

NFPA®

475

Recommended Practice for
Organizing, Managing, and
Sustaining a Hazardous
Materials/Weapons of Mass
Destruction Response Program

2022



NFPA[®] 475

Recommended Practice for Organizing, Managing, and Sustaining a Hazardous Materials/Weapons of Mass Destruction Response Program

2022 Edition



NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
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NFPA® 475

Recommended Practice for

**Organizing, Managing, and Sustaining a Hazardous Materials/Weapons of
Mass Destruction Response Program**

2022 Edition

This edition of NFPA 475, *Recommended Practice for Organizing, Managing, and Sustaining a Hazardous Materials/Weapons of Mass Destruction Response Program*, was prepared by the Technical Committee on Hazardous Materials Response Personnel. It was issued by the Standards Council on January 10, 2021, with an effective date of January 30, 2021, and supersedes all previous editions.

This edition of NFPA 475 was approved as an American National Standard on January 30, 2021.

Origin and Development of NFPA 475

The 2017 edition was the first edition of NFPA 475. The initial request for a document focusing on hazardous materials/weapons of mass destruction (WMD) response programs was submitted by the Technical Committee for Hazardous Materials Response Personnel. This recommended practice addresses the organizing, managing, and sustaining of a hazardous materials/WMD response program, which includes laws, regulations, consensus standards, and guidance documents; risk analysis; planning; resource management; staffing; training; health and medical considerations; financial management; program influences; and developing relationships.

For the 2022 edition, the technical committee updated the recommended practice to correlate better with the National Incident Management System (NIMS) and NFPA 3000TM. References to NFPA 472, NFPA 473, and NFPA 1072 were updated to refer to the new consolidated document, NFPA 470. Response language was added to Chapter 6 to clarify standard operating procedures (SOPs) for responding to hazardous materials/WMD incidents.

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

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NFPA 475

Recommended Practice for

Organizing, Managing, and Sustaining a Hazardous Materials/Weapons of Mass Destruction Response Program

2022 Edition

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

Chapter 1 Administration

1.1 Scope. This recommended practice provides the minimum criteria for organizing, managing, and sustaining a hazardous material response program (HMRP) based on the authority having jurisdiction’s (AHJ) function and assessed level of risk.

1.1.1 A review of the laws, regulations, consensus standards, and guidance documents in addition to guidance for risk assessment, HMRP planning, resource management, staffing, training, health and medical issues, financial management, programs influences, and developing relationships are covered in this recommended practice.

1.2* Purpose. The purpose of this document is to recommend the minimum program elements necessary for organizing, managing, and sustaining an HMRP to reduce or eliminate the hazardous materials/WMD risks within an organization/jurisdiction.

1.2.1 It is not the intent of this recommended practice to restrict any jurisdiction from using more stringent guidelines.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this recommended practice and shall be considered part of the recommendations of this document.

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

NFPA 470, *Hazardous Materials/Weapons of Mass Destruction (WMD) Standard for Responders*, 2022 edition.

NFPA 1500™, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*, 2021 edition.

NFPA 1521, *Standard for Fire Department Safety Officer Professional Qualifications*, 2020 edition.

NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*, 2021 edition.

NFPA 1584, *Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises*, 2021 edition.

NFPA 1851, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, 2020 edition.

NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA)*, 2019 edition.

NFPA 1951, *Standard on Protective Ensembles for Technical Rescue Incidents*, 2020 edition.

NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, 2019 edition.

NFPA 1982, *Standard on Personal Alert Safety Systems (PASS)*, 2018 edition.

NFPA 1991, *Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies and CBRN Terrorism Incidents*, 2016 edition.

NFPA 1992, *Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies*, 2018 edition.

NFPA 1994, *Standard on Protective Ensembles for First Responders to Hazardous Materials Emergencies and CBRN Terrorism Incidents*, 2018 edition.

2.3 Other Publications.

2.3.1 ANSI Publications. American National Standards Institute, Inc., 25 West 43rd Street, 4th floor, New York, NY 10036.

ANSI Z88.2, *American National Standard Practices for Respiratory Protection*, 2015.

ANSI Z88.10, *Fit Test Method*, 2010.

2.3.2 API Publications. American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005-4070.

API 2021, *Management of Atmospheric Storage Tank Fires*, 2006.

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

ASTM E2458, *Standard Practices for Bulk Sample Collection and Swab Sample Collection of Visible Powders Suspected of Being Biothreat Agents from Nonporous Surfaces*, 2010.

ASTM E2601, *Standard Practice for Radiological Emergency Response*, 2008.

ASTM E2770, *Standard Guide for Operational Guidelines for Initial Response to a Suspected Biothreat Agent*, 2010.

ASTM E2842, *Standard Guide for Credentialing for Access to a Disaster Scene*, 2014.

ASTM F1127, *Standard Guide for Containment of Hazardous Material Spill by Emergency Response Personnel*, 2013.

▲ **2.3.4 FEMA Publications.** Federal Emergency Management Agency, US Department of Homeland Security, 500 C Street, SW, Washington, DC 20472.

FEMA 508-1, *Typed Resource Definitions — Animal Health Resources*, 2005.

FEMA 508-4, *Typed Resource Definitions — Fire and Hazardous Materials Resources*, 2005.

FEMA NIMS Guide 0002, *National Credentialing Definition and Criteria*, 2007.

National Mutual Aid and Resource Management Initiative.

▲ **2.3.5 US Government Publications.** US Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

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

Emergency Response Guidebook, US Department of Transportation, 2012 edition.

Title 6, Code of Federal Regulations, Part 27, “Chemical Facility Anti-Terrorism Standards.”

Title 10, Code of Federal Regulations, Parts 1–199, “Nuclear Regulatory Commission.”

Title 10, Code of Federal Regulations, Parts 1500–1508, “Council on Environmental Quality.”

Title 10, Code of Federal Regulations, Part 20, “Standards for Protection Against Radiation.”

Title 10, Code of Federal Regulations, Part 20.1201–1208, “Occupational Dose Limits.”

Title 10, Code of Federal Regulations, Part 20.1301–1302, “Radiation Dose Limits for Individual Members of the Public.”

Title 10, Code of Federal Regulations, Part 20.1601–1602, “Control of Exposure from External Sources in Restricted Areas.”

Title 10, Code of Federal Regulations, Part 20.1901–1906, “Precautionary Procedures.”

Title 10, Code of Federal Regulations, Part 20 Appendix B, “Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage.”

Title 10, Code of Federal Regulations, Part 20 Appendix G, “Requirements for Transfers of Low-Level Radioactive Waste Intended for Disposal at Licensed Land Disposal Facilities and Manifests.”

Title 10, Code of Federal Regulations, Part 50, “Domestic Licensing of Production and Utilization Facilities.”

Title 10, Code of Federal Regulations, Part 50.47, “Emergency Plans.”

Title 10, Code of Federal Regulations, Part 50.54(q), “Evacuation Processes.”

Title 10, Code of Federal Regulations, Part 50 Annex E, “Emergency Planning and Preparedness for Production and Utilization Facilities.”

Title 18, US Code, Section 2332a, “Use of Weapons of Mass Destruction.”

Title 29, Code of Federal Regulations, Part 1910, “Occupational Safety and Health Standards.”

Title 29, Code of Federal Regulations, Part 1910.120, “Hazardous Waste Operations and Emergency Response.”

Title 29, Code of Federal Regulations, Part 1910.120(f), “Medical Surveillance.”

Title 29, Code of Federal Regulations, Part 1910.120(h).

Title 29, Code of Federal Regulations, Part 1910.120(q), “Emergency Response Program to Hazardous Substance Releases.”

Title 29, Code of Federal Regulations, Part 1910.120, Appendix E, “Training Curriculum Guidelines — (Non-mandatory).”

Title 29, Code of Federal Regulations, Part 1910.134, “Respiratory Protection.”

Title 29, Code of Federal Regulations, Part 1910.134(c), “Respiratory Protection Program.”

Title 29, Code of Federal Regulations, Part 1910.146, “Permit-Required Confined Spaces.”

Title 29, Code of Federal Regulations, Part 1910.147, “Control of Hazardous Energy.”

Title 29, Code of Federal Regulations, Part 1910.151(c), “Medical Services and First Aid.”

Title 29, Code of Federal Regulations, Part 1910.1020, “Access to Employee Exposure and Medical Records.”

Title 29, Code of Federal Regulations, Part 1910.1020(d), “Preservation of Records.”

Title 29, Code of Federal Regulations, Part 1910.1030, “Blood-Borne Pathogens.”

Title 29, Code of Federal Regulations, Part 1910.1200, “Hazard Communications.”

Title 29, Code of Federal Regulations, Part 1915, “Occupational Safety and Health Standards for Shipyard Employment.”

Title 29, Code of Federal Regulations, Part 1926, “Occupational Safety and Health Standards for Construction.”

Title 29, Code of Federal Regulations, Part 1926.65, “Hazardous Waste Operations and Emergency Response.”

Title 29, Code of Federal Regulations, Part 1928, “Safety and Health Standards for Agriculture.”

Title 33, Code of Federal Regulations, Part 104, "Maritime Security: Vessels."

Title 40, Code of Federal Regulations, "Protection of Environment."

Title 40, Code of Federal Regulations, Part 68, "Chemical Accident Prevention Provisions."

Title 40, Code of Federal Regulations, Part 110, "Discharge of Oil."

Title 40, Code of Federal Regulations, Part 112, "Oil Pollution Prevention."

Title 40, Code of Federal Regulations, Part 238–282, "Waste Management."

Title 40, Code of Federal Regulations, Part 300, "National Oil and Hazardous Substances Pollution Contingency Plan."

Title 40, Code of Federal Regulations, Part 310, "Reimbursement to Local Governments for Emergency Response to Hazardous Substance Releases."

Title 40, Code of Federal Regulations, Part 311, "Worker Protection."

Title 40, Code of Federal Regulations, Part 311.2, "Definition of Employee."

Title 40, Code of Federal Regulations, Part 355, "Emergency Planning and Notification."

Title 40, Code of Federal Regulations, Part 370, "Hazardous Chemical Reporting: Community Right-to-Know."

Title 40, Code of Federal Regulations, Part 372, "Toxic Chemical Release Reporting: Community Right-to-Know."

Title 49, Code of Federal Regulations, Part 130, "Oil Spill Prevention and Response Plans."

Title 49, Code of Federal Regulations, Part 171, "General Information, Regulations, and Definitions."

Title 49, Code of Federal Regulations, Part 172, "Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, Training Requirements, and Security Plans."

Title 49, Code of Federal Regulations, Part 173, "General Requirements for Shipments and Packaging."

Title 49, Code of Federal Regulations, Part 174, "Carriage by Rail."

Title 49, Code of Federal Regulations, Part 175, "Carriage by Aircraft."

Title 49, Code of Federal Regulations, Part 176, "Carriage by Vessel."

Title 49, Code of Federal Regulations, Part 177, "Carriage by Public Highway."

Title 49, Code of Federal Regulations, Part 178, "Specifications for Packaging."

Title 49, Code of Federal Regulations, Part 179, "Specifications for Tank Cars."

Title 49, Code of Federal Regulations, Part 180, "Continuing Qualification and Maintenance of Packagings."

Title 49, Code of Federal Regulations, Part 193, "Liquefied Natural Gas Facilities: Federal Safety Standards."

Title 49, Code of Federal Regulations, Part 194, "Response Plans for Onshore Oil Pipelines."

Title 49, Code of Federal Regulations, Part 195, "Transportation of Hazardous Liquids by Pipelines."

2.3.6 Other Publications.

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

2.4 References for Extracts in Recommended Sections. (Reserved)

Chapter 3 Definitions

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

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

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

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

3.2.4 Recommended Practice. A document that is similar in content and structure to a code or standard but that contains only nonmandatory provisions using the word "should" to indicate recommendations in the body of the text.

3.2.5 Shall. Indicates a mandatory requirement.

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

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

including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

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

3.3.2 Analyze. To identify a hazardous materials/weapons of mass destruction (WMD) problem and determine likely behavior and harm within the training and capabilities of the emergency responder.

3.3.3 Area of Specialization.

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

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

3.3.4 Awareness Level Personnel. Personnel who, in the course of their normal duties, could encounter an emergency involving hazardous materials/weapons of mass destruction (WMD) and who are expected to recognize the presence of the hazardous materials/weapons of mass destruction (WMD), protect themselves, call for trained personnel, and secure the scene.

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

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

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

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

3.3.9 Consensus Standard. A standard that has been adopted and promulgated by a nationally recognized standards-producing organization under procedures whereby it can be determined that persons interested and affected by the scope or provisions of the standard have reached substantial agreement on its adoption; was formulated in a manner that afforded an opportunity for diverse views to be considered; and has been designated as such.

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

3.3.11 Contaminant. A hazardous material, or the hazardous component of a weapon of mass destruction (WMD), that physically remains on or in people, animals, the environment, or equipment, thereby creating a continuing risk of direct injury or a risk of exposure.

3.3.12 Contamination. The process of transferring a hazardous material, or the hazardous component of a weapon of mass destruction (WMD), from its source to people, animals, the environment, or equipment which can act as a carrier.

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

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

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

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

3.3.13.3 Extinguishment. To cause to cease burning.

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

3.3.14.1 Cold Zone. The control zone of hazardous materials/weapons of mass destruction incidents that contains the incident command post and such other support functions as are deemed necessary to control the incident.

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

3.3.14.3 Hot Zone. The control zone immediately surrounding hazardous materials/weapons of mass destruction (WMD) incidents, which extends far enough to prevent adverse effects of hazards to personnel outside the zone and where only personnel who are trained, equipped, and authorized to do assigned work are permitted to enter.

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

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

3.3.16 Decision Point. A predefined circumstance in which the emergency responder is required to determine a path forward to maximize responder safety and public protection.

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

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

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

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

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

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

3.3.19* Demonstrate. To show by actual performance.

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

3.3.21 Detection and Monitoring Equipment. Instruments and devices used to detect, classify, or quantify materials.

3.3.22 Dispersal Device. Any weapon or combination of mechanical, electrical or pressurized components that is designed, intended or used to cause death or serious bodily injury through the release, dissemination or impact of toxic or poisonous chemicals or their precursors, biological agent, toxin or vector or radioactive material.

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

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

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

3.3.26 Example. An illustration of a problem serving to show the application of a rule, principle, or method (e.g., past incidents, simulated incidents, parameters, pictures, and diagrams).

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

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

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

3.3.30 Fusion Center. A focal point within the state and local environment for the receipt, analysis, gathering, and sharing of threat-related information between the federal government and state, local, tribal, territorial (SLTT), and private sector partners.

3.3.31 Harm. Adverse effect created by being exposed to a hazard.

3.3.32 Hazard. Capable of causing harm or posing an unreasonable risk to health, safety, or the environment.

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

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

3.3.35* Hazardous Materials Officer. The person who is responsible for directing and coordinating all operations involving hazardous materials/weapons of mass destruction (WMD) as assigned by the incident commander (IC).

3.3.36 Hazardous Materials Response Program (HMRP). A program designed to manage emergency preparedness issues (i.e., planning, prevention, response, recovery) associated with hazardous materials/weapons of mass destruction (WMD) within a jurisdiction.

3.3.37* Hazardous Materials Response Team (HMRT). An organized group of trained response personnel operating under an emergency response plan and applicable standard operating procedures who perform hazardous material technician level skills at hazardous materials/weapons of mass destruction (WMD) incidents.

3.3.38* Hazardous Materials Safety Officer. The person who works within an incident command system (ICS) (specifically, the hazardous materials branch/group) to ensure that recognized hazardous materials/weapons of mass destruction (WMD) safe practices are followed at hazardous materials/WMD incidents.

3.3.39* Hazardous Materials Technician. Person who responds to hazardous materials/weapons of mass destruction (WMD) incidents using a risk-based response process by which they analyze a problem involving hazardous materials/WMD, plan a response to the problem, implement the planned response, evaluate progress of the planned response to the problem, and assist in terminating the incident.

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

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

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

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

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

3.3.39.6 Hazardous Materials Technician with a Radioactive Materials Specialty. Person who provides support to the hazardous materials technician and other personnel, uses radiation detection instruments, manages the control of radiation exposure, conducts hazards assessment, and acts as a liaison between hazardous materials technicians at incidents involving radioactive materials.

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

3.3.40 Identify. To select or indicate verbally or in writing using standard terms to establish the fact of an item being the same as the one described.

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

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

3.3.43 Incident Command System (ICS). A specific component of an incident **command** system (ICS) designed to enable effective and efficient on-scene incident management by integrating organizational functions, tactical operations, incident planning, incident logistics, and administrative tasks within a common organizational structure.

3.3.44 Laws. Legislative action by governmental bodies such as Congress, individual states, and local government that provides broad goals and objectives, sets mandatory dates for compliance, and establishes penalties for noncompliance.

3.3.45 Match. To provide with a counterpart.

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

3.3.47 Penetration. The movement of a material through a suit's closures, such as zippers, buttonholes, seams, flaps, or other design features of chemical-protective clothing, and through punctures, cuts, and tears.

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

3.3.49* Personal Protective Equipment (PPE). The protective clothing and respiratory protective equipment provided to shield or isolate a person from the hazards encountered at hazardous materials/weapons of mass destruction (WMD) incidents operations.

3.3.50 Plan.

3.3.50.1* Emergency Response Plan. A plan developed by the authority having jurisdiction (AHJ) with the cooperation of all participating agencies and organizations, including a jurisdiction with emergency responsibilities and those outside jurisdictions who have entered into response/support agreements, that identifies goals and objectives for that emergency type, agency roles, and overall strategies.

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

3.3.50.3 Site Safety and Control Plan. A site-specific tactical document used by the hazardous materials branch under the incident command system (ICS) to organize information important to hazardous materials response operations.

3.3.51* Planned Response. The incident action plan, with the site safety and control plan, consistent with the emergency response plan and/or standard operating procedures for a specific hazardous material/weapon of mass destruction (WMD) incident.

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

3.3.53 Productivity and Quality of Life. A multidimensional concept that includes domains related to physical, mental, emotional, and social functioning and focuses on the impact that health status has on quality of life.

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

3.3.54.1 Ballistic Protective Clothing (BPC). An item of personal protective equipment (PPE) that provides protection against specific ballistic threats by helping to absorb the impact and reduce or prohibit penetration to the body from bullets and steel fragments from handheld weapons and exploding munitions.

3.3.54.2* Chemical-Protective Clothing (CPC). The ensemble elements (garment, gloves, and footwear) provided to shield

or isolate a person from the hazards encountered during hazardous materials/WMD incident operations.

3.3.54.2.1* Liquid Splash-Protective Ensemble. Multiple elements of compliant protective clothing and equipment that when worn together provide protection from some, but not all, risks of hazardous materials/WMD emergency incident operations involving liquids.

3.3.54.2.2* Vapor-Protective Ensemble. Multiple elements of compliant protective clothing and equipment that when worn together provide protection from some, but not all, risks of vapor, liquid-splash, and particulate environments during hazardous materials/WMD incident operations.

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

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

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

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

3.3.57 Regulations. Official rules created by government agencies that detail how something should be done.

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

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

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

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

3.3.62 Scenario. A sequence or synopsis of actual or imagined events used in the field or classroom to provide information necessary to meet student competencies; can be based upon threat assessment.

3.3.63 SETIQ. The Emergency Transportation System for the Chemical Industry in Mexico that provides emergency response information and assistance on a 24-hour basis for responders to emergencies involving hazardous materials/weapons of mass destruction (WMD).

3.3.64 Specialist Employees.

3.3.64.1* Specialist Employee A. That person who is specifically trained to handle incidents involving chemicals or containers for chemicals used in the organization's area of specialization.

3.3.64.2* Specialist Employee B. That person who, in the course of his or her regular job duties, works with or is trained in the hazards of specific chemicals or containers within the individual's area of specialization.

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

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

3.3.66 Standard Operating Guidelines (SOG). A written directive that establishes recommended strategies/concepts of emergency response to an incident.

3.3.67 Standard Operating Procedure (SOP). A written directive that establishes specific operational or administrative methods to be followed routinely for the performance of a task or for the use of equipment.

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

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

3.3.70* Weapon of Mass Destruction (WMD). (1) Any destructive device, such as any explosive, incendiary, or poison gas bomb, grenade, rocket having a propellant charge of more than 4 oz (113 grams), missile having an explosive or incendiary charge of more than .25 oz (7 grams), mine, or similar device; (2) any weapon involving toxic or poisonous chemicals; (3) any weapon involving a disease organism; or (4) any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.

3.3.70.1* Radiological Weapons of Mass Destruction.

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

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

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

3.4 Operations-Level Responders Definitions.

3.4.1 Mission-Specific Competencies. The knowledge, skills, and judgment needed by operations-level responders who have

completed the operations-level competencies and who are designated by the authority having jurisdiction to perform mission specific tasks, such as decontamination, victim/hostage rescue and recovery, evidence preservation, and sampling.

3.4.2* Operations-Level Responders. Persons who respond to hazardous materials/weapons of mass destruction (WMD) incidents for the purpose of implementing or supporting actions to protect nearby persons, the environment, or property from the effects of the release.

3.4.3 Operations-Level Responders Assigned to Disablement/Disruption of Improvised Explosives Devices (IED), Improvised WMD Dispersal Devices, and Operations at Improvised Explosive Laboratories. Persons, competent at the operations level, who are assigned to interrupt the functioning of improvised explosive devices (IED) and improvised WMD dispersal devices and to conduct operations at improvised explosive laboratories.

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

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

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

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

3.4.8 Operations-Level Responders Assigned to Perform Evidence Preservation and Sampling. Persons, competent at the operations level, who are assigned to preserve forensic evidence, take samples, and/or seize evidence at hazardous materials/weapons of mass destruction (WMD) incidents

involving potential violations of criminal statutes or governmental regulations.

3.4.9 Operations-Level Responders Assigned to Perform Mass Decontamination. Persons, competent at the operations level, who are assigned to implement mass decontamination operations at hazardous materials/weapons of mass destruction (WMD) incidents.

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

3.4.11 Operations-Level Responders Assigned to Perform Technical Decontamination. Persons, competent at the operations level, who are assigned to implement technical decontamination operations at hazardous materials/weapons of mass destruction (WMD) incidents.

3.4.12 Operations-Level Responders Assigned to Perform Victim Rescue/Recovery. Persons, competent at the operations level, who are assigned to rescue and/or recover exposed and contaminated victims at hazardous materials/weapons of mass destruction (WMD) incidents.

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

3.4.14 Operations-Level Responders Assigned to Use Personal Protective Equipment. Persons, competent at the operations level, who are assigned to use of personal protective equipment at hazardous materials/weapons of mass destruction (WMD) incidents.

Chapter 4 Laws, Regulations, Consensus Standards, and Guidance Documents

4.1 Scope. This chapter applies to those organizations and jurisdictions responsible for organizing, managing, and sustaining a hazardous materials/weapons of mass destruction (WMD) response program (HMRP) and provides information on applicable laws, regulations, consensus standards, and guidance documents that impact each program.

4.1.1 Laws are enacted by legislative action of governmental bodies such as Congress, individual states, and local government. Laws typically provide broad goals and objectives, set mandatory dates for compliance, and establish penalties for noncompliance.

4.1.2 Regulations are official rules created by government agencies that detail how something should be done.

4.1.3 A consensus standard is a standard that has been adopted and promulgated by a nationally recognized standards-producing organization under procedures whereby it can be determined that persons interested and affected by the scope or provisions of the standard have reached substantial agreement on its adoption; was formulated in a manner that affor-

ded an opportunity for diverse views to be considered; and has been designated as such.

4.2 Purpose.

4.3 Laws.

4.3.1 General.

4.3.1.1 Laws are enacted by legislative action of governmental bodies such as Congress, individual states, and local government. Laws typically provide broad goals and objectives, set mandatory dates for compliance, and establish penalties for noncompliance. Subsections 4.3.2 through 4.3.11 provide a brief summary of the provisions of several laws that can impact an HMRP.

4.3.2 Resource Conservation and Recovery Act (RCRA).

Passed by Congress in 1976, RCRA establishes a uniform national policy for proper management and disposal of all waste materials. It is intended to provide general oversight to state programs, which can be more stringent than RCRA but not less stringent. RCRA establishes the following four major programs:

- (1) *Hazardous Waste Management.* Subtitle C establishes a program to manage hazardous waste from “cradle-to-grave” (i.e., from generation to disposal) to protect human health and the environment.
- (2) *State and Regional Solid Waste Plans.* Subtitle D encourages states to develop comprehensive plans to manage nonhazardous industrial solid waste and municipal solid waste, sets criteria for municipal solid waste landfills and other solid waste disposal facilities, and prohibits the open dumping of solid waste.
- (3) *Regulation of Underground Storage Tanks.* Subtitle I establishes a program for preventing leaks of petroleum products and hazardous substances from underground tanks to groundwater and for cleaning up past leakage. Standards for new tanks and regulations for leak detection and prevention are also addressed.
- (4) *Standards for Tracking and Management of Medical Waste.* Subtitle J establishes a program to track medical waste from generation, to disposal.

4.3.3 Clean Air Act (CAA). Passed by Congress in 1970 and last amended in 1990, the CAA authorizes the development of comprehensive federal and state regulations to limit hazardous chemical emissions from both stationary (e.g., production, processing, and storage facilities) and mobile sources. The 1990 amendments established emergency response and planning activities at facilities using hazardous chemicals, a national permitting program, and mandates for making information available to the public.

4.3.3.1 Chemical Accident Prevention Provisions.

Section 112(r) of the CAA requires owners and operators of stationary sources that produce, process, or store hazardous substances to identify all hazards associated with an accidental release, design and maintain a safe facility, minimize the consequences of an accidental release, and develop a risk management plan (RMP) to submit to the Environmental Protection Agency (EPA).

4.3.4 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Passed by Congress in 1980, the CERCLA, commonly known as the Superfund, authorizes the EPA to respond to actual or threatened releases of hazard-

ous substances that could endanger public health, public welfare, or the environment; establishes prohibitions and requirements concerning closed and abandoned hazardous waste sites; provides for liability of persons responsible for releases of hazardous waste at these sites; establishes a trust fund to provide for cleanup where no responsible party can be identified; and enables the EPA to force parties responsible for environmental contamination to clean it up or to reimburse the Superfund for response or remediation costs incurred by the EPA.

4.3.5 Superfund Amendments and Reauthorization Act (SARA).

Passed by Congress in 1986 to amend CERCLA, SARA revises various sections of CERCLA. SARA addresses hazardous material releases and cleanup of inactive hazardous waste disposal sites; requires National Response Center notification by parties responsible for releases above reportable quantity (RQ) levels; and requires development of safety standards for work groups that handle or respond to chemical emergencies. Key provisions of SARA include the following:

- (1) *Provisions Relating Primarily to Response and Liability.* SARA Title I required OSHA to develop health and safety standards for worker groups that handle or respond to chemical emergencies and led to the development of 29 CFR 1910.120.
- (2) *Emergency Planning and Community Right-to-Know Act (EPCRA).* SARA Title III, or EPCRA, is designed to improve community access to information about chemical hazards and to facilitate the development of chemical emergency response plans. EPCRA establishes emergency planning and community right-to-know reporting on hazard and toxic chemicals to help increase the public's knowledge and access to information at individual facilities, including information on the uses of any hazardous or toxic chemicals and any release of hazardous or toxic chemical into the environment. EPCRA led to the establishment of State Emergency Response Commissions (SERCs) and Local Emergency Planning Committees (LEPCs). Key provisions of EPCRA include the following:
 - (a) *Sections 301–303: Emergency Planning.* These sections require state and local governments to prepare chemical emergency response plans, review them annually, and establish SERCs and LEPCs to oversee and coordinate planning efforts.
 - (b) *Section 304: Emergency Release Notification.* This section requires notification by facilities that store, produce, or use a hazardous chemical (i.e., any chemical that is a physical or health hazard) of any release of an RQ of a substance contained in either of the following two tables published by the EPA in the Code of Federal Regulations:
 - i. List of extremely hazardous substances (EHS)
 - ii. List of CERCLA hazardous substances
- (3) *Sections 311–312: Community Right-to-Know.* The data required by these sections increases public knowledge and allows first responders access to information on chemicals at individual facilities. States and communities, working with individual facilities, can use this information to improve chemical safety and protect public health and the environment. These sections increase public knowledge of and make first responders aware of the hazards and chemical inventories present at individual facilities. The safety data sheets (SDSs), which are required by Section 311, and the annual chemical inven-

tories, which are Tier II forms, are sent to the SERC, LEPC, and fire department with jurisdiction over the facility. First responders can use the information to guide their response. For example, the Tier II forms contain the name and phone number of the designated facility's "emergency contact," who could provide responders with first-hand knowledge of the facility.

- (4) *Section 313: Toxic Chemical Release Inventory.* Under this section, the EPA is required to establish the toxic release inventory (TRI), which is an inventory of routine toxic chemical emissions from certain facilities. This report, commonly known as Form R, covers releases and transfers of toxic chemicals to various facilities and environmental media, and allows the EPA to compile the national TRI database. The TRI also includes information on source reduction, recycling, and treatment. The data gathered assists in research and development of regulations, guidelines, and standards.

4.3.6 Federal Water Pollution Control Act (FWPCA). Passed by Congress in 1972 and amended in 1977 to become the Clean Water Act, FWPCA requires the EPA and US Coast Guard to regulate spills of oil and/or other hazardous substances that threaten coastal waters and inland waterways and to restore and maintain the chemical, physical, and biological integrity of the waters of the United States by preventing, reducing, and eliminating pollution.

4.3.7 Clean Water Act (CWA). Passed by Congress in 1977, the CWA establishes the basic structure (i.e., plans and permits) for regulating discharges of pollutants into the waters of the United States (e.g., navigable waterways, surface waters) and quality standards for surface waters.

4.3.7.1 The EPA's National Pollutant Discharge Elimination System (NPDES) permit program seeks to control discharges from industrial, municipal, and other facilities where such facilities discharge directly to surface waters.

4.3.8 Oil Pollution Act (OPA). Passed by Congress in 1990 to cover both facilities and carriers of oil and related liquid product, including deep-water marine terminals, marine vessels, pipelines, and railcars, the OPA requires development of emergency response plans, with regular training and exercise sessions; verification of spill resources and contractor capabilities; establishment of a national planning and response system on four levels: national, area, local, and facility; activation of the facility response plan (FRP) with other plans as needed; and owners or operators of a regulated facility to have a spill prevention, control, and countermeasure (SPCC) program.

4.3.8.1 Spill Prevention, Control, and Countermeasure Plans (SPCC). The OPA mandated the creation of SPCC plans for facilities engaged in drilling, producing, gathering, storing, processing, refining, transferring, distributing, or consuming oil and oil product where there is a risk of discharging oil in quantities that could be harmful if discharged into or on navigable waterways or adjoining shoreline, or on the water on the contiguous zone.

4.3.9 Hazardous Materials Transportation Act (HMTA). Passed by Congress in 1975 and reauthorized by the Hazardous Materials Transportation Safety and Security Reauthorization Act of 2005, HMTA protects against risks to life, property, and environment that are inherent in intrastate, interstate, and foreign transportation of hazardous material.

4.3.10 Robert T. Stafford Disaster Relief and Emergency Assistance Act (The Stafford Act). Passed by Congress in 1988, the Stafford Act designates the Federal Emergency Management Agency (FEMA) as the primary federal agency responsible for coordinating federal responses to disasters.

4.3.11 Maritime Transportation Security Act (MTSA). Passed by Congress in 2002, the MTSA addresses port and waterway security. It requires vessels and port facilities to conduct vulnerability assessments and develop security plans that could include passenger, vehicle, and baggage screening procedures; security patrols; establishing restricted areas; personnel identification procedures; access control measures; and/or installation of surveillance equipment.

4.4 Regulations by Agency.

4.4.1 General. Regulations are official rules created by government agencies that detail how something should be done. Section 4.4 contains a brief summary of the provisions of each regulation that can impact an HMRP.

4.4.2 Department of Homeland Security.

4.4.2.1 Chemical Facility Anti-Terrorism Standards (CFATS). CFATS, found in 6 CFR 27, addresses security regulations for high-risk chemical facilities, such as chemical plants, electrical generating facilities, refineries, and universities.

4.4.2.2 Area Maritime Security Committees (AMSC). AMSCs, established under MTSA I 33 CFR 104, are required in US ports to coordinate the activities of port stakeholders, including other federal, local, and state agencies; industries; and the boating public to best deter, prevent and respond to terror threats.

4.4.3 US Occupational Safety and Health Administration (OSHA).

4.4.3.1 OSHA regulations governing hazardous materials can be found in 29 CFR 1910. Several regulations of significance can be found in 4.4.3.1.1 through 4.4.3.1.6.

4.4.3.1.1 Hazardous Waste Operations and Emergency Response (HAZWOPER). Both 29 CFR 1910.120 and 29 CFR 1926.65 address emergency response operations for the release, or substantial threat of release, of hazardous substances without regard to the location of the hazard. Paragraph (q) of these parallel documents provides procedures for emergency response to hazardous substance releases pursuant to Section 303 of SARA.

4.4.3.1.2 Respiratory Protection. Title 29 CFR 1910.134 sets requirements to control occupational diseases caused by breathing contaminated air (e.g., harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors) by preventing atmospheric contamination through accepted engineering control measures (e.g., enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). Where effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used pursuant to this section per 29 CFR 1910.134.

4.4.3.1.3 Permit-Required Confined Spaces. Title 29 CFR 1910.146 sets requirements for practices and procedures to protect general-industry employees from the hazards of entry into permit-required confined spaces. This section does not apply to agriculture, construction, or shipyard employment (*see 29 CFR 1928, 1926, and 1915, respectively*).

4.4.3.1.4 Control of Hazardous Energy (Lock Out/Tag Out). Title 29 CFR 1910.147 sets minimum performance requirements of servicing and maintaining machines and equipment from which unexpected starting, energizing, or release of stored energy could harm employees.

4.4.3.1.5 Blood-Borne Pathogens. Title 29 CFR 1910.1030 focuses on the creation of a written exposure control plan that describes how an employer will protect employees from all occupational exposure to blood or other potentially infectious materials.

4.4.3.1.6 Hazard Communication (HAZCOM). Title 29 CFR 1910.1200 establishes procedures to ensure that the hazards of all produced or imported chemicals are classified, and that information concerning the classified hazards is transmitted to employers and employees. The requirements of this section are intended to be consistent with the provisions of the United Nations' globally harmonized system of classification and labeling of chemicals (GHS). The transmittal of this information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, SDSs, and employee training.

4.4.4 US Environmental Protection Agency (EPA).

4.4.4.1 EPA regulations governing hazardous materials can be found in 40 CFR. Several regulations of significance can be found in 4.4.4.1.1 through 4.4.4.1.7.

4.4.4.1.1 Chemical Accident Prevention Provisions. Title 40 CFR 68 sets forth risk management programs for accidental chemical release prevention activities, including hazard assessment, prevention programs, and emergency response considerations.

4.4.4.1.2 National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The NCP, addressed in 40 CFR 300, is the federal government's blueprint for responding to oil spills and hazardous substance releases. It develops a national response capability and promotes coordination among the hierarchy of responders and contingency plans. It establishes the National Response Team (NRT) and its roles and responsibilities in the national response system, which includes planning and coordinating responses, providing guidance to regional response teams, coordinating a national program of preparedness planning and response, and facilitating research to improve response activities.

4.4.4.1.3 Reimbursement to Local Governments for Emergency Response to Hazardous Substance Releases. Title 40 CFR 310 provides the procedures for seeking local government reimbursement for emergency responses to hazardous substance releases.

4.4.4.1.4 Worker Protection. Worker protection, addressed in 40 CFR 311, incorporates 29 CFR 1910.120 - requirements for states without OSHA-approved state plans.

4.4.4.1.5 Emergency Planning and Notification. Title 40 CFR 355 establishes requirements for a facility to provide information necessary for developing and implementing state and local chemical emergency response plans and requirements for emergency notification of chemical releases. This part also lists EHSs and threshold planning quantities (TPQs) in appendices A and B.

4.4.4.1.6 Hazardous Chemical Reporting: Community Right-to-Know. Title 40 CFR 370 establishes reporting requirements for providing the public with important information on hazardous chemicals in their communities. Such reporting raises community awareness of chemical hazards and aids in the development of state and local emergency response plans. Reporting requirements include SDSs and inventory reporting to the SERC, LEPC, and local fire department.

4.4.4.1.7 Toxic Chemical Release Inventory. Title 40 CFR 372 requires facilities to complete and submit a toxic chemical release inventory form (i.e., Form R) annually. A Form R must be submitted for each of the over 600 TRI chemicals that are manufactured or otherwise used above the applicable threshold quantities.

4.4.4.2 Discharge of Oil. Title 40 CFR 110 requires federal agencies to report discharges of oil from vessels or facilities under their jurisdiction or control to the National Response Center (NRC).

4.4.4.3 Oil Pollution Prevention. Title 40 CFR 112 establishes procedures, methods, equipment, and other requirements to prevent the discharge of oil from non-transportation-related onshore and offshore facilities into or on the navigable waters of the United States or adjoining shorelines.

4.4.4.4 Solid Wastes. Title 40 CFR 238–282 contains waste management regulations in support of the RCRA. CFRs 239 through 259 contain the regulations for solid waste. CFRs 260 through 279 pertain to hazardous waste regulations and also contains the definitions for characteristic and listed hazardous wastes. CFR 280 contains requirements for underground storage tanks.

4.4.5 US Department of Transportation (DOT). DOT regulations governing the transportation of hazardous materials/dangerous goods in commerce (e.g., highway, rail, air, and water) are found in 49 CFR. Where spills occur while the hazardous material is on the vehicle or otherwise “in transportation,” OSHA's 29 CFR 1910.120(q) HAZWOPER regulations apply to emergency response personnel who respond to the incident. Several regulations of significance can be found in 4.4.5.1 through 4.4.5.3.

4.4.5.1 Subchapter B Hazardous Materials and Oil Transportation.

4.4.5.1.1 Oil Spill Prevention and Response Plans. Title 49 CFR 130 contains prevention, containment, and response planning requirements applicable to the transportation of oil by motor vehicles and rolling stock.

4.4.5.2 Subchapter C Hazardous Materials Regulations (Parts 171–180). The following is a breakdown of the regulations in Subchapter C:

- (1) 49 CFR 171 — General Information Regulations and Definitions
- (2) 49 CFR 172 — Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, Training Requirements, and Security Plans
- (3) 49 CFR Part 173 — General Requirements for Shipments and Packagings
- (4) 49 CFR Part 174 — Carriage by Rail
- (5) 49 CFR Part 175 — Carriage by Aircraft
- (6) 49 CFR Part 176 — Carriage by Vessel

- (7) 49 CFR Part 177 — Carriage by Public Highway
- (8) 49 CFR Part 178 — Specifications for Packaging
- (9) 49 CFR Part 179 — Specifications for Tank Cars
- (10) 49 CFR Part 180 — Continuing Qualification and Maintenance of Packagings

▲ 4.4.5.3 Subchapter D Pipeline Safety (Parts 193–195) The following is a breakdown of the regulations in Subchapter D:

- (1) 49 CFR 193 — Liquefied Natural Gas Facilities: Federal Safety Standards
- (2) 49 CFR 194 — Response Plans for Onshore Oil Pipelines
- (3) 49 CFR 195 — Transportation of Hazardous Liquids by Pipelines

4.4.6 US Department of Energy (DOE). DOE regulations governing hazardous materials are found in 10 CFR. Several regulations of significance can be found in 4.4.6.1 through 4.4.6.1.2.

4.4.6.1 Nuclear Regulatory Commission. Parts 1–199 establish procedures for transportation and storage of nuclear materials; use of radioactive materials at nuclear power plants, research and test reactors, uranium recovery facilities, waste repositories, and other nuclear facilities; and use of nuclear materials for medical, industrial, and academic purposes. Subpart C establishes the requirements for the DOE to comply with Section 102(2) of the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (*see 10 CFR 1500–1508*). Parts 1500–1508 supplement, and are to be used in conjunction with, the CEQ regulations.

4.4.6.1.1 Standards for Protection Against Radiation. Part 20 establishes standards for protection against ionizing radiation resulting from activities conducted under licenses issued by the Nuclear Regulatory Commission. The following regulations were issued under the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, as amended:

- (1) 10 CFR 20.1201–1208 — Occupational Dose Limits
- (2) 10 CFR 20.1301–1302 — Radiation Dose Limits for Individual Members of the Public
- (3) 10 CFR 20.1601–1602 — Control of Exposure from External Sources in Restricted Areas
- (4) 10 CFR 20.1901–1906 — Precautionary Procedures
- (5) 10 CFR 20 Appendix B — Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage
- (6) 10 CFR 20 Appendix G — Requirements for Transfers of Low-Level Radioactive Waste Intended for Disposal at Licensed Land Disposal Facilities and Manifests

▲ 4.4.6.1.2 Domestic Licensing of Production and Utilization Facilities. Title 10 CFR 50 provides for the licensing of production and utilization facilities (i.e., nuclear reactors). The following regulations can be found in 10 CFR 50:

- (1) 10 CFR 50.47 includes the 16 planning standards of 10 CFR 50.47(b) and the “realism rule” in 10 CFR 50.47(c), which recognizes that state and local government officials do their best to protect public health and safety.
- (2) 10 CFR 50.54(q) contains requirements for following and maintaining in-effect emergency plans.
- (3) 10 CFR Appendix E to 10 CFR 50 describes information needed to demonstrate compliance with emergency

preparedness requirements in Section IV of this appendix.

4.5 Consensus Standards by Organization.

4.5.1 General.

4.5.1.1 A consensus standard is a standard that has been adopted and promulgated by a nationally recognized standards-producing organization under procedures whereby it can be determined that persons interested and affected by the scope or provisions of the standard have reached substantial agreement on its adoption; was formulated in a manner that afforded an opportunity for diverse views to be considered; and has been designated as such.

4.5.1.2 The documents or portions thereof listed in Section 4.5 are referenced within this recommended practice and should be considered part of the recommendations of this document.

4.5.2 NFPA Standards. This subsection contains a partial list of NFPA standards. To determine if other NFPA standards apply, review the complete list of NFPA standards at nfpa.org/codes-and-standards.

4.5.2.1 NFPA 470 provides a framework by which an organization can meet the requirements of the OSHA HAZWOPER regulation, identify the levels of competence required of emergency medical services (EMS) personnel who respond to incidents involving hazardous materials or WMD, and identify the minimum job performance requirements (JPRs) for personnel at the scene of a hazardous materials/WMD incident at the following levels: awareness, operations, operations mission-specific, hazardous materials technician, and incident commander. By meeting this standard, compliance with OSHA 1910.120 is met or exceeded.

4.5.2.2 NFPA 1500 contains minimum requirements for a fire service–related safety and health program. Items covered include personal protective equipment (PPE), staffing, medical requirements, and physical requirements.

4.5.2.3 NFPA 1521 contains minimum requirements for the assignment, duties, and responsibilities of a health and safety officer (HSO) and an incident safety officer (ISO) for a fire department.

4.5.2.4 NFPA 1582 provides guidance on annual physicals for fire fighters and members of hazardous materials response teams.

4.5.2.5 NFPA 1584 establishes the minimum criteria for developing and implementing a rehabilitation process for fire department members at incident scene operations and training exercises.

4.5.2.6 NFPA 1951 specifies the minimum design, performance, testing, and certification requirements for utility technical rescue; rescue and recovery technical rescue; and chemical, biological, radiological, and nuclear (CBRN) technical rescue and protective ensembles for use by emergency services personnel during technical rescue incidents.

4.5.2.7 NFPA 1981 specifies certification, labeling, design requirements, performance requirements, and test methods that apply to all open-circuit self-contained breathing apparatus (SCBA) and combination SCBA/supplied air respirator (SAR) used during firefighting, rescue, hazardous materials incidents,

terrorist incidents, and similar operations where responders could encounter confined spaces, atmospheres that are unknown, atmospheres that are or could become immediately dangerous to life and health (IDLH), or atmospheres that are or could become oxygen deficient.

4.5.2.8 NFPA 1982 specifies cover design, performance, testing, and certification of PASS that monitor an emergency responder's motion and automatically emit an audible signal to summon aid in the event the user becomes incapacitated or needs assistance.

4.5.2.9 NFPA 1991 contains requirements for protection for emergency responders against adverse vapor environments during hazardous materials incidents, and from specified chemical, biological, or radiological terrorism agents during chemical and biological terrorism incidents.

4.5.2.10 NFPA 1992 provides requirements for protection for emergency responders against adverse liquid-splash environments during hazardous materials emergency incidents.

4.5.2.11 NFPA 1994 establishes requirements for protective ensembles and ensemble elements to safeguard emergency first responder personnel from CBRN terrorism agents.

4.5.3 American Society for Testing and Materials (ASTM) Standards. This subsection contains a partial list of ASTM standards. To determine if other ASTM standards apply, review the complete list of ASTM standards at astm.org/standards.

4.5.3.1 ASTM F1127, *Standard Guide for Containment of Hazardous Material Spill by Emergency Response Personnel*, is the standard of care for hazardous materials response personnel.

4.5.3.2 ASTM E2458, *Standard Practices for Bulk Sample Collection and Swab Sample Collection of Visible Powders Suspected of Being Biothreat Agents from Nonporous Surfaces*, covers bulk and onsite sampling.

4.5.3.3 ASTM E2601, *Standard Practice for Radiological Emergency Response*, provides decision-making considerations for response to incidents that involve radioactive materials. It provides information and guidance for what to include in response planning and what activities to conduct during a response.

4.5.3.4 ASTM E2770, *Standard Guide for Operational Guidelines for Initial Response to a Suspected Biothreat Agent*, provides considerations for decision-makers where responding to incidents that could involve biothreats.

4.5.4 American National Standards Institute (ANSI) Standards. This subsection contains a partial list of ANSI standards. To determine if any other ANSI standards apply, review the complete list of ANSI standards at ansi.org.

4.5.4.1 ANSI Z88.2, *American National Standard Practices for Respiratory Protection*, sets forth accepted practices for respirator users; provides information and guidance on the proper selection, use, and care of respirators; and contains requirements for establishing and regulating respirator programs.

4.5.4.2 ANSI Z88.10, *Fit Test Method*, provides guidance on how to conduct fit testing of tight-fitting respirators and appropriate methods to be used.

4.5.5 American Petroleum Institute (API) Standards. This subsection contains a partial list of API standards. To determine if any other API standards apply, review the complete list of API standards at api.org/standards/.

4.5.5.1 API 2021, *Management of Atmospheric Storage Tank Fires*, provides information to enhance the understanding of fires in atmospheric storage tanks containing flammable and combustible materials. It presents a systematic management approach that can assist tank fire prevention and helps responders optimize fire suppression techniques to reduce the severity of an incident.

4.6 Guidance Documents.

4.6.1 General. Guidance documents are publications typically prepared by regulatory agencies, that provide instructions to establish the agencies expectations.

4.6.2 National Response Framework (NRF). The NRF is a comprehensive how-to guide that spells out how the nation should conduct an all-hazard response. It is intended to capture all levels of government and all incident levels. Local plans feed into state plans, which feed into the NRF. Its use during a federally declared disaster is required by the Stafford Act.

4.6.2.1 Resource typing is the categorization and description of resources that are exchanged in disasters via mutual aid, by capacity and/or capability, for the purpose of ordering and tracking resources.

4.6.3 Presidential Directives.

4.6.3.1 Homeland Security Presidential Directive 5 (HSPD 5) — Management of Domestic Incidents. HSPD 5, issued on Feb. 28, 2003, enhances the ability of the United States to manage domestic incidents by establishing a single, comprehensive national incident command system.

4.6.3.2 Homeland Security Presidential Directive 8 (HSPD 8) — National Preparedness. HSPD 8 was issued to strengthen the security and resilience of the United States through systematic preparation for the threats that pose the greatest risk to national security, including acts of terrorism, cyber-attacks, pandemics, and catastrophic natural disasters. National preparedness is the shared responsibility of all levels of government, the private and nonprofit sectors, and individual citizens. As such, while this directive is intended to galvanize action by the federal government, it is also aimed at facilitating an integrated, all-of-nation, capabilities-based approach to preparedness using the following:

- (1) *National Preparedness Vision.* A concise statement of the core preparedness goal for the nation.
- (2) *National Planning Scenarios.* A diverse set of high-consequence threat scenarios of potential terrorist attacks and natural disasters.
- (3) *Universal Task List.* A menu of some 1600 unique tasks that can facilitate efforts to prevent, protect against, respond to, and recover from the events represented by the national planning scenarios.
- (4) *Core Capabilities List.* A list divided into five mission areas, including prevention, protection, mitigation, response, and recovery that agencies and jurisdictions can use to identify mission deficiencies and take corrective actions. The target capabilities list has been merged into the core capabilities list.

4.6.3.3 Homeland Security Presidential Directive 12 (HSPD 12) — Policy for a Common Identification Standard for Federal Employees and Contractors. HSPD 12 was issued to eliminate variations in quality and security of identification

used to gain access to secure facilities where there is potential for terrorist attacks, and to enhance security, increase government efficiency, reduce identity fraud, and protect personal privacy. HSPD 12 established a mandatory, government-wide standard for secure and reliable forms of identification issued by federal government employees and contractors, including contractor employees.

4.6.3.4 National Security Presidential Directive 33 (NSPD 33). — Biodefense for the Twenty-First Century. NSPD 33 covers response planning, mass casualty care, risk communication, medical countermeasures, and decontamination. These initiatives strengthen the government's ability to provide mass casualty care and to decontaminate the site of an attack.

4.6.4 Additional Resources. The following resources might be helpful to HMRP in becoming familiar with laws, regulations, consensus standards, and guidance documents:

- (1) US Chemical Safety Board, www.csb.gov
- (2) National Transportation Safety Board, www.nts.gov
- (3) Lessons Learned Information Sharing, www.llis.dhs.gov
- (4) FEMA's National Training and Education Division, www.firstrespondertraining.gov
- (5) The National Fire Fighter Near-Miss Reporting System, www.firefighternearmiss.com
- (6) US Coast Guard, www.nrc.uscg.mil
- (7) Interagency Board, www.iab.gov

Chapter 5 Risk Assessment

5.1 Scope. This chapter applies to those organizations and jurisdictions responsible for organizing, managing, and sustaining a hazardous materials/weapons of mass destruction (WMD) response program (HMRP) and provides guidance for assessing an organization's/jurisdiction's risk of being affected by hazardous materials or a WMD.

5.2* Purpose. This chapter provides processes for conducting a risk assessment, including hazard identification, vulnerability assessment, consequence identification, and risk analysis within the organization/jurisdiction.

5.2.1 A risk assessment characterizes the impact and danger associated with hazardous materials/WMD within an organization/jurisdiction.

5.2.2 Risk assessment methods can vary but should involve the characterization of risk within the organization/jurisdiction.

5.2.3 Risk assessment influences all elements of an HMRP — prevention, preparedness, response, and recovery.

5.3 Identifying Hazardous Materials/WMD Within an Organization/Jurisdiction.

5.3.1 Identifying hazardous materials/WMD, which is the first step in risk assessment, is a process of collecting information regarding the locations and types of hazardous materials/WMD within the organization/jurisdiction.

5.3.2* Identifying hazardous materials/WMD locations should include any facilities within the organization/jurisdiction that manufacture/produce, store, transport, use, treat, or dispose of hazardous materials.

5.3.3 Hazardous materials/WMD identification should include all materials at the identified locations within the organization/jurisdiction that are capable of causing death,

injury, property or environmental damage, and system disruptions where there is an accidental or intentional release.

5.3.3.1* For each identified location, the following information should be collected:

- (1) List of all materials found categorized by name or other manner that allows identification to assess potential characteristics, behavior, and hazards of the materials
- (2) Quantity and concentration of material that could be involved in a release
- (3) Type and design of container used for the materials
- (4) Conditions found at the location, such as storage configuration, protection features, protection systems, safety devices, cleanliness, and so on
- (5) Transportation facilities and routes used by various transport modes
- (6) Properties of the material, including safety data sheets (SDSs) and other product-specific facility documents
- (7) Potential hazards associated with spills or releases
- (8) Surrounding conditions and circumstances adjacent to the potential incident site, including the following:
 - (a) Number and types of people, including facility employees, neighborhood residents, vulnerable populations, and other groups in the area.
 - (b) Private and public property, including critical facilities (e.g., homes, schools, hospitals, businesses, and offices), critical infrastructures (e.g., water, food, power, communication, and medical), and transportation facilities and corridors. Special attention should be given to facilities that could have a significant economic impact on an organization/jurisdiction should a major release or loss occur.
 - (c) Environmentally sensitive areas, including waterways, estuaries, parks, floodplains, wetlands, or adjacent facilities as well as areas containing endangered species.

5.3.4 Information about hazardous materials/WMD locations and types can be found from the following sources:

- (1) State emergency planning commissions (SERC)
- (2) Local emergency planning councils (LEPC)
- (3) Local emergency management agency personnel
- (4) Local pre-emergency planning activities
- (5) Scientific community
- (6) Industrial community
- (7) Governmental agencies [i.e., Department of Defense (DOD), Department of Transportation (DOT), and Environmental Protection Agency (EPA)]
- (8) Maritime community
- (9) Historical records

5.4 Analyzing the Consequences of a Release. Analyzing the consequences of a release of hazardous materials/WMD found at each location within the organization/jurisdiction is the process of evaluating the likely behavior of a container and its contents to determine the hazards associated with the release and the likely outcomes (e.g., deaths and injuries, environmental and property damage, system disruptions) associated with that release.

5.4.1 Predicting Behavior. Using data collected during the hazardous materials/WMD consequence analysis, the likely behavior of a material and its container as well as the resultant hazards associated with a release of the material should be identified.

5.4.1.1 Factors that can contribute to the behavior of a container and its contents include the following:

- (1) Type of container — pressure, nonpressure, or cryogenic
- (2) Type of stress — thermal, mechanical, chemical, or radiological
- (3) Type of breach — disintegration, linear cracking, closure opening up, puncture, split, or tear
- (4) Type of release — detonation, violent rupture, rapid relief, spill, or leak) — also provides indication of the rate of release
- (5) Type of release — matter or energy
- (6) Form released — solid, liquid, or gas
- (7) Type of dispersion pattern — considers type of breach, cause of movement, or path of movement
- (8) Type of impingement — short term, medium term, or long term
- (9) Type of harm — thermal, chemical, biological, radiological, asphyxiant, or mechanical

5.4.2 Estimating Outcomes. The analysis process should estimate the impact to the organization/jurisdiction, or the region, state, and/or nation in terms of potential deaths and injuries, cost of environmental and property damage, and impact of system disruptions, including land, equipment, infrastructure, and key resources that might have to be repaired, decontaminated, or replaced.

5.4.2.1 Surrounding conditions and circumstances adjacent to the potential incident site that could be impacted by the release of hazardous materials/WMD. [See 5.3.3.1(8).]

5.4.2.2 Estimated outcomes should include the following:

- (1) Likely dimensions of the endangered area based on the likely dispersion of the hazardous materials/WMD
- (2) Likely number and types of exposures within the endangered area (e.g., people, environment, property, systems)
- (3) Likely concentrations of the hazardous materials/WMD within the endangered area (i.e., dispersion modeling)
- (4) Likely physical, health, and safety hazards within the endangered area, including acute, delayed, and/or chronic health effects
- (5) Likely areas of harm within the endangered area
- (6) Likely outcomes within the endangered area based on exposures within the areas of harm

5.4.2.3 Estimated outcomes should be based on realistic worst-case scenarios — especially for high-frequency events.

5.5 Analyzing the Risk. Risk analysis is a judgment of the likelihood or probability of a release occurring coupled with the severity of outcomes, based on hazardous materials/WMD found within the organization/jurisdiction and an estimate of the likely outcomes associated with their release within the organization/jurisdiction.

5.5.1* Probability. Probability is the likelihood that a hazardous materials/WMD incident could occur.

5.5.1.1 Probability estimates the potential for an incident to take place. Where estimating probability, the following should be taken into account:

- (1) Types of incidents within the organization and/ jurisdiction.
- (2) Frequency of incidents, which is determined by how often hazardous materials/WMD incidents occur in your AHJ, the state, or the region.

5.5.2 Frequency. Frequency is the process of determining how often hazardous material/WMD incidents occur in your AHJ, the state, or the region. Frequency can be determined by asking the following questions:

- (1) Has a hazardous materials/WMD incident ever occurred in your AHJ?
- (2) Have similar types of incidents ever occurred within your AHJ?
- (3) What was the magnitude of the incidents that occurred?
- (4) How did the event impact the jurisdiction in terms of loss of life, injuries, property and environmental damage, and disruption of infrastructure or the economy? Criteria to consider includes the following:
 - (a) Types of materials involved
 - (b)* Analysis of the history of current conditions and controls at the location, including engineering controls to minimize release potential; plans to control a release; the organization's and jurisdiction's response capabilities
 - (c) Any unusual environmental conditions
 - (d)* Possibility of simultaneous incidents

5.5.3 Severity. For severity of consequences of human injury that might occur (e.g., acute, delayed, and/or chronic health effects), see Section 5.4.

5.5.4 Resources for Risk Analysis. National databases can be consulted to determine the most common types of hazardous materials/WMD involved in other incidents. This data can then be compared to the hazardous materials/WMD identified within the AHJ to determine if there is a high or low probability of an incident occurring. Probability can also be determined through the use of mathematics and models that measure the ratio of the favorable cases to the whole number of cases possible. Another source of information can be regional intelligence centers who can provide trend and threat information for analysis.

5.5.4.1 Geographic-Based Analysis. Geographic threat assessments utilize geographic information systems (GIS) that allow the user to better visualize, question, analyze, interpret, and understand interdependencies, patterns, and trends. A GIS provides layers of information that can be used to map locations and assess potential impact. This allows planners to identify the relationships between the hazards, predict outcomes, visualize scenarios, and plan strategies.

5.5.4.2 Computer-Based Modeling Analysis. Computer-based assessments use a variety of computer-based modeling to determine the potential impact of a hazardous materials release. Computer models are designed to evaluate specific issues such as hazardous substances releases, migrating toxic gas plumes, oil spill migration, blast effects, and weather. Where computer data is combined with GIS data, the consolidation of information can give planners a clearer picture of the potential vulnerabilities within the organization/jurisdiction, region, or state.

5.5.5* Ranking the Risks. Once risk assessment is completed, the organization/jurisdiction should be ranked by risk level.

5.5.6* Consequence. Consequences can be determined by the evaluation of the assessed risks, duration and nature of the event, property loss, personal injury or loss of life, psychological trauma, economic loss, interruption of commerce, and environmental impact.

5.5.7 Cascading Incidents. Cascading incidents can compound the stresses placed on the response system as a whole. A single man-made incident occurring at the same time as a natural disaster can compound the intensity by virtue of the sheer magnitude. A natural disaster such as an earthquake can cause multiple incidents at multiple locations that can spiral out of control and have secondary or tertiary impacts to life safety, public health, or the environment. When evaluating cascading incident potential, each location should be viewed as an individual incident within the context of a larger disaster complex.

5.5.8 Complex Coordinated Attacks. Complex coordinated attacks are synchronized attacks conducted by one or more independent teams occurring at multiple locations sequentially or in close succession using multiple attackers and employing one or more weapon systems. A complex coordinated attack can include hazardous materials/WMD. This will increase stress on the response system and require area command and multiple outside resources to manage it effectively. Clear concise communication and coordination planning and exercising can help in preparedness for a complex coordinated attack.

Chapter 6 Planning

6.1 Scope. This chapter applies to those organizations and jurisdictions responsible for organizing, managing, and sustaining a hazardous materials/weapons of mass destruction (WMD) response program (HMRP) and provides guidance for the planning process.

6.2 Purpose. This chapter addresses emergency operations plans (EOPs), standard operating procedures (SOPs), and standard operating guidelines (SOGs) where developing plans for the safe, effective response to hazardous materials/WMD incidents.

6.2.1 It is not the intent of this document to restrict any authority having jurisdiction (AHJ) from exceeding these minimum recommended practices.

6.3 Plan Development. A planning team should be established for plan development. The plan should address the findings of the jurisdictional risk assessment process, other related plans, mutual-aid agreements and memorandums of understanding (MOU). Plans are not a scripting process to dictate specific actions. They should provide a starting point for operations, be flexible, and be adjusted as circumstances change. Plans should be organized in a logical framework of functions and topics. HMRP managers should establish formal management systems to ensure that plans are developed, maintained, and enforced along a four-step process: a needs or gap assessment, plan development, implementation, and evaluation. The planning team should also perform a needs or gap assessment of any equipment, supplies and resources needed to meet the mission identified in the plan.

6.3.1 A planning team should be established for plan development with processes in place to insure the plan remains current and is implemented as designed.

6.3.2 Plans should be based on the results of a risk assessment and an analysis of the current capabilities of the HMRP in relation to the risk. This analysis should include the following:

- (1) Identifying the required HMRP capabilities

- (2) Current capabilities, including other plans and mutual-aid agreements already in place
- (3) Gaps between required and current capabilities
- (4) Capabilities required to bridge the gaps

6.3.3 Plans should address formal management activities, such as resource management, staffing, training, health and medical issues, financial management, and developing relationships as well as operational activities and emergency operations. Plans should provide a starting point for operations and be flexible, so that they can be adjusted as circumstances change.

6.3.4 Plans should be organized in a logical framework of functions and topics.

6.3.5* Plans should be exercised not less than once annually.

6.4 Emergency Operations Plan (EOP). Every state has an EOP that complements the National Response Framework (NRF) and that works in concert with the FEMA — Robert T. Stafford Act for disaster relief and emergency assistance. Many states require local jurisdictions to have a basic emergency operations plan supported by functional annexes with guidance for mitigation, preparedness, response, and recovery. Plans can mirror the national response framework and use emergency support functions (ESFs) in lieu of annexes.

6.4.1 Hazardous Materials/WMD Annex. Tactical planning guidance and recommendations for a Hazardous Materials/WMD annex should be based on a risk-based response process and use decision points.

6.5 Standard Operating Procedure (SOP)/Standard Operating Guideline (SOG) Planning Components. The following template can be used as a guide to develop SOGs and SOPs and to provide necessary information for an emergency response in a standardized format:

- (1) Introduction
- (2) Scope
- (3) Purpose
- (4) Health and safety
- (5) Response information
- (6) Operations
- (7) Annex
- (8) Glossary
- (9) Equipment
- (10) Documentation
- (11) Site specific information
- (12) Product specific information

6.6 SOPs. HMRP managers need a system to communicate operational procedures to personnel and ensure compliance with laws, regulations, and standards. SOPs provide a mechanism to identify job requirements and expectations in an applicable format. SOPs are written directives that describe in detail what is required of personnel in specific situations or how to use equipment. The result is improved operational performance and safety and reduced liability.

6.6.1 Response. An HMRP should have procedures for specific processes that should be followed for responding to a hazardous material/WMD incident. Procedural steps should be designed to assess and document actions, restore capabilities, address problems, and improve future results. The procedures should include the following:

- (1) Emergency decon
- (2) Gross decon

- (3) Technical decon
- (4) Incident management

6.6.2 Termination and Postincident Procedures. An HMRP should have procedures for specific processes that should be followed after a hazardous material/WMD incident. Procedural steps should be designed to assess and document actions, restore capabilities, address problems, and improve future results. The procedures should include the following:

- (1) Postincident analysis, including the following:
 - (a) Demobilization
 - (b) Debriefing
 - (c) Critique and after-action report
- (2) Postincident recovery
- (3) Incident record keeping and reporting
- (4) Injury/exposure reporting
- (5) Behavioral and mental health considerations

Δ 6.6.3 Incident Management. An HMRP should have an incident command procedure that is in full compliance with the National Incident Management System (NIMS). This is as an essential part of any emergency response plan (ERP). For an ERP to be compliant, it should require the use of an incident command system (ICS).

6.6.4 Respiratory Protection. An HMRP should have a respiratory protection program that meets the requirements of 29 CFR 1910.134, NFPA 1500, and NFPA 1852.

6.6.5 Medical Surveillance. An HMRP should have a medical surveillance program that meets the requirements set forth in 29 CFR 1910.120 (h), NFPA 1500, and NFPA 1582.

6.6.6 Selection, Care, and Maintenance of Protective Ensembles for Structural Firefighting and Proximity Firefighting. An HMRP should have an SOP for the selection, care, and maintenance of firefighter turnout gear that meets the requirements of NFPA 1851.

6.6.7 Personnel Credentialing. An HMRP should have a procedure designed to assess the capabilities of personnel and establish a credentialing system. The credentialing process entails objective evaluation and documentation of an individual's current certification, license, or degree; training and experience; and competence or proficiency to meet nationally accepted standards, provide particular services and/or functions, or perform specific tasks under specific conditions during an incident. According to NIMS, credentialing is the administrative process for validating personnel qualifications and providing authorization to respond/deploy, to perform specific functions, and to have specific access to an incident. Personnel credentialing is covered in greater detail in Chapter 7.

6.7 SOGs. SOGs enable HMRP personnel to operate at a hazardous materials/WMD incident where hazards are identified, risk are assessed, and response options are chosen based on the AHJ's concept of operations, available resources and capabilities and the responder's level of training. SOGs should be built around Core Capabilities as identified by the national preparedness goals. The advantages of SOGs include the following:

- (1) Enhances personnel safety
- (2) Provides response consistency
- (3) Serves as a guide for response actions
- (4) Enhances the decision process

- (5) Allows for better coordination and interoperability with other agencies and departments

6.7.1 Chemical Response Guideline. Guidelines for response to an incident involving chemicals should be based on available resources, personnel, and capabilities necessary to perform assigned tasks. Whether the event is accidental or intentional, HMRP personnel should identify all hazards associated with the incident and take appropriate actions, based on the greatest harm and danger. It is possible that additional present hazards could be more dangerous than exposure to the chemicals. The SOG should address the following:

- (1) SOG implemented during the emergency phase of an incident
- (2) SOG used for determining the feasibility of rescue and recovery operations
- (3) SOG safety and incident response considerations for the rescue of victims in the following situations:
 - (a) Line-of-sight with ambulatory victims
 - (b) Line-of-sight with nonambulatory victims
 - (c) Non-line-of-sight with ambulatory victims
 - (d) Non-line-of-sight with nonambulatory victims
 - (e) Rescue operations versus victim recovery
- (4) SOG for a risk-based response approach
- (5) SOG considerations for possible decontamination

6.7.2 Biological Response Guideline. Guideline for response to an incident involving biological materials should be based on available resources, personnel, and capabilities necessary to perform assigned tasks. Whether the event is accidental or intentional, HMRP personnel should identify all hazards associated with the incident and take appropriate actions, based on the greatest harm and danger. It is possible that additional present hazards could be more dangerous than exposure to the biological material. The SOG should address the following:

- (1) SOG safety and incident response considerations for the rescue of victims in the following situations:
- (2) Potential public health emergency
- (3) Known point-source
- (4) Potential area dissemination
- (5) SOG for a risk-based response approach
- (6) SOG considerations for possible decontamination

6.7.2.1 ASTM E2458, *Standard Practices for Bulk Sample Collection and Swab Sample Collection of Visible Powders Suspected of Being Biothreat Agents from Nonporous Surfaces.* ASTM E2458 addresses the collection of visible powders that are suspected biothreat agents from solid nonporous surfaces using a bulk collection method that employs a dry swab and laminated card followed by a swab sampling method using a sterile moistened swab. Bulk powder samples are collected and packaged in a manner that permits the maximum amount of the sample to be safely transported to a reference laboratory within the Centers for Disease Control and Prevention (CDC) national laboratory response network (LRN) for identification and safe storage.

6.7.2.2 ASTM E2770, *Standard Guide for Operational Guidelines for Initial Response to a Suspected Biothreat Agent.* ASTM E2770 provides considerations where responding to incidents that could involve biothreats. This guide contains information and recommendations for response planning and on activities to conduct during an initial response to an incident involving suspected biothreat agents.

6.7.3 Radiological Response Guideline. Guidelines for response to an incident involving radiological materials should be based on available resources, personnel, and capabilities necessary to perform assigned tasks. Whether the event is accidental or intentional, HMRP personnel should identify all hazards associated with the incident and take appropriate actions, based on the greatest harm and danger. It is possible that additional present hazards could be more dangerous than exposure to the radiological material.

6.7.3.1 ASTM E2601, *Standard Practice for Radiological Emergency Response*. ASTM E2601 contains recommended practices that can be incorporated into the development, planning, training, and implementation of a radiological response plan. It also provides choices for responses to an accidental or intentional release of radiological materials. The standard applies to the emergency phase of an incident and incorporates a risk-based response approach.

6.7.4 Explosives Response Guideline. Guidelines for response to an incident involving explosive materials should be based on available resources, personnel, and capabilities necessary to perform assigned tasks. Whether the event is accidental or intentional, HMRP personnel should identify all hazards associated with the incident and take appropriate actions, based on the greatest harm and danger. It is possible that additional present hazards could be more dangerous than the harms associated with explosive materials. The SOG should address the following:

- (1) SOG for the emergency phase of an emergency
- (2) SOG safety and incident response considerations for the following situations:
 - (a) Life threatening
 - (b) Non-life-threatening
 - (c) No threat to life or property
- (3) SOG for a risk-based response

6.7.5 WMD Response Guideline. Older emergency response plans were based on accepted procedures and safe work practices. The new hazardous materials/WMD mission includes concerns that are specific to an intentional release that is designed to kill, injure or cause mass destruction of property, infrastructure, or the environment. Guidelines for response to an incident involving a WMD should be based on available resources, personnel, and capabilities necessary to perform assigned tasks. Because the incident is intentional, the associated criminal activity could affect the decisions of HMRP personnel. HMRP personnel could find themselves in a situation and become targets themselves. The SOG should include safety and incident response considerations to address the following:

- (1) Immediate notification of on-scene and responding personnel
- (2) Deployment of law enforcement personnel for scene security and criminal investigation
- (3) SOG considerations for identification and preservation of evidence, chain of custody, and documentation issues
- (4) SOG considerations for information and intelligence exchange with other organizations or jurisdictions
- (5) SOG considerations for possible decontamination
- (6) SOG considerations for deployment of personnel for force protection
- (7) SOG considerations for awareness of the potential for secondary threats

6.7.6 Significant Incident Response Guideline. As part of the ERP, the AHJ should develop guidelines that outline such things as strategic objectives, tactical considerations, resource needs, dispatching and notification procedures, pre-determined mutual-aid requests and emergency operation center activation trigger points for an all-hazards approach to a significant incident. Procedures should include; guidelines for response, shelter-in-place, and personnel recall. The guidelines should focus on ensuring that a jurisdiction can respond to any threat or hazard, including those with cascading effects. Emphasis should be on saving and sustaining lives. Procedures should include: incident stabilization, meeting basic human needs, restoring basic services and functionality, establishing a safe and secure environment, and supporting the transition to recovery. Significant incidents demand a much broader set of atypical partners to meet the demands of the incident.

6.7.7 Public Planning Guideline. The AHJ should develop a guideline for public use that provides guidance for recognizing hazards and appropriate self-protective actions. Public involvement is vital to provide additional support to response personnel and can often be the primary source of response in the first hours or days after a catastrophic event. As such, the public should be encouraged to train, exercise, and partner with each other and emergency management officials.

6.8* Operational Security. SOGs, SOPs, ERPs and other response program documents can contain critical and sensitive information that can be used by adversaries against emergency responders. Operation Security (OPSEC) should be an integral element of the organization/jurisdiction preparedness program.

6.9 Information and Intelligence Sharing. The HMRP should develop, and maintain, relationships that help facilitate intelligence and information sharing, including formal relationships with government fusion centers.

6.9.1 The HMRP should gather intelligence from fusion centers, such as officer safety bulletins, threats against chemical facilities, or missing/stolen hazardous materials.

6.9.2 The HMRP should contribute or produce intelligence products for fusion centers by providing technical analyses, hazardous materials/WMD threat assessments, or hazardous materials/WMD-focused bulletins on emerging trends or hazards.

6.9.3 The HMRP should enroll and participate in Department of Homeland Security online intelligence portals and the International Association of Fire Chiefs' (IAFC) hazmat fusion center to receive and share Hazardous Materials/WMD best practices, case studies, and additional information.

6.9.4 Hazardous materials/WMD responders should maintain a wide professional network of other hazardous materials/WMD professionals to exchange best practices, response options, training information, and technical advice.

Chapter 7 Resource Management

7.1 Scope. This chapter applies to those organizations and jurisdictions responsible for organizing, managing, and sustaining a hazardous materials/weapons of mass destruction (WMD) response program (HMRP) and provides guidance for developing a comprehensive resource management plan to

ensure that all required resources are available to meet program objectives.

7.2 Purpose. This chapter addresses the identification, acquisition, and management of personnel, equipment, and supplies to support HMRP activities.

7.3 Personnel. Quality personnel is a critical aspect of HMRP management. Program success is dependent on proper recruitment, effective retention, and appropriate maintenance of personnel.

7.4* HMRP Types. HMRRs can vary in size and complexity based on the mission and objectives. Programs can be single or multijurisdictional, public or private industry, or any combination thereof and based on available personnel and resources.

7.4.1 Hazardous Materials/WMD Response Teams (HMRTs). A unit whose primary mission is to respond to hazardous materials/WMD incidents.

7.4.2 Types of HMRTs. Due to the professional competencies and job performance requirements (JPRs) of personnel needed to manage hazardous materials/WMD incidents, the training requirements needed to achieve and maintain these competencies and JPRs, and the specialized equipment and practices used in responding to such hazardous materials/WMD incidents, most HMRRs maintain a team of dedicated personnel. HMRTs are configured in various ways, including the following:

- (1) *Single jurisdiction/single agency or organization:* HMRT members are recruited and maintained from personnel within the specific agency, jurisdiction, or organization that is maintaining the HMRP.
- (2) *Private/industrial sector:* HMRT members are employees of a private business or industry that maintains hazardous materials response capabilities for other business operations and responds to offsite incidents that involve the company's products or services.
- (3) *Multijurisdictional/multiagency:* HMRT members are recruited and maintained from a pool of personnel from two or more agencies, jurisdictions, and organizations that cover a single or multijurisdictional geographic area. Often referred to as regional teams, this type of HMRT often pools personnel, equipment, funding, and other necessary resources into a single team to mitigate hazardous materials/WMD incidents.
- (4) *Combination teams:* HMRTs members are recruited and maintained from both public agencies and private industry, to form a combined team.

7.4.3 Resource Typing. Resource typing can have an impact on daily staffing, deployment, program sustainability, and team member recruitment and retention. Team typing categories describe resources by capacity and capability and include measurable standards that are intended to produce an identifiable response to a hazardous materials/WMD incident. Resource typing should provide the HMRP manager and on-scene incident management with the following:

- (1) Enhanced emergency readiness
- (2) Guidance for equipment purchasing and subsequent training
- (3) Ease in identifying, requesting, and tracking resources by type

7.4.4 Specialty Personnel. HMRP managers should be aware of other agencies that are capable of providing additional

resources to the hazardous materials/WMD incident, such as personnel and/or specialized equipment, or that could be otherwise available to the authority having jurisdiction (AHJ). These resources could come from many sources, including private-industry response teams, military units such as civil support teams or the United States Coast Guard National Strike Force, railroad response teams, pipeline experts, airline experts, and so forth. This pool of resources can change due to funding and/or other influences, so HMRP managers should be aware of resource availability. Chapter 14 of NFPA 470 offers detailed information on specialty employees and the conditions under which they could be utilized at hazardous materials/WMD incidents.

7.4.5* Core Capabilities (Team). Per the HMRP's mission, a specific set of core team capabilities should be developed based on available personnel, resources, and funding. Each responder within the HMRT should be trained and equipped to perform their assigned task in a safe and effective manner. A specific set of core team capabilities should be developed based on NFPA 470.

7.4.5.1 Various internal and external influences shape the mission of HMRRs. HMRP managers should assess these influences to determine the mission and scope of team operations and develop a plan for staffing the HMRP based on these factors.

7.4.5.2 Community support is an important influence on the HMRP's overall mission and, by relation, affects HMRP personnel recruitment and retention decisions.

7.4.5.3 Funding has direct and indirect effects on team personnel decisions. Reimbursement for team activities might be one of the largest line items in an HMRP budget. Planning is required to match available funding to personnel resources and the overall HMRP mission.

7.4.6 Competencies (Members). Title 29 CFR 1910.120 dictates personnel management and training requirements for HMRP personnel. Under this regulation, HMRP managers have legal requirements where training and maintaining their team members.

▲ **7.4.6.1** NFPA 470 provides competencies and JPRs for personnel assigned to respond to hazardous materials/WMD incidents. HMRP managers should use these documents as guides where developing competencies for HMRP personnel.

7.4.6.1.1 HMRP managers can recruit and maintain subject matter experts (SMEs) to assist them with specialized aspects of team responses and training. The SME might or might not be a trained and qualified team member and can only be used for specific purposes. One common example is the use of a chemist to assist with research and planning during responses.

7.4.6.1.2 By definition and practice, personnel are considered to be HMRP resources. In 2005, the United States Department of Homeland Security developed and published the *National Mutual Aid and Resource Management Initiative*, which was designed to support the National Incident Management System (NIMS) by establishing a comprehensive, integrated, national mutual-aid and resource management system that provides the basis to type, order, and track all federal, state, and local response assets. Resource typing for hazmat entry team personnel is defined within DHS Resource Typing Documents FEMA 508-1, *Typed Resource Definitions — Animal Health Resources*, and

FEMA 508-4, *Typed Resource Definitions — Fire and Hazardous Materials Resources*.

7.4.6.1.3 Personnel credentialing is defined within DHS NIMS Guide NG0002, *National Credentialing Definition and Criteria*, which provides credentialing requirements for personnel ordered as single resources or appointed to teams assigned to equipment listed within the Tier 1 NIMS national resource typing definitions. Personnel credentialing is a voluntary process and only relates to deployable resources for interstate mutual-aid responses. It is recommended that HMRP managers be familiar with NIMS credentialing requirements within ASTM E2842, *Standard Guide for Credentialing for Access to a Disaster Scene*. ASTM E2842 was developed with the Federal Emergency Management Agency (FEMA) National Integration Center (NIC) to identify essential elements from FEMA guidance on credentialing at a disaster scene.

7.4.6.1.4 Various federal regulations, guidance documents, voluntary standards, and recommended practices provide criteria for the recruitment, development, and training of HMRP personnel. Team personnel should be assigned specific roles and responsibilities based on their training specialties, experience, and capabilities. HMRP managers should be familiar with these documents and use them in making personnel management decisions.

7.4.7 Deployment. As influenced by the HMRP mission, responsibilities, geographic coverage area, regulations, and other various factors, HMRP managers should anticipate and prepare for team deployments. HMRP deployments vary in length and complexity and necessitate that HMRP managers perform appropriate predeployment planning. Staffing solutions are complex, with benefits and limitations for each staffing option. Response to a hazardous materials/WMD event demands familiarity with all resources (e.g., personnel, supplies, and equipment) including those from other jurisdictions or organizations. Deployment of these resources should take into consideration community risk assessment, response times, financial constraints, standard operating procedures/guidelines, automatic and mutual-aid agreements, and other policies and procedures of the AHJ. Long-term plans for retention and recruitment should also be considered. Deployment models should be developed based on the findings of the risk assessment process and the best interest of the organizations or jurisdictions.

7.4.7.1* Depending on the type and size of the HMRP, deployments can present an HMRP manager with staffing challenges. Title 29 CFR 1910.120 requires that personnel with specific training and competencies be present during emergency responses. It is the HMRP manager's responsibility to ensure that the correct number of trained and qualified personnel are present to meet this federal regulation.

7.4.7.2 Depending on the type and size of hazardous materials/WMD incident, HMRP managers should be prepared to sustain incident operations over long periods. Relief of on-scene personnel for incidents that are to be sustained for greater than one operational period should be anticipated by the HMRP manager.

7.4.7.2.1 The first choice for HMRP managers should be to relieve team personnel with other team members. Personnel rotations should be anticipated far in advance, and HMRP managers should have systems in place to recall off-duty personnel.

7.4.7.2.2 Mutual-aid resources are another source of relief for on-scene personnel. HMRP managers should be familiar with existing mutual-aid systems and available resources prior to calling for these resources to sustain operations at an existing emergency incident. Some mutual-aid relationships might require advance agreements outlining the provision and sharing of services prior to deploying to incidents.

7.4.7.2.3 Local and regional resources can be another source of personnel to sustain or enhance incident operations. These can include other emergency services agencies, private hazardous materials teams, military units proficient in hazardous materials response, and other like resources. HMRP managers should be familiar with these types of resources prior to requiring assistance from such services.

7.4.7.2.4 The Emergency Management Assistance Compact (EMAC) was established by Congress in 1996 and serves as a national state-to-state mutual-aid system. HMRP are subject to EMAC requests and can be requested to deploy to large-scale events of national significance. HMRP managers should be familiar with the EMAC system and seek guidance from their superiors as to whether their team can be deployed within this compact.

7.4.7.3 HMRP managers should develop and maintain demobilization plans as part of their team practices and documentation.

7.4.7.3.1 Record keeping is an important part of HMRP deployments. Based on the type, length, and complexity of the incident, team members might have to produce documentation after the incident, including, but not limited to, incident action plans (IAP), entry and medical records, payroll records, maintenance records, and so forth. HMRP managers should develop record-keeping requirements and systems prior to team deployments and maintain a system for the collection and review of such documentation following deployments.

7.4.7.3.2 HMRP managers should develop a process to conduct a postincident analysis following deployment to emergency incidents. A postincident analysis can provide an opportunity to review incident information and operations and to improve future team operations.

7.4.8 Compensation and Benefits. Where applicable, HMRP personnel management should include provisions for compensating team members and providing for their assigned benefits. HMRP managers should develop budget information on the compensation and benefit requirements of team members. Budgeting for compensation should include anticipating the deployment of team members and any associated overtime costs.

7.4.8.1 HMRP members can work under collective bargaining agreements that outline compensation and benefit requirements, including overtime provisions and working conditions. HMRP managers who have personnel working within collective bargaining agreements should be familiar with the provisions contained in these agreements and their associated responsibilities in managing such personnel.

7.4.8.2 Some team members might be subject to nonmonetary compensation for team activities. These can include compensation time and/or a variable work schedule.

7.4.8.3 Many HMRP members are covered under workers compensation regulations. If a team member suffers a duty-

related injury, the HMRP manager or his or her designee might be responsible for filing initial reporting documentation and managing the worker's compensation case to a conclusion.

7.4.9 Member Maintenance. Responses to hazardous materials/WMD incidents should include provisions to ensure the well-being of responders before, during, and after their designated actions are executed. Member maintenance incorporates a number of subcategories that in aggregate are designed to address the legal requirements set forth in applicable standards, but beyond the letter of the law are designed to ensure the well-being of personnel. Incorporated in this topic are 29 CFR 1910.120, 29 CFR 1910.134, and 29 CFR 1910.1020, as well as any employer's internal standards regarding the subject.

7.4.9.1 Respiratory Protection Program. Title 29 CFR 1910.134(c) requires that an employer develop and implement a written respiratory protection program where workplace conditions necessitate the use of a respirator to protect the health of the employee — hazmat teams also fall under this requirement. The respiratory protection program should be administered by trained and experienced individuals and should address respirator selection; annual fit-testing procedures; breathing-air quality; procedures for use, care, and cleaning of respirators; employee training; evaluation of program effectiveness; and medical evaluations to determine the employees' ability to don the required respirator.

7.4.9.1.1 It should be noted that the requirements in 29 CFR 1910.134(c) for use of a respirator do not require the employee to receive an annual medical examination. However, the Occupational Safety and Health Administration (OSHA) places the responsibility on the employer and the examining health care professional to determine the frequency and content of medical evaluations for each employee. Type and content of medical evaluations depend on the strenuousness of the work being performed, the type and frequency of respirator use, and the physical and medical condition of the employee as determined by the evaluating physician, as well as any physical and medical issues reported by the employee.

7.4.9.2 Medical Surveillance. Title 29 CFR 1910.120 (a)(1)(i) through (a)(1)(iv) defines the operational arenas in which employees fall under the routine medical surveillance program. Section (q)(9) incorporates hazmat team members and mandates the minimum requirements for an organization's/employer's medical surveillance program. It should be noted that the type of medical surveillance is based on roles filled during a response. Not all personnel have to have the same type of medical surveillance. However, this is a nonissue where all members of the team are trained to the same level [e.g., use of personal protective equipment (PPE)]. Medical surveillance is an annual requirement per Section (q)(9), unless the attending physician believes a longer interval is acceptable. In no case can the period between physicals exceed 2 years.

7.4.9.2.1 OSHA requires anyone who leaves the HMRP for any reason to have a physical examination on departure, unless an annual or biennial physical was conducted within 6 months of exiting, in which case it can be used to fulfill the requirement.

7.4.9.2.2 Medical examinations, including what might be in existence in an employee's file, should be conducted with detailed emphasis related to the handling of hazardous materials and their accompanying health hazards, as well as fitness for

duty, including the ability to wear any PPE that might be required.

7.4.9.3 Record Keeping. Record keeping is addressed in 29 CFR 1910.120(f)(8), and retention periods specified in 29 CFR 1910.1020(d)(1)(i) and (d)(1)(ii) require that medical records and exposure records be retained for 30 years beyond termination of employment.

7.4.9.3.1 Medical and exposure records should include, at a minimum, the following:

- (1) Employee name and Social Security number
- (2) Physician's written opinions, recommended limitations, and results of examinations and tests
- (3) Any employee medical complaints related to exposure to hazardous substances
- (4) A copy of the information provided to the examining physician by the employee

7.4.9.4 Personnel Exposures. Employers should, upon notification that an employee is experiencing signs or symptoms of exposure, provide the employee access to additional medical surveillance.

7.4.9.5 Treatment. Employees who undergo treatment for an exposure or injury should receive said treatment at no cost to them, with no loss of pay. Treatment should be performed by or under the supervision of a licensed physician at a reasonable time and place.

7.4.9.6 Follow-up. Follow-up medical surveillance and treatment by the examining physician should be provided as necessary. Additional medical surveillance could also be required under 29 CFR 1910 Subpart Z depending on the nature and extent of the exposure.

7.5 Supply Management. Supplies are defined as nonequipment, expendable related resources (e.g., pH paper or colorimetric tubes) that an HMRP could need to complete its mission.

7.5.1 The acquisition and maintenance of supplies is a key aspect of managing an HMRP. The amount of HMRP supplies can be significant in scope, number, and size, depending on the HMRP's mission. It is important that HMRPs are stocked with needed supplies and that these supplies be maintained in various locations, including at the same location as response units, on response vehicles, at vendor warehouses, and/or in storage buildings. Some supplies might have a defined shelf life that should be identified and handled according to a defined process for their management and restocking.

7.5.2 Supplies related to hazardous materials/WMD incident responses might be of a specialized nature with a limited number of vendors for such items. HMRP managers should ensure that vendor relationships are established to provide quick and efficient restocking of expended supplies. HMRP managers and personnel assigned to manage team supplies should be familiar with specific purchasing oversight requirements related to purchasing any supplies that are subject to municipal and/or organizational purchasing laws, regulations, and/or processes. They should be familiar with advance prequalification and approval requirements per government regulations and industry purchasing practices. Where required by these regulations and practices, standing purchasing agreements need to be developed and maintained with approved

vendors. Some might involve competitive bidding activities and require formal, contractual relationships with vendors.

7.5.3 HMRP managers should develop internal processes to ensure that team supplies are identified, maintained, and restocked. Mission-critical supplies should be noted as such in an inventory system and processes for rapid restocking should be developed.

7.5.4 Proper documentation of inventory and use is an important aspect of supply management. A thorough and complete record-keeping system should be established and maintained by HMRP managers to ensure that supply management is documented.

▲ **7.5.5** Supplies should be stored and maintained in suitable facilities. Many HMRPs maintain the supplies at the same location as response units to facilitate restocking after responses, exercises, or training. Regardless of location, supply storage facilities should be secure and appropriate for the type and amount of supplies being maintained. Some supplies require climate-controlled storage and all should be stored and maintained in suitable facilities, which should be secure and appropriate for the type and quantity maintained. HMRP managers should anticipate the needs related to emergency and routine transportation from remote storage. Plans to manage all such circumstances should be developed.

7.6* National Incident Management System (NIMS) and Resource Management.

7.6.1 NIMS. The NIMS command and management component stresses effective and efficient incident management and coordination via a flexible, standardized incident management structure. This structure should include the incident command system, multiagency coordination systems, and public information.

7.6.2 NIMS Resource Management. NIMS also emphasizes that careful resource management is essential before, during, and after incidents. NIMS emphasizes standardized resource management practices such as typing, inventory control, organizing, and tracking to allow for effective sharing and integration of critical resources across organizations/jurisdictions.

7.6.3 Preparedness and Response. In accordance with NIMS, the resource management process can be separated into two parts: resource management as an element of preparedness and resource management during an incident. The preparedness activities (e.g., resource typing, credentialing, and inventorying) are conducted on a continual basis to help ensure that resources are ready to be mobilized if called to an incident.

Chapter 8 Staffing

8.1 Scope. This chapter applies to those organizations or jurisdictions responsible for organizing, managing, and sustaining a hazardous materials/weapons of mass destruction (WMD) response program (HMRP) and provides guidance to evaluate personnel resources required to staff the program.

8.2 Purpose. This chapter addresses the various deployment options, team typing, and recommendations for specialty personnel or allied professionals.

8.3 Deployment of Personnel. Each staffing solution has benefits and limitations. Deployment of personnel should take into account jurisdictional risk assessment, response times,

financial considerations, program capabilities, automatic and mutual-aid agreements, and policies and procedures of the authority having jurisdiction (AHJ). Deployment models include the following:

- (1) *Response model.* In this model, daily staffing levels should be based on a jurisdictional risk analysis relative to hazardous materials/WMD incidents.
- (2) *Staffing model.* The HMRP should determine the staffing model that best meets the needs and resources of the organization/jurisdiction. Staffing model types include the following:
 - (a) *Dedicated staffing model.* In this model, personnel are assigned to a unit with a primary mission to respond to hazardous materials/WMD incidents. Personnel in this model have a specialized mission with specific training requirements instead of other response tasks, but this could include additional staffing to cover areas of specialty, which can increase program costs.
 - (b) *Cross-trained staffing model.* Cross-trained personnel can be assigned to more than one type of response unit in a single location and have multiple response duties. The nature of the incident drives staffing decisions. This model might allow for more flexibility in staffing but adds multiple responsibilities that can impact training and the ability to maintain proficiency. Other benefits might include reduced staffing levels, greater flexibility, increased capabilities, and program cost savings; however, maintaining the proficiency of personnel to multiple response tasks could be an issue, as well as unstaffed units or delayed response.
 - (c) *Regional response staffing model.* In this model, personnel from multiple agencies or organizations staff an HMRP to respond to an incident within a given or designated geographic area. With the regional response model, personnel from multiple agencies or organizations respond to an assembly point to gather supplies, equipment, and other necessary resources to respond to an incident. This model offers greater flexibility, increased capabilities, access to personnel with varied experience and specialties, and program cost savings. However, it might prove difficult to maintain the proficiency of personnel from multiple agencies and organizations due to interagency dynamics and logistics. Also, personnel with multiple response task(s) might not be available, which could result in understaffed units or delayed response.
 - (d) *Mission-specific or augmented staffing model.* Mission-specific response personnel or units are trained to supplement or augment any model. This model can allow for expanded capabilities at the operations level, additional staffing, maintaining proficiency, and program cost savings. Some limitations of this model include the logistics needed to train and supply more units and personnel, additional command and control elements, and coordinating operations.
 - (e) *Mutual-aid staffing model.* In this model, agencies provide or receive assistance from other organizations or jurisdictions for hazardous materials/WMD incidents. This staffing model should require written mutual-aid agreements that specify types of assis-

tance and cost reimbursement considerations. Mutual-aid benefits include increased flexibility and expanded capabilities, and program cost savings. However, some limitations of this model include “availability-only” mutual-aid based on jurisdictional requirements or needs, and varying levels of training, experience, and competence.

- (f) *Contract service staffing model.* Here, personnel from outside contractors are utilized to augment the staffing and response capabilities of an HMRP. This model can provide reduced staffing costs, greater flexibility, increased capabilities, and program cost savings. However, this model might also include extra liability because contracted personnel might not be trained and equipped for the incident, insured, or bonded, and a delay in response is possible because of availability of resources.

8.4 Resource Typing and Specialty Personnel or Allied Professionals.

8.4.1 Resource Typing Categories. Resource typing categorizes and describes the capacity and capability of a specific resource. Resource typing can impact staffing levels, deployment of personnel, program sustainability, and recruitment and retention where trying to maintain a specific level of resource for an HMRP.

8.4.2 Resource Typing Staffing Levels. Resource typing can assist HMRP managers and enhance emergency response readiness through consistent staffing levels, a standard equipment list, and recommended levels of training for personnel. Where available during a hazardous materials/WMD incident, command and control can identify and track resources by type and kind.

8.4.3 Specialty Personnel or Allied Professionals. HMRP managers should be aware of the capabilities of other HMRPs. Capabilities might include specialized resources and personnel that could be deployed. Specialty personnel can come from private industry, the Department of Defense (DOD), and other sources. Staffing levels can vary due to funding or other influences. HMRP managers should be aware of the availability of such resources. Chapter 14 of NFPA 470 offers detailed information on specialty employees and the conditions under which they could be utilized at a hazardous materials/WMD incident.

Chapter 9 Training

9.1 Scope. This chapter applies to those organizations and jurisdictions responsible for organizing, managing, and sustaining a hazardous materials/weapons of mass destruction (WMD) response program (HMRP) and provides guidance for the development of a comprehensive training program.

9.1.1* A training program should serve as the source of personnel training and should include a means for evaluating personnel competence as required by Occupational Safety and Health Administration (OSHA) regulations and NFPA standards.

9.1.2 A training program should provide accurate, relevant, and engaging training that is challenging and worthwhile to HMRP personnel.

9.2 Purpose. This chapter addresses training levels, competencies, and refresher training; training program development;

instructional design; training delivery models and methodologies; training facilities, equipment, and props; selecting competent instructors; training and exercise safety; and training records management in support of an HMRP.

9.3 Levels of Hazardous Materials Training. HMRP managers determine the level of training needed for the program and its support elements. Training should be based on risks assessed by the authority having jurisdiction (AHJ), tasks to be performed time available for training, and financial commitment from the AHJ.

9.3.1 Hazardous Materials Training Standards and Regulations.

9.3.1.1 There are three sources for determining hazardous materials training levels: OSHA, the Environmental Protection Agency (EPA), and NFPA. Title 29 CFR 1910.120 and 40 CFR 311 are laws and NFPA 470 is a voluntary consensus standard for hazardous materials emergency response. Hazardous materials personnel that train to the competencies set forth in NFPA exceed those established by OSHA or EPA regulations.

9.3.1.2 Title 29 CFR 1910.120 is a regulation enforced by OSHA. Violations can result in fines against the AHJ and/or individuals within the AHJ. Title 29 CFR 1910.120 defines the levels of training for hazardous materials emergency responders in paragraph (q)(6). Promulgated in 1990, the regulation recognizes 5 levels of training: first responder awareness level, first responder operations level, hazardous materials technician, hazardous materials specialist, and on-scene incident commander.

9.3.1.3 Title 40 CFR 311 is a mirror of 29 CFR 1910.120 and applies to all employees in states that do not have a state-specific OSHA plan. Title 40 CFR 311.2 defines an employee as either a compensated or noncompensated worker controlled by a state or local government, which includes volunteer public safety agencies. Title 40 CFR 311 incorporates 29 CFR 1910. Further references to 29 CFR 1910.120 in this document include 40 CFR 311.

9.3.1.4 NFPA 470 is a voluntary consensus standard that defines minimum competencies for personnel responding to hazardous materials/WMD incidents.

9.3.2 Awareness Level.

9.3.2.1 Awareness-Level Personnel. Awareness-level personnel are personnel who, in the course of normal duties, could encounter an emergency involving hazardous materials/WMD and who are expected to recognize the presence of the hazardous materials/WMD, protect themselves, call for trained personnel, and secure the scene. (See also NFPA 470.)

9.3.2.2 First Responder Awareness Level. First responders at the awareness level are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response by notifying authorities of the release and taking no further action. First responders at the awareness level should have sufficient training or experience to demonstrate competency in the following areas [see also 29 CFR 1910.120(q)(6)]:

- (1) An understanding of what hazardous substances are and the risks associated with them in an incident
- (2) An understanding of potential outcomes associated with an emergency where hazardous substances are present

- (3) The ability to recognize the presence of hazardous substances in an emergency
- (4) The ability to identify a hazardous substance, if possible
- (5) An understanding of the role of first responder at the awareness level in an employer's emergency response plan (ERP), including site security and control, and the US Department of Transportation's (DOT) *Emergency Response Guidebook*
- (6) The ability to recognize the need for additional resources and to notify the communications center

Δ 9.3.2.3* Delivery of Awareness-Level Training. Awareness-level personnel are not emergency responders but could encounter hazardous materials as part of their assigned duties. OSHA and NFPA 470 do not state that awareness-level training is necessary for anyone expected to respond to and deliver emergency response services at a hazardous materials/WMD incident.

9.3.2.3.1* Neither OSHA nor NFPA place a time factor on awareness-level training. The expectation is that upon the completion of training, personnel should have an understanding of the hazards associated with hazardous materials/WMD and know how to contact the appropriate response agency to deal with the situation. The HMRP manager should design an evaluation process for personnel. The instruction time varies based on a gap analysis and the number of personnel in class.

9.3.2.3.2 Title 29 CFR 1910.120 Appendix E(C)(b)(1)(F) states first responder awareness-level personnel should know the first responder awareness-level competencies covered in NFPA 470.

9.3.3 Operations Level.

Δ 9.3.3.1 Operations-Level Responders. Operations-level responders are personnel who respond to hazardous materials/WMD incidents to implement or support actions to protect nearby persons, the environment, or property from effects of a release. (See also NFPA 470.)

Δ 9.3.3.2 Operations-Level Mission-Specific Competencies. Operations-level mission-specific competencies are the knowledge, skills, and judgment needed by operations-level responders designated by the AHJ to perform mission-specific tasks, such as decontamination, victim/hostage rescue and recovery, evidence preservation, and sampling. (See also NFPA 470.)

9.3.3.3 First Responder Operations Level. First responders at the operations level are personnel who are part of the initial response to the site of releases or potential releases of hazardous substances to help protect people, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operations level should have at least 8 hours of training or sufficient experience to demonstrate competency in the following areas, in addition to those at the awareness level [see also 29 CFR 1910.120(q)(6)]:

- (1) Basic hazard and risk assessment techniques
- (2) How to select and use personal protective equipment (PPE) at the first responder operations level
- (3) Basic hazardous material terms
- (4) How to perform basic control, containment, and/or confinement operations with available resources and PPE
- (5) How to implement basic decontamination procedures

- (6) Relevant standard operating procedures (SOPs) and termination procedures

Δ 9.3.3.4* Delivery of Operations-Level Responder Training. Operations-level training is defined in NFPA 470 and includes personnel who respond to hazardous materials incidents. If personnel are sent to a hazardous materials incident, they need to be trained at or above the operations level. Personnel trained to the operations level can perform defensive actions at a hazardous materials/WMD incident. NFPA 470 states that operations-level personnel respond to hazardous materials/WMD incidents to protect people, property, or the environment from the effects of the release. NFPA 470 divides operations-level personnel into the following two categories:

- (1) Competencies for operations-level responders apply to all operations-level responders. (See Chapters 6 and 7 of NFPA 470.)
- (2) Competencies for operations-level responders assigned mission-specific competencies apply to operations-level responders wearing PPE, performing decontamination, or conducting other mission-specific tasks at hazardous materials incidents. (See Chapters 6 through 9 of NFPA 470.)

9.3.3.4.1 Title 29 CFR 1910.120 places a minimum time requirement on first responder operations-level training. OSHA requires that first responder operations personnel complete at least 8 hours of training or have enough experience to demonstrate competency in the identified areas.

9.3.3.4.2 The HMRP manager should design an evaluation process to track the progress of personnel in operations-level training. Operations-level training that meets the competencies in Chapters 8 and 9 of NFPA 470 also meets the OSHA first responder operations level as defined in 29 CFR 1910.120(q)(6)(ii). To meet the NFPA 470 competencies of an operations-level responder, additional training could be required beyond the 8 hours referenced in 29 CFR 1910.120.

9.3.3.4.3 Title 29 CFR 1910.120 Appendix E, (C)(b)(2)(H) states that first responder operations-level personnel should be aware of and know the first responder operations-level competencies covered in NFPA 470.

9.3.4 Operations-Level Responder with Mission-Specific Competencies (MSCs).

Δ 9.3.4.1* Delivery of Operations-Level Responder Mission-Specific Training. In NFPA 470, operations-level MSCs are designed to provide operations-level responders with the knowledge and skills to perform mission-specific responsibilities in a safe and effective manner. Any personnel expected to perform defensive actions in a hot zone or any action in a warm zone should receive operations-level responder training and any requisite MSCs. The AHJ determines the appropriate MSC based on the mission of the emergency responder. Personnel that need MSC training should achieve all the competencies listed in Chapters 4 and 6 of NFPA 470 prior to being trained in the MSCs. The mission-specific competencies set forth in NFPA 470 are based on the operations competencies and any competencies based on the specific mission and tasks of the HMRP. OSHA does not have an equivalency to the NFPA 470 mission-specific competencies; however, they are covered in 29 CFR 1910.120(q)(6)(ii).

9.3.4.2 MSCs — PPE. The operations-level responder assigned to use PPE should be competent at the operations-

level use of PPE at hazardous materials/WMD incidents. This MSC is necessary for any responder as all MSC levels use PPE.

9.3.4.3 MSCs — Mass Decontamination. The operations-level responder assigned to perform mass decontamination at hazardous materials/WMD incidents should be competent at operations-level mass decontamination operations at hazardous materials/WMD incidents.

9.3.4.4 MSCs — Technical Decontamination. The operations-level responder assigned to perform technical decontamination at hazardous materials/WMD incidents should be competent at operations-level technical decontamination operations at hazardous materials/WMD incidents. Technical decontamination is contamination removal to a level that is as low as reasonably achievable (ALARA) on responders wearing PPE.

9.3.4.5 MSCs — Evidence Preservation and Sampling. The operations-level responder assigned to perform evidence preservation and public safety sampling should be competent at operations-level forensic evidence preservation, sample collection, and/or evidence seizure at hazardous materials/WMD incidents involving potential violations of criminal statutes or governmental regulations. Evidence collection is performed by a law enforcement responder or under the guidance of law enforcement. Public safety samples can be collected by any responder authorized by the AHJ to assess incidents for potential threats to public safety.

9.3.4.6 MSCs — Product Control. The operations-level responder assigned to perform product control should be competent at operations-level implementation of product control measures at hazardous materials/WMD incidents. This MSC is only designed for defensive actions, such as damming or diking, and the application of Class B foams. Advanced product control, such as the application of patching kits, falls under the skill set of hazardous materials technicians.

9.3.4.7 MSCs — Air Monitoring and Sampling. The operations-level responder assigned to perform air monitoring and sampling should be competent at operations-level air monitoring and sampling operations at hazardous materials/WMD incidents. This MSC applies to air monitoring and detection devices that do not need direct contact with hazardous substances.

9.3.4.8 MSCs — Victim Rescue and Recovery. The operations-level responder assigned to perform victim rescue and recovery should be competent at operations-level rescue and recovery of exposed and contaminated victims at hazardous materials/WMD incidents.

9.3.4.9 MSCs — Response to Illicit Laboratory Incidents. The operations-level responder assigned to respond to illicit laboratory incidents should be competent at operations-level security at hazardous materials/WMD incidents involving potential violations of criminal statutes specific to the illegal manufacture of methamphetamines, other drugs, or WMD, as well as identifying the laboratory or process, and preserving evidence.

9.3.4.10 MSCs — Improvised WMD Dispersal Device Disablement/Disruption and Operations at Improvised Explosive Laboratories. The operations-level responder assigned to interrupt the functioning of an improvised WMD dispersal device or conduct mitigation procedures on energetic materials should be competent at operations-level disablement and/or disruption procedures on improvised explosive devices

(IEDs) or WMD dispersal devices. This MSC is designed for a responder certified as a hazardous devices technician through the Federal Bureau of Investigation's (FBI) hazardous devices school or the Department of Defense (DOD).

9.3.4.11* Competency Evaluation. The HMRP manager should design an evaluation process to track the progress of personnel in operations-level training. Instruction time varies based on a gap analysis and the number of personnel in the class. NFPA 470 operations-level responder mission-specific competency training requires additional training time beyond the 8 hours referenced in 29 CFR 1910.120.

9.3.5 Technician Level.

9.3.5.1 Hazardous Materials Technician. A hazardous materials technician responds to hazardous materials/WMD incidents using a risk-based response process to analyze problems involving hazardous materials/WMD, select decontamination procedures, and control a release using specialized PPE. (See also NFPA 470.)

9.3.5.2 Hazardous Materials Technician. Hazardous materials technicians respond to releases or potential releases to stop the release. They assume a more aggressive role than an operations-level first responder in that they approach the point of release to plug, patch, or otherwise stop the release of a hazardous substance. Hazardous materials technicians should have at least 24 hours of training equal to the first responder operations level and competency in the following areas [see also 29 CFR 1910.120(q)(6)]:

- (1) How to implement the employer's ERP
- (2) How to classify, identify, and verify known and unknown materials using field survey instruments and equipment
- (3) How to function within an assigned role in the incident command system (ICS)
- (4) How to select and use proper specialized chemical PPE
- (5) Hazard and risk assessment techniques
- (6) How to perform advanced control, containment, and/or confinement operations with available resources and PPE
- (7) How to implement decontamination procedures
- (8) Termination procedures
- (9) Basic chemical and toxicological terminology and behaviors

9.3.5.3 Delivery of Hazardous Materials Technician Training. Personnel expected to perform offensive actions at a hazardous materials/WMD incident should meet the requirements of hazardous materials technician-level training in 29 CFR 1910.120(q)(6)(iii). Such personnel can include the following:

- (1) Hazmat team members tasked to perform product control
- (2) Responders who perform advanced risk assessment and presumptive identification on hazardous materials within hazardous environments
- (3) Bomb squad members tasked to perform render-safe actions that can affect container integrity or change the stability of hazardous materials
- (4) Members of railroad, trucking, or other related industries performing product control or transfer at emergency incidents
- (5) Fire brigade members tasked to perform product control

9.3.5.3.1* The HMRP manager should design an evaluation process to track the progress of personnel in technician-level training. Title 29 CFR 1910.120 places a minimum time

requirement on technician-level training by requiring OSHA hazardous materials technicians to complete at least 24 hours at a level equal to OSHA first responder operations level.

9.3.5.3.2 Title 29 CFR 1910.120 Appendix E, (C)(b)(3)(H) states that hazardous materials technicians should be aware of and know the hazardous materials technician-level competencies covered in NFPA 470.

9.3.6 Specialist Employees. Chapter 9 of NFPA 470 defines the role of specialist employees as subject matter experts (SMEs) within an organization. NFPA 470 defines three levels of specialist employee. Personnel should have documented demonstration of competency in their specific area of expertise.

9.3.6.1 Specialist Employee A. Specialist employee A is trained to handle incidents involving chemicals or chemical containers used in an organization and who can analyze an incident involving any or all such chemicals. The specialist employee A is trained to the specialist employee C and hazardous materials technician level. The specialist employee A can plan a response to an incident, operate under the incident command system (ICS) to implement the planned response, and evaluate the results within the capabilities of the available resources consistent with ERPs and/or SOPs.

9.3.6.2 Specialist Employee B. Specialist employee B is trained in the hazards of specific chemicals or chemical containers and who responds to incidents involving these chemicals or chemical containers. The specialist employee B can gather and record information, provide technical advice, provide technical assistance for the technical decontamination process, employ federal or provincial regulations, develop an incident action plan (IAP), and perform assigned actions consist with ERPs and/or SOPs.

9.3.6.3 Specialist Employee C. Specialist employee C is trained to respond to emergencies involving hazardous materials/WMD and/or hazardous materials/WMD containers in an organization and can gather and record information, provide technical advice, and arrange for technical assistance.

9.3.6.4 Specialist Employee. Specialist employees, in the course of their regular job duties, work with and are trained in the hazards of specific hazardous substances, and can provide technical advice or assistance at a hazardous substance release incident. Specialist employees should receive training required by 29 CFR 1910.120(q)(5) and not 29 CFR 1910.120(q)(6), and should demonstrate their competency annually. [See also 29 CFR 1910.120(q)(5).]

9.3.7 Hazardous Materials Technician with Specialty. The following are examples of hazardous materials technician specialties (see also NFPA 470):

- (1) Hazardous materials technician with a tank car specialty
- (2) Hazardous materials technician with a cargo tank specialty
- (3) Hazardous materials technician with an intermodal tank specialty
- (4) Hazardous materials technician with a marine tank and non-tank vessel specialty
- (5) Hazardous materials technician with a flammable liquids bulk storage specialty
- (6) Hazardous materials technician with a flammable gases bulk storage specialty

- (7) Hazardous materials technician with a radioactive materials specialty

9.3.7.1* Hazardous Materials Specialist. Hazardous materials specialists respond with and support hazardous materials technicians. Their duties parallel those of hazardous materials technicians; however, the duties of a technician require a more direct or specific knowledge of the substances they can be called on to contain. A hazardous materials specialist also acts as the site liaison with federal, state, local and other government authorities with regards to site activities. Hazardous materials specialists should have at least 24 hours of technician-level training and be competent in the following areas [see also 29 CFR 1910.120(q)(6)]:

- (1) How to implement the local ERP
- (2) How to classify, identify, and verify known and unknown materials using survey instruments and equipment
- (3) The state ERP
- (4) How to select and use specialized chemical PPE
- (5) In-depth hazard and risk techniques
- (6) How to perform specialized control, containment, and/or confinement operations with available resources and PPE
- (7) How to determine and implement decontamination procedures
- (8) How to develop a site safety and control plan
- (9) Chemical, radiological, and toxicological terminology and behaviors

9.3.8 Incident Commanders. Chapter 8 of NFPA 470 defines incident commander as the person responsible for all incident activities, including strategies and tactics, and resources as designated by the AHJ. (See also NFPA 470.)

9.3.8.1 On-Scene Incident Commander. Incident commanders who assume control of an incident scene beyond the first responder awareness level should have at least 24 hours of first responder operations-level training and show competency in the following areas [see also 29 CFR 1910.120(q)(6)(v)]:

- (1) How to implement an employer's ICS
- (2) How to implement an employer's ERP
- (3) The hazards and risks associated with working in chemical protective clothing
- (4) How to implement the local ERP
- (5) The state ERP and the federal regional response team
- (6) Decontamination procedures

9.3.9 Hazardous Materials Officer. The hazardous materials officer, or, according to the National Incident Management System (NIMS), the hazardous materials branch director/group supervisor, is responsible for directing and coordinating all operations involving hazardous materials/WMD as assigned by the incident commander. Hazardous materials officers should show competency for awareness level, operations-level responder, hazardous materials technician, and hazardous materials officers as defined in NFPA 470.

9.3.9.1 OSHA does not have an equivalent competencies for a hazardous materials officer.

9.3.10 Hazardous Materials Safety Officer. The hazardous materials safety officer, or, according to NIMS, the assistant safety officer — hazardous material, works within an incident command system (ICS), specifically, the hazardous material branch/group, to ensure that recognized hazardous materials/WMD safe practices are followed at hazardous mate-

rials/WMD incidents. Chapter 11 of NFPA 470 defines the competencies of a hazardous materials safety officer.

9.3.10.1 OSHA does not have equivalent competencies for a hazardous materials safety officer.

9.4* Establishing Training Level. HMRP managers determine the level of training needed for a program. An objective assessment should be made based on the expected mission and assigned tasks of personnel. The HMRP manager should understand the commitment necessary to train and maintain competency at the hazardous materials technician level.

9.4.1 Other Hazardous Materials/WMD Position Training. NFPA 470 defines several other hazardous materials/WMD responder positions for personnel assigned to an HMRP. Each position carries additional mandates for training and competency demonstration. The AHJ should assess organizational needs for these positions and identify the best method for competency demonstrations.

9.5 Annual Competencies and Refresher Training. The HMRP manager should ensure that personnel retain knowledge and show competency on an annual basis.

9.5.1* OSHA Requirements for Refresher Training. Title 29 CFR 1910.120(q)(8) states that employees are required to receive training that is of sufficient content and length to maintain or demonstrate competency in the area of certification on at least an annual basis. Refresher training should include knowledge-based and competency training consistent with a job task analysis for the employee.

9.5.2 NFPA Requirements for Refresher Training. NFPA 470 does not specify a refresher/training requirement. NFPA 470 identifies the objectives and abilities required for a responder to be considered competent. NFPA 470 defines competence as possessing knowledge, skills, and judgment needed to perform indicated objectives and assigned tasks.

9.6 Training Program Development. Training development programs should be based on the needs of the organization. HMRP managers should ensure that training programs meet all regulatory requirements and operational needs of the team. External, internal, or electronic programs, or any combination thereof, can be used to deliver training programs.

9.6.1* External Training Programs. External training programs are programs developed and delivered by agencies or individuals outside of the AHJ.

9.6.2* Internal Training Programs. Internal training programs are programs or instructional curricula developed and delivered by individuals within the AHJ.

9.7 Instructional Design. Proper training curricula is the cornerstone of a successful training program. Training should focus on the transfer of skills and knowledge and that education is a professional process.

9.7.1* Training curricula should follow a consistent instructional design process that meets the needs of the AHJ and can withstand scrutiny for regulatory and accreditation purposes.

9.7.1.1 Planning. The planning phase looks at training from a strategic level, assessing the needs of the AHJ, the training scope, developmental resource needs, scheduling, and budgets. HMRP managers should weigh the benefits of internal develop-

ment against available financial, staffing, and logistical resources.

9.7.1.2 Analysis. Every training project should contain an analysis of the factors that can impact course development. The analysis should concentrate on identifying gaps in the AHJ's response capabilities; the current relevant and available instruction; and the knowledge, skills, and abilities of trainees. Examples of analysis factors include the following:

- (1) *Audience analysis:* An analysis of which personnel should attend training and any challenges in getting personnel to the training event
- (2) *Job task, or work, analysis:* An analysis of job tasks and how the training applies to the trainee's job
- (3) *Learner, or learner gap, analysis:* An analysis of the trainee's current knowledge, skills, and abilities with regard to the training subject

9.7.1.2.1 Analysis review can be accomplished using a variety of tools, including surveys, interviews, group sessions, and other similar techniques. It is often beneficial to include agency stakeholders (e.g., supervisors, administrators, external peers, and so forth) where performing learner and job task analysis. Where performing analysis, the curriculum designer should ensure that a sufficient number of trainees are included in the discussion.

9.7.1.3 Design. Once the analysis tools are complete, the training product design can begin. During the design phase, decisions are made regarding training components and delivery methods to bridge any gaps discovered during the analysis phase. Often, the design phase is captured in a design document. Design document elements can include the following:

- (1) The training goal
- (2) Training objectives
- (3) Performance targets
- (4) Results of all analysis tools
- (5) Statutory and regulatory requirements
- (6) Training prerequisites
- (7) A list of course materials (e.g., visuals, handouts, evaluation tools)
- (8) Instructional strategies and models (e.g., classroom, practical sessions, group sessions, e-learning)
- (9) Evaluation strategies
- (10) Plan to implement the training

9.7.1.3.1 The design phase is complete when the curriculum development team understands how the training product looks, who should attend, how to deliver the training, and how transfer of skills and knowledge is measured.

9.7.1.4 Development. Once the design phase is complete, development of the training product can begin. During the development phase, course materials are researched and written, visual aids are created, practical skill sessions are developed, training aids and props are built, evaluation tools are written and validated, student and instructor handbooks are designed, and any courses for computer or web-based delivery are loaded into an electronic format.

9.7.1.4.1 An instruction or lesson plan should be developed to deliver the course, including goals and objectives, materials needed, and instructor guidance. The lesson plan should be written so that any instructor knowledgeable in the topic can deliver the course. As the development phase proceeds, the

curriculum development team should reference elements of the design phase.

9.7.1.5 Implementation. Once the course materials are developed, the implementation phase begins. The curriculum development team might decide to offer a pilot course to evaluate the course. A pilot course provides an opportunity to ensure the quality and consistency of the course material, visual aids, practical sessions, evaluation tools, and overall flow of the material.

9.7.1.5.1 Delivery of the training course should be coordinated so that HMRP personnel can attend and participate in all classroom and practical sessions. The instructional team should ensure that all tools and materials identified during the design and development phases are available for implementation. The trainee should be given all course materials to review after delivery. Instructors should measure the trainee-to-instructor ratio to maintain control of the learning environment.

9.7.1.6 Evaluation. Once the training program is implemented, the evaluation phase can begin. HMRP managers should determine the appropriate methodology to measure competency. During the design phase, the curriculum development team should have identified the level of evaluation needed to assess transfer of skills and knowledge.

9.8* Training Delivery Models. During the design phase, the curriculum development team should determine the best model of delivery for the training program. Although each method of delivery has its advantages, successful training programs often use a blended format of several different models to offer a variety to the trainee. The following are the most common types of delivery models:

- (1) *Instructor-led classroom lecture:* This model is suited for large-group delivery of technical material. However, it is not useful for evaluating competency.
- (2) *Instructor-facilitated discussion:* This model is suited for large-group delivery of technical material where immediate feedback is desired. However, it is not efficient for evaluating competency.
- (3) *Instructor-led demonstration:* This model is suited for large-group demonstrations of visual concepts, such as chemical and physical property demonstrations. However, it is not useful for evaluating competency.
- (4) *Self-paced learning:* This model is suited for research-type work. This model can be used for competency skills evaluation.
- (5) *Small-group lecture:* This model is suited for delivery of technical information where a smaller instructor-to-trainee ratio is desired. However, it is not efficient for evaluating competency.
- (6) *Small-group demonstration:* This model is suited for equipment demonstrations where trainees need to be in close proximity of the instructor. This model can be used as an evaluation tool.
- (7) *Practical skill sessions:* This model is suited for hands-on experience and can be used for competency evaluation if planned by the instructor team.
- (8) *Web-based or computer-based e-learning:* This model is suited for individual delivery of written material and can be used for evaluation of written competency.
- (9) *Simulation:* This model is suited for individual or group training and uses electronic aids to present unique problem-solving and critical-thinking exercises.

- (10) *Scenario-based practical sessions:* This model is suited for maximum transfer of skills and knowledge and can be used for evaluating competency.
- (11) *Table-top exercises:* This model is suited for transfer of skills and knowledge on administrative tasks, such as the ICS or strategic management training, and can be used for competency evaluation if planned by the instructor team.
- (12) *Full-scale exercises:* This model is suited for maximum transfer of skills and knowledge and can be used for evaluating competency. Real-time, unannounced exercises are beneficial for maximum evaluation.
- (13) *One-on-one evaluation:* This model is best suited for evaluating individual skill competencies.

9.9 Training Delivery Methodologies and Models.

9.9.1 Competency-Based Training. OSHA and NFPA both reference the term *competency* throughout their respective documents. Title 29 CFR 1910.120 states in paragraph (q) (6) under each response level that the responder is required to demonstrate competency in each skill area referenced. NFPA 470 defines competence as possessing knowledge, skills, and judgment needed to perform indicated objectives and assigned tasks.

9.9.1.1* Various methods can be used to evaluate learning. HMRP managers should use one of the following methodologies to evaluate the competency of a team:

- (1) *Level 1 evaluation:* This evaluation level measures the *reaction* to the training delivered. This reaction is typically measured using an evaluation form. These forms provide the training program manager with feedback of the training's effectiveness from the trainee's perspective and should include questions on the content, delivery, and relevance of the training material. Evaluation forms do not prove competence, but they do help validate the training delivery.
- (2) *Level 2 evaluation:* This evaluation level measures *learning*. Learning is typically measured by a metric-based, quantifiable evaluation tool such as written tests, skills testing, or observation of performance. There are many techniques to enhance learning measurement, such as measuring pretesting prior to training delivery against posttraining testing.
- (3) *Level 3 evaluation:* This evaluation level measures changes in *behavior*. Behavior change is typically evaluated over time to ensure that knowledge, skills, and judgment are retained. Behavior change can be evaluated through retesting after a period of time or by direct performance observation.

9.10* Training Facilities. Well-designed training facilities can enhance learning. Conversely, inadequate training facilities can detract from learning. HMRP managers should work within the AHJ's budget to develop training facilities that provide safe and effective learning environments.

9.10.1* Training Props and Equipment. Meeting the NFPA 470 hazardous materials competencies requires a demonstration of skills using props and equipment that are associated with subject areas including PPE, product control, decontamination, and detection and monitoring. HMRP managers should ensure that training programs have access to equipment and props for team training and evaluation. Training props can be expensive and are often too large for existing training facilities.

ties. HMRP managers should consider developing regional training centers or partnering with stakeholders to share larger props, such as rail tank cars and tank trucks.

9.11 Selection and Competence of Instructors. HMRP managers should select the instructors to deliver training to members of the HMRP. OSHA gives general guidance for instructor competence in 29 CFR 1910.120(q)(8), stating that instructors delivering instruction on hazardous materials topics should have the following:

- (1) Successful completion of a course in training delivery
- (2) Training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills
- (3) A good command of the subject matter to be delivered

9.11.1 HMRP personnel chosen to be instructors should prepare for the training programs they deliver. As OSHA recommends, instructors should have a good command of the subject matter and should be able to deliver the material with confidence. HMRP personnel should also be encouraged to deliver team training.

9.11.2 Critical elements for adult learning include the following (see also Knowles, *The Adult Learner*):

- (1) Adults want to make decisions regarding learning (i.e., self-direction).
- (2) Adult life experiences provide a foundation for learning.
- (3) Adults should be ready to learn (i.e., have a desire to learn).
- (4) Adults want to learn things they can apply to life.
- (5) Adults are more internally, rather than externally, motivated to learn.
- (6) Adults need to understand the reason they are learning.

9.11.3 Instructors should facilitate learning based on the elements in 9.11.2 and use a variety of teaching techniques. The key is to provide an environment that encourages participants to learn.

9.12 Training and Exercise Safety.

9.12.1 During hazardous materials/WMD training, the instructor-to-student ratio should be determined by the AHJ.

9.12.1.1 During any period of instruction where students don chemical protective clothing, the instructor-to-student ratio should be modified to provide adequate safety oversight at a level determined by the AHJ.

9.12.1.2 The instructor should adjust the instructor-to-student ratio as needed based on the degree of risk and previous hazardous materials experience of the students involved.

9.12.2 Hands-on training includes a simulated work environment that permits each student to experience performing tasks, making decisions, or using equipment appropriate to the job assignment for which training is being conducted. Where training environments involve immediately dangerous to life or health (IDLH) atmospheres, additional health and safety regulations might apply.

9.12.2.1 Where hands-on training is conducted, the following safety precautions are recommended:

- (1) All participating students should have authorization of the AHJ or employer to attend.

- (2) All participating students and instructors should meet the medical clearance requirements of the training and exercise program.
- (3) A safety briefing with all students should be held prior to the start of instruction.
- (4) Instructor(s) should be present at all times during hands-on training.
- (5) Access to the community's emergency medical care system should be available.
- (6) Instructor(s) should ensure adequate breaks are taken based on level of activity and environmental conditions.

9.12.3 During a hazardous materials/WMD training session or exercise, small quantities of hazardous materials can be used to enhance the learning environment, provided the appropriate precautions are taken.

9.12.3.1 Instructors should attempt to use simulated products in place of hazardous materials wherever possible.

9.12.3.2 Hazardous materials used for training should be kept to the minimum quantity needed to achieve training objectives.

9.12.3.3 Where hazardous materials are used, the following safety precautions are recommended:

- (1) All safety recommendations for hands-on training (see 9.12.2) should be followed.
- (2) The use of hazardous materials should be approved by the hazardous materials program manager.
- (3) Products that are in violation of governmental law should not be used or created without authorization from and in close coordination with appropriate law enforcement or regulatory agencies.
- (4) Hazardous materials should be shipped or transported in a manner consistent with all governmental laws and regulations.
- (5) Approved PPE should be used based on the hazard.
- (6) An emergency decontamination area should be available based on the degree of hazard per 29 CFR 1910.151(c).
- (7) Safety data sheets (SDSs) should be available for all products used if the product's identity is not revealed to students for training purposes. (See 29 CFR 1910.1200.)
- (8) Instructors should know the identity of all products involved.
- (9) Each product involved should be labeled with a means to determine the identity of the product.

9.12.3.4 Hazardous materials not consumed during training should be stored or disposed of in compliance with governmental regulations.

9.12.4 Where an IDLH hazardous materials environment is created for training purposes, the training event should be treated as an actual hazardous materials emergency.

9.12.4.1 Students participating in hazardous materials training involving IDLH environments should have the requisite knowledge, skills, and abilities prior to entering the IDLH situation.

9.12.4.2 If a student or instructor suffers a hazardous materials exposure during training, the exposure should be documented and treated in accordance with the policies of the AHJ.

9.12.5 Hazardous materials exercises, including practical skill sessions, scenario-based practical sessions, and full-scale exercises, are intended to simulate real situations involving hazardous materials/WMD. It is possible that a real emergency could be mistaken for a simulated emergency during an exercise.

9.12.5.1 Each hazardous materials exercise should have a prearranged signal to indicate an actual emergency during an exercise. All participants should be briefed on the emergency signal prior to the start of the exercise. Upon notification of an actual emergency, all exercise participants should stop and await instruction.

9.12.5.2 No participant or observer should be permitted to bring live firearms or weapons into the exercise site. All weapons should be identified and rendered safe in accordance with the AHJ.

9.12.5.3 The following safety guidelines are recommended for the use of simulated explosives, training props, IEDs, or simulated weapons:

- (1) All simulated explosives should be identified.
- (2) Simulated chemical containers intended as training props should not contain any hazardous material and should be marked.
- (3) All simulated weapons and explosives/IEDs should be accounted for according to AHJ policies.
- (4) Simulated weapons, explosives devices, and training chemical containers should be secured if not in use.

9.13 Training Records Management.

9.13.1 The HMRP manager should ensure all training sessions and exercises are documented. Each training session should be documented to include the following information:

- (1) Date, time(s), and duration of the training
- (2) Where the training was conducted
- (3) Name of training instructor(s)
- (4) Training topic or exercise title
- (5) Overview of course content
- (6) Students that attended
- (7) Competencies that were demonstrated

9.13.2 Hazardous materials/WMD exercises should include documentation of all lessons learned and any corrective actions taken.

9.13.3 Each student that completes a hazardous materials/WMD certification training course should receive a printed certificate of completion. The certificate of completion should include the following information (*see also 29 CFR 1910.120, Appendix E*):

- (1) Student's name
- (2) Course title
- (3) Course date
- (4) Statement that the student successfully completed the course
- (5) Standard, rule, or law the training session complied with, if applicable
- (6) Name and address of the training provider
- (7) Signature of the instructor, program manager, or training director

9.13.4 The HMRP manager should maintain a record of the individual NFPA 470 competencies demonstrated and professional qualifications maintained by each HMRP member on an annual basis.

9.13.4.1 Hazardous materials/WMD competencies can be demonstrated during training, critiques, or exercises if instructional personnel are present to evaluate the student.

9.13.4.2 Hazardous materials/WMD competencies can be demonstrated during an incident provided the demonstration is validated and documented in accordance with the AHJ and applicable governmental regulations.

9.13.5 All training records should be kept for at least 5 years or a period of time determined by the AHJ.

Chapter 10 Health and Medical

10.1 Scope. This chapter applies to those organizations or jurisdictions responsible for organizing, managing, and sustaining a hazardous materials/weapons of mass destruction (WMD) response program (HMRP) and provides guidance for establishing a comprehensive health and medical program for an HMRP.

10.2 Purpose. This chapter addresses preincident considerations, functional capacity, response considerations, postincident surveillance, and medical surveillance programs that should be in place for a safe and effective response program. The preservation of life, productivity, and quality of life in response to a hazardous materials/WMD incident in accordance with Occupational Safety Health Organization (OSHA) regulations and clinical practices are also addressed.

10.2.1 This chapter is not intended to replace, supersede, or otherwise circumvent existing governmental laws associated with medical surveillance programs, but rather serve as a guide in the development, implementation, and management of such programs. Program and medical personnel should know and understand all applicable laws, rules, and regulations for medical surveillance programs in their organization/jurisdiction, as well as for other geographical and jurisdictional areas if applicable to the HMRP.

10.2.2 Title 29 CFR 1910.120(f) mandates that employees involved in emergency response operations for releases, or substantial threats of releases, of hazardous substances be covered by a medical surveillance program. Per 29 CFR 1910.120(f), medical examinations and consultations will be made available by the authority having jurisdiction (AHJ) to each covered member of the HMRP.

10.3 Preincident Considerations. The baseline or preincident health state of HMRP personnel is often underconsidered relative to the physical demands and other challenges that can be encountered during an HMRP response. Fit, optimized personnel can be more resilient and effective. A wellness program, which can vary according to the AHJ, should include a fitness standard and fit-for-duty (FFD) program, so that preincident health optimization can be a part of preincident planning.

10.3.1 A wellness program is designed to promote general health and improve and extend the quality of an individual's life.

10.3.2* FFD is a specific assessment related to an individual's job, mission, or responsibility. An FFD assessment should include an evaluation of the following:

- (1) Infectious diseases
- (2) Malignant neoplasms
- (3) Gastrointestinal diseases
- (4) Cardiovascular system
- (5) Blood or blood-forming organ diseases
- (6) Mental disorders

- (7) Nervous system diseases
- (8) Musculoskeletal system
- (9) Skin lesions or active skin disease
- (10) Endocrine and metabolic disorders
- (11) Genitourinary system
- (12) Respiratory system
- (13) Ear, nose, and throat
- (14) Ophthalmic and visual acuity
- (15) Dental health
- (16) Medications
- (17) Pregnancy
- (18) Pulmonary function, if necessary
- (19) Audiometry, if necessary
- (20) Drug and alcohol dependency

10.4 Functional Capacity. In some cases, additional functional capacity could be warranted to better address the physical and exertion requirements of a particular job or class of jobs to identify those individuals who might be at greater risk for illness, injury, or death associated with a particular task. Individual business units should assess the need for this application, the incremental or incident-related nature of any requirement, and the frequency on a case-by-case or classification basis.

10.4.1 The preincident medical assessment might inform the deployment or response time medical approval, check-in, or response health screening and scrutiny. Acute medical conditions can influence the response health and medical process. The information and awareness of the steady-state should support the process. Some **preincident** contributing factors to optimal health protection and effectiveness of HMRP personnel can include familiarity with procedures, treatments, and the logistics of treatment, prophylaxis, countermeasures, and more.

10.5 Response Considerations. Response considerations include the following:

- (1) Threat and potential for exposure
- (2) Biological protections, antidotes, treatments, and personal protective equipment (PPE)
- (3) Physical exertion requirements of the hazardous environment

10.5.1* Medical support personnel should be provided along with the necessary resources to monitor and treat acute medical conditions. Support duties include, but are not limited to, the following:

- (1) Dispensing PPE and preventive medicine
- (2) Administering patient care
- (3) Providing medical expertise to onsite leadership
- (4) Providing scene assessment recommendations with regard to medical need
- (5) Functioning as a liaison to receiving facilities, hospitals, and **health care** systems
- (6) Facilitating medical logistics to and from the scene
- (7) Monitoring and assessing personnel
- (8) Recognizing signs and symptoms of exposure and toxicity
- (9) Treating exposure and toxicity
- (10) Recognizing metabolic stress from working in PPE
- (11) Treating dehydration and temperature extremes
- (12) Maintaining clinical documentation that is compliant with regulations and patient privacy considerations

10.6 Postincident Surveillance. Postincident surveillance is necessary to safeguard the physical and mental health of HMRP personnel against acute and long-term effects of exposure. The key elements to postincident surveillance can be found in 10.6.1 and 10.6.2.

10.6.1 A postincident surveillance program is designed to capture exposures and execute medical monitoring. It also includes periodic screening of defined populations for specific diseases or biological markers of diseases for which the population is, or could be, at significant risk.

10.6.1.1 Triggers for a postincident surveillance program can be routine and predictable or triggered to activate based on a threat or known incidental exposure. A consistent surveillance program allows cross-referencing for different exposures experienced by the same individual.

10.6.1.2 A postincident surveillance program draws from and communicates with the toxic substance and disease registry, while maintaining all ethical, regulatory, and legal requirements of privacy. A postincident surveillance program should address the following:

- (1) Threats (e.g., toxic substances and harmful agents), which includes the following:
 - (a) Metals and dusts
 - (b) Biological agents (e.g., bacteria, viruses, fungi)
 - (c) Physical stress (e.g., noise, cold, vibration, repetitive motion)
- (2) Mechanism and medium (e.g., aqueous, marine, aerosol, dust, colloid, particle)
- (3) Concentration or magnitude of the exposure
- (4) Additional factors
- (5) Qualification and responsibility (e.g., primary or third party)
- (6) Accessibility, which is the right of the individual to examine and copy exposure and medical records, and any analysis of the same
- (7) Environmental monitoring, which could be the primary responsibility of the medical provider or occupational health administrator and should be included in the registry and record
- (8) Responsibility or custodian of records
- (9) Notification procedures
- (10) Mitigating activities at the time of the exposure
- (11) Time, date, and signatures
- (12) Acute care administration, including any complicating factors
- (13) Manufacturer-specific identifiers (e.g., lot numbers, batch numbers, and so forth)
- (14) Health monitoring, which could include workplace air measurements and other data such as safety data sheets (SDSs) and biological monitoring results such as bioassay, dosimetry, serology and urine testing.
- (15) Medical records, which should include questionnaires, histories, examination results, **health care** provider opinions, diagnoses, progress notes, first-aid records, and subjective patient information.

10.6.1.3 Medical records should be maintained in accordance with all legal and regulatory requirements, including, but not limited to, the AHJ, the Health Insurance Portability and Accountability Act (HIPAA), and OSHA.

10.6.2 Toxic Substance and Disease Registry. The registry is a program under the direction of the Centers for Disease

Control and Prevention (CDC) to prevent and act on harmful exposures and diseases related to toxic substances. The registry uses scientific research to take responsive health actions and provide trusted health information.

10.6.2.1 Harmful exposures and diseases related to toxic substances can be referred to as exposures to toxic substances and harmful physical agents. Reporting terminology can be driven by a professional requirement or regulation, or determined by a threat or known incidental exposure.

10.6.2.2 The registry should maintain the specifics of incidents and the individuals exposed consistent with all legal and regulatory requirements.

10.7 Medical Surveillance Program.

10.7.1 Covered Employees. Title 29 CFR 1910.120(f) specifies that a medical surveillance program be instituted by an employer for the following covered employees:

- (1) All employees who have been or could be exposed to hazardous substances or health hazards at or above the established permissible exposure limit or above the published exposure levels, without regard to the use of respirators, for 30 days or more a year
- (2) All employees who wear a respirator for 30 days or more a year or as required by 29 CFR 1910.134
- (3) All employees who have been injured, become ill, or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation
- (4) Members of hazmat teams

10.7.2 Frequency of Medical Examinations and Consultations. Medical examinations and consultations should be made available by the employer to each covered employee at the following instances:

- (1) Prior to assignment
- (2) At least once every 12 months unless the attending physician believes a longer, but not greater than biennial, interval is appropriate
- (3) At termination of employment or reassignment to an area where the employee would not be covered if the employee has not had an examination within the last 6 months
- (4) As soon as possible upon notification that an employee has developed signs or symptoms of possible overexposure to hazardous substances or health hazards, or if an employee has been injured or exposed above the permissible exposure limits or published exposure levels in an emergency situation
- (5) If the examining health care provider determines that an increased frequency of examination is medically necessary
- (6) For covered employees and for all employees including those of employers covered by the regulation who may have been injured, received a health impairment, developed signs or symptoms which may have resulted from exposure to hazardous substances resulting from an emergency incident, or exposed during an emergency incident to hazardous substances at concentrations above the permissible exposure limits or the published exposure levels without the necessary personal protective equipment being used
- (7) As soon as possible following the emergency incident or development of signs or symptoms

- (8) At additional times, if the examining health care provider determines that follow-up examinations with consultations are medically necessary

10.7.3* Content of Medical Examinations and Consultations.

Medical examinations and consultations should include a medical and work history with an emphasis on symptoms related to the handling of hazardous substances and health hazards, and to FFD, including the ability to wear any required PPE under conditions expected at the work site. The content of medical examinations or consultations made available to employees should be determined by the attending physician or health care provider.

10.7.4 Examination by a Physician and Costs. All medical examinations and procedures should be performed by or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine, and should be provided without cost to the covered employee, without loss of pay, and at a reasonable time and place.

10.7.5 Information Provided to the Physician. The employer should provide one copy of this recommended practice to the attending physician or health care provider, along with the following for each covered employee:

- (1) A description of the employee's duties as they relate to the employee's exposures
- (2) The employee's exposure levels or anticipated exposure levels
- (3) A description of any PPE used or to be used
- (4) Information from any previous medical examination of the employee that is not readily available to the examining physician
- (5) Information required by 29 CFR 1910.134

10.7.6 Physician's Written Opinion. The employer should obtain and furnish the employee with a copy of a written opinion from the examining physician or health care provider that contains the following:

- (1) The physician's or health care provider's opinion as to whether the employee has any detected medical conditions that would place the employee's health at increased risk from work in hazardous waste operations or emergency response, or from respirator use
- (2) The physician's recommended limitations for the employee
- (3) The results of the medical examination and any tests, if requested by the employee
- (4) A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions that need further examination or treatment
- (5) The written opinion should not reveal specific findings or diagnoses unrelated to occupational exposure without the patient's consent

10.7.7 Recordkeeping.

10.7.7.1 Employee Medical Records. The medical records for each employee should be preserved and maintained for at least the duration of employment plus 30 years. The following records need not be retained for any specified period:

- (1) Health insurance claims records maintained separately from the employer's medical program and its records per 29 CFR 1910.1020(d)(1)(i)(A)

- (2) First-aid records of one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and the like that do not involve medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job, if made on-site by a nonphysician and if maintained separately from the employer's medical program and its records per 29 CFR 1910.1020(d)(1)(i)(B)
- (3) Medical records of employees who have worked for the employer less than 1 year need not be retained beyond the term of employment if the records are provided to the employee upon termination of employment per 29 CFR 1910.1020(d)(1)(i)(C).

10.7.7.2* Employee Exposure Records. Each employee exposure record should be preserved and maintained for at least 30 years, except for the following:

- (1) Background data to workplace monitoring or measuring, such as laboratory reports and worksheets, need only be retained for 1 year as long as the sampling results, the collection methodology, a description of the analytical and mathematical methods used, and a summary of other background data relevant to interpretation of the results obtained are retained for at least 30 years per 29 CFR 1910.1020(d)(1)(ii)(A)
- (2) SDSs and 29 CFR 1910.1020(c)(5)(iv) records concerning the identity of a substance or agent need not be retained for any specified period as long as some record of the identity of the substance or agent, where it was used, and when it was used is retained for at least 30 years per 29 CFR 1910.1020(d)(1)(ii)(B)
- (3) Biological monitoring results designated as exposure records by specific occupational safety and health standards should be preserved and maintained as required by the specific standard per 29 CFR 1910.1020(d)(1)(ii)(C)

10.7.7.3 Analyses Using Exposure or Medical Records. Each analysis using exposure or medical records should be preserved and maintained for at least 30 years per 29 CFR 1910.1020(d)(1)(iii).

Chapter 11 Financial Management

11.1 Scope. This chapter applies to those organizations or jurisdictions responsible for organizing, managing, and sustaining a hazardous materials/weapons of mass destruction (WMD) response program (HMRP) and provides guidance for managing all financial elements of the program.

11.2 Purpose. This chapter addresses revenue sources, program costs, inventory control, and cost recovery issues.

11.2.1 Financial management elements can vary based on the type of organization.

11.2.2 Financial management elements can encompass funding sources and processes, budgetary processes and procedures, capital and operations budgets, program costs, and cost recovery.

11.2.3 A critical challenge for an HMRP is to ensure adequate funding for assigned missions and tasks.

11.3 Revenue Sources. Revenue to support the program can be derived from a number of sources, including response agency or organization budgets, grants, cooperative agree-

ments, donations, fees, and cost recovery. Fiscal responsibilities for organizations participating in a multiagency program agreement should be well defined and agreed on in advance. HMRP managers should be aware of alternative revenue sources that might be available.

11.3.1 Operating Budgets. It is imperative that HMRP managers be knowledgeable of the specific budget policies and practices that govern the program. There are various types of budgets used in the public and private sectors, including the following:

- (1) Line-item budgets list budget categories along with expected expenditures. This is the simplest form of budgeting.
- (2) Zero-based or justification budgets start at zero dollars each year with no balance brought forward from the preceding year. This budget process allows each program to be scrutinized and validated on an annual basis.
- (3) Program budgets organize the functional activities of the agency or organization. The overall budget becomes a sum of its programs and is a way to plan and track expenditures.

11.3.1.1* Incident Pre-Planning Activities. Preincident planning is an effective tool that provides essential facility/occupancy information to assist first responders during hazmat emergencies.

11.3.2 Grant Programs.

11.3.2.1 Federal Grant Programs. Within the United States, the majority of grant programs used to support HMRPs are promulgated through the US Department of Homeland Security (DHS) and the Federal Emergency Management Agency (FEMA). The FEMA national preparedness grant programs focus on the development and sustainability of core capabilities outlined in the national preparedness goal. Most grants should be tied to state, regional, or local strategic plans. Each grant program has its own application and reporting process. Grant options could include requiring the grantee expend their own funds before being reimbursed; spending funds only to augment or increase capabilities and not to supplant normal funding streams; or a "one-time" award with no sustainability funding provided. The following are examples of current grant programs that might be available to an HMRP:

- (1) US DHS National Preparedness Grant Program
- (2) Urban Area Security Initiative Grant (UASI)
- (3) State Homeland Security Program Grant (HSGP)
- (4) US Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) — Hazardous Materials Emergency Preparedness (HMEP) Grants
- (5) FEMA Assistance to Firefighters Grant (AFG) Program
- (6) FEMA Staffing for Adequate Fire and Emergency Response (SAFER)

11.3.2.2 State and Local Grant Programs. State and local grant programs vary from jurisdiction to jurisdiction. Some grant programs are supported by private industry and others come from government agencies. Local agency and industry stakeholders should be contacted to determine what grants are available.

11.4 Program Costs. All program costs in an HMRP budget should be identified. These can include initial and sustainability costs pertaining to personnel, supplies and equipment, training and exercises, administrative support and services, and fixed asset and capital item maintenance and replacement.

11.4.1 Initial Costs. The initial capital outlay used to purchase, lease, and acquire assets such as facilities, apparatus, equipment, and supplies.

11.4.2 Sustainability and Maintenance Costs. Ongoing costs and activities necessary to sustain the operational readiness and capability of the HMRP. These can include personnel, equipment, and supply expenses.

11.4.3 Personnel Costs. In career-based organizations, personnel costs can account for a large percentage of the operating budget. Personnel costs could include the following:

- (1) Salary and benefits
- (2) Preemployment costs
- (3) Uniforms
- (4) Initial hazardous materials/WMD training
- (5) Refresher training
- (6) Continuing education and personnel development
- (7) Health and safety program
- (8) Medical surveillance program
- (9) Personal protective equipment (PPE)
- (10) Licensing and certifications

11.4.4* Equipment Costs. Equipment can be divided into the following categories:

- (1) Non-capital equipment, which has an expiration date or needs periodic replacement
- (2) Capital equipment, which requires an investment that could be amortized or depreciated over time

11.4.4.1 Detection and monitoring equipment can be high-maintenance items that need third-party inspection and maintenance. Based on the technology, equipment costs can be high and can range from parts or equipment replacement to extensive manufacturer inspections. Some HMRPs have internal personnel qualified to perform equipment maintenance and repairs, which can reduce equipment maintenance, repair, replacement, and out-of-service time.

11.4.5 Supply Costs. Supply costs can be a significant expense and should include both initial procurement and inventory sustainability. Some HMRPs rely on grants to acquire initial supplies with the HMRP then assuming responsibility for sustainability costs. The authority having jurisdiction (AHJ) can have ordinances or rules that allow for cost recovery where the responsible party provides reimbursement for certain supplies.

11.4.6 Outside Vendor Support Services Costs. These are costs for services provided by an outside vendor. Vendor-provided support costs might include the following:

- (1) Medical exams for personnel
- (2) Fleet maintenance and repair
- (3) Service contracts or agreements
- (4) Administrative support
- (5) Bonding and insurance
- (6) Waste disposal

11.4.7 Fixed Asset Costs. Fixed asset costs are incurred from the purchase or improvement of land or buildings, or construction of facilities.

11.5 Inventory Control. Inventory control is an essential part of budgeting and fiscal management and could be required by the AHJ or some grant programs.

11.6* Cost Recovery. Some jurisdictions have enacted cost recovery policies and procedures. Policy options include flat-

rate fees, per-hour rates, or the actual cost of time and materials. For government agencies, cost recovery legislation might be required before the program can be enacted.

Chapter 12 Program Influences

12.1 Scope. This chapter applies to those organizations or jurisdictions responsible for organizing, managing, and sustaining a hazardous materials/weapons of mass destruction (WMD) response program (HMRP) and identifies influences that could affect an organization's/jurisdiction's program.

12.2 Purpose. This chapter addresses the importance of identifying, understanding, and managing the internal and external influences that could impact an HMRP.

12.3 Influences. Internal and external influences can impact an HMRP. It is critical to identify these influences, understand their function, and develop a plan to address them.

12.3.1 Internal Influences. Internal influences are those from within the organization/jurisdiction (e.g., local, regional, provincial, tribal, territorial, and state) that affect the organization, management, and sustainability of an HMRP.

12.3.1.1 Internal influences that can impact an HMRP include the following:

- (1) Risk assessment results (*see Chapter 5*), which can influence all aspects of an HMRP, including the following:
 - (a) *Prevention activities* — public education, community/jurisdiction support, and involvement activities such as household hazardous waste programs
 - (b) *Preparedness activities* — resource and allocation plans, policies, and procedures; training and response levels; team size; developing response capabilities; external resource availabilities; and management
 - (c) *Response activities* — incident management issues, response issues, external resources, debriefings
 - (d) *Recovery activities* — cleanup and disposal, cause investigation, postincident analysis, and internal and external critiques
- (2) Financial decisions by the authority having jurisdiction (AHJ) could force HMRP managers to find other ways of addressing issues as well as other sources of additional financial support to minimize the impact on organizational/jurisdictional risks.

Documentation of risk assessment and planning activities for requests to the AHJ is critical.

- (3) Internal economic conditions can influence funding sources, financial liabilities, budget priorities, resource allocation, and internal and external funding streams, and can also affect management of an HMRP. HMRP managers should be prepared to justify program costs and budget requests. A primary justification should include a reminder that major hazardous materials/WMD incidents are low-frequency, high-consequence occurrences. Budget allocations and priorities can change with each budget cycle. Ongoing cost-benefit analysis and performance tracking are important components of HMRP management.
- (4) Internal political influences (e.g., government agencies, business interests, labor agreements, citizen groups, community activities, jurisdictional mutual-aid agree-

ments, and code, ordinance, and regulatory requirements) can impact an HMRP. Local Emergency Planning Committees (LEPCs) can provide funding, planning, and training support.

- (5) Industrial and commercial influences are important parts of local economies and can have significant economic impact, employ large numbers of people, generate significant tax revenues, and be an important partner for in-community preparedness and response efforts — all of which can impact an HMRP.

HMRP managers should be aware of political and organizational sensitivities associated with fixed facilities and transportation modalities to understand the ramifications of hazardous materials/WMD incidents at such facilities.

- (6) Internal environmental influences can include land use, zoning, prevailing weather conditions, projected growth, and atmospheric and topographical conditions — all of which could affect planning for and response to hazardous materials/WMD incidents. Land-use and zoning regulations can cluster high-risk facilities and hazardous materials transportation modalities.

12.3.2 External Influences. External influences are those beyond the organization/jurisdiction (e.g., local, regional, provincial, tribal, territorial, and state) that affect the organization, management, and sustainability of an HMRP. These influences can be regional, national, or international.

12.3.2.1 External influences that can impact an HMRP include the following:

- (1) Economic influences, including current economic conditions, the business environment, and potential funding streams such as grant programs, donations, and cost recovery programs, affect all aspects of an HMRP. HMRP managers should be familiar with cost recovery programs for hazardous materials/WMD incidents and should develop administrative and financial processes to manage them.
- (2) External training programs can provide excellent training opportunities at little to no cost to an HMRP. HMRP managers should monitor and take advantage of such programs.
- (3) Industry and other service providers, including jurisdictions; local, state, and federal agencies; and contractors, can influence decisions to add, reduce, or eliminate response capacity and could affect an HMRP's emergency response plans (ERPs), mutual-aid agreements, and program funding. Other service providers that could influence an HMRP include the following:
 - (a) Industry and external service providers could provide opportunities for additional funding, training support, team participation, and technical resources.
 - (b) State Emergency Response Commissions (SERCs), the Chlorine Institute, the Ammonia Institute, transportation community awareness and emergency response (TRANSCAER), and other organizations could provide funding, planning, and training support.
 - (c) State and federal emergency management agencies, the Federal Bureau of Investigation (FBI), the Coast Guard, the Environmental Protection Agency (EPA), civil support teams (CSTs), and similar agen-

cies could provide additional training and technical resources.

- (4) External political and governmental actions that influence changes to laws, regulations, directives, and standards could affect an HMRP.

Chapter 13 Developing Relationships

13.1 Scope. This chapter applies to those organizations or jurisdictions responsible for organizing, managing, and sustaining a hazardous materials/weapons of mass destruction (WMD) response program (HMRP) and identifies potential activities and opportunities to support and enhance the program's mission.

13.2 Purpose. This chapter addresses promoting HMRP capabilities, coordinating with other response entities, and developing relationships to enhance the program.

13.3 Promoting HMRP Capabilities. HMRP managers should explore opportunities to promote program activities/capabilities and build professional relationships. Program activities/capabilities might include:

- (1) Utilizing specialized skills and equipment to allow personnel to act in a health and safety capacity to monitor hazardous environments and preplan for target hazard facilities
- (2) Developing and implementing hazardous materials/WMD training programs
- (3) Developing response plans for hazardous materials/WMD incidents
- (4) Providing recommendations for equipment and supply acquisitions for use during initial responses to hazardous materials/WMD incidents

13.4 Coordination with Other Response Entities. HMRP managers should explore opportunities to promote program activities, understand organizational capabilities and limitations, and coordinate with other response agencies and organizations to build professional relationships.

13.4.1 HMRP managers should coordinate with task-level teams or units to support their specialized emergency response missions, including the following:

- (1) Explosive and ordinance disposal (EOD)
- (2) Evidence response
- (3) Rescue and recovery
- (4) Medical
- (5) Decontamination
- (6) Illicit laboratory
- (7) Medical examiners

▲ **13.4.2** HMRP managers should coordinate with public health agencies to support their activities, including the following:

- (1)* Sampling and collection procedures of suspected biological materials
- (2) Radiological monitoring activities

13.4.3* HMRP managers should coordinate with emergency management (EM) to assist with the development of public service announcements (PSAs), which can provide personal protective actions for the public in the event of a hazardous material/WMD incident.

13.5 Local and State Planning Group Relationships.

13.5.1 Local Emergency Planning Committee (LEPC). HMRP personnel should participate in LEPC meetings and activities. An LEPC is a forum for industry members, responders, and the public to interact and it provides an opportunity to build professional relationships. It is also a potential source for planning, training, and grant funding for an HMRP. The annual LEPC exercise, which is required under the Emergency Planning and Community-Right-to-Know Act (EPCRA), provides an outreach opportunity with the public. Extremely hazardous substances (EHS) facilities participate in LEPCs as well as some Tier II facilities.

13.5.2 State Emergency Response Commission (SERC). SERCs provide guidance and information to LEPCs. In some states, the SERC influences and might even determine state-wide responses to hazardous materials/WMD incidents. The SERC provides funding to the LEPC through the hazardous materials emergency planning (HMEP) grant program, which can also be used by the HMRP to support HMRP activities. In many states, administrative support to the SERC is provided by the state EM agency.

13.6 Private Sector Relationships. HMRP personnel should engage the private sector by participating in committees, boards, commissions, and groups to build and strengthen professional relationships. Participation could be voluntary per industry or a statutory requirement such as those required of EHS facilities. Other opportunities for participating with private sector personnel can be found in 13.6.1 and 13.6.2.

13.6.1 Training, exercise, and coordinating with industrial mutual-aid groups found in jurisdictions with large numbers of chemical/manufacturing facilities can provide opportunities to build professional relationships. Some of the benefits of these professional relationships might include access to the following:

- (1) Fire-fighting foam, including specialized foam
- (2) Large quantities of neutralizing materials or agents
- (3) Chemists, chemical engineers, industrial hygienists, and product/material experts
- (4) Specialized equipment and response vehicles
- (5) Facility-based response teams and other trained personnel

13.6.2 Business sector groups, such as Chamber of Commerce, Rotary International, and others, can provide opportunities to develop program support. Opportunities for support might include assistance with the following:

- (1) Continuity of operations plans
- (2) Emergency action plans (EAPs)
- (3) Business interruption plans
- (4) Loss prevention plans

13.7 Public Relationships. HMRP personnel should engage the public by participating in committees, boards, and groups that enhance public awareness, build trust, and provide for a safer environment.

13.7.1 Hosting household hazardous waste collection events provide an opportunity for HMRP personnel to interact with the public. HMRP personnel often work as safety officers and in identifying and classifying hazardous waste, both of which display their knowledge and skills to the public. Other public opportunities include the following:

- (1) Education on personal hazardous materials/WMD incident preplanning
- (2) Sheltering-in-place measures
- (3) Emergency evacuation procedures

13.7.2 Professional relationships with local colleges and universities can develop technical specialist relationships in a given field within their respective facility or the HMRP's jurisdiction and can provide training opportunities.

13.7.3 Relationships with community-based citizen volunteer groups such as community emergency response teams (CERTs), Fire Corps, Medical Reserve Corps, amateur radio emergency services, volunteers in police service programs, and Boy and Girl Scouts can provide opportunities to strengthen their disaster preparedness capabilities.

Annex A Explanatory Material

Annex A is not a part of the recommendations of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.2 The committee believes that this document specifies the minimum job performance requirements for emergency response personnel to hazardous materials/weapons of mass destruction incidents given specific levels. The committee recognizes that emergency services organizations might have to invest considerable resources to provide the equipment and training needed to perform at hazardous materials/WMD incidents safely and efficiently. The committee does not mean to imply that organizations with limited resources cannot provide hazardous materials/WMD emergency response services, only that the individuals charged with performing hazardous materials/WMD responsibilities are qualified to specific levels according to this standard.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the AHJ may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The AHJ may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a police chief, sheriff, fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer

or departmental official may be the authority having jurisdiction.

A.3.3.2.3 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.1 Allied Professional. Examples include certified safety professional (CSP), certified health physicist (CHP), certified industrial hygienist (CIH), radiation safety officer (RSO) or similar credentialed or competent individuals as determined by the authority having jurisdiction (AHJ). An allied professional can also be referred to as a technical specialist or subject matter expert (SME) in a mission-specific area.

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

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

A.3.3.14 Control Zones. Law enforcement agencies might utilize different terminology for site control, for example, *inner* and *outer perimeters* as opposed to *hot* and *cold zones*. The operations-level responder should be familiar with the terminology and procedures used by the authority having jurisdiction (AHJ) and coordinate on-scene site control operations with law enforcement.

Many terms are used to describe these control zones; however, for the purposes of this standard, zones are defined as the hot, warm, and cold zones.

A.3.3.14.4 Warm Zone. The warm zone includes control points for the decontamination corridor, thus helping to reduce the spread of contamination. This support can include staging of backup personnel and equipment, staging of evidence, and personnel and equipment decontamination. Additionally, portions of this area can be used as a safe refuge for initial patient evacuation and triage.

A.3.3.17 Decontamination. There are three types of decontamination (also known as “decon”) performed by emergency responders: emergency, mass, and technical.

Gross decontamination is performed on the following:

- (1) Team members before their technical decontamination
- (2) Emergency responders before leaving the incident scene
- (3) Victims during emergency decontamination
- (4) Persons requiring mass decontamination

A.3.3.17.1 Emergency Decontamination. This process can be as simple as removal of outer or all garments from the individual to washing down with water from a fire hose or emergency safety shower. The sole purpose is to quickly separate as much

of the contaminant as possible from the individual to minimize exposure and injury.

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

A.3.3.17.3 Mass Decontamination. Mass decontamination is initiated where the number of victims and time constraints do not allow the establishment of an in-depth decontamination process. Mass decontamination should be established at once to reduce the harm being done to the victims by the contaminants. Initial operations are most often performed with handheld hose lines or master streams supplied from fire apparatus while a more formal process is being set up. A formal technical decontamination might be necessary if it is determined through detection, observation, or concern that the initial emergency decontamination was not effective. For example, this could be the case for victims exposed to a radiological dispersal device (RDD) or an aerosolized biological agent.

A.3.3.17.4 Technical Decontamination. Technical decontamination is the process subsequent to gross decontamination designed to remove contaminants from responders, their equipment, and victims. It is intended to minimize the spread of contamination and ensure responder safety. Technical decontamination is normally established in support of emergency responder entry operations at a hazardous materials incident, with the scope and level of technical decontamination based on the type and properties of the contaminants involved. In non-life-threatening contamination incidents, technical decontamination can also be used on victims of the initial release. Examples of technical decontamination methods are the following:

- (1) Absorption
- (2) Adsorption
- (3) Chemical degradation
- (4) Dilution
- (5) Disinfecting
- (6) Evaporation
- (7) Isolation and disposal
- (8) Neutralization
- (9) Solidification
- (10) Sterilization
- (11) Vacuuming
- (12) Washing

The specific decontamination procedure to be used at an incident is typically selected by a hazardous materials technician (see 10.3.4 of NFPA 470) and is subject to the approval of the incident commander.

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

A.3.3.27 Exposure. The magnitude of exposure is dependent primarily on the duration of exposure and the concentration

of the hazardous material. This term is also used to describe a person, animal, the environment, or a piece of equipment. The exposure can be external, internal, or both.

A.3.3.29 Fissile Material. Department of Transportation (DOT) regulations define fissile material as plutonium-239, plutonium-242, uranium-233, uranium-235, or any combination of these radionuclides. This material is usually transported with additional shipping controls that limit the quantity of material in any one shipment. Packaging used for fissile material is designed and tested to prevent a fission reaction from occurring during normal transport conditions as well as hypothetical accident conditions.

A.3.3.33 Hazardous Material. In United Nations model codes and regulations, hazardous materials are called *dangerous goods*. [See also 3.3.70 and A.3.3.70, *Weapons of Mass Destruction (WMD)*].

A.3.3.34 Hazardous Materials Branch/Group. This function is directed by a hazardous materials officer and deals principally with the technical aspects of the incident.

A.3.3.35 Hazardous Materials Officer. This individual might also serve as a technical specialist for incidents that involve hazardous materials/WMD. The National Incident Management System (NIMS) identifies this person as the Hazardous Materials Branch/Group Supervisor.

A.3.3.37 Hazardous Materials Response Team (HMRT). The team members respond to releases or potential releases of hazardous materials/WMD for the purpose of control or stabilization of the incident.

A.3.3.38 Hazardous Materials Safety Officer. The hazardous materials safety officer will be called on to provide technical advice or assistance regarding safety issues to the hazardous materials officer and incident safety officer at a hazardous materials/WMD incident. The National Incident Management System (NIMS) identifies this person as the Hazardous Materials Branch/Group Supervisor.

A.3.3.39 Hazardous Materials Technician. These persons might have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ.

A.3.3.39.1 Hazardous Materials Technician with a Cargo Tank Specialty. The hazardous materials technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

A.3.3.39.5 Hazardous Materials Technician with an Intermodal Tank Specialty. See A.3.3.39.1.

A.3.3.39.7 Hazardous Materials Technician with a Tank Car Specialty. See A.3.3.39.1.

A.3.3.42 Incident Commander (IC). This position is equivalent to the on-scene incident commander as defined in OSHA 1910.120(8), "Hazardous Waste Operations and Emergency Response." The IC has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site.

A.3.3.49 Personal Protective Equipment. Personal protective equipment includes both personal protective clothing and respiratory protection. Adequate personal protective equip-

ment should protect the respiratory system, skin, eyes, face, hands, feet, head, body, and hearing.

A.3.3.50.1 Emergency Response Plan. Emergency response plans can be developed at organizational and governmental levels (agency, local, state, regional, provincial, territorial, tribal, and federal).

A.3.3.50.2 Incident Action Plan. It can include the identification of operational resources and assignments. It can also include attachments that provide direction and important information for management of the incident during one or more operational periods.

A.3.3.51 Planned Response. The following site safety plan considerations are from the EPA's *Standard Operating Safety Guides*:

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

A.3.3.54 Protective Clothing. Protective clothing is divided into three types:

- (1) Structural fire-fighting protective clothing
- (2) High temperature-protective clothing
- (3) Chemical-protective clothing
 - (a) Liquid splash-protective clothing
 - (b) Vapor-protective clothing

A.3.3.54.2 Chemical-Protective Clothing. Chemical-protective clothing (garments) can be constructed as a single- or multi-piece garment. The garment can completely enclose the wearer either by itself or in combination with the wearer's respiratory protection, attached or detachable hood, gloves, and boots.

A.3.3.54.2.1 Liquid Splash-Protective Ensemble. This type of protective clothing is a component of EPA Level B chemical protection. Liquid splash-protective ensembles should meet the requirements of NFPA 1992.

A.3.3.54.2.2 Vapor-Protective Ensemble. This type of protective clothing is a component of EPA Level A chemical protection. Vapor-protective clothing should meet the requirements of NFPA 1991 or NFPA 1994.

A.3.3.54.3 High Temperature-Protective Clothing. This type of clothing is usually of limited use in dealing with chemical commodities.

A.3.3.54.4 Structural Fire-Fighting Protective Clothing. Structural fire-fighting protective clothing provides limited protection from heat but might not provide adequate protection from the harmful gases, vapors, liquids, or dusts that are encountered during hazardous materials/WMD incidents. The NFPA 1971 CBRN option is intended to add chemical protection to structural fire-fighting protective clothing.

A.3.3.56 Radioactive Materials Containers. *Excepted packaging* is used to transport materials with extremely low levels of radio-

activity that meet only general design requirements for any hazardous material. Excepted packaging ranges from a product's fiberboard box to a sturdy wooden or steel crate, and typical shipments include limited quantities of materials, instruments, and articles such as smoke detectors. Excepted packaging will contain non-life-endangering amounts of radioactive material.

Industrial packaging is used to transport materials that present limited hazard to the public and the environment. Examples of these materials are contaminated equipment and radioactive waste solidified in materials such as concrete. This packaging is grouped into three categories based on the strength of packaging: IP-1, IP-2, and IP-3. Industrial packaging will contain non-life-endangering amounts of radioactive material.

Type A packaging is used to transport radioactive materials with concentrations of radioactivity not exceeding the limits established in 49 CFR 173.431. Typically, Type A packaging has an inner containment vessel made of glass, plastic, or metal and packing material made of polyethylene, rubber, or vermiculite. Examples of materials shipped in Type A packaging include radiopharmaceuticals and low-level radioactive wastes. Type A packaging will contain non-life-endangering amounts of radioactive material.

Type B packaging is used to transport radioactive materials with radioactivity levels higher than those allowed in Type A packaging, such as spent fuel and high-level radioactive waste. Limits on activity contained in Type B packaging are provided in 49 CFR 173.431. Type B packaging ranges from small drums [55 gal (208 L)] to heavily shielded steel casks that sometimes weigh more than 138 tons (125 metric tons). Type B packaging can contain potentially life endangering amounts of radioactive material.

Type C packaging is used for consignments transported by aircraft of high-activity radioactive materials that have not been certified as "low dispersible radioactive material" (including plutonium). They are designed to withstand severe accident conditions associated with air transport without loss of containment or significant increase in external radiation levels. The Type C packaging performance requirements are significantly more stringent than those for Type B packaging. Type C packaging is not authorized for domestic use but can be authorized for international shipments of high-activity radioactive material consignments. Regulations require that both Type B and Type C packaging be marked with a trefoil symbol to ensure that the package can be positively identified as carrying radioactive material. The trefoil symbol must be resistant to the effects of both fire and water so that it is likely to survive a severe accident and serve as a warning to emergency responders.

The performance requirements for Type C packaging include those applicable to Type B packaging with enhancements on some tests that are significantly more stringent than those for Type B packaging. For example, a 200 mph (321.8 km/hr) impact onto an unyielding target is required instead of the 30 ft (9.1 m) drop test required for Type B packaging; a 60-minute fire test is required instead of the 30-minute test for Type B packaging; and a puncture/tearing test is required. These stringent tests are expected to result in packaging designs that will survive more severe aircraft accidents than Type B packaging designs.

A.3.3.58 Respiratory Protection. Respiratory protection is divided into three types:

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

A.3.3.59 Response. The tasks in the response portion of a hazardous materials/WMD incident include analyzing the incident, planning the response, implementing the planned response, evaluating progress, and terminating the emergency phase of the incident.

A.3.3.61 Safety Data Sheet (SDS). SDS is a component of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) and replaces the term material safety data sheet (MSDS). GHS is an internationally agreed-upon system created by the United Nations beginning in 1992. It replaces the various classification and labeling standards used in different countries by using consistent criteria on a global level. It supersedes the relevant European Union (EU) system, which implemented the GHS into EU law as the Classification, Labeling and Packaging (CLP) Regulation, and United States Occupational Safety and Health Administration (OSHA) standards. The SDS requires more information than MSDS regulations and provides a standardized structure for presenting the required information.

A.3.3.64.1 Specialist Employee A. Consistent with the organization's emergency response plan and/or standard operating procedures, the specialist employee A is able to analyze an incident involving chemicals within the organization's area of specialization, plan a response to that incident, implement the planned response within the capabilities of the resources available, and evaluate the progress of the planned response. Specialist employees are those persons who, in the course of their regular job duties, work with or are trained in the hazards of specific chemicals or containers within their organization's area of specialization. In response to emergencies involving hazardous materials/WMD in their organization's area of specialization, they could be called on to provide technical advice or assistance to the incident commander relative to specific chemicals or containers for chemicals. Specialist employees should receive training or demonstrate competency in their area of specialization annually. Specialist employees also should receive additional training to meet applicable DOT, OSHA, EPA, and other appropriate state, local, or provincial occupational health and safety regulatory requirements. Specialist employees respond to hazardous materials/WMD incidents under differing circumstances. They respond to incidents within their facility, inside and outside their assigned work area, and outside their facility. Persons responding away from the facility or within the facility outside their assigned work area respond as members of a hazardous materials response team or as specialist employees as outlined in this definition and in Chapter 9. When responding to incidents away from their assigned work area, specialist employees should be permitted to perform only at the response level at which they have been trained.

Persons responding to a hazardous materials/WMD incident within their work area are not required to be trained to the levels specified by this chapter. Persons within their work area who have informed the incident management structure of an emergency as defined in the emergency response plan who have adequate personal protective equipment and adequate training in the procedures they are to perform and who have employed the buddy system can take limited action in the danger area (e.g., turning a valve) before the emergency

response team arrives. The limited action taken should be addressed in the emergency response plan. Once the emergency response team arrives, these persons should be restricted to the actions that their training level allows and should operate under the incident command structure.

A.3.3.64.2 Specialist Employee B. Because of the employee's education, training, or work experience, the specialist employee B can be called on to respond to incidents involving specific chemicals or containers. The specialist employee B can be used to gather and record information, provide technical advice, and provide technical assistance (including work within the hot zone) at the incident consistent with the organization's emergency response plan and/or standard operating procedures and the emergency response plan. (See 3.3.50.1.)

A.3.3.64.3 Specialist Employee C. Consistent with the organization's emergency response plan and/or standard operating procedures, the specialist employee C can be called on to gather and record information, provide technical advice, and/or arrange for technical assistance. A specialist employee C does not enter the hot or warm zone at an emergency. (See 3.3.14.)

A.3.3.68 Termination. Termination is divided into three phases: debriefing the incident, post incident analysis, and critiquing the incident.

A.3.3.69 UN/NA Identification Number. United Nations (UN) numbers are four-digit numbers used in international commerce and transportation to identify hazardous chemicals or classes of hazardous materials. These numbers generally range between 0000 and 3500 and usually are preceded by the letters "UN" (e.g., "UN1005") to avoid confusion with number codes.

North American (NA) numbers are identical to UN numbers. If a material does not have a UN number, it might be assigned an NA number. These usually are preceded by "NA" followed by a four-digit number starting with 8 or 9.

A.3.3.70 Weapon of Mass Destruction (WMD). The source of this definition is 18 USC, 2332a. Weapons of mass destruction (WMD) are known by many different abbreviations and acronyms, the most common of which is CBRN, which is the acronym for chemical, biological, and radiological/nuclear, and explosives particulate agents that could be released as the result of a terrorist attack. CBRN agents are further categorized as follows:

- (1) *Chemical terrorism agents* are materials used to inflict lethal or incapacitating casualties, generally on a civilian population, and include chemical warfare agents and toxic industrial chemicals:
 - (a) *Chemical warfare agents* are solid, liquid, gaseous, and vapor agents, including, but not limited to, GB (Sarin), GD (Soman), HD (sulfur mustard), and VX.
 - (b) *Toxic industrial chemicals* include chlorine and ammonia, which have been identified as mass casualty threats.
- (2) *Biological terrorism agents* are liquid or particulate agents that can consist of a biologically derived toxin or pathogen to inflict lethal or incapacitating casualties, such as bacteria, viruses, or the toxins derived from biological material.

- (3) *Radiological particulate terrorism agents* are particles that emit ionizing radiation in excess of normal background levels used to inflict lethal or incapacitating casualties, generally on a civilian population, as the result of a terrorist attack.

A.3.3.70.1 Radiological Weapons of Mass Destruction The intent of this annex material is to provide information on the different types of radiological/nuclear devices that can be used as a weapon by those with malicious intent.

A.3.3.70.1.1 Improvised Nuclear Device (IND) The nuclear explosion from an IND produces extreme heat, powerful shockwaves, and prompt radiation that would be acutely lethal for a significant distance. It also produces potentially lethal radioactive fallout, which could spread and deposit over very large areas. It also produces potentially lethal radioactive fallout, which may spread and deposit over very large areas. A nuclear detonation in an urban area could result in over 100,000 fatalities (and many more injured), massive infrastructure damage, and thousands of square kilometers of contaminated land. If the IND fails to work correctly and does not create a nuclear explosion, then the detonation of the conventional explosives would likely disperse radioactive material like an explosive radiological dispersal device (RDD).

A.3.3.70.1.2 Radiation Exposure Device (RED) An RED (used interchangeably with the terms *radiological exposure device* or *radiation emitting device*) is a device consisting of radioactive material, either as a sealed source or as material within some type of container or radiation-generating device that causes harm by exposure to ionizing radiation.

A.3.3.70.1.3 Radiological Dispersal Device (RDD) An RDD is any device that intentionally spreads radioactive material across an area with the intent to cause harm, without a nuclear explosion occurring. An RDD that uses explosives for spreading or dispersing radioactive material is commonly referred to as a "dirty bomb" or "explosive RDD." Nonexplosive RDDs could spread radioactive material using common items such as pressurized containers, fans, building air-handling systems, sprayers, crop dusters, or even by hand.

A.3.4.2 Operations-Level Responders. The source of this definition is OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response." These responders can have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ.

A.5.2 Risk assessment is a process used to determine the probability of a hazardous materials/WMD incident within the organization/jurisdiction along with the associated impact. Risk assessment considers various factors, including severity, frequency, causes, and location and the organization's/jurisdiction's vulnerability to the threat. Assessing risk includes examining local response history and comparing it to regional, state, and national historical data. In addition, the following factors should be examined:

- (1) The HMRP manager should examine previous events in their local area. DOT, OSHA, and NIOSH accident data involving the most common hazardous materials/WMD can be valuable in conducting local risk assessments. Where a catastrophic event occurs in some other area and the AHJ has a comparable facility in their area, the local HMRP manager should ensure that its response

plans and training programs include information about that type of facility.

- (2) The HMRP manager should maintain a list of the Tier 2 facilities, including those facilities that have EHS and the ones that are covered by EPA RMP regulations. Response plans should be developed and reviewed with both the facility and the nearby community. The review should identify vulnerable populations such as schools, day cares, retirement centers, assisted living/nursing homes, hospitals, and other facilities that cannot be quickly evacuated and might have to shelter in place. Response plans should include atmospheric air monitoring and protection strategies for vulnerable populations. Outreach efforts between the facility and the vulnerable populations should be conducted on a regular basis so that all parties are aware of emergency response plans prior to a release.
- (3) Fuel stations, liquefied gas (i.e., LPG/LNG) facilities, and their respective storage present a likely risk in many communities. The number, frequency, and method of delivery make incidents at these locations a likely scenario. Conducting a commodity flow study that identifies the delivery routes can assist in the development of **preincident** plans.
- (4) The transportation system should be analyzed for potential threats. The railroad that operates in the AHJ can be contacted for information concerning the number and frequency of hazardous cargo shipments. The Port Authority can be contacted to determine the number and frequency of maritime shipments. The DOT Pipeline and Hazardous Materials Safety Administration (PHMSA) pipeline mapping system can be researched to determine what pipelines are located in the AHJ's area of responsibility. For highway transportation one method of determining the potential threat is to conduct a community flow study where HMRP personnel track the number of truck shipments in their area along with the type and quantity of materials being shipped. Peek truck traffic can vary greatly, so a community flow study should encompass a variety of times and should be done over a period of days to reveal trends. If a weigh station is present, law enforcement agencies that conduct truck inspections can help identify cargos by examining the shipping papers.
- (5) The impact of natural events and their interaction with at-risk facilities should be considered. Where natural events occur, the HMRP manager should identify comparable facilities within their region and plan for the possibility of a similar event. Examining historical weather data can determine the frequency of unusual weather-related events.
- (6) Emergency response plans should include expected accidental releases, including the frequency and impact. Events can be categorized as frequent or infrequent and have a low or high impact. The impact to the local community should be considered as well as the potential impact to adjacent facilities. Fixed facilities should have safety systems in place with redundant backups to prevent accidental releases.
- (7) Intentional releases are criminal in nature and could be an attempted terrorist attack. Although both acts are criminal, it is the purpose and intent of the release that makes the difference. Releases at fixed facilities should be considered criminal acts until proven otherwise. While it can be difficult to determine whether a release is accidental or intentional, the HMRP personnel along with

trained investigators should try to determine the root cause. In cases where terrorism is suspected, the appropriate law enforcement officials should be notified.

- (8) Explosions also require an investigation, including the root cause. The bomb squad can be used to determine the cause of an explosion. The HMRP personnel should be used to determine if there are flammable gases or other hazardous materials present.

A.5.3.2 Special attention should be given to facilities that could have a profound human health, or economic impact on the community, should a major release or loss occur. The majority of the population within any given area could be either directly or indirectly employed by a facility that manufactures, stores, or ships certain regulated materials. Some could be employed by the stricken facility itself while others could work for companies that support or depend on those facilities.

A.5.3.3.1 Threshold planning quantities (TPQs) have been established under the Emergency Planning and Community Right-to-Know Act (EPCRA). The TPQ for ammonia is 500 lb (227 kg). Ammonia, however, can be found in an anhydrous or aqueous (i.e., mixed with water) state. The potential impact from a release of anhydrous and aqueous ammonia can be very different. If a fixed facility stores more than 500 lb (227 kg) of ammonia it is considered an EHS facility. Some materials that are not considered EHSs could create situations where there is substantial risk to the facility and the public.

A.5.5.1 Assessing risks combines the potential for an incident to happen, an estimation of the probability of an event, and the potential impact to life and property should an incident occur. The AHJ's vulnerability should be assessed from an accidental and intentional release perspective.

A.5.5.2(4)(b) The ability of a fixed facility to prevent, detect, and mitigate a potential release is an important part of a threat assessment. The HMRP's capability to detect, control, and mitigate a potential release is a vital part of the threat assessment process. In the event of a terrorist attack there is potential for the terrorist to try and exploit weaknesses in the system for maximum impact.

A.5.5.2(4)(d) Simultaneous incident types are categorized as either natural or man-made. Man-made incidents can include accidental and intentional or deliberate acts. Naturally occurring incidents have the potential to cause hazardous materials/WMD releases. Unforeseen hazards from naturally occurring incidents can hamper response efforts. The AHJ could be faced with difficult decisions such as determining alternate routes for access and egress, designating specialized equipment needed to support the response, and allocating specialized resources to overcome obstacles encountered. Naturally occurring incidents that could affect a response include the following:

- (1) Floods
- (2) Hurricanes
- (3) Earthquakes
- (4) Tsunamis
- (5) Tornadoes
- (6) Wildfires
- (7) Landslides
- (8) Winter storms
- (9) Drought
- (10) Lightning
- (11) Plough (i.e., shear) winds