NFPA 472 Standard for Professional Competence of Responders to Hazardous Materials Incidents 1992 Edition

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An International Standards-Making Organization

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Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

Statement on NFPA Procedures

This material has been developed under the published procedures of the National Fire Protection Association, which are designed to assure the appointment of technically competent Committees having balanced representation. While these procedures assure the highest degree of care, neither the National Fire Protection Association, its members, nor those participating in its activities accept any liability resulting from compliance or noncompliance with the provisions given herein, for any restrictions imposed on materials or processes, or for the completeness of the text.

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NFPA 472

Standard for

Professional Competence of Responders to Hazardous Materials Incidents

1992 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 the National Fire Protection Association, Inc. at its Annual Meeting held May 18-21, 1992 in New Orleans, LA. It was issued by the Standards Council on July 17, 1992, with an effective date of August 14, 1992, and supersedes all previous editions.

The 1992 edition of this document has been approved by the American National Standards Institute.

Origin and Development of NFPA 472

In 1984, two separate requests to NFPA expressed a perceived need for documents relating to response to hazardous materials incidents. One came from the International Society of Fire Service Instructors, the other from the International Fire Service Training Association. NFPA sought public support for the idea and received many letters indicating agreement with the requests.

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 at the Fairfax County Fire and Rescue Training Center. Since that opening session, four additional meetings were held to complete work on the document.

Interest in the subject of hazardous materials, especially as it relates to the emergency responder, continues at a high level. Some of this is due to an increased awareness of the magnitude of the problem; much of it can be credited to federal regulations that will 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 changes the original format and presents the competencies in a more complete manner.

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.

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This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred.

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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Professional Competence of Responders to Hazardous Materials Incidents

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

Information on referenced publications can be found in Chapter 7 and Appendix B.

Chapter 1 Administration

1-1 General.

1-1.1 Scope. This standard identifies the levels of competence required of responders to hazardous materials incidents. It specifically covers the competencies for first responders at the awareness level, first responders at the operational level, hazardous materials technicians, incident commanders, and off-site specialist employees.

1-1.2 Purpose. The purpose of this standard is to specify minimum competencies for those who will respond to hazardous materials incidents. It is not the intent of this standard to restrict any jurisdiction from exceeding these minimum requirements.

One of the purposes of the competencies contained herein is 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.

1-2 Definitions.

Approved.* Acceptable to the "authority having jurisdiction."

Authority Having Jurisdiction.* The "authority having jurisdiction" is the organization, office or individual responsible for "approving" equipment, an installation or a procedure.

CANUTEC. The Canadian Transport Emergency Center operated by Transport Canada. CANUTEC provides emergency response information and assistance on a 24-hr basis for responders to hazardous materials incidents.

Chemical. Regulated and nonregulated hazardous materials (solids, liquids, and gases; natural or manmade; including petroleum products) with the potential for creating harm to people, the environment, and property when released.

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. Chemical-protective clothing (garments) can be constructed as a single- or multipiece garment. The garment may completely enclose the wearer either by itself or in combination with the wearer's respiratory protection, attached or detachable hood, gloves, and boots.

CHEMTREC. The Chemical Transportation Emergency Center, a public service of the Chemical Manufacturers Association, in Washington, DC. CHEMTREC provides emergency response information and assistance on a 24-hr basis for responders to hazardous materials incidents.

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. This zone is also referred to as the clean zone or support zone in other documents.

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

Confined Space. Refers to a space that by design has limited openings for entry and exit, that has unfavorable natural ventilation that could contain or produce dangerous concentrations of air contaminants, and that is not intended for continuous occupancy. Examples of confined spaces include, but are not limited to, storage tanks, compartments of ships, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and pipelines.

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

Container. Any vessel or receptacle that holds material, including storage vessels, pipelines, and packaging (see definition of packaging). Containers include:

(a) Nonbulk packaging, such as bags, bottles, boxes, carboys, cylinders, drums, jerricans, multicell packages, and wooden barrels;

(b) Bulk packaging, such as bulk bags, bulk boxes, cargo tanks, covered hopper cars, freight containers, gondolas, pneumatic hopper trailers, portable tanks and bins, protective overpacks for radioactive materials, tank cars, ton containers, and van trailers; and

(c) Fixed containers such as piping, reactors, storage bins, tanks, and storage vessels.

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).

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 outside of the hot zone.

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

Contamination Reduction Corridor. This area is usually located within the warm zone and is where decontamination procedures take place. This is also referred to as the decontamination area in other documents.

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

Control Zones. The designation of areas at hazardous materials incidents based upon safety and the degree of hazard. 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.

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

Decontamination (Contamination Reduction). The physical or chemical process of reducing and preventing the spread of contamination from persons and equipment used at a hazardous materials incident.

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.

Demonstrate. To show by actual performance. This may be supplemented by simulation, explanation, illustration, or a combination of these.

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

Emergency Decontamination. The physical process of immediately reducing contamination of individuals in potentially life-threatening situations without the formal establishment of a contamination reduction corridor.

Emergency Response Guidebook. A reference book, written in plain language, to guide emergency responders in their initial actions at the incident scene. In the U.S., this book is published by the U.S. Department of Transportation. In Canada, this book is published by Transport Canada. Both books contain similar data in a similar format, with the exception of the table of isolation distances, which is found only in the U.S. version.

Emergency Response Plan. A plan that establishes guidelines for handling hazardous materials incidents as required by 29 CFR 1910.120.

Endangered Area. The actual or potential area of exposure from a hazardous material. This is sometimes referred to as the engulfed area.

Exposure. The process by which people, animals, the environment, and equipment are subjected to or come in contact with a hazardous material. The magnitude of exposure is dependent primarily upon the duration of exposure and the concentration of the hazardous material. Also used to describe a person, animal, the environment, or a piece of equipment.

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

Hazard Sector. That function within an overall incident management system that deals with the mitigation of a hazardous materials incident. It is directed by a sector officer and principally deals with the technical aspects of the incident.

Hazard Sector Officer. The person responsible for the management of the hazard sector.

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

Hazardous Materials Response Team. The hazardous materials response team is an organized group of trained response personnel operating under an emergency response plan and appropriate standard operating procedures, who are expected to perform work to handle and control actual or potential leaks or spills of hazardous materials requiring possible close approach to the material. The team members perform response to releases or potential releases of hazardous materials for the purpose of control or stabilization of the incident.

High Temperature-Protective Clothing. Protective clothing designed to protect the wearer for short-term high temperature exposures. This type of clothing is usually of limited use in dealing with chemical commodities.

Hot Zone. Area immediately surrounding a hazardous materials incident, which extends far enough to prevent adverse effects from hazardous materials releases to personnel outside the zone. This zone is also referred to as the exclusion zone or the restricted zone in other documents.

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

Incident. An emergency involving the release or potential release of a hazardous material, with or without fire.

Incident Commander. The person responsible for all decisions relating to the management of the incident. The incident commander is in charge of the incident site. This is equivalent to the on-scene incident commander as defined by 29 CFR 1910.120.

Incident Management System. An organized system of roles, responsibilities, and standard operating procedures used to manage and direct emergency operations. Such systems are sometimes referred to as incident command systems (ICS).

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

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. Liquid splash-protective clothing must meet the requirements of NFPA 1992. This type of protective clothing is a component of EPA Level B chemical protection.

Listed.* Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

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

Match. To provide with a counterpart.

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 as required by 29 CFR 1910.1200.

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

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

Off-site Specialist Employee A. Those persons who are specifically trained to handle incidents involving chemicals and/or containers for chemicals used in their organization's area of specialization. Consistent with the organization's emergency response plan and standard operating procedures, the off-site specialist employee A shall have the ability 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.

Off-site Specialist Employee B. 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 individual area of specialization. Because of his or her education, training, or work experience, the off-site specialist employee B may be called upon to gather and record information, provide technical advice, and provide technical assistance (including work within the hot zone) at an incident involving chemicals consistent with his or her organization's emergency response plan and standard operating procedures and the local emergency response plan.

Off-site Specialist Employee C. Those persons who may respond to incidents involving chemicals and/or containers within their organization's area of specialization. The off-site specialist employee C may be called upon to gather and record information, provide technical advice, and/or arrange for technical assistance consistent with his or her organizations's emergency response plan and standard operating procedures. The off-site specialist employee C is not expected to enter the hot/warm zone at an incident.

Organization's Area of Specialization. Refers to any chemicals and containers used by the off-site specialist employee's employer.

Packaging. Any container that holds a material (hazardous and nonhazardous). Packaging for hazardous materials includes nonbulk and bulk packaging.

Nonbulk Packaging. Any packaging having a capacity meeting one of the following criteria:

(a) Liquid — internal volume of 119 gal (450 L) or less;

(b) Solid — capacity of 882 lb (400 kg) or less; and

(c) Compressed gas — water capacity of 1,001 lb (454 kg) or less.

Bulk Packaging. Any packaging, including transport vehicles, having a capacity greater than described above under nonbulk 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) Liquid — internal volume of more than 119 gal (450 L);

(b) Solid — capacity of more than 882 lb (400 kg); and

(c) Compressed gas — water capacity of more than 1,001 lb (454 kg).

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.

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

Personal Protective Equipment. The equipment provided to shield or isolate a person from the chemical, physical, and thermal hazards that may be encountered at a hazardous materials incident. 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.

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.

Protective Clothing. Equipment designed to protect the wearer from heat and/or hazardous materials contacting the skin or eyes. Protective clothing is divided into four types:

(a) Structural fire fighting protective clothing;

(b) Liquid splash-protective clothing;

(c) Vapor-protective clothing; and

(d) High temperature-protective clothing.

Qualified. Having satisfactorily completed the learning objectives.

Respiratory Protection. Equipment designed to protect the wearer from the inhalation of contaminants. Respiratory protection is divided into three types:

(a) Positive pressure self-contained breathing apparatus;

(b) Positive pressure airline respirators; and

(c) Air purifying respirators.

Response. That portion of incident management in which personnel are involved in controlling (defensively or offensively) a hazardous materials incident. The activities in the response portion of a hazardous materials incident include analyzing the incident, planning the response, implementing the planned response, and evaluating progress.

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

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

Shall. Indicates a mandatory requirement.

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

Stabilization. The point in an incident at which the adverse behavior of the hazardous material is controlled.

State. Where the noun "state" is used it shall also include by implication any outlying U.S. areas where this standard is in effect. Use of the noun "state" shall imply "provinces and territories" in Canada.

Structural Fire Fighting Protective Clothing. This category of clothing, often called turnout or bunker gear, means the protective clothing normally worn by fire fighters during structural fire fighting operations. It includes a helmet, coat, pants, boots, gloves, and a hood to cover parts of the head not protected by the helmet and facepiece. Structural fire fighters' protective clothing provides limited protection from heat but may not provide adequate protection from the harmful gases, vapors, liquids, or dusts that are encountered during hazardous materials incidents.

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

UN/NA Identification Number. UN/NA identification numbers are four-digit numbers assigned to a hazardous material. The number is used to identify and cross-reference the product.

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. Vapor-protective clothing must meet the requirements of NFPA 1991. This type of protective clothing is a component of EPA Level A chemical protection.

Warm Zone. The control zone at a hazardous materials incident site where personnel and equipment decontamination and hot zone support takes place. It includes control points for the access corridor, helping to reduce the spread of contamination. This zone is also referred to as the decontamination, contamination reduction, or limited access zone in other documents.

Chapter 2 Competencies for the First Responder at the Awareness Level

2-1 General.

2-1.1 Introduction. First responders at the awareness level shall be trained to meet all competencies of this chapter. In addition, first responders at the awareness level shall receive training to meet federal Occupational Safety and Health Administration (OSHA), local occupational health and safety regulatory, or U.S. Environmental Protection Agency (EPA) requirements, whichever are appropriate for their jurisdiction.

2-1.2 Definition. First responders at the awareness level are those persons who, in the course of their normal duties, may be the first on the scene of an emergency involving hazardous materials. First responders at the awareness level are expected to recognize hazardous materials presence, protect themselves, call for trained personnel, and secure the area.

2-1.3 Goal. The goal of the competencies at the awareness level shall be to provide first responders with the knowledge and skills to perform the following tasks safely. Therefore, when first on the scene of an emergency involving hazardous materials, the first responder at the awareness level shall be able to:

(a) 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:

1. Detect the presence of hazardous materials;

2. 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; and

3. Collect hazard information from the current edition of the *Emergency Response Guidebook*.

(b) 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 completing the following tasks:

1. Initiate protective actions consistent with the local emergency response plan, the organization's standard operating procedures, and the current edition of the *Emergency Response Guidebook;* and

2. Initiate the notification process specified in the local emergency response plan and the organization's standard operating procedures.

2-2 Competencies — Analyzing the Incident.

2-2.1 Detecting the Presence of Hazardous Materials. The first responder at the awareness level shall, given various facility and/or transportation situations, with and without hazardous materials present, identify those situations where hazardous materials are present. The first responder at the awareness level shall be able to:

2-2.1.1* Identify the definition of hazardous materials (or dangerous goods, in Canada).

2-2.1.2* Identify the DOT hazard classes and divisions of hazardous materials and identify common examples of materials in each hazard class or division.

2-2.1.3* Identify the primary hazards associated with each of the DOT hazard classes and divisions of hazardous materials by hazard class or division.

2-2.1.4 Identify the difference between hazardous materials incidents and other emergencies.

2-2.1.5 Identify typical occupancies and locations in the community where hazardous materials are manufactured, transported, stored, used, or disposed of.

2-2.1.6 Identify typical container shapes that may indicate hazardous materials.

2-2.1.7 Identify facility and transportation markings and colors that indicate hazardous materials, including:

(a) UN/NA identification numbers;

(b) NFPA 704 markings;

(c) Military hazardous materials markings;

(d) Special hazard communication markings;

(e) Pipeline marker; and

(f) Container markings.

2-2.1.7.1 Given an NFPA 704 marking, identify the significance of the colors, numbers, and special symbols.

2-2.1.8 Identify U.S. and Canadian placards and labels that indicate hazardous materials.

2-2.1.9 Identify the basic information on material safety data sheets (MSDS) and shipping papers that indicates hazardous materials.

2-2.1.9.1 Identify where to find material safety data sheets (MSDS).

2-2.1.9.2 Identify entries on a material safety data sheet that indicate the presence of hazardous materials.

2-2.1.9.3 Identify the entries on shipping papers that indicate the presence of hazardous materials.

2-2.1.9.4 Match the name of the shipping papers found in transportation (air, highway, rail, and water) with the mode of transportation.

2-2.1.9.5 Identify the person responsible for having the shipping papers in each mode of transportation.

2-2.1.9.6 Identify where the shipping papers are found in each mode of transportation.

2-2.1.9.7 Identify where the papers may be found in an emergency in each mode of transportation.

2-2.1.10* Identify examples of clues (other than occupancy/location, container shape, markings/color, placards/labels, and shipping papers) that use the senses of sight, sound, and odor to indicate hazardous materials.

2-2.1.11 Describe the limitations of using the senses in determining the presence or absence of hazardous materials.

2-2.2 Surveying the Hazardous Materials Incident from a Safe Location. The first responder at the awareness level shall, given examples of facility and transportation situations involving hazardous materials, identify the hazardous material(s) in each situation by name, UN/NA identification number, and/or type placard applied. The first responder at the awareness level shall be able to:

2-2.2.1 Identify difficulties encountered in determining the specific names of hazardous materials in both facilities and transportation.

2-2.2.2 Identify sources for obtaining the names of, UN/NA identification numbers for, or types of placard associated with hazardous materials in transportation.

2-2.2.3 Identify sources for obtaining the names of hazardous materials in a facility.

2-2.3* Collecting Hazard Information. The first responder at the awareness level shall, given the identity of various hazardous materials (name, UN/NA identification number, or type placard), identify the fire, explosion, and health hazard information for each material using the current edition of the *Emergency Response Guidebook*. The first responder at the awareness level shall be able to:

2-2.3.1* Identify the ways hazardous materials are harmful to people, the environment, and property at hazardous materials incidents.

2-2.3.2* Identify the general routes of entry for human exposure to hazardous materials.

2-2.3.3 Given the current edition of the *Emergency Response Guidebook*, identify the three methods for determining the appropriate guide page for a specific hazardous material.

2-2.3.4 Given the current edition of the *Emergency Response Guidebook*, identify the two general types of hazards found on each guide page.

2-3 Competencies — Planning the Response. (No competencies currently required at this level.)

2-4 Competencies — Implementing the Planned Response.

2-4.1* Initiating Protective Actions. First responders at the awareness level shall, given examples of facility and transportation hazardous materials incidents, identify the

actions to be taken to protect themselves and others and to control access to the scene using the local emergency response plan, the organization's standard operating procedures, or the current edition of the *Emergency Response Guidebook*. The first responder at the awareness level shall be able to:

2-4.1.1 Identify the location of both the local emergency response plan and the organization's standard operating procedures.

2-4.1.2 Given a copy of the current edition of the DOT *Emergency Response Guidebook*, describe the difference between the protective action distances in the orange-bordered guide pages and the green-bordered pages in the document.

2-4.1.3 Given the local emergency response plan or the organization's standard operating procedures, identify the role of the first responder at the awareness level during a hazardous materials incident.

2-4.1.4 Given the local emergency response plan or the organization's standard operating procedures, identify the basic precautions to be taken to protect himself/herself and others in a hazardous materials incident.

2-4.1.4.1 Identify the precautions necessary when providing emergency medical care to victims of hazardous materials incidents.

2-4.1.4.2 Identify typical ignition sources found at the scenes of hazardous materials incidents.

2-4.1.5* Given the identity of various hazardous materials (name, UN/NA identification number, or type placard), identify the following response information using the current edition of the *Emergency Response Guidebook:*

(a) Emergency action (fire, spill, or leak and first aid);

(b) Personal protective equipment necessary; and

(c) Initial isolation and protective action distances.

2-4.1.5.1 Given the current edition of the *Emergency Response Guidebook* and the name of a hazardous material, identify the recommended personal protective equipment for the particular incident from the following list of protective equipment:

(a) Street clothing and work uniforms;

(b) Structural fire fighters' protective clothing;

(c) Positive pressure self-contained breathing apparatus; and

(d) Chemical-protective clothing and equipment.

2-4.1.5.2 Given the current edition of the *Emergency Response Guidebook*, identify the definitions for each of the following protective actions:

(a) Isolate hazard area and deny entry;

(b) Evacuate; and

(c) In-place protection.

2-4.1.5.3 Given the current edition of the DOT *Emergency Response Guidebook*, identify the shapes of recommended initial isolation and protective action zones.

2-4.1.5.4 Given the current edition of the DOT *Emergency Response Guidebook*, describe the difference between small and large spills as found in the table of isolation distances.

2-4.1.5.5 Given the current edition of the DOT *Emergency Response Guidebook*, identify the circumstances under which the following distances are used at a hazardous materials incident:

(a) Table of initial isolation and protective action distances; and

(b) Isolation distances in the numbered guides.

2-4.1.6 Identify the techniques used to isolate the hazard area and deny entry to unauthorized persons at hazardous materials incidents.

2-4.2 Initiating the Notification Process. The first responder at the awareness level shall, given either a facility or transportation scenario of hazardous materials incidents, identify the appropriate notifications to be made and how to make them, consistent with the local emergency response plan or the organization's standard operating procedures. The first responder at the awareness level shall be able to:

2-4.2.1 Identify the initial notification procedures for hazardous materials incidents in the local emergency response plan or the organization's standard operating procedures.

Chapter 3 Competencies for the First Responder at the Operational Level

3-1 General.

3-1.1 Introduction. First responders at the operational level shall be trained to meet all requirements at the awareness and operational levels. In addition, first responders at the operational level shall receive training to meet federal Occupational Safety and Health Administration (OSHA), local occupational health and safety regulatory, or U.S. Environmental Protection Agency (EPA) requirements, whichever are appropriate for their jurisdiction.

3-1.2 Definition. First responders at the operational level are 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. They shall be trained to respond in a defensive fashion to control the release from a safe distance and keep it from spreading.

3-1.3 Goal. The goal of the competencies at the operational level shall be to provide first responders with the knowledge and skills to perform the following tasks safely. Therefore, in addition to being competent at the awareness level, the first responder at the operational level shall be able to:

(a) Analyze a hazardous materials incident to determine the magnitude of the problem in terms of outcomes by completing the following tasks:

1. Survey the hazardous materials incident to determine the containers and materials involved, whether hazardous materials have been released, and the surrounding conditions;

2. Collect hazard and response information from material safety data sheets (MSDS), CHEMTREC/CANUTEC, and shipper/manufacturer contacts;

3. Predict the likely behavior of a material and its container; and

4. Estimate the potential harm at a hazardous materials incident.

(b) Plan an initial response within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by completing the following tasks:

1. Describe the response objectives for hazardous materials incidents;

2. Describe the defensive options available for a given response objective;

3. Determine whether the personal protective equipment provided is appropriate for implementing each defensive option; and

4. Identify the emergency decontamination procedures.

(c) 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:

1. Establish and enforce scene control procedures including control zones, emergency decontamination, and communications;

2. Initiate the incident management system (IMS) for hazardous materials incidents;

3. Don, work in, and doff personal protective equipment provided by the authority having jurisdiction; and

4. Perform defensive control functions identified in the plan of action.

(d) 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:

1. Evaluate the status of the defensive actions taken in accomplishing the response objectives; and

2. Communicate the status of the planned response.

3-2 Competencies — Analyzing the Incident.

3-2.1* Surveying the Hazardous Materials Incident. The first responder at the operational level shall, given examples of both facility and transportation situations involving hazardous materials, survey the hazardous materials incident to identify the containers and materials involved, whether hazardous materials have been released, and the surrounding conditions. The first responder at the operational level shall be able to:

3-2.1.1* Given examples of various hazardous materials containers, identify the general shapes of containers for liquids, gases, and solids.

3-2.1.1.1 Given examples of the following tank cars, identify each tank car by type:

(a) Nonpressure tank cars with and without expansion domes;

(b) Pressure tank cars; and

(c) Cryogenic liquid tank cars.

3-2.1.1.2 Given examples of the following intermodal tank containers, identify each intermodal tank container by type:

(a) Nonpressure intermodal tank containers; and

(b) Pressure intermodal tank containers.

3-2.1.1.3 Given examples of the following cargo tanks, identify each cargo tank by type:

(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; and

(f) Dry bulk cargo tanks.

3-2.1.1.4 Given examples of the following facility tanks, identify each fixed facility tank by type:

(a) Nonpressure facility tanks; and

(b) Pressure facility tanks.

3-2.1.2 Given examples of facility and transportation containers, identify the markings that differentiate one container from another.

3-2.1.2.1 Given examples of the following transport vehicles and their corresponding shipping papers, identify the vehicle or tank identification marking in all applicable locations:

(a) Rail transport vehicles, including tank cars;

(b) Intermodal equipment including tank containers; and

(c) Highway transport vehicles, including cargo tanks.

3-2.1.2.2 Given examples of facility containers, identify the markings indicating container size, product contained, and/or site identification numbers.

3-2.1.3 Given examples of facility and transportation situations involving hazardous materials, identify the name(s) of the hazardous material(s) in each situation.

3-2.1.3.1 Identify the following information on a pipeline marker:

(a) Product;

(b) Owner; and

(c) Emergency telephone number.

3-2.1.3.2 Given a pesticide label, identify each of the following pieces of information; then match the piece of information to its significance in surveying the hazardous materials incident:

(a) Name of pesticide;

(b) Signal word;

(c) Pest control product (PCP) number (in Canada);

(d) Precautionary statement;

(e) Hazard statement; and

(f) Active ingredient.

3-2.1.4* Identify and list the surrounding conditions that should be noted when surveying hazardous materials incidents.

3-2.1.5 Give examples of ways to verify information obtained from the survey of a hazardous materials incident.

3-2.2 Collecting Hazard and Response Information. The first responder at the operational level shall, given known hazardous materials, collect hazard and response information using material safety data sheets (MSDS), CHEMTREC/CANUTEC, and contacts with the shipper/manufacturer. The first responder at the operational level shall be able to:

3-2.2.1 Match the definitions associated with the DOT hazard classes and divisions of hazardous materials, including refrigerated liquefied gases and cryogenic liquids, with the class or division.

3-2.2.2 Identify two ways to obtain a material safety data sheet (MSDS) in an emergency.

3-2.2.3 Using a material safety data sheet (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; and

(j) Emergency and first aid procedures.

3-2.2.4 Identify the following:

(a) The type of assistance provided by CHEMTREC/CANUTEC;

(b) How to contact CHEMTREC/CANUTEC; and

(c) The information to be furnished to CHEMTREC/CANUTEC.

3-2.2.5 Identify two methods of contacting the manufacturer or shipper to obtain hazard and response information.

3-2.3* Predicting the Behavior of a Material and Its Container. The first responder at the operational level shall, given examples of facility and transportation hazardous materials incidents involving a single hazardous material, predict the likely behavior of the material and its container in each incident. The first responder at the operational level shall be able to:

3-2.3.1 Given situations involving known hazardous materials, interpret the hazard and response information obtained from the current edition of the *Emergency Response Guidebook*, material safety data sheets (MSDS), CHEMTREC/CANUTEC, and shipper/manufacturer contacts.

3-2.3.1.1 Match the following chemical and physical properties with their significance and impact on the behavior of the container and/or its contents:

(a) Corrosivity (pH);

(b) Flammable (explosive) range;

(c) Flash point;

(d) Form (solid, liquid, gas);

(e) Ignition (autoignition) temperature;

(f) Reactivity;

(g) Specific gravity;

(h) Toxic products of combustion;

(i) Vapor density; and

(j) Water solubility.

3-2.3.1.2 Identify the differences among the following terms:

(a) Exposure and hazard;

(b) Exposure and contamination; and

(c) Contamination and secondary contamination.

3-2.3.2* Identify three types of stress that could cause a container system to release its contents.

3-2.3.3* Identify five ways in which containers can breach.

3-2.3.4* Identify four ways in which containers can release their contents.

3-2.3.5* Identify at least four dispersion patterns that can be created upon release of a hazardous material.

3-2.3.6* Identify the three general time frames for predicting the length of time that exposures may be in contact with hazardous materials in an endangered area.

3-2.3.7* Identify the health and physical hazards that could cause harm.

3-2.3.7.1* Identify the health hazards associated with the following terms:

(a) Asphyxiant;

(b) Irritant/corrosive;

(c) Sensitizer/allergen;

(d) Convulsant; and

(e)* Chronic health hazard.

3-2.4* 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. The first responder at the operational level shall be able to:

3-2.4.1* Identify a resource for determining the size of an endangered area of a hazardous materials incident.

3-2.4.2 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.

3-2.4.3 Identify resources available for determining the concentrations of a released hazardous material within an endangered area.

3-2.4.4* Identify the factors for determining the extent of physical, health, and safety hazards within the endangered area of a hazardous materials incident given the concentrations of the released material.

3-3 Competencies — Planning the Response.

3-3.1 Describing Response Objectives for Hazardous Materials Incidents. The first responder at the operational level shall, given simulated facility and transportation hazardous materials problems, describe the first responder's response objectives for each problem. The first responder at the operational level shall be able to:

3-3.1.1 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, given an analysis of a hazardous materials problem and the exposures already lost.

3-3.1.2 Describe the steps for determining defensive response objectives given an analysis of a hazardous materials incident.

3-3.2 Identifying Defensive Options. The first responder at the operational level shall, given simulated facility and transportation hazardous materials problems, identify the defensive options for each response objective. The first responder at the operational level shall be able to:

3-3.2.1 Identify the defensive options to accomplish a given response objective.

3-3.2.2 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) Vapor dispersion; and

(e) Vapor suppression.

3-3.3 Determining Appropriateness of Personal Protective Equipment. The first responder at the operational level shall, given the name of the hazardous material involved and the anticipated type of exposure, determine whether available personal protective equipment is appropriate for implementing a defensive option. The first responder at the operational level shall be able to:

3-3.3.1* Identify the appropriate respiratory protection required for a given defensive option.

3-3.3.1.1 Identify the three types of respiratory protection and the advantages and limitations presented by the use of each at hazardous materials incidents.

3-3.3.1.2 Identify the required physical capabilities and limitations of personnel working in positive pressure self-contained breathing apparatus.

3-3.3.2 Identify the appropriate personal protective equipment required for a given defensive option.

3-3.3.2.1 Identify skin contact hazards encountered at hazardous materials incidents.

3-3.3.2.2 Identify the purpose, advantages, and limitations of the following levels of protective clothing at hazardous materials incidents:

(a) Structural fire fighting clothing;

(b) High temperature-protective clothing; and

(c) Chemical-protective clothing:

1. Liquid splash-protective clothing; and
2. Vapor-protective clothing.

3-3.4* Identifying Emergency Decontamination Procedures. The first responder at the operational level shall identify emergency decontamination procedures. The first responder at the operational level shall be able to:

3-3.4.1 Identify ways that personnel, personal protective equipment, apparatus, and tools and equipment become contaminated.

3-3.4.2 Describe how the potential for secondary contamination determines the need for emergency decontamination procedures.

3-3.4.3 Identify the purpose of emergency decontamination procedures at hazardous materials incidents.

3-3.4.4 Identify the advantages and limitations of emergency decontamination procedures.

3-4 Competencies — Implementing the Planned Response.

3-4.1 Establishing and Enforcing Scene Control Procedures. The first responder at the operational level shall, given scenarios for facility and/or transportation hazardous materials incidents, identify how to establish and enforce

scene control including control zones, emergency decontamination, and communications. The first responder at the operational level shall be able to:

3-4.1.1 Identify the procedures for establishing scene control through control zones.

3-4.1.1.1 Identify the criteria for determining the locations of the control zones at hazardous materials incidents.

3-4.1.2 Identify the basic techniques for the following protective actions at hazardous materials incidents:

(a) Evacuation; and

(b) In-place protection.

3-4.1.3 Identify the considerations associated with locating emergency decontamination areas.

3-4.1.4* Demonstrate the ability to perform emergency decontamination.

3-4.1.5* Identify the items to be considered in a safety briefing prior to allowing personnel to work on a hazardous materials incident.

3-4.2* Initiating the Incident Management System (IMS). The first responder at the operational level shall, given simulated facility and/or transportation hazardous materials incidents, initiate the incident management system (IMS) specified in the local emergency response plan and the organization's standard operating procedures. The first responder at the operational level shall be able to:

3-4.2.1 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.

3-4.2.2 Identify the levels of hazardous materials incidents as defined in the local emergency response plan.

3-4.2.3 Identify the purpose, need, benefits, and elements of an incident management system (IMS) at hazardous materials incidents.

3-4.2.4 Identify the considerations for determining the location of the command post for a hazardous materials incident.

3-4.2.5 Identify the procedures for requesting additional resources at a hazardous materials incident.

3-4.2.6* Identify the responsibilities of the safety officer.

3-4.3 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. The first responder at the operational level shall be able to:

3-4.3.1 Identify the importance of the buddy system in implementing the planned defensive options.

3-4.3.2 Identify the importance of the back-up personnel in implementing the planned defensive options.

3-4.3.3 Identify the safety precautions to be observed when approaching and working at hazardous materials incidents.

3-4.3.4 Identify the symptoms of heat and cold stress.

3-4.3.5 Identify the physical capabilities required for and the limitations of personnel working in the personal protective equipment as provided by the authority having jurisdiction.

3-4.3.6 Match the function of the operational components of the positive pressure self-contained breathing apparatus provided the hazardous materials responder to the name of the component.

3-4.3.7 Identify the procedures for cleaning, sanitizing, and inspecting respiratory protective equipment.

3-4.3.8 Identify the procedures for donning, working in, and doffing positive pressure self-contained breathing apparatus.

3-4.3.9 Demonstrate donning, working in, and doffing positive pressure self-contained breathing apparatus.

3-4.4 Performing Defensive Control Actions. The first responder at the operational level shall, given a plan of action for a hazardous materials incident within his or her capabilities, demonstrate the ability to perform the defensive control actions set out in the plan. The first responder at the operational level shall be able to:

3-4.4.1 Using the type of fire fighting foam or vapor suppressing agent and foam equipment furnished by the authority having jurisdiction, demonstrate the proper application of the fire fighting foam(s) or vapor suppressing agent(s) on a spill or fire involving hazardous materials.

3-4.4.1.1 Identify the characteristics and applicability of the following foams:

(a) Protein;

(b) Fluoroprotein;

(c) Special purpose:

1. Polar solvent alcohol-resistant concentrates;
2. Hazardous materials concentrates.

(d) Aqueous film-forming foam (AFFF); and

(e) High expansion.

3-4.4.2 Given the appropriate tools and equipment, describe how to perform the following defensive control activities:

(a) Absorption;

(b) Dike, dam, diversion, and retention;

(c) Dilution;

(d) Vapor dispersion; and

(e) Vapor suppression.

3-4.4.3 Identify the location and use of the mechanical, hydraulic, and air emergency remote shutoff devices as found on MC-306/DOT 406 and MC-331 cargo tanks.

3-4.4.4 Describe the objectives and dangers of search and rescue missions at hazardous materials incidents.

3-5 Competencies — Evaluating Progress.

3-5.1 Evaluating the Status of Defensive Actions. The first responder at the operational level shall, given simulated facility and/or transportation hazardous materials incidents, evaluate the status of the defensive actions taken in accomplishing the response objectives. The first responder at the operational level shall be able to:

3-5.1.1 Identify the considerations for evaluating whether defensive options are effective in accomplishing the objectives.

3-5.1.2 Describe the circumstances under which it would be prudent to pull back from a hazardous materials incident.

3-5.2 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. The first responder at the operational level shall be able to:

3-5.2.1 Identify the methods for communicating the status of the planned response to the incident commander through the normal chain of command.

3-5.2.2 Identify the methods for immediate notification of the incident commander and other response personnel about critical emergency conditions at the incident.

Chapter 4 Competencies for the Hazardous Materials Technician

4-1 General.

4-1.1 Introduction. Hazardous materials technicians shall be trained to meet all requirements at the first responder awareness and operational levels and at the technician level. In addition, hazardous materials technicians shall meet the training requirements and be provided medical surveillance in accordance with federal Occupational Safety and Health Administration (OSHA), local occupational health and safety regulatory, or U.S. Environmental Protection Agency (EPA) requirements, whichever are appropriate for their jurisdiction.

4-1.2 Definition. 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.

4-1.3 Goal. The goal of training at the technician level shall be to provide the hazardous materials technician with the knowledge and skills to perform the following tasks safely. Therefore, in addition to being competent at both the first responder awareness and operational levels, the hazardous materials technician shall be able to:

(a) Analyze a hazardous materials incident to determine the magnitude of the problem in terms of outcomes by completing the following tasks:

1. Survey the hazardous materials 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;

2. Collect and interpret hazard and response information from printed resources, technical resources, computer data bases, and monitoring equipment;

3. Determine the extent of damage to containers;

4. Predict the likely behavior of materials when released; and

5. Estimate the size of an endangered area using computer modeling, monitoring equipment, or specialists in this area.

(b) Plan a response within the capabilities of available personnel, personal protective equipment, and control equipment by completing the following tasks:

1. Identify the response objectives for hazardous materials incidents;

2. Identify the potential action options available by response objective;

3. Select the personal protective equipment required for a given action option;

4. Select the appropriate decontamination procedures; and

5. 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.

(c) Implement the planned response to favorably change the outcomes consistent with the organization's standard operating procedures and/or a site safety plan by completing the following tasks:

1. Perform the duties of an assigned position within the local incident management system (IMS);

2. Don, work in, and doff appropriate personal protective clothing including, but not limited to, both liquid splash and vapor protective clothing with appropriate respiratory protection; and

3. Perform the control functions identified in the plan of action.

4-2 Competencies — Analyzing the Incident.

4-2.1 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 hazardous materials, and determine the concentration of hazardous materials. The hazardous materials technician shall be able to:

4-2.1.1 Given examples of various specialized containers, identify each container by name and match the hazard class of the materials typically found inside the container.

4-2.1.1.1 Given examples of the following tank cars, identify each tank car by type:

(a) Cryogenic liquid tank cars;

(b) High-pressure tube cars; and

(c) Pneumatically unloaded hopper car.

4-2.1.1.2 Given examples of the following intermodal tank containers, identify each intermodal tank container by type:

(a) IM-101 portable tanks;

(b) IM-102 portable tanks; and

(c) Specialized intermodal tank containers:

1. Cryogenic intermodal tank containers;
2. Tube modules.

4-2.1.2 Given examples of both facility and transportation containers, identify the approximate quantity in or capacity of each container.

4-2.1.2.1 Given examples of the following transport vehicles, identify the capacity (by weight and/or volume) of each transport vehicle using the markings on the vehicle:

(a) Tank cars;

(b) Tank containers; and

(c) Cargo tanks.

4-2.1.3 Given at least three unknown materials, one of which is a solid, one a liquid, and one a gas, identify or classify by hazard each unknown material.

4-2.1.3.1 Identify steps in an analysis process for identifying unknown materials.

4-2.1.3.2 Identify the type(s) of monitoring equipment used to determine the following hazards:

(a) Corrosivity (pH);

(b) Flammability;

(c) Oxidizing potential;

(d) Oxygen deficiency;

(e) Radioactivity; and

(f) Toxic exposures.

4-2.1.3.3* Identify the limiting factors associated with the selection and use of the following monitoring equipment:

(a) Carbon monoxide meter;

(b) Colorimetric tubes;

(c) Combustible gas meter;

(d) Oxygen meter;

(e) Passive dosimeter;

(f) pH papers, pH meters, and strips; and

(g) Radiation detection instruments.

4-2.1.3.4 Given examples of various hazardous materials and the following monitoring equipment, in addition to other monitoring and detection equipment provided by the authority having jurisdiction, select the appropriate monitoring equipment to identify and quantify the materials:

(a) Carbon monoxide meter;

(b) Colorimetric tubes;

(c) Combustible gas meter;

(d) Oxygen meter;

(e) pH papers, pH meters, and strips; and

(f) Radiation detection instruments.

4-2.1.3.5 Demonstrate the field maintenance and testing procedures for the monitoring equipment provided by the authority having jurisdiction.

4-2.1.4 Given a label for a radioactive material, identify vertical bars, contents, activity, and transport index, then match the label item to its significance in surveying a hazardous materials incident.

4-2.2 Collecting and Interpreting Hazard and Response Information. The hazardous materials technician shall, given access to printed resources, technical resources, computer data bases, and monitoring equipment, collect and interpret hazard and response information not available from the current edition of the *Emergency Response Guidebook* or a material safety data sheet (MSDS). The hazardous materials technician shall be able to:

4-2.2.1 Identify the types of hazard and response information available from each of the following resources and explain the advantages and disadvantages of each resource:

(a) Reference manuals;

(b) Hazardous materials data bases;

(c) Technical information centers (for example CHEMTREC/CANUTEC, NRC);

(d) Technical information specialists; and

(e) Monitoring equipment.

4-2.2.2 Describe the following chemical and physical properties and their significance in a hazardous materials release:

(a) Boiling point;

(b) Concentration;

(c) Corrosivity (pH);

(d) Expansion ratio;

(e) Flammable (explosive) range;

(f) Flash point;

(g) Form (solid, liquid, gas);

(h) Ignition (autoignition) temperature;

(i) Melting point;

(j) Reactivity;

(k) Specific gravity;

(l) Temperature of product;

(m) Toxic products of combustion;

(n) Vapor density;

(o) Vapor pressure; and

(p) Water solubility.

4-2.2.3 Match the following chemical and physical terms with their significance and impact on the behavior of the container and/or its contents:

(a) Acid, caustic;

(b) Air reactivity;

(c) Catalyst;

(d) Chemical interactions;

(e) Compound, mixture;

(f) Critical temperatures and pressure;

(g) Halogenated hydrocarbon;

(h) Inhibitor;

(i) Instability;

(j) Organic and inorganic;

(k) Oxidation ability;

(l) pH;

(m) Polymerization;

(n) Radioactivity;

(o) Salt, nonsalt;

(p) Saturated, unsaturated, and aromatic hydrocarbons;

(q) Solution, slurry;

(r) Strength;

(s) Sublimation;

(t) Viscosity;

(u) Volatility;

(v) Water miscible, immiscible; and

(w) Water reactivity.

4-2.2.4 Given various hazardous materials and appropriate reference materials, identify the signs and symptoms of exposure to each material and the target organ effects of exposure to that material.

4-2.3 Describing the Condition of the Container Involved in the Incident. The hazardous materials technician shall, given simulated facility and transportation container damage, describe the damage found using one of the following terms:

(a) Undamaged, no product release;

(b) Damaged, no product release;

(c) Damaged, product release; and

(d) Undamaged, product release.

4-2.3.1 Given examples of the following containers, identify the basic design and construction features of each bulk packaging and storage vessel:

(a) Fixed tanks, storage tanks;

(b) Tank containers (intermodal portable tanks);

(c) Piping;

(d) Tank cars; and

(e) Cargo tanks (tank trucks and trailers).

4-2.3.1.1 Given DOT specification markings for nonbulk or bulk packaging (including tank cars, tank containers, and cargo tanks) and the appropriate reference guide, identify the design and construction of the packaging and identify examples of the likely materials found in the packaging.

4-2.3.2 Given examples of the following containers, identify the closures found on each container by name and match the purpose of each closure to the name of the closure:

(a) Cylinders;

(b) Drums;

(c) Fixed tanks, storage tanks;

(d) Tank containers, intermodal portable tanks;

(e) Piping;

(f) Tank cars; and

(g) Cargo tanks (tank trucks and trailers).

4-2.3.3 Identify how a liquid pipeline may carry different products.

4-2.3.4 Given an example of a ruptured pipeline, identify the following:

(a) Ownership of the line;

(b) Type of product in the line;

(c) Procedures for checking for gas migration; and

(d) Procedure for shutting down the line or controlling the leak.

4-2.3.5 Given an example of a domestic gas line break and the readings from a combustible gas indicator, determine the area of evacuation.

4-2.3.6 Identify the method for determining the pressure in bulk packaging or facility containers using both a pressure gauge and the temperature of the contents.

4-2.3.7 Identify the method for determining the amount of lading in bulk packaging or facility containers.

4-2.3.8* Identify the types of damage that a container could incur.

4-2.3.8.1 Given examples of tank car damage, identify the type of damage in each example by name.

4-2.3.8.2 Identify the basic design and construction features of the following nonbulk packages used to store or transport hazardous materials:

(a) Carboys;

(b) Cylinders; and

(c) Drums.

4-2.4 Predicting Behavior of Containers and Contents Where Multiple Materials Are Involved. The hazardous materials technician shall, given examples of both facility and transportation incidents involving multiple hazardous materials, predict the likely behavior of the contents in each case. The hazardous materials technician shall be able to:

4-2.4.1 Identify at least three resources available that indicate the effects of mixing various chemicals.

4-2.4.2 Describe the heat transfer processes that occur as a result of a cryogenic liquid spill.

4-2.4.3 Identify the impact of the following fire and safety features on the behavior of the products during an incident at a bulk storage facility:

(a) Tank spacing;

(b) Product spillage and control (impoundment and diking);

(c) Tank venting and flaring systems;

(d) Transfer operations;

(e) Monitoring and detection systems; and

(f) Fire protection systems.

4-2.5 Estimating the Size of an Endangered Area. The hazardous materials technician shall, given various facility and transportation hazardous materials incidents, estimate the size, shape, and concentrations associated with the materials involved in the incident using computer modeling, monitoring equipment, or specialists in this field. The hazardous materials technician shall be able to:

4-2.5.1 Identify local resources for dispersion pattern prediction and modeling including computers, monitoring equipment, or specialists in the field.

4-2.5.2 Identify the steps for determining the extent of physical, health, and safety hazards within the endangered area of a hazardous materials incident given the concentrations of the released material.

4-2.5.2.1 Match the following toxological terms and exposure values with their significance in predicting the extent of health hazards in a hazardous materials incident:

(a) Immediately dangerous to life and health value (IDLH);

(b) Lethal concentrations (LC_{50});

(c) Lethal dose (LD_{50});

(d) Permissible exposure limit (PEL);

(e) Threshold limit value ceiling (TLV-C);

(f) Threshold limit value short-term exposure limit (TLV-STEL);

(g) Threshold limit value time-weighted average (TLV-TWA);

(h) Parts per million (ppm), parts per billion (ppb); and

(i) Emergency response planning guide value (ERPG).

4-2.5.2.2 Match the following terms associated with radioactive materials with their significance in predicting the extent of health hazards in a hazardous materials incident:

(a) Alpha radiation;

(b) Beta radiation;

(c) Gamma radiation;

(d) Half-life; and

(e) Time, distance, and shielding.

4-2.5.3 Identify the method for estimating the outcomes within an endangered area of a hazardous materials incident.

4-3 Competencies — Planning the Response.

4-3.1 Identifying Response Objectives. The hazardous materials technician shall, given simulated facility and transportation problems, describe the response objectives for each problem. The hazardous materials technician shall be able to:

4-3.1.1 Describe the steps for determining response objectives (defensive, offensive, nonintervention) given an analysis of a hazardous materials incident.

4-3.2 Identifying Potential Action Options. The hazardous materials technician shall, given simulated facility and transportation hazardous materials incidents, identify the possible action options (defensive, offensive, and nonintervention) by response objective for each problem. The hazardous materials technician shall be able to:

4-3.2.1 Identify the possible action options to accomplish a given response objective.

4-3.2.2 Identify the purpose and the procedures, equipment, and safety precautions for each of the following control techniques:

(a) Adsorption;

(b) Neutralization;

(c) Overpacking; and

(d) Patch and plug.

4-3.3 Selecting Personal Protective Equipment. The hazardous materials technician shall, given situations with known and unknown hazardous materials, determine the appropriate personal protective equipment for the action options specified in the plan of action in each situation. The hazardous materials technician shall be able to:

4-3.3.1 Identify the four levels of chemical protection (EPA/NIOSH) and match both the equipment required for each level and the conditions under which each level is used.

4-3.3.2 Identify the factors to be considered in selecting the proper respiratory protection for a specified action option.

4-3.3.2.1 Describe the advantages, limitations, and proper use of the following types of respiratory protection at hazardous materials incidents:

(a) Air purifying respirator; and

(b) Supplied air respirator (air line respirator).

4-3.3.2.2 Identify the process for selecting the proper respiratory protection at hazardous materials incidents.

4-3.3.2.3 Identify the operational components of the air purifying respirators and supplied air respirators by name and match the function to the component.

4-3.3.3 Identify the factors to be considered in selecting the proper chemical-protective clothing for a specified action option.

4-3.3.3.1 Match the following terms with their definitions and explain their impact and significance on the selection of chemical-protective clothing:

(a) Degradation;

(b) Penetration; and

(c) Permeation.

4-3.3.3.2 Identify at least three indications of material degradation of chemical-protective clothing.

4-3.3.3.3* Identify the three types of vapor-protective and splash-protective clothing and describe the advantages and disadvantages of each type.

4-3.3.3.4 Identify the relative advantages and disadvantages of: heat exchange units, air-cooled jackets, water-cooled jackets, and ice vests used for the cooling of personnel in chemical-protective clothing.

4-3.3.3.5 Identify the process for selecting the proper protective clothing at hazardous materials incidents.

4-3.3.3.6 Given examples of various hazardous materials, determine the appropriate protective clothing construction materials for a given action option using chemical compatibility charts.

4-3.3.3.7 Identify the physical and psychological stresses that can affect users of specialized protective clothing.

4-3.4 Developing Appropriate Decontamination Procedures. The hazardous materials technician shall, given a simulated hazardous materials incident, select an appropriate decontamination procedure and determine the equipment required to implement that procedure. The hazardous materials technician shall be able to:

4-3.4.1 Identify the advantages and limitations and describe an example where each of the following decontamination methods would be used:

(a) Absorption;

(b) Adsorption;

(c) Chemical and physical degradation;

(d) Dilution;

(e) Disposal;

(f) Neutralization;

(g) Solidification;

(h) Evaporation;

(i) Washing; and

(j) Vacuuming.

4-3.4.2 Identify the sources of technical information for selecting appropriate decontamination procedures and identify how to contact those sources in an emergency.

4-3.5 Developing a Plan of Action. The hazardous materials technician shall, given simulated hazardous materials incidents in facility and transportation settings, develop a plan of action, including safety considerations. The plan shall be consistent with the local emergency response plan and the organization's standard operating procedures and be within the capability of available personnel, personal protective equipment, and control equipment for that incident. The hazardous materials technician shall be able to:

4-3.5.1 Describe the purpose of, procedures for, equipment required, and safety precautions used with the following techniques for hazardous materials control:

(a) Adsorption;

(b) Neutralization;

(c) Overpacking; and

(d) Patch and plug.

4-3.5.1.1 Given MC-306/DOT-406, MC-307/DOT-407, MC-312/DOT-412, MC-331, and MC-338 cargo tanks, identify the common methods for product transfer from each type of cargo tank.

4-3.5.2 Develop a site safety plan for a hazardous materials incident.

4-3.5.2.1 Describe the components of a site safety plan for a hazardous materials incident.

4-3.5.2.2 Given a simulated hazardous materials incident, demonstrate the ability to develop a site safety plan.

4-3.5.2.3 Given a plan of action for a simulated hazardous materials incident, identify the points that should be made in a safety briefing prior to working on the scene.

4-4 Competencies — Implementing the Planned Response.

4-4.1 Performing Incident Management Duties. The hazardous materials technician shall, given a role within the local incident management system for hazardous materials incidents, demonstrate how to perform the functions and responsibilities of that role. The hazardous materials technician shall be able to:

4-4.1.1 Identify the role, specified in the local emergency response plan and the organization's standard operating procedures, of the hazardous materials technician during an incident involving hazardous materials.

4-4.1.2 Given the local emergency response plan or organization's standard operating procedures, identify the duties and responsibilities of the following hazard sector functions within the incident management system, including:

(a) Safety;
(b) Entry/reconnaissance;
(c) Information/research;
(d) Resources;
(e) Decontamination; and
(f) Operations.

4-4.1.3 Given the local emergency response plan or organization's standard operating procedures, identify the duties and responsibilities of the hazard sector officer and describe how to coordinate all activities of that sector.

4-4.1.4 Given a simulated hazardous materials incident, demonstrate set-up of the contamination reduction corridor as specified in the planned response.

4-4.1.5 Given a simulated hazardous materials incident, demonstrate how to perform the decontamination process specified in the planned response.

4-4.2 Using Protective Clothing and Respiratory Protection. The hazardous materials technician shall demonstrate the ability to don, work in, and doff both liquid splash- and vapor-protective clothing and any other specialized personal protective equipment provided by the authority having jurisdiction, with the appropriate respiratory protection. The hazardous materials technician shall be able to:

4-4.2.1 Identify the safety and emergency procedures for personnel wearing vapor-protective clothing.

4-4.2.2* Identify the procedures for donning, working in, and doffing the following types of respiratory protection.
(a) Air purifying respirator; and
(b) Air line respirator and required escape unit.

4-4.2.3 Demonstrate donning, working in, and doffing chemical-protective clothing in addition to any other specialized protective equipment provided by the authority having jurisdiction.

4-4.2.4 Demonstrate the ability to record the use, repair, and testing of chemical-protective clothing according to manufacturer's specifications and recommendations.

4-4.2.5 Describe the maintenance, testing, inspection, and storage procedures for personal protective equipment provided by the authority having jurisdiction according to the manufacturer's specifications and recommendations.

4-4.3 Performing Control Functions Identified in Plan of Action. The hazardous materials technician shall, given various simulated hazardous materials incidents involving nonbulk and bulk packaging and facility containers, select the tools, equipment, and materials for the control of hazardous materials incidents and identify the precautions for controlling releases from those packagings/containers. The hazardous materials technician shall be able to:

4-4.3.1* Given a nonbulk and a bulk pressure vessel/container, select the appropriate material or equipment and demonstrate a method(s) to contain the following leaks:
(a) Valve gland;
(b) Valve seat;
(c) Valve inlet threads;
(d) Valve blowout;
(e) Fusible plug threads;
(f) Fusible metal of plug;
(g) Valve stem assembly blowout; and
(h) Side wall of cylinder.

4-4.3.2* Given the fittings on a pressure container, demonstrate the ability to:
(a) Close open valves;
(b) Tighten loose plugs; and
(c) Replace missing plugs.

4-4.3.3 Given a 55-gal drum, demonstrate the ability to contain the following leaks using appropriate tools and materials:
(a) Bung leak;
(b) Chime leak;
(c) Nail puncture; and
(d) Forklift puncture.

4-4.3.4 Given a 55-gal drum and an overpack drum, demonstrate the ability to place the 55-gal drum into the overpack drum using the following methods:
(a) Slide-in;
(b) Rolling slide-in; and
(c) Slip-over.

4-4.3.5 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.

4-4.3.6 Identify three considerations for assessing a leak or spill inside a confined space without entering the area.

4-4.3.7 Identify the safety considerations for product transfer operations, including bonding, grounding, elimination of ignition sources, and shock hazards.

4-4.3.8 Given an MC-306/DOT-406 cargo tank and a dome cover clamp, demonstrate the ability to install the clamp on the dome properly.

4-4.3.9 Identify the methods and precautions used when controlling a fire involving an MC-306/DOT-406 aluminum shell cargo tank.

4-4.3.10 Describe methods for containing the following leaks in MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412 cargo tanks:
(a) Puncture;
(b) Irregular-shaped hole;
(c) Split or tear; and
(d) Dome cover leak.

4-4.3.11 Describe 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, including:

(a) Inherent risks associated with such operations;

(b) Procedures and safety precautions; and

(c) Equipment required.

4-5* Competencies — Evaluating Progress. The hazardous materials technician shall be capable of evaluating the effectiveness of any control functions identified in the plan of action.

Chapter 5 Competencies for the Incident Commander

5-1 General.

5-1.1 Introduction. The incident commander shall be trained to meet all requirements indicated for the first responder at the awareness (Chapter 2) and operational (Chapter 3) levels and the requirements of this chapter. In addition, the incident commander shall receive any additional training to meet federal Occupational Safety and Health Administration (OSHA), local occupational health and safety regulatory, or U.S. Environmental Protection Agency (EPA) requirements, whichever are appropriate for his or her jurisdiction.

5-1.2* Definition. The incident commander is that person who is responsible for directing and coordinating all aspects of a hazardous materials incident.

5-1.3 Goal. The goal of this chapter shall be to provide the incident commander with the knowledge and skills to perform the following tasks safely. Therefore, in addition to being competent at the awareness and operational levels, the incident commander shall be able to:

(a) Analyze a hazardous materials incident to determine the magnitude of the problem in terms of outcomes by completing the following tasks:

1. Collect and interpret hazard and response information from printed resources, technical resources, computer data bases, and monitoring equipment, and;

2. Estimate the potential outcomes within the endangered area at a hazardous materials incident.

(b) Plan a response within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by completing the following tasks:

1. Identify the response objectives for hazardous materials incidents;

2. Identify the potential action options (defensive, offensive, and nonintervention) available by response objective;

3. Approve the level of personal protective equipment required for a given action option; and

4. Develop a plan of action consistent with the local emergency response plan and the organization's standard operating procedures and within the capability of available personnel, personal protective equipment, and control equipment.

(c) Implement a 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:

1. Implement the incident management system including the specified procedures for notification and utilization of nonlocal resources, e.g., private, state, and federal government personnel;

2. 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; and

3. Provide a focal point for information transfer to media and local elected officials.

(d) Evaluate the progress of the planned response to ensure that the response objectives are being met safely, effectively, and efficiently and adjust the plan of action accordingly by completing the following tasks:

1. Evaluate the progress of the plan of action;

2. Report and document the hazardous materials incident, and;

3. Conduct a multiagency critique.

5-2 Competencies — Analyzing the Problem.

5-2.1 Collecting and Interpreting Hazard and Response Information. The incident commander shall, given access to printed resources, technical resources, computer data bases, and monitoring equipment, collect and interpret hazard and response information not available from the current edition of the *Emergency Response Guidebook* or a material safety data sheet (MSDS). The incident commander shall be able to:

5-2.1.1 Identify the types of hazard and response information available from each of the following resources and explain the advantages and disadvantages of each resource:

(a) Reference manuals;

(b) Hazardous materials data bases;

(c) Technical information centers;

(d) Technical information specialists; and

(e) Monitoring equipment.

5-2.2 Estimating Potential Outcomes. The incident commander shall, given simulated facility or transportation incidents involving hazardous materials, the surrounding conditions, and the predicted behavior of the container and its contents, estimate the potential outcomes within the endangered area. The incident commander shall be able to:

5-2.2.1 Given the dimensions and the surrounding conditions of an endangered area of a hazardous materials incident, identify the steps for estimating the number of exposures within the endangered area.

5-2.2.2 Match the following toxological terms and exposure values with their significance in predicting the extent of health hazards in a hazardous materials incident:

(a) Immediately dangerous to life and health value (IDLH);

(b) Lethal concentrations (LC_{50});

(c) Lethal dose (LD_{50});

(d) Permissible exposure limit (PEL);

(e) Threshold limit value ceiling (TLV-C);

(f) Threshold limit value short-term exposure limit (TLV-STEL);

(g) Threshold limit value time-weighted average (TLV-TWA);

(h) Parts per million (ppm), parts per billion (ppb); and

(i) Emergency response planning guide value (ERPG).

5-2.2.3 Match the following terms associated with radioactive materials with their significance in predicting the extent of health hazards in a hazardous materials incident.

(a) Alpha radiation;

(b) Beta radiation;

(c) Gamma radiation;

(d) Half-life; and

(e) Time, distance, and shielding.

5-2.2.4 Identify the method for predicting the areas of potential harm within the endangered area of a hazardous materials incident.

5-3 Competencies — Planning the Response.

5-3.1 Identifying Response Objectives. The incident commander shall, given simulated facility and transportation hazardous materials incidents, describe the response objectives for each problem. The incident commander shall be able to:

5-3.1.1 Describe the steps for determining response objectives (defensive, offensive, and nonintervention) given an analysis of a hazardous materials incident.

5-3.2 Identifying the Potential Action Options. The incident commander shall, given simulated facility and transportation hazardous materials incidents, identify the possible action options (defensive, offensive, and nonintervention) by response objective for each problem. The incident commander shall be able to:

5-3.2.1 Identify the possible action options to accomplish a given response objective.

5-3.2.2 Identify the purpose of each of the following techniques for hazardous materials control:

(a) Adsorption;

(b) Neutralization;

(c) Overpacking; and

(d) Patch and plug.

5-3.3 Approving the Level of Personal Protective Equipment. The incident commander shall, given situations with known and unknown hazardous materials, approve the appropriate personal protective equipment for the action options specified in the plan of action in each situation. The incident commander shall be able to:

5-3.3.1 Identify the four levels of chemical protection (EPA/NIOSH) and match the equipment required for each level with the conditions under which each level is used.

5-3.3.2 Match the following terms with their impact and significance on the selection of chemical-protective clothing:

(a) Degradation;

(b) Penetration; and

(c) Permeation.

5-3.3.3 Identify the safety considerations for personnel wearing vapor-protective, liquid splash-protective, and high temperature-protective clothing.

5-3.3.4 Identify the physiological and psychological stresses that can affect users of specialized protective clothing.

5-3.4 Developing a Plan of Action. The incident commander shall, given simulated facility and transportation hazardous materials incidents, develop a plan of action, consistent with the local emergency response plan and the organization's standard operating procedures, that is within the capability of the available personnel, personal protective equipment, and control equipment. The incident commander shall be able to:

5-3.4.1 Identify the order of steps for developing a plan of action consistent with the local emergency response plan and the organization's standard operating procedures and within the capability of available personnel, personal protective equipment, and control equipment.

5-3.4.2 Identify the factors to be evaluated in selecting public protective actions including evacuation and in-place protection.

5-3.4.3 Given the local emergency response plan or the organization's standard operating procedures, identify which agency will:

(a) Receive the initial notification;

(b) Provide secondary notification and activation of response agencies;

(c) Make on-going assessments of the situation;

(d) Command on-scene personnel (incident management system);

(e) Coordinate support and mutual aid;

(f) Provide law enforcement and on-scene security (crowd control);

(g) Provide traffic control and rerouting;

(h) Provide resources for public safety protective action (evacuation or in-place protection);

(i) Provide fire suppression services when appropriate;

(j) Provide on-scene medical assistance (ambulance) and medical treatment (hospital);

(k) Provide public notification (warning);

(l) Provide public information (news media statements);

(m) Provide on-scene communications support;

(n) Provide on-scene decontamination when appropriate;

(o) Provide operational-level hazard control services;

(p) Provide technician-level hazard mitigation services; and

(q) Provide environmental remedial action ("cleanup") services.

5-3.4.4 Identify the process for determining the effectiveness of an action option on the potential outcomes.

5-3.4.5 Identify the procedures for presenting a safety briefing prior to allowing personnel to work on a hazardous materials incident.

5-4 Competencies — Implementing the Planned Response.

5-4.1 Implementing the Incident Management System. The incident commander shall, given a copy of the local emergency response plan, identify the requirements of the plan including the required procedures for notification and utilization of nonlocal resources (private, state, and federal government personnel). The incident commander shall be able to:

5-4.1.1 Identify the process and procedures for obtaining cleanup and restoration services in the local emergency response plan or organization's standard operating procedures.

5-4.1.2 Identify the steps for implementing the local and related emergency response plans as required under SARA Title III Section 303 of the federal regulations or other local emergency response planning legislation.

5-4.1.3 Given the local emergency response planning documents, identify the elements of each of the documents.

5-4.1.4 Identify the elements of the incident management system necessary to coordinate response activities at hazardous materials incidents.

5-4.1.5 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 and the disposal of hazardous wastes.

5-4.1.6 Identify the governmental agencies and private sector resources offering assistance during a hazardous materials incident, and identify their role and the type of assistance or resources available.

5-4.2 Directing Resources (Private and Governmental). Given a simulated hazardous materials 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. The incident commander shall be able to:

5-4.2.1 Given a hazardous materials incident, terminate the emergency phase of the incident.

5-4.2.1.1 Identify the steps required in terminating the emergency phase of a hazardous materials incident.

5-4.2.1.2 Identify the procedures for conducting incident debriefings at a hazardous materials incident.

5-4.2.1.3 Identify the steps in transferring authority as prescribed in the local emergency response plan or the organization's standard operating procedures.

5-4.3 Providing a Focal Point for Information Transfer to Media and Elected Officials. The incident commander shall, given a simulated hazardous materials incident, identify appropriate information to provide to the media and local, state, and federal officials. The incident commander shall be able to:

5-4.3.1 Identify the local policy for providing information to the media.

5-4.3.2 Identify the responsibilities of the public information officer at a hazardous materials incident.

5-5 Competencies — Evaluating Progress.

5-5.1 Evaluating Progress of the Plan of Action. The incident commander shall, given simulated facility and transportation hazardous materials incidents, evaluate the progress of the plan of action to determine whether the efforts are accomplishing the response objectives. The incident commander shall be able to:

5-5.1.1 Identify the procedures for evaluating whether the action options are effective in accomplishing the objectives.

5-5.1.2 Identify the steps for comparing actual behavior of the material and the container to that predicted in the analysis process.

5-5.1.3 Given a simulated hazardous materials incident, determine the effectiveness of:

(a) Personnel being used;

(b) Personal protective equipment;

(c) Established control zones; and

(d) Decontamination process.

5-5.2 Reporting and Documenting the Hazardous Materials Incident. The incident commander shall, given a simulated hazardous materials incident, demonstrate the ability to report and document the incident consistent with the local, state, and federal requirements. The incident commander shall be able to:

5-5.2.1 Identify the reporting requirements of federal, state, and local agencies.

5-5.2.2 Identify the importance of documentation for a hazardous materials incident including training records, exposure records, incident reports, and critique reports.

5-5.2.3 Identify the steps in keeping an activity log and exposure records for hazardous materials incidents.

5-5.2.4 Identify the requirements for compiling hazardous materials incident reports found in the local emergency response plan and the organization's standard operating procedures.

5-5.2.5 Identify the requirements for filing documents and maintaining records found in the local emergency response plan and the organization's standard operating procedures.

5-5.3 Conducting a Multiagency Critique. The incident commander shall, given the details of a simulated hazardous materials incident, conduct a critique of the incident. The incident commander shall be able to:

5-5.3.1 Identify the procedure for conducting a critique of a hazardous materials incident.

Chapter 6 Competencies for Off-site Specialist Employees

6-1 General.

6-1.1 Introduction. Off-site specialist employees are those who, in the course of their regular job duties, work with or are trained in the hazards of specific materials and/or containers. In response to incidents involving chemicals, they may be called upon to provide technical advice or assistance to the incident commander relative to their area of specialization. Off-site specialist employees shall receive training or demonstrate competency in their area of specialization annually. In addition, off-site specialist employees shall receive training to meet any applicable federal Department of Transportation, Occupational Safety and Health Administration, Environmental Protection Agency, or local occupational health and safety regulatory agency requirements applicable to their area of specialization.

6-1.2 Scope. This chapter will address competencies for the following off-site specialist employees:

(a) Off-site specialist employee C;

(b) Off-site specialist employee B; and

(c) Off-site specialist employee A.

6-2 Off-site Specialist Employee C.

6-2.1 General.

6-2.1.1 Introduction. The off-site specialist employee C shall be trained to meet the competencies at the first responder awareness level (Chapter 2) relative to his or her organization's area of specialization and the additional competencies in Section 6-2 of this chapter. In addition, the off-site specialist employee C shall receive training to meet any applicable federal Department of Transportation (DOT), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), or local occupational health and safety regulatory agency requirements.

6-2.1.2 Definition. Level C off-site specialist employees are those persons who may respond to incidents involving chemicals and/or containers within their organization's area of specialization. The off-site specialist employee C may be called upon to gather and record information, provide technical advice, and/or arrange for technical assistance consistent with his or her organization's emergency response plan and standard operating procedures. The off-site specialist employee C is not expected to enter the hot/warm zone at an incident.

6-2.1.3 Goal. The goal of these competencies is to ensure that the off-site specialist employee C has the knowledge and skills to safely perform the duties and responsibilities assigned in his or her organization's emergency response plan and standard operating procedures. Therefore, in addition to being trained at the first responder awareness level relative to his or her organization's area of specialization, the off-site specialist employee C shall also be able to:

(a) Assist the incident commander in analyzing the magnitude of an incident involving chemicals and/or containers for chemicals used in his or her organization's area of specialization by completing the following tasks:

1. Provide information on the hazards and harmful effects of specific chemicals used in his or her organization's area of specialization.

2. Provide information on the characteristics of specific containers for chemicals used in his or her organization's area of specialization.

(b) Assist the incident commander in planning a response to an incident involving chemicals and/or containers for chemicals used in his or her organization's area of specialization by completing the following task:

1. Provide information on the potential response options for chemicals and/or containers for chemicals used in his or her organization's area of specialization.

6-2.2 Competencies — Analyzing the Problem.

6-2.2.1 Providing Information on Hazards of Specific Chemicals. Given a specific chemical used in his or her organization's area of specialization and an appropriate material safety data sheet (MSDS) or other appropriate resource, the off-site specialist employee C shall advise the incident commander of the chemical's hazards and harmful effects. The off-site specialist employee C shall be able to:

6-2.2.1.1 Given a specific chemical within his or her organization's area of specialization and an appropriate material safety data sheet (MSDS), identify the following hazard information from the MSDS:

(a) Physical and chemical characteristics;

(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; and

(h) Environmental concerns.

6-2.2.1.2 Identify how to contact CHEMTREC/CANUTEC.

6-2.2.1.3 Identify the resources available from CHEMTREC/CANUTEC.

6-2.2.1.4 Given his or her organization's emergency response plan and standard operating procedures, identify additional resources of hazard information including a method of contact.

6-2.2.2 Providing Information on Characteristics of Specific Containers. Given a specific container for a chemical used in his or her organization's area of specialization, the off-site specialist employee C shall advise the incident commander of the characteristics of the containers. The off-site specialist employee C shall be able to:

6-2.2.2.1 Given examples of various containers for chemicals used in his or her organization's area of specialization, identify each container by name.

6-2.2.2.2 Given examples of facility and transportation containers for chemicals in his or her organization's area of specialization, identify the markings that differentiate one container from another.

6-2.2.2.3 Given his or her organization's emergency response plan and standard operating procedures, identify the resources available that can provide information about the characteristics of the container.

6-2.3 Competencies — Planning the Response.

6-2.3.1 Providing Information on Potential Response Options for Specific Chemicals. Given a specific chemical used in his or her organization's area of specialization and an appropriate material safety data sheet (MSDS) or other appropriate resource, the off-site employee C shall advise the incident commander of the response information for that chemical. The off-site specialist employee C shall be able to:

6-2.3.1.1 Given a specific chemical used in his or her organization's area of specialization and an appropriate material safety data sheet (MSDS), obtain the following response information:

(a) Precautions for safe handling, including hygiene practices, protective measures, and procedures for cleanup of spills/leaks;

(b) Applicable control measures, including personal protective equipment; and

(c) Emergency and first aid procedures.

6-2.3.1.2 Given his or her organization's emergency response plan and standard operating procedures, identify additional resources for obtaining response information for a chemical used in his or her organization's area of specialization.

6-3 Off-site Specialist Employee B.

6-3.1 General.

6-3.1.1 Introduction. The off-site specialist employee B shall be trained to meet the competencies at the off-site specialist employee C level and the additional competencies in Section 6-3 of this chapter. In addition, the off-site specialist employee B shall receive training to meet any applicable federal Department of Transportation (DOT), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), or local occupational health and safety regulatory agency requirements.

6-3.1.2 Definition. Level B off-site 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 individual area of specialization. Because of his or her education, training, or work experience, the off-site specialist employee B may be called upon to respond to incidents involving chemicals. The off-site specialist employee B may 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 his or her organization's emergency response plan and standard operating procedures and the local emergency response plan.

6-3.1.3 Goal. The goal of these competencies is to ensure that the off-site specialist employee B has the knowledge and skills to safely perform the duties and responsibilities assigned in his or her organization's emergency response plan and standard operating procedures. Therefore, within his or her individual area of specialization, the off-site specialist employee B shall be able to:

(a) Assist the incident commander in analyzing the magnitude of an incident involving chemicals and/or containers for chemicals within his or her individual area of specialization by completing the following tasks:

1. Provide and interpret information on the hazards and harmful effects of specific chemicals within his or her individual area of specialization.

2. Provide and interpret information on the characteristics of specific containers for chemicals within his or her individual area of specialization.

3. Provide information on concentrations of chemicals within his or her individual area of specialization from exposure monitoring, dispersion modeling, or any other predictive method.

(b) Assist the incident commander in planning a response to an incident involving chemicals and/or containers for chemicals within his or her individual area of specialization by completing the following tasks:

1. Provide information on the potential response options and their consequences for specific chemicals and/or containers for chemicals within his or her individual area of specialization.

2. Provide information on the personal protective equipment requirements for a specific chemical within his or her individual area of specialization.

3. Provide information on the decontamination methods for a specific chemical within his or her individual area of specialization.

4. Provide information on the federal/provincial regulations that relate to the handling and/or disposal of a specific chemical within his or her individual area of specialization.

5. Develop a plan of action (within the capabilities of the available resources), including safety considerations, for handling chemicals and/or containers for chemicals within his or her individual area of specialization consistent with his or her organization's emergency response plan and standard operating procedures.

(c) Implement the planned response, as developed with the incident commander, for chemicals and/or containers for chemicals within his or her individual area of specialization, consistent with his or her organization's emergency response plan and standard operating procedures and within the capabilities of the available resources, by completing the following tasks:

1. Perform response options within his or her individual area of specialization, specified in the plan of action, as agreed upon with the incident commander and consistent with his or her organization's emergency response plan and standard operating procedures (within the capabilities of the available resources).

2. Don, work in, and doff personal protective equipment needed to implement the response options consistent with his or her organization's emergency response plan and standard operating procedures.

(d) Assist the incident commander to evaluate the results of implementing the planned response by completing the following tasks:

1. Provide feedback on the effectiveness of the response options taken within his or her individual area of specialization.

2. Provide reporting and subsequent documentation of the incident involving chemicals as required in his or her organization's emergency response plan and standard operating procedures.

6-3.2 Competencies — Analyzing the Problem.

6-3.2.1 Providing and Interpreting Information on Hazards of Specific Chemicals. Given a specific chemical within his or her individual area of specialization and an appropriate material safety data sheet (MSDS) or other appropriate resource, the off-site specialist employee B shall advise the incident commander of the chemical's hazards and harmful effects and the potential consequences based on the incident. The off-site specialist employee B shall be able to:

6-3.2.1.1 Given a specific chemical within his or her individual area of specialization and an appropriate material safety data sheet (MSDS), identify and interpret the following hazard information:

(a) Physical and chemical characteristics;

(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; and

(h) Environmental concerns.

6-3.2.1.2 Given examples of specific chemicals used in his or her individual area of specialization and the appropriate resources (as identified in his or her organization's emergency response plan and standard operating procedures), predict the potential behavior of the chemicals based on the damage found, including the consequences of that behavior.

6-3.2.1.3 Identify the general types of hazard information available from the other resources identified in his or her organization's emergency response plan and standard operating procedures.

6-3.2.2 Providing Information on Characteristics of Specific Containers. Given a container for specific chemicals within his or her individual area of specialization, the off-site specialist employee B shall advise the incident commander of the characteristics and potential behavior of that container. The off-site specialist employee B shall be able to:

6-3.2.2.1 Given examples of containers for specific chemicals used in his or her individual area of specialization, identify the purpose and operation of the closures found on those containers.

6-3.2.2.2 Given a chemical container within his or her individual area of specialization, list the types of damage that could occur.

6-3.2.2.3 Given examples of containers for specific chemicals within his or her individual area of specialization and the appropriate resources (as identified in his or her organization's emergency response plan and standard operating procedures), predict the potential behavior of the containers and the consequences, based on the damage found.

6-3.2.2.4 Given his or her organization's emergency response plan and standard operating procedures, identify resources (including a method of contact) knowledgeable in the design, construction, and damage assessment of containers for chemicals within his or her individual area of specialization.

6-3.2.3 Providing Information on Concentrations of Chemicals. Given a chemical used in his or her individual area of specialization and the applicable monitoring equipment provided by his or her organization for that chemical or the available predictive capabilities (e.g., dispersion modeling, exposure modeling), the off-site specialist employee B shall advise the incident commander of the concentrations of the released chemical and the implications of that information to the incident. The off-site specialist employee B shall be able to:

6-3.2.3.1 Identify the appropriate monitoring equipment for a chemical used in his or her individual area of specialization.

6-3.2.3.2 Use the appropriate monitoring equipment provided by his or her organization to determine the actual concentrations of a specific chemical used in his or her individual area of specialization.

6-3.2.3.3 Given information on the concentrations of a chemical used in his or her individual area of specialization, interpret the significance of that concentration information relative to the hazards and harmful effects of the chemical to responders.

6-3.2.3.4 Demonstrate field calibration and testing procedures, as necessary, for the monitoring equipment provided by his or her organization.

6-3.2.3.5 Given his or her organization's emergency response plan and standard operating procedures, identify the resources (including a method of contact) capable of providing monitoring equipment, dispersion modeling, and/or monitoring services for chemicals within his or her organization's area of specialization.

6-3.3 Competencies — Planning the Response.

6-3.3.1 Providing Information on Potential Response Options and Consequences for Specific Chemicals. Given specific chemicals or containers within his or her individual area of specialization and the appropriate resources, the off-site specialist employee B shall advise the incident commander of the potential response options and their consequences. The off-site specialist employee B shall be able to:

6-3.3.1.1 Given a specific chemical within his or her individual area of specialization and an appropriate material safety data sheet (MSDS), identify and interpret the following response information:

(a) Precautions for safe handling, including hygiene practices, protective measures, and procedures for cleanup of spills/leaks;

(b) Applicable control measures, including personal protective equipment; and

(c) Emergency and first aid procedures.

6-3.3.1.2 Given his or her organization's emergency response plan and standard operating procedures, identify additional resources for interpreting response information for a chemical within his or her organization's area of specialization.

6-3.3.1.3 Describe the advantages and limitations of the potential response options for a specific chemical within his or her individual area of specialization.

6-3.3.1.4 Given his or her organization's emergency response plan and standard operating procedures, identify resources (including a method of contact) capable of:

(a) Repairing containers for chemicals within his or her individual area of specialization;

(b) Removing the contents of containers for chemicals within his or her individual area of specialization; and

(c) Cleanup and disposal of chemicals and/or containers for chemicals within his or her individual area of specialization.

6-3.3.2 Providing Information on Personal Protective Equipment Requirements. Given specific chemicals and/or containers for chemicals within his or her individual area of specialization and the appropriate resources, the off-site specialist employee B shall advise the incident commander of the appropriate personal protective equipment necessary for various response options. The off-site specialist employee B shall be able to:

6-3.3.2.1 Given a specific chemical within his or her individual area of specialization and an appropriate material safety data sheet (MSDS), identify personal protective equipment, including the materials of construction, that will be compatible with that chemical.

6-3.3.2.2 Given his or her organization's emergency response plan and standard operating procedures, identify other appropriate resources (including a method of contact) capable of identifying the personal protective equipment that is compatible with a specific chemical.

6-3.3.2.3 Given an incident involving a specific chemical used in his or her individual area of specialization and the response options for that problem, determine whether the personal protective equipment provided by the organization is appropriate for the options presented.

6-3.3.3 Providing Information on Decontamination Methods. Given a specific chemical within his or her individual area of specialization and the available resources, the off-site specialist employee B shall identify appropriate decontamination methods for various response options. The off-site specialist employee B shall be able to:

6-3.3.3.1 Given a specific chemical within his or her individual area of specialization and a material safety data sheet (MSDS) or other resource, obtain the potential methods for removing or neutralizing that chemical.

6-3.3.3.2 Given a specific chemical within his or her individual area of specialization and a material safety data sheet (MSDS) or other resource, identify the circumstances under which disposal of contaminated equipment would be necessary.

6-3.3.3.3 Given his or her organization's emergency response plan and standard operating procedures, identify resources (including a method of contact) capable of identifying potential decontamination methods for chemicals within his or her individual area of specialization.

6-3.3.4 Providing Information on Handling and Disposal Regulations. Given a specific chemical within his or her area of specialization and the available resources, the off-site specialist employee B shall advise the incident commander of the federal or provincial regulations that relate to the handling, transportation, and/or disposal of that chemical. The off-site specialist employee B shall be able to:

6-3.3.4.1 Given a specific chemical within his or her individual area of specialization and a material safety data sheet (MSDS) or other resource, identify federal or provincial regulations that apply to the handling, transportation, and/or disposal of that chemical.

6-3.3.4.2 Given a specific chemical within his or her individual area of specialization and a material safety data sheet (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/or disposal of a specific chemical.

6-3.3.4.3 Given his or her organization's emergency response plan and standard operating procedures, identify resources for information pertaining to federal or provincial regulations relative to the handling and/or disposal of a specific chemical.

6-3.3.5 Developing a Plan of Action. Given a simulated incident involving chemicals and/or containers used in his or her individual area of specialization, the off-site specialist employee B shall (in conjunction with the incident commander) develop a plan of action, consistent with his or her organization's emergency response plan and standard operating procedures, for handling chemicals and/or containers in that incident. The plan of action developed shall be within the capabilities of the available resources, and shall include safety considerations. The off-site specialist employee B shall be able to:

6-3.3.5.1 Given his or her organization's emergency response plan and standard operating procedures, identify the process for development of a plan of action, including safety considerations.

6-3.4 Competencies — Implementing the Planned Response.

6-3.4.1 Performing Response Options Specified in the Plan of Action. Given an assignment by the incident commander within his or her individual area of specialization, the off-site specialist employee B shall perform the assigned actions consistent with his or her organization's emergency response plan and standard operating procedures. The off-site specialist employee B shall be able to:

6-3.4.1.1 Perform assigned tasks consistent with his or her organization's emergency response plan and standard operating procedures and the available personnel, tools, and equipment (including personal protective equipment), including:

(a) Confinement activities;

(b) Containment activities; and

(c) Product removal activities.

6-3.4.1.2* Identify factors that may affect his or her individual's ability to perform the assigned tasks.

6-3.4.2 Using Personal Protective Equipment. Given an assignment by the incident commander within his or her individual area of specialization, the off-site specialist employee B shall don, work in, and doff the appropriate personal protective equipment needed to implement the assigned response options, consistent with his or her organization's emergency response plan and standard operating procedures. The off-site specialist employee B shall be able to:

6-3.4.2.1 Don, work in, and doff the appropriate respiratory protection and protective clothing for the assigned tasks consistent with his or her organization's emergency response plan and standard operating procedures.

6-3.4.2.2 Identify the safety procedures for personnel wearing personal protective equipment, including:

(a) Buddy system;

(b) Back-up 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; and

(g) Emergency procedures and hand signals.

6-3.4.2.3 Identify the procedures for cleaning, sanitizing, and inspecting personal protective equipment provided by the employer.

6-3.5 Competencies — Evaluating Progress.

6-3.5.1 Providing an Evaluation of the Effectiveness of Selected Response Options. Given an incident involving specific chemicals and/or containers for chemicals within his or her individual area of specialization, the off-site specialist employee B shall advise the incident commander of the effectiveness of the selected response options. The off-site specialist employee B shall be able to:

6-3.5.1.1 Identify the criteria for evaluating whether or not the selected response options are effective in accomplishing the objectives.

6-3.5.1.2 Identify the circumstances under which it would be prudent to pull back from a chemical incident.

6-3.5.2 Reporting and Documenting the Incident. Given a simulated incident involving chemicals and/or containers for chemicals used in his or her individual area of specialization, the off-site specialist employee B shall complete the reporting and subsequent documentation requirements consistent with his or her organization's emergency response plan and standard operating procedures. The off-site specialist employee B shall be able to:

6-3.5.2.1 Identify the importance of documentation (including training records, exposure records, incident reports, and critique reports) for an incident involving chemicals.

6-3.5.2.2 Identify the steps used in keeping an activity log and exposure records as described in his or her organization's emergency response plan and standard operating procedures.

6-3.5.2.3 Identify the requirements for compiling incident reports from his or her organization's emergency response plan and standard operating procedures.

6-3.5.2.4 Identify the requirements for compiling hot zone entry and exit logs from his or her organization's emergency response plan and standard operating procedures.

6-3.5.2.5 Identify the requirements for compiling personal protective equipment logs from his or her organization's emergency response plan and standard operating procedures.

6-3.5.2.6 Identify the requirements for filing documents and maintaining records as prescribed in his or her organization's emergency response plan and standard operating procedures.

6-4 Off-site Specialist Employee A.

6-4.1 General.

6-4.1.1 Introduction. The off-site specialist employee A shall be trained to meet the competencies at the off-site specialist employee C (Section 6-2 in this chapter), off-site specialist employee B (Section 6-3 in this chapter), and hazardous materials technician (Chapter 4) levels relative to the chemicals and containers used in his or her organization's area of specialization. In addition, the off-site specialist employee A shall receive training to meet any applicable federal Department of Transportation (DOT), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), or local occupational health and safety regulatory agency requirements.

6-4.1.2 Definition. Level A off-site specialist employees are those persons who are specifically trained to handle incidents involving chemicals and/or containers for chemicals used in their organization's area of specialization. Consistent with his or her organization's emergency response plan and standard operating procedures, the off-site specialist employee A shall be able to analyze an incident involving chemicals within his or her 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.

6-4.1.3 Goal. The goal of this level of competence is to ensure that the off-site specialist employee A has the knowledge and skills to safely perform the duties and responsibilities assigned in his or her organization's emergency response plan and standard operating procedures. Therefore, in addition to being competent at the off-site specialist employee C and off-site specialist employee B levels, the off-site specialist employee A shall be able to, in conjunction with the incident commander:

(a) Analyze an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization to determine the magnitude of the incident by completing the following tasks:

1. Survey an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization to:

   a. Identify the containers involved;

   b. Identify or classify unknown materials; and

   c. Verify the identity of the chemicals.

2. Collect and interpret hazard and response information from printed resources, technical resources, computer data bases, and monitoring equipment for chemicals used in his or her organization's area of specialization.

3. Determine the extent of damage to containers of chemicals used in his or her organization's area of specialization.

4. Predict the likely behavior of the chemicals and containers for chemicals used in his or her organization's area of specialization.

5. Estimate the potential outcomes of an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

(b) Plan a response (within the capabilities of available resources) to an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization by completing the following tasks:

1. Identify the response objectives for an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

2. Identify the potential action options for each response objective for an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

3. Select the personal protective equipment required for a given response option for an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

4. Select the appropriate decontamination procedures, as necessary, for an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

5. Develop a plan of action (within the capabilities of the available resources), including safety considerations, for handling an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization consistent with his or her organization's emergency response plan and standard operating procedures.

(c) Implement the planned response (as developed with the incident commander) to an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization consistent with his or her organization's emergency response plan and standard operating procedures.

1. Don, work in, and doff appropriate personal protective equipment provided by his or her organization for chemicals used in his or her organization's area of specialization, consistent with his or her organization's emergency response plan and standard operating procedures.

2. Perform control functions, as agreed upon with the incident commander, for chemicals and containers for chemicals used in his or her organization's area of specialization consistent with his or her organization's emergency response plan and standard operating procedures.

(d) Evaluate the results of implementing the planned response to an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

Chapter 7 Referenced Publications

7-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

7-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 704, *Standard System for the Identification of Fire Hazards of Materials*, 1990 edition

NFPA 1991, *Standard on Vapor-Protective Suits for Hazardous Chemical Emergencies*, 1990 edition

NFPA 1992, *Standard on Liquid Splash-Protective Suits for Hazardous Chemical Emergencies*, 1990 edition.

7-1.2 Other Publications.

7-1.2.1 U.S. Government Publications. U.S. Government Printing Office, Superintendent of Documents, Washington, DC 20402.

Title 29 CFR Part 1910.120

Title 29 CFR Part 1910.1200

Emergency Response Guidebook, U.S. Department of Transportation DOT P 5800.4, 1990 edition.

Appendix A

This Appendix is not a part of the requirements of this NFPA document, but is included for information purposes only.

A-1-2 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 or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

A-1-2 Authority Having Jurisdiction. The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner since jurisdictions and "approval" agencies vary as do their responsibilities. Where public safety is primary, the "authority having jurisdiction" may be a federal, state, local or other regional department or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department, 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 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-1-2 Hazardous Material. There are many definitions and descriptive names being used for the term hazardous material, each of which depends on the nature of the problem being addressed.

Unfortunately, there is no one list or definition that covers everything. The U.S. agencies involved, 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.

(a) *Hazardous Materials.* The U.S. Department of Transportation (DOT) uses the term *hazardous materials*, which covers eleven 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.

(b) *Hazardous Substances.* EPA uses the term *hazardous substance* for the 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 40 CFR Part 302, Table 302.4. The U.S. Occupational Safety and Health Administration (OSHA) uses the term hazardous substance in 29 CFR Part 1910.120, which resulted from Title I of SARA and covers emergency response. OSHA uses the term differently than EPA. Hazardous substances, as used by OSHA, cover every chemical regulated by both DOT and EPA.

(c) *Extremely Hazardous Substances.* EPA uses the term *extremely hazardous substance* for the chemical 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 the Superfund Amendments and Reauthorization Act (SARA) of 1986 (40 CFR Part 355).

(d) *Toxic Chemicals.* EPA uses the term *toxic chemical* 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 list of toxic chemicals is identified in Title III of SARA.

(e) *Hazardous Wastes.* EPA uses the term *hazardous wastes* for chemicals that are regulated under the Resource, Conservation, and Recovery Act (40 CFR Part 261.33). Hazardous wastes in transportation are regulated by DOT (49 CFR Parts 170–179).

(f) *Hazardous Chemicals.* OSHA uses the term *hazardous chemical* to denote any chemical that would be a risk to

employees if exposed in the workplace. Hazardous chemicals cover a broader group of chemicals than the other chemical lists.

(g) *Dangerous Goods.* In Canadian transportation, hazardous materials are called *dangerous goods.*

A-1-2 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which 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-2-2.1.1 See A-1-2, Hazardous Materials.

A-2-2.1.2 Definitions of Department of Transportation Hazard Classes and Divisions. Department of Transportation, Research and Special Programs Administration, "Performance-Oriented Packaging Standards; Changes to Classification, Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative; Final Rule," *Federal Register*, Vol. 55, No. 246, December 21, 1990, pages 52,402–52,729.

Class 1 (Explosives)

Explosive means 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 will have a letter designation.

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, dynamite, and TNT.

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.

Division 1.3 consists of explosives that have a fire hazard and either a minor blast hazard or 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.

Division 1.4 consists of explosive devices that present a minor explosion hazard. No device in the division may contain more than 25 g (0.9 oz) 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.

Division 1.5 consists of very insensitive explosives. This division is comprised of 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 prilled ammonium nitrate fertilizer-fuel oil mixtures (blasting agents).

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

Class 2

Division 2.1 (Flammable Gas) means any material that is a gas at 20°C (68°F) or less and 101.3 kPa (14.7 psi) of pressure, a material that has a boiling point of 20°C (68°F) or less at 101.3 kPa (14.7 psi) and that:

(a) Is ignitable at 101.3 kPa (14.7 psi) when in a mixture of 13 percent or less by volume with air; or

(b) Has a flammable range at 101.3 kPa (14.7 psi) 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.

Division 2.2 (Nonflammable, Nonpoisonous Compressed Gas, Including Compressed Gas, Liquefied Gas, Pressurized Cryogenic Gas, and Compressed Gas in Solution) A nonflammable, nonpoisonous compressed gas means any material (or mixture) that exerts in the packaging an absolute pressure of 280 kPa (41 psia) at 20°C (68°F).

A cryogenic liquid means a refrigerated liquefied gas having a boiling point colder than -90°C (-130°F) at 101.3 kPa (14.7 psi) absolute.

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

Division 2.3 (Poisonous Gas) means a material that is a gas at 20°C (68°F) or less and a pressure of 101.3 kPa (14.7 psi or 1 atm), a material that has a boiling point of 20°C (68°F) or less at 101.3 kPa (14.7 psi), and that:

(a) Is known to be so toxic to humans as to pose a hazard to health during transportation; or

(b) In the absence of adequate data on human toxicity, is presumed to be toxic to humans because, when tested on laboratory animals, it has an LC_{50} value of not more than 5,000 ppm.

Examples of Division 2.3 gases include anhydrous hydrogen fluoride, arsine, chlorine, and methyl bromide.

Hazard zones are associated with Division 2.3 materials:

Hazard zone A — LC_{50} less than or equal to 200 ppm.

Hazard zone B — LC_{50} greater than 200 ppm and less than or equal to 1,000 ppm.

Hazard zone C — LC_{50} greater than 1,000 ppm and less than or equal to 3,000 ppm.

Hazard zone D — LC_{50} greater than 3,000 ppm and less than or equal to 5,000 ppm.

Class 3 (Flammable Liquid)

Flammable liquid means any liquid having a flash point of not more than 60.5°C (141°F).

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

Hazard zones are associated with Class 3 materials:

Hazard zone A — LC_{50} less than or equal to 200 ppm.

Hazard zone B — LC_{50} greater than 200 ppm and less than or equal to 1,000 ppm.

Combustible Liquid

Combustible liquid means any liquid that does not meet the definition of any other hazard class and has a flash point above 60°C (140°F) and below 93°C (200°F). Flammable liquids with a flash point above 38°C (100°F) may be reclassified as a combustible liquid.

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

Class 4

Division 4.1 (Flammable Solid) means any of the following three types of materials:

(a) Wetted explosives — explosives wetted with sufficient water, alcohol, or plasticizers to suppress explosive properties.

(b) Self-reactive materials — materials that are liable to undergo, at normal or elevated temperatures, a strongly exothermic decomposition caused by excessively high transport temperatures or by contamination.

(c) Readily combustible solids — solids that may 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.

Division 4.2 (Spontaneously Combustible Material) means any of the following materials:

(a) Pyrophoric material — a liquid or solid that, even in small quantities and without an external ignition source, can ignite within 5 minutes after coming in contact with air.

(b) Self-heating material — a material that, when in contact with air and without an energy supply, is liable to self-heat.

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

Division 4.3 (Dangerous When Wet Material) means a material that, by contact with water, is liable to become spontaneously flammable or to give off flammable or toxic gas at a rate greater than 1 L per kg of the material, per hour.

Examples of Division 4.3 materials include calcium carbide, magnesium powder, potassium metal alloys, and sodium hydride.

Class 5

Division 5.1 (Oxidizer) means a material that may, 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.

Division 5.2 (Organic Peroxide) means any organic compound containing oxygen (O) in the bivalent -O-O- structure that may be considered a derivative of hydrogen peroxide, where one or more of the hydrogen atoms have been replaced by organic radicals.

Division 5.2 (Organic Peroxide) materials are assigned to one of seven types:

Type A — organic peroxide that can detonate or deflagrate rapidly as packaged for transport. Transportation of type A organic peroxides is forbidden.

Type B — organic peroxide that neither detonates nor deflagrates rapidly, but that can undergo a thermal explosion.

Type C — organic peroxide that neither detonates nor deflagrates rapidly and cannot undergo a thermal explosion.

Type D — organic peroxide that detonates only partially or deflagrates slowly, with medium to no effect when heated under confinement.

Type E — organic peroxide that neither detonates nor deflagrates and shows low, or no, effect when heated under confinement.

Type F — organic peroxide that will not detonate, does not deflagrate, shows only a low, or no, effect if heated when confined, and has low or no explosive power.

Type G — organic peroxide that will not detonate, does not deflagrate, shows no effect if heated when confined, and has no explosive power, is thermally stable, and is desensitized.

Examples of Division 5.2 materials include dibenzoyl peroxide, methyl ethyl ketone peroxide, and peroxyacetic acid.

Class 6

Division 6.1 (Poisonous Material) means a material, other than a gas, that is either 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, is presumed to be toxic to humans, including irritating materials that cause irritation.

Examples of Division 6.1 materials include aniline, arsenic compounds, carbon tetrachloride, hydrocyanic acid, and tear gas.

Division 6.2 (Infectious Substance) means a viable microorganism, or its toxin, that causes or may cause disease in humans or animals. Infectious substance and etiologic agent are synonymous.

Examples of Division 6.2 materials include anthrax, botulism, rabies, and tetanus.

Class 7

Radioactive material means any material having a specific activity greater than 0.002 microcuries per gram (μCi/g).

Examples of Class 7 materials include cobalt, uranium hexafluoride, and "yellow cake."

Class 8

Corrosive material means a liquid or solid that causes visible destruction or irreversible alterations in human skin tissue at the site of contact, or a liquid that has a severe corrosion rate on steel or aluminum.

Examples of Class 8 materials include nitric acid, phosphorus trichloride, sodium hydroxide, and sulfuric acid.

Class 9

Miscellaneous hazardous material means a material that presents a hazard during transport, but that is not included in another hazard class, including:

(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; and

(2) Any material that is not included in any other hazard class, but is subject to the DOT requirements (a hazardous substance or a hazardous waste).

Examples of Class 9 materials include adipic acid, hazardous substances (e.g., PCBs), and molten sulfur.

ORM-D Material

An ORM-D material is a material that presents a limited hazard during transportation due to its form, quantity, and packaging.

Examples of ORM-D materials include consumer commodities and small arms ammunition.

Forbidden

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

A-2-2.1.3 See A-2-2.1.2.

A-2-2.1.10 These clues would 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-2-2.3 It is the intent of this standard that the first responder at the awareness level be taught the noted competency to a specific task level. This task level would be to have knowledge of the contents of the current edition of the *Emergency Response Guidebook* or other reference material provided. Awareness level responders should be familiar with the information provided in those documents so that they can use it to assist with accurate notification of an incident and take protective actions.

If other sources of response information [including the material safety data sheet (MSDS)] are provided to the hazardous materials responder at the awareness level in lieu of the current edition of the *Emergency Response Guidebook*, the responder shall identify hazard information similar to that found in the current edition of the *Emergency Response Guidebook*.

A-2-2.3.1 These would include thermal, mechanical, poisonous, corrosive, asphyxiation, radiation, and etiologic. There may also be psychological harm.

A-2-2.3.2 These are: contact, absorption, inhalation, and ingestion. Absorption includes entry through the eyes and through punctures.

A-2-4.1 Those jurisdictions that have not developed an emergency response plan may refer to the document NRT-1, *Hazardous Materials Emergency Planning Guide*, developed by the National Response Team.

The National Response Team, composed of fourteen 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-2-4.1.5 If other sources of response information [including the material safety data sheet (MSDS)] are provided to the hazardous materials responder at the awareness level in lieu of the current edition of the *Emergency*

Response Guidebook, the responder shall identify response information similar to that found in the current edition of the DOT *Emergency Response Guidebook*.

A-3-2.1 The survey of the incident includes 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 must be verified.

A-3-2.1.1 Examples should include all containers including nonbulk packaging, bulk packaging, vessels, and facility containers such as piping, open piles, reactors, and storage bins. Refer to the Chemical Manufacturers Association/ Association of American Railroads Hazardous Materials Technical Bulletin *Packaging for Transporting Hazardous and Non-hazardous Materials*, issued June 1989.

A-3-2.1.4 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. Also, include building information such as floor drains, ventilation ducts, air returns, etc., when appropriate.

A-3-2.3 Predicting the likely behavior of a hazardous material and its container requires the following skills: 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. Reference can be made to Benner, Ludwig, Jr., *A Textbook for Use in the Study of Hazardous Materials Emergencies*, 2nd edition, Lufred Industries, Inc., Oakton, VA, 1978; the National Fire Academy's training program, *Hazardous Materials Incident Analysis*, 1984; Noll, Gregory G., et al., *Hazardous Materials: Managing the Incident*, Fire Protection Publications, Stillwater, OK, 1988; or Wright, Charles J., "Managing the Hazardous Materials Incident," *Fire Protection Handbook*, 17th edition, National Fire Protection Association, Quincy, MA, 1991.

A-3-2.3.2 The three types of stress that could cause a container to release its contents are: thermal, mechanical, and chemical.

A-3-2.3.3 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 3-2.3.3 through 3-2.3.5 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 under stress will 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 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-3-2.3.4 The four ways in which containment systems can release their contents are: detonation, violent rupture, rapid relief, and spill or leak.

A-3-2.3.5 The seven dispersion patterns that can be created upon release of hazardous materials are: hemisphere, cloud, plume, cone, stream, pool, and irregular.

A-3-2.3.6 The three general time frames for predicting the length of time that an exposure may be in contact with hazardous materials in an endangered area are: short-term (minutes and hours), medium-term (days, weeks, and months), and long-term (years and generations).

A-3-2.3.7 The health and physical hazards that could cause harm in a hazardous materials incident are: thermal, mechanical, poisonous, corrosive, asphyxiation, radiation, and etiologic.

A-3-2.3.7.1 Health Hazard Definitions.

(a) *Carcinogen:* A chemical is considered to be a carcinogen if:

1. It has been evaluated by the International Agency for Research on Cancer (IARC), and found to be a carcinogen or potential carcinogen; or

2. It is listed as a carcinogen or potential carcinogen in the *Annual Report on Carcinogens* published by the National Toxicology Program (NTP) (latest edition); or,

3. It is regulated by federal OSHA as a carcinogen (may be regulated additionally by states).

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

(c) *Highly toxic:* A chemical falling within any of the following categories:

1. A chemical that has a median lethal dose (LD_{50}) of 50 mg or less per kg of body weight when administered orally to albino rats weighing between 200 and 300 g each.

2. A chemical that has a median lethal dose (LD_{50}) of 200 mg or less per kg of body weight when administered by continuous contact for 24 hr (or less if death occurs within 24 hr) with the bare skin of albino rabbits weighing between 2 and 3 kg each.

3. 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 L or less of mist, fume, or dust, when administered by continuous inhalation for 1 hr (or less if death occurs within 1 hr) to albino rats weighing between 200 and 300 g each.

(d) *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.

(e) *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 chemicals.

(f) *Toxic:* A chemical falling within any of the following categories:

1. A chemical that has a median lethal dose (LD_{50}) or more than 50 mg per kg but not more than 500 mg per kg of body weight when administered orally to albino rats weighting between 200 and 300 g each.

2. A chemical that has a median lethal dose (LD_{50}) of more than 200 mg per kg but not more than 1,000 mg per kg of body weight when administered by continuous contact for 24 hr (or less if death occurs within 24 hr) with the bare skin of albino rabbits weighing between 2 and 3 kg each.

3. A chemical that has a median lethal concentration (LD_{50}) in air of more than 200 parts per million but not more than 3,000 parts per million by volume of gas or vapor, or more than 2 mg per L but not more than 200 mg per L of mist, fume, or dust, when administered by continuous inhalation for 1 hr (or less if death occurs within 1 hr) to albino rats weighing between 200 and 300 g each.

(g) *Target organ effects:* The following is a target organ categorization of effects that may occur, including examples of signs and symptoms and chemicals that have been found to cause such effects. These examples are presented to illustrate the range and diversity of effects and hazards that may be encountered but are not intended to be all-inclusive.

1. *Hepatotoxins.* Chemicals that produce liver damage.
   Signs and Symptoms: Jaundice; liver enlargement.
   Chemicals: Carbontetrachloride; nitorsamines.

2. *Nephroxtoxins.* Chemicals that produce kidney damage.
   Signs and Symptoms: Edema; protein urea.
   Chemicals: Halogenated hydrocarbons; uranium.

3. *Neruotoxins.* Chemicals that produce their primary toxic effects on the nervous system.

   a. *Central Nervous System Hazards:* Chemicals that cause depression or stimulation of consciousness or otherwise injure the brain.

   b. *Peripheral Nervous System:* 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.

4. Agents that decrease hemoglobin in the blood of function; deprive the hematopolatic body tissues of oxygen system.
   Signs and Symptoms: Cyanosis; loss of consciousness.
   Chemicals: carbon monoxide; benzene.

5. Agents that irritate the lung or damage the pulmonary tissue.
   Signs and Symptoms: Cough; tightness in chest; shortness of breath.
   Chemicals: Silica; asbestos; HCL.

6. *Reproductive toxins.* Chemicals that affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).
   Signs and Symptoms: Birth defects; sterility.
   Chemicals: Lead; DBCP.

7. *Cutaneous hazards.* Chemicals that affect the dermal layer of the body.
   Signs and Symptoms: Defatting of the skin; rashes; irritation.
   Chemicals: Ketones; chlorinated compounds.

8. *Eye hazards.* Chemicals that affect the eye or visual capacity.
   Signs and Symptoms: Conjunctivitis; corneal damage.
   Chemicals: Organic solvents; acids.

A-3-2.3.7.1(e) Chronic health hazards would include carcinogen, mutagen, and teratogen.

A-3-2.4 The process for estimating the potential outcomes within an endangered area at a hazardous materials 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-3-2.4.1 One resource for determining the size of an endangered area of a hazardous materials incident is the current edition of the *Emergency Response Guide.*

A-3-2.4.4 The factors for determining the extent of physical, health, and safety hazards within an endangered area at a hazardous materials incident are: surrounding conditions, an indication of the behavior of the hazardous material and its container, and the degree of hazard.

A-3-3.3.1 The minimum requirement for respiratory protection at hazardous materials incidents (emergency operations until concentrations have been determined) is positive pressure self-contained breathing apparatus. Therefore, the minimum for the first responder at the operational level is positive pressure self-contained breathing apparatus.

A-3-3.4 Refer to the following publication: *Hazardous Materials Response Handbook*, National Fire Protection Association, Quincy, MA.

A-3-4.1.4 See A-3-3.4.

A-3-4.1.5 Refer to the following publication: NIOSH/OSHA/USCG/EPA *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, October 1985.

A-3-4.2 See A-2-4.1.

A-3-4.2.6 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 is an individual who directs the safety of operations within the hot and warm zones. A hazardous materials safety officer must be designated specifically at all hazardous material incidents (CFR 1910.120). The hazardous materials safety officer has the following responsibilities:

(a) Obtains a briefing from the incident commander or incident safety officer and the hazard sector officer;

(b) Participates in the preparation of and monitors the implementation of the incident safety plan (including medical monitoring of entry team personnel before and after entry);

(c) Advises the incident commander/sector officer of deviations from the incident safety plan and of any dangerous situations; and

(d) Alters, suspends, or terminates any activity that is judged to be unsafe.

A-4-2.1.3.3 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 the following publication: NIOSH/OSHA/USCG/EPA *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, October 1985.

A-4-2.3.8 Some of the types of damage that containers could incur include:

(a) *Cracks.* A crack is a narrow split or break in the container metal that may penetrate through the metal of the container.

(b) *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.

(c) *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.

(d) *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-4-3.3.3.3 Refer to the Chemical Manufacturers Association and Association of American Railroads Hazardous Materials Technical Bulletin *Recommended Terms for Personal Protective Equipment*, issued October 1985.

A-4-4.2.2 Competency for positive pressure self-contained breathing apparatus was met as part of Chapter 3.

A-4-4.3.1 Contact the Chlorine Institute for assistance in obtaining training on the use of the various chlorine kits.

A-4-4.3.2 See A-4-4.3.1.

A-4-5 The Committee feels that the evaluation competencies required at the operational level (Section 3-5) meet the requirements of the technician level.

A-5-1.2 The following are the typical duties and responsibilities of the incident commander at a hazardous materials incident. These duties and responsibilities may be performed directly or delegated to other response personnel as necessary.

(a) Analysis Activities

- Classify and identify unknown materials
- Verify known materials
- Monitor changes in climatic conditions
- Identify contaminated people and equipment
- Establish environmental monitoring
- Interpret the data collected from environmental monitoring

(b) Planning Activities

- Develop a plan of action for the incident
- Develop a plan of action for activities in the control zones
- Develop an incident safety plan
- Seek technical advice
- Evaluate and recommend public protective actions
- Coordinate handling, storage, and transfer of contaminants
- Determine personal protective equipment compatibility
- Organize and supervise assigned personnel to control site access
- Provide required emergency medical services

(c) Implementation Activities

- Conduct safety briefings
- Implement the plan of action for the incident
- Implement the incident safety plan
- Oversee placement of control zones
- Supervise entry operations
- Direct rescue operations
- Maintain communications and coordination during the incident
- Provide medical monitoring of entry personnel before and after entry
- Protect personnel from physical, environmental, and safety hazards/exposures
- Provide information for public and private agencies
- Enforce recognized safe operational practices
- Ensure that injured or exposed individuals are decontaminated prior to departure from the hazard site
- Separate and keep track of potentially contaminated persons
- Track persons passing through the contamination reduction corridor
- Ensure that decontamination activities are conducted
- Coordinate transfer of decontaminated patients

(d) Evaluation Activities

- Evaluate progress of the actions taken and modify as necessary
- Recognize deviations from the incident safety plan and any dangerous situations
- Alter, suspend, or terminate any activity that may be judged unsafe
- Keep required records for litigation and documentation
- Ensure that medical-related exposure records are maintained

A-6-3.4.1.2 Factors include heat, cold, working in confined space, working in personal protective equipment, working in a flammable or toxic atmosphere, and preexisting health conditions.

Appendix B Referenced Publications

B-1 The following documents or portions thereof are referenced within this standard for informational purposes only and thus are not considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

B-1.1 NFPA Publication. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

Hazardous Materials Response Handbook.

B-1.2 Other Publications.

B-1.2.1 Chemical Manufacturers Association Publication. Chemical Manufacturers Association, 2501 M Street NW, Washington, DC 20037.

Packaging for Transporting Hazardous and Non-hazardous Materials, June 1989 edition.

B-1.2.2 National Fire Academy Publication. National Fire Academy, Federal Emergency Management Agency, Emmitsburg, MD 21727.

Hazardous Materials Incident Analysis.

B-1.2.3 National Response Team Publication. National Response Team, National Oil and Hazardous Substances Contingency Plan, Washington, DC 20593.

NRT-1, *Hazardous Materials Emergency Planning Guide.*

B-1.2.4 U.S. Government Publications. U.S. Government Printing Office, Superintendent of Documents, Washington, DC 20402.

Code of Federal Regulations:

Title 40 CFR Part 261.33

Title 40 CFR Part 302

Title 40 CFR Part 355

Title 49 CFR Parts 170–179.

Department of Transportation:

Research and Special Programs Administration, "Performance-Oriented Packaging Standards; Changes to Classification, Hazard Communication, Packaging and Handling Requirements based on UN Standards and Agency Initiative; Final Rule," *Federal Register*, Vol. 55, No. 246, December 21, 1990, pp. 52,402–52,729.

B-1.2.5 Miscellaneous Publications.

Benner, Ludwig, Jr., *A Textbook for Use in the Study of Hazardous Materials Emergencies*, 2nd edition, Lufred Industries, Inc., Oakton, VA, 1978

Noll, Gregory G., et al., *Hazardous Materials: Managing the Incident*, Fire Protection Publications, Stillwater, OK, 1988

NIOSH/OSHA/USCG/EPA *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, October 1985

Wright, Charles J., "Managing the Hazardous Materials Incident," *Fire Protection Handbook*, 17th edition, National Fire Protection Association, Quincy, MA, 1991.

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