad cars, the hazardous materials technician shall identify each car by type and identify at least one material, and its hazard class that is typically found in each car as follows:

- (1) Cryogenic liquid tank cars
- (2) High-pressure tube cars
- (3) Nonpressure tank cars
- (4) Pneumatically unloaded hopper car
- (5) Pressure tank cars

(B) Given examples of the following intermodal tanks, the hazardous materials technician shall identify each intermodal tank by type and identify at least one material, and its hazard class, that is typically found in each tank:

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

(C) Given examples of the following cargo tanks, the hazardous materials technician shall identify each cargo tank by type:

- (1) Nonpressure liquid tanks
- (2) Low pressure chemical tanks
- (3) Corrosive liquid tanks
- (4) High pressure tanks
- (5) Cryogenic liquid tanks
- (6) Tube trailers
- (7) Cryogenic liquid tanks

(D) Given examples of the following tanks, the hazardous materials technician shall identify at least one material and its hazard that is typically found in each tank:

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

(E) Given examples of the following nonbulk containers, the hazardous materials technician shall identify at least one material, and its hazard class, that is typically found in each container:

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

(F) Given examples of the following radioactive materials packages, the hazardous materials technician shall identify each package by type and identify at least one typical material found in each package:

- (1) Type A
- (2) Type B
- (3) Industrial
- (4) Excepted
- (5) Strong, tight containers

(G) The hazardous materials technician shall describe the basic identification tools and detection devices and where they are available locally for each of the following:

- (1) Nerve agents
- (2) Vesicants (blister agents)
- (3) Biological agents and toxins
- (4) Irritants (riot control agents)

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

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

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

(B) Using the markings on the container and other available resources, the hazardous materials technician shall identify the capacity (by weight and/or volume) of each of the following facility containers:

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

6.2.1.3* Given at least three unknown materials, 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.

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

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

(C) The hazardous materials technician shall identify the type(s) of monitoring equipment, test strips, and reagents used to determine the following hazards:

- (1) Corrosivity (pH)
- (2) Flammability
- (3) Oxidation potential
- (4) Oxygen deficiency
- (5) Radioactivity
- (6) Toxic levels

(D)* 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) Carbon monoxide meter
- (2) Colorimetric tubes
- (3) Combustible gas indicator
- (4) Oxygen meter
- (5) Passive dosimeter
- (6) Photoionization detectors
- (7) pH indicators and/or pH meters
- (8) Radiation detection and measurement instruments
- (9) Reagents
- (10) Test strips

(E)* Given three hazardous materials, one of which is a solid, one is a liquid, and one is a gas, and the following monitoring equipment, test strips, and reagents, the hazardous materials technician shall select the equipment and demonstrate the proper techniques to identify and quantify the materials:

- (1) Carbon monoxide meter
- (2) Colorimetric tubes
- (3) Combustible gas indicator
- (4) Oxygen meter

- (5) pH indicators and/or pH meters
- (6) Radiation detection instruments
- (7) Reagents
- (8) Test strips

(F) The hazardous materials technician shall demonstrate the field maintenance and testing procedures for the monitoring equipment, test strips, and reagents provided by the authority having jurisdiction.

6.2.1.4 Given a label for a radioactive material, the hazardous materials technician shall identify vertical bars, contents, activity, and transport index, then describe the labeled item and its significance in surveying a radioactive materials incident.

6.2.2 Collecting and Interpreting Hazard and Response Information. Given access to printed resources, 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 *Emergency Response Guidebook* or a MSDS and shall meet the following related requirements in 6.2.2(A) through 6.2.2(G).

(A)* 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) Maps and diagrams
- (3) Monitoring equipment
- (4) Reference manuals
- (5) Technical information centers (i.e., CHEMTREC/CANUTEC/SETIQ and local, state, and federal authorities)
- (6) Technical information specialists

(B) The hazardous materials technician shall describe the following terms and explain their significance in the risk assessment process:

- (1) Acid, caustic
- (2) Air reactivity
- (3) Biological agents and toxins
- (4) Boiling point
- (5) Catalyst
- (6) Chemical interactions
- (7) Chemical reactivity
- (8) Compound, mixture
- (9) Concentration
- (10) Corrosivity (pH)
- (11) Critical temperatures and pressure
- (12) Dose
- (13) Dose rate
- (14) Expansion ratio
- (15) Flammable (explosive) range (LEL and UEL)
- (16) Fire point
- (17) Flash point
- (18) Half-life
- (19) Halogenated hydrocarbon
- (20) Ignition (autoignition) temperature
- (21) Inhibitor
- (22) Instability
- (23) Ionic and covalent compounds
- (24) Irritants (riot control agents)
- (25) Maximum safe storage temperature (MSST)
- (26) Melting point/freezing point

- (27) Miscibility
- (28) Nerve agents
- (29) Organic and inorganic
- (30) Oxidation potential
- (31) pH
- (32) Physical state (solid, liquid, gas)
- (33) Polymerization
- (34) Radioactivity
- (35) Saturated, unsaturated, and aromatic hydrocarbons
- (36) Self-accelerating decomposition temperature (SADT)
- (37) Solution, slurry
- (38) Specific gravity
- (39) Strength
- (40) Sublimation
- (41) Temperature of product
- (42) Toxic products of combustion
- (43) Vapor density
- (44) Vapor pressure
- (45) Vesicants (blister agents)
- (46) Viscosity
- (47) Volatility
- (48) Water reactivity
- (49) Water solubility

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

(D)* Given five hazardous material 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.

(E) Given the scenario of a domestic gas line break and the readings from a combustible gas indicator, the hazardous materials technician shall determine the area of evacuation.

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

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

6.2.3* Describing the Condition of the Container Involved in the Incident. Given simulated facility and transportation container damage, the hazardous materials technician shall describe the damage and meet the related requirements in 6.2.3.1 through 6.2.3.6.

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

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

- (1) Cargo tanks such as the following:
 - (a) Nonpressure liquid tanks
 - (b) Low pressure chemical tanks
 - (c) Corrosive liquid tanks
 - (d) High pressure tanks
 - (e) Cryogenic liquid tanks
 - (f) Dry bulk cargo tanks
 - (g) Compressed gas tube trailers

- (2) Fixed facility tanks such as the following:
 - (a) Nonpressure tank
 - (b) Pressure tank
- (3) Intermodal tanks such as the following:
 - (a) Nonpressure intermodal tanks:
 - i. IM-101 portable tank
 - ii. IM-102 portable tank
 - (b) Pressure intermodal tanks (specification 51)
 - (c) Specialized intermodal tanks:
 - i. Cryogenic intermodal tanks
 - ii. Tube modules
- (4) One-ton containers
- (5) Pipelines
- (6) Railroad cars such as the following:
 - (a) Cryogenic liquid tank cars
 - (b) High-pressure tube cars
 - (c) Nonpressure tank cars
 - (d) Pneumatically unloaded hopper cars
 - (e) Pressure tank cars

(7) Intermediate bulk containers (also known as tote tanks)

(B) The hazardous materials technician shall identify the basic design and construction features including closures of the following nonbulk containers:

- (1) Carboys
- (2) Drums
- (3) Pressurized cylinders

(C) The hazardous materials technician shall identify the basic design and construction features of the following radioactive materials containers:

- (1) Type A package
- (2) Type B package
- (3) Industrial
- (4) Excepted
- (5) Strong, tight containers

(D) The hazardous materials technician shall demonstrate a method for collecting samples of the following:

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

6.2.3.2 The hazardous materials technician shall describe how a liquid pipeline can carry different products.

6.2.3.3 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

6.2.3.4* The hazardous materials technician shall identify the types of damage that a pressure container could incur.

6.2.3.5 Given examples of tank car damage, the hazardous materials technician shall identify the type of damage in each example by name.

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